



United Nations
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Intergovernmental
Oceanographic
Commission



Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem

2nd Edition: Revised and Expanded

Technical Series 110

Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO)



UNESCO's Intergovernmental Oceanographic Commission (IOC), established in 1960, promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation, and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. By applying this knowledge, the Commission aims to improve the governance, management, institutional capacity, and decision-making processes of its 148 Member States with respect to marine resources and climate variability and to foster sustainable development of the marine environment, in particular in developing countries. The Commission responds, as a competent international organisation, to the requirements deriving from the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Conference on Environment and Development (UNCED), and other international instruments relevant to marine scientific research, related services and capacity-building.

Instituto Español de Oceanografía (IEO)



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Spanish Agency for International Development Cooperation (AECID)



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**Intergovernmental Oceanographic Commission
Technical Series 110**

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Hydrographic and Biological datasets
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2nd Edition: Revised and Expanded**

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The *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem* will be reviewed on a systematic and routine basis and the updates will be available online at:

http://www.unesco.org/new/ioc_ts110

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FOREWORD

The Large Marine Ecosystem (LME) concept has been defined mainly for ecosystem conservation purposes. It identifies a number of continental margin areas suitable for uniform ecosystem-based management. The assessment of the state of environment and the associated marine resources in LMEs is based on data that comes from oceanographic research, monitoring and observation programmes. It allows adequate comparable characterization of the LMEs and the establishment of suitable indicators for their conservation and management.

Waters of the Canary Current Large Marine Ecosystem (CCLME) have been sampled intensely during the last 40 years. The work carried out for purposes of fish stock assessment, time-series, ecological studies, etc. has generated a vast amount of information, which is, however, dispersed at numerous scientific institutions, inside and outside North-West Africa.

To compile the metadata available in the CCLME, a *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem* was published in 2014 as issue number 110 of the UNESCO's Intergovernmental Oceanographic Commission Technical Series. The Directory developed within the IOC project "Enhancing oceanography capacities on Western Africa countries" was well received by the scientific community. However, its first edition now requires an update as significant additional metadata continuously becomes available, and new contributions are expected from collaborators at multiple research and data centres in the CCLME African countries.

Under the framework of the IOC project "Enhancing oceanography capacities on CCLME Western Africa countries - Phase II", two updates of the Directory are foreseen. I hope this *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem. 2nd Edition: Revised and Expanded* will accelerate the dataflow within the national oceanographic data and information centres. This should help enhance the capacities of scientific institutes in the region. New intra- and inter-regional collaborations will hopefully emerge, and the use of the scientific data by the international community will continue to grow. The combined analysis of datasets would improve the understanding of dynamics and trends of different variables, and would contribute to the improvement of the scientific knowledge of the CCLME.

I encourage regional organizations to think and start collaborating on a further 3rd edition of the Directory, contributing to strengthening capacities in the region. I trust this regional effort will serve as a model to inspire the elaboration of similar directories in other LMEs, boosting new scientific collaborations within and among regions around the world.

The IOC of UNESCO addresses both its global and African priorities through activities in marine science and operational oceanography, with a special emphasis on adaptation to climate change in the coastal zones and enhancing capabilities to safeguard marine resources. This is our continuing effort to achieve the goals of the United Nations Conference on Sustainable Development ("Rio+20"), and to contribute to the new United Nations Sustainable Development Goals. African countries are the main beneficiaries of this regional initiative.



Vladimir Ryabinin
Executive Secretary of the IOC

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The compilation of such complex directory of atmospheric, hydrographic and biological datasets in the Canary Current Large Marine Ecosystem would not be possible without the support of a donor. The Spanish Agency for International Development Cooperation (AECID) has funded generously the projects *Enhancing oceanography capacities on Western Africa countries* and *Enhancing oceanography capacities on CCLME Western Africa countries Phase II*, in which framework this document was elaborated, and now updated and expanded.

We would like to thank the fruitful collaboration of our partner in this project, the Instituto Español de Oceanografía (IEO). We warmly thank IEO staff (especially the IEO Centro Oceanográfico de Canarias) who have directly participated in the document search and in the completion and/or revision of many metadata fiches included in the Directory. Their input and comments have been very constructive. By alphabetical order, they were:

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We thank all the collaborating institutions which have provided us *ad hoc* descriptive figures and tables about their datasets or databases to better illustrate the information contained in this directory. We also acknowledge the institutions that have open access figures and data

available in their websites, which has facilitated us the task of recovering significant information and figures to complete the contents in many metadata fiches. Their generosity is important for scientists all around the world, and especially for those in developing countries.

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Ward Appeltans (Ocean Biogeographic Information System – OBIS – Project Office, IOC Project Office for IODE, IOC-UNESCO, Belgium)

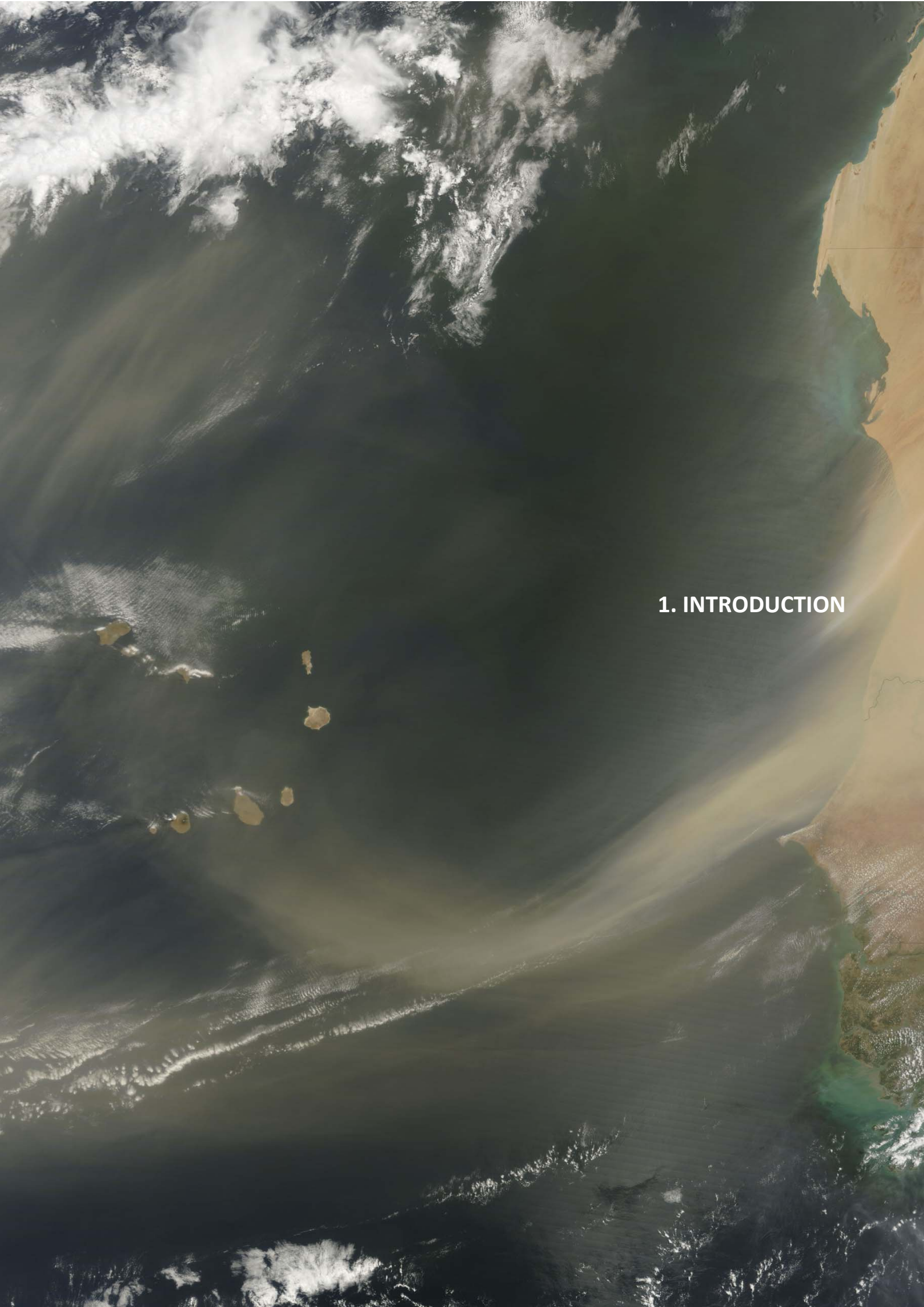
Albert Fischer (Ocean Observations and Services Section – GOOS Project Office – JCOMM, IOC-UNESCO, France)

Osamu Miyaki (Marine Policy and Regional Coordination Section, IOC-UNESCO, France)

Mika Odido (IOC Sub Commission for Africa and the Adjacent Island States, IOC-UNESCO, Kenya)

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Finally, we would like to thank every single person who have guided us and helped in identifying the right contact persons to reach our objective.



1. INTRODUCTION

MODIS/TERRA image showing Saharan sand blowing off the coasts of Mauritania, Senegal and The Gambia. Two dust plumes blow toward the south west, one plume stretching possibly 150 kilometres off the coast, and the other plume forming an arc that reaches all the way to Cape Verde. Thinner but larger plumes of dust hover over the Atlantic west and north of the island archipelago (22 June 2009). Source: NASA Earth Observatory. <http://earthobservatory.nasa.gov/IOTD/view.php?id=39014> (accessed 18 January 2016). Image by Jeff Schmaltz, MODIS Rapid Response Team, Goddard Space Flight Centre.

1.1 Region description

The Canary Current Large Marine Ecosystem (CCLME) is a major upwelling region off the coast of northwest Africa. It extends southwards from Canary Islands (Spain) and the Atlantic coast of Morocco, Western Sahara, Mauritania, Senegal, Guinea-Bissau and Gambia, but also Cape Verde and the waters of Guinea Conakry are considered adjacent areas within the zone of influence of the CCLME (Fig. 1).

The CCLME is strongly influenced by the Canary Current, which flows along the African coast from north to south between 30°N-10°N and offshore to 20°W (Barton, 1998), being one of the world's major boundary current systems with cold water upwelling. It ranks 3rd in the world in terms of primary productivity after the Humboldt and Benguela LMEs and has the highest fisheries production of any African LME (annual production ranges from 2 to 3 million tonnes).

Upwelling regions are characterized by high natural variability in terms of production. In the biennium 2009-2010 and registering variable trends, Morocco and Senegal maintained their positions among the three major marine producers in Africa (FAO, 2012). In the biennium 2011-2012, Morocco was included in the ranking of the 18 countries that caught more than one million tonnes per year on average (FAO, 2014).

This LME has an area of about 1.086 million km² and contains 0.134 of the world's seamounts (Sea Around Us Project, 2016). There are 7 major estuaries and river systems draining into the LME including the Casamance, Senegal and Gambia. The CCLME is a vital food and economic resource not only for coastal populations bordering the LME, but also for much of West Africa and beyond.

1.2 Ocean observations

Several national governmental marine laboratories and agencies in the countries surrounding the CCLME area conduct observations, model operations and provide services to inform the industry, the public and other end users. The CCLME has also been a region where several countries offered international cooperation, e.g.: Russia, Norway, Germany, France and Spain.

Environmental and biological data have been obtained from short and long term studies in the region. The existing ocean observing systems have been developed and maintained to meet the needs of the bordering countries, including:

- Managing of fish stocks for sustainable exploitation
- Preserving healthy marine ecosystems
- Ensuring public health and
- Safe and efficient navigation

However, the information gathered in the observation systems and research projects is very often dispersed and disaggregated, which makes difficult both, to access and to share the data. The compilation of datasets to make them available for other relevant purposes and user groups is critical to maximise the utility of the observations beyond the specific purpose for which they have been originally designed. It is intended that this directory of environmental and biological datasets will enable researchers to identify and obtain the most appropriate data for their scientific studies in the CCLME.

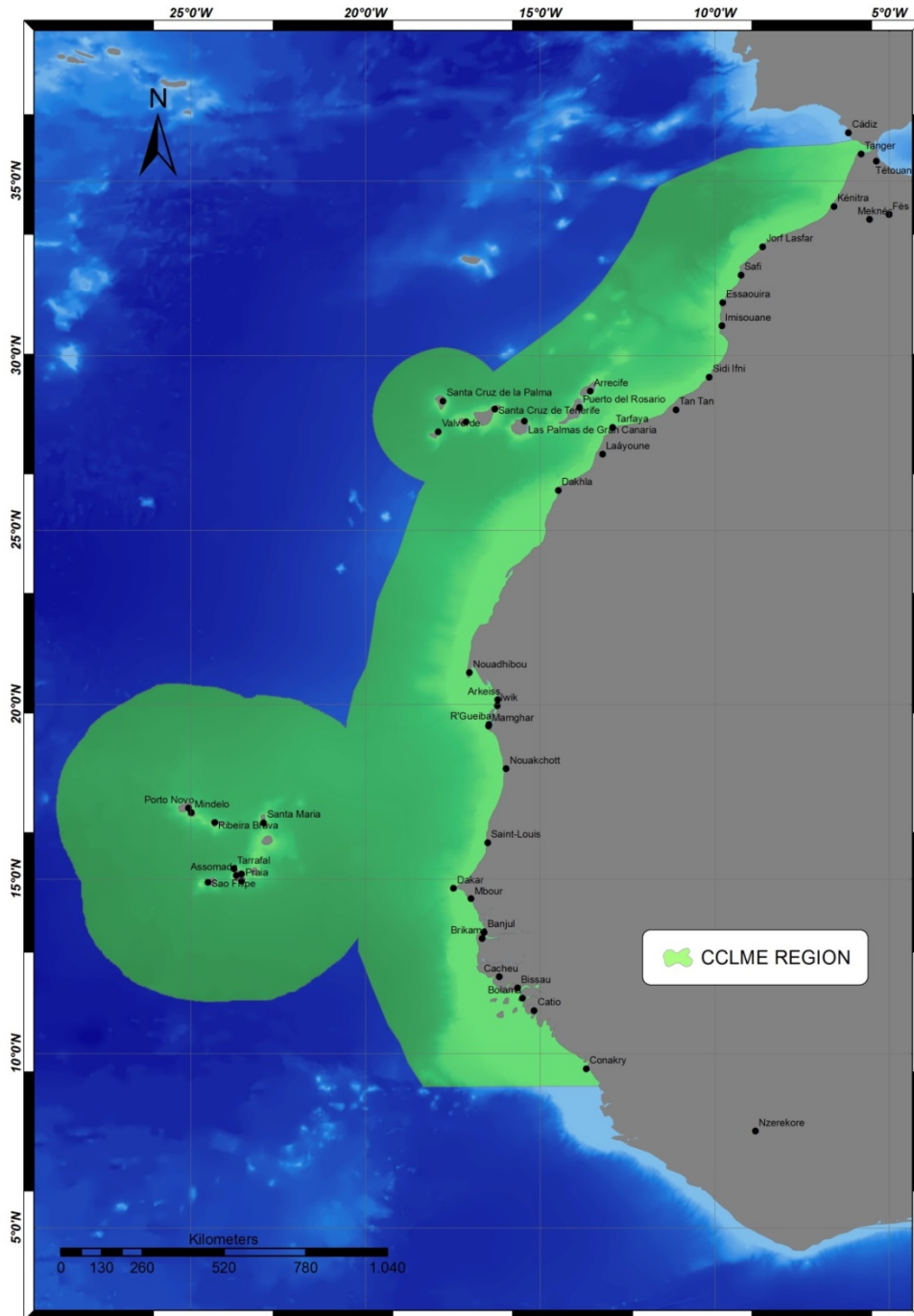


Figure 1. CCLME region including adjacent waters of Cape Verde and Guinea Conakry, within the CCLME zone of influence. This LME limits in the North with the Iberian Coastal LME and in the South with Guinea Current LME

Regional inventories have been produced in other regions as well, e.g. *A directory of hydrographic and atmospheric datasets for the North East Atlantic and UK shelf seas* (Clark et al., 2001).

This inventory is aligned with the framework for strategic actions included at the *2050 Africa's Integrated Maritime Strategy*, which Strategic Action XIV (Environmental and Biodiversity Monitoring) reads as follows: The African Union, the Regional Economic Communities/Regional

Mechanisms and Member States shall support such efforts which require inventory knowledge and a full understanding of natural and artificial changes in Africa's Maritime Domain biodiversity (African Union, 2012).

The combination of different sources and multidisciplinary data will permit to perform better science with higher resolution in models, more rapid delivery of products, and longer forecast horizons.

1.3 Data Sources and format

The majority of data listed in this directory are from direct measurements carried out by different research cruises or sampling programmes which are discrete in time and space. The Directory also includes remote sensing data which give the synoptic and spatial coverage needed for models and forecasts. It also includes climatic indicators which serve as an index of atmospheric conditions at a large spatial scale such as the NAO index or the upwelling index. Finally, the Directory links some existing environmental and biological databases with derived, interpolated or raw data, which can be explored and used as a proxy to study different ecosystem characteristic.

It must be noted that the spatial coverage and resolution of the listed datasets in this directory varies considerably. Regarding the temporal coverage, it was decided to compile datasets from 1976 onwards¹. Also the methodologies used by the different countries (mostly in biological studies) differ, which must be taken into consideration by the users when calculating and comparing data extracted from different datasets.

The information is presented in metadata fiches. The compiled metadata are in accordance with 2007/2/EC INSPIRE Directive, but it should be taken into account that the aim is not being exhaustive in this sense but to promoting the networking in the CCLME area. Some information has been added to facilitate the readability of this outreach publication.

As clarification, resource language is described with codes defined in the standard ISO 639-2: *Codes for the representation of names of languages-Part 2: alpha-3 code*, as indicated in 2007/2/EC INSPIRE Directive. In this directory the following codes are used: "eng", "fre", "por", "rus" and "spa" for English, French, Portuguese, Russian and Spanish, respectively.

Keywords are provided from the general environmental multilingual thesaurus (GEMET) describing the relevant spatial data theme. Thesauruses were chosen from the INSPIRE Spatial Data Themes list (http://www.eionet.europa.eu/gemet/en/inspire_themes, accessed 30 March 2016).

¹ The campaigns undertaken in the coast of West Africa before 1976 are not included in this inventory, such as the surveys: Abrego 4105, Cierzo 4207, Walther Herwig 6403, Thalassa 6211 (on board of the R/V *Thalassa*). The scientific surveys done on board of the R/V *Cornide de Saavedra* are neither listed. The vessel belonging to the Instituto Español de Oceanografía was launched on 1971 and before 1976 different surveys got place in the North-West Africa region: Sahara I and Sahara II during 1971; Atlor I and Maroc-Iberia I during 1972; Atlor II and III during 1973; Atlor V in 1974; and Atlor VII during 1975 (Guerra-Sierra and Prego-Reboredo, 2003). Also, some surveys in the waters of the Canary Islands took place and are not included in this directory, as for example: Norcanarias-72 (1972) and CINECA-73 (1973).

The descriptive metadata sheets have been filled by using metadata provided by the originators or by analyzing datasets and reports to rescue and extract this information. To this end a straightforward collaboration has been established with researchers and data managers in research and environmental data centres in the CCLME and other countries, which allow us to rescue and describe data that they have in their own archives. Nevertheless, the Directory does not claim to be exhaustive and it will need of further cooperation of the scientific community in the region to expand and complete it in the future (the online version will be updated on a routine basis).

Remote sensing fiches are organized taking into account the most important variable obtained for oceanographical studies aims: atmospheric data, hydrographic data, biological data and new satellites offering a wide variety of variables.

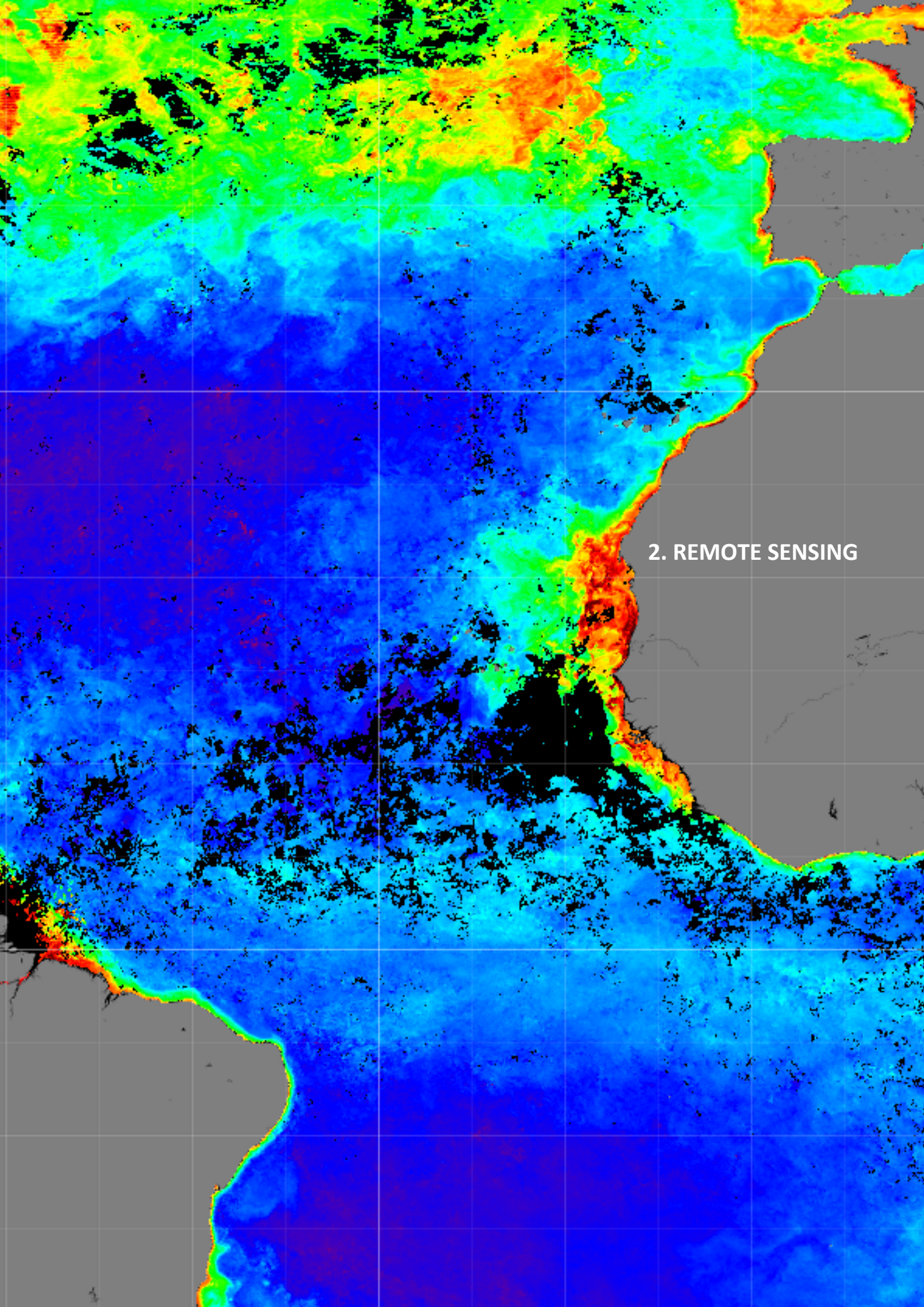
Regarding the atmospheric data, the metadata fiches are in the following order: atmospheric observatories, measuring stations and indices.

In the case of tide-gauges, moorings and Argo buoys float, they are assembled by the name of the managing institution in the following order: IEO, IGN and Puertos del Estado datasets, WMO-IOC-JCOMM.

The ocean observatories and ship based repeat hydrography are listed in that order. It should be taken into account that during several biological surveys, hydrographic data has been simultaneously collected. For further information, please verify the availability of hydrographic data in the metadata sheets contained in Chapter 6 on biological surveys.

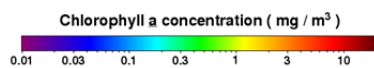
The biological surveys include: (i) international and national databases, and (ii) research surveys. The surveys have been grouped by countries in the following order: Morocco-Western Sahara, Mauritania, Senegal, The Gambia, Guinea Bissau, Guinea, Cape Verde, Spain and finally transboundary surveys. Within each country group, the fiches are displayed in chronological order.

The origin of each dataset is given in the respective sheet and potential users should contact these sources directly. The use of the data is limited to academic, research and educational uses only; and its use is not allowed for commercial purposes without a license from the owners. The use of the data must be properly acknowledged and should not infringe the rights of any third party.



2. REMOTE SENSING

MODIS/AQUA: monthly mean chlorophyll-a concentration (9 km grid resolution, May 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014a).



Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov/> (accessed 25 March 2016)

QuikSCAT/SeaWinds – Quick Scatterometer –

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), UNITED STATES OF AMERICA

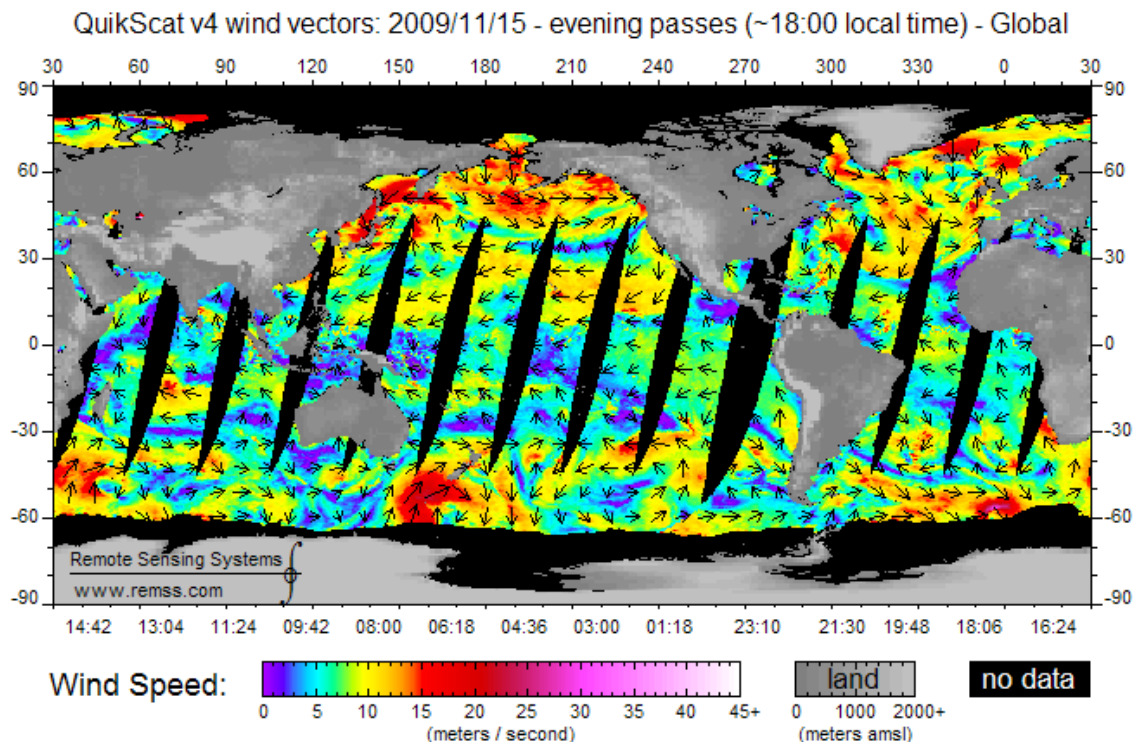


Figure 2. Example of 12 hours QuikSCAT global wind speed coverage. The revisit time is about 29 days. Source: Remote Sensing Systems.

http://images.remss.com/qscat/scatterometer_data_daily.html (accessed 29 March 2016)

Resource abstract:

QuikSCAT (Quick Scatterometer) is an Earth observation satellite carrying the SeaWinds scatterometer. Its primary mission is to measure the surface wind speed and direction over the ice-free global oceans. Observations from QuikSCAT have a wide array of applications, and have contributed to climatological studies, weather forecasting, meteorology, oceanographic research, marine safety, commercial fishing, tracking large icebergs, and studies of land and sea ice, among others. This SeaWinds scatterometer is referred to as the QuikSCAT scatterometer to distinguish it from the nearly identical SeaWinds scatterometer flown on the ADEOS-2 satellite.

Resource language: eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Wind speed and direction

Sea ice coverage

Geographic location: Global coverage

Spatial resolution: QuikSCAT datasets are available at a resolution of 25 km grid for level 2 and 0.25° grid for level 3

Temporal extent: 1999-07 / 2009-11

Temporal resolution: Daytime and nighttime for level 2 and daily for level 3

Depth range/resolution: Surface

Conditions for access & use: No conditions apply to access and use

Limitations on public access: No

Responsible organisation: NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) and Remote Sensing Systems (RSS), USA

Data via: PO.DAAC: <http://podaac.jpl.nasa.gov/datasetlist?ids=Platfor>

m:Sensor&values=QUIKSCAT:SEAWINDS

Contact: podaac@podaac.jpl.nasa.gov

RSS: ftp://ftp.remss.com/qscat/bmaps_v04

Contact: support@remss.com

Data format:

Digital, in HDF (Hierarchical Data Format)

References

Information about citation and acknowledgements in:

<https://podaac.jpl.nasa.gov/CitingPODAAC>

<http://www.remss.com/missions/qscat>

When using data from RSS, please include the following statement in the acknowledgement section of your paper: "QuikScat (or SeaWinds) data are produced by Remote Sensing Systems and sponsored by the NASA Ocean Vector Winds Science Team. Data are available at www.remss.com."

Additional information:

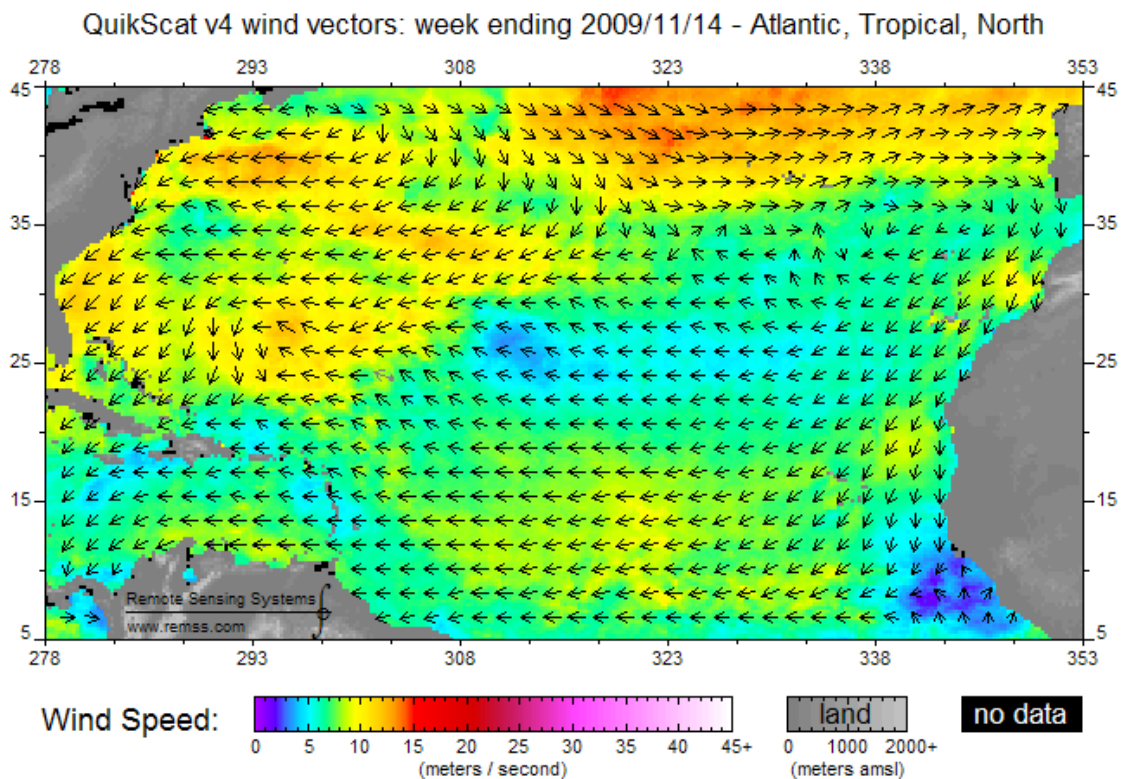


Figure 3. Example of QuikScat weekly sea wind speed and direction (week ending 14 November 2009). Source: RSS. http://images.remss.com/qscat/scatterometer_data_weekly.html (accessed 29 March 2016)

**SSM/I – Special Sensor Microwave Imager – and SSMIS – Special Sensor Microwave Imager
Sounder –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA**

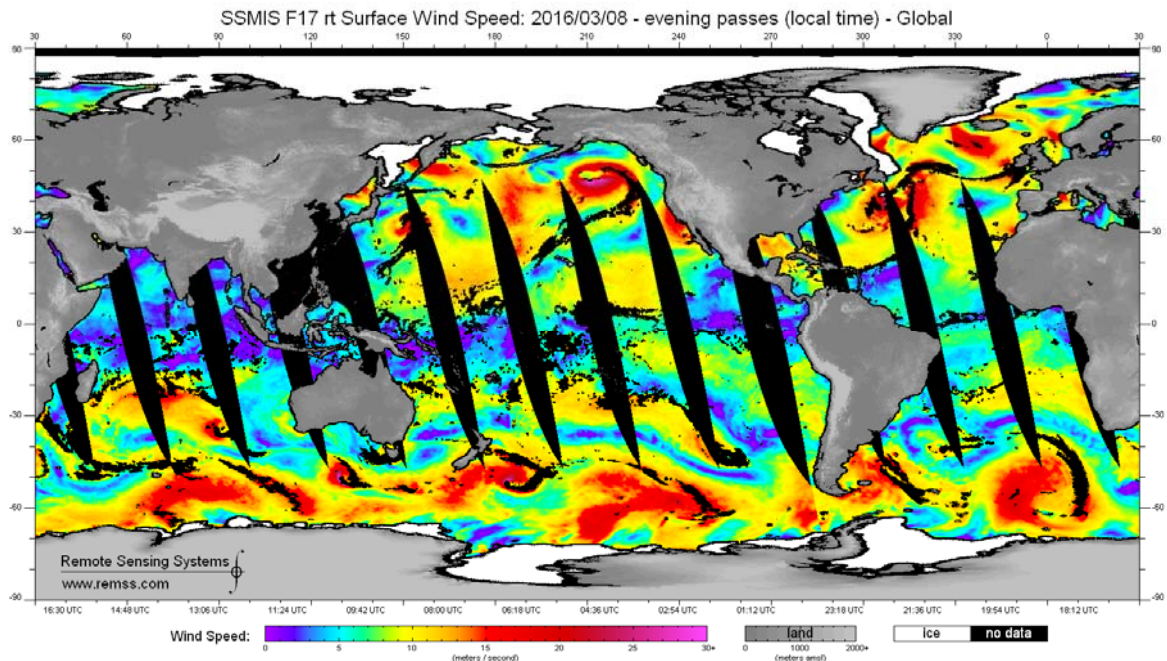


Figure 4. Example of SSMIS daily wind speed coverage. The revisit time is about 1 day. Source: RSS. http://images.remss.com/ssmi/ssmi_data_daily.html (accessed 29 March 2016)

Resource abstract:

SSM/I and SSMIS are satellite passive microwave radiometers that measure atmospheric, ocean and terrain microwave brightness temperatures incident upon a seven-port horn antenna. The SSMIS is the successor of the SSM/I. The SSM/I is a seven-channel, four-frequency sensor ranging from 19 GHz to 85.5 GHz, while SSMIS is a 24-channel with frequencies ranging from 19 GHz to 183 GHz. The primary mission of these instruments is to support Department of Defense operations. This series of instruments are carried onboard Defense Meteorological Satellite Program (DMSP) satellites, and are referred to by satellite number starting with F08. The first SSMIS sensor was launched aboard the DMSP F16 satellite.

Resource language:

eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Ocean surface wind speed

Atmospheric water vapor

Ocean cloud liquid water

Rain rate

Geographic location:

Global coverage

Spatial resolution:

For SSM/I sensor, spatial resolution varies from 69 km x 43 km (along x cross) at 19.35 GHz to 15 km x 13 km at 85.5 GHz. For SSMIS sensor, spatial resolution varies from 73 km x 43 km at 19.35 GHz to 14 km x 13 km at 183 GHz. Gridded binary data files are available in 0.25° grid

Temporal extent:

F08 SSM/I: 1987-07 / 1991-12

F10 SSM/I: 1990-12 / 1997-11

F11 SSM/I: 1991-12 / 2000-05

F13 SSM/I: 1995-05 / 2009-11

F14 SSM/I: 1997-05 / 2008-08

F15 SSM/I: 1999-12 / present
 F16 SSMIS: 2003-10 / present
 F17 SSMIS: 2006-12 / present
 F18 SSMIS: 2009-10 / present

Temporal resolution: Daily (both ascending and descending swaths) binary data files, and 3-days, weekly and monthly time-averaged data files

Depth range/resolution: Surface

Conditions for access & use: No conditions apply to access and use

Limitations on public access: No

Responsible organisation: NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), NOAA National Centers for Environmental Information (NCEI) and Remote Sensing Systems (RSS), USA

Data via: PO.DAAC:
podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=SSM%2FI
podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=SSMIS
 Contact: podaac@podaac.jpl.nasa.gov

NCEI: <http://www.ncdc.noaa.gov/data-access/satellite-data>
 Contact: ncei.sat.info@noaa.gov

RSS: <ftp://ftp.remss.com/ssmi>
 Contact: support@remss.com

Data format: Digital, in HDF (Hierarchical Data Format), binary format and netCDF

References: Information about citation and acknowledgements in:
<https://podaac.jpl.nasa.gov/CitingPODAAC>
<http://www.remss.com/missions/ssmi>
 When using data from RSS, please include the following statement in the acknowledgement section of your paper:
 "SSM/I and SSMIS data are produced by Remote Sensing Systems and sponsored by the NASA Earth Science MEaSUREs Program and are available at www.remss.com."

Additional information:

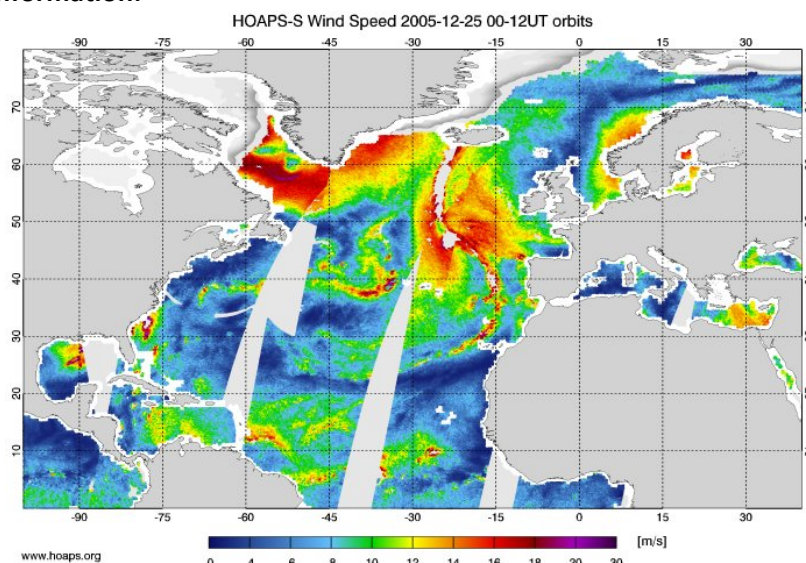


Figure 5. Example of Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data (HOAPS) wind speed (in m/s) on 25 December 2005 (Andersson et al., 2007, 2010; Fennig et al., 2012). Source: HOAPS-3. <http://www.hoaps.zmaw.de> (accessed 03 March 2016)

WINDSAT

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA

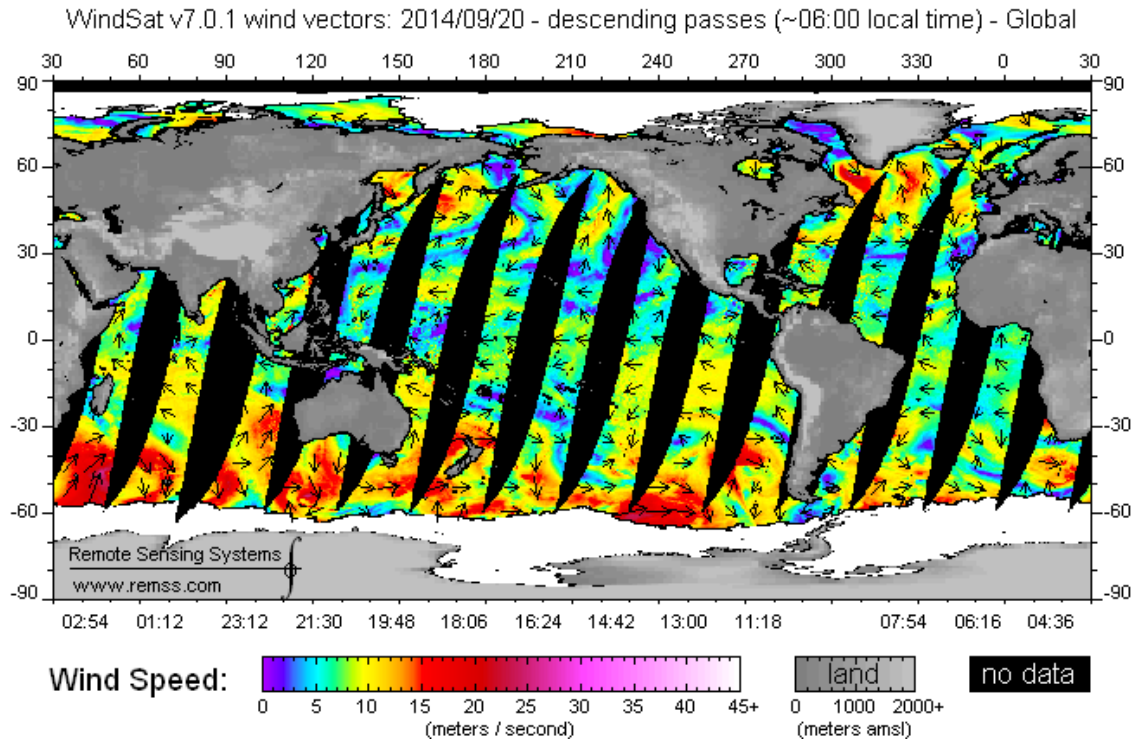


Figure 6. Example of WindSat daily wind speed coverage. Complete global coverage is provided every 8 days. Source: RSS. http://images.remss.com/wind/wind_vector_data_daily.html (accessed 29 March 2016)

Resource abstract:

WindSat is a satellite-based polarimetric microwave radiometer developed by the Naval Research Laboratory Remote Sensing Division and the Naval Center for Space Technology for the U.S. Navy and the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Program Office (IPO). WindSat is designed to demonstrate the capability of polarimetric microwave radiometry to measure the ocean surface wind vector from space. It was launched aboard the Coriolis satellite.

Resource language: eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Ocean surface wind speed and direction

Ocean cloud liquid water

Rain rate

Sea surface temperature (SST)

Soil moisture

Water vapor

Geographic location: Global coverage

Spatial resolution: WindSat level 2 datasets are available at a resolution of 25 km. For level 3, datasets are available in 0.25° grid

Temporal extent: 2003-01 / present

Temporal resolution: Daily (both ascending and descending passes) for level 2 and 3 days, weekly and monthly for level 3

Depth range/resolution: Surface

Conditions for access & use: No conditions apply to access and use

Limitations on public access: No

Responsible organisation: NOAA National Oceanographic Data Center (NODC), NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) and Remote Sensing Systems (RSS), USA

Data via: NODC: http://data.nodc.noaa.gov/thredds/catalog/ghrsst/L2P_GRIDDED/WSAT/REMSS/
Contact: NODC.Webmaster@noaa.gov

PO.DAAC web page:
<http://podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=WindSat>
Contact: podaac@podaac.jpl.nasa.gov

RSS: <http://data.remss.com/windsat/>
Contact: support@remss.com

Data format: Digital, in HDF (Hierarchical Data Format), binary format and netCDF

References: Information about citation and acknowledgements in:
<https://podaac.jpl.nasa.gov/CitingPODAAC>
<http://www.remss.com/missions/windsat>
When using data from RSS, please include the following statement in the acknowledgement section of your paper:
"WindSat data are produced by Remote Sensing Systems and sponsored by the NASA Earth Science MEaSUREs DISCOVER Project and the NASA Earth Science Physical Oceanography Program. RSS WindSat data are available at www.remss.com."

Additional information:

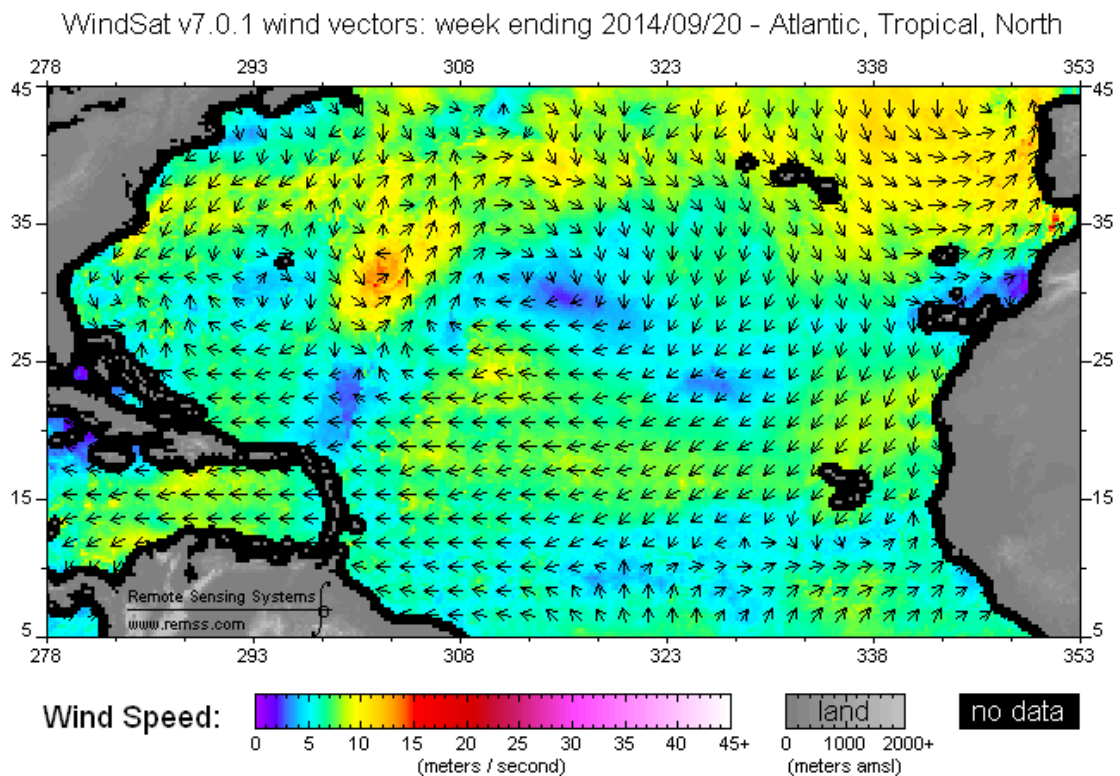


Figure 7. Example of WindSat weekly wind speed and direction (week ending 20 September 2014). Source: RSS. http://images.remss.com/wind/wind_vector_data_weekly.html (accessed 29 March 2016)

ASCAT – Advanced Scatterometer –
 EUROPEAN SPACE AGENCY (ESA)
 EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES
 (EUMETSAT)

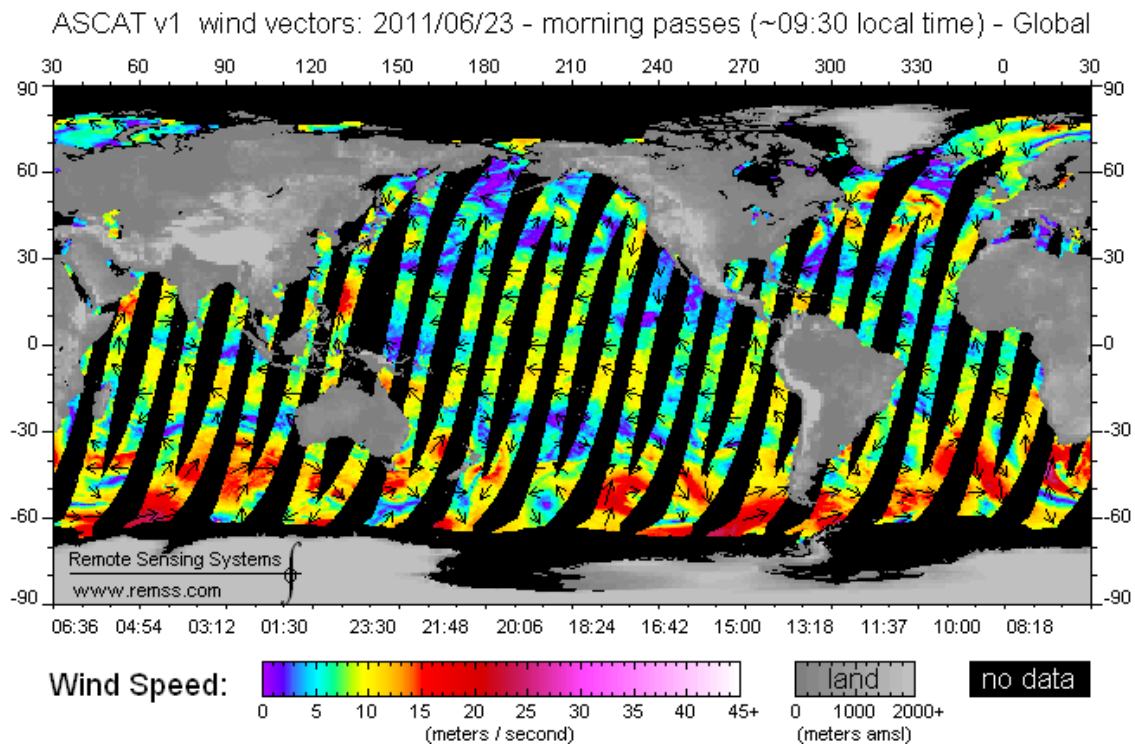


Figure 8. Example of 12 hours ASCAT global coverage. The revisit time is about 4 days. Source: RSS. http://images.remss.com/wind/wind_vector_data_daily_ascat.html (accessed 29 March 2016)

Resource abstract:

ESA and EUMETSAT launched the first C-band ASCAT in 2006 onboard Metop-A. ASCAT is a real aperture radar, operating at 5.255 GHz (C-band) and using vertically polarised antennas. It transmits a long pulse with Linear Frequency Modulation ('chirp'). The prime objective of ASCAT is to measure wind speed and direction over the oceans, but also to provide useful data in a variety of studies, including polar ice and tropical vegetation.

Resource language: eng
Keyword values: Environmental monitoring facilities
Variables available: *Observed variables*

Wind speed and direction
 Soil moisture
 Ice coverage

Geographic location: Global coverage

Spatial resolution: ASCAT datasets are available at a resolution of 12.5 km and 25 km grid for level 2 and 0.125° and 0.25° grid for level 3

Temporal extent: 2009-03 / present

Temporal resolution: Daytime and nighttime for level 2 and daily for level 3

Depth range/resolution: Surface

Conditions for access & use: Data is provided free of charge but user registration is required in Copernicus Marine Environment Monitoring Service (CMEMS) and EUMETSAT Data Centre

Limitations on public access: No

Responsible organisation: EUMETSAT Data Centre, NASA Physical Oceanography

Data via:

Distributed Active Archive Center (PO.DAAC) and Remote Sensing Systems (RSS)

The EUMETSAT Data Centre:

<http://www.eumetsat.int/website/home/Data/DataDelivery/EUMETSATDataCentre/index.html>

Contact: ops@eumetsat.int

CMEMS: http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&view=details&product_id=WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002

Contact: servicedesk.cmems@mercator-ocean.eu

PO.DAAC: <http://podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=ASCAT>

Contact: podaac@podaac.jpl.nasa.gov

RSS: <ftp://ftp.ssmi.com/ascat>

Contact: support@remss.com

Data format:

Digital, in HDF (Hierarchical Data Format), netCDF and BUFR

References:

Information about citation and acknowledgements in:

<https://earth.esa.int/pi/esa?type=file&table=aotarget&cmd=image&alias=TPMterms>

<https://podaac.jpl.nasa.gov/CitingPODAAC>

<http://www.remss.com/missions/ascat>

When using data from RSS, please include the following statement in the acknowledgement section of your paper:

"C-2013 ASCAT data are produced by Remote Sensing Systems and sponsored by the NASA Ocean Vector Winds Science Team. Data are available at www.remss.com."

Additional information:

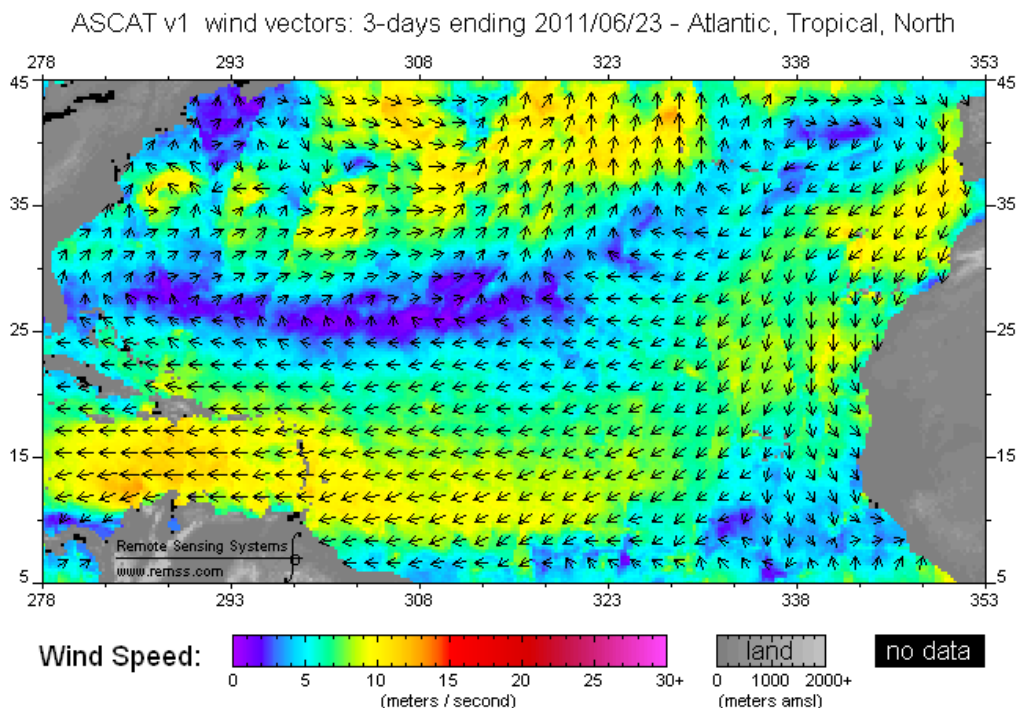


Figure 9. Example of ASCAT 3-day sea wind speed and direction (time period ending 23 June 2011). Source: RSS. http://images.remss.com/wind/wind_vector_data_3day_ascat.html (accessed 29 March 2016)

TOPEX/Poseidon

CENTRE NATIONAL D'ETUDES SPATIALES (CNES), FRANCE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

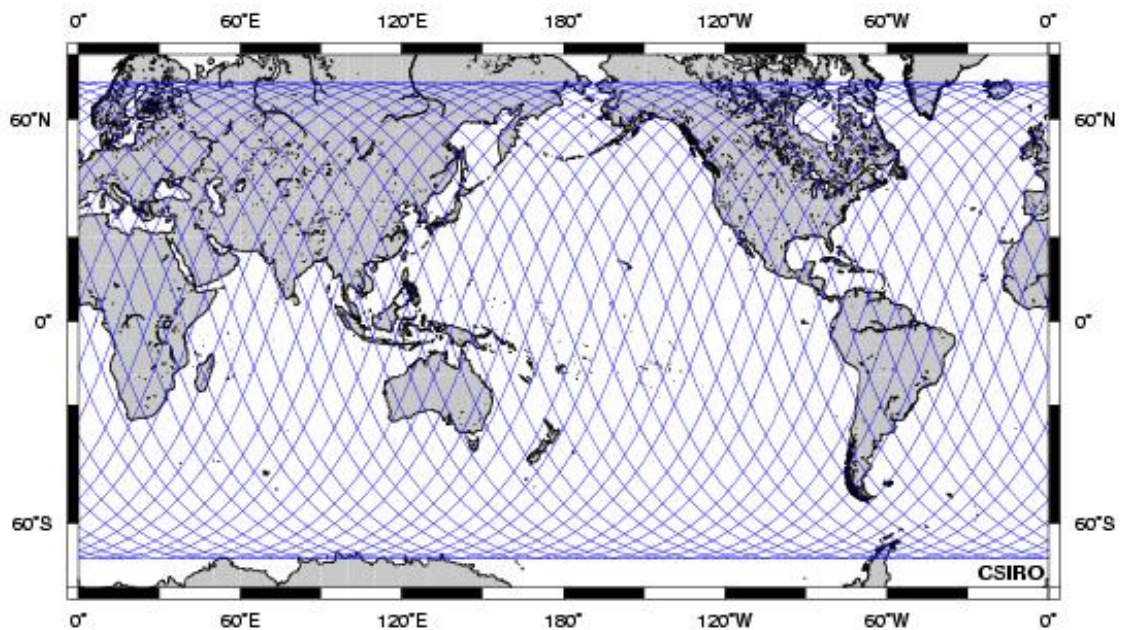


Figure 10. The ground track of the first three days of the 10-day cycle of TOPEX/Poseidon. Source: CSIRO. <http://www.cmar.csiro.au> (accessed 23 March 2016)

Resource abstract:

TOPEX/Poseidon was jointly conducted by the United States' National Aeronautics and Space Administration (NASA) and the French Space Agency, Centre National d'Etudes Spatiales (CNES), for studying the global circulation from space. The mission used the technique of satellite altimetry to make precise and accurate observations of sea level for several years.

Resource language:

eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea level

Geographic location:

Coverage of 95% of ice-free oceans (66°N – 66°S)

Spatial resolution:

TOPEX/Poseidon datasets have a resolution of 11.2 km (along) x 5.1 km (across)

Temporal extent:

1992-09 / 2005-10

Temporal resolution:

TOPEX/Poseidon Cycles

Depth range/resolution:

Surface

Conditions for access & use:

No conditions apply to access and use

Limitations on public access:

No

Responsible organisation:

NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC)

Data via:

PO.DAAC: <ftp://podaac.jpl.nasa.gov/allData/topex/L2/>

Contact: podaac@podaac.jpl.nasa.gov

Data format:

Digital, in HDF (Hierarchical Data Format)

References:

Information about citation and acknowledgements in: <https://podaac.jpl.nasa.gov/CitingPODAAC>

Additional information:

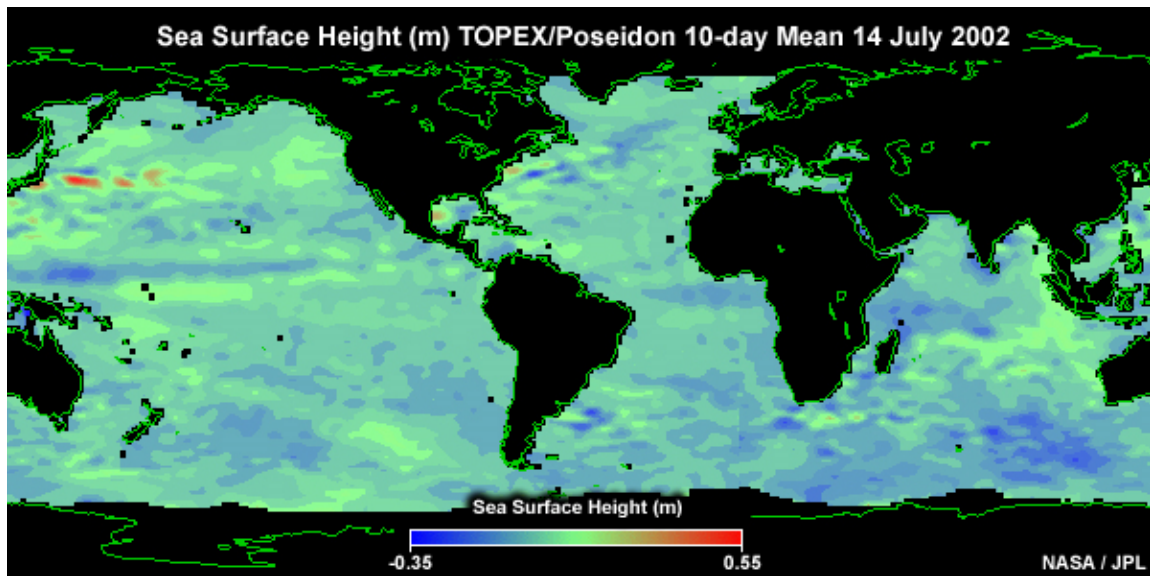


Figure 11. Example of TOPEX/Poseidon sea surface height. Source: NASA/JPL.
<http://www.meted.ucar.edu/oceans/currents/print.htm> (accessed 18 January 2016)

JASON-1

CENTRE NATIONAL D'ETUDES SPATIALES (CNES), FRANCE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

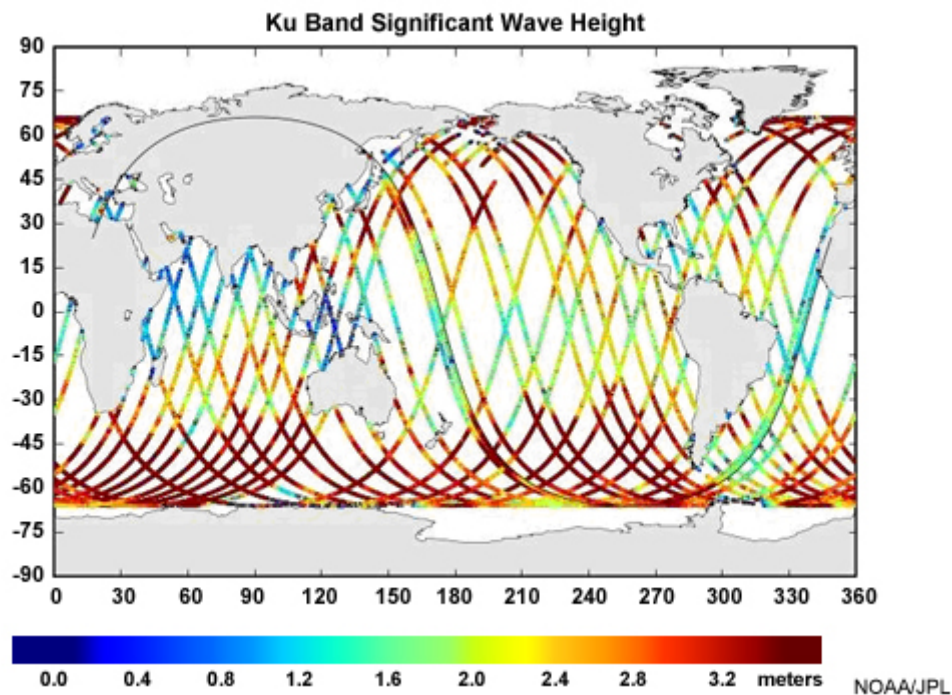


Figure 12. Example of JASON-2 sea level coverage. The revisit time is about 10 days. Source: NOAA/JPL. https://www.eumetsat.int/jason/media/graphics/sig_wave_height.jpg (accessed 29 March 2016)

Resource abstract:

Jason-1 is a satellite oceanography mission to monitor global ocean circulation, study the ties between the ocean and the atmosphere, improve global climate forecasts and predictions, and monitor events such as El Niño and ocean eddies. It is the successor to the TOPEX/Poseidon mission, which measured ocean surface topography from 1992 through 2005. Like its predecessor, Jason-1 is a joint project between the NASA and CNES space agencies.

Resource language: eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Wave height

Geographic location: Coverage of 95% of ice-free oceans (66°N – 66°S)

Spatial resolution: JASON-1 datasets have a resolution of 11.2 km (along) x 5.1 km (across)

Temporal extent: 2002-01 / 2013-06

Temporal resolution: JASON -1 Cycles

Depth range/resolution: Surface

Conditions for access & use: No conditions apply to access and use

Limitations on public access: No

Responsible organisation: NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC)

Data via: PO.DAAC: <ftp://podaac-ftp.jpl.nasa.gov/allData/jason1/L2/>

Contact: podaac@podaac.jpl.nasa.gov

Data format: Digital, in netCDF and binary format

References:

Information about citation and acknowledgements in:

<https://podaac.jpl.nasa.gov/CitingPODAAC>

Additional information:

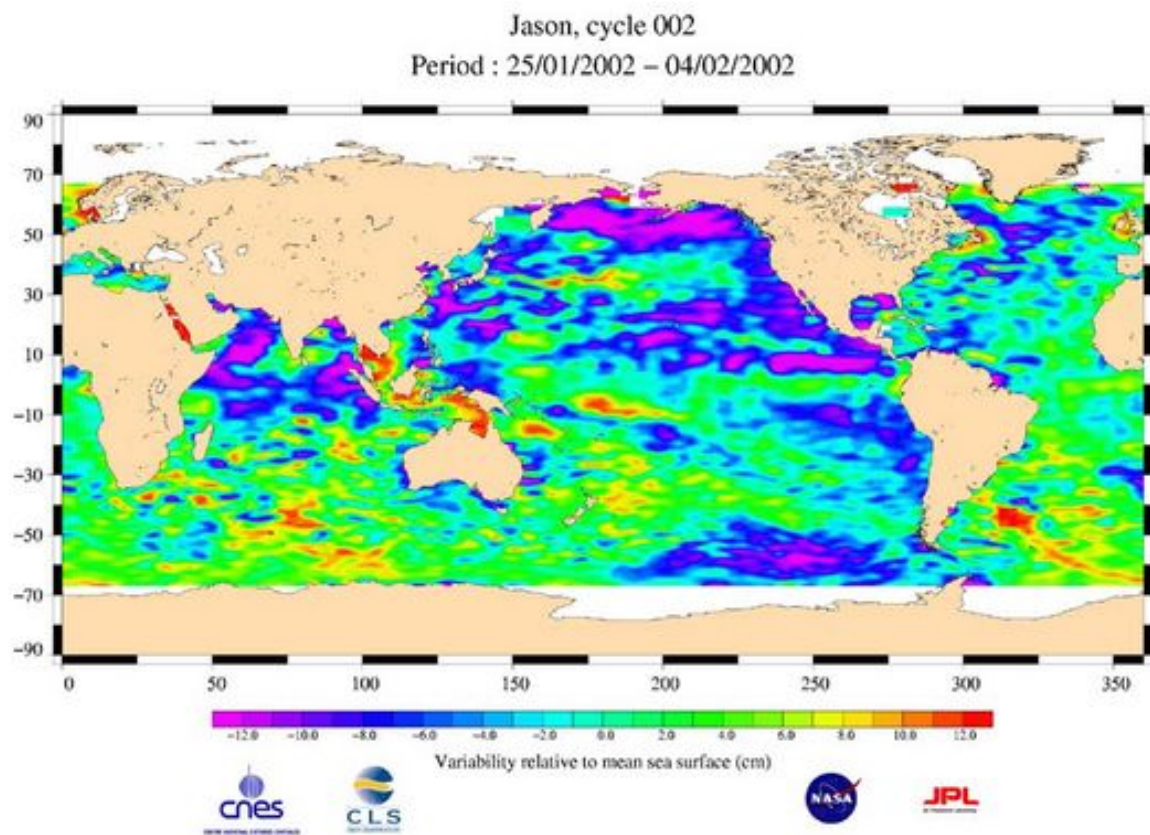


Figure 13. Example of Jason-1 global sea surface height (first cycle, 2002). Source: <http://sealevel.jpl.nasa.gov/gallery/sciencedata/> (accessed 29 March 2016)

**AVHRR – Advanced Very High Resolution Radiometer –
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA**

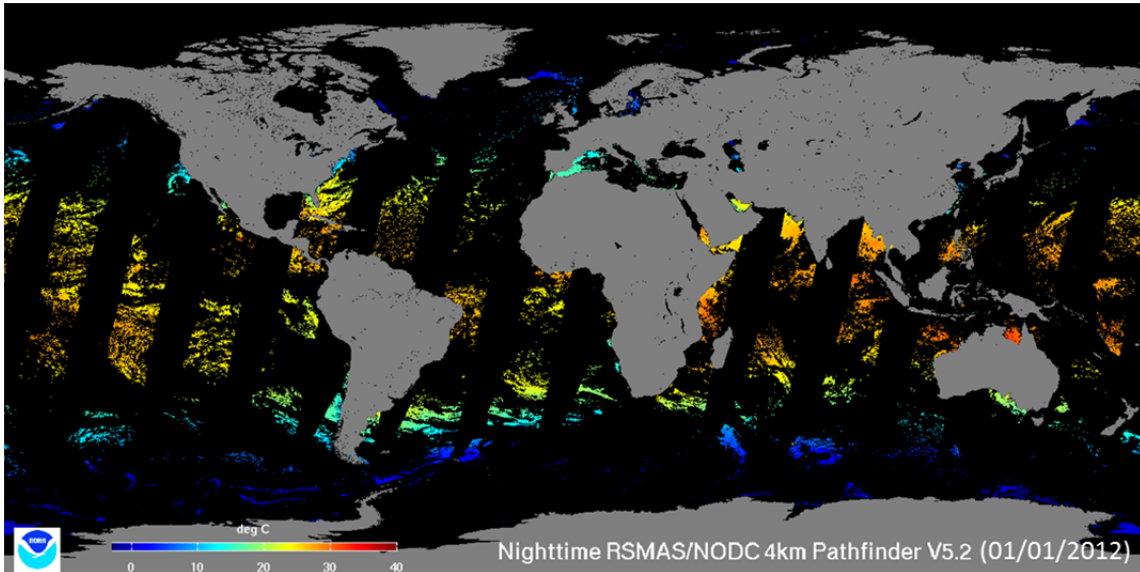


Figure 14. Example of AVHRR nighttime sea surface temperature coverage. Complete global coverage is provided daily. AVHRR Pathfinder Version 5.2 (PFV5.2) data are described in Casey et al. (2010). Source: NOAA

ftp://ftp.nodc.noaa.gov/pub/data.nodc/pathfinder/Version5.2/browse_images/2012/decode_d_sst/ (accessed 24 March 2016)

Resource abstract:

AVHRR is a broad-band, four (AVHRR/1 and AVHRR/2) or five channel (AVHRR/3) scanner, sensing in the visible, near-infrared, and thermal infrared portions of the electromagnetic spectrum. This sensor is carried on NOAA's Polar Orbiting Environmental Satellites (POES), beginning with TIROS-N in 1978. AVHRR data are acquired in three formats: High Resolution Picture Transmission (HRPT), Local Area Coverage (LAC) and Global Area Coverage (GAC).

Resource language: eng
Keyword values: Environmental monitoring facilities
Variables available: *Observed variables*
 Sea surface temperature (SST)
 Sea ice coverage
Geographic location: Global coverage
Spatial resolution: AVHRR level 2 datasets are available at a resolution of 1.1 km. For level 3, datasets are available in 4.9 km and 18 km grid
Temporal extent: 1978 / present
Temporal resolution: Daytime and nighttime for level 2 and daily, 5 day, 8 day, monthly and yearly for level 3
Depth range/resolution: Surface
Conditions for access & use: No conditions apply to access and use
Limitations on public access: No
Responsible organisation: NOAA's National Oceanographic Data Center (NODC) and NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), USA

Data via: 4 km AVHRR Pathfinder Project:
<http://www.nodc.noaa.gov/SatelliteData/pathfinder4km/>
<http://data.nodc.noaa.gov/pathfinder/>

Contact: NODC.Webmaster@noaa.gov

PO.DAAC: <ftp://podaac-ftp.jpl.nasa.gov/allData/avhrr/L3/>

Contact: podaac@podaac.jpl.nasa.gov

Data format:

Digital, in netCDF and HDF

References:

If you use Pathfinder 4 km data, please acknowledge the use of these data with the following statement: "These data were provided by GHRSSST and the US National Oceanographic Data Center. This project was supported in part by a grant from the NOAA Climate Data Record (CDR) Program for satellites" and cite the following publication:

Casey, K. S., Brandon, T. B., Cornillon, P. and Evans, R. 2010. The Past, Present and Future of the AVHRR Pathfinder SST Program. In: *Oceanography from Space: Revisited*. Barale, V., Gower, J. F. R. and Alberotanza, L. (eds). Springer Science+Business Media B.V, pp. 323-341. doi:10.1007/978-90-481-8681-5_16

Information about citation and acknowledgements in: <https://podaac.jpl.nasa.gov/CitingPODAAC>

Additional information:

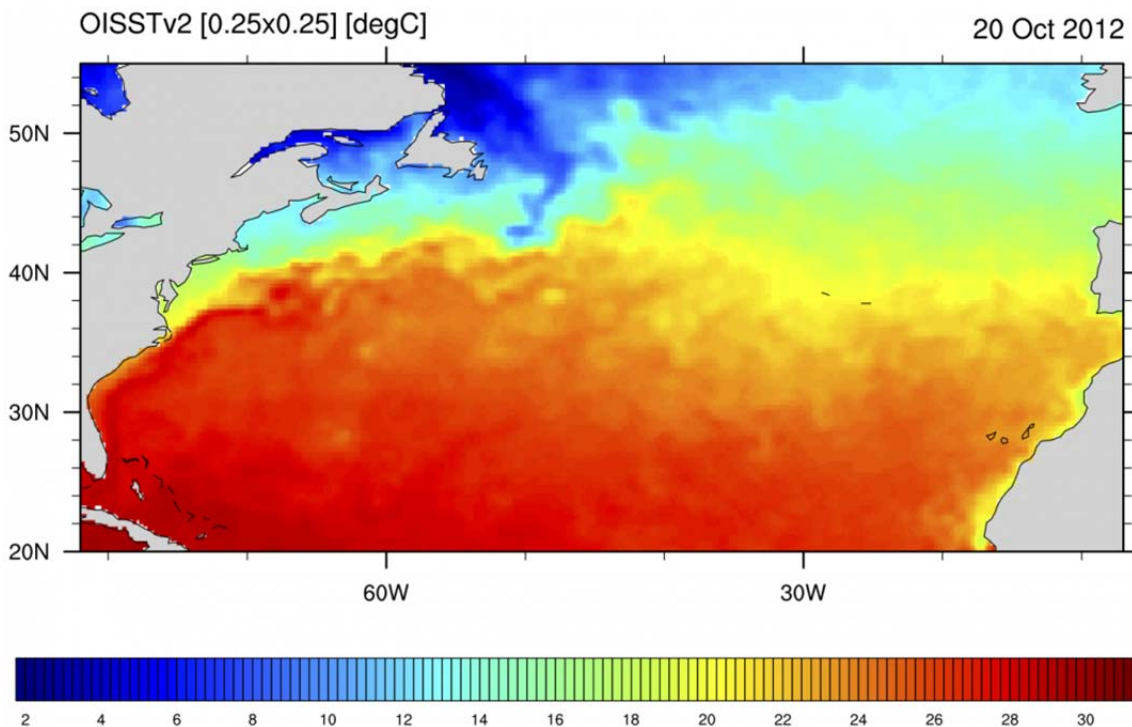


Figure 15. Example of SST ($^{\circ}\text{C}$) in the North Atlantic on 0.25° grid (20 October 2012). This image shows the AVHRR-only version of OISSTv2 (Optimum Interpolation Sea Surface Temperature version 2, NOAA-NCDC). Source: National Center for Atmospheric Research, David Schneider. *The Climate Data Guide: SST Data Sets: Overview & Comparison Table*. <https://climatedataguide.ucar.edu/climate-data/sst-data-sets-overview-comparison-table> (accessed 29 March 2016)

**AATSR – Advanced Along-Track Scanning Radiometer –
EUROPEAN SPACE AGENCY (ESA)**

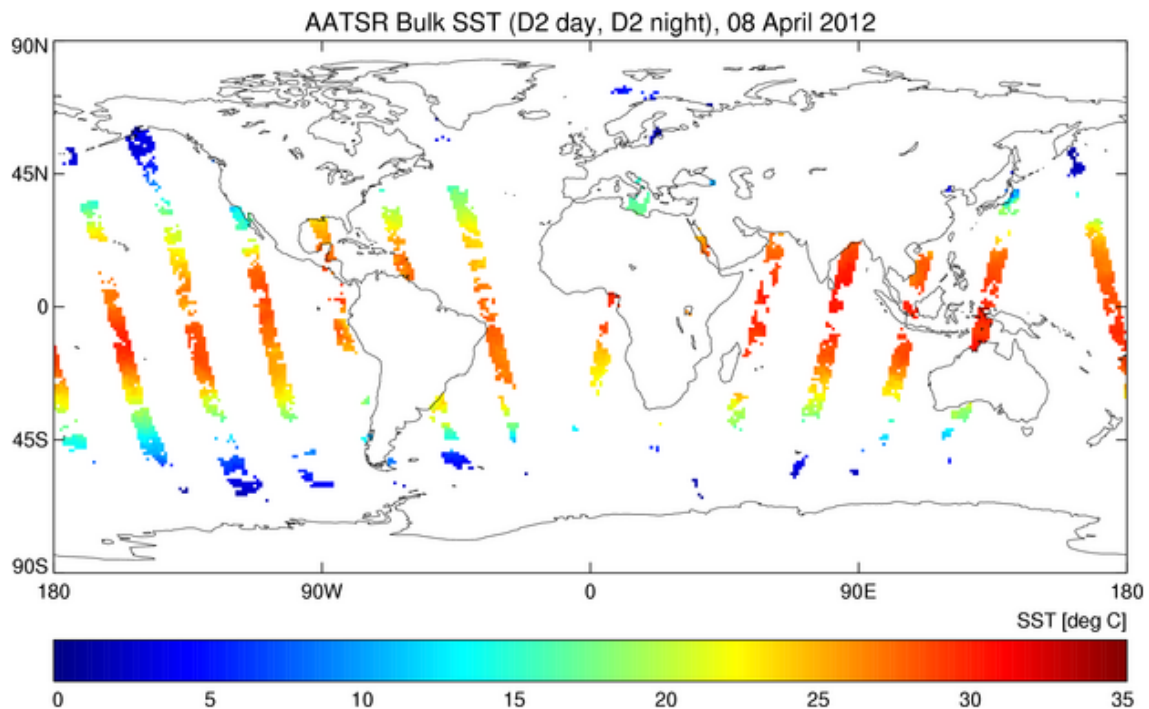


Figure 16. Daily sea surface temperature coverage by the AATSR. Complete global coverage is provided in 35 days. Source: Met Office.

<http://research.metoffice.gov.uk/research/nwp/satellite/infrared/aatsr/main.html> (accessed 29 March 2016). Contains public sector information licensed under the Open Government Licence v1.0

Resource abstract:

AATSR is a multi-channel imaging radiometer on board the ENVISAT satellite, the most recent in a series of instruments designed primarily to measure global Sea Surface Temperature (SST), following on from ATSR-1 and ATSR-2 on board ERS-1 and ERS-2. AATSR data have a resolution of 1 km at nadir, and can measure Earth's surface temperature to a precision of 0.3 K.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	<i>Observed variables</i> Sea surface temperature (SST)
Geographic location:	Global coverage
Spatial resolution:	AATSR datasets are available at a resolution of 1 km grid for level 2 and in 10 or 30 arcmin grid for level 3
Temporal extent:	2002-04 / 2012-04
Temporal resolution:	Daily (with 35 days of revisit time) for level 2 and daily or monthly for level 3
Depth range/resolution:	Surface
Access and use conditions:	Data is provided free of charge upon registration in ESA portal (access via MERCI) for level 2 and for free access for level 3. Data access from NEODC needs a registration too
Limitations on public access:	No
Responsible organisation:	European Space Agency (ESA) and NERC Earth Observation Data Centre (NEODC)

Data via:

ESA

Level 2: <https://earth.esa.int/web/guest/data-access/online-archives>

Level 3: <http://earth.eo.esa.int/level3/aatsr-level3/>

Contact: <https://earth.esa.int/web/guest/contact-us>

NEODC

Level 2: http://www.neodc.rl.ac.uk/browse/neodc/aatsr_multimission

Contact: neodc@rl.ac.uk

Data format:

Digital, in netCDF format for level 2 and in HDF (Hierarchical Data Format) for level 3

References:

Any publication whatsoever resulting from work carried out using ESA data shall contain the following sentence: "Data provided by the European Space Agency."

Additional information:

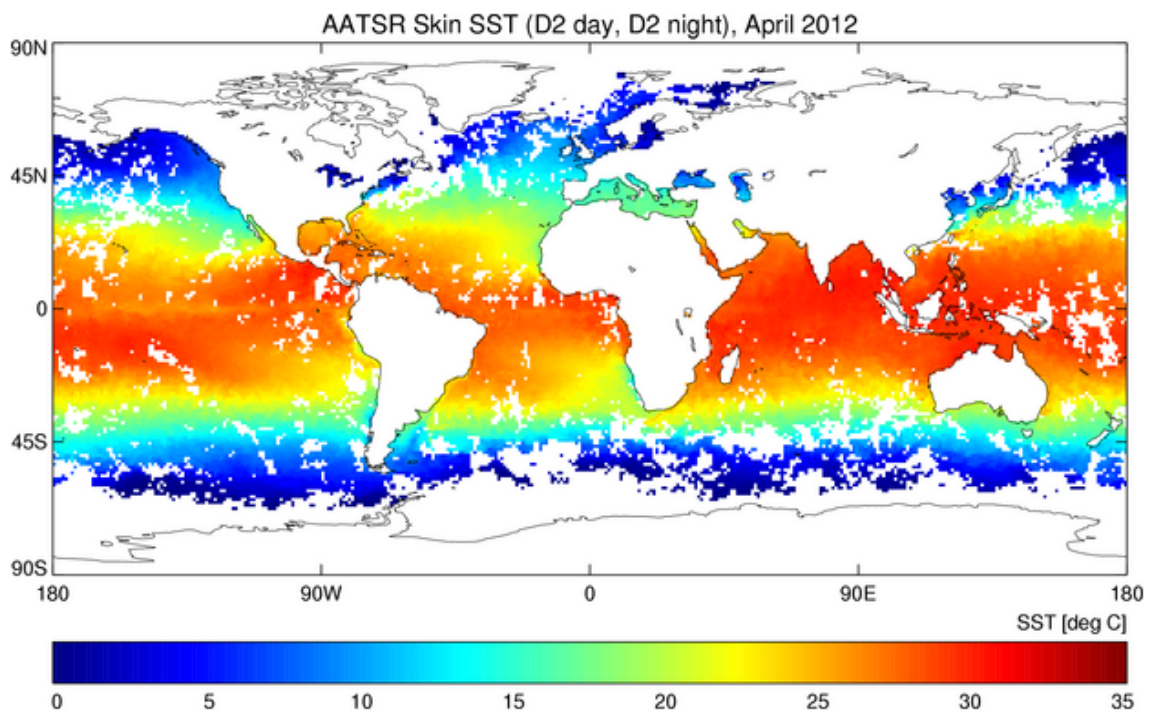


Figure 17. Example of AATSR monthly averaged skin SST 2-channel retrieval (April 2012). Source: Met Office.

<http://research.metoffice.gov.uk/research/nwp/satellite/infrared/aatsr/main.html> (accessed 29 March 2016). Contains public sector information licensed under the Open Government Licence v1.0

AMSR-E – Advanced Microwave Scanning Radiometer for NASA’s Earth Observing System – NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

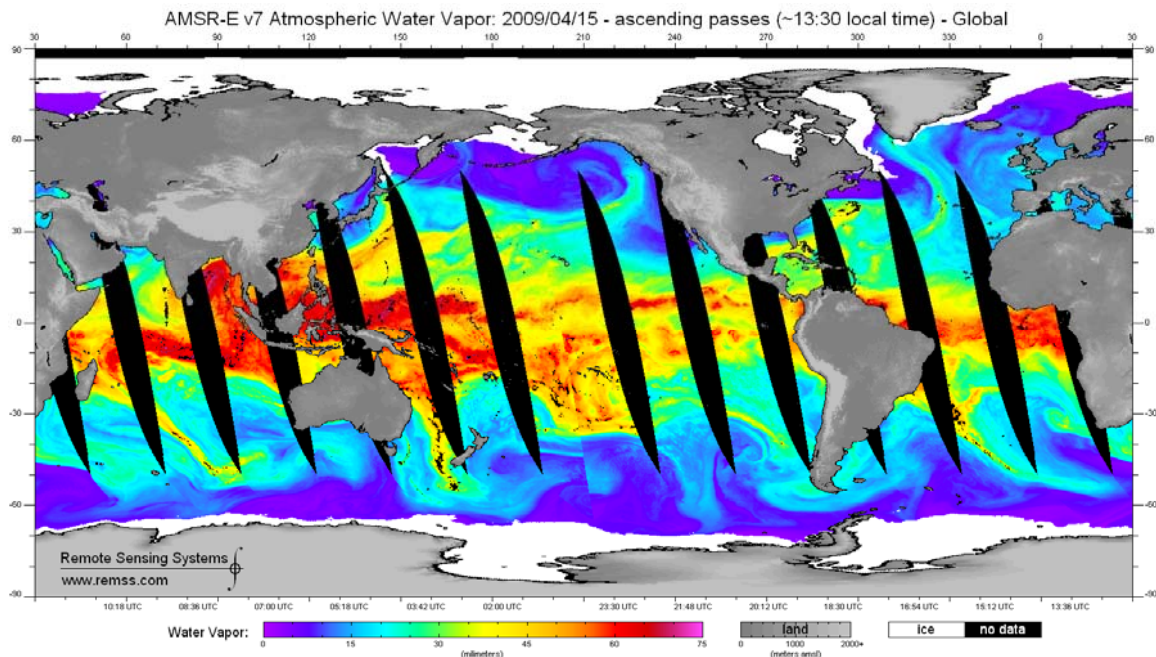


Figure 18. Example of AMSR-E v7 water vapour over ocean coverage. Complete global coverage is provided every 1-2 days. Source: RSS.

http://images.remss.com/amsr/amsre_data_daily.html (accessed 29 March 2016)

Resource abstract:

AMSR-E is multifrequency, dual-polarized microwave radiometer operating at 6 frequencies ranging from 6.925 GHz to 89.0 GHz that detects faint microwave emissions from the Earth's surface and atmosphere. It is a modified version of AMSR that flew on ADEOS-II. JAXA provides the instrument for flight on board NASA's Earth Observing System (EOS) Aqua platform. AMSR-E is indispensable for Aqua's mission, which is dedicated to the observation of climate and hydrology.

Resource language:

eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Water vapor

Cloud liquid water

Precipitation

Sea surface temperature (SST)

Sea surface wind speed

Sea ice coverage

Snow water equivalent

Soil moisture

Geographic location:

Global coverage

Spatial resolution:

Spatial resolution of the individual measurements varies from 5.4 km at 89 GHz to 56 km at 6.9 GHz for level 2 and 25 km for level 3

Temporal extent:

2002-06 / 2011-10

Temporal resolution:

Daily for level 2 and daily and monthly for level 3

Depth range/resolution:

Surface

Conditions for access & use:

Data is provided free of charge but user registration is required in GCOM-W1 Data Providing Service

Limitations on public access: No

Responsible organisation: GCOM-W1 Data Providing Service, National Snow and Ice Data Center (NSIDC) and Remote Sensing Systems (RSS)

Data via: GCOM-W1 Data Providing Service:
<https://gcom-w1.jaxa.jp/auth.html>
 Contact: amrsci@eorc.jaxa.jp

NSIDC: <ftp://sidacs.colorado.edu/pub/DATASETS/>
 Contact:
<https://nsidc.zendesk.com/account/dropboxes/20123172>

RSS: <ftp://ftp.ssmi.com/amsre>
 Contact: support@remss.com

Data format: Digital, in HDF (Hierarchical Data Format)

References: Information about citation in:
http://nsidc.org/about/use_copyright.html
http://suzaku.eorc.jaxa.jp/GCOM_W/research/terms.html
<http://www.remss.com/missions/amsre>
 When using data from RSS, please include the following statement in the acknowledgement section of your paper:
 "AMSR data are produced by Remote Sensing Systems and were sponsored by the NASA AMSR-E Science Team and the NASA Earth Science MEaSURES Program. Data are available at www.remss.com. "

Additional information:

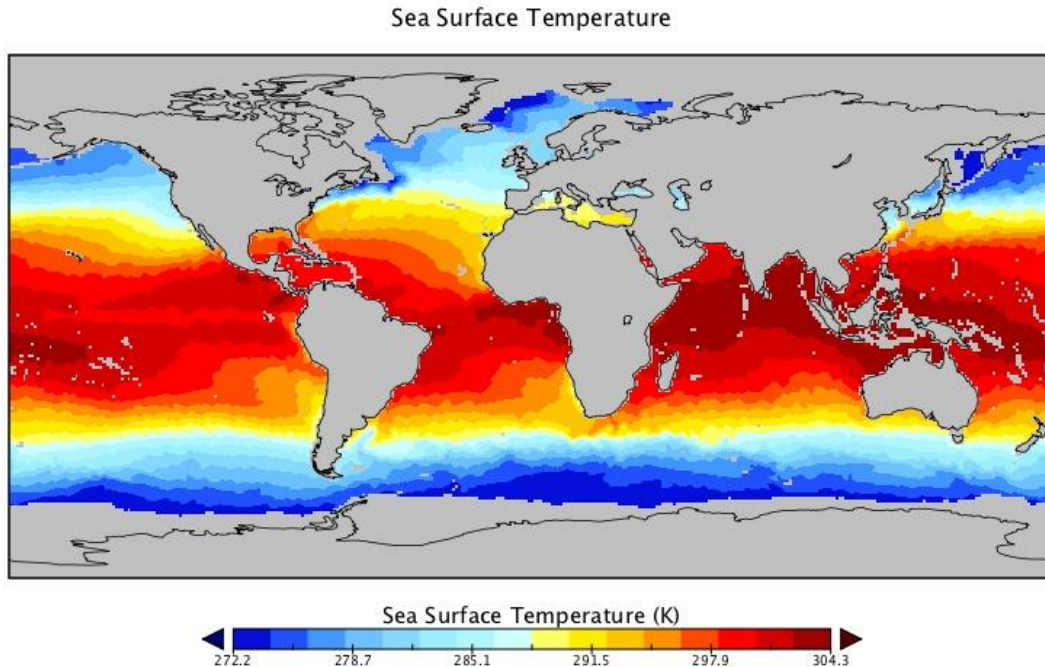


Figure 19. Example of AMSR-E monthly SST (April 2009) (Remote Sensing Systems, 2011).
 Source: http://podaac-www.jpl.nasa.gov/highlights/GriddedClimateVariables_2012_0913
 (accessed 29 March 2016)

SMOS – Soil Moisture and Ocean Salinity –
EUROPEAN SPACE AGENCY (ESA)

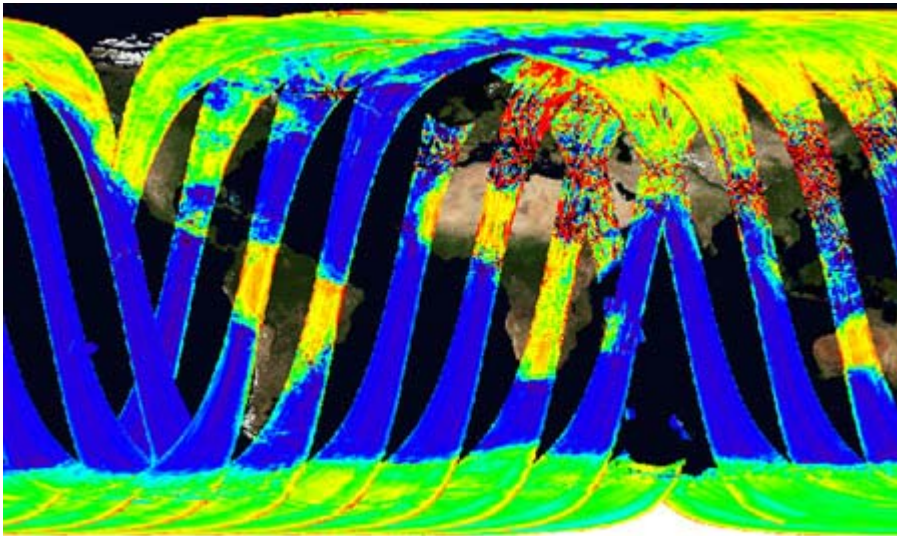


Figure 20. Example of SMOS daily coverage. Complete global coverage is provided every 3 days. This is the first data sent by the MIRAS instrument, acquired as part of the initial functional verification test since the instrument was switched on 17 November 2009. The image depicts non-calibrated brightness temperature values colour coded from blue (low) to red (high). Source: ESA. http://www.esa.int/spaceinimages/Images/2009/11/First_data_from_SMOS (accessed 24 March 2016)

Resource abstract:

SMOS is a radio telescope in orbit. It is Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) radiometer picks up faint microwave emissions from Earth's surface to map levels of land soil moisture for hydrology studies and ocean salinity for enhanced understanding of ocean circulation.

Resource language: eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*
Sea surface salinity (SSS)
Soil moisture

Geographic location: Global coverage

Spatial resolution: SMOS level 2 datasets are available at a resolution of 43 km. For level 3, datasets are available in 25 km, 50 km, 100 km and 200 km grid

Temporal extent: 2010-01 / present

Temporal resolution: Daily for level 2 and daily, 10 day and monthly, for level 3

Depth range/resolution: Surface

Conditions for access & use: Data is provided free of charge but a registration is required in the ESA portal and CATDS web page

Limitations on public access: Yes

Responsible organisation: European Space Agency (ESA) and Centre Aval de Traitement de Données SMOS (CATDS)

Data via: ESA Portal (level 2): <http://smos-diss.eo.esa.int>

Contact: <https://smos-ds-02.eo.esa.int/oads/access/contact/>

CATDS web page (level 3): <http://www.catds.fr/sipad/login.do>

Contact: contact@catds.fr

Data format:

Digital, in HDF (Hierarchical Data Format) or netCDF

References:

Any publication whatsoever resulting from work carried out using ESA data shall contain the following sentence: "Data provided by the European Space Agency."

Additional information:

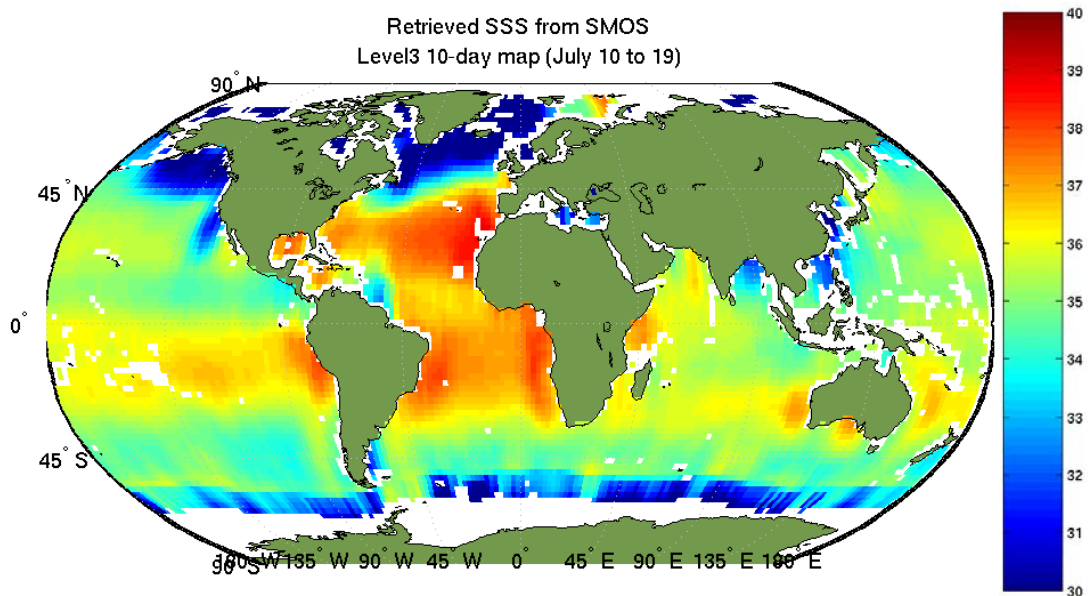


Figure 21. Example of SMOS 10-day SSS (10 to 19 July 2013). Source: SMOS Barcelona Expert Centre.

http://www.smos-bec.icm.csic.es/retrieved_sss_map_for_a_10_day_averaging_at_level_3
(accessed 24 March 2016)

AQUARIUS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

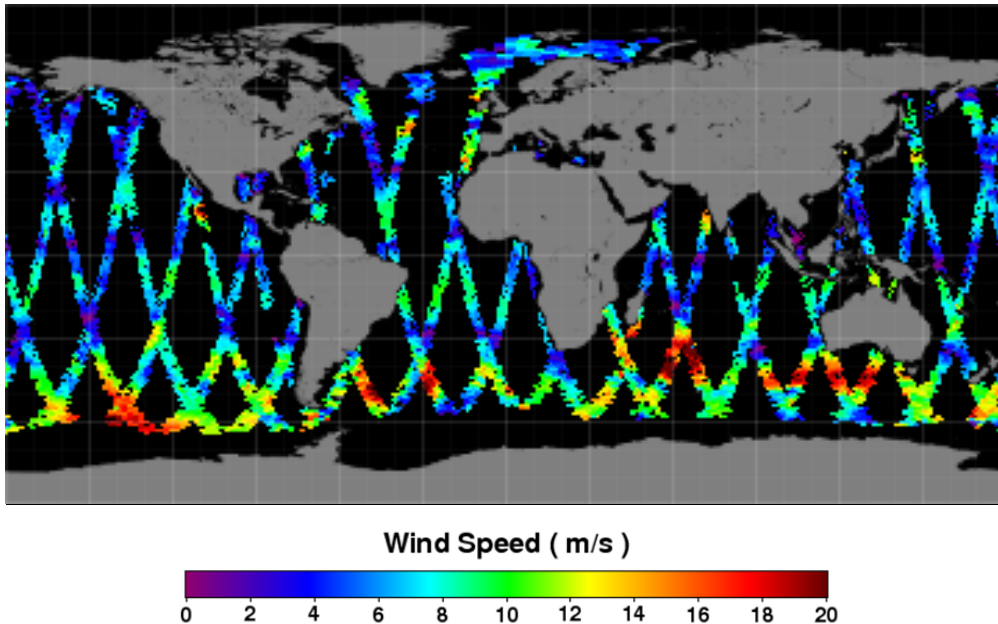


Figure 22. Example of Aquarius daily wind speed coverage, version 4 (6 June 2015) (NASA Aquarius project, 2015). Complete global coverage is provided every 7 days. Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

Resource abstract:

Aquarius is a NASA instrument aboard the Argentine SAC-D spacecraft. Its mission is to measure global sea surface salinity to better predict future climate conditions and to provide insight observations of variations in salinity and creating global ocean salinity distribution maps.

Resource language:

eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea surface salinity (SSS)

Wind speed

Geographic location:

Global coverage

Spatial resolution:

Aquarius level 2 and 3 datasets are available at a resolution of 100 km

Temporal extent:

2011-07 / 2015-06-07

Temporal resolution:

Daily for level 2 and daily, 8 day, monthly, 3 months and yearly for level 3

Depth range/resolution:

Surface

Conditions for access & use:

No conditions apply to access and use

Limitations on public access:

No

Responsible organisation:

NASA Ocean Biology Processing Group (OBPG) (OceanColor Web) and NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), USA

Data via:

OceanColor Web:

<http://oceandata.sci.gsfc.nasa.gov/Aquarius/>

Contact: webadmin@oceancolor.gsfc.nasa.gov

PO.DAAC: http://podaac.jpl.nasa.gov/dataset/AQUARIUS_L3_SSS_SMI_DAILY_V4

Contact: podaac@podaac.jpl.nasa.gov

Data format:

Digital, in HDF (Hierarchical Data Format)

References:

Information about citation and acknowledgements in:

<http://oceancolor.gsfc.nasa.gov/cms/citations>

<https://podaac.jpl.nasa.gov/CitingPODAAC>

Additional information:

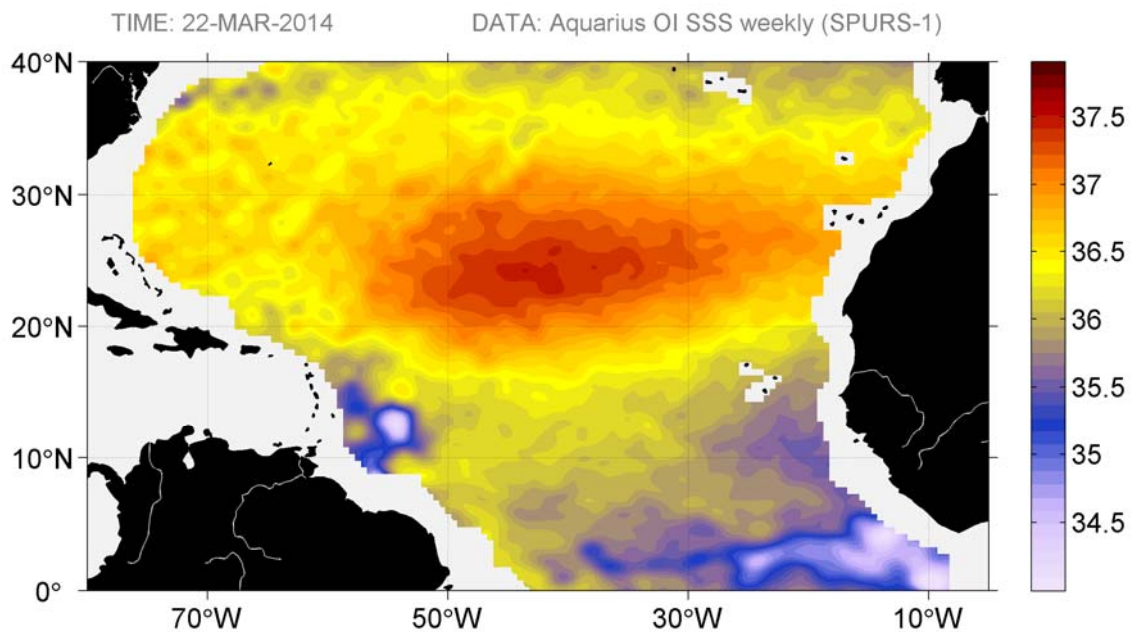


Figure 23. Aquarius sea surface salinity map (week starting on 19 March 2014) based in the Optimum Interpolation (OI) analysis (Melnicenko, 2014a,b). Source: International Pacific Research Center, University of Hawaii. <http://iprc.soest.hawaii.edu/users/oleg/oisss/at/> (accessed 23 March 2016)

CZCS – Coastal Zone Colour Scanner –
 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

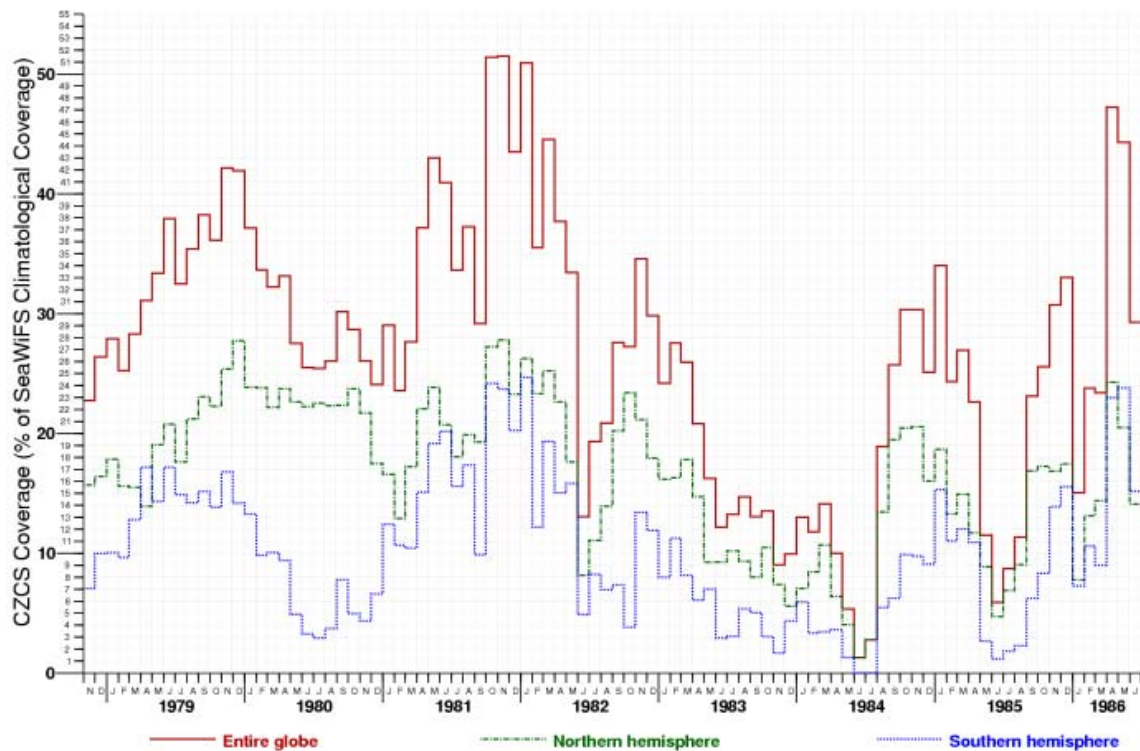


Figure 24. Timeline of the percentage of coverage obtained by CZCS, normalized against the representative monthly coverage from SeaWiFS. Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov/CZCS/czcs_datacollect.html (accessed 25 March 2016)

Resource abstract:

The Coastal Zone Color Scanner Experiment (CZCS) was the first instrument flown on a spacecraft devoted to the measurement of ocean color. CZCS had six spectral bands, four of which were used primarily for ocean color. Because CZCS shared power and data recorder storage with the other instruments on Nimbus-7, data collection was not uniform in time or space. It was originally estimated that the CZCS would only have a 10% duty cycle and was never intended to provide the kind of consistent, global sampling that we have become accustomed to with SeaWiFS and MODIS.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	<i>Observed variables</i> Chlorophyll a Diffuse attenuation coefficient at 490 nm
Geographic location:	Not uniform
Spatial resolution:	CZCS level 2 datasets are available at a resolution of 825 m. For level 3, datasets are available in 4.63 km and 9.26 km grid
Temporal extent:	1978-10 / 1986-06
Temporal resolution:	Daily for level 2 and daily, weekly (8 day), monthly and yearly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No

Responsible organisation: NASA Ocean Biology Processing Group (OBPG) (OceanColor Web), USA

Data via: OceanColor Web
Level 2: <http://oceancolor.gsfc.nasa.gov/>
Level 3: <http://oceandata.sci.gsfc.nasa.gov/>
Contact: webadmin@oceancolor.gsfc.nasa.gov

Data format: Digital, in HDF (Hierarchical Data Format)

References: Information about citation and acknowledgements in: <http://oceancolor.gsfc.nasa.gov/cms/citations>

Additional information:

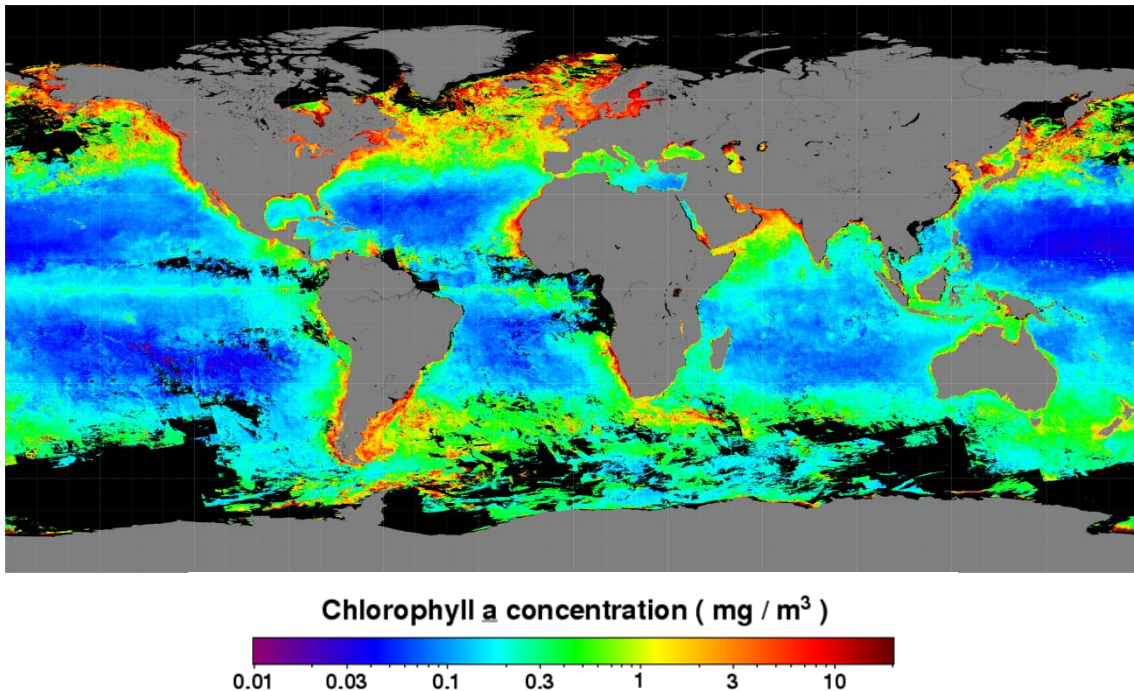


Figure 25. Example of CZCS annual composite chlorophyll a concentration on 9 km grid (1981) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014b). Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

SeaWiFS – Sea-Viewing Wide Field-of-View Sensor –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

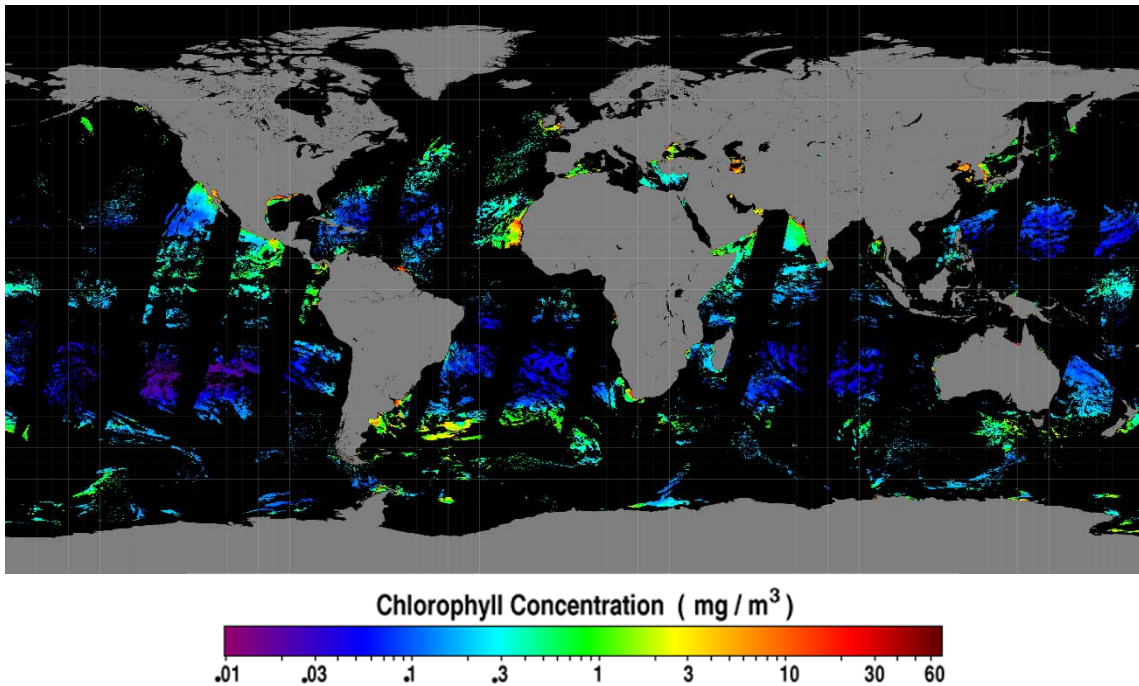


Figure 26. Example of SeaWiFS daily chlorophyll concentration (mg/m^3) global coverage on 9 km grid (1 March 2009) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014c). Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

Resource abstract:

SeaWiFS was the only scientific instrument on GeoEye's OrbView-2 (AKA SeaStar) satellite, designed to obtain global high-precision, moderate-resolution, multispectral visible observations of ocean radiance for research in biogeochemical processes, climate change, and oceanography, using 8 optical bands in the visible/near infrared regions of the spectrum.

Resource language:

eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Chlorophyll a
 Normalized water-leaving
 radiance at 555 nm
 Diffuse attenuation
 coefficient at 490 nm
 Photosynthetically Active
 Radiation (PAR)

Derived variables

Particulate Inorganic Carbon
 (PIC)
 Particulate Organic Carbon
 (POC)

Geographic location:

Global coverage

Spatial resolution:

SeaWiFS level 2 datasets are available in two resolutions: 1.1 km (LAC) and 4.5 km (GAC). For level 3, datasets are available in 4.63 km and 9.26 km grid

Temporal extent:

1997-09 / 2010-12

Temporal resolution:

Daily (for both daytime and nighttime passes) for level 2 and daily, weekly (8 day), monthly and annually for level 3

Depth range/resolution:

Surface

Conditions for access & use:

No conditions apply to access and use

Limitations on public access:

No

Responsible organisation: NASA Ocean Biology Processing Group (OBPG) (OceanColor Web), USA

Data via: OceanColor Web
Level 2: <http://oceancolor.gsfc.nasa.gov/>
Level 3: <http://oceandata.sci.gsfc.nasa.gov/>
Contact: webadmin@oceancolor.gsfc.nasa.gov

Data format: Digital, in HDF (Hierarchical Data Format)

References: Information about citation and acknowledgements in: <http://oceancolor.gsfc.nasa.gov/cms/citations>

Additional information:

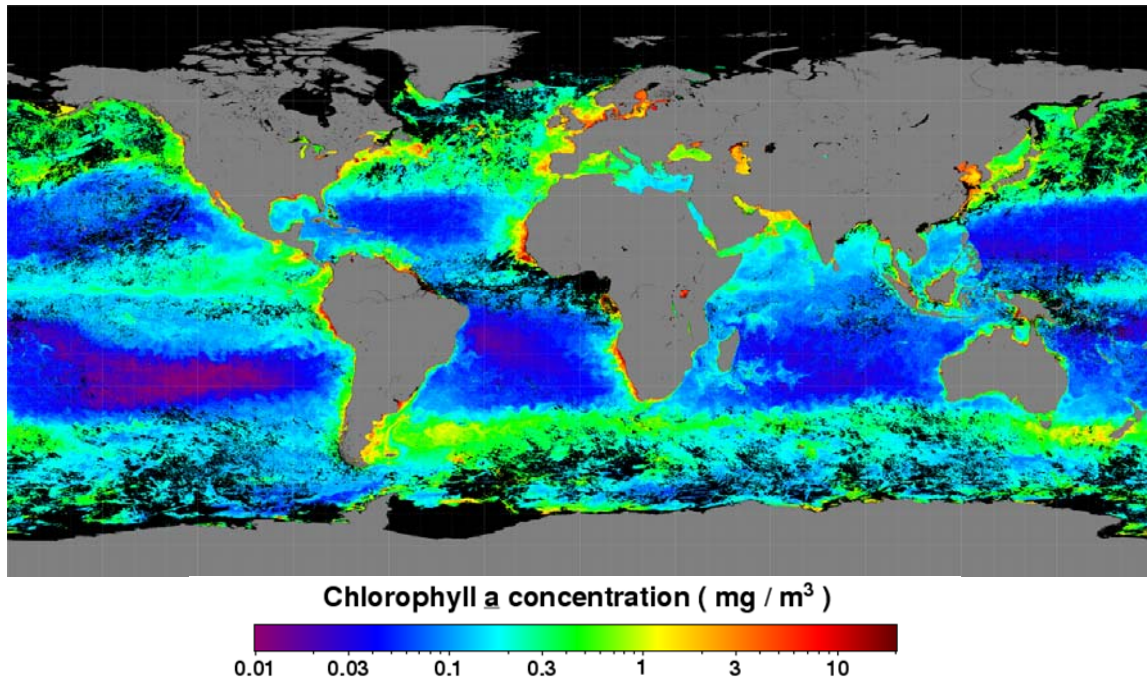


Figure 27. Example of SeaWiFS monthly averaged chlorophyll concentration on 9 km grid (March 2009) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014c). Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

VIIRS – Visible Infrared Imaging Radiometer Suite –
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA

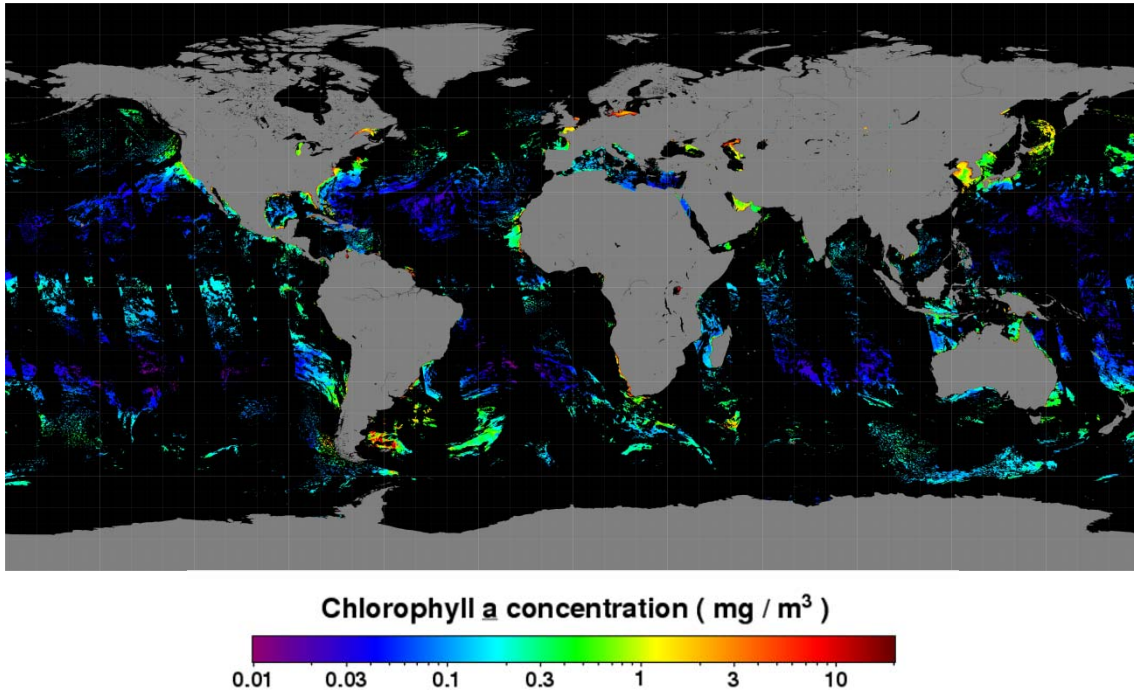


Figure 28. Example of VIIRS daily chlorophyll concentration global coverage on 4 km grid (28 October 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014d). Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

Resource abstract:

VIIRS, a scanning radiometer, collects visible and infrared imagery and radiometric measurements of the land, atmosphere, cryosphere, and oceans. VIIRS data is used to measure cloud and aerosol properties, ocean color, sea and land surface temperature, ice motion and temperature, fires, and Earth's albedo.

Resource language: eng

Keyword values: Environmental monitoring facilities

Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Sea surface temperature (SST)	Particulate Inorganic Carbon (PIC)
	Chlorophyll a	Particulate Organic Carbon (POC)
	Diffuse attenuation coefficient at 490 nm	
	Photosynthetically Active Radiation (PAR)	

Geographic location: Global coverage

Spatial resolution: VIIRS level 2 datasets are available at a resolution of 750 m. For level 3, datasets are available in 4 km and 9 km grid

Temporal extent: 2012-01 / present

Temporal resolution: Daily for level 2 and daily, 8 day, monthly, seasonally and yearly for level 3

Depth range/resolution: Surface

Conditions for access & use: No conditions apply to access and use

Limitations on public access: No

Responsible organisation: NASA Ocean Biology Processing Group (OBPG) (OceanColor Web) and NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), USA

Data via: OceanColor Web: <http://oceandata.sci.gsfc.nasa.gov/VIIRS/>
Contact: webadmin@oceancolor.gsfc.nasa.gov

PO.DAAC web page:
http://podaac.jpl.nasa.gov/dataset/VIIRS_NPP-NAVO-L2P-v1.0
Contact: podaac@podaac.jpl.nasa.gov

Data format: Digital, in HDF (Hierarchical Data Format)

References: Information about citation and acknowledgements in:
<http://oceancolor.gsfc.nasa.gov/cms/citations>
<https://podaac.jpl.nasa.gov/CitingPODAAC>

Additional information:

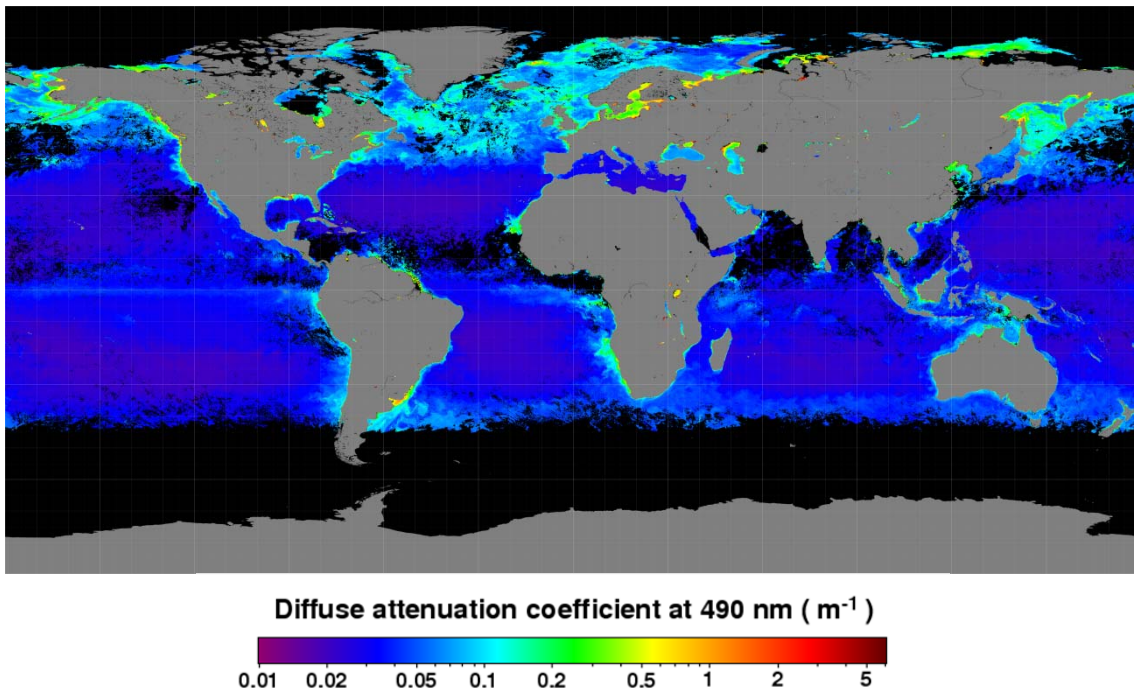


Figure 29. Example of VIIRS diffuse attenuation coefficient at 490 nm on 9 km grid (June 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014e). Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

**MODIS – MODerate Resolution Imaging Spectroradiometer –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA**

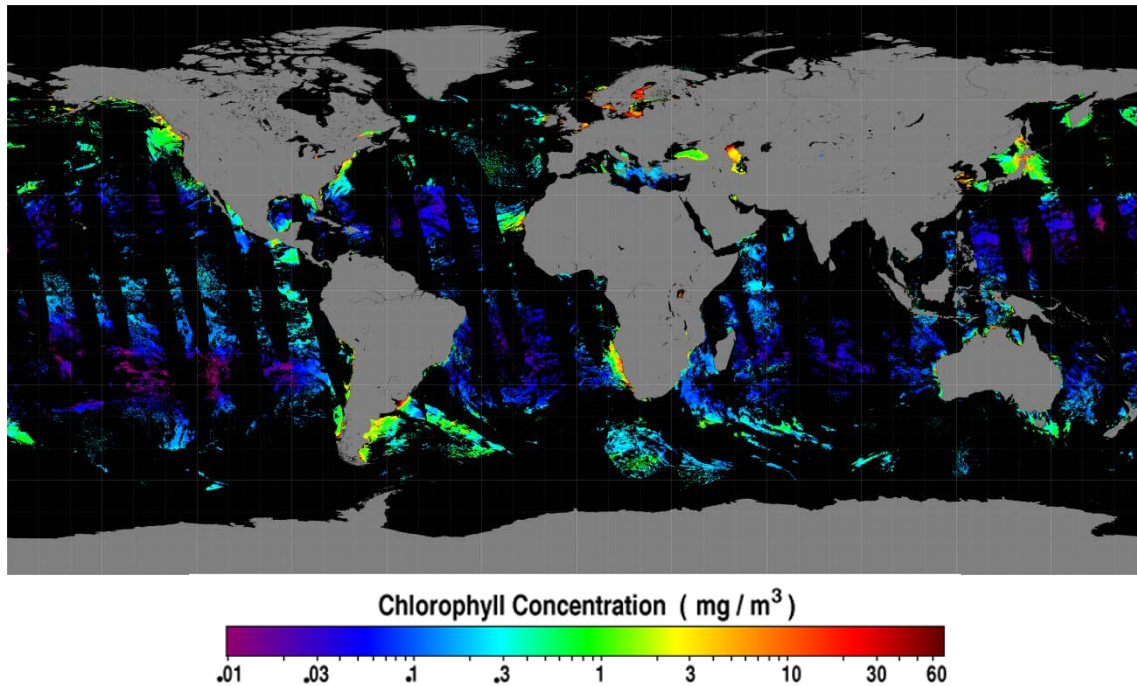


Figure 30. Example of MODIS/AQUA chlorophyll concentration daytime coverage on 4 km grid (1 April 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014a). Complete global coverage is provided in 1-2 days. Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

Resource abstract:

MODIS is a radiometer on board the NASA Terra and Aqua satellite platforms, launched in 1999 and 2002 respectively to study global dynamics of the Earth’s atmosphere, land, ice and oceans. MODIS captures data in 36 spectral bands at varying spatial resolutions.

Resource language:

eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea surface temperature (SST)
Chlorophyll a
Diffuse attenuation coefficient (KD)
Colored dissolved organic matter (CDOM)
Photosynthetically Active Radiation (PAR)

Derived variables

Particulate Inorganic Carbon (PIC)
Particulate Organic Carbon (POC)

Geographic location:

Global coverage

Spatial resolution:

MODIS level 2 datasets are available in different resolutions: 2 bands at 250 m, 5 bands at 500 m and 29 bands at 1 km. For level 3, datasets are available in 4.63 km and 9.26 km grid

Temporal extent:

Terra: 2000-02 / present

Aqua: 2002-06 / present

Temporal resolution:

Daily (for both daytime and nighttime passes) for level 2 and daily, weekly (8 days), monthly, seasonally and annually for level 3

Depth range/resolution: Surface
Conditions for access & use: No conditions apply to access and use
Limitations on public access: No
Responsible organisation: NASA Ocean Biology Processing Group (OBPG), USA
Data via: OceanColor Web
Level 2: <http://oceancolor.gsfc.nasa.gov/>
Level 3: <http://oceandata.sci.gsfc.nasa.gov/>
Contact: webadmin@oceancolor.gsfc.nasa.gov

Data format: Digital, in HDF (Hierarchical Data Format)
References: Information about citation and acknowledgements in: <http://oceancolor.gsfc.nasa.gov/cms/citations>

Additional information:

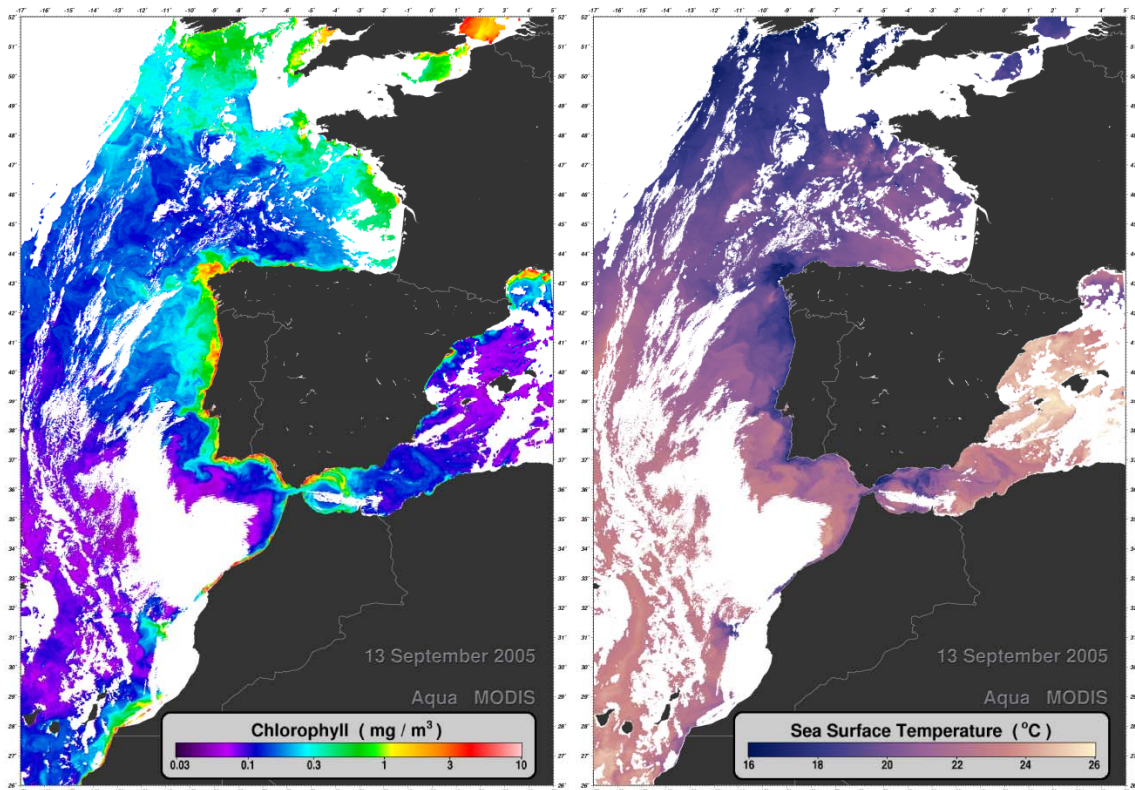


Figure 31. Example of MODIS daily synoptic chlorophyll concentration data in left panel, and SST data in the right panel (13 September 2005). Source: OceanColor Web. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

MERIS – MEdium Resolution Imaging Spectrometer –
EUROPEAN SPACE AGENCY (ESA)

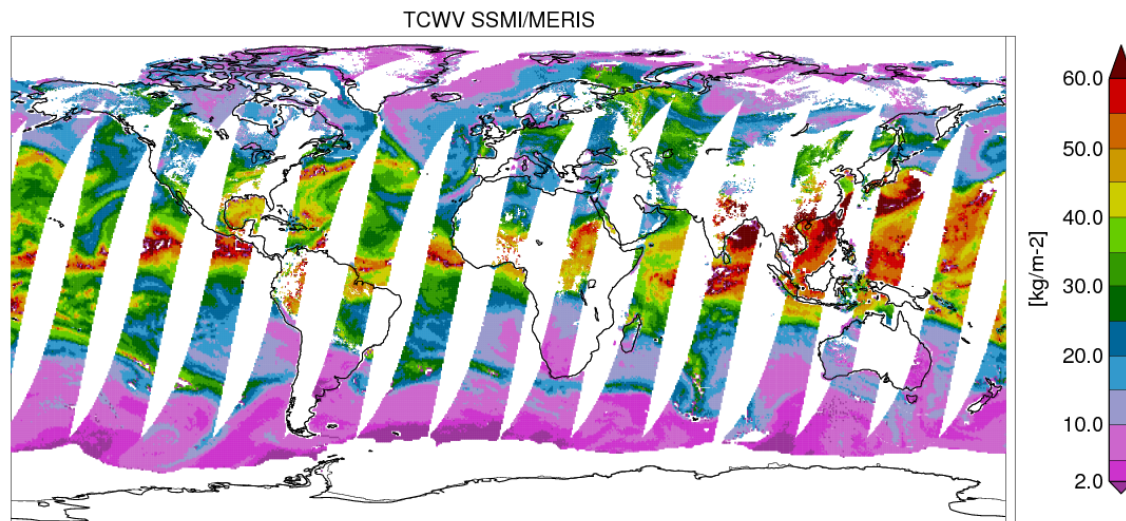


Figure 32. Daily composite of the combined product of total columnar water vapour (TCWV) from SSM/I and MERIS for the 15 July 2007, showing an example of SSM/I and MERIS daily coverage (land and ocean respectively) (Schröder et al., 2012; Lindstrot et al., 2014). To collect data for the entire planet 2-3 days are needed. Source: ESA DUE GlobVapour Project. <http://www.globvapour.info/newsarchive.html> (accessed 29 February 2016)

Resource abstract:

MERIS is a programmable, medium-spectral resolution, imaging spectrometer operating in the solar reflective spectral range for observing the color of ocean, and one of the main instruments on board the Envisat platform. It provides data from 15 spectral bands, and the spatial resolution is 300 m near nadir, with a swath width of 1165 km.

Resource language: eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

- Chlorophyll a
- Dissolved organic matter
- Suspended solid matter

Geographic location: Global coverage

Spatial resolution: MERIS datasets are available in full resolution (FR) – 1 pixel = 260 m x 290 m – or reduced resolution (RR) – 1 pixel = 1.040 m x 1.160 m for level 2. For level 3, data are generated on a 4.6 km or 9 km resolution grid (ESA) and a 4 km or 9 km resolution (NASA)

Temporal extent: 2002-04 / 2012-04

Temporal resolution: Daily (with 2-3 days of revisit time) for level 2 and daily or monthly for level 3

Depth range/resolution: Surface

Conditions for access & use: The ESA portal provides the data free of charge upon registration (access via MERCI) for level 2 and free access for level 3. Regarding OceanColor Web, data are of free access

Limitations on public access: No

Responsible organisation: European Space Agency (ESA) and NASA Ocean Biology Processing Group (OBPG) (OceanColor Web)

Data via:

ESA

Level 2: <https://earth.esa.int/web/guest/data-access/online-archives>

Level 3: <https://earth.esa.int/level3/meris-level3/index.html>

Contact: <https://earth.esa.int/web/guest/contact-us>

OceanColor Web (Levels 2 and 3):

<http://oceandata.sci.gsfc.nasa.gov/MERIS>

Contact: webadmin@oceancolor.gsfc.nasa.gov

Data format:

Digital, in HDF (Hierarchical Data Format) or netCDF format

References:

Any publication whatsoever resulting from work carried out using ESA data shall contain the following sentence: "Data provided by the European Space Agency."

Information about citation and acknowledgements in:

<http://oceancolor.gsfc.nasa.gov/cms/citations>

Additional information:

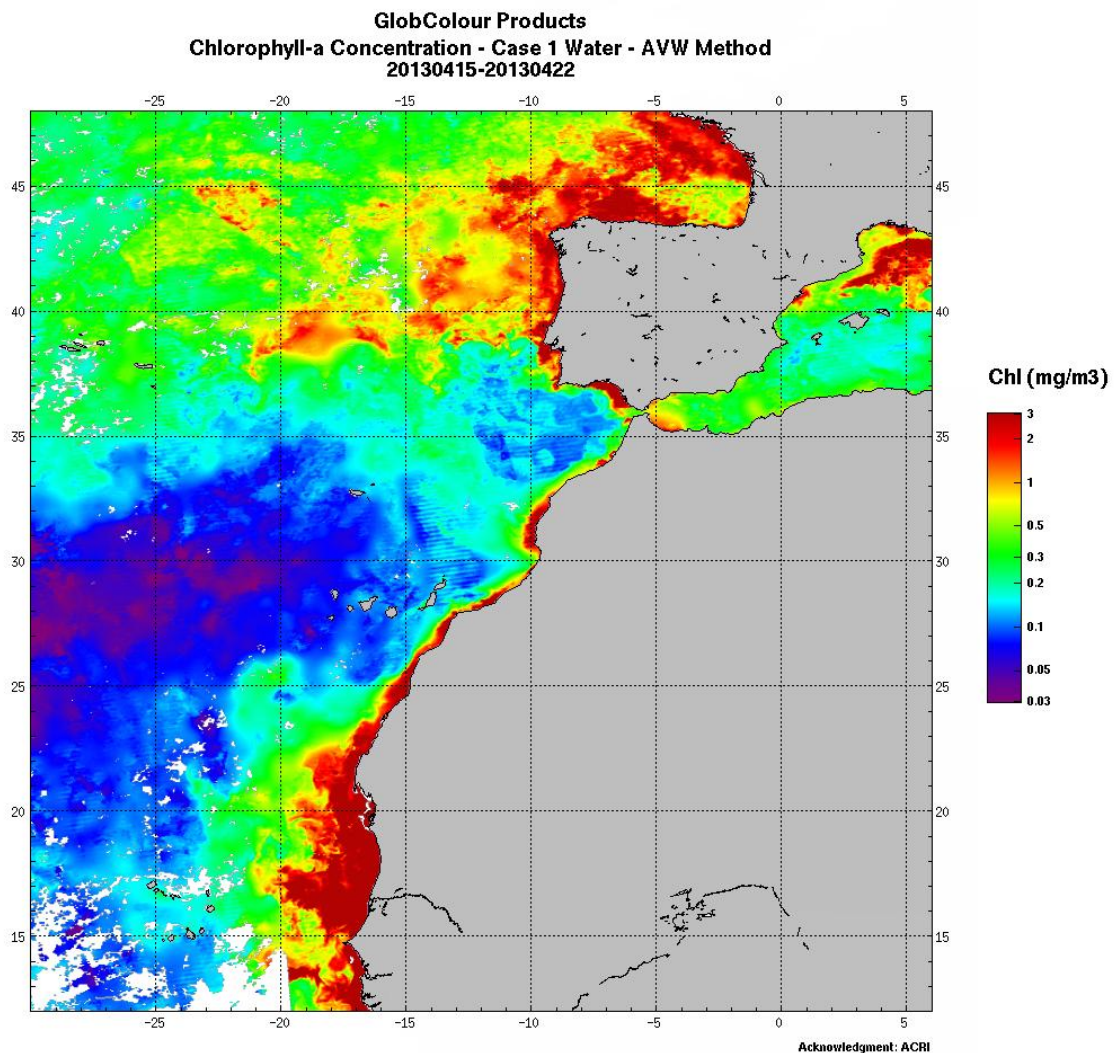


Figure 33. 8-days composite weighted averaged method (AVW) applied to merge the adjusted MODIS and SeaWiFS products with MERIS data (15-22 April 2013). Source: ESA DUE GlobColour Project. <http://www.globcolour.info/gallery/> (accessed 24 March 2016)

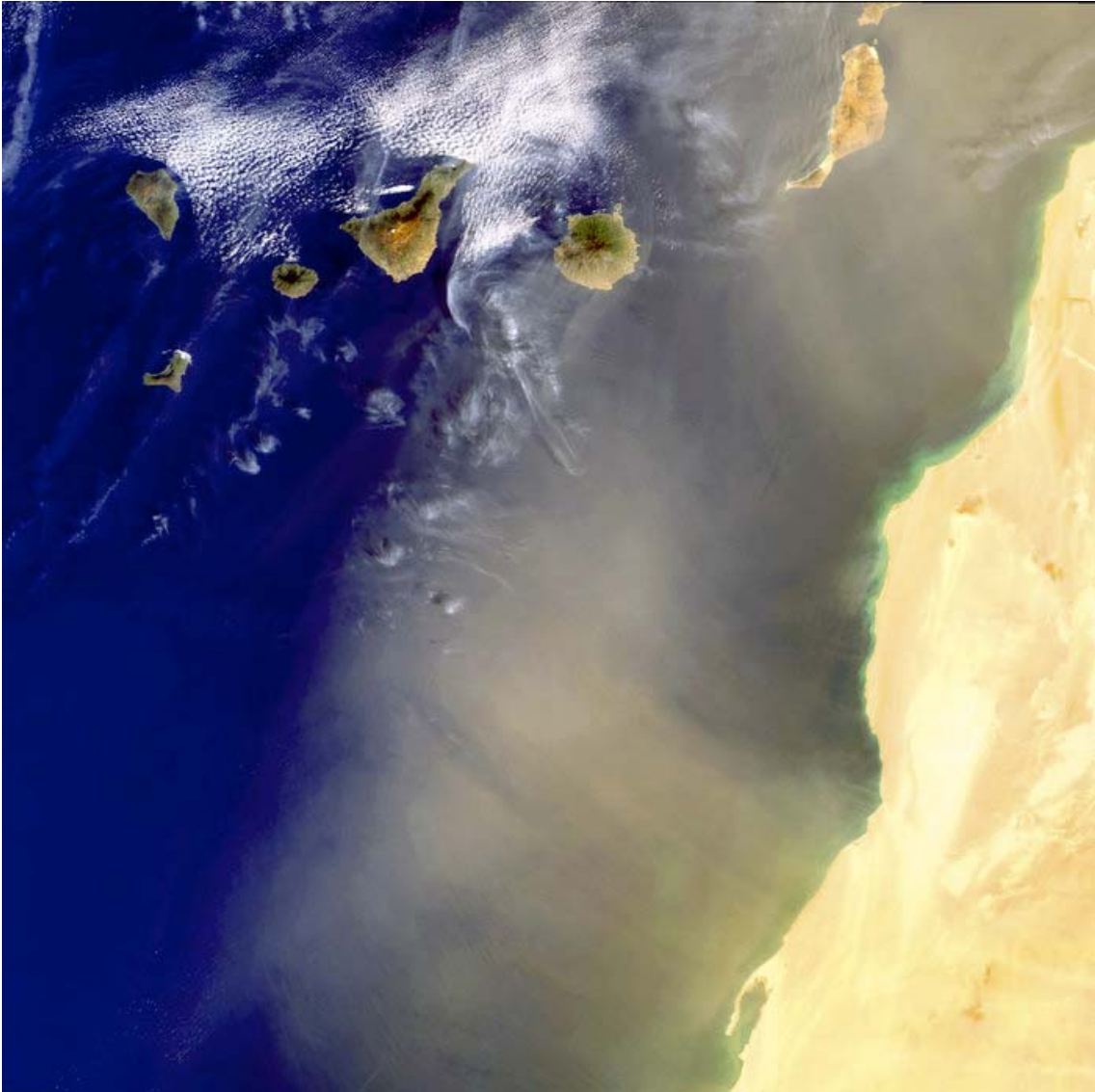
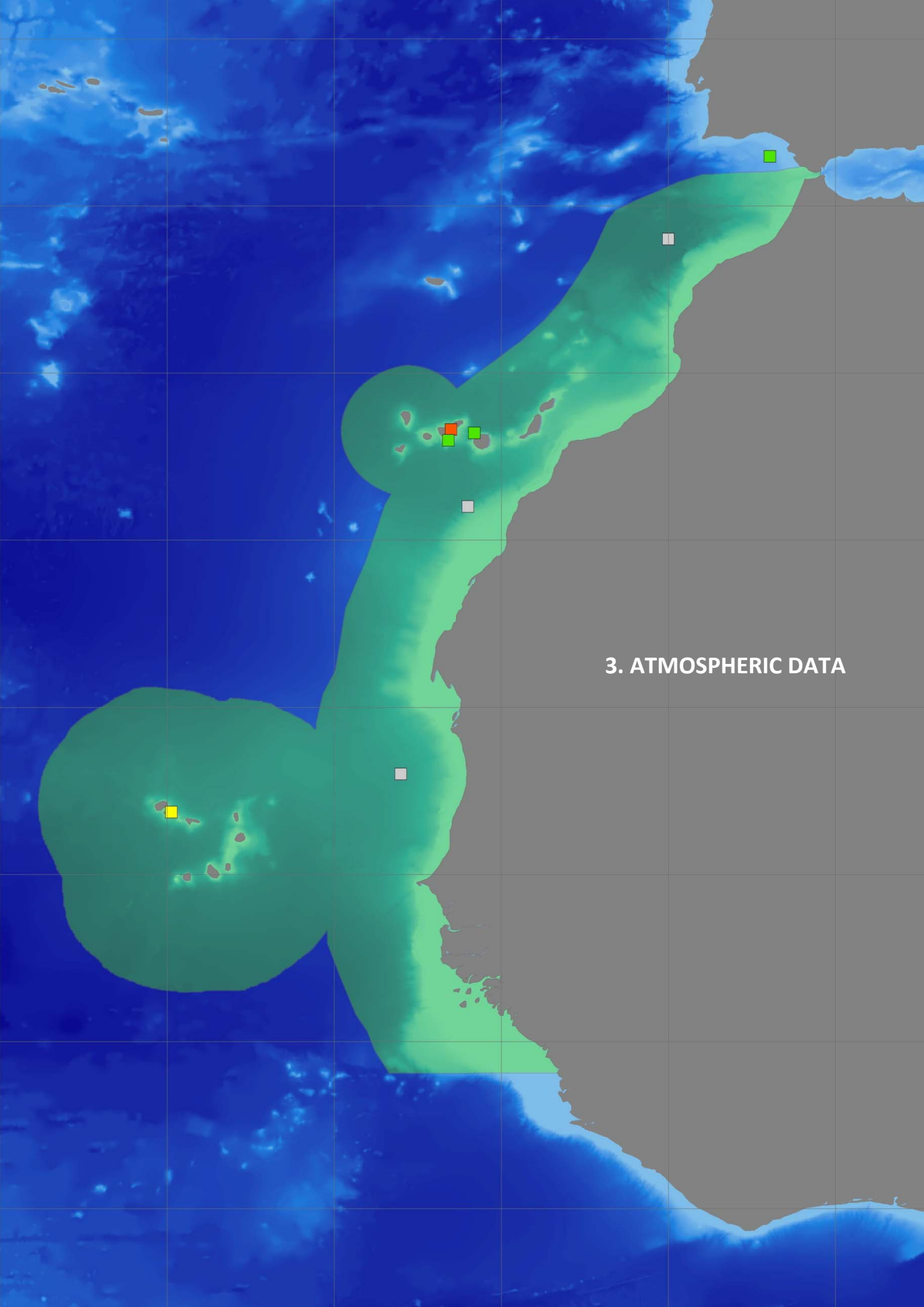


Figure 34. Example of MERIS 300-m resolution true color image. Desert dust is blown from the Western Sahara towards the Canary Islands (1 March 2003). Source: ESA. <http://www.esa.int/> (accessed 24 March 2016)



3. ATMOSPHERIC DATA

*Atmospheric data included in the CCLME area (in green).
The yellow square shows the location of the Cape Verde Atmospheric Observatory.
The orange square shows the location of the Izaña Atmospheric Observatory.
The green squares show the location of the Puertos del Estado's deep water buoys.
The grey squares show the sites used as reference for the IEO to calculate the Upwelling Indices.*

CAPE VERDE ATMOSPHERIC OBSERVATORY – CVAO –

INSTITUTO DE NACIONAL DE METEOROLOGIA E GEOFISICA (INMG), CAPE VERDE
DEPARTMENT OF CHEMISTRY, UNIVERSITY OF YORK, UNITED KINGDOM
MAX-PLANCK INSTITUTE FUR BIOGEOCHEMIE, GERMANY
TROPOS, LEIBNIZ-INSTITUT FUR TROPOSPHARENFORSCHUNG, GERMANY

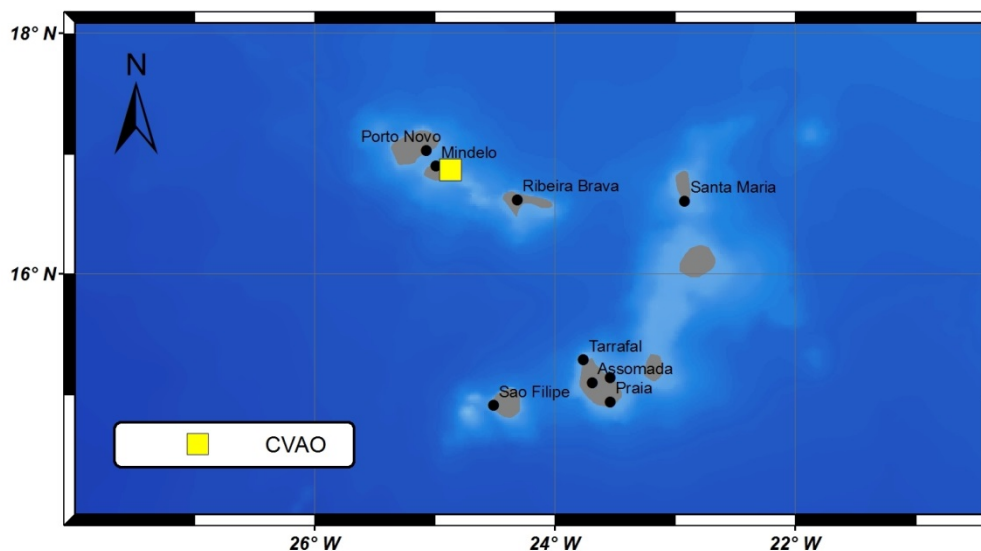


Figure 35. Location of the Cape Verde Atmospheric Observatory (CVAO) on the island of Sao Vicente, part of the Cape Verde archipelago off the west coast of Africa

Resource abstract:

The Cape Verde Atmospheric Observatory is a Global Atmospheric Watch (GAW) Global Station (http://www.wmo.int/pages/prog/arep/gaw/GAW_Global_st.html, accessed 30 March 2016). Measurements of meteorological parameters, greenhouse gases, shorter-lived trace gases and aerosol composition (physical and chemical parameters) are made in the context of the clean marine boundary layer. One of the major objectives is to investigate air-sea interactions and processes, and coupled data obtained at the Cape Verde Ocean Observatory (CVOO), and the CVAO provides highly valuable information about these processes.

Resource language: eng

Keyword values: Environmental monitoring facilities; Atmospheric conditions; Meteorological geographical features

Variables available:

Observed variables

Temperature (7.5 m, 30 m)

Relative Humidity (7.5 m, 30 m)

Wind direction (7.5 m, 30 m)

Wind speed (7.5 m, 30 m)

Atmospheric pressure

Total radiation

Rainfall

Surface ozone

Carbon monoxide

Speciated C2-C8 NMHC

O-VOC (acetone, methanol, acetaldehyde)

Dimethyl sulfide

Short-lived halocarbons

Nitrogen oxide

Nitrogen dioxide

Total gaseous mercury
 Physical, size resolved aerosol
 Chemical characteristics of aerosol
 Greenhouse gases (CO₂, CH₄, N₂O)

Geographic location: 24.86752°W 16.86403°N

Spatial resolution: Fixed-point measurements. Occasional aircraft experiments around Cape Verde to 200 km from African coastline. Some ship data from the surrounding area also available from during the RHaMBLe campaign (Table 1)

Temporal extent: 2006-10-01 / present

Temporal resolution: Variable depending on the instrument, at least hourly data available for above list of variables, in most cases higher time resolution data available

Depth range/resolution: 20-40 m a.s.l.

Conditions for access & use: No costs for data use although data access is restricted to approved users (apply for access) for 2 years after collection. Acknowledgement or co-authorship required for publications

Limitations on public access: Yes (login via web portal required)

Responsible organisation: University of York, York, United Kingdom

Data via: British Atmospheric Data Centre (BADC):
<http://badc.nerc.ac.uk/home/index.html>

World Data Centre for Greenhouse Gases (WDCGG):
<http://ds.data.jma.go.jp/gmd/wdcgg/>

Contact: katie.read@ncas.ac.uk
 Dr. Katie Read. Coordinator of Cape Verde Atmospheric Observatory, NCAS, University of York

Contact: Lucy.carpenter@york.ac.uk
 Prof. Lucy Carpenter. Principal Investigator, University of York

Contact: martin.heimann@bgc-jena.mpg.de
 Prof. Martin Heimann. Principal Investigator, MPI-Jena

Contact: herrmann@tropos.de
 Prof. Hartmut Hermann. Principal investigator, Tropos, Leipzig Digital, available as ASCII (NASA Ames formatted) text files
References: "Data is taken from the Cape Verde Atmospheric Observatory (CVAO), Sao Vicente, Republic of Cape Verde, www.ncas.ac.uk/index.php/en/cvao-home."

Additional information:
 CVAO facilities on site can be used (air conditioned lab space, 30 m tower, space for containers -for a fee).

Additional information (e.g. information on instruments, real-time data, publication lists, etc.) can be found via the CVAO website: <https://www.ncas.ac.uk/index.php/en/cvao-home> (accessed 30 March 2016) or by contacting katie.read@ncas.ac.uk

Access to the observatory is through the National Centre for Atmospheric Science (NCAS) Atmospheric Measurement Facility (AMF) please contact: katie.read@ncas.ac.uk

Table 1. The table shows a summary of additional instrumentation and campaigns which have been held at the CVAO, with timescales and responsible institution. Source: CVAO

Campaign Name and PI	Date	Institute, Country
SOLAS Aerosol filtration (Achterberg)	Apr 2007-Nov 2008	NOC, Southampton, UK
MAX-DOAS (BrO, IO, OIO) (Platt)	Oct 2006 –Present	Heidelberg, Germany
GHG monitoring (flask sampling) (Heimann, Kozlova)	Mar 2007 - Present	MPI, Germany
Reactive Halogens in the Marine Boundary Layer experiment (RHAMBLE) + SOPRAN (McFiggans)*	May-Jun 2007	Leeds, UK, Irvine, USA, Germany
SOPRAN-Aerosol intensive (Müller)	Nov 2007 – Jan 2008	Leipzig, Germany
Passive air sampling, PCBs, POPs (Gioia)	Dec 2007-July 2009	Lancaster, UK
SOPRAN Aerosol intensive (Müller)	Jun-Aug 2008	Leipzig, Germany
SOPRAN Aerosol intensive (Müller)	Dec 2008 – Feb 2009	Leipzig, Germany
SOPRAN (radiometer) (Fischer)	Mar 2009-Present	Hamburg, Germany
Seasonal Oxidant Study (SOS) + SOPRAN (Carpenter, Monks, Heard)*	Feb, May, Sep, Nov 2009	Leeds, UK, Irvine, USA, Germany
O3 Sondes (Von Glasow)	May 2009	Manchester, UK
O3 fluxes (Phillips)	Sep 2009- Present	CEH, UK
SOPRAN (halocarbon isotopes) (Bahlmann)	Nov 2009	Hamburg, Germany
Ship cruise SOPRAN: MAX-DOAS measurements alongside site longpath measurements (Platt).	May-June 2010	Heidelberg, Germany
O3 Sondes (Jenkins)	Summer 2010	Howard, Washington, US
POP's (Gioia)	Sept 2010	Lancaster, UK
DLR Falcon measurements Halogens in the MBL and upper troposphere, as well as methane and biomass burning plumes from Africa. Instrumentation/measurements: NO/NOy,	October 2010	Heidelberg, Germany

*During both RHAMBLE and SOS the Leipzig group did an increased frequency of aerosol measurements

IZAÑA ATMOSPHERIC OBSERVATORY – IZO –
AGENCIA ESTATAL DE METEOROLOGIA (AEMET), SPAIN

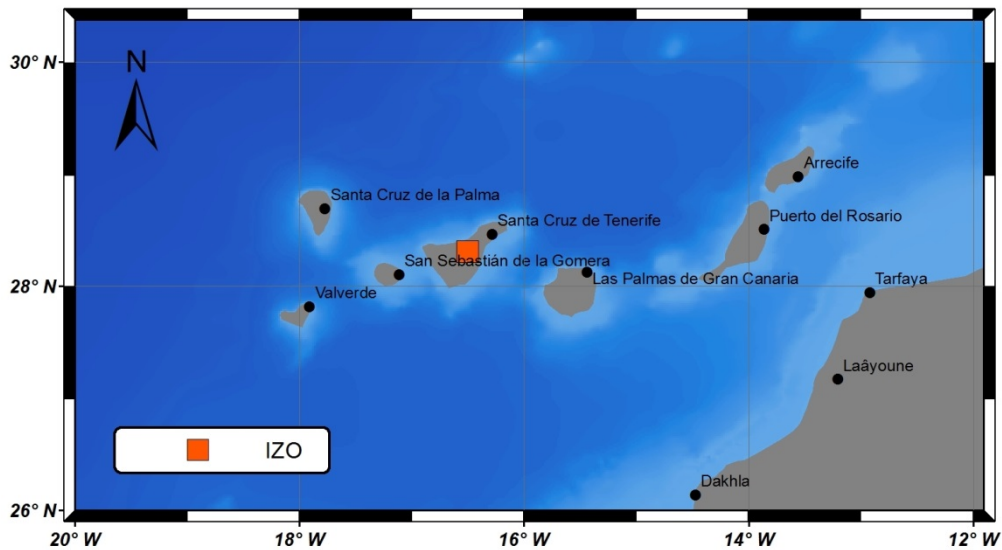


Figure 36. Location of the IZO in the island of Tenerife (Canary Islands)

Resource abstract:

The Izaña Atmospheric Observatory is located on the Island of Tenerife, Spain, roughly 300 km west of Africa. The meteorological observatory is situated on a mountain at 2373 m a.s.l., 15 km north-east of the volcano Teide (3718 m a.s.l.). The local wind field at the site is dominated by north-westerly winds. A predominant meteorological attribute of the Canary Islands region is the presence of the trade wind inversion that persists through most of the year and is well below the altitude of the station.

Resource language:

spa

Keyword values:

Environmental monitoring facilities; Atmospheric conditions; Meteorological geographical features

Variables available:

Observed variables

- Light absorption coefficient, total aerosol
- Light backscattering coefficient, total aerosol
- Light scattering coefficient, total aerosol
- Major chemical components (size fractionated)
- Mass concentration (coarse) or Mass PM10
- Mass concentration (size fractionated)
- Mass concentration (total aerosol) or Mass TSP
- Multiwavelength optical depth, total aerosol
- Number concentration
- Number size distribution, total aerosol
- Vertical distribution of properties
- Aerosol optical depth (AOD)
- Angstrom exponent
- Column aerosol size distribution
- Aerosol extinction vertical profiles
- CH₄
- CO₂
- N₂O
- SF₆
- CO

SO₂
 NO_x
 Aerological sounding
 Humidity
 Precipitation
 Trajectories
 Wind direction
 Wind speed
 Sunshine
 Surface ozone
 Total column ozone
 Vertical ozone profile
 Direct solar radiation (DNI)
 Global solar radiation (GHI)
 Diffuse radiation (DHI)
 Long-wave radiation (>3μm)
 Clouds observation
 UV Broadband
 UV Erythemally weighted
 UV Spectral
 Radio Nuclide (CO₂ [C-14])
 C₂H₆
 C₃H₈
 CH₂O
 ClONO₂
 CO
 COF₂
 H₂
 HCl
 HCN
 HF
 HNO₃
 i-C₄H₁₀
 i-C₅H₁₂
 n-C₄H₁₀
 n-C₅H₁₂

Geographic location: 16.4993833°W 28.3089833°N
Spatial resolution: n/a
Temporal extent: 1984 / present
 Meteorology: 1916 / present
Temporal resolution: n/a
Depth range/resolution: 2372.899 m.a.s.l.
Conditions for access & use: Temporary restriction of two years in some variables
Limitations on public access: Yes
Responsible organisation: Izaña Atmospheric Research Center (CIAI) from the Agencia Estatal de Meteorología (AEMET), Santa Cruz de Tenerife, Spain
Data via: <http://izana.aemet.es>
<http://www.aemet.es>

Contact: ecuevasa@aemet.es

Emilio Cuevas-Agullo. Head, Izaña Atmospheric Research Center, AEMET
Digital (plain text)

Data format:

Additional information:

At the Izaña Observatory clean air and clear sky conditions are prevailing around all the year. Firstly, it is located in the region below the descending branch of the Hadley cell, typically above a stable inversion layer. Secondly, it is situated on an island far away from any significant industrial activities. Consequently, it offers excellent conditions for in-situ measurements of trace gases and aerosols under “free troposphere” conditions and for atmospheric observations by remote sensing techniques. The environmental conditions and pristine skies are optimal for instrument calibration and validation activities. Due to its geographic location it is most valuable for the investigation of dust transport from Africa to the North Atlantic, and large scale transport from the tropics to higher latitudes.

Contact: mar@puertos.es

Marta de Alfonso. Networks Development Manager, Physical Oceanography Group, Puertos del Estado

Data format:

Digital, in ASCII and netCDF

References:

“These data come from Puertos del Estado’s Spanish Deep Water Buoy Network, a multipurpose network for the marine environment monitoring.”

Additional information:

Two of these stations are in the CCLME region:

- Gran Canaria (WMO: 13130). 15.80°W - 28.20°N

Mooring Depth: 780 m

Temporal extent: 1997-06-20 / present

Type of sensor: Directional Oce-Met

- Tenerife (WMO: 13131). 16.58°W - 27.99°N

Mooring Depth: 710 m

Temporal extent: 1998-04-01 / present

Type of sensor: Directional Oce-Met

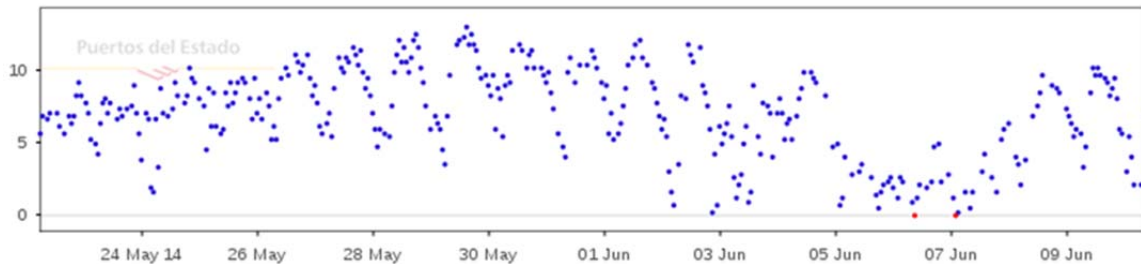


Figure 38. Wind speed (knots) observed at Tenerife Sur buoy (coverage period: 24 May 2014 – 9 June 2014). Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

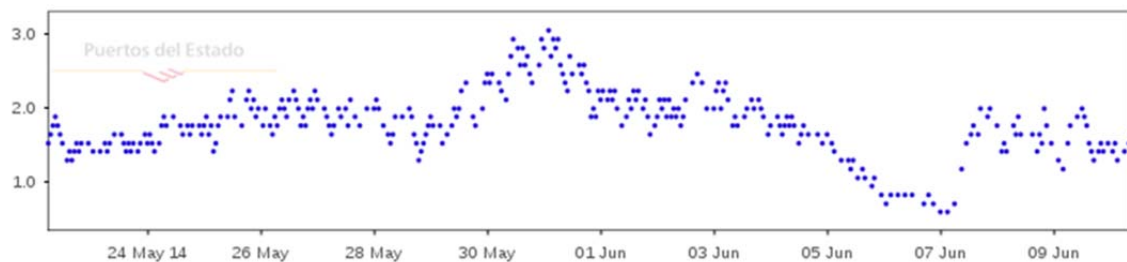


Figure 39. Significant wave height (m) observed at Gran Canaria buoy (coverage period: 24 May 2014 – 9 June 2014). Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

NORTH ATLANTIC OSCILLATION – NAO –

CLIMATE PREDICTION CENTER, NATIONAL WEATHER CENTER, NOAA, UNITED STATES OF AMERICA

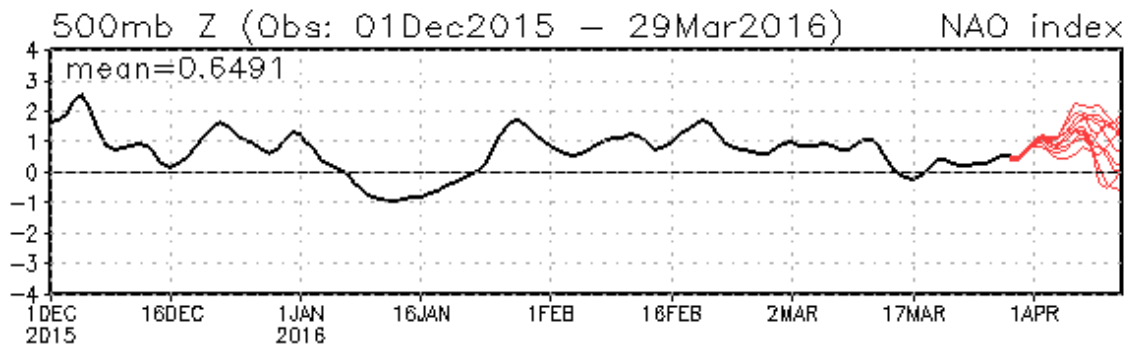


Figure 40. Observed NAO index (black line) plus forecasted NAO indices from each of the 11 MRF (Medium Range Forecast) ensemble members starting from the last day of the observations (red lines). Source: NWS/NOAA.

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/new.nao.shtml> (accessed 30 March 2016)

Resource abstract:

The NAO is a measure of the strength of the westerlies across the North Atlantic. It is the difference in pressure between Ponta Delgada on the Azores and Stykkisholmur in Iceland. The NAO consists of a north-south dipole of anomalies, with one center located over Greenland and the other center of opposite sign spanning the central latitudes of the North Atlantic between 35°N and 40°N.

Daily and monthly NAO indices are calculated. The daily NAO index corresponds to the NAO patterns, which vary from one month to the next. Each daily value has been standardized by the standard deviation of the monthly NAO index from 1950 to 2000 interpolated to the day in question. Monthly NAO indices are standardized by the 1981-2010 climatology.

Resource language:	eng	
Keyword values:	Oceanographic geographical features	
Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Pressure	Daily NAO index Monthly NAO index

Geographic location: North Atlantic Ocean

Spatial resolution: n/a

Temporal extent: 1950 / present

Temporal resolution: Daily

Depth range/resolution: Surface

Conditions for access & use: The information on National Weather Service (NWS) web pages are in the public domain, unless specifically noted otherwise, and may be used without charge for any lawful purpose

Limitations on public access: No

Responsible organisation: National Weather Service, NOAA, Silver Spring, USA

Data via: Daily NAO: <ftp://ftp.cpc.ncep.noaa.gov/cwlinks/>

Monthly NAO:
All monthly means in graphical format:

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/>

[month_nao_index.shtml](#)

JFM Seasonal mean in graphical format:

http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/JFM_season_nao_index.shtml

Tabular ASCII format:

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii.table>

ASCII format:

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii>

Data format:

Digital (ASCII format and graphics)

Additional information:

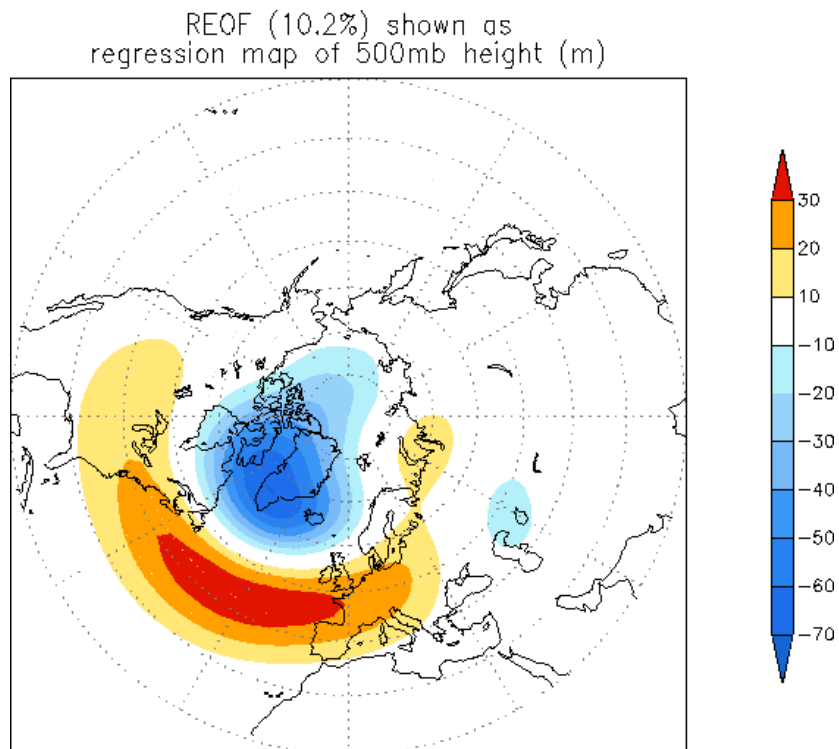


Figure 41. Rotated Empirical Orthogonal Function (REOF) analysis of monthly mean 500 mb height during 1950-2000 time period. Source: NWS/NOAA. http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao_loading.html (accessed 30 March 2016)

UPWELLING INDEX – UI –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

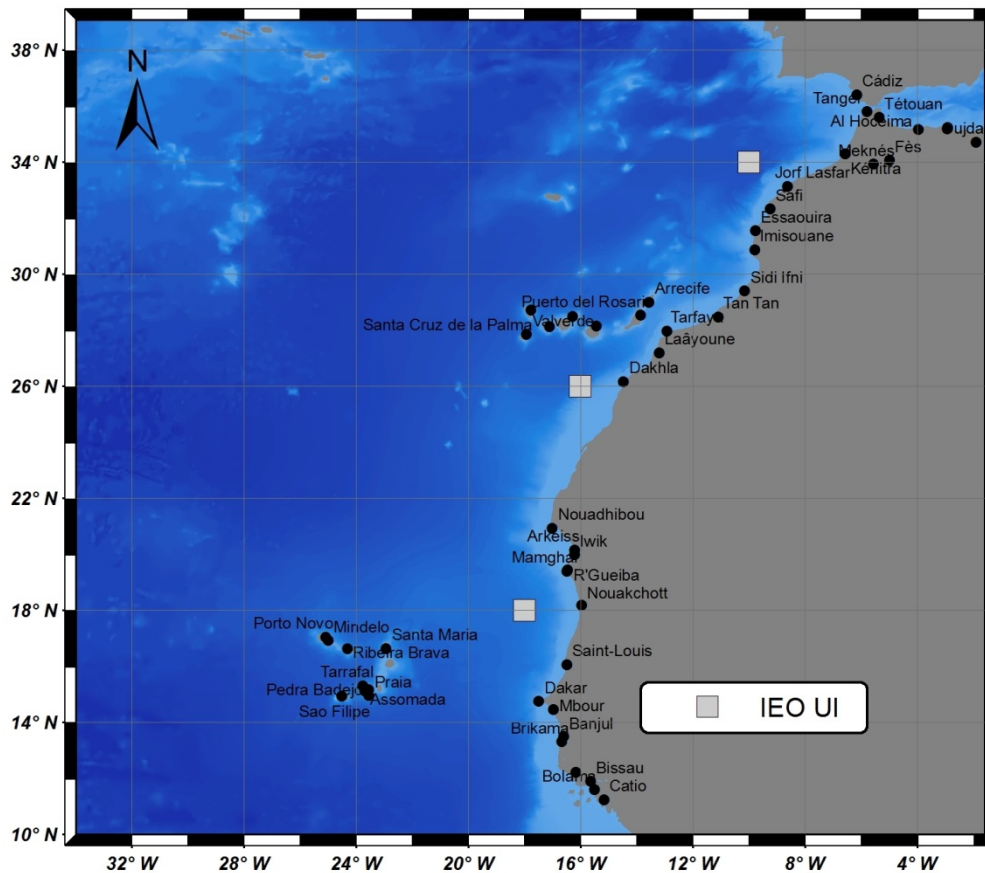


Figure 42. Location of the three stations where the Upwelling Index is calculated

Resource abstract:

The Instituto Español Oceanografía coastal upwelling indices are calculated based upon Ekman's theory of mass transport due to wind stress and are available in the IEO website (<http://www.indicedeafloresamiento.ieo.es>, accessed 30 March 2016). The methodology used was the proposed by Bakun (1973) as indicated in the technical reports published by the IEO (Lavín et al., 1991).

The basic input data to calculate UI is the sea level pressure field over the ocean. The Navy Operational Global Atmospheric Prediction System (NOGAPS) model 6 hourly sea level pressure (SLP, hPa) database, maintained by FNMOC (Fleet Numerical Meteorology and Oceanography Center, US Navy's), is used to calculate UI following Lavín et al. (1991).

Resource language:	eng, spa	
Keyword values:	Oceanographic geographical features	
Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Sea Level Pressure	Upwelling Index
		Winds
Geographic location:	18.00°W – 10.00°W	18.00°N – 34.00°N
Spatial resolution:	Three stations:	
	Morocco: 10.00°W – 34.00°N	
	Western Sahara-Canary Islands: 16.00°W – 26.00°N	
	Mauritania: 18.00°W – 18.00°N	
Temporal extent:	1967-01-01 / present+7 days of forecast	
Temporal resolution:	6 hours	

Depth range/resolution: Surface
Conditions for access & use: The data can be used without limitations for educational and scientific objectives. It must be cited and acknowledged following the citation example
Limitations on public access: No
Responsible organisation: Instituto Español de Oceanografía, Vigo, Spain.
Data via: <http://www.indicedeafloramiento.ieo.es>

Contact: gonzalo.gonzalez@vi.ieo.es.
 Gonzalo González-Nuevo González. Scientist, Instituto Español de Oceanografía

Data format: Digital: ASCII (CSV format), Excel and Matlab
References: "Upwelling index time series has been provided by the Instituto Español de Oceanografía (www.indicedeafloramiento.ieo.es) and has been calculated using sea level pressure obtained from the Fleet Numerical Meteorology and Oceanography Center (www.usno.navy.mil/FNMOC)."

Additional information:

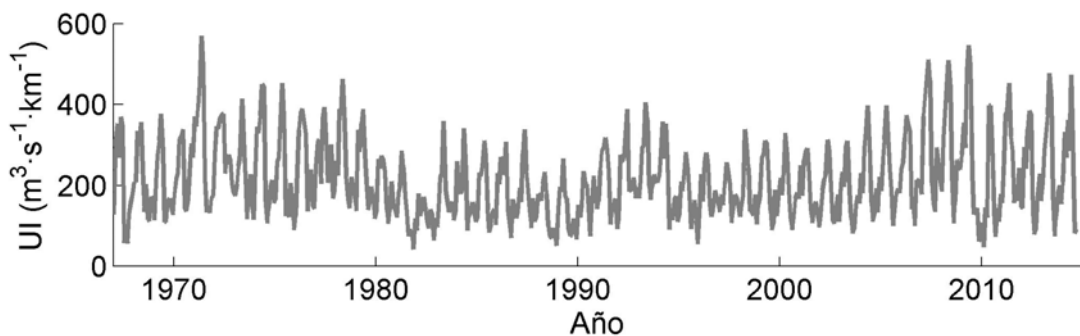


Figure 43. Upwelling Index time series of the Mauritania station. Source: IEO

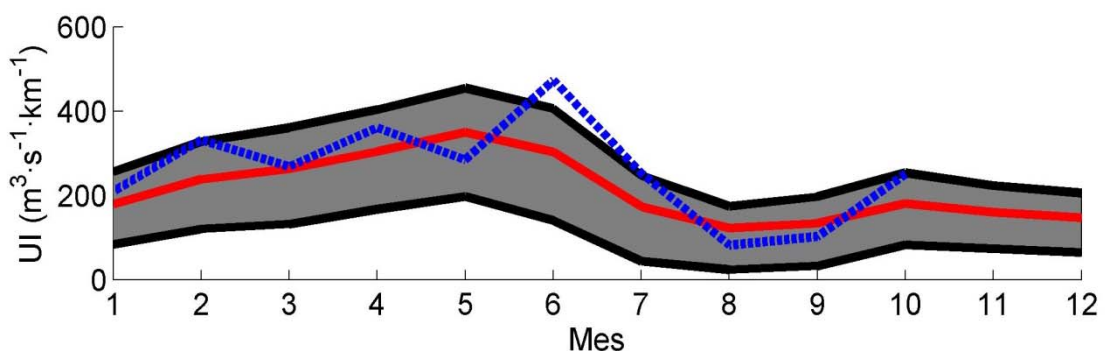
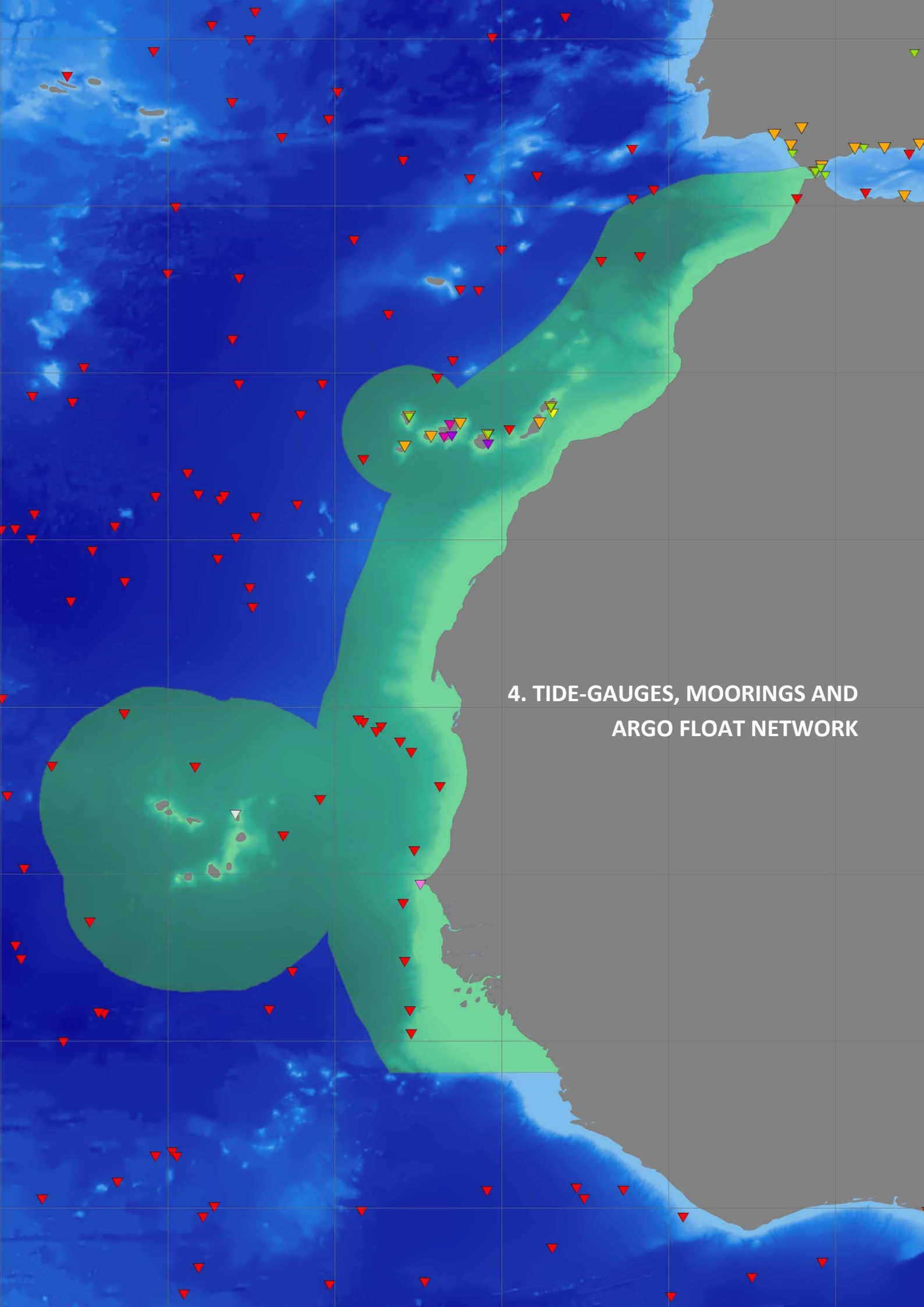


Figure 44. Mean seasonal cycle of upwelling index calculated from the Mauritania station (1967-2014, red line). The black solid lines are the percentile 25 and 75 respectively. The upwelling index series of the year 2014 is represented in blue dashed line. Source: IEO



**4. TIDE-GAUGES, MOORINGS AND
ARGO FLOAT NETWORK**

Tide gauges, moorings and Argo buoys deployed at CCLME (in green).
The green triangles show the location of the Instituto Español de Oceanografía tide gauges.
The fuchsia triangles show the location of the Instituto Geográfico Nacional tide gauges.
The orange triangles show the location of the Puertos del Estado tide gauges.
The purple triangles show old Puertos del Estado tide gauges.
The grey triangle shows the location of the Palmeira tide gauge.
The pink triangle shows the location of the Dakar tide gauge.
The yellow triangle shows the location of the Eastern boundary Current 4 mooring.
The red triangles show the Argo array on 24 October 2014.

EASTERN BOUNDARY CURRENT 4 MOORING – EBC4 –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

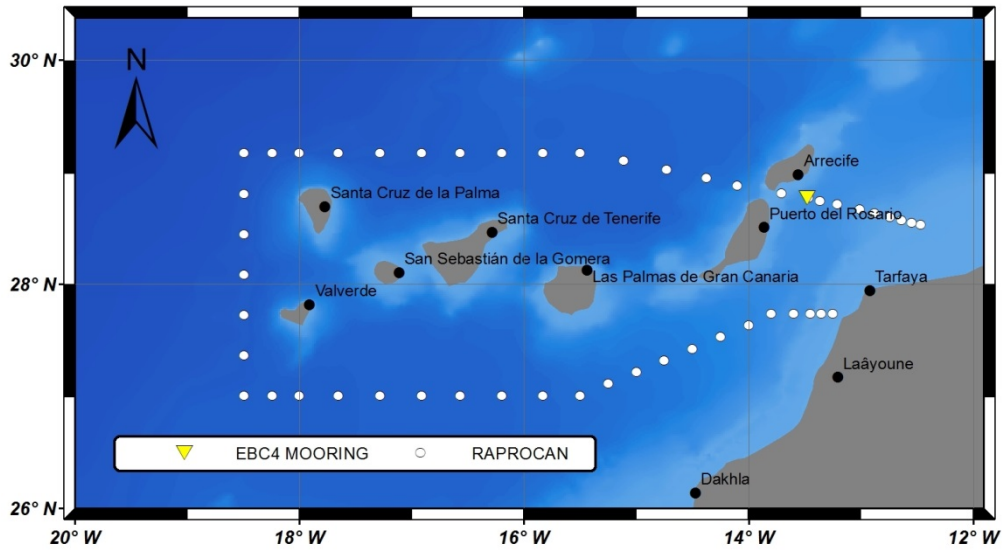


Figure 45. Location of EBC-4 mooring (yellow triangle), in the Lanzarote Passage, between Lanzarote island and Africa. EBC-4 is one sampling station within the RAPROCAN section (white dots)

Resource abstract:

The objective of the Eastern Boundary Current mooring (EBC) is to monitor the decadal and long-term changes of the North Atlantic Subtropical Gyre eastern branch. The mooring monitors the three waters masses found in the area (North Atlantic Central Waters, Antarctic Intermediate Waters and Mediterranean Outflow Waters) and the transport across the Lanzarote Passage. The transport was calibrated during the initial phase (1997-1999) with an array of four moorings across the passage.

Resource language: spa, eng

Keyword values: Oceanographic geographical features

Variables available:

<i>Observed variables</i>	<i>Derived variables</i>
Currents speed and direction	Density
	Transport

Geographic location: 13.474833°W 28.764000°N

Spatial resolution: n/a

Temporal extent: 1997 / present

Depth range/resolution: From 50 m to 1380 m depth

Temporal resolution: Time series with 2 hours resolution

Conditions for access & use: No conditions apply

Limitations on public access: No

Responsible organisation: Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain
 Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain

Data via: Contact: pedro.velez@ca.ieo.es
 Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía

Contact: alonso.hernandez@ulpgc.es
 Alonso Hernández-Guerra. Professor, Instituto de

Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria

Data format: Digital (plain text)

References: Vélez-Belchí, P., Hernández-Guerra, A., Barrera, C., Fraile-Nuez, E., Barrera, A., Llinas, O., Benítez-Barrios, V., Domínguez, F., Alonso-González, I., González-Dávila, M., Santana-Casiano, J. M., Hernández-Brito, J. J., Presas-Navarro, C., Arístegui-Ruiz, J., Comas-Rodríguez, I., Garijo-Lopez, J. C., Hernández-León, S., Pérez-Hernández, M. D., Rodríguez-Santana, A. and Sosa-Trejo, D. 2014. *Monitoring the Oceanic Waters of the Canary Islands: the deep hydrographic section of the Canaries*. IV Congress of Marine Science, Las Palmas de Gran Canaria, Spain, 11-13 June 2014. URI: <http://hdl.handle.net/10508/2649>

Additional information:

These data are collected by the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, <http://www.ieo.es> - accessed 30 March 2016).

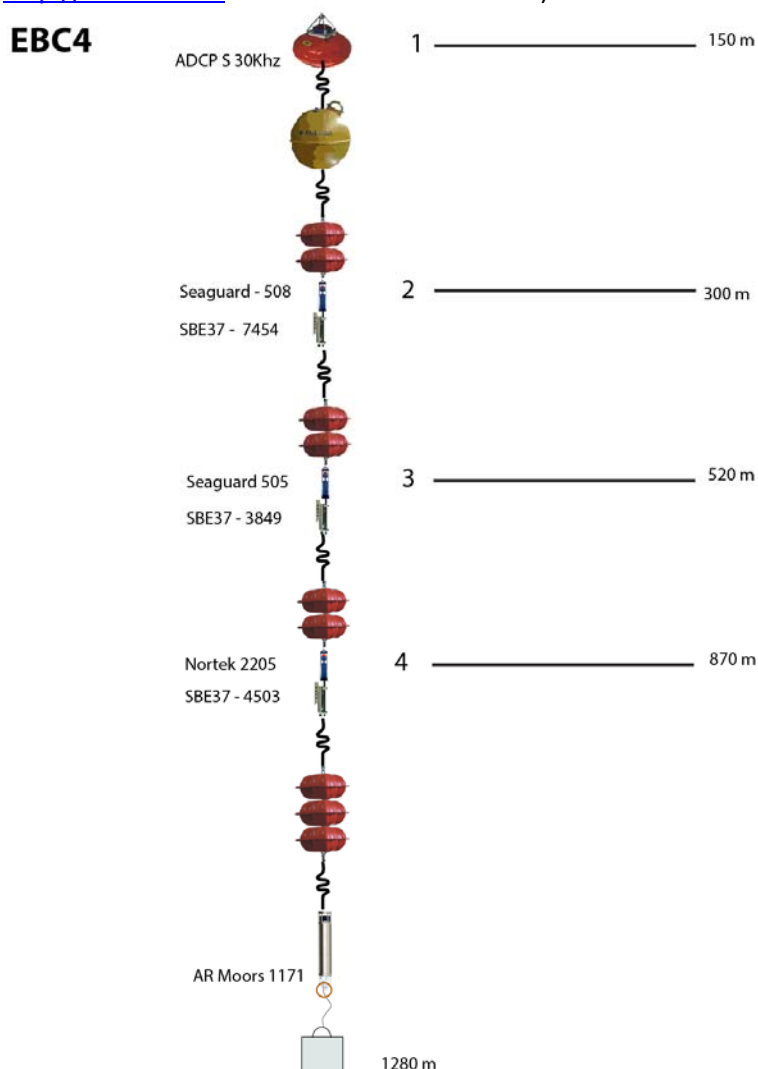


Figure 46. Scheme of the EBC4 mooring, showing the vertical distribution of the instruments taking measurements. One ADCP covers the top 150 meters, and 4 current meters are located at 300 m, 520 m, 800 m and 1200 m depth to monitor the main waters masses in the area. Source: IEO

**RED OPERACIONAL DEL NIVEL DEL MAR – RONIMAR –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN**

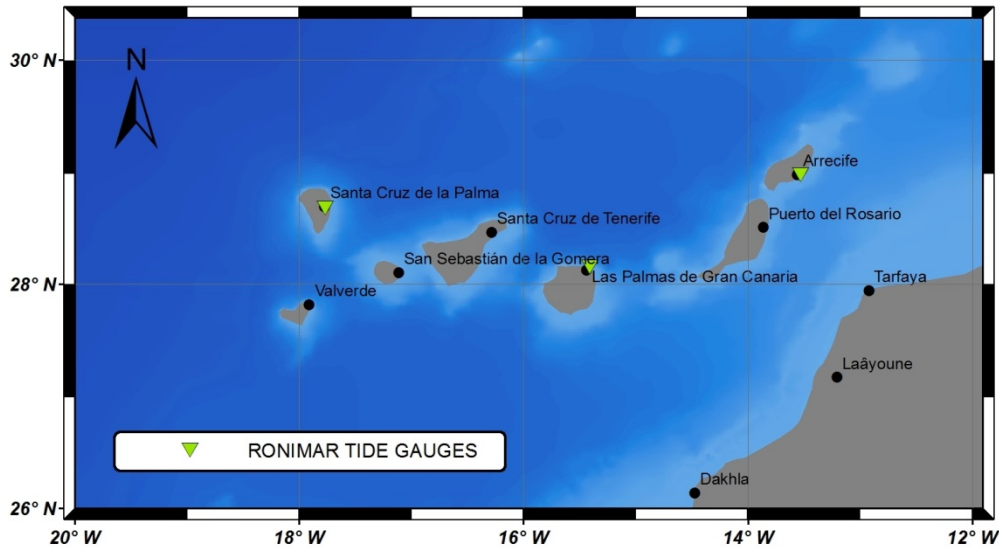


Figure 47. RONIMAR tide gauges location map in the Canary Islands

Resource abstract:

The IEO mareographs network (12 tide gauges, 3 of them in the Canary Islands) was created in 1943 and meets the requirements established by international services and programmes. All monthly mean sea level time series from all the RONIMAR stations are included in the Permanent Service for Mean Sea level (PSMSL), and the station of Puerto de la Luz delivers data to GLOSS.

The network is made by float gauges with digital output and radar sensor. Data are automatically downloaded via modem once per day.

Resource language:	spa	
Keyword values:	Environmental monitoring facilities	
Variables available:	Observed variables Sea level	
Geographic location:	17.7687°W – 2.6386°E	28.1466°N – 43.4614°N
Spatial resolution:	n/a	
Temporal extent:	1943 / present	
Temporal resolution:	Variable from 5 minutes to 60 minutes	
Depth range/resolution:	Surface	
Conditions for access & use:	Open access, citing as data source "Red Mareográfica del IEO"	
Limitations on public access:	Near real data and graphs can be used only in forecast models, bathymetric corrections and other operational processes, but not to build data-series	
Responsible organisation:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	http://indamar.ieo.es/mareas/mareas.htm	

Monthly mean sea level data:
<http://www.psmsl.org/data/obtaining/>

Contact: mjesus.garcia@md.ieo.es
María-Jesús García Fernández. Senior scientist, programme operation responsible, Madrid IEO Headquarters

Data format: Digital (plain text and plots for individual datasets)
References: In any use of the data, the IEO should be acknowledged as the owner

Additional information:

The RONIMAR stations included in the CCLME area are:

- Arrecife: 13.5300°W - 28.9718°N

Temporal extent: 1949-01-01 / 1975; 1980 / present

Type of sensor: Float with digital output

- Puerto de la Luz: 15.4075°W - 28.1466°N

Temporal extent: 1949-01-01 / 1956; 1971 / 1989; 1991 / present

Type of sensor: Float with digital output and radar

- Santa Cruz de La Palma: 17.7687°W - 28.6720°N

Temporal extent: 1949 / 1960; 1997 / present

Type of sensor: Float with digital output

Datum information: The data reference is the Tide Gauge Zero (TGZ) (see Figure 48). For further information about the datum of the network, see http://indamar.ieo.es/mareas/red_mareografica.htm (accessed 30 March 2016)

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 30 March 2016).

This network is part of the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, <http://www.ieo.es> - accessed 30 March 2016).

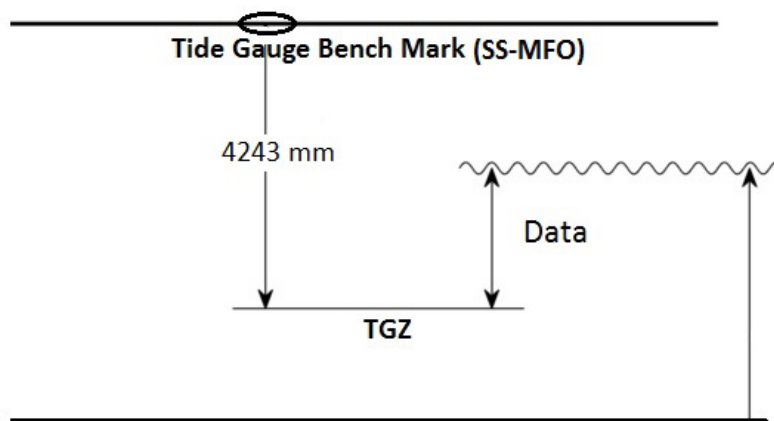


Figure 48. Datum information schema for the Arrecife tide gauge station. The data reference is the Tide Gauge Zero (TGZ). Source: IEO. <http://indamar.ieo.es/mareas/mareas.htm> (accessed 30 March 2016)

ARRECIFE-IEO TIDE GAUGE – ieotg_arrecife –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

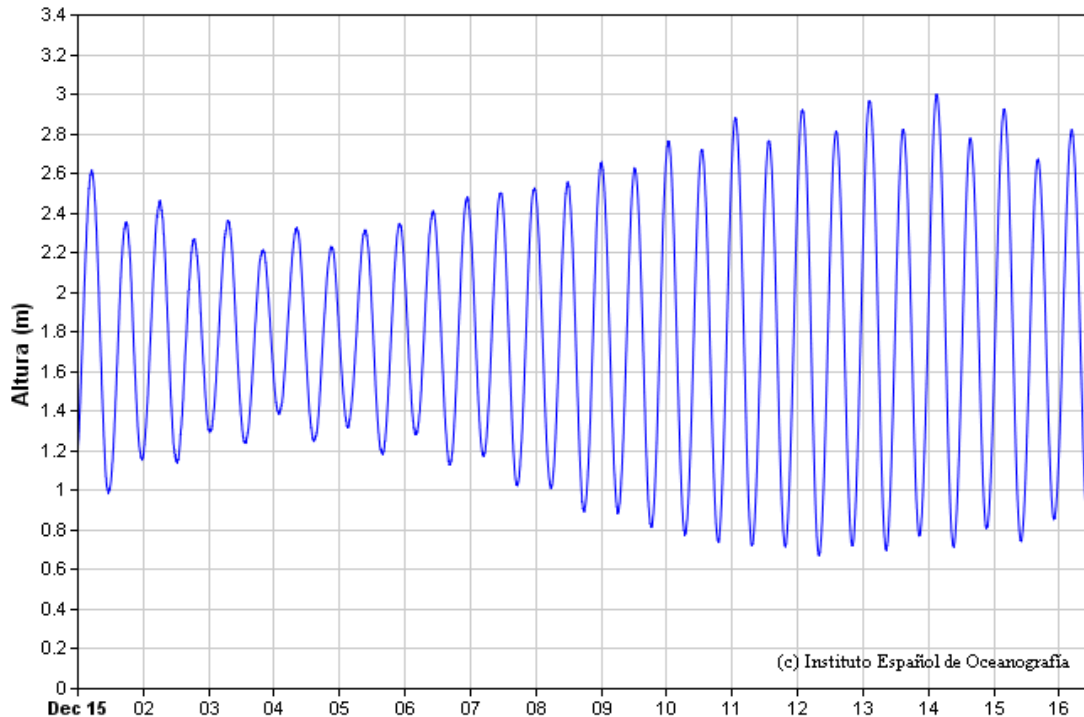


Figure 49. Sea level time-series (1 December 2015 - 16 December 2015) from the Arrecife IEO tide gauge. Source: IEO. <http://indamar.ieo.es/mareas/realdata/realarre.png> (accessed 16 December 2015)

Resource abstract:

The tide gauge is located in the harbour of Arrecife, in Lanzarote (Canary Islands).

Resource language:

spa

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea level

Geographic location:

13.5300°W

28.9718°N

Geographic resolution:

n/a

Temporal extent:

1949-01-01 / 1975

1980 / present

Temporal resolution:

Variable from 5 minutes to 60 minutes

Depth range/resolution:

Surface

Conditions for access & use:

Open access, citing as data source "Red Mareográfica del IEO"

Limitations on public access:

Near real data and graphs can be used only in forecast models, bathymetric corrections and other operational processes, but not to build data-series

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

<http://indamar.ieo.es/mareas/mareas.htm>

Monthly mean sea level data:

<http://www.psmsl.org/data/obtaining/stations/593.php>

Contact: mjesus.garcia@md.ieo.es

María-Jesús García Fernández. Senior scientist, programme operation responsible, Madrid IEO Headquarters

Data format: Digital (plain text and plots for individual datasets)

References: In any use of the data, the IEO should be acknowledged as the owner

Additional information:

Programme: Red Operacional del Nivel del Mar – RONIMAR – (IEO)

Benchmarks: TGBM: SS-MFO

Datum information: The data reference is the Tide Gauge Zero (TGZ). See Figure 48.

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 30 March 2016).

PUERTO DE LA LUZ-IEO TIDE GAUGE – ieotg_pluz –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

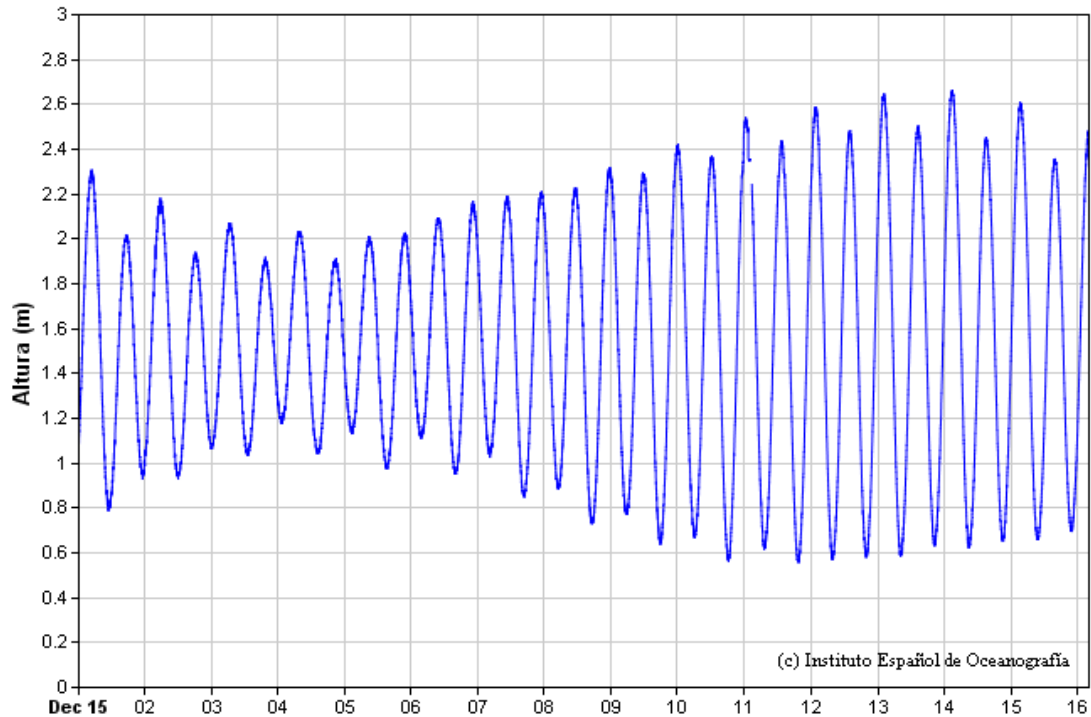


Figure 50. Sea level oscillations (1 December 2015 - 16 December 2015) from the Puerto de la Luz-IEO tide gauge. Source: IEO. <http://indamar.ieo.es/mareas/realdata/realplur.png> (accessed 16 December 2015)

Resource abstract:

The tide gauge is located in a small building in the harbour of Puerto de La Luz, in the city of Las Palmas de Gran Canaria (Canary Islands). The tide gauge equipment (float and radar) is measuring over a stilling well or tube located at the edge of the pier.

Resource language: spa

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Geographic location: 15.4075°W 28.1466°N

Geographic resolution: n/a

Temporal extent: 1949-01-01 / 1956

1971 / 1989

1991 / present

Temporal resolution: Variable from 5 minutes to 60 minutes

Depth range/resolution: Surface

Conditions for access & use: Open access, citing as data source "Red Mareográfica del IEO"

Limitations on public access: Near real data and graphs can be used only in forecast models, bathymetric corrections and other operational processes, but not to build data-series

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain

Data via: <http://indamar.ieo.es/mareas/mareas.htm>

Real-time data viewer:

<http://www.ioc-sealevelmonitoring.org/bgraph.php?code=pluz&output=tab&period=05>

Monthly mean sea level data:

<http://www.psmsl.org/data/obtaining/stations/565.php>

Contact: mjesus.garcia@md.ieo.es

María-Jesús García Fernández. Senior scientist, programme operation responsible, Madrid IEO Headquarters

Digital (plain text and plots for individual datasets)

Data format:

References:

In any use of the data, the IEO should be acknowledged as the owner

Additional information:

Programmes: Red Operacional del Nivel del Mar – RONIMAR – (IEO)

Global Sea Level Observing System – GLOSS – (Joint Technical Commission for Oceanography and Marine Meteorology – JCOMM)

Benchmarks: TGBM: NGU-340.

Datum information: The data are referred to the Tide Gauge Zero (TGZ)

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 30 March 2016).

SANTA CRUZ DE LA PALMA-IEO TIDE GAUGE – ieotg_stacruz –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

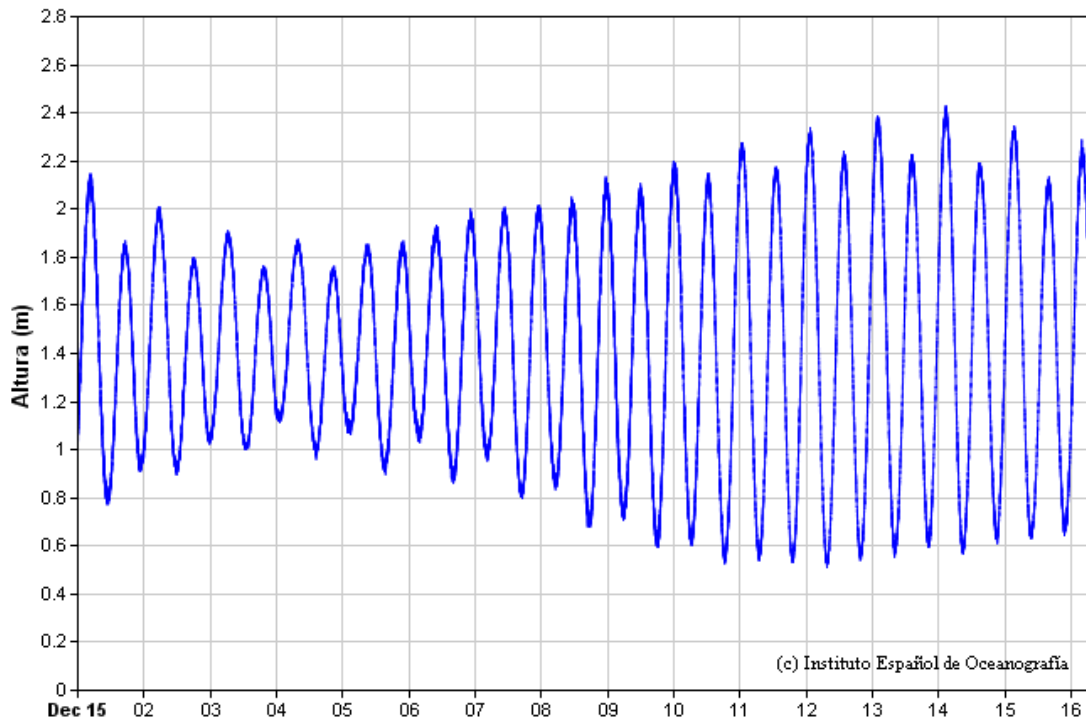


Figure 51. Sea level oscillations (1 December 2015 - 16 December 2015) from the Santa Cruz de La Palma-IEO tide gauge. Source: IEO. <http://indamar.ieo.es/mareas/realdata/realstcr.png> (accessed 16 December 2015)

Resource abstract:

The tide gauge is located in a small building in the harbour of Santa Cruz de la Palma (Canary Islands). The tide gauge equipment (float) is measuring over a stilling well or tube.

Resource language: spa

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Geographic location: 17.7687°W 28.6720°N

Geographic resolution: n/a

Temporal extent: 1949 / 1960
 1997 / present

Temporal resolution: Variable from 5 minutes to 60 minutes

Depth range/resolution: Surface

Conditions for access & use: Open access, citing as data source "Red Mareográfica del IEO"

Limitations on public access: Near real data and graphs can be used only in forecast models, bathymetric corrections and other operational processes, but not to build data-series

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain

Data via: <http://indamar.ieo.es/mareas/mareas.htm>

Monthly mean sea level data:

<http://www.psmsl.org/data/obtaining/stations/568.php>

Contact: mjesus.garcia@md.ieo.es

María-Jesús García Fernández. Senior scientist, programme operation responsible, Madrid IEO Headquarters

Data format: Digital (plain text and plots for individual datasets)

References: In any use of the data, the IEO should be acknowledged as the owner

Additional information:

Programme: Red Operacional del Nivel del Mar – RONIMAR – (IEO)

Benchmarks: TGBM : Clavo Mareografo IO No: 6.027.

Datum information: The data reference is the Tide Gauge Zero (TGZ).

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 30 March 2016).

RED DE MAREÓGRAFOS DEL IGN

INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

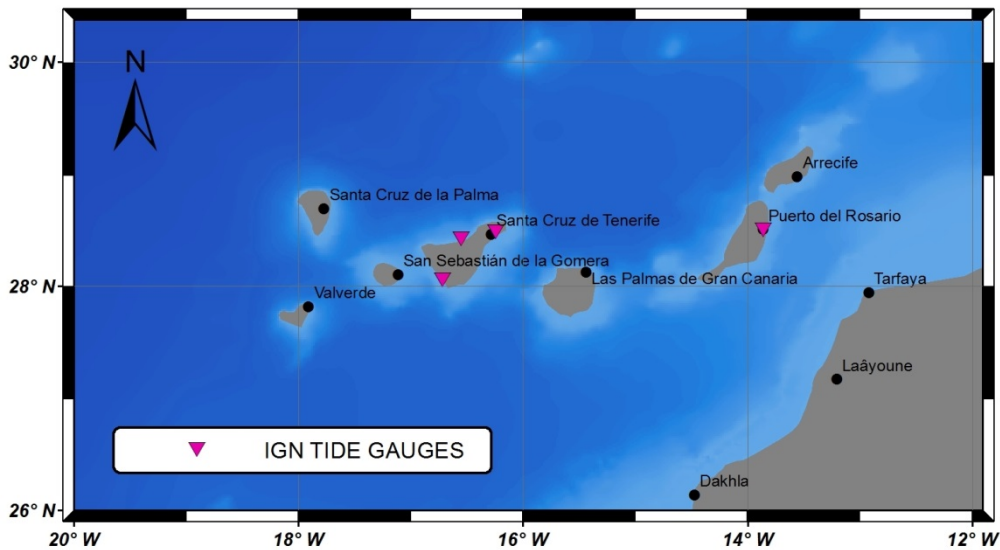


Figure 52. Location of the 4 IGN tide gauges in the Canary Islands

Resource abstract:

The IGN tide gauge network consists of nine stations, four of them in the Canary Islands. All are equipped with radar sensors recording data every minute. The stations also collect data every ten minutes with float and angle encoder gauges except in Puerto de la Cruz (TN021) and Los Cristianos (TN031).

The data are referred to a levelling signal belonging to the National Precision Levelling Network.

At the IGN HQ in Madrid, the data are received via ADSL, GSM or telephonic line.

Resource language:	spa	
Keyword values:	Environmental monitoring facilities	
Variables available:	<i>Observed variables</i> Sea level	
Geographic location:	16.7180°W – 0.4778°W	28.0469°N – 43.3644°N
Spatial resolution:	n/a	
Temporal extent:	1874 / present	
Temporal resolution:	1 minute	
Depth range/resolution:	Surface	
Conditions for access & use:	Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN	
Limitations on public access:	No	
Responsible organisation:	Instituto Geográfico Nacional, Madrid, Spain	
Data via:	http://www.ign.es/ign/hwide/redMareografica.do ftp://ftp.geodesia.ign.es/Red_de_Mareografos	

Contact: mafraile@fomento.es

M^a Angeles Fraile Torrecilla. Technical staff, Madrid IGN

Data format: Digital (plain text: raw data and sometimes average data is available)

Additional information:

IGN has 4 tide gauges in the CCLME area:

- Los Cristianos IGN tide gauge: 16.71800°W – 28.04686°N

Temporal extent: 2009-03 / present

Type of sensor: radar

- Puerto del Rosario IGN tide gauge: 13.85909°W – 28.49659°N

Temporal extent: 1999-09 / 2002-04; 2005-10 / 2011-07; 2012-09 / present

Type of sensor: float and radar

- Puerto de La Cruz IGN tide gauge: 16.55047°W – 28.41831°N

Temporal extent: 2008-10 / 2009-01; 2009-03 / present

Type of sensor: radar

- Santa Cruz IGN tide gauge: 16.24111°W – 28.47719°N

Temporal extent: 1927-01 / 1936-05; 1940-03 / 1956-06; 1958-03 / 1990-09; 1992-01 / present

Type of sensor: float and radar

Datum information: The data are referred to the Tide Gauge Bench Mark (TGBM). See Fig. 53.

Raw data are recorded. Average data have been screened and quality controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations.



Figure 53. Generic figure about datum information. The data reference is the Tide Gauge Bench Mark (TGBM). Source: Área de Geodesia, IGN

LOS CRISTIANOS IGN TIDE GAUGE – TN031 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

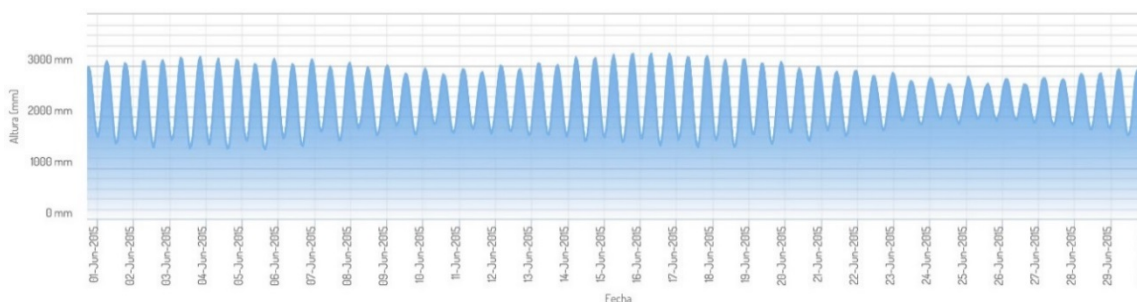


Figure 54. Sea level observed data from the Los Cristianos IGN tide gauge (June 2015). Source: IGN. <http://www.ign.es/ign/hwide/redMareografica.do> (accessed 16 February 2016)

Resource abstract:

The tide gauge is located in the harbour of Los Cristianos, in Tenerife (Canary Islands). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a radar sensor.

Resource language: spa

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Geographic location: 16.71800°W 28.04686°N

Geographic resolution: n/a

Temporal extent: 2009-03 / present

Temporal resolution: 1 minute

Depth range/resolution: Surface

Conditions for access & use: Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN

Limitations on public access: No

Responsible organisation: Instituto Geográfico Nacional, Madrid, Spain

Data via: <http://www.ign.es/ign/hwide/redMareografica.do>

ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN031/

Contact: mafraile@fomento.es

M^a Ángeles Fraile Torrecilla, Technical staff, Madrid IGN

Data format: Digital (plain text: raw data and average data)

Additional information:

Benchmarks: TGBM: NGAB-161.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 53.

Raw data are recorded. Average data have been screened and quality controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations.

PUERTO DEL ROSARIO IGN TIDE GAUGE – FUER1 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

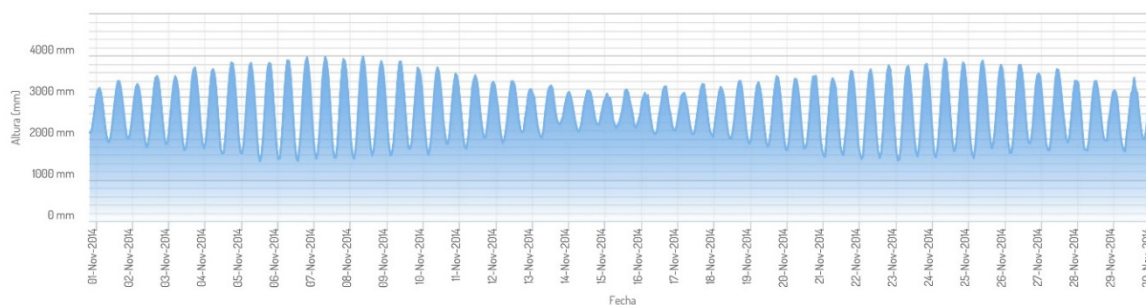


Figure 55. Sea level observed data from the Puerto del Rosario IGN tide gauge radar sensor (November 2014). Source: IGN. <http://www.ign.es/ign/hwide/redMareografica.do> (accessed 16 February 2016)

Resource abstract:

The tide gauge is located in the harbour of Puerto del Rosario, in Fuerteventura (Canary Islands). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a float and a radar sensor.

Resource language: spa

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Geographic location: 13.85909°W 28.49659°N

Geographic resolution: n/a

Temporal extent: 1999-09 / 2002-04

2005-10 / 2011-07

2012-09 / present

Temporal resolution: Variable from 1 minute to 10 minutes

Depth range/resolution: Surface

Conditions for access & use: Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN

Limitations on public access: No

Responsible organisation: Instituto Geográfico Nacional, Madrid, Spain

Data via: <http://www.ign.es/ign/hwide/redMareografica.do>
ftp://ftp.geodesia.ign.es/Red_de_Mareografos/FUER1/

Contact: mafraile@fomento.es

M^a Ángeles Fraile Torrecilla, Technical staff, Madrid IGN

Data format: Digital (plain text: raw data)

Additional information:

Benchmarks: TGBM: SS Pozo.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 53.

PUERTO DE LA CRUZ IGN TIDE GAUGE – TN021 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

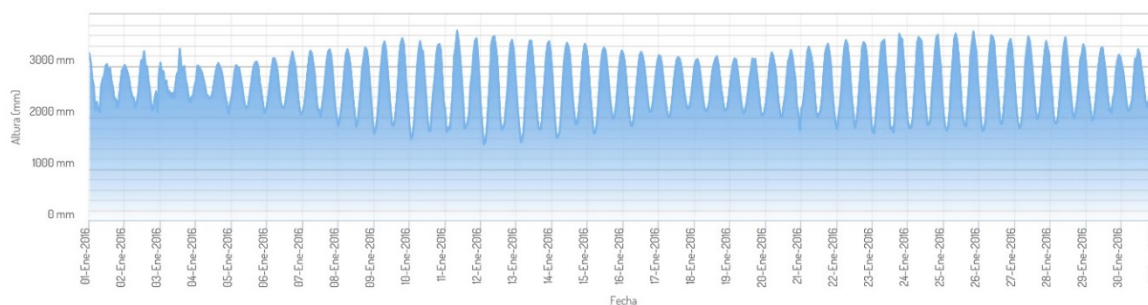


Figure 56. Sea level observed data from the Puerto de la Cruz IGN tide gauge (1 July 2013).
 Source: IGN. <http://www.ign.es/ign/hwide/redMareografica.do> (accessed 16 February 2016)

Resource abstract:

The tide gauge is located in the harbour of Puerto de la Cruz, in Tenerife (Canary Islands). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a radar sensor.

Resource language:

spa

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea level

Geographic location:

16.55047°W

28.41831°N

Geographic resolution:

n/a

Temporal extent:

200810 /2009-01

2009-03 / present

Temporal resolution:

Variable from 1 minute to 5 minutes

Depth range/resolution:

Surface

Conditions for access & use:

Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN

Limitations on public access:

No

Responsible organisation:

Instituto Geográfico Nacional, Madrid, Spain

Data via:

<http://www.ign.es/ign/hwide/redMareografica.do>

ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN021/

Contact: mafraile@fomento.es

M^a Ángeles Fraile Torrecilla, Technical staff, Madrid IGN

Data format:

Digital (plain text: raw data)

Additional information:

Benchmarks: TGBM: NGZ-581.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 53.

Raw data are recorded. Average data have been screened and quality controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations.

SANTA CRUZ DE TENERIFE IGN TIDE GAUGE – TN013 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

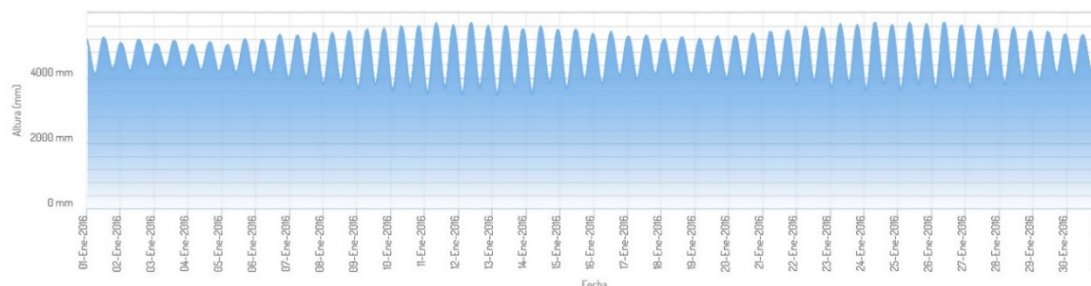


Figure 57. Sea level observed data from the Santa Cruz de Tenerife IGN tide gauge radar sensor (January 2016). Source: IGN. <http://www.ign.es/ign/hwide/redMareografica.do> (accessed 16 February 2016)

Resource abstract:

The tide gauge is located in the harbour of Santa Cruz de Tenerife, in Tenerife (Canary Islands). Its location inside the harbour has been modified 3 times during the tide-gauge history (TN011, TN012 and TN013). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a float and a radar sensor.

Resource language: spa

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Geographic location: 16.24111°W 28.47719°N

Geographic resolution: n/a

Temporal extent: 1927-01 / 1936-05

1940-03 / 1956-06

1958-03 / 1990-09

1992-01 / present

Temporal resolution: Variable from 1 hour to 1 minute

Depth range/resolution: Surface

Conditions for access & use: Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN

Limitations on public access: No

Responsible organisation: Instituto Geográfico Nacional, Madrid, Spain

Data via: <http://www.ign.es/ign/hwide/redMareografica.do>
ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN011/
ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN012/
ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN013/

Contact: mafraile@fomento.es

M^a Ángeles Fraile Torrecilla, Technical staff, Madrid IGN

Data format: Digital (plain text: raw data and average data)

Additional information:

Benchmarks: TGBM: NGU-320.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 53.

Raw data are recorded. Average data have been screened and quality controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations. More information about Sea level changes at Tenerife Island since 1927 in Marcos et al., 2013.

**RED DE MAREÓGRAFOS DE PUERTOS DEL ESTADO – REDMAR –
PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN**

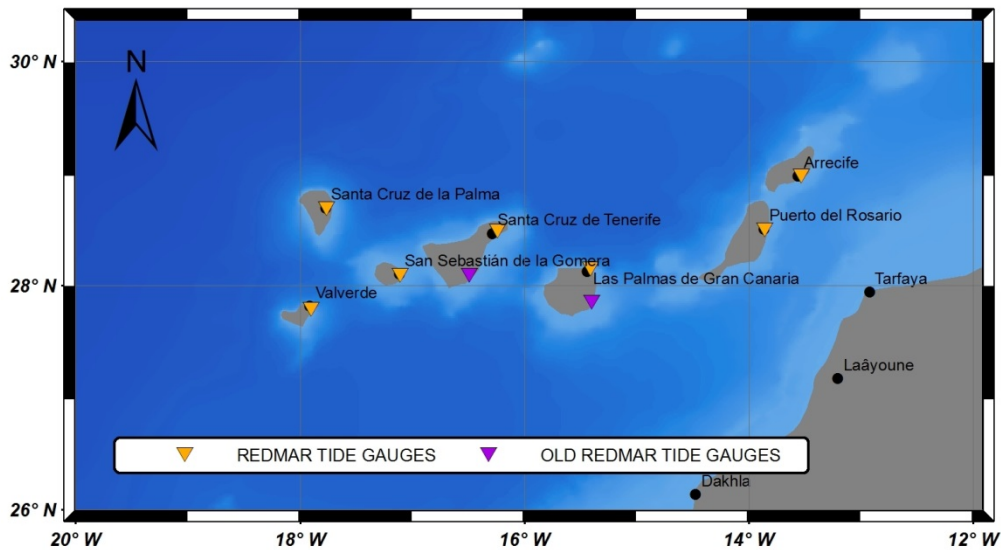


Figure 58. Location map of REDMAR tide gauges and old REDMAR tide gauges in the Canary Islands

Resource abstract:

The original network, established in 1992, has been upgraded during last years from SRD Acoustic sensors to MIROS radar sensors. All the 36 stations (7 are located in the Canary Islands) consist of a MIROS radar system that provides 2 Hz raw data and transmits 1-min averages in real time (via ADSL, GPRS or Internet) to Puertos del Estado (<http://www.puertos.es>, accessed 30 March 2016). These sensors provide also agitation information each 20 minutes (significant wave height and mean period). Nowadays, the stations at Granadilla and Arinaga, originally part of the network and operated by two Aanderaa pressure sensors, are not integrated in REDMAR nowadays; nevertheless, the harbours maintain their operation for local purposes.

All these stations are integrated in the Nivmar Sea Level Forecast System, run by Puertos del Estado, in the IBIROOS Data Portal (IBI In-situ Tac, developed within Myocean project and now integrated in the Copernicus Marine Environment Monitoring Service – CMEMS – IBI In-situ TAC) and practically all are also contributing to the IOC Sea Level Data Facility with 1-min data. Automatic quality control is performed in near-real time for application in operational oceanography (more details can be found in: *Use of tide gauge data in operational oceanography and sea level hazard warning systems*, Pérez et al., 2013).

Resource language:	spa, eng	
Keyword values:	Environmental monitoring facilities	
Variables available:	Observed variables Sea level Local waves (agitation) Atmospheric pressure Wind (in some stations)	
Geographic location:	17.90163°W – 4.27056°E	27.78408°N – 43.55803°N
Spatial resolution:	n/a	
Temporal extent:	1992 / present	
Temporal resolution:	One sample per minute	
Depth range/resolution:	Surface	

Conditions for access & use: Open access. When using the tide gauge data set, it should be referenced

Limitations on public access: No

Responsible organisation: Puertos del Estado, Madrid, Spain

Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Real-time data viewer:
<http://www.ioc-sealevelmonitoring.org/>

Monthly mean sea level data:
<http://www.psmsl.org/data/obtaining/>

To download high frequency files:
<http://marine.copernicus.eu/>

Contact: bego@puertos.es
Begoña Pérez Gómez. Head of Harbour Oceanography
Division, Physical Oceanography Group, Puertos del Estado
Digital (ASCII format)

Data format:

Additional information:

The REDMAR stations included in the CCLME area are:

- El Hierro 2 (La Estaca): 17.90163°W - 27.78408°N

Temporal extent: 2004 / present

Type of sensor: Radar-Miros

- Fuerteventura 2: 28.49251°W - 13.85822°N

Temporal extent: 2004 / present

Type of sensor: Radar-Miros

- La Gomera: 17.10831°W - 28.08777°N

Temporal extent: 2006 / present

Type of sensor: Radar-Miros

- La Palma: 17.76795°W - 28.67780°N

Temporal extent: 2006 / present

Type of sensor: Radar-Miros

- Lanzarote-Arrecife: 13.53006°W - 28.97188°N

Temporal extent: 2008 / present

Type of sensor: Radar-Miros

- Las Palmas 2: 15.41181°W - 28.14056°N

Temporal extent: 1992 / present

Type of sensor: Radar-Miros

- Tenerife 2: 16.24111°W - 28.47722°N

Temporal extent: 1992 / 2014

Type of sensor: Radar-Miros

ARINAGA-GRAN CANARIA PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

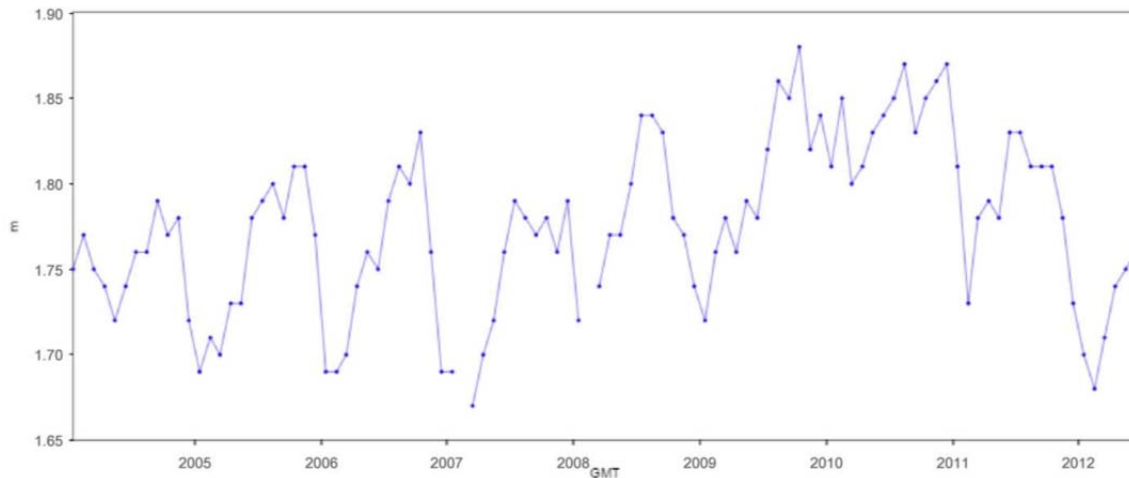


Figure 59. Time-series (2004-2012) of monthly mean sea level (m) at the Arinaga station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

The Arinaga tide gauge is an Aanderaa pressure gauge placed in Muelle de Arinaga, at El Puerto de Arinaga, in Gran Canaria (Canary Islands) since 2004 to mid-2012. Actually the station is operated by the port authority and it is not integrated in the REDMAR network.

Resource language:

spa, eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea level

Geographic location:

15.40146°W

27.84691°N

Geographic resolution:

n/a

Temporal extent:

2004-01-01 / 2012-07-25

Temporal resolution:

One sample per 5 min

Depth range/resolution:

Surface

Conditions for access & use:

Open access. When using the tide gauge dataset, it should be referenced

Limitations on public access:

No

Responsible organisation:

Puertos del Estado, Madrid, Spain

Data via:

Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Monthly mean sea level data:

<http://www.psmsl.org/data/obtaining/stations/2049.php>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: ZN20, 5.550 m relative to the REDMAR datum.

All the data are in digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithm (further information in Pérez et al., 2013).

EL HIERRO 2 PUERTOS DEL ESTADO TIDE GAUGE
 PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

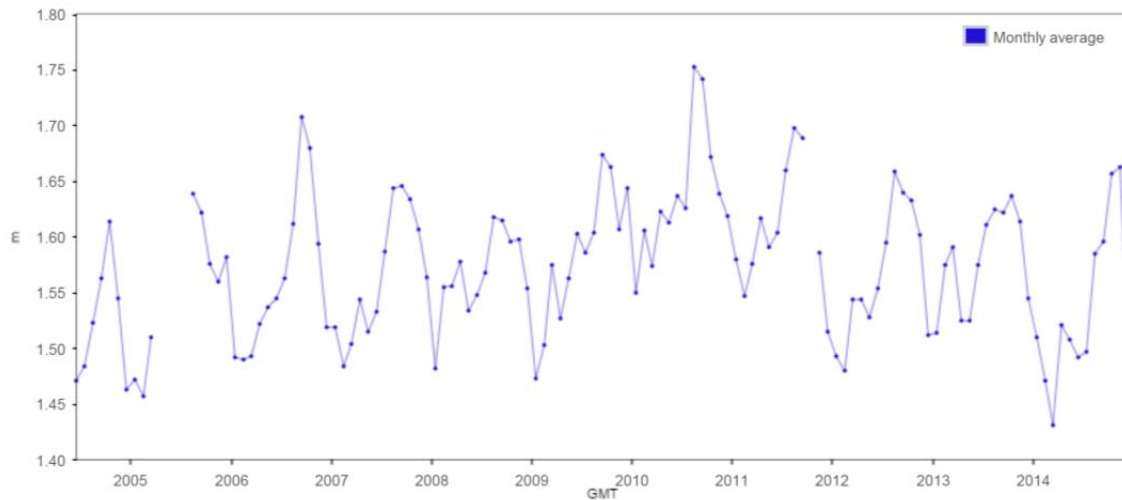


Figure 60. Time-series (2004-2014) of monthly mean sea level (m) at the El Hierro 2 station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

The El Hierro (Estaca) tide gauge was an Aanderaa tide gauge placed in Dársena de Embarcaciones Menores at Puerto de la Estaca (El Hierro Island, Canary Islands) from 2004 to 2012. It has been replaced by Hierro2, a MIROS radar tide gauge placed in a dock in the marina in Puerto de La Estaca (Hierro Island). It provides 1 min sea level and wind-wave parameters every 20 min. Both the old and new gauges were running for the time period 14 November 2009 to 15 June 2010 for inter-comparison purposes. A bias (mean difference) of -0.29 cm between the two gauges was obtained and a new complete dataset was re-entered onto the database.

Resource language: spa, eng
Keyword values: Environmental monitoring facilities
Variables available: Observed variables
 Sea level
Geographic location: 17.90163°W 27.78408°N
Geographic resolution: n/a
Temporal extent: El Hierro (La Estaca): 2004-05-20 / 2010-11-23
 El Hierro 2: 2009-11-14 / present
Temporal resolution: Variable; one sample per 5 min to one sample per minute
Depth range/resolution: Surface
Conditions for access & use: Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access: No
Responsible organisation: Puertos del Estado, Madrid, Spain
Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

To download high frequency files:
<http://marine.copernicus.eu/>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: B.M. MAREOG. HIERRO2, 4.323 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

Further information about the transition between the old and the new tide gauge in Pérez et al., 2014.

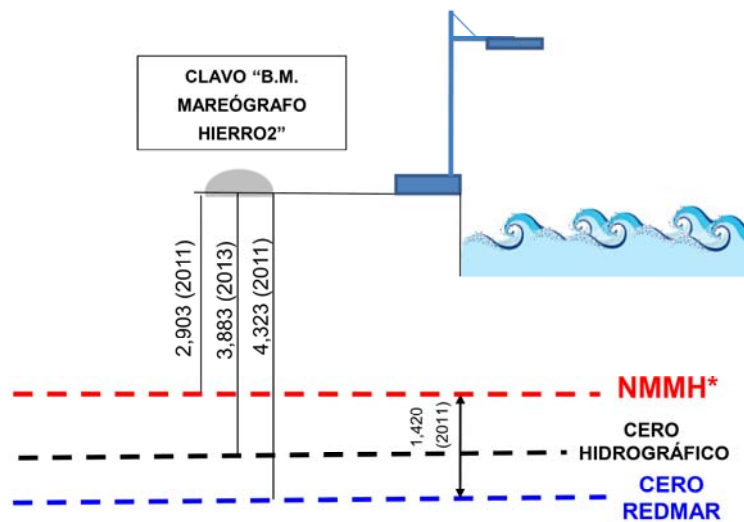


Figure 61. El Hierro 2 Puertos del Estado tide gauge datum information. In red, mean sea level in El Hierro that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

FUERTEVENTURA 2 PUERTOS DEL ESTADO TIDE GAUGE
PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

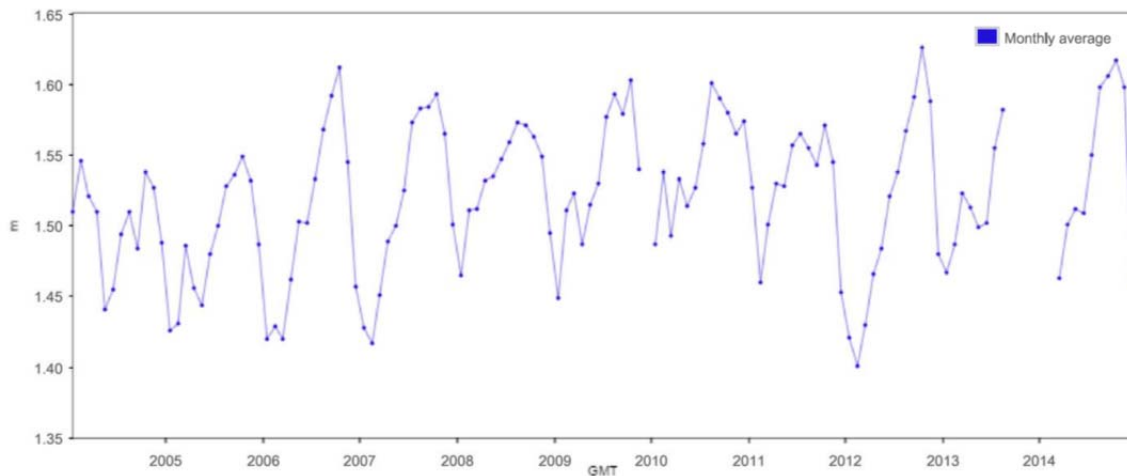


Figure 62. Time-series (2004-2014) of monthly mean sea level (m) at the Fuerteventura 2 station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

Fuerteventura tide gauge was an Aanderaa tide gauge placed in Placed at the Sports Vessels Dock beside the Avenue in El Rosario (Fuerteventura Island, Canary Islands) since 2004 to 2012. Today is not active and has been replaced by Fuerteventura 2, a MIROS radar tide gauge placed at the end of the cruises dock in El Rosario Harbour (Fuerteventura Island). It provides 1 min sea level and wind-wave parameters every 20 min. Both old and new gauges were running for the time period 1 December 2009 to 7 February 2011. A bias (mean difference) of 4.25 cm was found between the two gauges. Further investigation revealed that the bias was due to a problem with the old pressure gauge. Data from this has been revised and the complete dataset was re-entered onto the database.

Resource language: spa, eng
Keyword values: Environmental monitoring facilities
Variables available: Observed variables
 Sea level
Geographic location: 13.85822°W 28.49251°N
Geographic resolution: n/a
Temporal extent: Fuerteventura: 2004-01-01 / 2012-03-26
 Fuerteventura 2: 2009-11-12 / present
Temporal resolution: Variable; from one sample per 5 min to one sample per minute
Depth range/resolution: Surface
Conditions for access & use: Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access: No
Responsible organisation: Puertos del Estado, Madrid, Spain
Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Real-time data viewer: <http://www.ioc-sealevelmonitoring.org/station.php?code=fue2>

Monthly mean sea level data:

<http://www.psmsl.org/data/obtaining/stations/2048.php>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: NGAB MAREO, 4.269 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

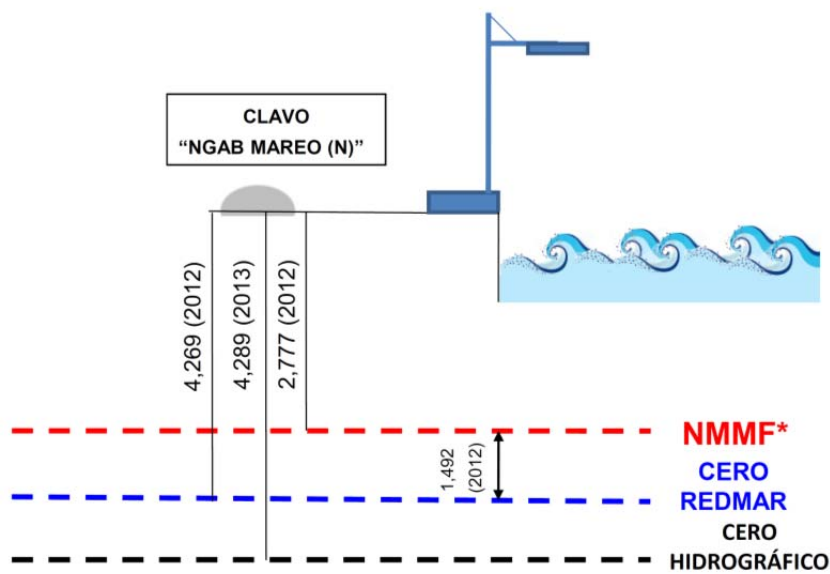


Figure 63. Fuerteventura 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Fuerteventura that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

GRANADILLA PUERTOS DEL ESTADO TIDE GAUGE
PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

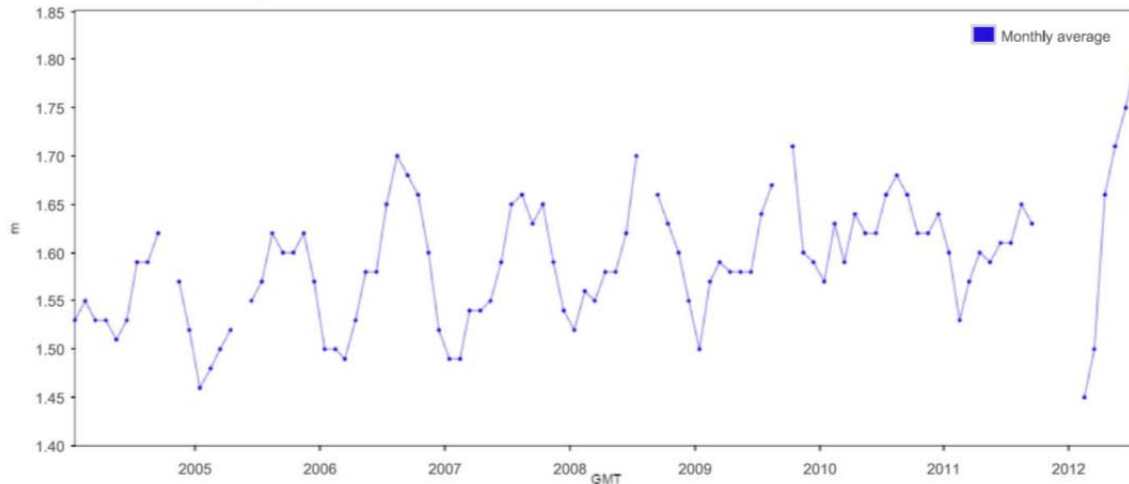


Figure 64. Time-series (2004-2012) of monthly mean sea level (m) at the Granadilla station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

Granadilla was a station on the island of Tenerife (Canary Islands), in operation for the REDMAR network from 2003 to mid-2012. Since then the harbor authority is responsible of this station. The gauge is an Aanderaa pressure sensor that provided 5 min sea level data.

Resource language: spa, eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*
Sea level

Geographic location: 16.48964°W 28.08528°N

Geographic resolution: n/a

Temporal extent: 2004-01-15 / 2012-07-15

Temporal resolution: One sample per minute

Depth range/resolution: Surface

Conditions for access & use : Open access. When using the tide gauge dataset, it should be referenced

Limitations on public access: No

Responsible organisation: Puertos del Estado, Madrid, Spain

Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: AP1, 3.850 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

LA GOMERA PUERTOS DEL ESTADO TIDE GAUGE
PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

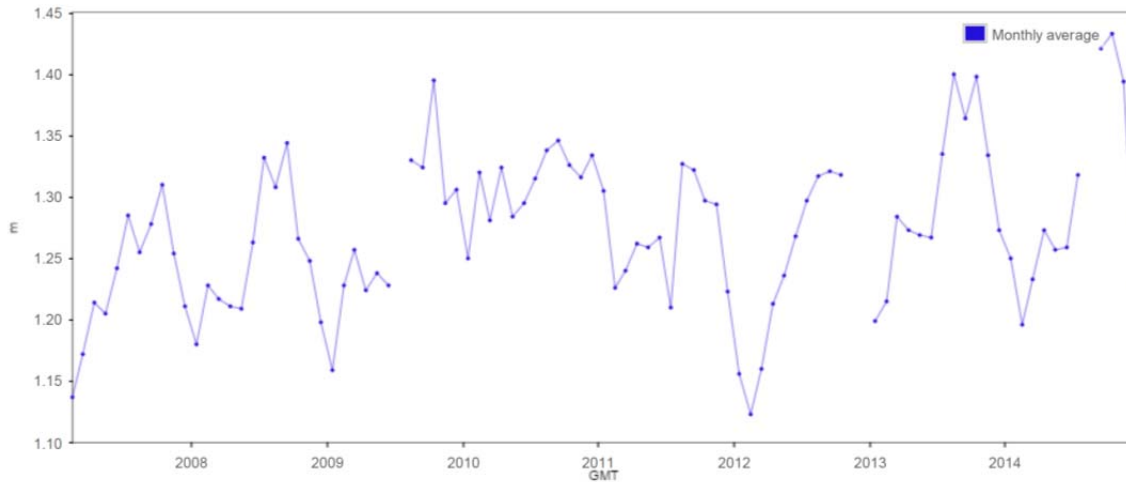


Figure 65. Time-series (2007-2014) of monthly mean sea level (m) at the La Gomera station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

This is a tide gauge station placed in La Gomera (Canary Islands). The measurements started in 2007, and the tide gauge is included in the newly established REDMAR network. The gauge is a MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min.

Resource language: spa, eng

Keyword values: Environmental monitoring facilities

Variables available: *Observed variables*

Sea level

Geographic location: 17.10831°W 28.08777°N

Geographic resolution: n/a

Temporal extent: 2007-02-15 / present

Temporal resolution: One sample per minute

Depth range/resolution: Surface

Conditions for access & use: Open access. When using the tide gauge dataset, it should be referenced

Limitations on public access: No

Responsible organisation: Puertos del Estado, Madrid, Spain

Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Real-time data viewer: <http://www.ioc-sealevelmonitoring.org/station.php?code=lago>

Monthly mean sea level data: <http://www.psmsl.org/data/obtaining/stations/2065.php>

To download high frequency files: <http://marine.copernicus.eu/>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: B.M.MAREOG.LA GOMERA, 2.899 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

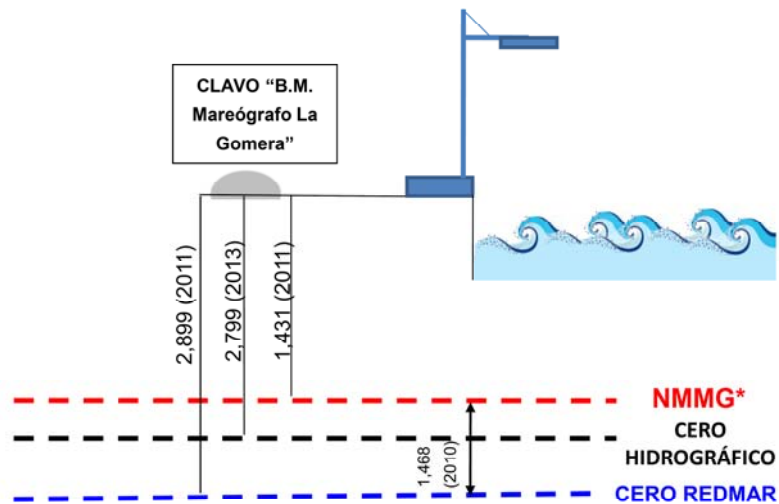


Figure 66. La Gomera Puertos del Estado tide gauge datum information. In red, mean sea level in La Gomera that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

LA PALMA PUERTOS DEL ESTADO TIDE GAUGE
PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

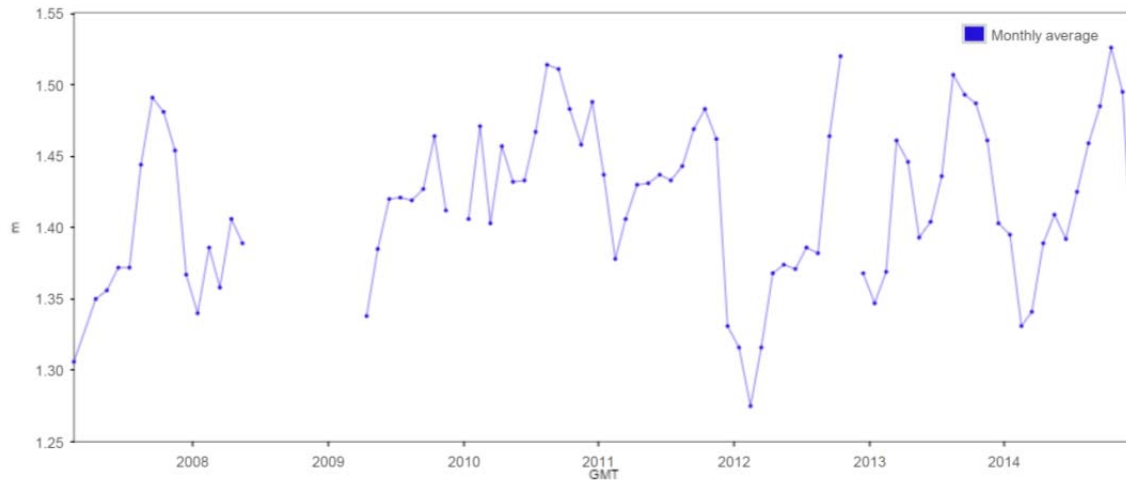


Figure 67. Time-series (2007-2014) of monthly mean sea level (m) at the La Palma station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

La Palma tide gauge is placed at the marina entrance. It is a MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min.

Resource language:

spa, eng

Keyword values:

Environmental monitoring facilities

Variables available:

Observed variables

Sea level

Geographic location:

17.76795°W

28.67780°N

Geographic resolution:

n/a

Temporal extent:

2006-11-14 / present

Temporal resolution:

One sample per minute

Depth range/resolution:

Surface

Conditions for access & use:

Open access. When using the tide gauge dataset, it should be referenced

Limitations on public access:

No

Responsible organisation:

Puertos del Estado, Madrid, Spain

Data via:

Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

To download high frequency files:

<http://marine.copernicus.eu/>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: B.M.MAR.LAPALMA, 4.320 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

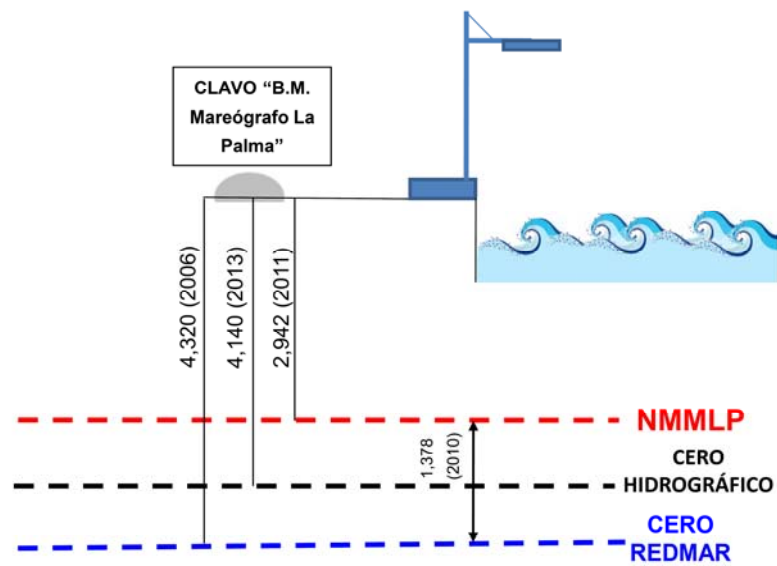


Figure 68. La Palma Puertos del Estado tide gauge datum information. In red, mean sea level in La Palma that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

LANZAROTE-ARRECIFE PUERTOS DEL ESTADO TIDE GAUGE
 PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

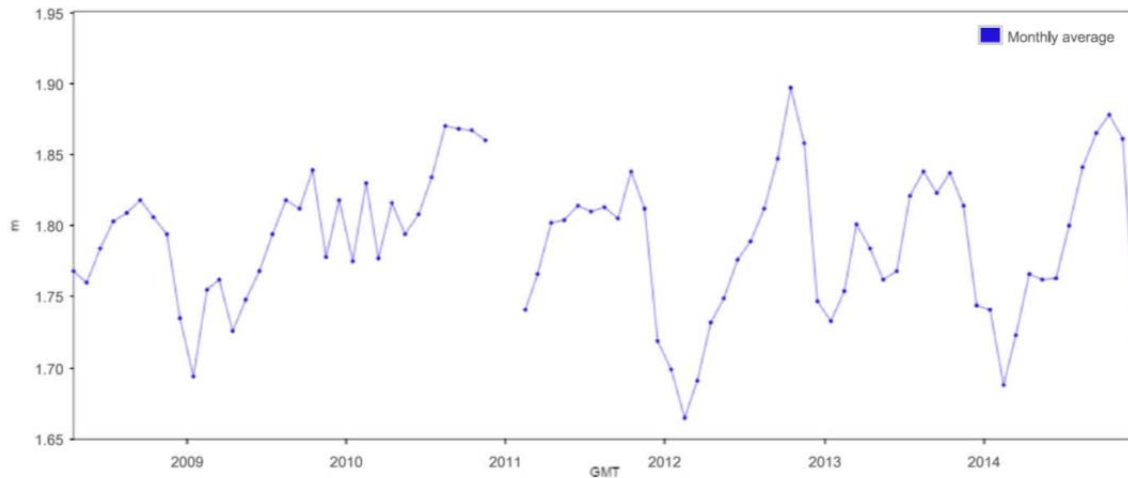


Figure 69. Time-series (2008-2014) of monthly mean sea level (m) at the Lanzarote-Arrecife station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

The Arrecife 2 tide gauge is on the island of Lanzarote in the Canaries. It is a new station; first data are from 2008. It forms part of the newly established REDMAR network. The gauge is a MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min. Initial hardware problems (de-lamination) have been taken into account in the supplied data.

Resource language: spa, eng
Keyword values: Environmental monitoring facilities
Variables available: Observed variables
 Sea level
Geographic location: 13.53006°W 28.97188°N
Geographic resolution: n/a
Temporal extent: 2008-03-07 / present
Temporal resolution: One sample per minute
Depth range/resolution: Surface
Conditions for access & use: Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access: No
Responsible organisation: Puertos del Estado, Madrid, Spain
Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Real-time data viewer: <http://www.ioc-sealevelmonitoring.org/station.php?code=arre>

Monthly mean sea level data: <http://www.psmsl.org/data/obtaining/stations/2066.php>

To download high frequency files: <http://marine.copernicus.eu/>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: SSMFO, 4.243 m relative to the REDMAR datum and 2.530 m relative to IGN datum.

All the data are in digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

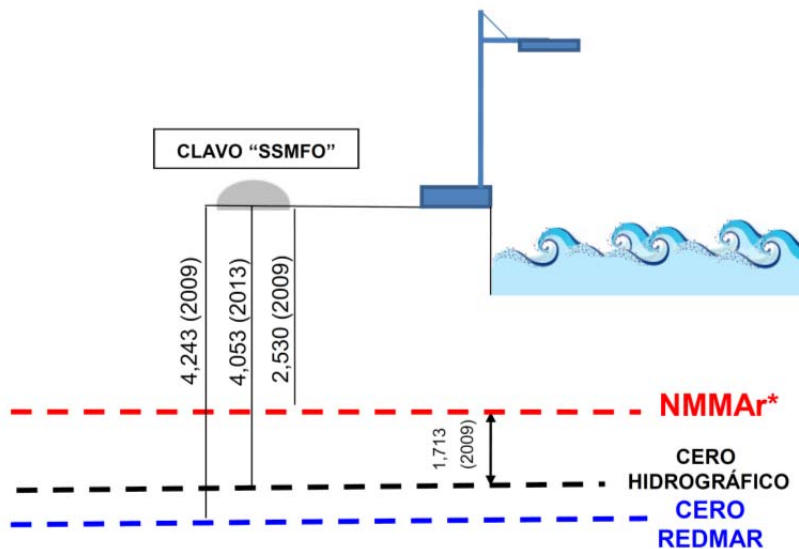


Figure 70. Arrecife 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Arrecife that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

LAS PALMAS 2 PUERTOS DEL ESTADO TIDE GAUGE
 PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

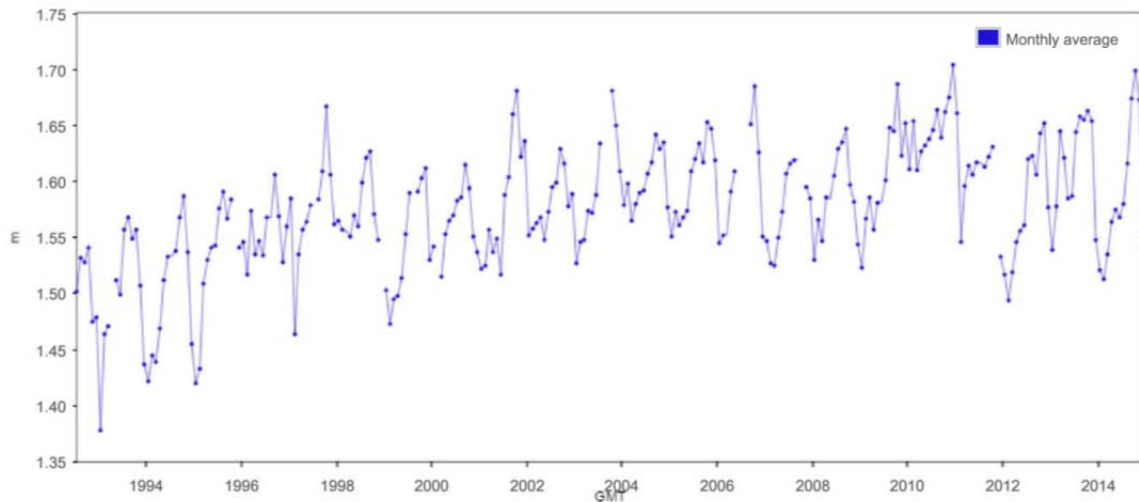


Figure 71. Time-series (2009-2014) of monthly mean sea level (m) at the Las Palmas 2 tide gauge. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

Las Palmas station was a SRD acoustic gauge placed in the Reina Sofia dike (tankers berth), in Gran Canaria (Canary Islands), since 1992. The SRD acoustic gauge was replaced with a MIROS radar sensor. The Las Palmas 2 station is placed in el Muelle Elder, in Gran Canaria (Canary Islands), and provides 1 min sea level and wind-wave parameters every 20 min. Both old and new gauges were running for the time period 1 January 2009 to 29 April 2010 for inter-comparison purposes. A bias (mean difference) of -0.1 cm was calculated between the two gauges. Hardware problems (de-lamination) occurred with the new Miros gauge and the datum differs by -4 cm from November 2011. This has been accounted for in the supplied data. The complete dataset has been re-entered into the database.

Resource language: spa, eng
Keyword values: Environmental monitoring facilities
Variables available: *Observed variables*
 Sea level
Geographic location: 15.41181°W 28.14056°N
Geographic resolution: n/a
Temporal extent: Las Palmas: 1992-07-01 / 2010-11-29
 Las Palmas 2: 2009-01-01 / present
Temporal resolution: Variable from one sample per 5 minutes to one sample per minute
Depth range/resolution: Surface
Conditions for access & use: Open access. When using the tide gauge data set, it should be referenced
Limitations on public access: No
Responsible organisation: Puertos del Estado, Madrid, Spain
Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>
 Real-time data viewer: <http://www.ioc-sealevelmonitoring.org/station.php?code=lasp>
 Monthly mean sea level data:

<http://www.pmsl.org/data/obtaining/stations/1802.php>

To download high frequency files:

<http://marine.copernicus.eu/>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: For Las Palmas, NGU340 4.295 m relative to datum REDMAR Station. For Las Palmas 2, FARO 4.535 m relative to REDMAR datum.

Further information about quality control Puertos del estado procedures in Pérez et al. (2013).

Further information about the transition between the old and the new tide gauge in Pérez et al. (2014).

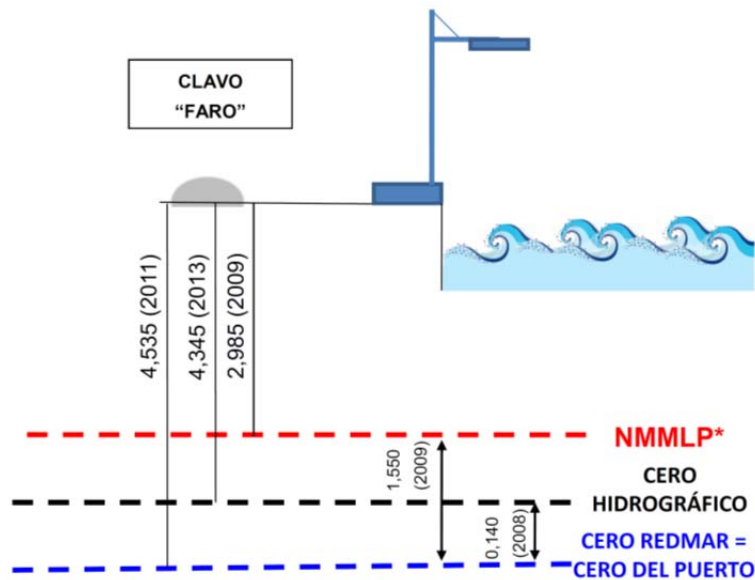


Figure 72. Las Palmas 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Las Palmas that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum, that is equal to the harbor datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

TENERIFE 2 PUERTOS DEL ESTADO TIDE GAUGE
 PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

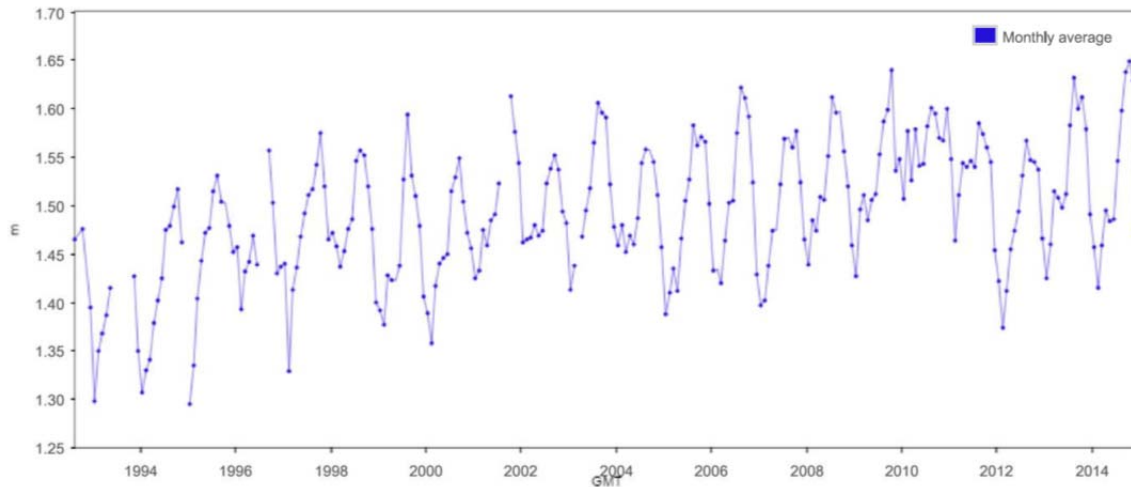


Figure 73. Time-series (June 2009–November 2014) of monthly mean sea level (m) at the Tenerife 2 station. Source: Puertos del Estado. <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx> (accessed 11 February 2016)

Resource abstract:

Tenerife station is located in Tenerife Island (Canary Islands). The SRD acoustic gauge has been replaced by a new MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min. Both the old and new gauges were running for the time period 22 May 2009 to 12 August 2010 for inter-comparison purposes. During this time a malfunction in the old sensor was detected. A bias (mean difference) of 1.28 cm between the two gauges was calculated. Furthermore, a datum change has been accounted for in the supplied data. The data was revised and the complete dataset was re-entered into the database.

Resource language: spa, eng
Keyword values: Environmental monitoring facilities
Variables available: Observed variables
 Sea level
Geographic location: 16.24111°W 28.47722°N
Geographic resolution: n/a
Temporal extent: Tenerife: 1992-07-01 / 2011-11-17
 Tenerife 2: 2009-05-26 / 2014-02-11
Temporal resolution: Variable: From one sample per 5 minutes to one sample per minute
Depth range/resolution: Surface
Conditions for access & use: Open access. When using the tide gauge dataset, it should be referenced.
Limitations on public access: No
Responsible organisation: Puertos del Estado, Madrid, Spain
Data via: Data viewer: <http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx>

Real-time data viewer: <http://www.ioc-sealevelmonitoring.org/station.php?code=tene#>

Monthly mean sea level data:
<http://www.psmsl.org/data/obtaining/stations/1803.php>

To download high frequency files:

<http://marine.copernicus.eu/>

Contact: bego@puertos.es

Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Portuaria, Área de Medio Físico, Puertos del Estado Digital (ASCII format)

Data format:

Additional information:

Benchmarks: SS 412; 5.198 m relative to REDMAR datum.

Further information about quality control Puertos del Estado procedures in Pérez et al. (2013).

Further information about the transition between the old and the new tide gauge in Pérez et al. (2014).

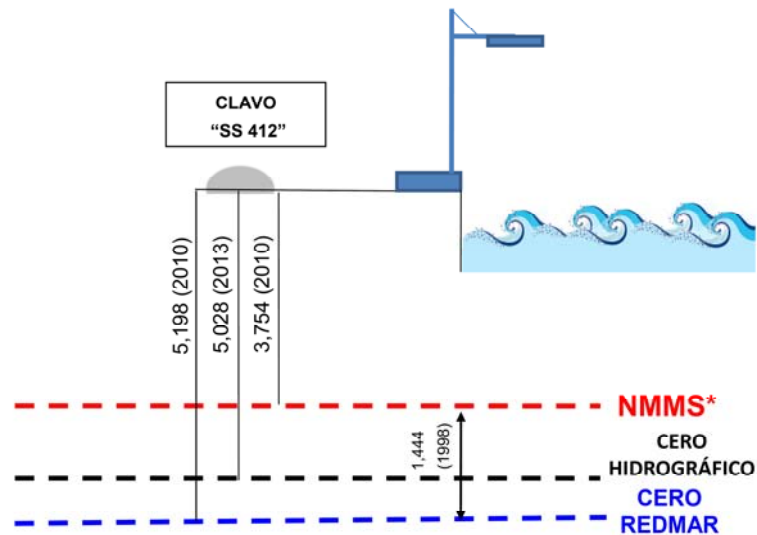


Figure 74. Tenerife 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Santa Cruz de Tenerife that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. <http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx> (accessed 8 December 2015)

ARGO PROGRAM

ARGO PRINCIPAL INVESTIGATORS

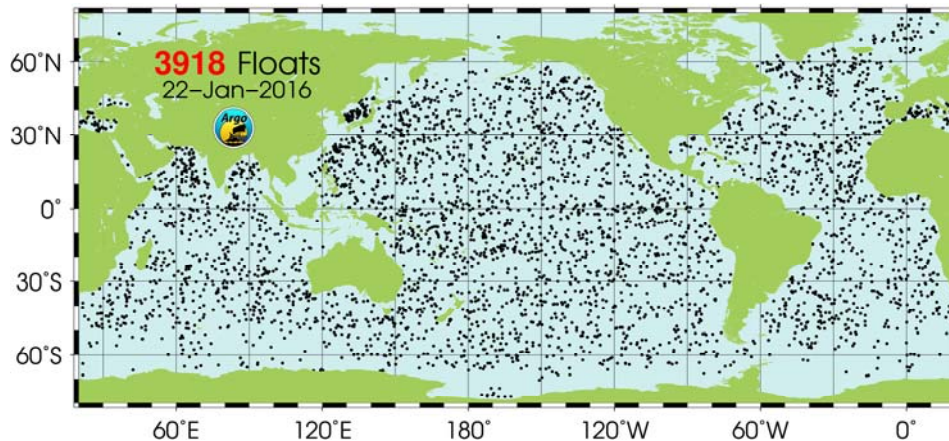


Figure 75. Argo array on 22 January 2016. Source: Argo program. <http://www.argo.ucsd.edu/statusbig.gif> (accessed 23 January 2016)

Resource abstract:

The broad-scale global array of temperature/salinity profiling floats, known as Argo, is a major component of the ocean observing system. Argo is a standard to which other developing ocean observing systems can look to.

Argo's Objectives:

- It provides a quantitative description of the changing state of the upper ocean and the patterns of ocean climate variability from months to decades, including heat and freshwater storage and transport.
- The data enhance the value of the Jason satellite altimeter through measurement of subsurface temperature, salinity and velocity, with sufficient coverage and resolution to permit interpretation of altimetric sea surface height variability.
- Argo data is used for initializing ocean and coupled ocean-atmosphere forecast models, for data assimilation and for model testing.
- A primary focus of Argo is to document seasonal to decadal climate variability and to aid the understanding of its predictability. The Argo dataset is used in a wide range of applications for high-quality global ocean analyses.

Resource language: eng

Keyword values: Oceanographic geographical features

Variables available: *Observed variables*

Salinity

Temperature

Pressure

Velocity

Geographic location: Global ocean coverage

Spatial resolution: Variable. The mean coverage is one float in every box of 3° latitude x 3° longitude

Temporal extent: 2000 / present

Depth range/resolution: From surface to 2000 m depth

Conditions for access & use: No conditions apply

Limitations on public access: No

Responsible organisation: USGODAE Global Data Assembly Center (GDAC) and Coriolis GDAC

Data via: <http://argo.jcommops.org/website/Argo/viewer.htm>
<http://www.argodatamgt.org/Access-to-data/Argo-data-selection>
http://www.usgodae.org/cgi-bin/argo_select.pl
<http://www.coriolis.eu.org/Data-Products/Data-Delivery>
<https://www.nodc.noaa.gov/argo/>
<http://www.argo.ucsd.edu/>

Contact: support@argo.net
Argo Information Centre data users support, JCOMMOPS,
Toulouse, France

Contact: aic@jcommops.org
Argo Information Centre, JCOMMOPS, Toulouse, France

Contact: argo@ucsd.edu
Argo Project Office

Contact: codac@ifremer.fr
Programme Coriolis, Ifremer, France

Contact: pedro.velez@ca.ieo.es
Pedro Vélez Belchí. Senior scientist, Argo Spain Project
coordinator, Instituto Español de Oceanografía, Canary
Islands, Spain

Data format: Digital (plain text)

References: "These data were collected and made freely available by the International Argo Program and the national programs that contribute to it. (<http://www.argo.ucsd.edu>, <http://argo.jcommops.org>). The Argo Program is part of the Global Ocean Observing System."

Additional information:

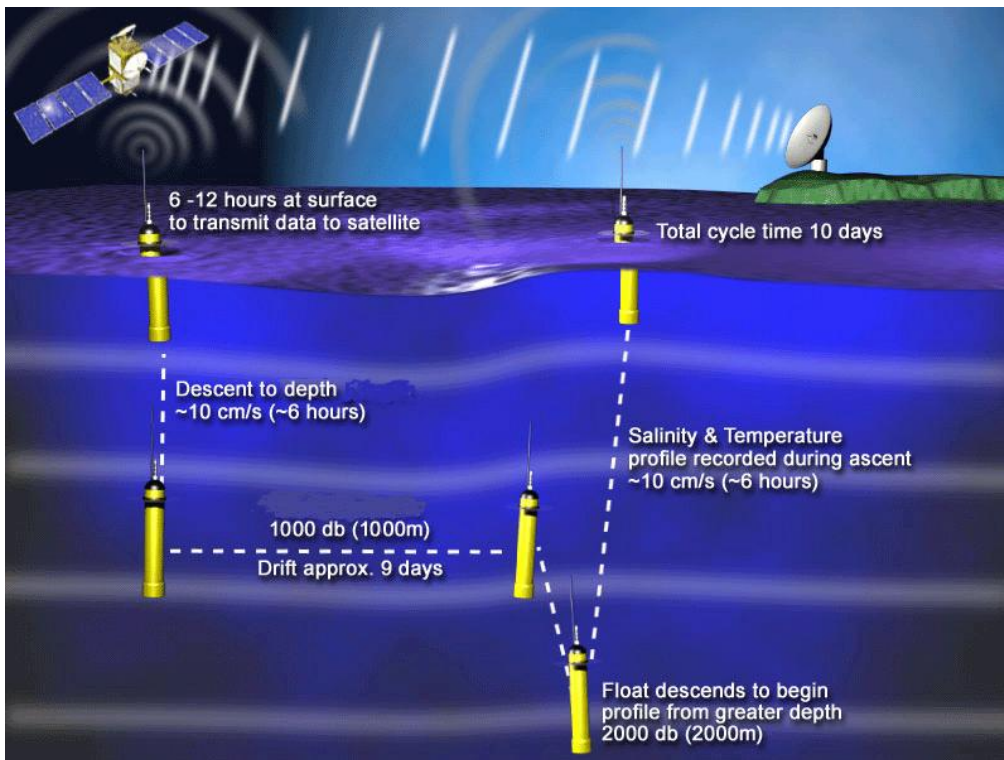


Figure 76. The standard Argo mission is a park and profile mission where the float descends to a target depth of 1000 m to drift and then descends again to 2000 m to start the temperature and salinity profile. In the beginning of 2010, 70% of floats recorded profiles to depths greater than 1500 m. Another 20% between 1000 m and 1500 m. Source: Argo program. Schematic image by Southampton Oceanography Centre, UK.

http://www.argo.ucsd.edu/operation_park_profile.jpg (accessed 30 March 2016)

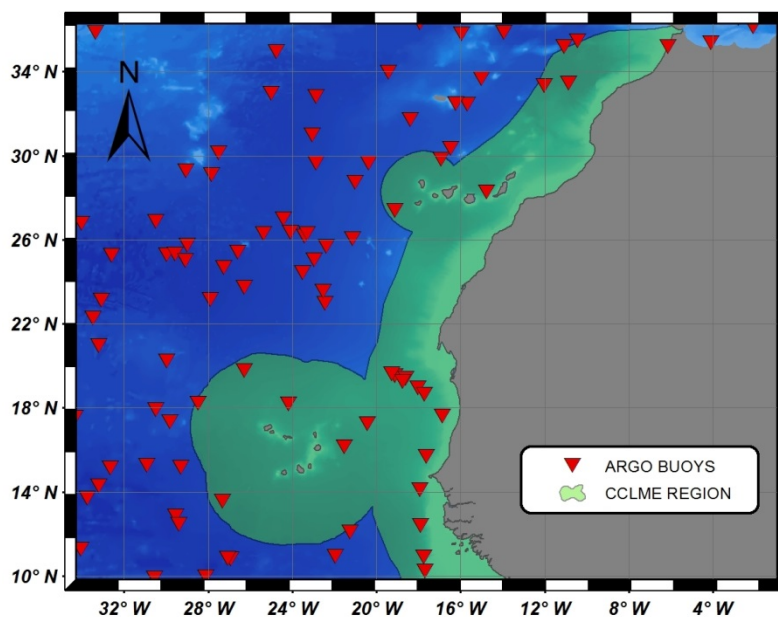


Figure 77. Active Argo buoys deployed in the CCLME and the surrounding area (west coast of Africa) on 24 October 2014. Data source: Argo program

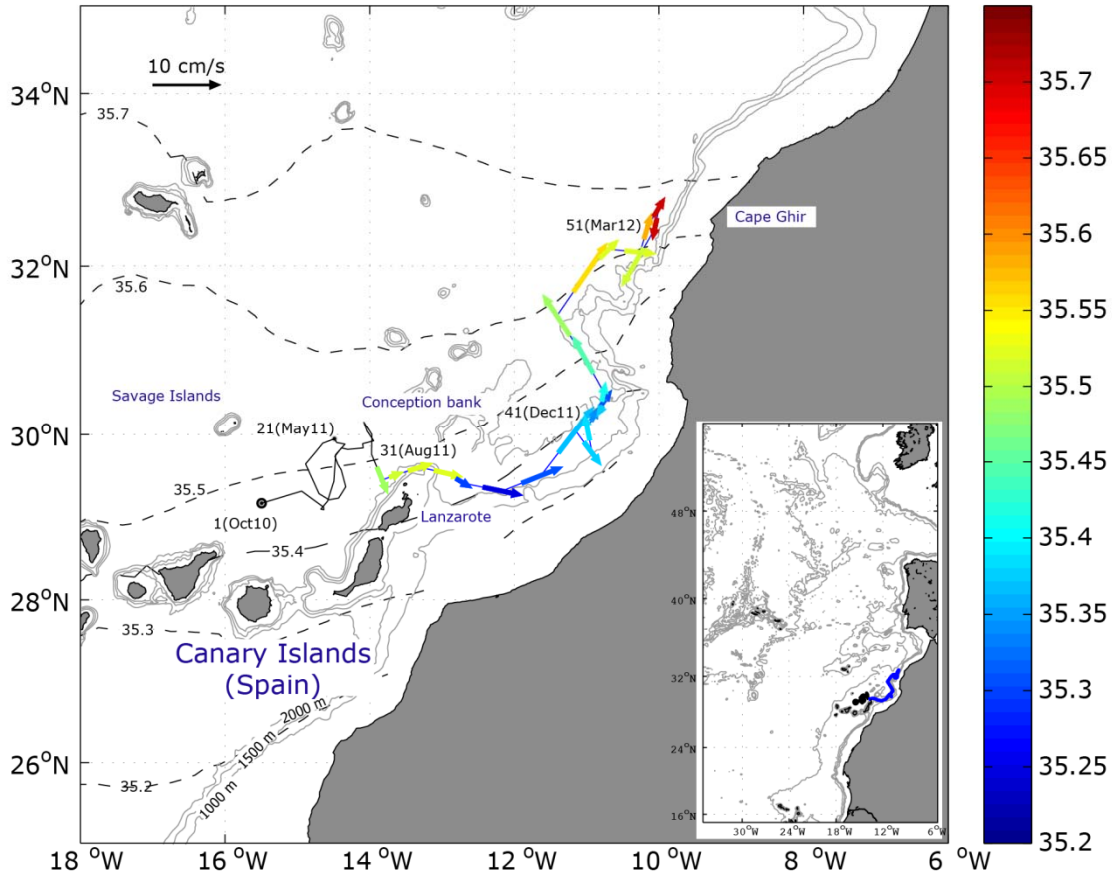
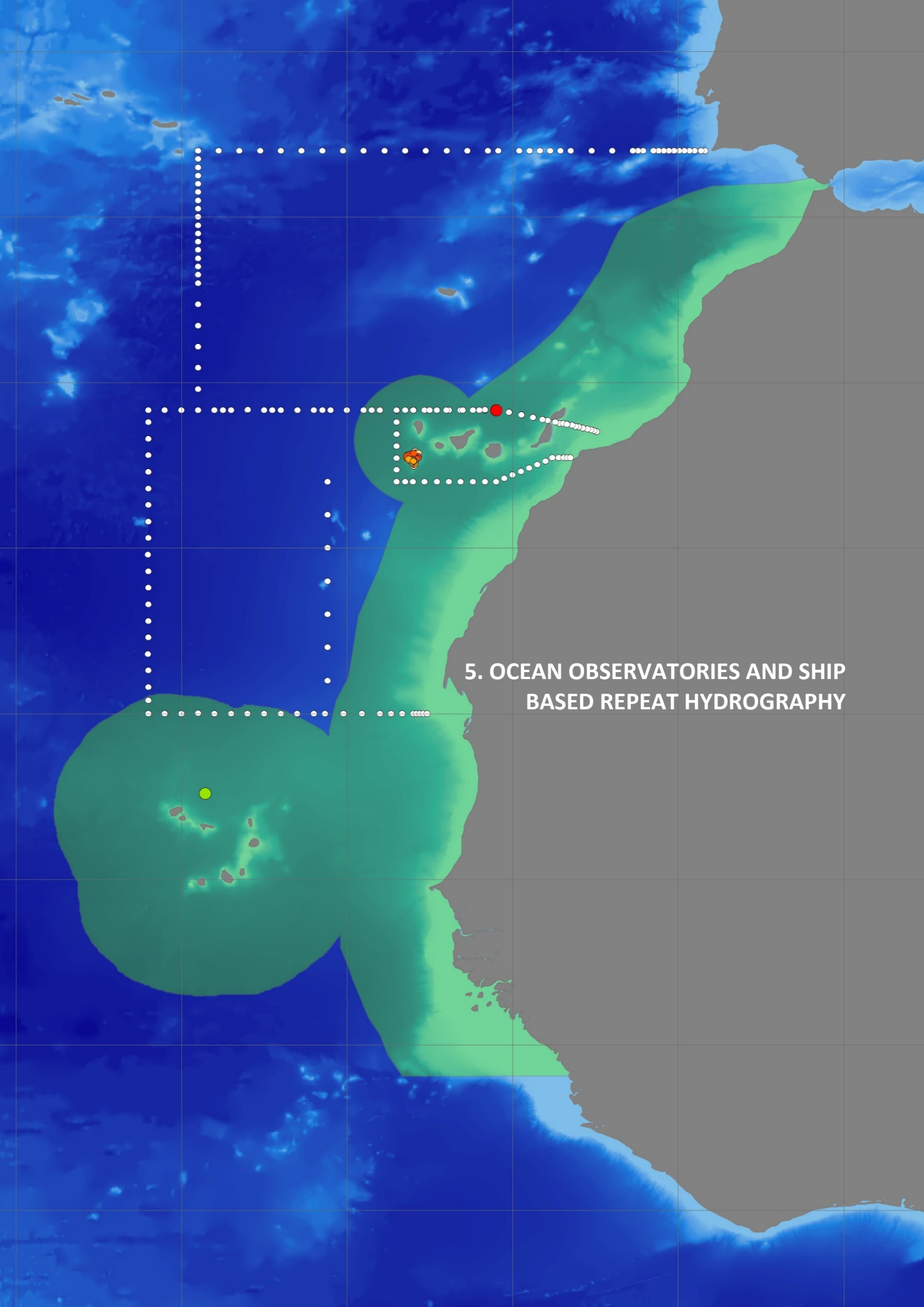


Figure 78. (a) Trajectory of Argo float WMO-690072 in the Canary Current Eastern Upwelling system. The arrows represent the velocity at the parking depth (between two profiles), color-coded with the salinity (PSU) at the parking depth. There are arrows only after the float enters the Canary deep Poleward Undercurrent (CdPU) (profile 33); prior to this, the float trajectory is a thin black line. The labels correspond to the number and the month/year of a profile. The dashed lines represent the climatological for salinity at 1000 m. The isobaths for 1000 m, 1500 m and 2000 m are depicted with a grey line. Source: Vélez-Belchí et al. (2012)



**5. OCEAN OBSERVATORIES AND SHIP
BASED REPEAT HYDROGRAPHY**

*Ocean observatories and ship based repeat hydrography in the CCLME region (in green).
The red circle shows the location of the European Station for Time Series in the Ocean.
The green circle shows the location of the Cape Verde Ocean Observatory.
The white circles show the location of the stations in the Canary deep hydrographic section,
CORICA 2003 survey and ORCA 2009 survey.
The orange circles show the location of the stations in the Vulcano project surveys around El
Hierro island (Vulcano0313, Vulcano1013 and Vulcano0314 surveys)*

CAPE VERDE OCEAN OBSERVATORY – CVOO –

INSTITUTO NACIONAL DE DESENVOLVIMENTO DAS PESCAS (INDP), CAPE VERDE
HELMHOLTZ CENTRE FOR OCEAN RESEARCH KIEL (GEOMAR), GERMANY

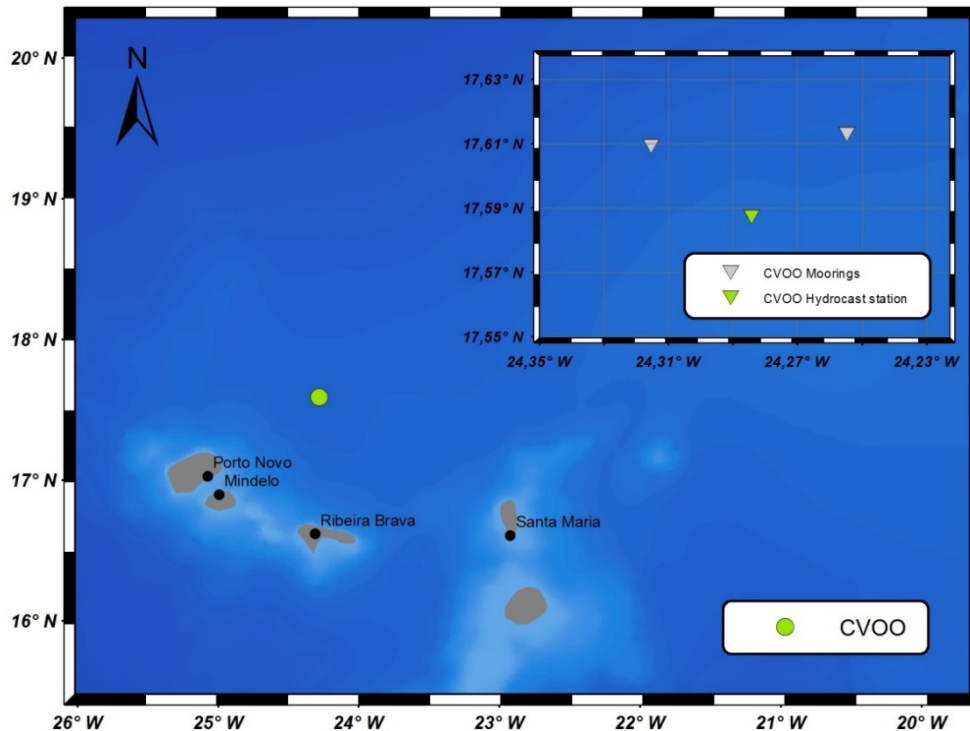


Figure 79. Map showing the location of the Cape Verde ocean observatory (CVOO), 60 nautical miles NE off the Cape Verde archipelago. The CVOO working area (see enlargement) includes the hydrocast station for monthly samplings, the M1 long-term mooring (the eastern one) and the experimental mooring M2 (submersible winch test, at the west)

Resource abstract:

The CVOO is a biogeochemical ocean time-series site in the Eastern Tropical North Atlantic (ETNA) which is based on two pillars: a monthly ship-based sampling programme (measurements of temperature, conductivity, biological parameters, nutrients, dissolved carbon and oxygen), as well as an oceanographic multi-parameter long-term mooring for in-situ observations (including real-time telemetry). The Cape Verdean research vessel *Islândia* is equipped with state of the art oceanographic instruments to collect samples for oceanographic parameters. Novel observational platforms such as gliders or profiling floats are used within the framework of various field studies at the CVOO.

Collected data are coupled to observations at the atmospheric site (CAVO) which measures meteorological parameters, greenhouse and short-lived gases, and aerosols. Coupled data between both observatories provides highly valuable information about processes at the ocean-atmosphere interface.

Resource language:

eng

Keyword values:

Oceanographic geographical features

Variables available:

Observed variables

CTD sensors:

Temperature
Conductivity
Pressure
Oxygen
Photoactive radiation (PAR)
Fluorescence

	CTD sampling:	Turbidity Conductivity Oxygen Total alkalinity (TA) Dissolved inorganic carbon (DIC) Particulate organic carbon/nitrogen Total organic carbon/nitrogen Chlorophyll a Nitrate Nitrite Phosphate Silicate
	Mooring:	Temperature Conductivity Pressure Oxygen pCO ₂ Fluorescence Current Downward particle flux (sediment traps)
Geographic location:		24.2833333°W 17.5833333°N
Spatial resolution:		Fixed-point measurements. Occasional surveys around the archipelago (within a radius of ~ 150 nautical miles)
Temporal extent:		Long-term mooring: 2006 / present Monthly samplings: 2008 / present, with interruptions
Temporal resolution:		Variable from monthly (samplings) to hourly (long-term mooring)
Depth range/resolution:		Samplings: 0 m – 500 m Long-term mooring: 10 m – 3600 m
Conditions for access & use:		No costs for data use. Acknowledgement or co-authorship required for publications.
Limitations on public access:		Yes (login via web portal required)
Responsible organisation:		Helmholtz Centre for Ocean Research Kiel (GEOMAR), Kiel, Germany
Data via:		http://portal.geomar.de/group/cvoo
		Contact: bfiedler@geomar.de Dr. Bjoern Fiedler. Scientific Coordinator CVOO, GEOMAR, Germany
		Contact: akoertzinger@geomar.de Prof. Dr. Arne Koertzinger. Principal Investigator CVOO, GEOMAR, Germany
Data format:		Digital. Available as ASCII text files or via database including web interface (various export formats available)
References:		“Data taken from the Cape Verde Ocean Observatory (CVOO), Mindelo, Republic of Cape Verde, cvoo.geomar.de ”
Additional information:		All information presented in this document (plus more detailed information about equipment, setup etc.) can be found via the observatory’s website: cvoo.geomar.de (accessed 19 January 2016).

**EUROPEAN STATION FOR TIME SERIES IN THE OCEAN – ESTOC –
OCEANIC PLATFORM OF THE CANARY ISLANDS (PLOCAN), SPAIN**

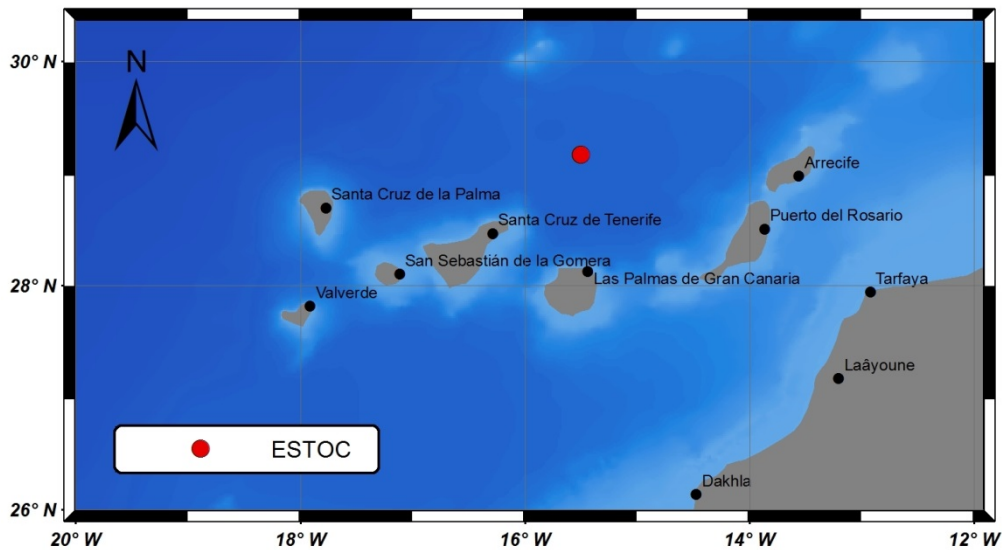


Figure 80. Location of the ESTOC station

Resource abstract:

Observations of long-term changes in the ocean are a key to understanding regional and global climate variability. ESTOC was sponsored by four European institutions: the Universities of Bremen and Kiel in Germany, and by the Instituto Español de Oceanografía and the Canary Institute for Marine Sciences in Spain and was initially funded by several observational programmes: the German JGOFS (Joint Global Ocean Flux Study), and national and local funding in Spain.

ESTOC is an open ocean site in the sense that it is located well outside the highly variable eastern boundary with its strong coastal upwelling regime (although interaction with this regime exists), is deep enough to encompass the eastern subtropical North Atlantic's major water masses including the North Atlantic Deep Water (however not the Antarctic Bottom Water), is windward of the Canary Islands to avoid wake effects of both the major currents and winds (Canary Current and Northeast Trade Winds), and is far enough from coasts and islands to serve as reference for satellite images and altimetry (the Selvages 100 km northwards are very small and flat).

The first activities included a ship-based observation programme (monthly observations of physical, chemical and biological parameters) and two moored structures with current meters and particle traps. In addition, other cruises were foreseen to carry out process studies in the surrounding area at least once per year.

Resource language: eng
Keyword values: Oceanographic geographical features
Variables available: Observed variables
 Pressure
 Temperature (ITS90)
 Salinity (PSS78)
 Dissolved oxygen
 Dissolved inorganic nitrogen (Nitrate + Nitrite)
 Dissolved inorganic Phosphate
 Dissolved inorganic Silicate
 Chlorophyll a

Geographic location: 15.500°W 29.167°N

Spatial resolution: Station

Temporal extent: 1994-02 / present

Temporal resolution: Variable. ESTOC was regularly occupied once per month from 1994 to 2004 and after this date the sampling frequency changed to seasonal due to logistical constraints

Depth range/resolution: The depth range is from surface to bottom (3608 m), distributed in 24 levels: 0 m, 10 m, 25 m, 50 m, 75 m, 100 m, 125 m, 150 m, 200 m, 300 m, 400 m, 600 m, 800 m, 1000 m, 1100 m, 1200 m, 1300 m, 1500 m, 1800 m, 2000 m, 2500 m, 2800 m, 3000 m and seabed

Conditions for access & use: The data access is through ESTOC web site. Data are free of cost by the application form

Limitations on public access: Yes

Responsible organisation: Oceanic Platform of the Canary Islands, Telde, Spain

Data via: <http://www.estoc.es>
 Drs. Octavio Llinás and M^a José Rueda
 Principal Investigators of the ESTOC project

Contact: marimar.villagarcia@plocan.eu
 María del Mar Villagarcía. Head of the PLOCAN integrated observatory, PLOCAN

Contact: Andres.cianca@plocan.eu
 Andrés Cianca. ESTOC Data manager, PLOCAN

Data format: Digital (netCDF file)

References: Data users are requested that all data produced by the observatory are cited in reports and publications with proper authorship, in agreement with common and standard practices (e.g., using doi: when possible or other form of traceable acknowledgement). Co-authorship of publication may be requested by the owner or principal investigator of the instrument.

Preferred format of citation (including doi):
 Martin, F., Smith, J., Chang, Y. P. 2002. Acoustic data from 2013 to 2014 at ESTOC site, PLOCAN Observatory. doi:10.1591/PANGAEA.72142

When no Digital Object Identifier exists yet:
 Martin, F., Smith, J., Chang, Y. P. 2002. Acoustic data from 2013 to 2014 at ESTOC site, PLOCAN Observatory. (*Add URL to dataset or data portal if available*)

CANARY DEEP HYDROGRAPHIC SECTION – RAPROCAN –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

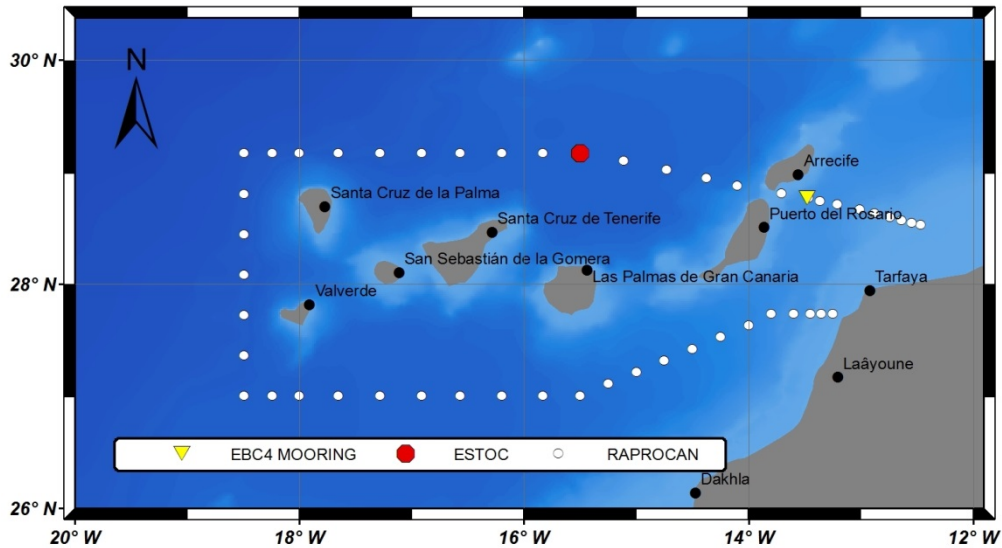


Figure 81. Situation of the 50 stations in the Canary deep hydrographic section, which includes ESTOC and EBC-4 moorings

Resource abstract:

The objective of the Raprocan project is to monitor and understand the changes happening in the Coastal Transition Zone between the upwelling of the northeast Africa and the oriental limit of the Subtropical Gyre. It is important to understand the mechanisms driving this change since the subtropical gyre plays a significant role in the heat transport in the North Atlantic Ocean and the ocean-atmosphere interaction through the North Atlantic Oscillation (NAO). The RAPROCAN project started in 2006 and includes oceanographic surveys in February and September and the EBC-4 mooring maintained in the Lanzarote passage since 1997.

Resource language:

spa, eng

Keyword values:

Oceanographic geographical features

Variables available:

Observed variables

Salinity
 Temperature
 Pressure
 Oxygen
 Nutrients
 Chlorophyll
 Current velocity

Derived variables

Density
 Geostrophic velocity
 Heat content

Geographic location:

25.00°W – 13.00°W

27.00°N – 29.50°N

Spatial resolution:

50 stations

Temporal extent:

2006 / present

Temporal resolution:

Twice a year

Depth range/resolution:

From surface to seabed

Conditions for access & use:

No conditions apply

Limitations on public access:

No

Responsible organisation:

Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain

Data via:

Contact: pedro.velez@ca.ieo.es

Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía

Contact: eugenio.fraile@ca.ieo.es

Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía

Digital (plain text)

Data format:

References:

Vélez-Belchí, P., Hernández-Guerra, A., Barrera, C., Fraile-Nuez, E., Barrera, A., Llinas, O., Benítez-Barrios, V., Domínguez, F., Alonso-González, I., González-Dávila, M., Santana-Casiano, J. M., Hernández-Brito, J. J., Presas-Navarro, C., Arístegui-Ruiz, J., Comas-Rodríguez, I., Garijo-Lopez, J. C., Hernández-León, S., Pérez-Hernández, M. D., Rodríguez-Santana, A. and Sosa-Trejo, D. 2014. *Monitoring the Oceanic Waters of the Canary Islands: the deep hydrographic section of the Canaries*. IV Congress of Marine Science, Las Palmas de Gran Canaria, Spain, 11-13 June 2014. URI: <http://hdl.handle.net/10508/2649>

Additional information:

These data are collected by the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, <http://www.ieo.es> – accessed 30 March 2016).

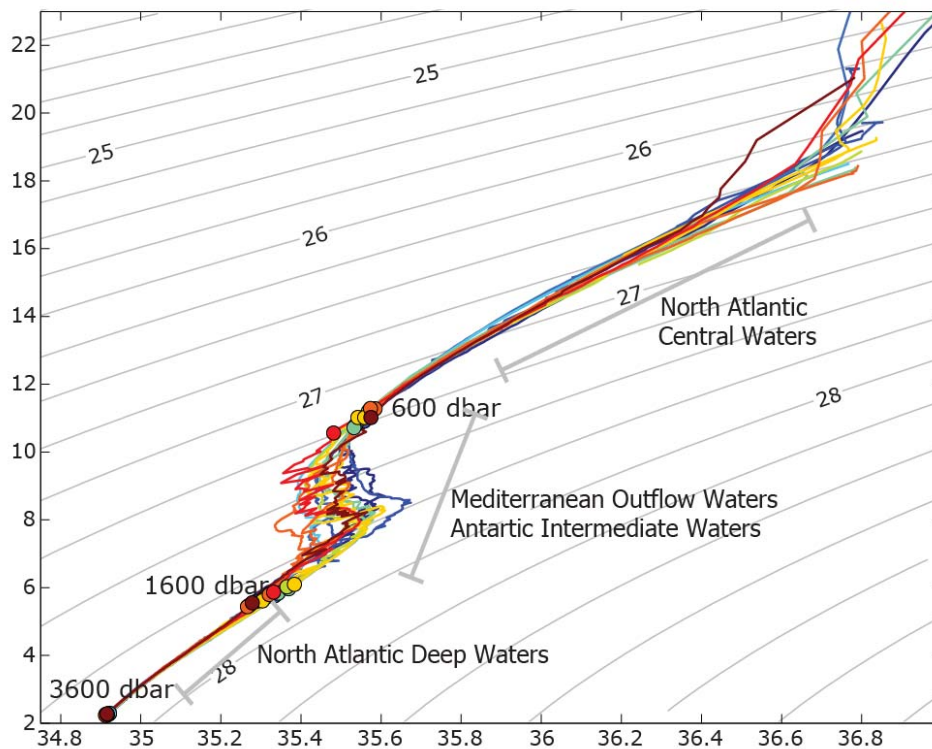


Figure 82. TS diagram for station 10, where the main water mass and its mean depth are indicated (Vélez-Belchí et al., 2014). Salinity on the x-axis is in PSU and temperature on the y-axis is in °C

CORRIENTE DEL CONTORNO ORIENTAL-CANARIAS SURVEY – CORICA 2003 –
 UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

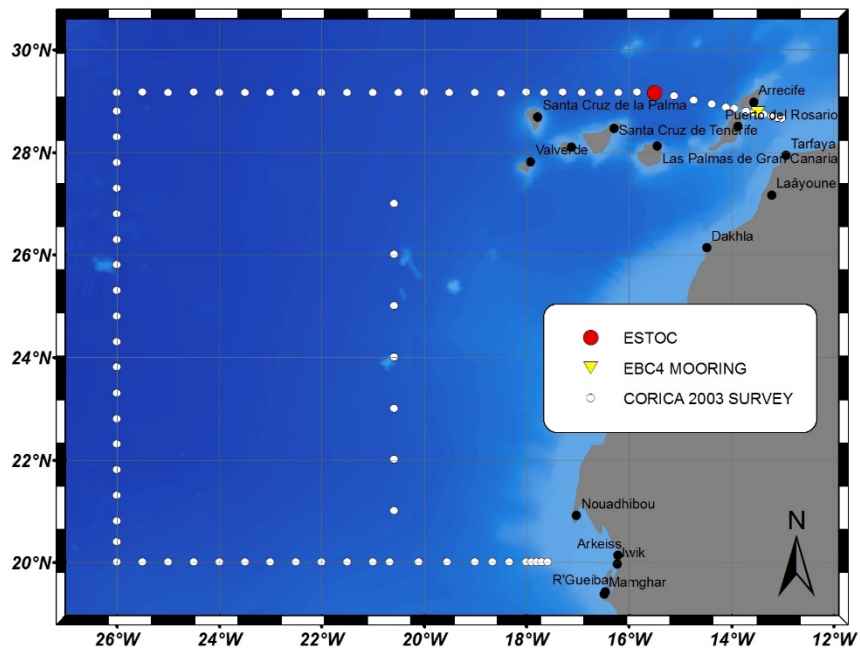


Figure 83. Situation of the 83 hydrographic stations during the Corica2003 survey, which includes ESTOC and the EBC-4 mooring

Resource abstract:

The objective of this project was to study the Eastern Boundary Current which transports Antarctic Intermediate Water (AAIW) northwards, the Canary Current and its interaction with the upwelling system off Northwest Africa, as well as the mixing between the AAIW and the Mediterranean Water. The study was aimed to carry out a hydrographic survey bounded by the latitudes 20.00°N-29.25°N, the longitude 26.00°W and the African coast. The hydrographic survey consisted of CTD/O₂, Lowered Acoustic Doppler Current Profiler (LADCP) and nutrient casts following the World Ocean Circulation Experiment (WOCE) recommendation.

Resource language:

spa, eng

Keyword values:

Oceanographic geographical features

Variables available:

Observed variables

Derived variables

- Salinity
- Temperature
- Pressure
- Oxygen
- Nutrients
- Chlorophyll
- Current velocity
- Zooplankton
- Upper air observations

- Density
- Geostrophic velocity
- Heat content
- Transport

Geographic location:

26.00°W – 12.50°W

20.00°N – 29.50°N

Spatial resolution:

83 stations

Temporal extent:

2003-09-07 / 2003-09-29

Temporal resolution:

n/a

Depth range/resolution:

From surface to seabed

Conditions for access & use:

No conditions apply

Limitations on public access: No

Responsible organisation: Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain
 Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain

Data via: Contact: alonso.hernandez@ulpgc.es
 Alonso Hernández-Guerra. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria

Contact: pedro.velez@ca.ieo.es
 Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía

Data format: Digital (plain text)

References: Hernández-Guerra, A., Fraile-Nuez, E., López-Laatzén, F., Martínez, A., Parrilla, G. and Vélez-Belchí, P. 2005. Canary Current and North Equatorial Current from an inverse box model. *Journal of Geophysical Research*, Vol. 110, C12019. doi:10.1029/2005JC003032
 Martínez-Marrero, A., Rodríguez-Santana, A., Hernández-Guerra, A., Fraile-Nuez, E., López-Laatzén, F., Vélez-Belchí, P. and Parrilla, G. 2008. Distribution of water masses and diapycnal mixing in the Cape Verde Frontal Zone. *Geophysical Research Letters*, Vol. 35, L07609. doi:10.1029/2008GL033229

Additional information:

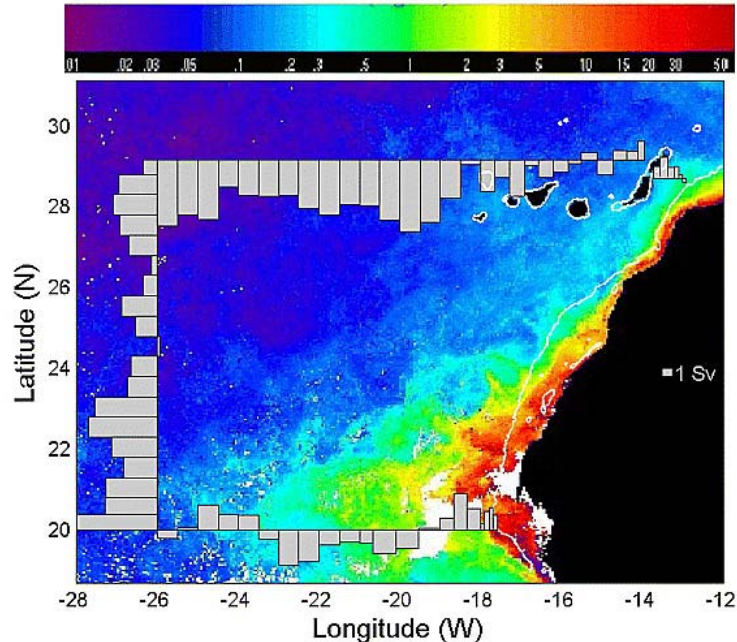


Figure 84. Image of phytoplankton pigment concentration from SeaWiFS data corresponding to September 2003 monthly mean together with the accumulated mass transport (in Sv) for the surface layer. Land and clouds are represented in black and white, respectively. The scale of phytoplankton concentration is given by the color bar at the top (in mg/m^3) of every pixel in the image. The white curve along the African coast is the 200 m isobath. Source: Hernández-Guerra et al. (2005)

ORIGEN DE LA CORRIENTE DE CANARIAS SURVEY – ORCA 2009 –
 UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

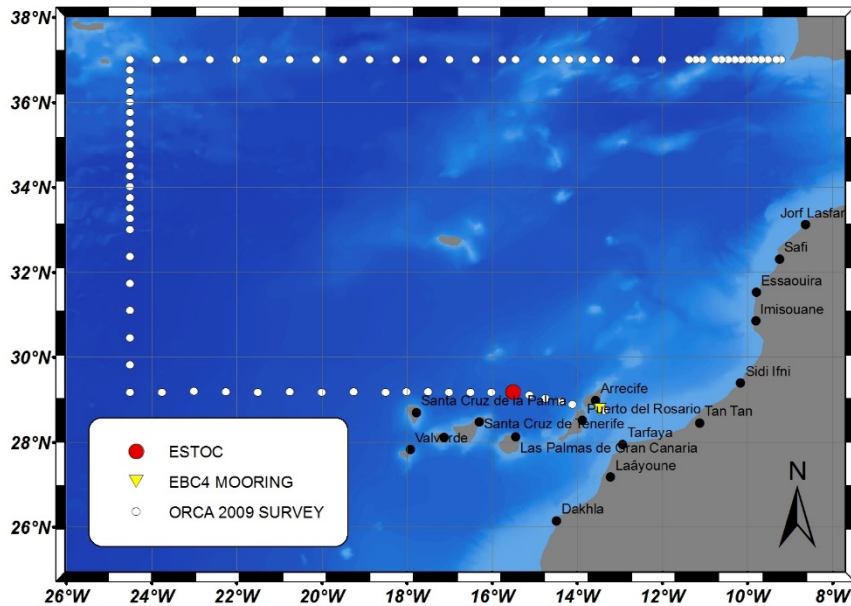


Figure 85. Situation of the 80 stations in the ORCA 2009 survey, which includes RAPROCAN section and ESTOC (station 75) and EBC-4 moorings (station 80)

Resource abstract:

The objective of this project was to study the contributions of the Azores and the Portugal currents to the Canary Current. The study carried out a hydrographic survey bounded by the latitudes 28.73°N-37.09°N, the longitude 25°W and the African and European coast. The hydrographic survey consisted of 80 CTD/O₂, Lowered Acoustic Doppler Current Profiler (LADCP) and nutrient casts following the WOCE recommendation.

Resource language:

spa, eng

Keyword values:

Oceanographic geographical features

Variables available:

Observed variables

- Salinity
- Temperature
- Pressure
- Gravity
- Air temperature
- Wind speed and direction
- Atmospheric humidity
- Solar radiation

Derived variables

- Density
- Geostrophic velocity
- Heat content

Geographic location:

24.5221°W – 6.2762°W

28.7383°N – 37.0938°N

Spatial resolution:

80 stations

Temporal extent:

2009-10-17 / 2009-11-11

Temporal resolution:

n/a

Depth range/resolution:

From surface to seabed

Conditions for access & use:

No conditions apply

Limitations on public access:

No

Responsible organisation:

Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain
 Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain

Data via:

Contact: alonso.hernandez@ulpgc.es

Alonso Hernández-Guerra. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria

Contact: pedro.velez@ca.ieo.es

Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

Comas-Rodríguez, I., Hernández-Guerra, A., Fraile-Nuez, E., Martínez-Marrero, A., Benítez-Barrios, V. M., Pérez-Hernández, M. D. and P. Vélez-Belchí. 2011. The Azores Current System from a meridional section at 24.5°W. *Journal of Geophysical Research*, Vol. 116, C09021. doi:10.1029/2011JC007129

Pérez-Hernández, M. D., Hernández-Guerra, A., Fraile-Nuez, E., Comas-Rodríguez, I., Benítez-Barrios, V. M., Domínguez-Yanes, J. F., Vélez-Belchí, P. and De Armas, D. 2013. The source of the Canary current in fall 2009. *Journal of Geophysical Research: Oceans*, Vol. 118, pp. 2874-2891. doi:10.1002/jgrc.20227

Additional information:

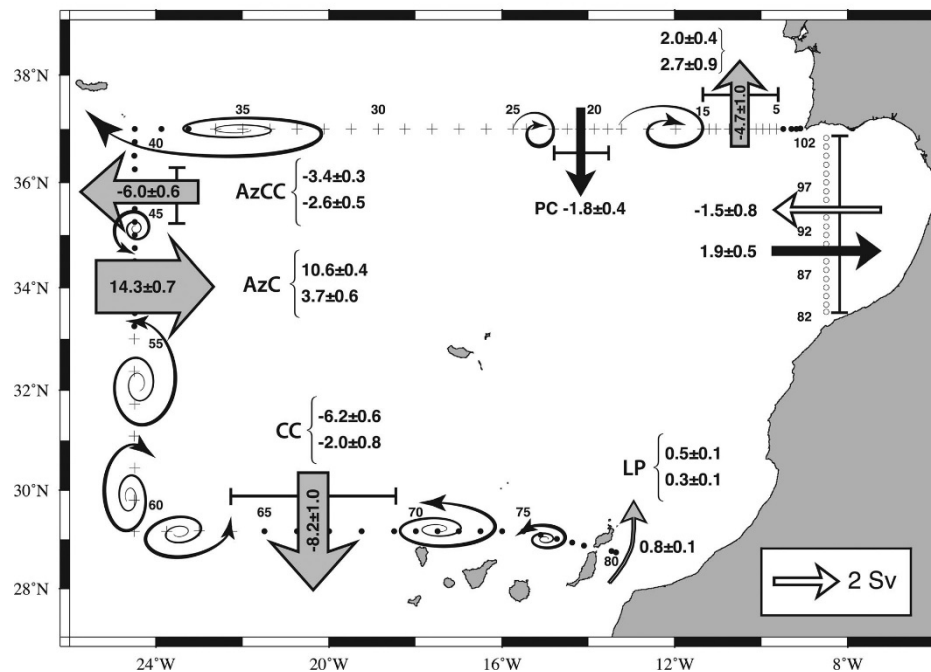


Figure 86. Main currents with their corresponding integrated mass transport (in Sv). PC, AzCC, AzC, CC, and LP stand for Portugal Current, Azores Countercurrent, Azores Current, Canary Current, and Lanzarote Passage, respectively. Curly brackets indicate (top) the surface and (bottom) intermediate mass transport for each current. Gray arrows and the enclosed number, correspond to the integrated surface and intermediate transport. The exchange between the Mediterranean Sea and the Atlantic Ocean is shown with black arrows (surface layers) and white arrows (intermediate layers). The width of the arrow shaft is proportional to the mass transport values. Spiral arrows indicate the presence of an anticyclonic/cyclonic eddy. The stations where deep circulation was found are shown with black crosses instead of black dots (ORCA stations) or white dots (WOCE AR06 stations). Source: Pérez-Hernández et al. (2013)

BIMBACHE1011 SURVEYS

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
 UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
 BANCO ESPAÑOL DE ALGAS (BEA), SPAIN
 OCEANIC PLATFORM OF THE CANARY ISLANDS (PLOCAN), SPAIN

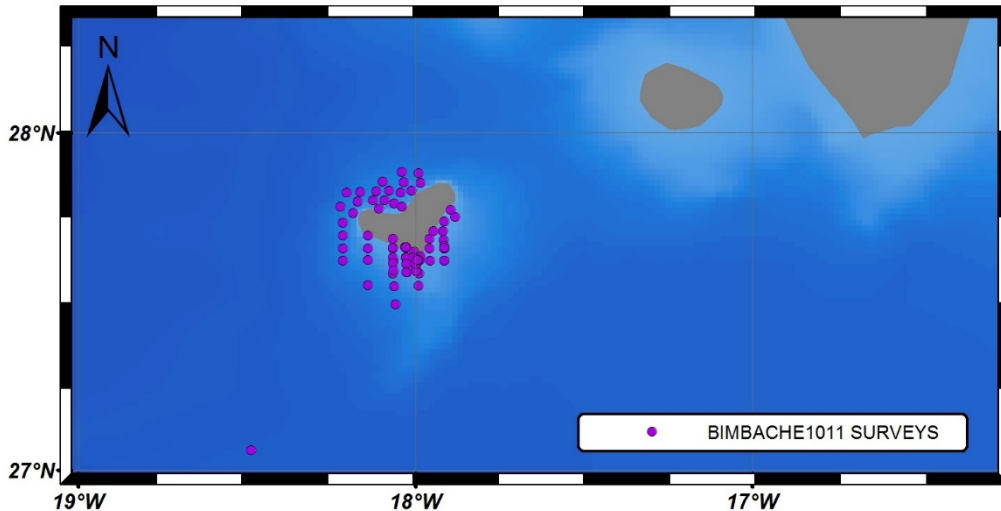


Figure 87. Map showing the location of the sampling stations during 5 of the Bimbache oceanographic surveys carried out between November 2011 and February 2012

Resource abstract:

12 oceanographic surveys have been undertaken to monitor a submarine eruption happened in El Hierro (Canary Islands) in 2011. This series of surveys was called Bimbache1011. The acquired data was critical to give technical and scientific advice to the civil security committee. The action was organized by Spanish Institut of Oceanography (IEO) in collaboration with the the University of Las Palmas de Gran Canaria (ULPGC), Banco Español de Algas (BEA) and the Oceanic Platform of the Canary Islands (PLOCAN).

Different scientific aspects have been studied to monitor the volcano and its activity as (Fraile-Nuez et al., 2012):

- Geology and geophysics
- Bathymetry
- Impacts on the benthic community
- Physical, chemical and biological characterization
- Impacts in the water column
- Follow up of the eruptive process

Resource language: spa, eng

Keyword values: Oceanographic geographical features

Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
IEO data:	Salinity Temperature Pressure Oxygen Nutrients Turbidity Chlorophyll Current velocity Meteorological parameters	Density Geostrophic velocity Heat content

	ULPGC data:	Phytoplankton Total alkalinity (A_T) Total inorganic carbon (C_T) pH pCO ₂ Organic matter Metals	
	BEA data:	Microorganisms	
Geographic location:	18.30°W – 17.50°W		27.00°N – 28.00°N
Spatial resolution:	n/a		
Temporal extent:	2011-10 / 2012-02		
Temporal resolution:	n/a		
Depth range/resolution:	From surface to seabed		
Conditions for access & use:	Agreement with the appropriate institution		
Limitations on public access:	Yes		
Responsible organisation:	Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain		
Data via:	Contact: eugenio.fraile@ca.ieo.es Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía		
	Contact: Magdalena.santana@ulgpc.es Magdalena Santana Casiano. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria		
Data format:	Digital (plain text). The twelve survey reports are available as well (PDF)		
References:	When datasets from these surveys are used the following article must be cited: Fraile-Nuez, E., González-Dávila, M., Santana-Casiano, J. M., Arístegui, J., Alonso-González, I. J., Hernández-León, S., Blanco, M. J., Rodríguez-Santana, A., Hernández-Guerra, A., Gelado-Caballero, M. D., Eugenio, F., Marcello, J., de Armas, D., Domínguez-Yanes, J. F., Montero, M. F., Laetsch, D. R., Vélez-Belchí, P., Ramos, A., Ariza, A. V., Comas-Rodríguez, I. and Benítez-Barrios, V. M. 2012. The submarine volcano eruption at the island of El Hierro: physical-chemical perturbation and biological response. <i>Scientific Reports</i> , Vol. 2, No. 486. doi:10.1038/srep00486. Santana-Casiano, J. M., González-Dávila, M., Fraile-Nuez, E., de Armas, D., González, A. G., Domínguez-Yanes, J. F. and Escánez, J. 2013. The natural ocean acidification and fertilization event caused by the submarine eruption of El Hierro. <i>Scientific Reports</i> , Vol. 3, No. 1140, doi:10.1038/srep01140.		

Additional information:

These surveys have carried out on board of the R/V *Ramón Margalef*.

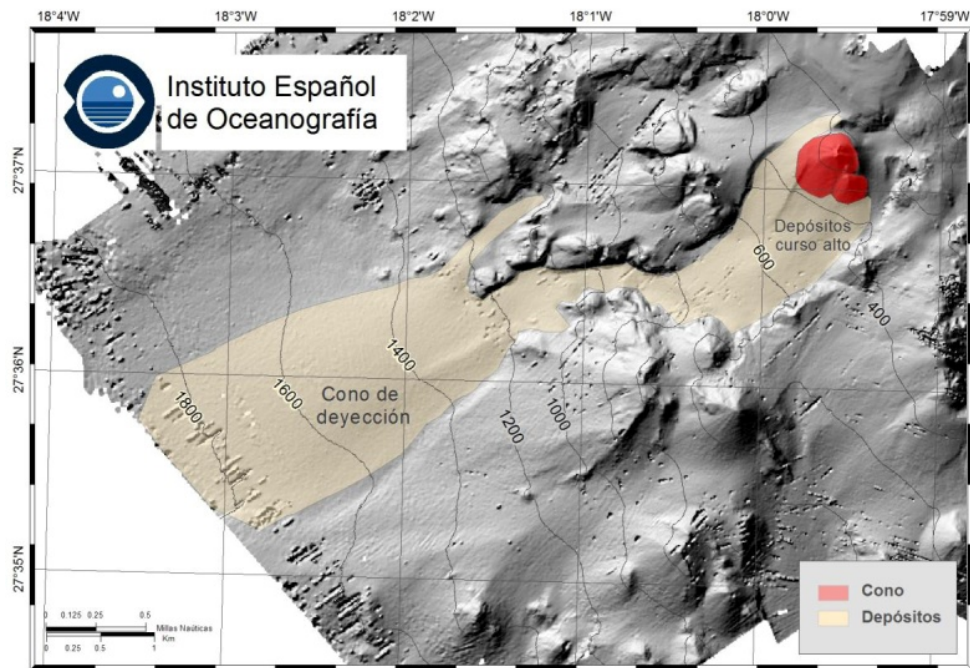


Figure 88. Map of the volcanic cone (in red) and associated deposits (in beige). Bathymetric chart (10 January 2012). Source: IEO

VULCANO PROJECT SURVEYS

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN

UNIVERSITY OF LA LAGUNA (ULL), SPAIN

BANCO ESPAÑOL DE ALGAS (BEA), SPAIN

MUSEO DE LA NATURALEZA Y EL HOMBRE DE TENERIFE (MNH), SPAIN

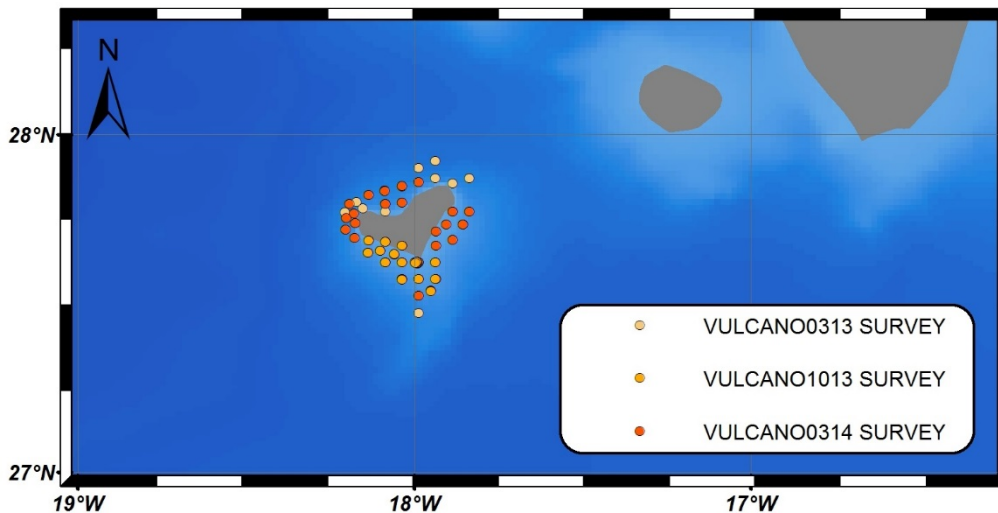


Figure 89. Distribution of the stations in the Vulcano0313, Vulcano1013 and Vulcano0314 surveys

Resource abstract:

The main objective of Vulcano project is to study the temporal evolution of changes in the marine ecosystem associated to the volcanic submarine eruption in El Hierro (Canary Islands) in 2011. Three oceanographic surveys took place: Vulcano0313, Vulcano1013 and Vulcano0314. Vulcano project belongs to the Spanish National Plan of Research, Development and Innovation (CTM2012-36317) and it is led by the IEO. The following organisations also contribute to the project: the University of Las Palmas de Gran Canaria, the University of La Laguna, Banco Español de Algas and the Museo de la Naturaleza y el Hombre de Tenerife.

The observations included:

- Study of spatial and temporal variability of physicals, chemical and biological properties.
- Evaluation of the eruptive process impact on lower trophic levels
- Physiographic, morphologic and structural characterization of the sea-bed associated to submarine eruptions and adjacent areas.

Resource language: spa, eng

Keyword values: Oceanographic geographical features

Variables available: *Observed variables*

IEO data: Conductivity
Temperature
Pressure
Oxygen
Fluorescence
Chlorophyll
Current velocity

ULPGC data: Phytoplankton
Biomass and prokaryotes abundance
Microbial community structure

	Total alkalinity (A_T)	
	Total inorganic carbon (C_T)	
	pH	
	pCO ₂	
	Metals	
	Organic matter	
	Dissolved organic carbon (DOC)	
	Particulated organic carbon (POC)	
	Particulated organic nitrogen (PON)	
	Coloured dissolved organic matter (CDOM)	
	Picoplankton abundance and composition	
	Nano and microplankton composition	
	ULL data: Metals	
	BEA data: Microorganisms	
	IEO, ULL and MNH data: Zooplankton	
Geographic location:	18.2500°W – 17.8000°W	27.4700°N – 27.9000°N
Spatial resolution:	51 stations	
Temporal extent:	2013-03 / 2014-03	
Temporal resolution:	n/a	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	Agreement with the appropriate institution	
Limitations on public access:	Yes	
Responsible organisation:	Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain	
Data via:	Contact: eugenio.fraile@ca.ieo.es Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía	
	Contact: Magdalena.santana@ulgpc.es Magdalena Santana Casiano. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria	
Data format:	Digital (plain text)	
References:	When datasets from these surveys are used the appropriate institution must be acknowledged, including a mention to the reference number of the project and the funding sources, like: "The data obtained under the frame of the VULCANO Project were funded by MINECO and FEDER (Code no. CTM2012-36317)"	
Additional information:	These surveys have been carried out on board of the R/V <i>Ángeles Alvariño</i> .	
	For further information, see http://www.vulcanoelhierro.es (accessed 30 March 2016).	

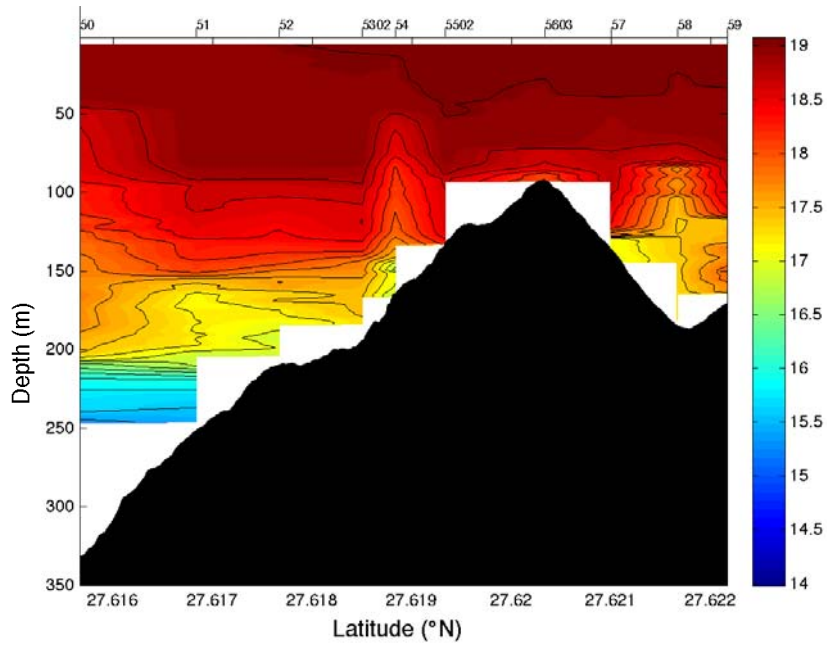


Figure 90. Vertical outline of potential temperature ($^{\circ}\text{C}$) to a high-resolution grid on the submarine volcano. Numbers in the upper horizontal axis are the numbers of sampling stations. Source: IEO

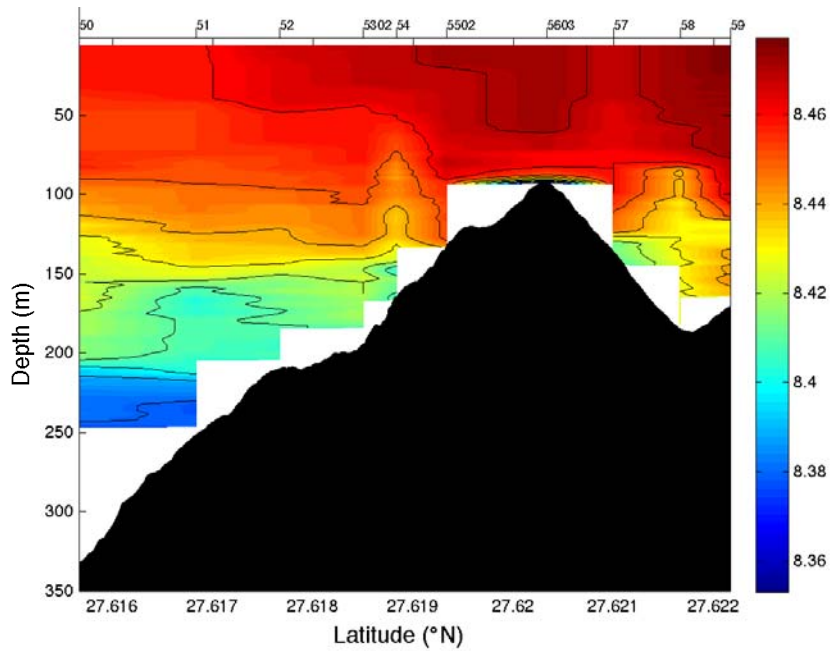


Figure 91. Vertical outline of pH to a high-resolution grid on the submarine volcano. Numbers in the upper horizontal axis are the numbers of sampling stations. Source: QUIMA Research Group (IOCAG-ULPGC)

VULCANA PROJECT SURVEYS

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN

UNIVERSITY OF LA LAGUNA (ULL), SPAIN

MUSEO DE LA NATURALEZA Y EL HOMBRE DE TENERIFE (MNH), SPAIN

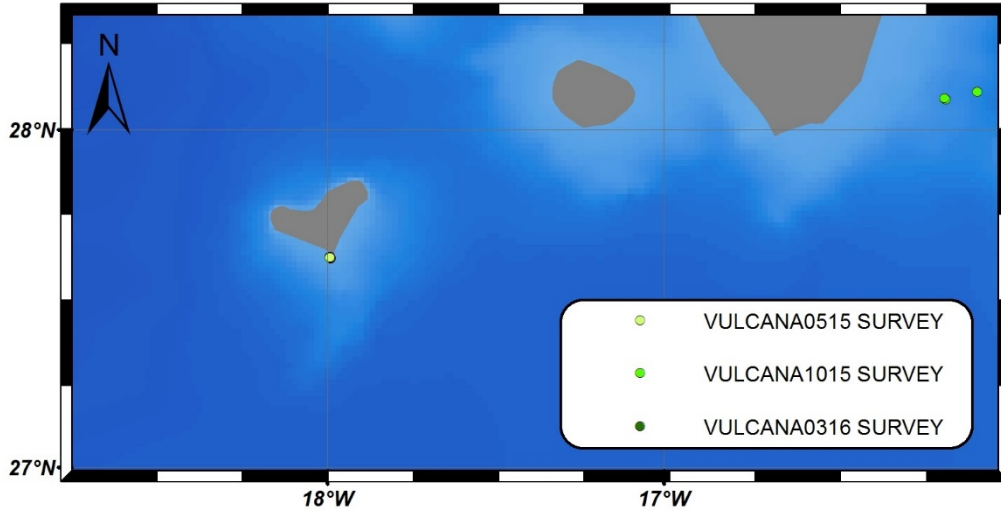


Figure 92. Map showing the location of the sampling stations during Vulcana0515, Vulcana1015 and Vulcana0316. A high resolution CTD stations grid has been carried out in the South of El Hierro Island for every single cruise

Resource abstract:

The main objective of Vulcana project is to study the environmental impact caused by the degassing process of the El Hierro submarine volcano, as well as the so-called “Volcan de Enmedio” between Gran Canaria and Tenerife islands (Canary Islands) from a multidisciplinary point of view. Other areas of the Canarian Archipelago will be studied in the same way. Three oceanographic surveys have taken place: Vulcana0515, Vulcana1015 and Vulcana0316.

Resource language:

spa, eng

Keyword values:

Oceanographic geographical features; Elevation

Variables available:

Observed variables

Derived variables

IEO data:

- Salinity
- Temperature
- Pressure
- Oxygen
- Nutrients
- Turbidity
- Chlorophyll
- Current velocity
- Meteorological parameters
- Bathymetry

- Density
- Geostrophic velocity
- Heat content

ULPGC data:

- Total alkalinity (A_T)
- Total inorganic carbon (C_T)
- pH
- pCO₂
- Organic matter
- Phytoplankton

ULL data:

- Metals

ULL and MNH data:

- Zooplankton

Geographic location: 18.30°W – 17.50°W 27.00°N – 28.00°N
Spatial resolution: n/a
Temporal extent: 2015-05 / 2016-03
Temporal resolution: n/a
Depth range/resolution: From surface to seabed
Conditions for access & use: Agreement with the appropriate institution
Limitations on public access: Yes
Responsible organisation: Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain
Data via: Contact: eugenio.fraile@ca.ieo.es
Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía

Contact: Magdalena.santana@ulgpc.es
Magdalena Santana Casiano. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria

Data format: Digital (plain text). The two survey reports are available as well (PDF)

References: When datasets from these surveys are used the appropriate institution must be cited, including a mention to the funding source, like: “The data obtained under the frame of the VULCANA Project were funded by the Spanish Institute of Oceanography”

Additional information:

These surveys have carried out on board of the R/V *Ángeles Alvariño*.

For further information, see <http://www.vulcanoelhierro.es> (accessed 30 March 2016).

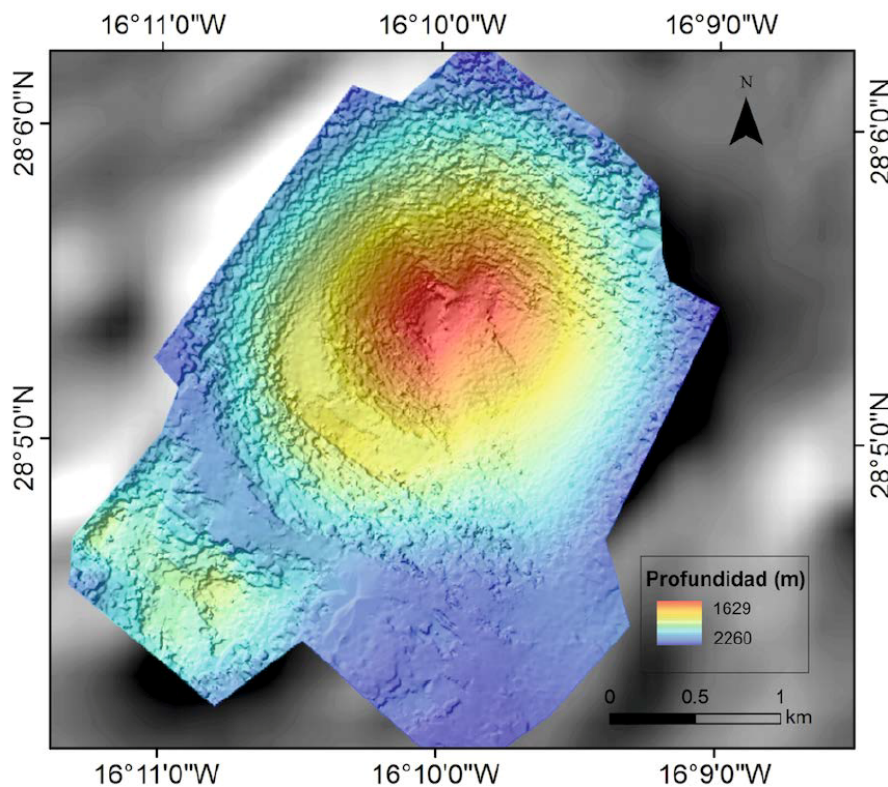
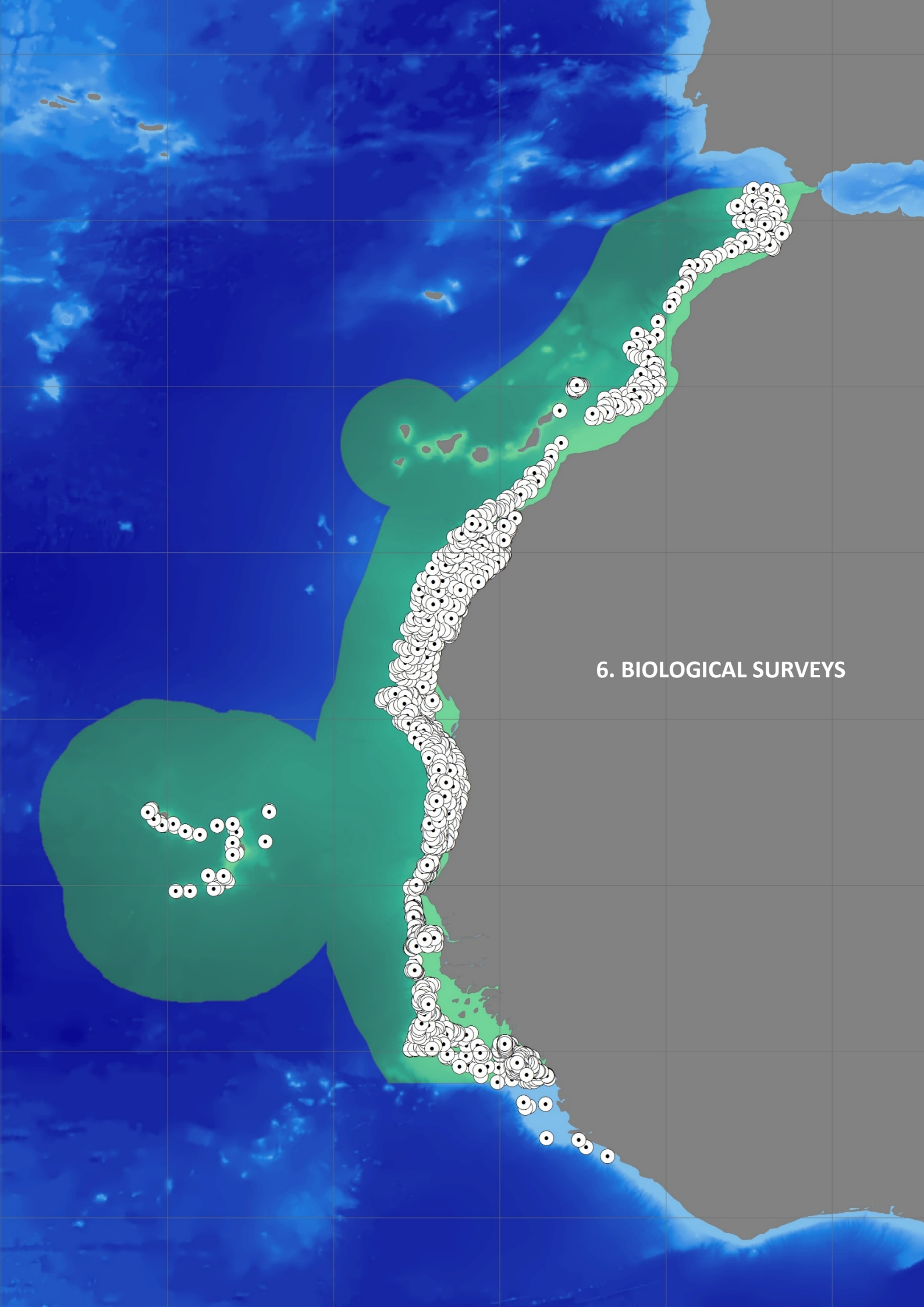


Figure 93. Multibeam bathymetric chart of the submarine volcano “Enmedio”. The scale of depth is given by the color bar (in m). Source: IEO



6. BIOLOGICAL SURVEYS

*Instituto Español de Oceanografía fishing stations (white dots) included in this Directory.
The CCLME area is represented in green.*

EAF-NANSEN PROJECT INVENTORY IN THE CCLME AREA
COUNTRIES PARTICIPATING IN THE CCLME PROJECT
CANARY CURRENT LARGE MARINE ECOSYSTEM (CCLME) PROJECT

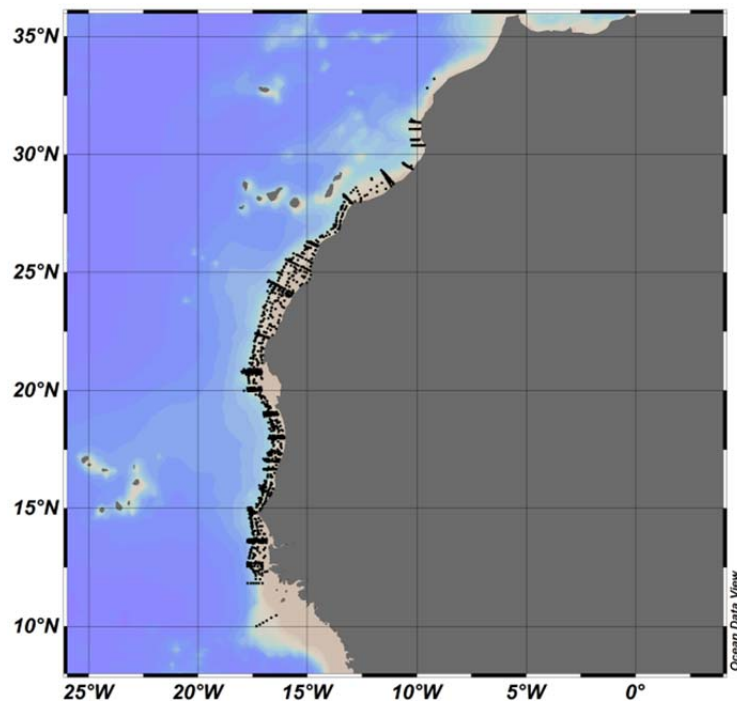


Figure 94. Area surveyed within the CCLME region from 1995 to 2006. The map shows the CTD stations sampled along the survey tracks (2198 stations sampled from 1995 to 2006) (ODV-Plot, Schlitzer, 2014). Data Source: EAF-Nansen Project

Resource abstract:

The long term objective of the EAF-Nansen project is to strengthen regional and country specific efforts to reduce poverty and create conditions to assist in the achievement of food security through development of sustainable fisheries management regimes and specifically through the application of the ecosystem approach to fisheries in a number of developing countries at global level, with an early emphasis on Sub-Saharan Africa.

The long term objective could be achieved through the provision of support for the development and country driven application of the conceptual framework of the Ecosystem Approach to Fisheries (EAF) through capacity-building, promoting standardized data collection and monitoring, supporting policy development and management practices consistent with EAF principles and contributing to an expanded knowledge base.

The immediate objectives of the project are to provide the fisheries research institutions and management administrations in the participating countries with additional knowledge on their ecosystems for their use in planning and monitoring, and to further increase the acceptance and application of the key principles of the EAF. These are the following:

- The fisheries should be managed to limit their impact on the ecosystem to an acceptable level
- The ecological relationships between species should be maintained
- The management measures should be compatible across the entire distribution of the resource
- Precaution in decision-making and action is needed because the knowledge on ecosystems is incomplete
- Governance should ensure both human and ecosystem well-being and equity.

An inventory of the surveys conducted by R/V *Dr. Fridtjof Nansen* in the CCLME region until 2006 has been made available.

Resource language:	eng																
Keyword values:	Area management/restriction/regulation zones and reporting units; Oceanographic geographical features; Species distribution																
Variables available:	<table><thead><tr><th><i>Observed variables</i></th><th><i>Derived variables</i></th></tr></thead><tbody><tr><td>Georeferenced data for:</td><td>Ecological diversity index</td></tr><tr><td>Taxonomic identification</td><td>Relative abundance</td></tr><tr><td>Depth range</td><td>Selectivity of bottom trawl</td></tr><tr><td>Size, weight, sex and maturity by specimen</td><td>Richness (No. of species/station)</td></tr><tr><td>Meteorological data</td><td>Abundance (No. specimen/km²)</td></tr><tr><td>Current data (ADCP)</td><td>Yield (kg/h; kg/km²)</td></tr><tr><td>CTD profiles</td><td>Catch rates (kg/trawling)</td></tr></tbody></table>	<i>Observed variables</i>	<i>Derived variables</i>	Georeferenced data for:	Ecological diversity index	Taxonomic identification	Relative abundance	Depth range	Selectivity of bottom trawl	Size, weight, sex and maturity by specimen	Richness (No. of species/station)	Meteorological data	Abundance (No. specimen/km ²)	Current data (ADCP)	Yield (kg/h; kg/km ²)	CTD profiles	Catch rates (kg/trawling)
<i>Observed variables</i>	<i>Derived variables</i>																
Georeferenced data for:	Ecological diversity index																
Taxonomic identification	Relative abundance																
Depth range	Selectivity of bottom trawl																
Size, weight, sex and maturity by specimen	Richness (No. of species/station)																
Meteorological data	Abundance (No. specimen/km ²)																
Current data (ADCP)	Yield (kg/h; kg/km ²)																
CTD profiles	Catch rates (kg/trawling)																
Geographic location:	Canary Current large Marine Ecosystem (CCLME)																
Spatial resolution:	18 cruises																
Temporal extent:	1995 / 2006																
Depth range/resolution:	From surface to 1100 m																
Conditions for access & use:	Agreement with the country owner of the data																
Limitations on public access:	Yes																
Responsible organisation:	Centre for development cooperation in Fisheries (CDCF), Institute of Marine Research (IMR), Bergen, Norway (coordinating organization) Institut National de Recherche Halieutique (INRH), Casablanca, Maroc Institut Mauritanien de Recherches Océanographiques et des Pêches (IMROP), Nouadhibou, Mauritania Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT), Dakar, Senegal Fisheries Department (FD), Banjul, Gambia																
Data via:	http://preface.imr.no/index.php/EAF_Nansen_Data_Service Contact: jens.otto.krakstad@imr.no Jens-Otto Krakstad. Researcher, CDCF Contact: ines.dias.bernardes@imr.no Inês Dias Bernardes. Technician, CDCF																
Data format:	Depends on the type of data: fisheries data is accessible though a free access software (but can also be exported to text); most of data exists in raw format; and CTD, acoustic biomass, meteorological and fisheries data can be exported to plain text																
References:	Data Source: Institute of Marine Research, Bergen, Norway. Toktdatabase, Norsk Marine datasenter. Database restricted to public. Accessed on 20-02-2014																

Additional information:

Post-survey reports were produced for every R/V *Dr. Fridtjof Nansen* survey (PDF). The reports can be consulted in the following websites:

<http://www.eaf-nansen.org/nansen/publications/en> (accessed 30 March 2016)

http://brage.bibsys.no/imr/handle/URN:NBN:no-bibsys_brage_12044/browse?type=dateissued&sort_by=2&order=DESC&rpp=100&etal=0&submit_browse=Update (accessed 30 March 2016)

BIOLOGICAL AND ENVIRONMENTAL PARAMETERS FROM CERESCOR
CENTRE DE RECHERCHE SCIENTIFIQUE DE CONAKRY ROBAGNÈ (CERESCOR), GUINEA

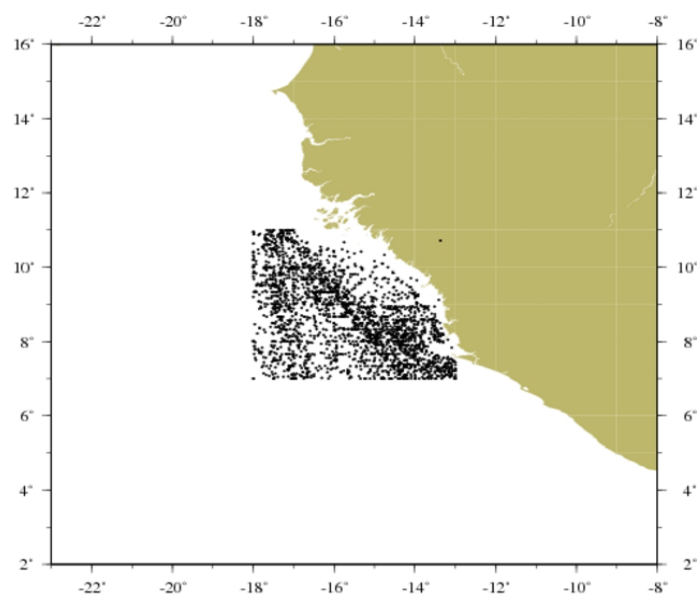


Figure 95. Distribution of biological and environmental samples taken in the continental shelf of Guinea. Source: Diakité, S., CERESCOR

Resource abstract:

Among the objectives of the CERESCOR, a study of the spatio-temporal distribution of biological and environmental parameters in the coastal area and the continental shelf of Guinea has been carried out, including the dominant big groups and plankton species: phytoplankton, zooplankton and ichthyoplankton (see Fig. 95).

The fundamental objective of CERESCOR research is to do a systematic study of the composition, the biology of groups and the most widespread plankton species in the Coastal Zone, as well as the spatio-temporal variability of temperature and salinity.

Resource language:	fre, rus	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	<i>Observed variables</i>	
	Plankton groups and species	
	Air temperature	
	Rainfall	
	Water temperature	
	Density	
	Salinity	
	Tides	
	Ocean currents	
	Waves	
Geographic location:	18.00°W – 13.00°W	7.00°N – 10.30°N
Spatial resolution:	n/a	
Temporal extent:	1981 / 2010	
Temporal resolution:	Daily, monthly and annual data	
Depth range/resolution:	From surface to 4529 m depth	
Conditions for access & use:	Access to metadata is defined by the CERESCOR and by the database manager. Some data is Open Access	
Limitations on public access:	Non	

Responsible organisation: Centre de Recherche Scientifique de Conakry Rogbanè (CERESCOR), Conakry, Guinea

Data via: Contact : sabousatigui@gmail.com; satigui2001@yahoo.fr
Satigui Diakité. Database manager, CERESCOR

Contact : dgcerescor@yahoo.fr
Gnan Clotaire Maomy. Director General, CERESCOR

Contact : keitaansoumane@yahoo.fr
Ansoumane Keita. Scientific Secretary, CERESCOR

Data format: Digital (Excel, ASCII, netCDF, JPEG, JPG, GIF, PNG, TIF) and paper (reports, plots and maps)

References: When datasets from the CERESCOR are used, the appropriate publications indicated by the CERESCOR will be cited

FLIPPER 7601 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

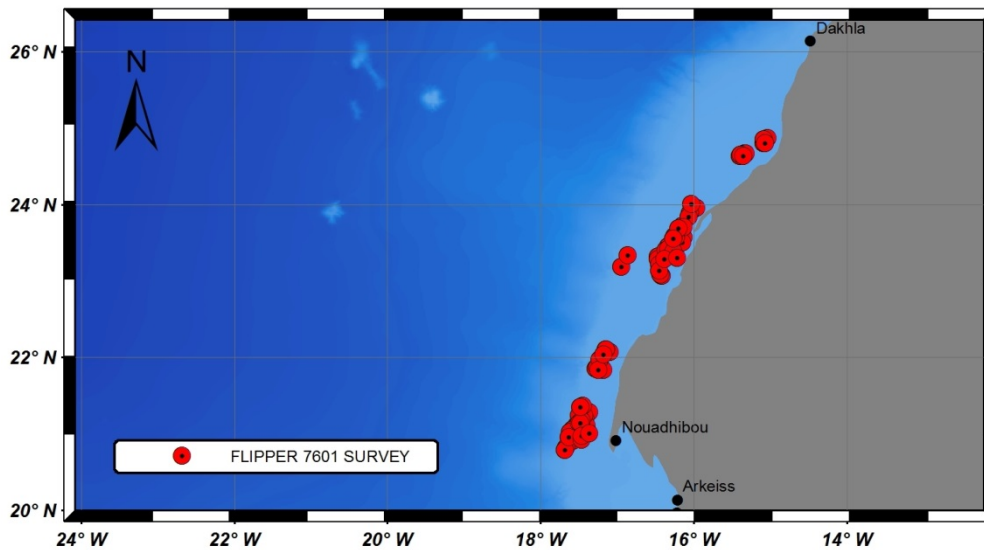


Figure 96. Distribution of the 33 bottom trawl stations in FLIPPER 7601 survey, carried out in the continental shelf off Western Sahara (15.0333°N – 17.6833°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Studies of cephalopods for different commercial categories, composition analysis and discards.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.6833°W – 15.0333°W

20.7833°N – 24.8667°N

Spatial resolution:

33 stations

Temporal extent:

1976-01-23 / 1976-02-18

Temporal resolution:

n/a

Depth range/resolution:

From 20 m to 167 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

Partial results in:

Bravo-de-Laguna, J., Ariz-Tellería, J., Santana, J. C. 1980. *Informe sobre la distribución de los rendimientos en la*

pesquería de cefalópodos del Banco Sahariano, entre Cabo Bojador (26°N) y Cabo Blanco (21°N). Instituto Español de Oceanografía, Spain (unpublished).

Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1976. *Discardings of fishes in the cephalopods fishery off West Africa*. ICES CM 1976/K:32.

Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1977. *Discarding of Sparids in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:12.

Additional information:

The gear used was the same as the standard one used by the Spanish fleet fishing cephalopods (40 mm. mesh size in the cod end).

FLIPPER 7701 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

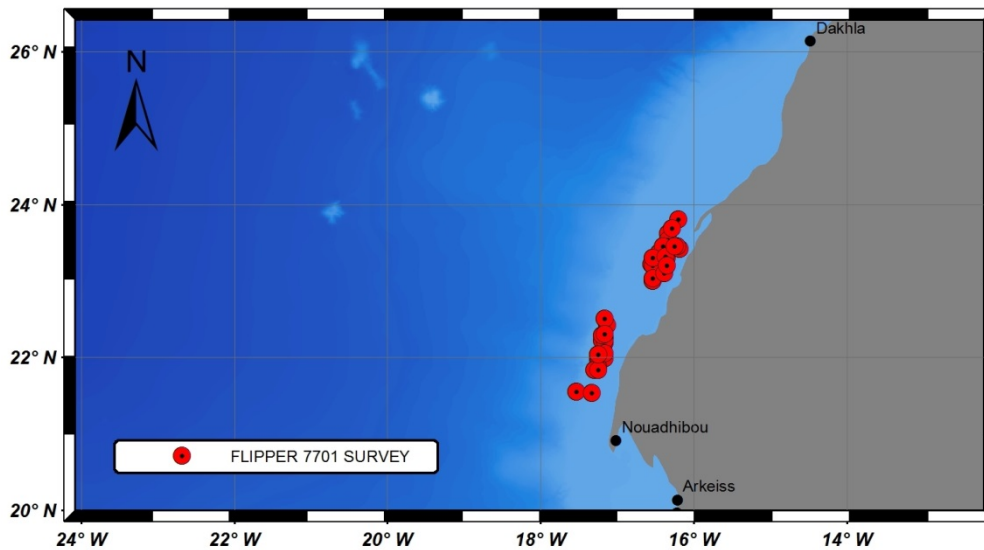


Figure 97. Distribution of the 46 bottom trawl stations in FLIPPER 7701 survey, carried out in the continental shelf off Western Sahara (21.5333°N – 23.6833°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Studies of cephalopods for different commercial categories, tagging of cephalopods and composition and discards size analysis.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

Geographic location:

17.5333°W – 16.1833°W

Spatial resolution:

46 stations

Temporal extent:

1977-01-24 / 1977-02-06

Temporal resolution:

n/a

Depth range/resolution:

From 12 m to 59 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

Partial results in:

Bravo-de-Laguna, J., Ariz-Tellería, J., Santana, J. C. 1980. *Informe sobre la distribución de los rendimientos en la pesquería de cefalópodos del Banco Sahariano, entre Cabo Bojador (26°N) y Cabo Blanco (21°N)*. Instituto Español de Oceanografía, Spain (unpublished).

Bravo-de-Laguna, J., Fernández, M. A. R, Santana, J. C. 1977. *Discarding of Sparids in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:12.

Bravo-de-Laguna, J., Fernández, M. A. R, Santana, J. C. 1977. *Length Distributions of the Fishes Discarded in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:13.

Additional information:

The fishing gear employed was the standard one used by the Spanish cephalopods fishing fleet (40 mm mesh size in the cod end).

FLIPPER 7705 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

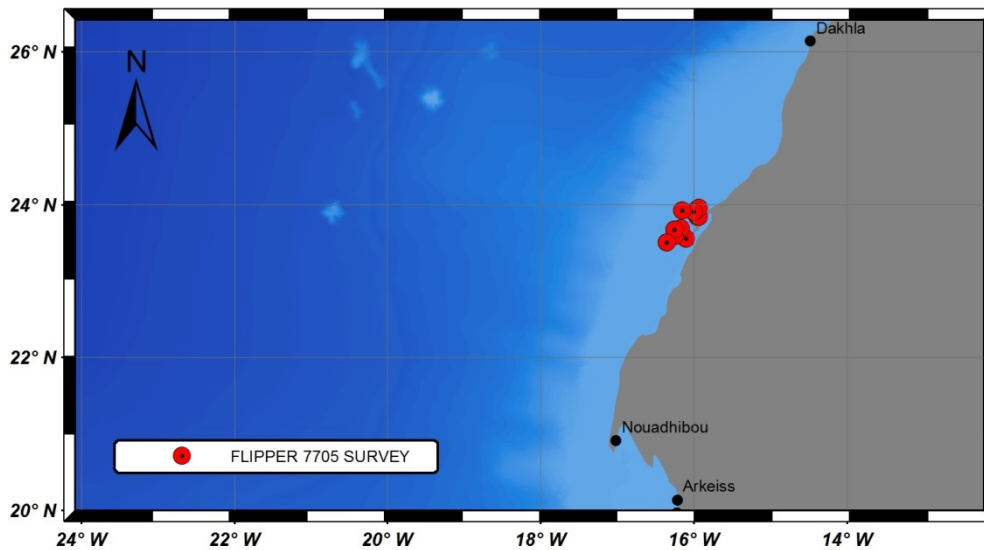


Figure 98. Distribution of the 10 bottom trawl stations in FLIPPER 7705 survey, carried out in the continental shelf off Western Sahara (23.5000°N – 23.9500°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Studies of cephalopods for different commercial categories, tagging of cephalopods and composition and discards size analysis.

Resource language:

spa

Keyword values:

Species distribution

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

23.5000°N – 23.9500°N

Geographic location:

16.3500°W – 15.9333°W

Spatial resolution:

10 stations

Temporal extent:

1977-05-01 / 1977-05-08

Temporal resolution:

n/a

Depth range/resolution:

From 22 m to 31 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

Partial results in:

Bravo-de-Laguna, J., Ariz-Tellería, J., Santana, J. C. 1980. *Informe sobre la distribución de los rendimientos en la pesquería de cefalópodos del Banco Sahariano, entre Cabo Bojador (26°N) y Cabo Blanco (21°N)*. Instituto Español de Oceanografía, Spain (unpublished).

Bravo-de-Laguna, J., Fernández, M. A. R, Santana, J. C. 1977. *Discarding of Sparids in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:12.

Bravo-de-Laguna, J., Fernández, M. A. R, Santana, J. C. 1977. *Length Distributions of the Fishes Discarded in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:13.

Additional information:

The fishing gear employed was the standard one used by the Spanish cephalopods fishing fleet (40 mm mesh size in the cod end).

IBN SINA 8002 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

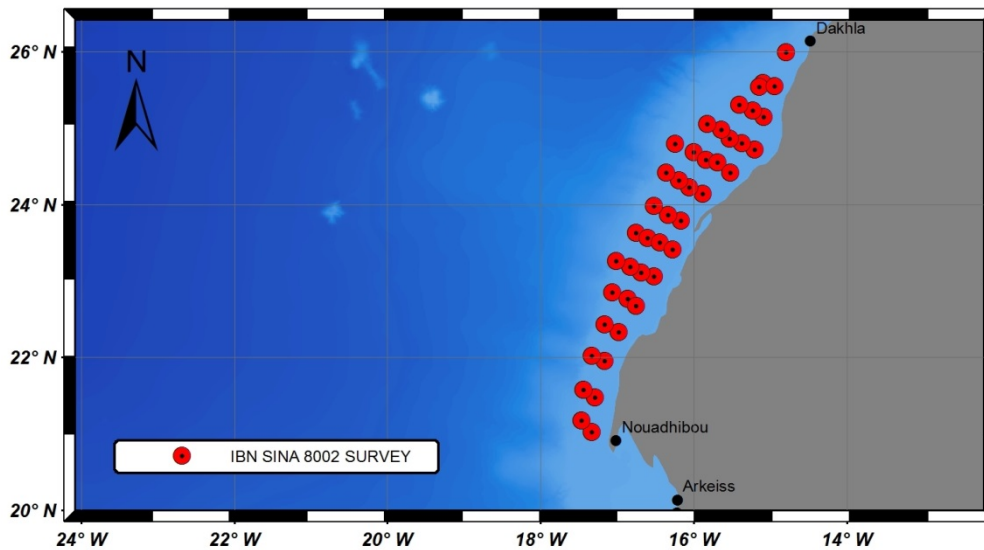


Figure 99. Distribution of the 42 bottom trawl stations in IBN SINA 8002 survey, carried out in the continental shelf off Western Sahara (21.0167°N – 25.9833°N)

Resource abstract:

Investigation of demersal stocks in the continental shelf. A Spanish - Moroccan Cooperative Research Programme started at the beginning of 1980. Within this programme different scientific surveys in the area were carried out to evaluate the stock of cephalopods and sea breams in the region, as well as to investigate the selectivity of the most commonly type of gear used by the cephalopods fishery in that area, and other important commercial fish species. This survey also was part of the project FAO-ISPM: UNPD/FAO/ISPM/MOR 78.018 to estimate and monitor the Moroccan fishery resources (Ariz-Tellería, 1980a).

The objectives of this survey were to define, at the beginning of the fishing season in 1980:

- Cephalopod assemblage and species distribution
- The study of growth, mortality and reproduction of the main cephalopod species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data:	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
	Taxonomic identification	
	Depth range	
	Temperature	
	Weight by species	
Geographic location:	17.4500°W – 14.7833°W	
Spatial resolution:	42 stations	
Temporal extent:	1980-03-05 / 1980-03-13	
Temporal resolution:	n/a	

Depth range/resolution: From 24 m to 108 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain

Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Data format: Digital (plain text and survey report in PDF format)

References: Ariz-Tellería, J. 1980. *Informe de los trabajos realizados en la campaña "IBN SINA 8002"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain (unpublished).

Additional information:

The survey was carried out in the R/V *Ibn Sina* (ISPM). The fishing gear is described in the following figure.

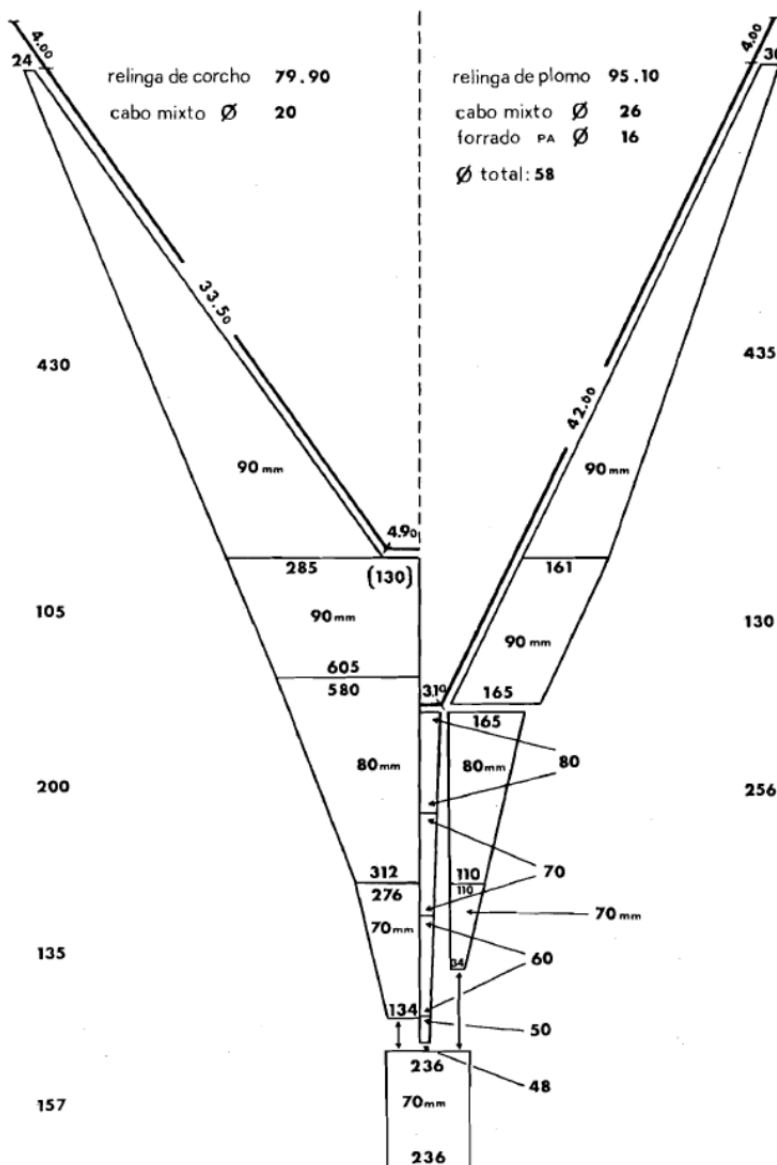


Figure 100. The fishing gear used in this survey is of the type used by the Spanish Cephalopods fishing fleet operating in that area. The material used in its construction is polyamide. In selectivity experiences, it was applied the covered cod-end method (Ariz-Tellería, 1980a)

IBN SINA 8005 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

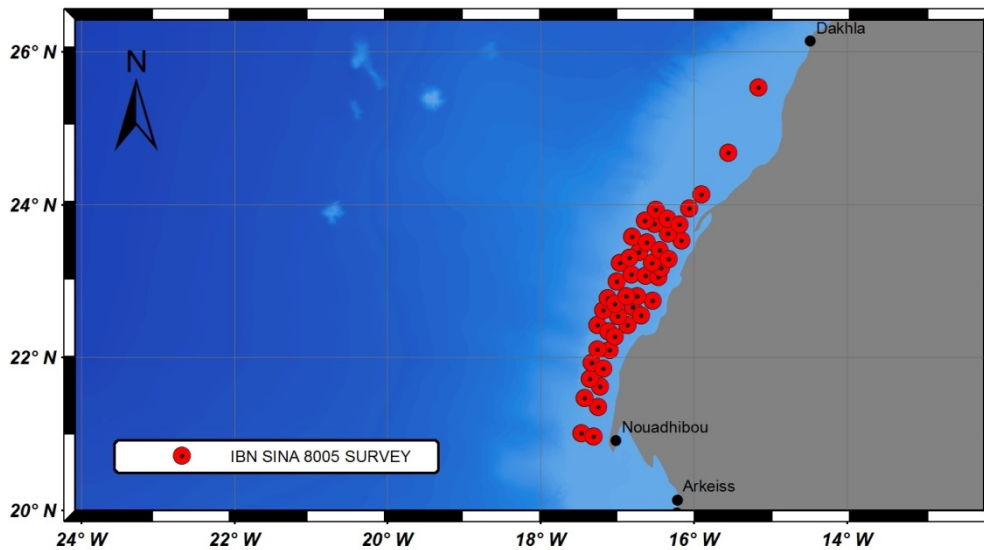


Figure 101. Distribution of the 68 bottom trawl stations in IBN SINA 8005 survey, carried out in the continental shelf off Western Sahara (20.9667°N – 25.5333°N)

Resource abstract:

Investigation of demersal stocks in the continental shelf. This was the second survey carried out in the area under the frame of Spanish - Moroccan Cooperative Research Programme, aiming to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of the most commonly type of gear used by the cephalopods fishery in that area, and other important commercial fish species (Ariz-Tellería, 1980b).

The objectives of this survey were:

- To complete the distribution study of main cephalopods species
- To obtain biological data of cephalopods and seabreams
- To determine the selectivity of the gear on each species.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Temperature
Weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices
20.9667°N – 25.5333°N

Geographic location:

17.4667°W – 15.1500°W

Spatial resolution:

68 stations

Temporal extent:

1980-05-15 / 1980-05-22

Temporal resolution:

n/a

Depth range/resolution:

From 21 m to 107 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain

Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Data format: Digital (plain text and survey report in PDF format)

References: Ariz-Tellería, J. 1980. *Informe de la Estancia en el ISPM de Casablanca y de los trabajos realizados en la campaña IBN SINA 8005*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain (unpublished).

Additional information:

The survey was carried out on the R/V *Ibn Sina* (ISPM). The fishing gear used in this survey was of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 100). In selectivity experiences, it was applied the covered cod-end method.

IBN SINA 8104 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

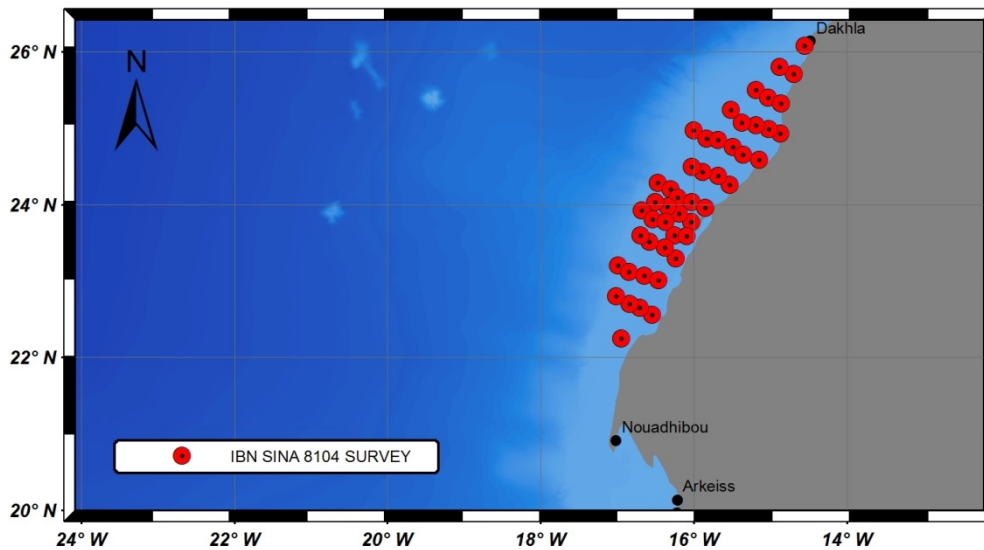


Figure 102. Distribution of the 48 bottom trawl stations in IBN SINA 8104 survey, carried out in the continental shelf off Western Sahara (22.2500°N – 26.1000°N)

Resource abstract:

Investigation of demersal stocks in the continental shelf. Under the frame of the Fishing Agreement between Spain and Morocco, scientific surveys in the area were carried out to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of bottom trawl studies (Delgado-de-Molina and Goñi, 1981).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
Taxonomic distribution
Depth range
Size, weight, sex and maturity by species
Meteorology

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices
22.2500°N – 26.1000°N

Geographic location:

17.0167°W – 14.5333°W

Spatial resolution:

48 stations

Temporal extent:

1981-05-29 / 1981-06-10

Temporal resolution:

n/a

Depth range/resolution:

From 18 m to 98 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text and survey report in PDF format)

References:

Delgado-de-Molina, A. and Goñi, R. 1981. *Informe de los trabajos realizados en la campaña IBN SINA 8104*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 48 pp. (unpublished).

Additional information:

This survey has been carried out in the R/V *Ibn Sina*. The fishing gear used in it is of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 100).

IBN SINA 8105 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

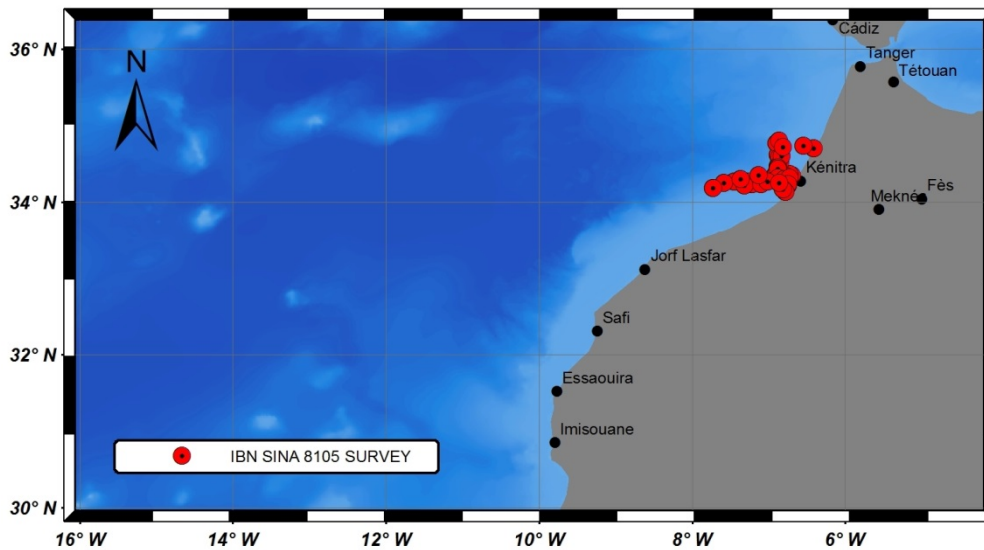


Figure 103. Distribution of the 40 bottom trawl stations in IBN SINA 8105 survey, carried out in the continental shelf off Morocco (34.1667°N – 34.8333°N)

Resource abstract:

This survey was carried out within the Fishing Agreement between Spain and Morocco (Goñi and Delgado-de-Molina, 1981). Selectivity studies for hake and shrimps in the continental shelf and talus were carried out.

Resource language:

spa

Keyword values:

Species distribution

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Size, sex and maturity by species

Geographic location:

7.8333°W – 6.3333°W

34.1667°N – 34.8333°N

Spatial resolution:

40 stations

Temporal extent:

1981-06-23 / 1981-07-02

Temporal resolution:

n/a

Depth range/resolution:

From 39 m to 700 m

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (survey report in PDF format)

References:

Goñi, R. and Delgado-de-Molina, A. 1981. *Informe de los trabajos realizados en la campaña IBN SINA 8105*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 67 pp. (unpublished).

Additional information:

This survey has been carried out on the R/V *Ibn Sina*. The fishing gears used in this survey were Marisco and fresco kind.

IBN SINA 8109 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

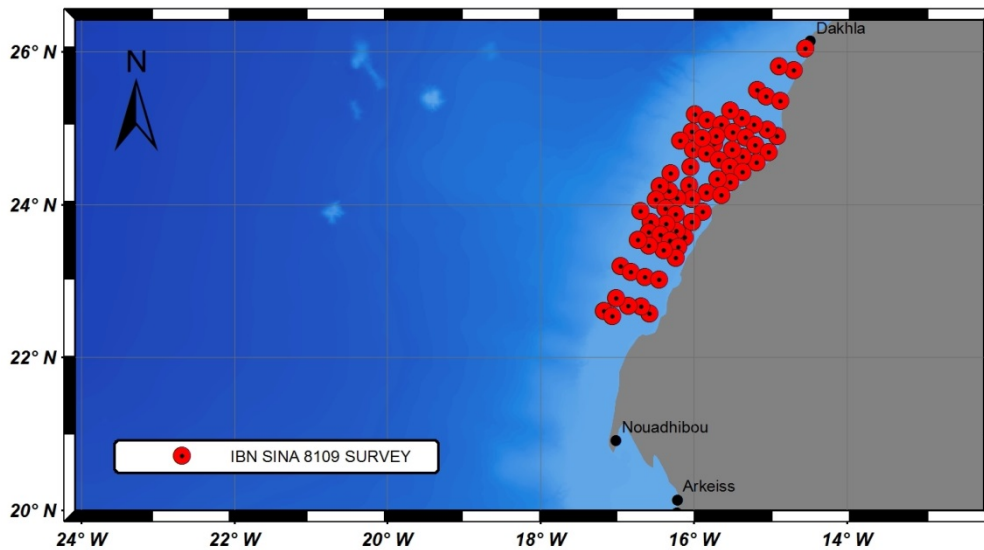


Figure 104. Distribution of the 71 bottom trawl stations in IBN SINA 8109 survey, carried out in the continental shelf off Western Sahara (22.5000°N – 26.0333°N)

Resource abstract:

Investigation of demersal stocks in the continental shelf. Survey carried out within the Fishing Agreement between Spain and Morocco, to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of bottom trawl gears. This survey is especially relevant because it was the first one carried out during autumn. Therefore, it was aimed to complete the spatial-temporal distribution, to determine the spawning-season, etc. of the different studied species (Delgado-de-Molina and Samper, 1981).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Size, weight, sex and maturity by species
Meteorology

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.1667°W – 14.5333°W

Spatial resolution:

71 stations

Temporal extent:

1981-11-14 / 1981-11-23

Temporal resolution:

n/a

Depth range/resolution:

From 17 m to 106 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text and survey report in PDF format)

References:

Delgado-de-Molina, A. and Samper, M. 1981. *Informe de los trabajos realizados en la campaña IBN SINA 8109*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 68 pp. (unpublished).

Additional information:

This survey has been carried out on the R/V *Ibn Sina*. The fishing gear used in this survey is of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 100).

IBN SINA 8203 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

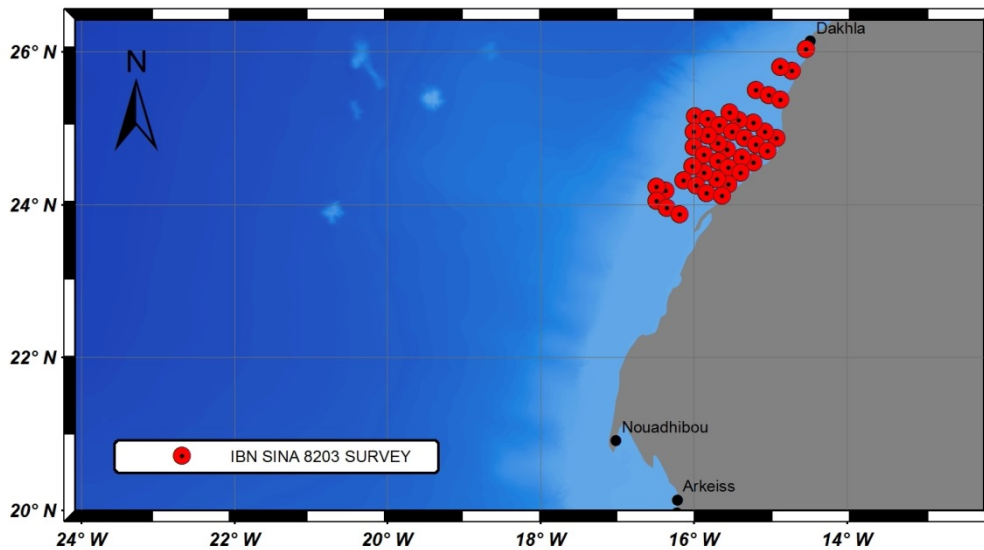


Figure 105. Distribution of the 47 bottom trawl stations in IBN SINA 8203 survey, carried out in the continental shelf off Western Sahara (23.8667°N – 26.0333°N)

Resource abstract:

Investigation of demersal stocks in the continental shelf. Survey carried out within the Fishing Agreement between Spain and Morocco, to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of bottom trawl gears (Goñi and Santana, 1982).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

Geographic location:

16.4833°W – 14.5333°W

Spatial resolution:

47 stations

Temporal extent:

1982-03-16 / 1982-03-20

Temporal resolution:

n/a

Depth range/resolution:

From 16 m to 92 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text and survey report in PDF format)

References:

Goñi, R. and Santana, J. C. 1982. *Informe de los trabajos realizados en la campaña IBN SINA 8203*. Instituto Español de Oceanografía, S. C de Tenerife, Spain: 69 pp. (unpublished).

Additional information:

This survey has been carried out on the R/V *Ibn Sina*. The fishing gear used in this survey is of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 100). In selectivity experiences, it was applied the covered cod-end method.

CONGEL 8905 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

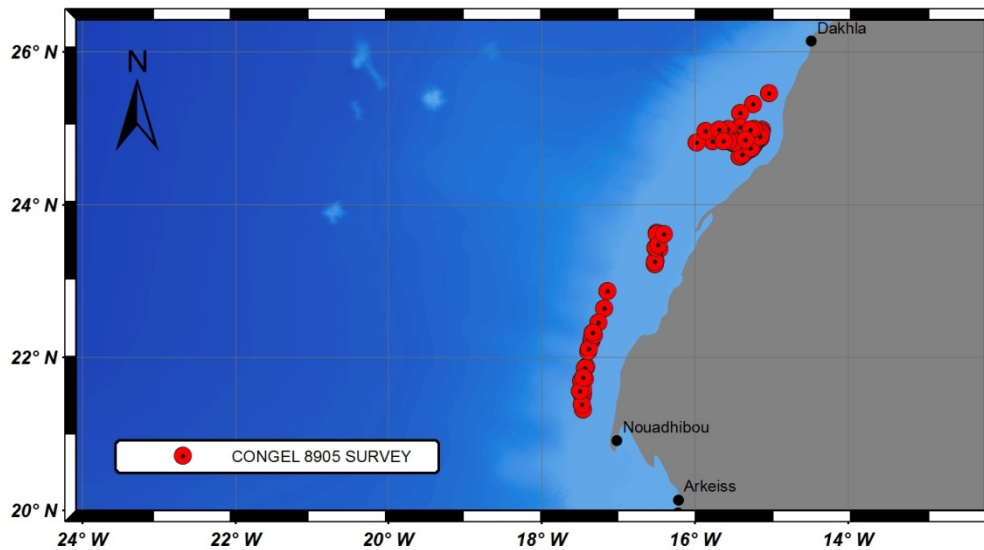


Figure 106. Distribution of the 107 bottom trawl stations in CONGEL 8905 survey, carried out in the continental shelf off Western Sahara (21.3010°N – 25.4567°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. Its main objective was the prospection of commercial cephalopod species. To this aim, the cephalopods assemblage catches, fishing effort, distribution and biologic parameters were studied.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Weight, total body length, wet weight and/or sex by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

Geographic location:

17.4967°W – 15.2833°W

Spatial resolution:

107 stations

Temporal extent:

1989-05-12 / 1989-05-29

Temporal resolution:

n/a

Depth range/resolution:

From 14 m to 130 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

CONGEL 8911 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

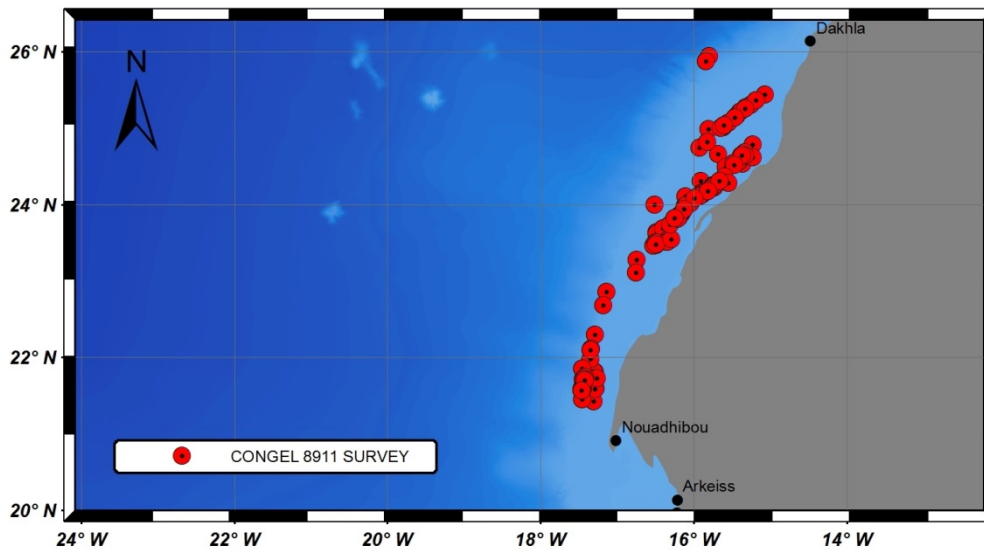


Figure 107. Distribution of the 125 bottom trawl stations in CONGEL 8911 survey, carried out in the continental shelf off Western Sahara (21.4250°N – 25.9383°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. Its main objective had been the prospection of commercial cephalopods. The research focused on the cephalopods catches, fishing effort, distribution and biologic parameters.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Size, weight, total body length, wet weight and sex by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

Geographic location:

17.4683°W – 15.0683°W

Spatial resolution:

125 stations

Temporal extent:

1989-11-04 / 1989-11-25

Temporal resolution:

n/a

Depth range/resolution:

From 13 m to 90 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the IEO and the ISPM must be acknowledged

CONGEL 9006 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

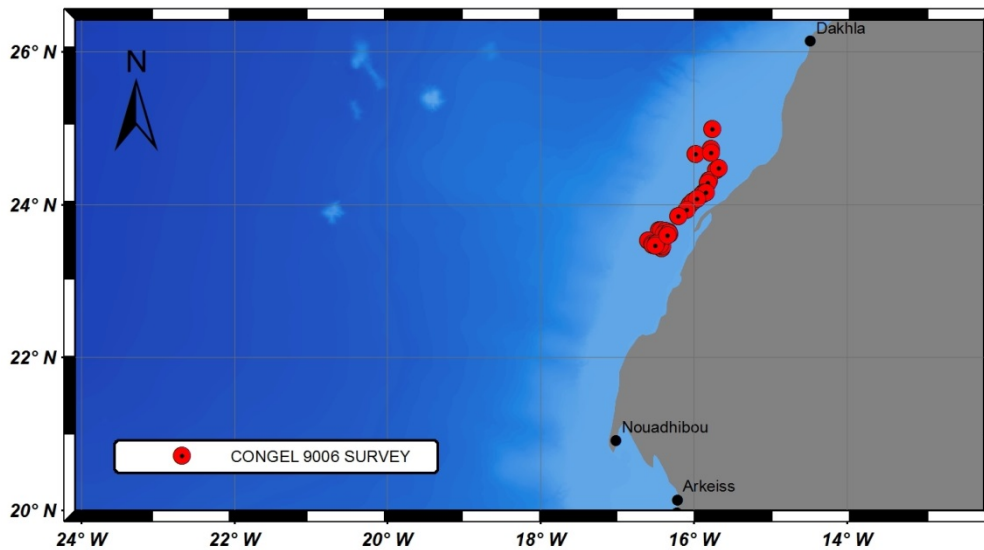


Figure 108. Distribution of the 35 bottom trawl stations in CONGEL 9006 survey, carried out in the continental shelf off Western Sahara (23.4237°N – 24.9867°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. The main objective was the prospection of commercial cephalopods. The research focused on cephalopods catches, fishing effort, distribution and biologic parameters.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Size, weight, wet weight, eviscerated weight and sex by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

16.5975°W – 15.6738°W

Spatial resolution:

35 stations

Temporal extent:

1990-06-21 / 1990-06-26

Temporal resolution:

n/a

Depth range/resolution:

From 27 m to 64 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the IEO and the ISPM must be acknowledged

REPOS BIOLOGIQUE 9010 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
 INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

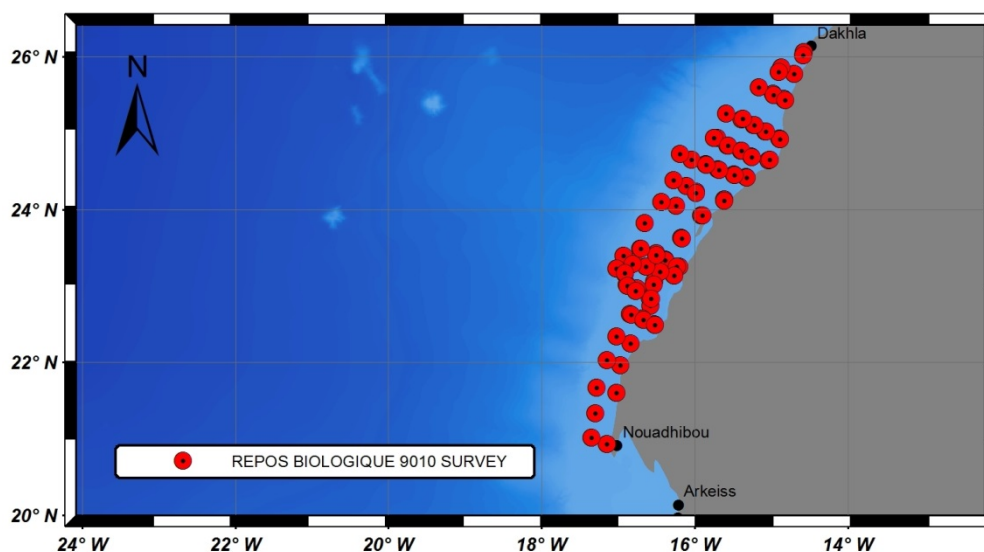


Figure 109. Distribution of the 116 bottom trawl stations in REPOS BIOLOGIQUE 9010 survey, carried out in the continental shelf off Western Sahara (20.9167°N – 26.0500°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods resources. Biologic samples were taken from octopus, cuttlefish and squid.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range
 Size, weight, total body length, wet weight, sex and maturity by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

17.3500°W – 14.5667°W

20.9167°N – 26.0500°N

Spatial resolution:

116 stations

Temporal extent:

1990-09-29 / 1990-10-27

Temporal resolution:

n/a

Depth range/resolution:

From 17 m to 105 m

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

Additional information:

Biological samples were taken from 844 specimens of octopus, 86 specimens of cuttlefish and 1911 specimens of squid.

REPOS BIOLOGIQUE 9110 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
 INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

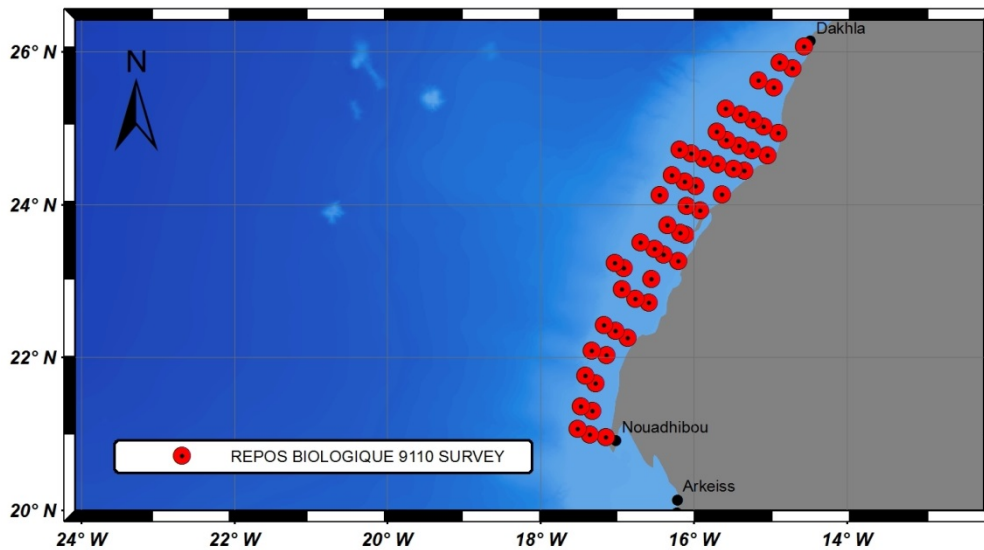


Figure 110. Distribution of the 53 bottom trawl stations in REPOS BIOLOGIQUE 9110 survey, carried out in the continental shelf off Western Sahara (20.9550°N – 26.0683°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods resources. Biologic samples were taken from octopus, cuttlefish and squid.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range
 Size, weight, total body length, wet weight, sex and maturity by species
 Sea surface temperature (SST)

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices
 20.9550°N – 26.0683°N

Geographic location:

17.5133°W – 14.5583°W

Spatial resolution:

53 stations

Temporal extent:

1991-10-04 / 1991-10-25

Temporal resolution:

n/a

Depth range/resolution:

From 18 m to 107 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

Additional information:

Biological samples were taken from 1878 specimens of octopus, 125 specimens of cuttlefish and 1715 specimens of squid.

REPOS BIOLOGIQUE 9305 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

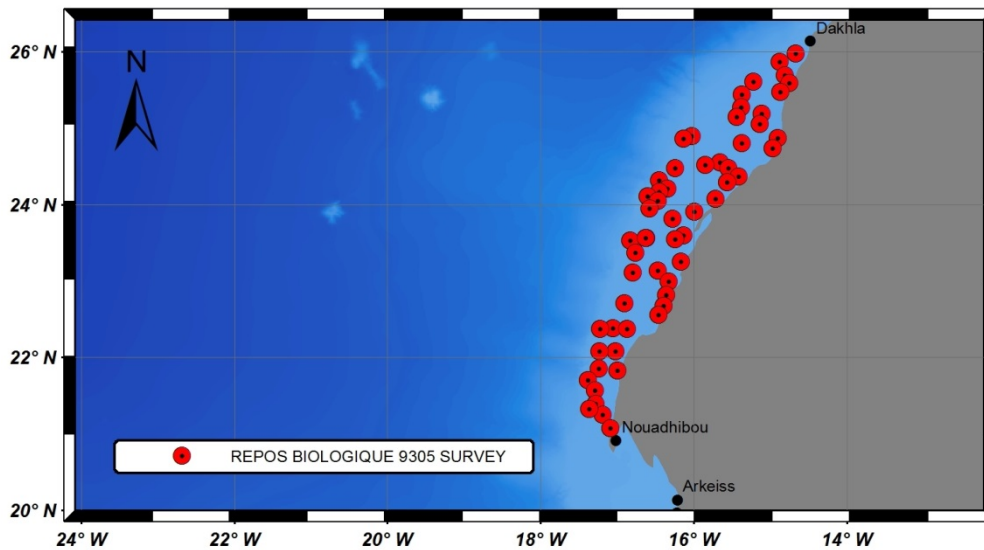


Figure 111. Distribution of the 58 bottom trawl stations in REPOS BIOLOGIQUE 9305 survey, carried out in the continental shelf off Western Sahara (21.0700°N – 25.9767°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods and fish stocks during the biological rest period which was established by the Fishing Agreement between the CEE and Morocco, as well as selectivity studies. Biological samples were taken from octopus, cuttlefish, squid and some species of fishes.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Size, weight, total body length, wet weight, sex and maturity by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.3800°W – 14.6667°W

Spatial resolution:

58 stations

Temporal extent:

1993-05-02 / 1993-05-23

Temporal resolution:

n/a

Depth range/resolution:

From 20 m to 104 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

Additional information:

This survey was carried out on board of the R/V *Charif Al Idrissi*. The fishing gear chosen for the cruise was of the Spanish kind for cephalopods bottom trawl net.

Biological samples were taken from 4245 specimens of octopus, 125 specimens of cuttlefish, 830 specimens of squid and 1245 specimen of fish.

REPOS BIOLOGIQUE 9310 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
 INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

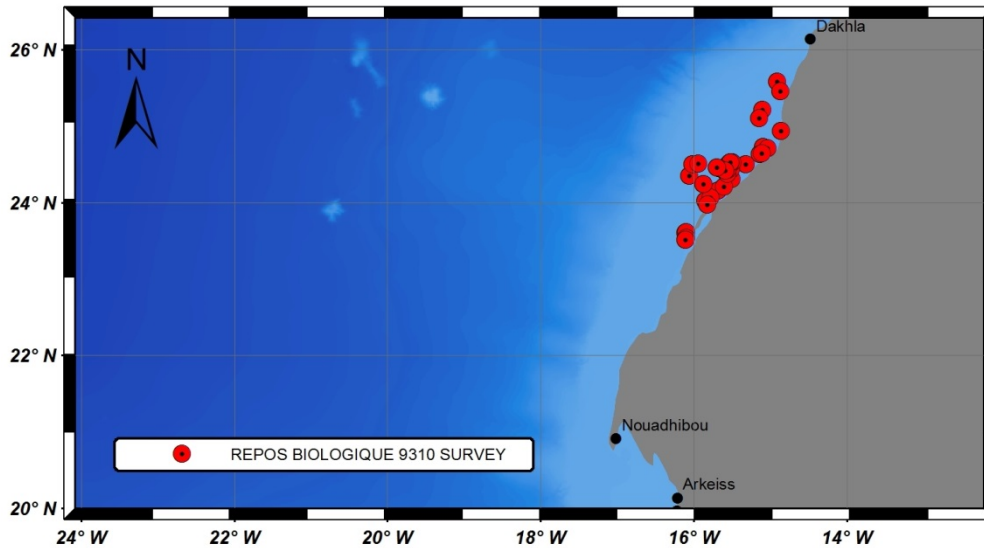


Figure 112. Distribution of the 41 bottom trawl stations in REPOS BIOLOGIQUE 9310 survey, carried out in the continental shelf off Western Sahara (23.5058°N – 25.5773°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods and fish stocks during the biological rest period which was established by the Fishing Agreement between the CEE and Morocco, as well as selectivity studies. Biological samples were taken from octopus, cuttlefish, squid and some species of fishes.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range
 Size, weight, total body length, wet weight, sex and maturity by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

16.1095°W – 14.8500°W

Spatial resolution:

41 stations

Temporal extent:

1993-10-12 / 1993-10-24

Temporal resolution:

n/a

Depth range/resolution:

From 18 m to 37 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

Additional information:

This survey was carried out by two cephalopod freezer trawlers: *Agdal IV* and *Al-Hariri*. The fishing gear chosen for the cruise were the Spanish and Korean nets for demersal cephalopods. Biological samples were taken from 397 specimens of octopus.

CONGEL 9404 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

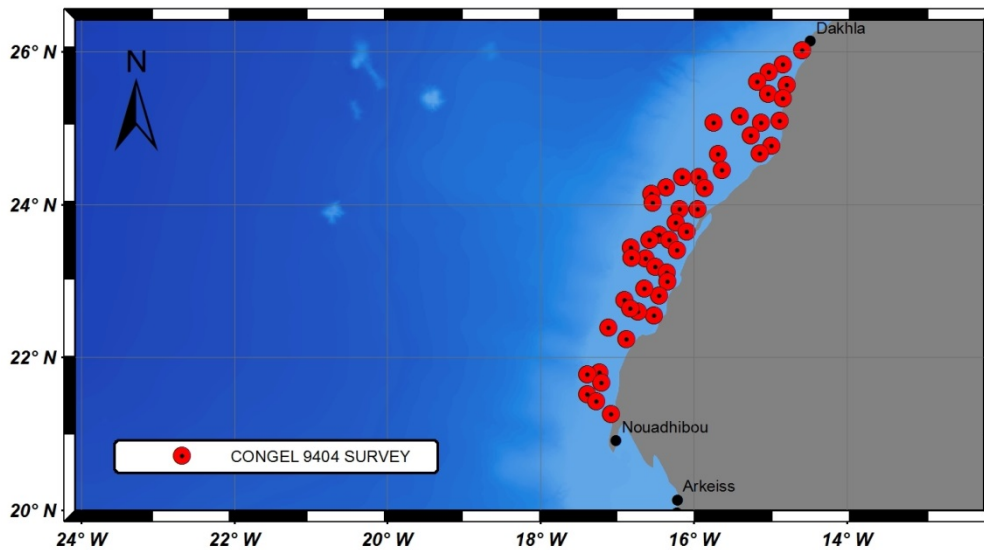


Figure 113. Distribution of the 58 bottom trawl stations in CONGEL 9404 survey, carried out in the continental shelf off Western Sahara (21.2566°N – 26.0150°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Monitoring of the biological recovery period for cephalopods and selectivity experiences for seabreams.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
Taxonomic distribution
Depth range
Total body length, wet weight, sex and maturity by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.3917°W – 14.5833°W

21.2566°N – 26.0150°N

Spatial resolution:

58 stations

Temporal extent:

1994-03-29 / 1994-04-07

Temporal resolution:

n/a

Depth range/resolution:

From 25 m to 104 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

CONGEL 9902 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

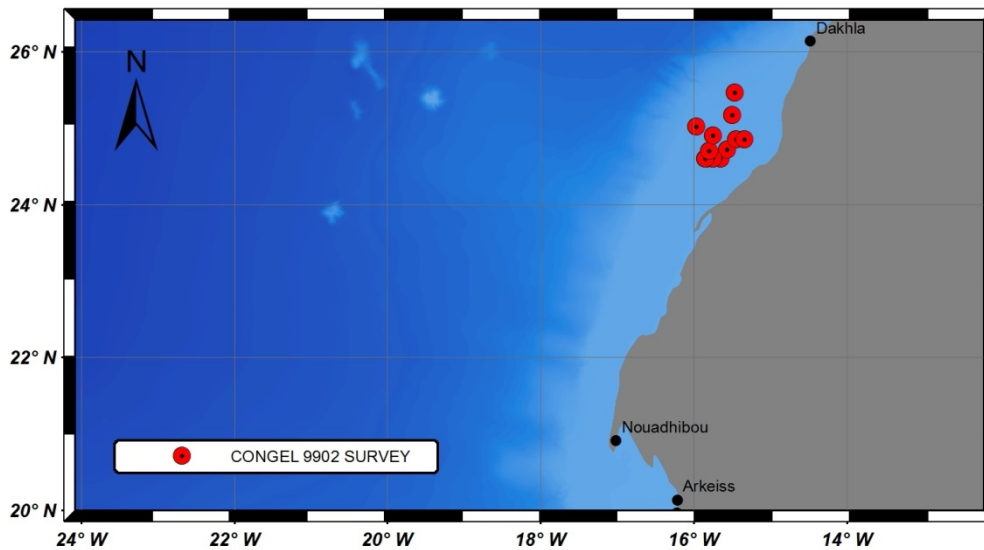


Figure 114. Distribution of the 13 bottom trawl stations in CONGEL 9902 survey, carried out in the continental shelf off Western Sahara (24.6000°N – 25.4667°N)

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Genetic studies of octopus, cuttlefish and squid.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Size, weight, total body length, sex and maturity by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

Geographic location:

15.9667°W – 15.3333°W

24.6000°N – 25.4667°N

Spatial resolution:

13 stations

Temporal extent:

1999-02-25 / 1999-02-28

Temporal resolution:

n/a

Depth range/resolution:

From 35 m to 110 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged

Additional information:

This survey has been carried out under the umbrella of the project “Cephalopods resources dynamics: Patterns in environmental and genetic variation” (FAIR-CT96-1520).

MAROC-0411 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

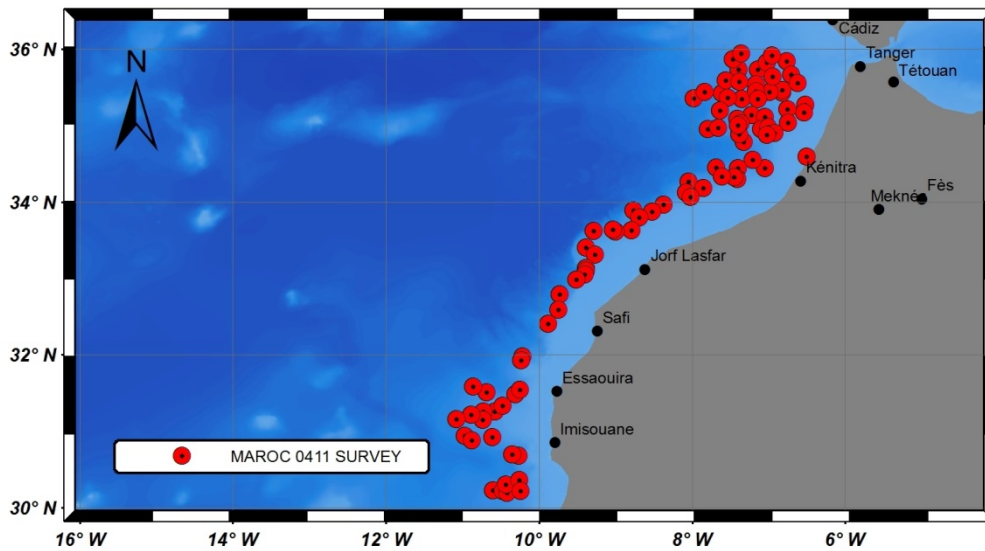


Figure 115. Distribution of the 93 trawling stations in Maroc-0411 survey (30.1002°N – 35.9385°N)

Resource abstract:

Under the frame of the scientific and technique cooperation between Spain and Morocco, and in relation to the deep waters prospection by trawl in the Atlantic coast of Morocco and the Western Sahara, three surveys have been planed to study and evaluate deep demersal resources and megabenthos (fish, crustaceans and cephalopods) in the littoral strip between Tanger and Cape Blanc, within 2004 and 2006 (Ramos et al., 2005). The main objective was the determination of yields.

Resource language:

spa, fre

Keyword values:

Species distribution; Habitats and biotopes; Elevation

Variables available:

Observed variables

Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species
 Sizes all fishes and other selected invertebrates
 Biological data of selected species
 Faunistic collections demersal fishes and benthic invertebrates
 Pictures collection
 Multibeam records

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

11.0637°W – 6.3724°W

30.1002°N – 35.9385°N

Spatial resolution:

93 stations

Temporal extent:

2004-11-13 / 2004-12-14

Temporal resolution:

n/a

Depth range/resolution:

From 500 m to 2000 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and Institut National de Recherche Halieutique (INRH)

Limitations on public access: Yes

Responsible organisations: Instituto Español de Oceanografía, Madrid, Spain
Institut National de Recherche Halieutique, Casablanca, Morocco

Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Contact: faraj@inrh.ma
Abdelmalek Faraj. Director, Institut National de Recherche Halieutique

Data format: Digital (plain text)

References: Ramos, A., Faraj, A., Balguerías, E., Belcaid, S., Burgos, C., Gómez, M., González, J. F., Hakim, M., Hernández, C., Manchih, K., Meiners, C., Ramil, F., Salmerón, F., Sanz, J. L. and Settih, J. 2005. *Informe de resultados de la Campaña 'Maroc-0411'. Prospección por arrastre de los recursos demersales profundos del norte de Marruecos*. Inf. Int. IEO-SGPM (MAPA), Málaga, Spain: 230 pp + Annexes (unpublished).

Additional information:
The fishing gears chosen for the cruise were the Lofoten commercial trawl.
Other devices: Multibeam echosounder EM-300.

MAROC 0511 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

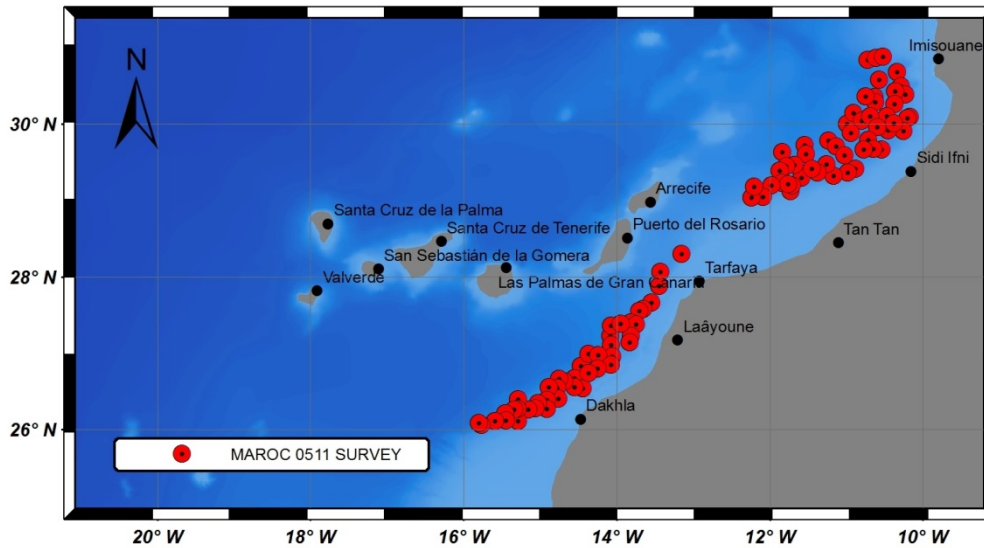


Figure 116. Situation of the 95 bottom trawl stations in Maroc 0511 survey (26.0596°N – 30.9160°N)

Resource abstract:

Under the frame of the scientific and technique cooperation between Spain and Morocco, and in relation to the deep waters prospection by trawl in the Atlantic coast of Morocco and the Western Sahara, three surveys have been planned to study the littoral strip between Tangier and Cape Blanc, within the time period 2004-2006. This was the second survey undertaken.

The objectives of these surveys were (Hernández-González et al., 2006):

- To study the bathymetry of the seabed
- To evaluate deep demersal stocks.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data for cephalopods, crustaceans, fishes and main groups of benthic invertebrates:

- Taxonomic identification (to species level when it was possible)
- Depth range
- Size composition of catches
- Size, weight, sex and maturity by species
- Temperature

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

15.7490°W – 10.1691°W

26.0596°N – 30.9160°N

Spatial resolution:

95 stations

Temporal extent:

2005-11-12 / 2005-12-14

Temporal resolution:

n/a

Depth range/resolution: From 500 m to 1867 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Institut National de Recherche Halieutique (INRH)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Institut National de Recherche Halieutique, Casablanca, Morocco

Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Contact: faraj@inrh.ma
Abdelmalek Faraj. Director, Institut National de Recherche Halieutique

Data format: Digital (plain text)

References: Hernández-González, C. L., Faraj, A., Balguerías, E., Belcaid, S., Burgos, C., Cansado, S., Fernández, L., González, J. F., Jiménez, P., Manchih, K., Meiners, C., Muñoz, A., Nuño, L., Presas, C., Ramos, A., Salmerón, F., Settih, J. and Soto, E. 2006. *Informe Final de la campaña MAROC 0511 para la prospección por arrastre de los recursos demersales profundos en aguas del centro de Marruecos*. Instituto Español de Oceanografía and Institut National des Recherches Halieutiques, S. C. de Tenerife, Spain: 526 pp. (unpublished).

Additional information:
The survey has been carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was the Lofoten bottom trawl net.

MAROC 0611 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

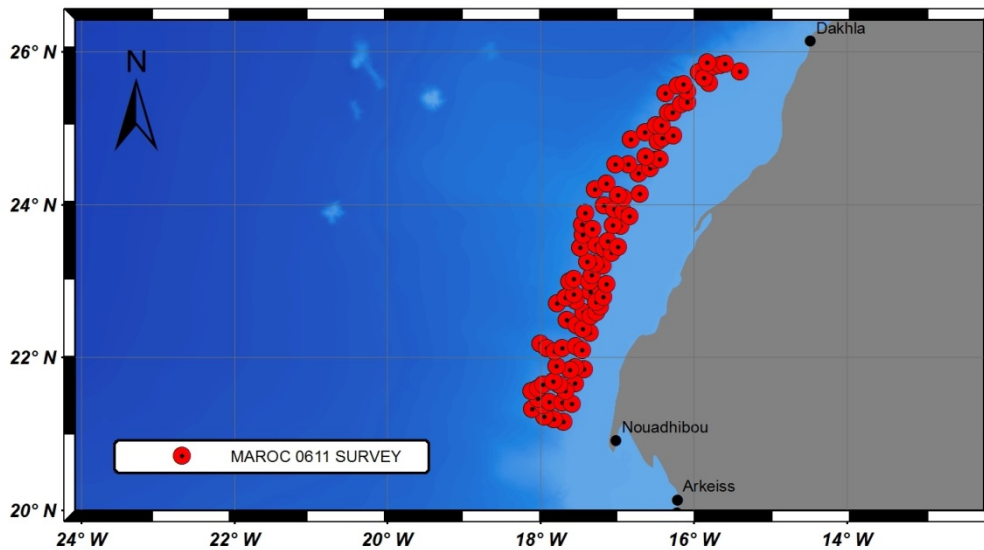


Figure 117. Situation of the 99 bottom trawl stations in Maroc 0611 survey (21.1510°N – 25.8900°N)

Resource abstract:

Under the frame of the scientific and technique cooperation between Spain and Morocco, and in relation to the deep waters prospection by trawl in the Atlantic coast of Morocco and the Western Sahara, three surveys have been planned to study the littoral strip between Tangier and Cape Blanc, within the time period 2004-2006.

This was the third survey undertaken, and it covered the waters of the southern zone of Western Sahara littoral strip.

The objectives of these surveys have been (Hernández-González, 2007):

- To study the bathymetry of the seabed
- To prospect and to evaluate deep demersal stocks.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data for cephalopods, crustaceans, fishes and main groups of benthic invertebrates:
 Taxonomic identification (to species level when it was possible)
 Depth range
 Size composition of catches
 Size, weight, sex and maturity by species
 Temperature

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

18.1237°W – 15.3925°W

21.1510°N – 25.8900°N

Spatial resolution:

99 stations

Temporal extent: 2006-11-12 / 2006-12-12
Temporal resolution: n/a
Depth range/resolution: From 207 m to 1860 m depth
Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Institut National de Recherche Halieutique (INRH)
Limitations on public access: Yes
Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Institut National de Recherche Halieutique, Casablanca, Morocco
Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Contact: faraj@inrh.ma
Abdelmalek Faraj. Director, Institut National de Recherche Halieutique
Data format: Digital (plain text)
References: Hernández-González, C. L. 2007. *Informe Preliminar de la campaña Maroc 0611 de prospección por arrastre de los recursos demersales profundos en aguas del sur de Marruecos*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain. (unpublished).
Additional information:
The survey has been carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was the Lofoten bottom trawl net.

AL AWAM 9810 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCEANOGRAPHIQUES ET DES PECHES (IMROP), MAURITANIA

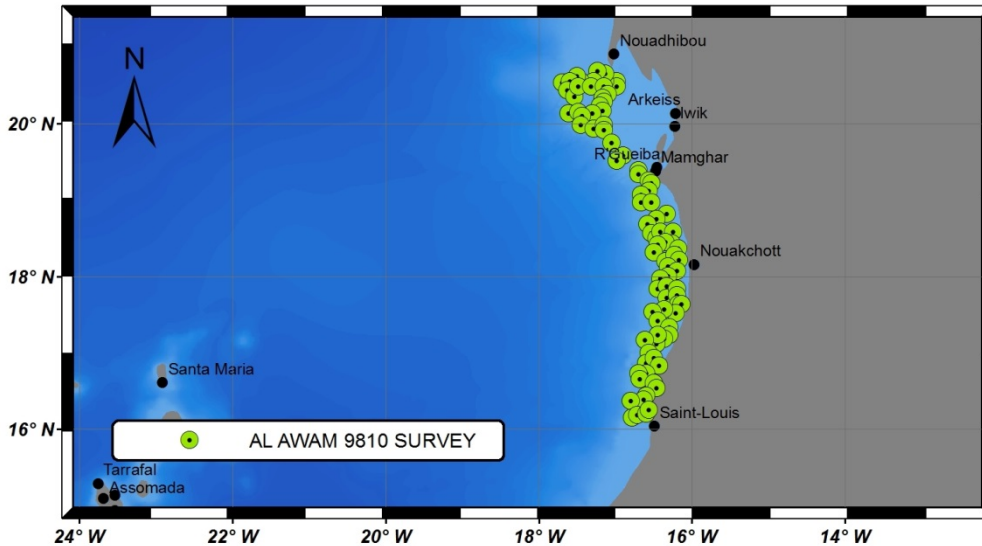


Figure 118. Situation of the 91 bottom trawl stations in Al Awam 9810 survey, carried out in the continental shelf off Mauritania (16.1500°N – 20.9833°N)

Resource abstract:

Study of demersal stocks in waters of Mauritania.

Resource language:

spa

Keyword values:

Species distribution; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Weight, sex and maturity by species
Beaks
pH
Temperature
Wind speed
Current velocity

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.7000°W – 16.1333°W

16.1500°N – 20.9833°N

Spatial resolution:

91 stations

Temporal extent:

1998-10-11 / 1998-10-23

Temporal resolution:

n/a

Depth range/resolution:

From 10 m to 200 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques (IMROP)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain
Institut Mauritanien des Recherches Océanographiques, Nouadhibou, Mauritania

Data via:

Contact: director@ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Mauritanien des Recherches Océanographiques must be acknowledged

AL AWAM 9910 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCEANOGRAPHIQUES ET DES PECHES (IMROP), MAURITANIA

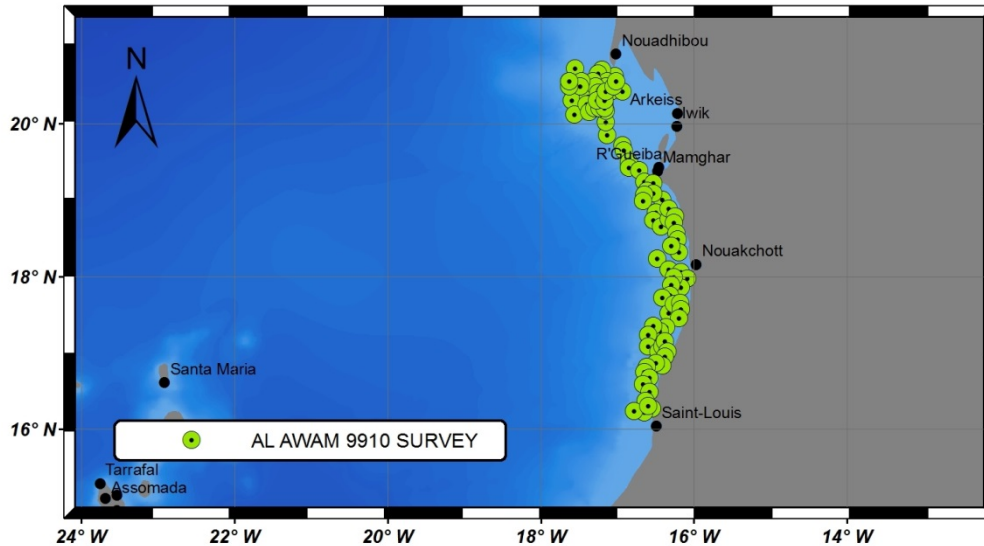


Figure 119. Situation of the 99 bottom trawl stations in Al Awam 9910 survey (16.2167°N – 20.9167°N)

Resource abstract:

Study of demersal stocks in waters of Mauritania.

Resource language:

spa

Keyword values:

Species distribution; Oceanographic geographical features

Variables available:

Observed variables

- Georeferenced data:
- Taxonomic identification
- Depth range
- Size, weight, sex and maturity by species
- Beaks
- pH
- Temperature
- Salinity
- Wind speed
- Current velocity

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.6333°W – 16.0833°W

16.2167°N – 20.9167°N

Spatial resolution:

99 stations

Temporal extent:

1999-10-12 / 1999-10-28

Temporal resolution:

n/a

Depth range/resolution:

From 12 m to 110 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques (IMROP)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain
Institut Mauritanien des Recherches Océanographiques, Nouadhibou, Mauritania

Data via:

Contact: director@ieo.es

Data format:

Head, Instituto Español de Oceanografía
Digital (plain text)

References:

When using the data, the Instituto Español de Oceanografía and the Institut Mauritanien des Recherches Océanographiques must be acknowledged

MAURIT 1107 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCEANOGRAPHIQUES ET DES PECHES (IMROP), MAURITANIA

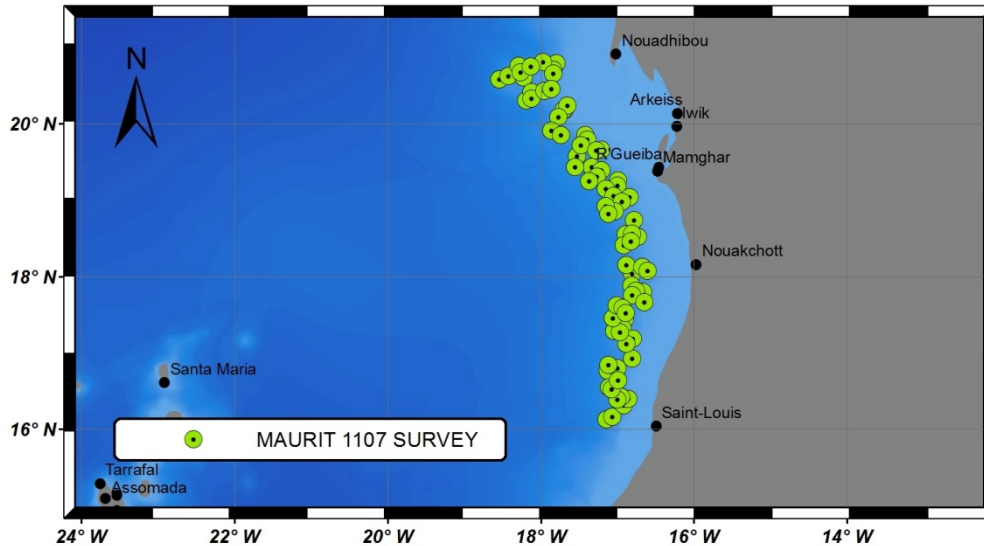


Figure 120. Situation of the 77 bottom trawl stations in Maurit 1107 survey (16.1242°N – 20.8022°N)

Resource abstract:

Ecosystems study in the continental shelf and shelf break in Mauritania waters. Prospection and evaluation of demersal stocks. The main objective was to determine the yield of cephalopods, crustaceans and some fish species in that area. Benthos population analyses have been undertaken (Hernández-González et al., 2010).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features

Variables available:

Observed variables

Georeferenced data for cephalopods, crustaceans, fishes and main groups of benthic invertebrates:
Taxonomic identification (to species level when it was possible)
Depth range
Size composition of catches
Size, weight, sex and maturity by species
Temperature (in some fishing stations conductivity was also obtained).

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

18.5377°W – 16.6065°W

16.1242°N – 20.8022°N

Spatial resolution:

77 stations

Temporal extent:

2007-11-14 / 2007-12-15

Temporal resolution:

n/a

Depth range/resolution:

From 403 m to 1824 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques (IMROP)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Institut Mauritanien des Recherches Océanographiques, Nouadhibou, Mauritania

Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Contact: mahfoudht@yahoo.fr
Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques

Data format: Digital (plain text)

References: Hernández-González, C. L., Bouzouma, M. O., Burgos, C., Hernández-Rodríguez, E. and Cheikhna, S. Y. O. 2010. *Informe de la campaña Maurit-1107 de prospección por arrastre de los recursos demersales profundos en aguas de la República Islámica de Mauritania*. Instituto Español de Oceanografía and Institut Mauritanien des Recherches Océanographiques et Pêches, S. C. de Tenerife, Spain: 416 pp. (unpublished).

Additional information:
The survey has been carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was the Lofoten bottom trawl net.

MAURIT-0811 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCÉANOGRAPHIQUES ET PÊCHES (IMROP), MAURITANIA

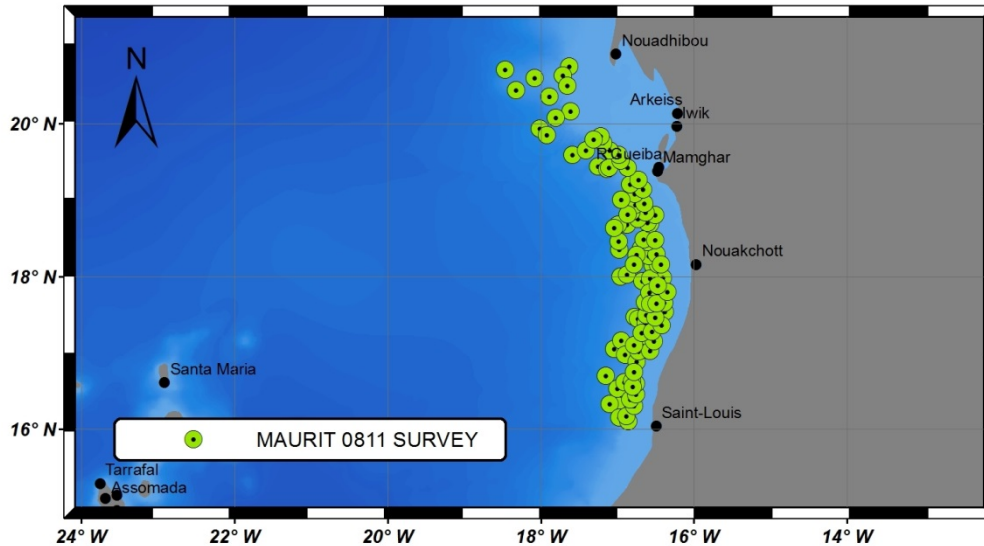


Figure 121. Distribution of the 99 trawling stations in Maurit-0811 survey (16.0970°N – 20.7445°N)

Resource abstract:

Trawling survey for exploration and evaluation of demersal resources, ichthyoplankton and megabenthos study in deep shelf and continental margin off Mauritania.

The main objective of this survey was to determining the yield for fishes, crustaceans and cephalopods (Ramos and Bouzouma, 2008).

Resource language:

spa, fre

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features; Elevation

Variables available:

Observed variables

Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species
 Sizes all fishes and other selected invertebrates
 Biological data of selected species
 Temperature and salinity of water mass
 Ichthyoplankton data
 Faunistic collections demersal fishes and benthic invertebrates
 Pictures collection
 Multibeam records

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

18.4647°W – 16.3462°W

16.0970°N – 20.7445°N

Spatial resolution:

99 stations

Temporal extent: 2008-11-15 / 2008-12-16
Temporal resolution: n/a
Depth range/resolution: From 400 m to 2000 m depth
Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access: Yes
Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
 Institut Mauritanien des Recherches Océanographiques et Pêches, Nouadhibou, Mauritania
Data via: Contact: director@md.ieo.es
 Head, Instituto Español de Oceanografía
 Contact: mahfoudht@yahoo.fr
 Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format: Digital (plain text)
References: Ramos, A. and Bouzouma, M. 2008. *Prospección por arrastre de los recursos demersales de la plataforma y margen continental de Mauritania. Plan de la Campaña Maurit-0811.* IEO-SGPM (MAPA), IMROP, Vigo, Spain: 29 pp. (unpublished).

Additional information:

The fishing gear chosen for the cruise was the Lofoten commercial trawl.

Other devices: Multibeam echosounder EM-300, net CTD 37-SM Micro CAT, Bongo plankton trawl net.

MAURIT-0911 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCÉANOGRAPHIQUES ET PÊCHES (IMROP), MAURITANIA

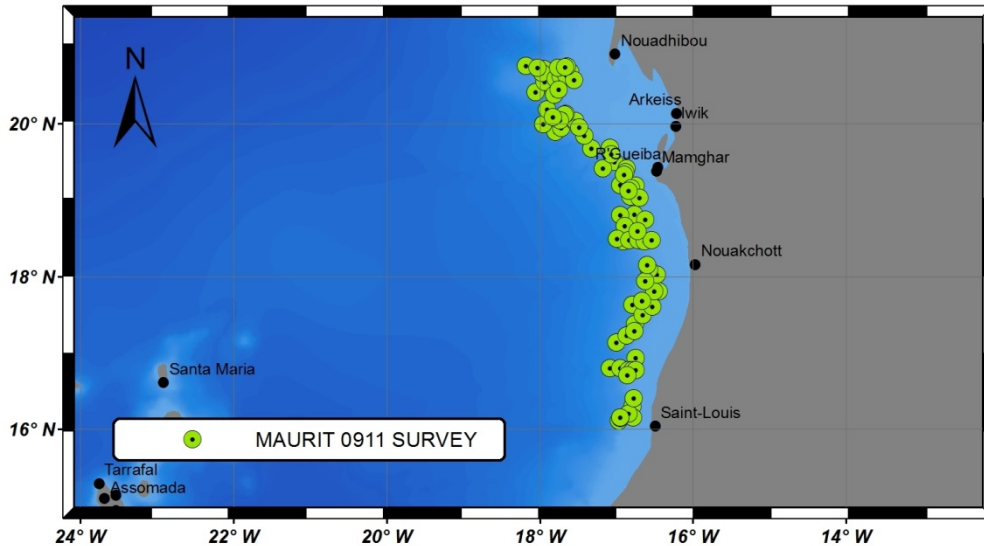


Figure 122. Distribution of the 57 bottom trawl stations in Maurit-0911 survey (16.1055°N – 20.7596°N)

Resource abstract:

Characterization of the demersal, benthic and ichthyoplanktonic ecosystems of deep shelf and shelf break off Mauritania. Geomorphologic prospecting and oceanographic sampling was undertaken (Ramos et al., 2010).

Resource language:

spa, fre

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features; Elevation; Land cover

Variables available:

Observed variables

Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species
 Sizes all fishes and other selected invertebrates
 Biological data of selected species
 Temperature and salinity of water mass
 Ichthyoplankton data
 Faunistic collections demersal fishes and benthic invertebrates
 Pictures collection
 Multibeam and TOPAS records
 Video recording

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

18.1868°W – 16.4445°W

16.1055°N – 20.7596°N

Spatial resolution: 57 stations
Temporal extent: 2009-11-16 / 2009-12-16
Temporal resolution: n/a
Depth range/resolution: From 80 m to 2000 m depth
Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access: Yes
Responsible organisations: Instituto Español de Oceanografía, Madrid, Spain
 Institut Mauritanien des Recherches Océanographiques et Pêches Nouadhibou, Mauritania
Data via: Contact: director@md.ieo.es
 Head, Instituto Español de Oceanografía

 Contact: mahfoudht@yahoo.fr
 Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format: Digital (plain text)
References: Ramos, A., Alcalá, C., Fernández, F., Fernández, L., González-Porto, M., López, V., Moya, J. A., Pascual, P., Presas, C., Puerto, M. A., Ramil, F., Salmerón, F., Sanz, J. L., Rey, J., Viscasillas, L., Abed, J. O., Baye, S. O., Ciré, B. A., Mohamed, B. O., Samba, A. O. and Valy, Y. O. 2010. *Estudio de los ecosistemas de la plataforma y margen continental de Mauritania. Informe de resultados de la campaña 'Maurit-0911'*. Inf. Téc. IEO-IMROP, Spain: 161 pp. (unpublished).
Additional information:
 The fishing gear chosen for the cruise was the Lofoten commercial trawl.
 Other devices: Multibeam echosounder EM-300, high resolution seismic profiler (TOPAS), CTD Seabird-25, net CTD 37-SM Micro CAT, Bongo plankton trawl net, Agassiz trawl, rock dredge.

MAURIT-1011 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCÉANOGRAPHIQUES ET PÊCHES (IMROP), MAURITANIA

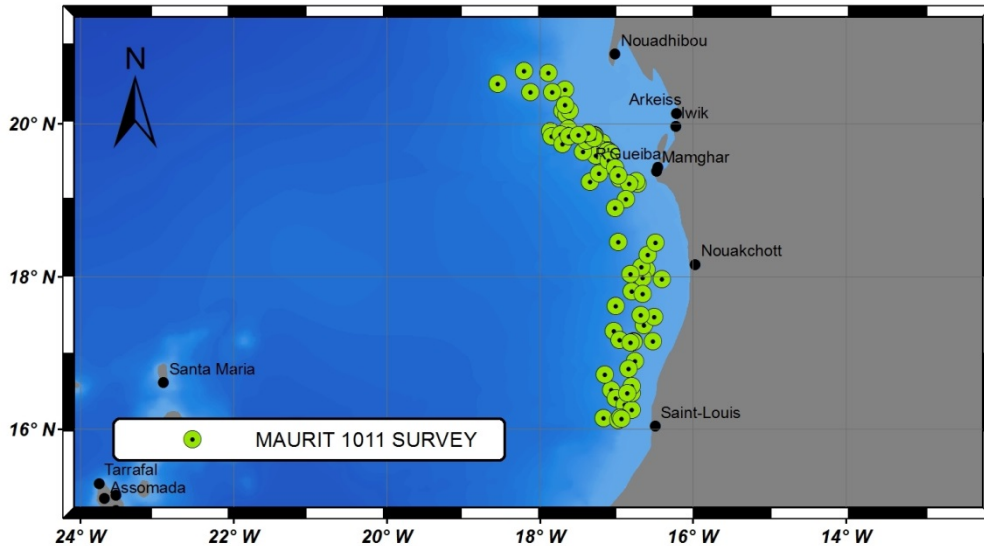


Figure 123. Distribution of the 56 bottom trawl stations in Maurit-1011 survey (16.1158°N – 20.6953°N)

Resource abstract:

Multidisciplinary survey for the characterization of demersal, benthic and ichthyoplanktonic ecosystems of deep shelf and shelf break off Mauritania. Geomorphologic prospecting characterization and oceanographic sampling was undertaken (Ramos and Bouzouma, 2010).

Resource language:

spa, fre

Keyword values:

Species distribution; Habitats and biotopes; Oceanographic geographical features; Elevation; Land cover

Variables available:

Observed variables

Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species
 Sizes all fishes and other selected invertebrates
 Biological data of selected species
 Temperature and salinity of water mass
 Ichthyoplankton data
 Macrobenthos specific sampling
 Faunistic collections demersal fishes and benthic invertebrates
 Pictures collection
 Multibeam and TOPAS records

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location: 18.5500°W – 16.3962°W 16.1158°N – 20.6953°N
Spatial resolution: 56 stations
Temporal extent: 2010-11-16 / 2010-12-15
Temporal resolution: n/a
Depth range/resolution: From 80 m to 2000 m depth
Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access: Yes
Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
 Institut Mauritanien des Recherches Océanographiques et Pêches Nouadhibou, Mauritania
Data via: Contact: director@md.ieo.es
 Head, Instituto Español de Oceanografía

 Contact: mahfoudht@yahoo.fr
 Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format: Digital (plain text)
References: Ramos, A. and Bouzouma, M. 2010. *Estudio de los ecosistemas de la plataforma y margen continental de Mauritania. Plan de la Campaña Mauri-1011*. IEO-SGPM (MAPA), IMROP, Vigo, Spain: 24 pp. (unpublished).

Additional information:

The fishing gear chosen for the cruise was the Lofoten commercial trawl.

Other devices: Multibeam echosounder EM-300, high resolution seismic profiler (TOPAS), CTD Seabird-25, net CTD 37-SM Micro CAT, Bongo plankton tow net, Agassiz trawl, rock dredge.

SENEGAL 8210 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OcéANOGRAPHYQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

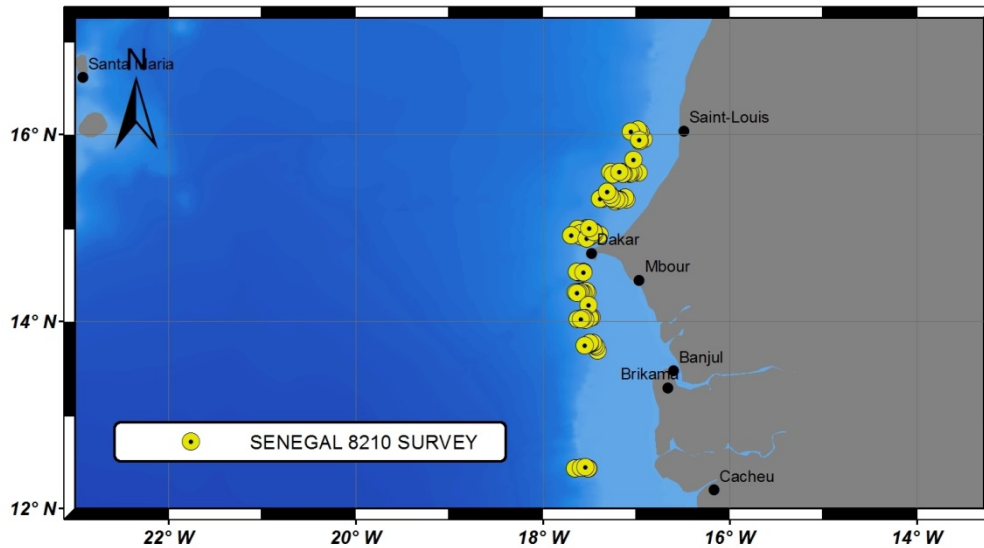


Figure 124. Distribution of the 98 bottom trawl stations in the shelf break off Senegal (Senegal 8210 survey, 12.4170°N – 16.0463°N)

Resource abstract:

This deep sea fishing research was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal. Two surveys per year were planned to evaluate deep stocks of crustaceans and hake. The research programme was established by the Centre de Recherches Océanographiques de Dakar-Thiaroye and the Instituto Español de Oceanografía.

This first survey had the following specific objectives (López-Abellán et al., 1982):

- To record the qualitative inventory of the species assemblage in the area
- To study the geographic and bathymetric distribution of the species, as well as their demographic structures
- To obtain relative abundance and reproduction indices for the main species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data:	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
	Taxonomic identification	
	Depth range	
	Size and weight by species	
Geographic location:	17.700°W – 16.9243°W	12.4170°N – 16.0463°N
Spatial resolution:	98 stations	
Temporal extent:	1981-10-17 / 1981-11-03	
Temporal resolution:	n/a	
Depth range/resolution:	From 100 m to 1000 m depth	

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal

Data via: http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selcampagne%5B%5D=SENEGAL-8210&methode=1

Data format: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Digital (plain text and survey report in PDF format)

References: López-Abellán, L. J., Ariz-Tellería, J., Santana, J. C., Caveriviere, A. and Thiam M. 1982. *Informe de la primera campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. "Senegal 8210"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 110 pp. (unpublished).

Additional information:
This survey was carried out on the F/V *Cruz de Aralar*. The fishing gears used in this survey were the Clásico Tangón and Troli trawl nets.

SENEGAL 8304 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCÉANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

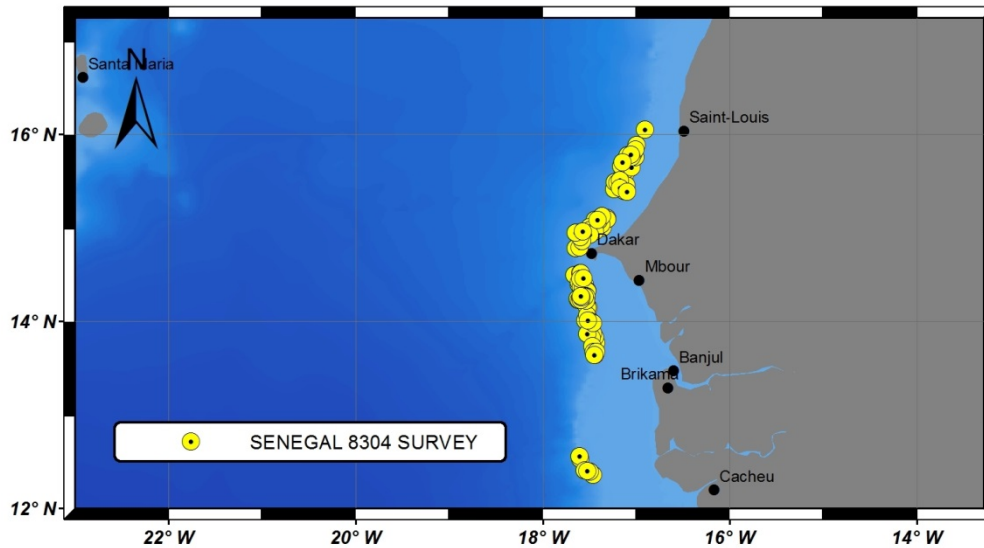


Figure 125. Distribution of the 99 bottom trawl stations in the shelf break off Senegal (Senegal 8304 survey, 12.4167°N – 16.0000°N)

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective (López-Abellán et al., 1983a):

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance index for hake, scorpion fish and other fish species
- To study the demographic structures for the main species
- To obtain biological data for the main species.

Resource language: spa

Keyword values: Species distribution; Habitats and biotopes

Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data: Taxonomic identification Depth range Size and weight by species	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices

Geographic location: 17.6500°W – 16.9000°W

Spatial resolution: 99 stations

Temporal extent: 1983-04-29 / 1983-05-17

Temporal resolution: n/a

Depth range/resolution: From 150 m to 800 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal

Data via: http://halieut.agrocampus-ouest.fr/istam/rawlbase/inter2_1.php?dbse=&active=1&selc=ampagne%5B%5D=SENEGAL-8304&methode=1

Data format: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Digital (plain text and survey report in PDF format)

References: López-Abellán, L. J., Ariz-Tellería, J., García-Vela, J. A., Caveriviere, A. and Thiam, M. 1983. *Informe de la segunda campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. "Senegal 8304"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 141 pp. (unpublished).

Additional information:
This survey was carried out on the F/V *Villa Ana*. The fishing gear used in this survey was the Marisco trawl net.

SENEGAL 8306 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCÉANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

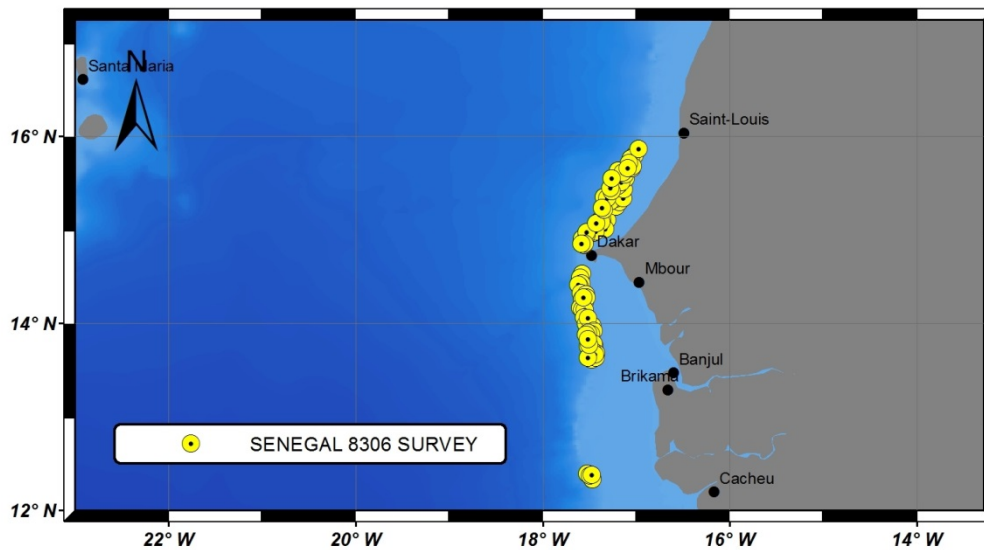


Figure 126. Distribution of the 84 bottom trawl stations in the shelf break off Senegal (Senegal 8306 survey, 12.4167°N – 16.0000°N).

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective (López-Abellán et al., 1983b):

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance index for hake, scorpion fish and other fish species
- To study the demographic structures for the main species
- To obtain biological data for the main species.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables
 Georeferenced data:
 Taxonomic identification
 Depth range
 Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

17.6167°W – 16.9667°W

Spatial resolution:

84 stations

Temporal extent:

1983-06-26 / 1983-07-10

Temporal resolution:

n/a

Depth range/resolution:

From 150 m to 800 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal

Data via: http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selc=ampagne%5B%5D=SENEGAL-8306&methode=1

Data format: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Digital (plain text and survey report in PDF format)

References: López-Abellán, L. J., Ariz-Tellería, J., García-Vela, J. A., Caveriviere, A. and Thiam, M. 1983. *Informe de la tercera campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. "Senegal 8306"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 136 pp. (unpublished).

Additional information:
This survey was carried out on the F/V *Villa Ana*. The fishing gear used in this survey was the Marisco trawl net.

SENEGAL 8402 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCEANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

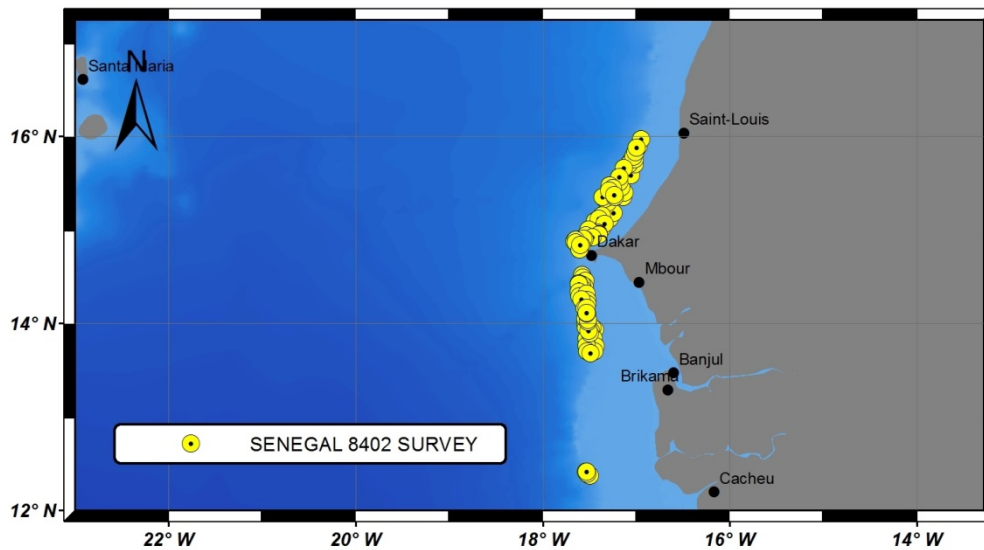


Figure 127. Distribution of the 93 bottom trawl stations in the shelf break off Senegal (Senegal 8402 survey, 12.3333°N – 16.0000°N)

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective (Delgado-de-Molina et al., 1984):

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance indicators for hake, scorpion fish and other fish species
- To study the demographic structures for the principal species
- To obtain biological data for the principal species.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
Taxonomic identification
Depth range
Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location:

17.6500° W – 16.9333° W

Spatial resolution:

93 stations

Temporal extent:

1984-02-19 / 1984-03-16

Temporal resolution:

n/a

Depth range/resolution:

From 150 m to 800 m depth

12.3333°N – 16.0000°N

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar Thiaroye (CRODT)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal

Data via: http://halieut.agrocampus-ouest.fr/istam/rawlbase/inter2_1.php?dbse=&active=1&selc=ampagne%5B%5D=SENEGAL-8402&methode=1

Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Data format: Digital (plain text and survey report in PDF format)

References: Delgado-de-Molina, A., Santana, J. C., Torres-Núñez, S., Caveriviere, A., Thiam, M. and Thiam, D. 1984. *Informe de la cuarta campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. Senegal 8402*. Instituto Español de Oceanografía, Spain: 271 pp. (unpublished).

Additional information:
This survey has been carried out on the F/V *Villa Ana*. The fishing gear used in this survey was the Marisco kind.

SENEGAL 8611 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCEANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

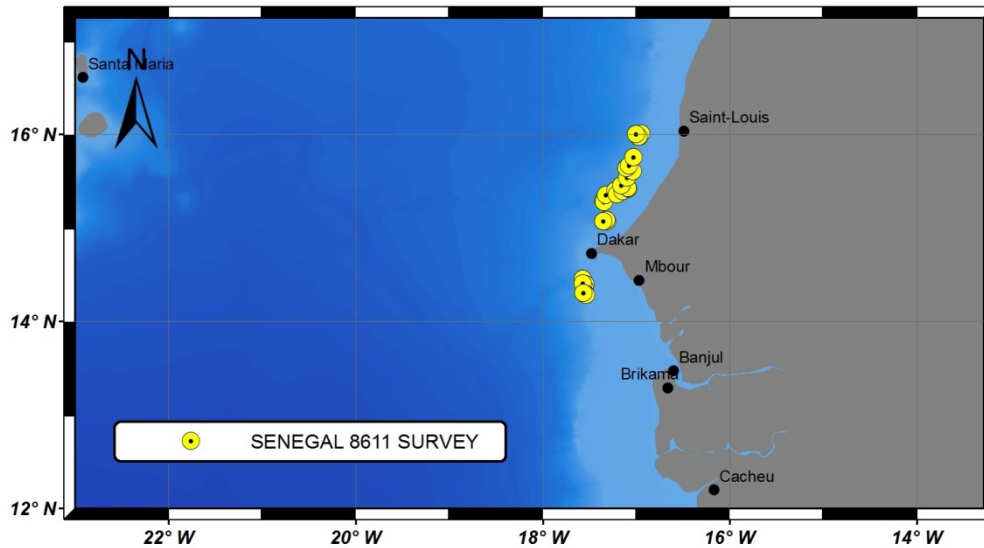


Figure 128. Distribution of the 28 bottom trawl stations in the continental slope off Senegal (Senegal 8611 survey, 14.2500°N – 16.0000°N)

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective:

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance index for hake, scorpion fish and other fish species
- To study the demographic structures for the main species
- To obtain biological data for the main species.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables
 Georeferenced data:
 Taxonomic identification
 Depth range
 Size and weight by species

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

17.5667°W – 16.9333°W

Spatial resolution:

28 stations

Temporal extent:

1986-11-18 / 1986-11-21

Temporal resolution:

n/a

Depth range/resolution:

From 151 m to 726 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal

Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía

Data format: Digital (plain text)

References: When using the data, the Instituto Español de Oceanografía and the Centre de Recherches Océanographiques de Dakar-Thiaroye must be acknowledged

GAMBIA 8611 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
SECRETARÍA GENERAL DE PESCA MARÍTIMA, SPAIN

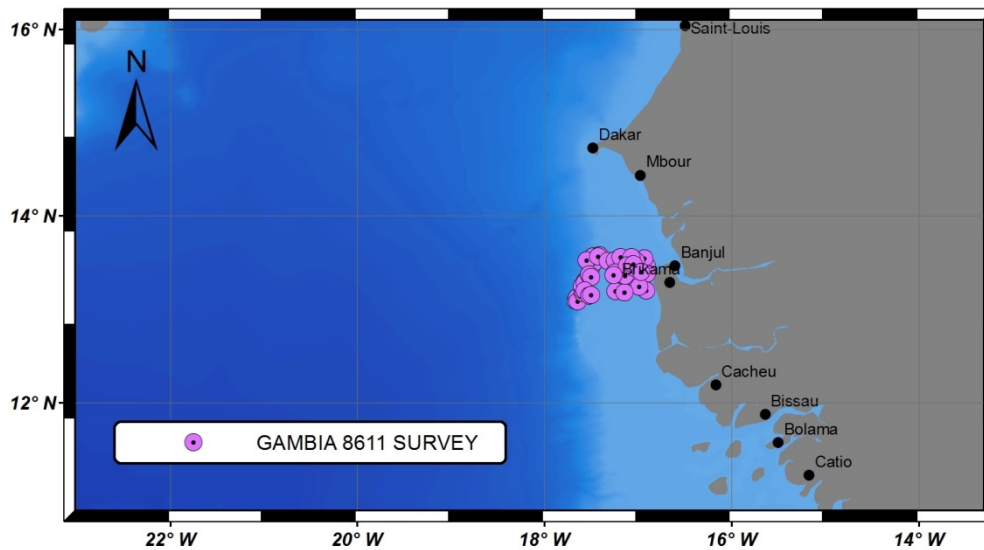


Figure 129. Distribution of the 41 bottom trawl stations in GAMBIA 8611 survey (13.0833°N-13.5833°N)

Resource abstract:

Exploratory fishing survey for demersal stocks in waters of the Republic of Gambia, undertaken within the framework of the Programme for the Development of Fisheries in the Eastern Central Atlantic (Committee for the Eastern Central Atlantic Fisheries -CECAF-). This survey was a collaborative work between the Secretaría General de Pesca Marítima (Spain) and the Instituto Español de Oceanografía (Spain).

The General Objective of the Gambia 8611 cruise was to estimate the coastal and deep water demersal stocks in Gambian waters (López-Abellán et al., 1987a, 1987b).

Specific objectives:

- To obtain relative abundance index of the main demersal commercial species, particularly hake, shellfish, cephalopods and sea breams
- To study the geographical and bathymetrical distribution of the main species, as well as their age structure
- To obtain biological data on the main species.

Resource language: spa

Keyword values: Species distribution; Habitats and biotopes

Variables available: *Observed variables*
Georeferenced data:
Taxonomic identification
Depth range
Size and weight by species

Derived variables
A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Abundance
Ecological diversity indices

Geographic location: 17.6667°W – 16.8833°W

Spatial resolution: 41 stations

Temporal extent: 1986-11-24 / 1986-11-30

Temporal resolution: n/a
Depth range/resolution: From 0 m to 800 m depth
Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO)
Limitations on public access: Yes
Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Data via: http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selc=ampagne%5B%5D=GAMBIA-8611&methode=1

Data format: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Digital (plain text and report in PDF format)

References: López-Abellán, L. J., Cervantes, A. and De-La-Serna, J. M. 1987. *Campaña de prospección pesquera de los stocks demersales en aguas de la República de Gambia. "Gambia 8611"*. Instituto Español de Oceanografía, Spain (unpublished).
López-Abellán, L. J., Cervantes, A. and De-La-Serna, J. M. 1987b. *Exploratory fishing cruise for demersal stocks in waters of the Republic of the Gambia. "Gambia 8611"*. Programme for the development of fisheries in the Eastern Central Atlantic. United Nations Food and Agriculture Organization (FAO), Dakar, CECAF/TECH/87/87: 187 pp.

Additional information:

This survey was carried out on board of the bottom trawl vessel *Isla Lanzarote*. The fishing gear chosen for the cruise was the so-called Marisco. Because of the continuous breakages of this fishing gear on the continental shelf, another gear called Bou had to be used for five stations.

GUINEA BISSAU 10-2002 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRO DE INVESTIGAÇÃO PESQUEIRA APLICADA (CIPA), GUINEA-BISSAU

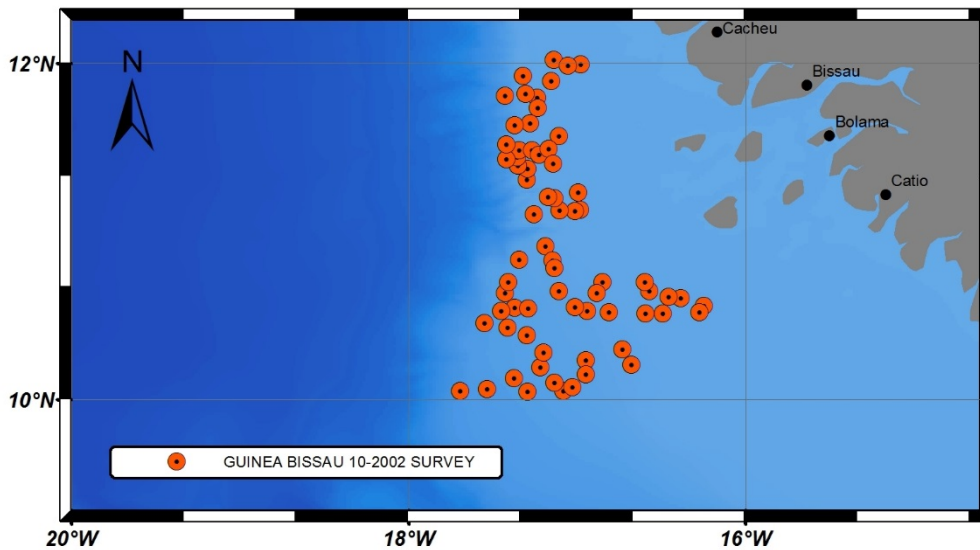


Figure 130. Distribution of the 68 bottom trawl stations in Guinea Bissau 10-2002 survey, carried out in the continental slope and middle slope of Guinea-Bissau (10.0450°N - 12.0200°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the shelf and slope waters of the Guinea-Bissau exclusive economic zone. It was conducted in a cooperation framework between Spain and Guinea-Bissau, with the main aim of assessing main commercial species in the area (fish, crustaceans and cephalopods) (Sobrino and Malaba, 2003).

Resource language:

spa, por

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data (number and weight by species) by station for all fishes, crustaceans and cephalopods

Size composition of all fishes and commercial crustacean and cephalopods

Biological parameters of commercial species (body length, sex and maturity stages)

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:

Abundance

Ecological diversity indices

Geographic location:

17.695°W – 16.2483°W

10.0450°N - 12.0200°N

Spatial resolution:

68 stations

Temporal extent:

2002-10-10 / 2002-10-31

Temporal resolution:

n/a

Depth range/resolution:

From 16 m to 916 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO) and the Centro de Investigação Pesqueira Aplicada (CIPA)

Limitations on public access:

Yes

Responsible organisation: Instituto Español Oceanografía. Madrid, Spain
Centro de InvestigaçãO Pesqueira Aplicada, Bissau, Guinea-Bissau

Data via: Contact: director@ieo.es
Head, Instituto Español de Oceanografía

Data format: Digital (plain text)

References: Sobrino, I. and Malaba, L. F. 2003. *Informe de la campaña Guinea Bissau 10-2002*. Instituto Español de Oceanografía and Centro de Investigaçao Pesqueira Aplicada, Cádiz, Spain: 40 pp. (unpublished).

Additional information:
The survey was carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was a trawl net called Baka.

GUINEA BISSAU 0810 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRO DE INVESTIGAÇÃO PESQUEIRA APLICADA (CIPA), GUINEA-BISSAU

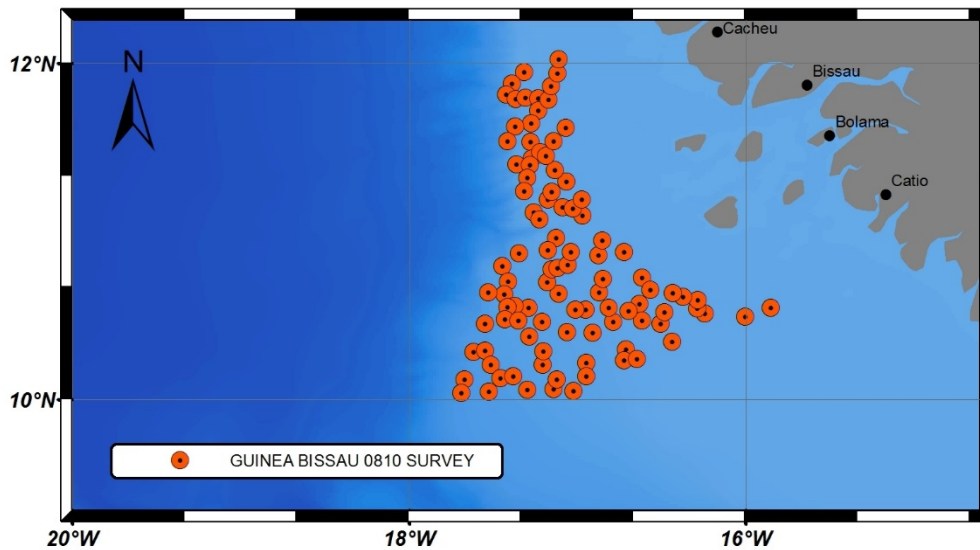


Figure 131. Distribution of the 100 bottom trawl stations in Guinea Bissau 0810 survey, carried out in the shelf and continental slope of Guinea-Bissau (10.0362°N - 12.0212°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the shelf and slope waters of the Guinea-Bissau exclusive economic zone. It was conducted in a cooperation framework between Spain and Guinea-Bissau, with the main aim of assessing main commercial species in the area (fish, crustaceans and cephalopods). Other objectives developed during the survey were: the study of the population structure and biological parameters of main species; mapping of main species; analysis of benthos and ichthyoplankton communities; and hydrographic characterization of the area (García-Isarch et al., 2009).

Resource language: spa, por

Keyword values: Species distribution; Habitats and biotopes; Hydrography; Oceanographic geographical features

Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
	Size composition of all fish and selected crustacean and cephalopod species	
	Biological data of main commercial species	
	Biomass	
	Ichthyoplankton data	
	Densities of fish eggs and larvae and other zooplankton components, at global level and by taxonomical groups (at the lowest possible	

	taxonomical level)	
	Faunistic collections of demersal fish and benthic invertebrates	
	Pictures collection of the caught species	
	Temperature	
	Salinity	
Geographic location:	17.6927°W – 15.8520°W	10.0362°N - 12.0212°N
Spatial resolution:	100 stations	
Temporal extent:	2008-10-22 / 2008-11-12	
Temporal resolution:	n/a	
Depth range/resolution:	From 20 m to 940 m	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centro de Investigação Pesqueira Aplicada (CIPA)	
Limitations on public access:	Yes	
Responsible organisation:	Instituto Español Oceanografía. Madrid, Spain Centro de Investigação Pesqueira Aplicada, Bissau, Guinea-Bissau	
Data via:	Contact: director@ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plein text)	
References:	García-Isarch, E., Burgos, C., Sobrino, I., Mendes, A., Barri, I., Assau, V., Gomes, R. and Gomes. M. J. 2009. <i>Informe de la Campaña de Evaluación de Recursos Demersales de la ZEE de Guinea Bissau a bordo del B/O Vizconde de Eza "Guinea Bissau 0810"</i> . Instituto Español de Oceanografía and Centro de Investigação Pesqueira Aplicada, Cádiz, Spain: 112 pp + Annexes (unpublished).	

Additional information:

The survey was carried out on the R/V *Vizconde de Eza*. Demersal trawls were conducted using a Conakry otter bottom trawl (baka type). Plankton sampling was conducted with a squared mouth Bongo of 90 cm aperture.

Other devices: CTD SBE25 equipped with a SBE43 oximeter and a SeaPoint fluorometer.

For further information about this survey results, see Muñoz et al. (2012) and Jiménez et al. (2015).

GUINEA CONAKRY 8010 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
 SECRETARIA GENERAL DE PESCA MARÍTIMA, SPAIN

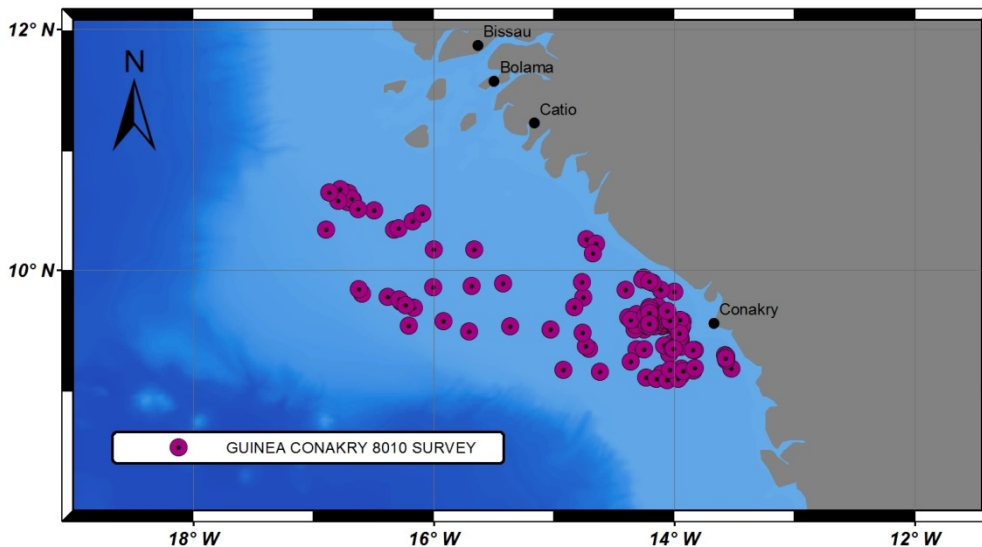


Figure 132. Distribution of the 151 bottom trawl stations in Guinea Conakry 8010 survey (9.0550°N – 10.6667°N)

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf of the Republic of Guinea Conakry. Its main objective has been the investigation of cephalopods and crustaceans. To this aim, the composition of commercial species, catches size distribution, areas of major concentration, yields and other fish species caught were studied (Ariz-Telleria, 1981).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range
 Weight of catches

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices
 9.0550°N – 10.6667°N

Geographic location:

17.1667°W – 13.5833°W

Spatial resolution:

151 stations

Temporal extent:

1980-10-27 / 1980-11-27

Temporal resolution:

n/a

Depth range/resolution:

From 18 m to 244 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text and survey report in PDF format)

References:

Ariz-Tellería, J. 1981. *Campaña de prospección pesquera de los stocks demersales en aguas de la República de Guinea*

Conakry. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 93 pp. (unpublished).

Additional information:

The fishing gears chosen for the cruise were:

- 2 semipelagic gears
- Clásico tangón
- Clásico Marisco
- Cephalopods mix
- Cephalopods nylon

CONAKRY 8305 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

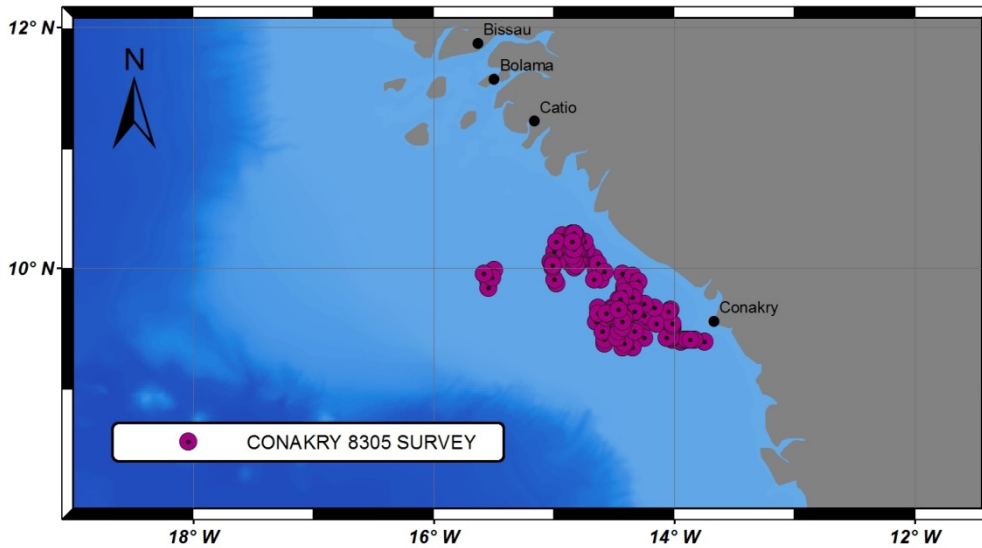


Figure 133. Distribution of the 151 bottom trawl stations in CONAKRY 8305 survey (9.3333°N – 10.2833°N)

Resource abstract:

Exploratory trawling survey for demersal stocks in the continental shelf of the Republic of Guinea. Its main objective has been to determine the yield of cephalopods and crustaceans in that area, completing the information obtained in the surveys Guinea Conakry 8010 and Guinea Conakry 8011 (Santana and Samper, 1983).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range
 Weight of catches

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices

Geographic location:

15.5500°W – 13.7500°W

Spatial resolution:

151 stations

Temporal extent:

1983-05-22 / 1983-06-19

Temporal resolution:

n/a

Depth range/resolution:

From 9 m to 58 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text and survey report in PDF format)

References:

Santana, J. C. and Samper, M. 1983. Campaña de prospección en aguas de la República Popular Revolucionaria de Guinea. *Informes Técnicos del Instituto Español de Oceanografía*, Vol. 18: 122 pp.

Additional information:

This survey has been carried out on the F/V *Villa Ana*. The fishing gears chosen for the cruise were the so called Marisco and Cefalópodos.

CAPVERT 8201 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

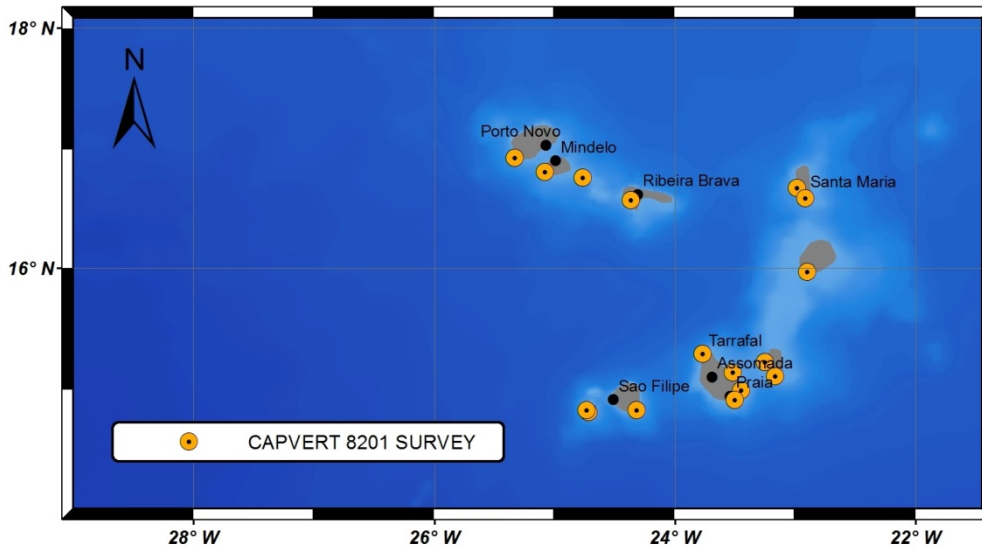


Figure 134. Distribution of the 16 fishing stations in CAPVERT 8201 survey (14.8000°N – 16.9167°N)

Resource abstract:

Investigation of pelagic fisheries on the continental shelf, undertaken under the frame of the Scientific and Technical Cooperation Agreement between Spain and Cape Verde Republic, signed on 18 June 1979.

The aim of this survey was to study technical possibilities of fishing of Atlantic mackerel, as well as the areas suitable for this activity in the waters of the Republic of Cape Verde (Torres-Núñez, 1982a).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Depth range

Weight of catches

Accompanying species

Wind speed

Sea conditions

Nature of the seabed

Geographic location:

25.3333°W – 22.9000°W

14.8000°N – 16.9167°N

Spatial resolution:

16 stations

Temporal extent:

1982-04-22 / 1982-05-26

Temporal resolution:

n/a

Depth range/resolution:

From 25 m to 65 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (survey report in PDF format)

References:

Torres-Núñez, S. 1982. *Informe de la campaña CAPVERT 8201: posibilidades de pesca de caballa en Cabo Verde*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 23 pp. (unpublished).

Additional information:

This survey has been carried out on the F/V *El Gran Rey*. The fishing gear chosen for the cruise was the seine net.

CAPVERT 8202 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

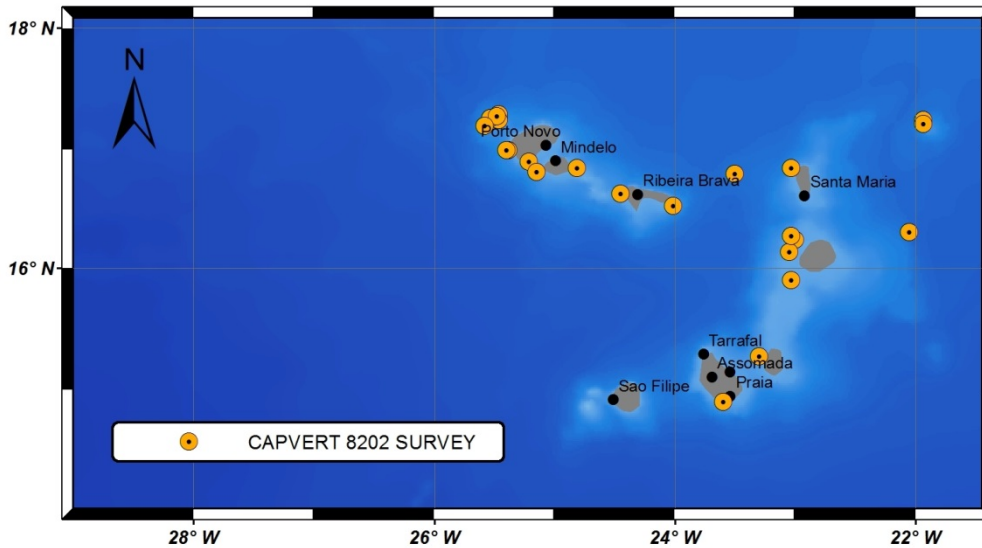


Figure 135. Distribution of the 24 fishing stations in CAPVERT 8202 survey (14.8833°N – 17.3500°N)

Resource abstract:

Investigation of demersal and pelagic fisheries on the continental shelf, undertaken under the frame of the Scientific and Technical Cooperation Agreement between Spain and Cape Verde Republic, signed on 18 June 1979. The aim of this survey was to explore and evaluate the possibilities of longline fisheries, in surfacel and deep waters, of the Republic of Cape Verde.

The objectives of this survey were (Torres-Núñez, 1982b):

- Exploration of commercial species using longline
- Evaluation of the profitability of fishing demersal and pelagic species caught during the investigation using longline.

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:

Taxonomic identification

Depth range

Total weight of catches

Number of specimen by station

Mean size and mean weight by species

Accompanying species

Wind speed

Sea conditions

Air temperature

Sea surface temperature (SST)

Geographic location:

25.7500°W – 21.9000°W 14.8833°N – 17.3500°N

Spatial resolution:

24 stations

Temporal extent:

1982-09-24 / 1982-10-21

Temporal resolution:

n/a

Depth range/resolution:

From 125 m to 1000 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access: Yes
Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Data format: Digital (survey report in PDF format)
References: Torres-Núñez, S. 1982. *Informe de la campaña CAPVERT 8202: posibilidades de pesca con palangre en el archipiélago de Cabo Verde*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 30 pp. (unpublished).

Additional information:

This survey has been carried out on the F/V *Playa de Tamaris*. The fishing gears chosen for the cruise were two kinds of surface longline and one kind of demersal longline.

BAN/CO 8102 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

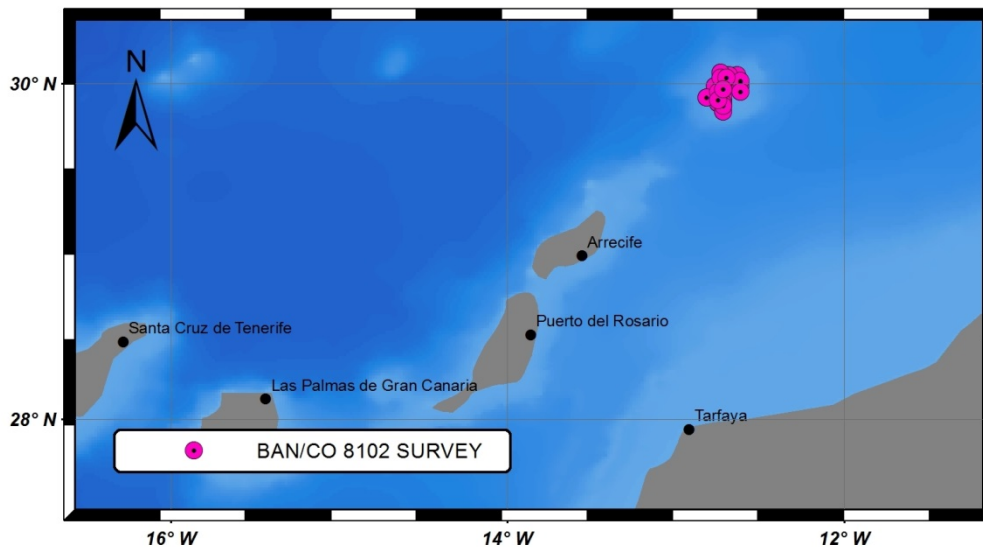


Figure 136. Distribution of 20 bottom trawl stations in BAN/CO 8102 survey (29.8333°N – 30.0667°N)

Resource abstract:

Exploratory trawl survey for demersal stocks in Concepcion Bank, north-east of Canary Island. The main objective was to obtain data about commercial species and yields in the area, as well as data about the seabed quality and fishing areas (Santana, 1981a).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices
 29.8333°N – 30.0667°N

Geographic location:

12.8167°W – 12.6167°W

Spatial resolution:

20 stations

Temporal extent:

1981-02-15 / 1981-02-23

Temporal resolution:

n/a

Depth range/resolution:

From 201 m to 326 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text and survey report in PDF format)

References:

Santana, J. C. 1981. *Estudio de los rendimientos de las especies de interés comercial del Banco de la Concepción*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 41 pp. (unpublished).

Additional information:

This survey has been carried out on board of three vessels: *Pasajes de San Juan*, *Pasajes de San Pedro* and *Pasajes Ancho*.

BAN/CO 8103 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

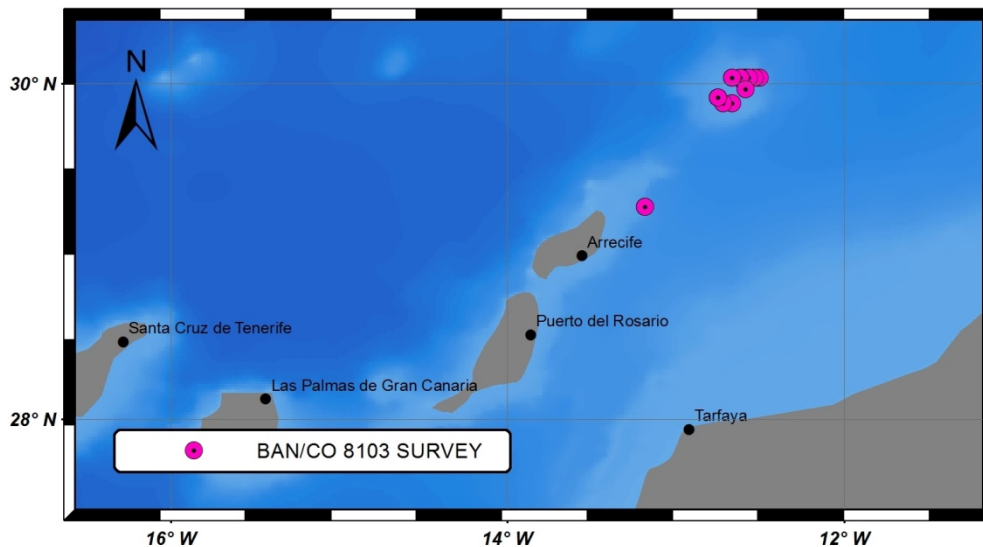


Figure 137. Distribution of the 39 bottom trawl stations in BAN/CO 8103 survey (29.2667°N – 30.0333°N)

Resource abstract:

Exploratory trawl survey for demersal stocks in Conception Bank, north-east of Canary Island. The main objective was to obtain data about commercial species and yields in the area, as well as data about the seabed quality and fishing grounds, trying to complete the information obtained during BAN/CO 8103 (Santana, 1981a).

Resource language: spa

Keyword values: Species distribution; Habitats and biotopes

Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data: Taxonomic identification Depth range	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices

Geographic location: 13.1833°W – 12.5000°W

Spatial resolution: 39 stations

Temporal extent: 1981-03-14 / 1981-03-30

Temporal resolution: n/a

Depth range/resolution: From 146 m to 351 m depth

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access: Yes

Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain

Data via: Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format: Digital (plain text and survey report in PDF format)

References:

Santana, J. C. 1981. *Estudio de los rendimientos de las especies de interés comercial del Banco de la Concepción*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 41 pp. (unpublished).

Additional information:

This survey has been carried out on board of the vessel *Pondal*.

GUINEA CONAKRY 8011 SURVEY
 INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

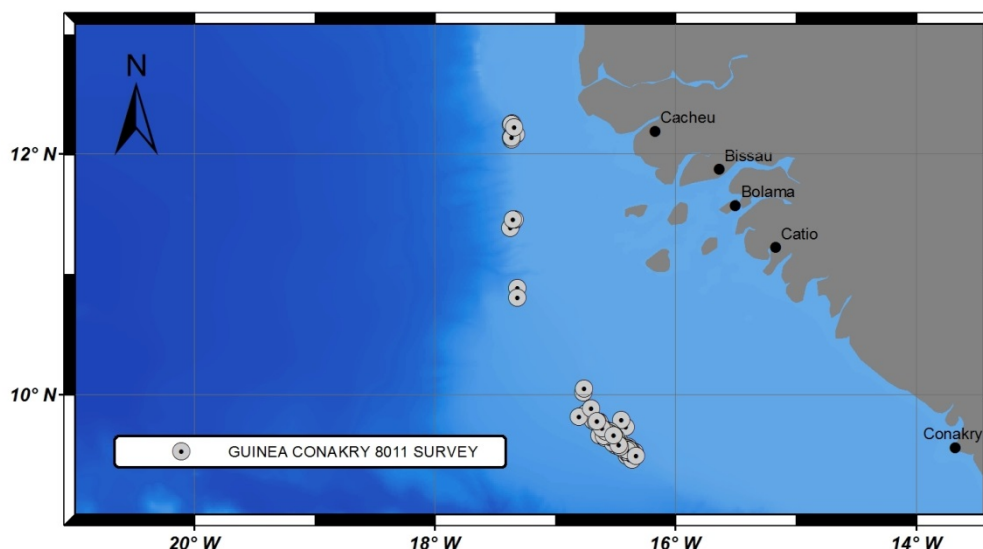


Figure 138. Distribution of the 107 bottom trawl stations in GUINEA CONAKRY 8011 survey, in the waters off Guinea Bissau and Guinea (9.4498°N – 12.2540°N)

Resource abstract:

Exploratory bottom trawl survey for demersal stocks in the continental shelf of the Republic of Guinea Conakry and Guinea Bissau. The main objective was to obtain data about commercial yields of crustaceans and fish in the waters of both countries (Santana, 1981b).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

Observed variables

Georeferenced data:
 Taxonomic identification
 Depth range

Derived variables

A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
 Abundance
 Ecological diversity indices
 9.4498°N – 12.2540°N

Geographic location:

17.3745°W – 16.3268°W

Spatial resolution:

107 stations

Temporal extent:

1980-10-31 / 1980-11-25

Temporal resolution:

n/a

Depth range/resolution:

From 185 m to 384 m depth

Conditions for access & use:

Agreement with the Instituto Español de Oceanografía (IEO)

Limitations on public access:

Yes

Responsible organisation:

Instituto Español de Oceanografía, Madrid, Spain

Data via:

Contact: director@md.ieo.es

Head, Instituto Español de Oceanografía

Data format:

Digital (plain text in PDF format)

References:

Santana, J. C. 1981. *Estudio de los rendimientos comerciales de crustáceos y peces en aguas de la República de Guinea Conakry y Guinea Bissau*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 101 pp. (unpublished).

Additional information:

This survey has been carried out on the R/V *Vicente Barreiro*. The fishing gear chosen for the cruise was the so called Tangon.

PELAGOS 7909 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

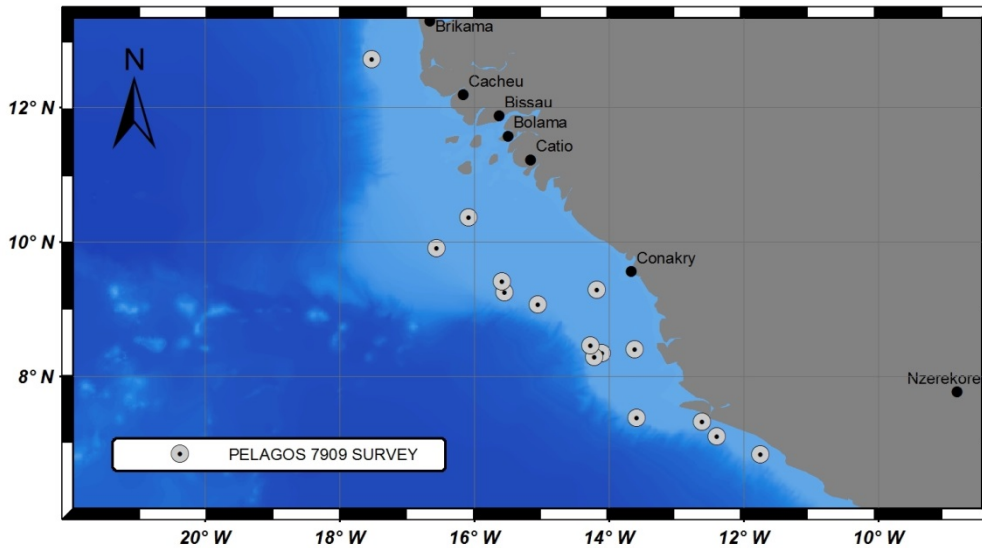


Figure 139. Distribution of the 15 fishing stations in Pelagos 7909 survey (6.8333°N – 12.7167°N)

Resource abstract:

Acoustic survey between Cabo Mount (Sierra Leona) and the mouth of river Gambia, Cabo Roxo (Senegal).

Objectives (Bravo-de-Laguna, 1981):

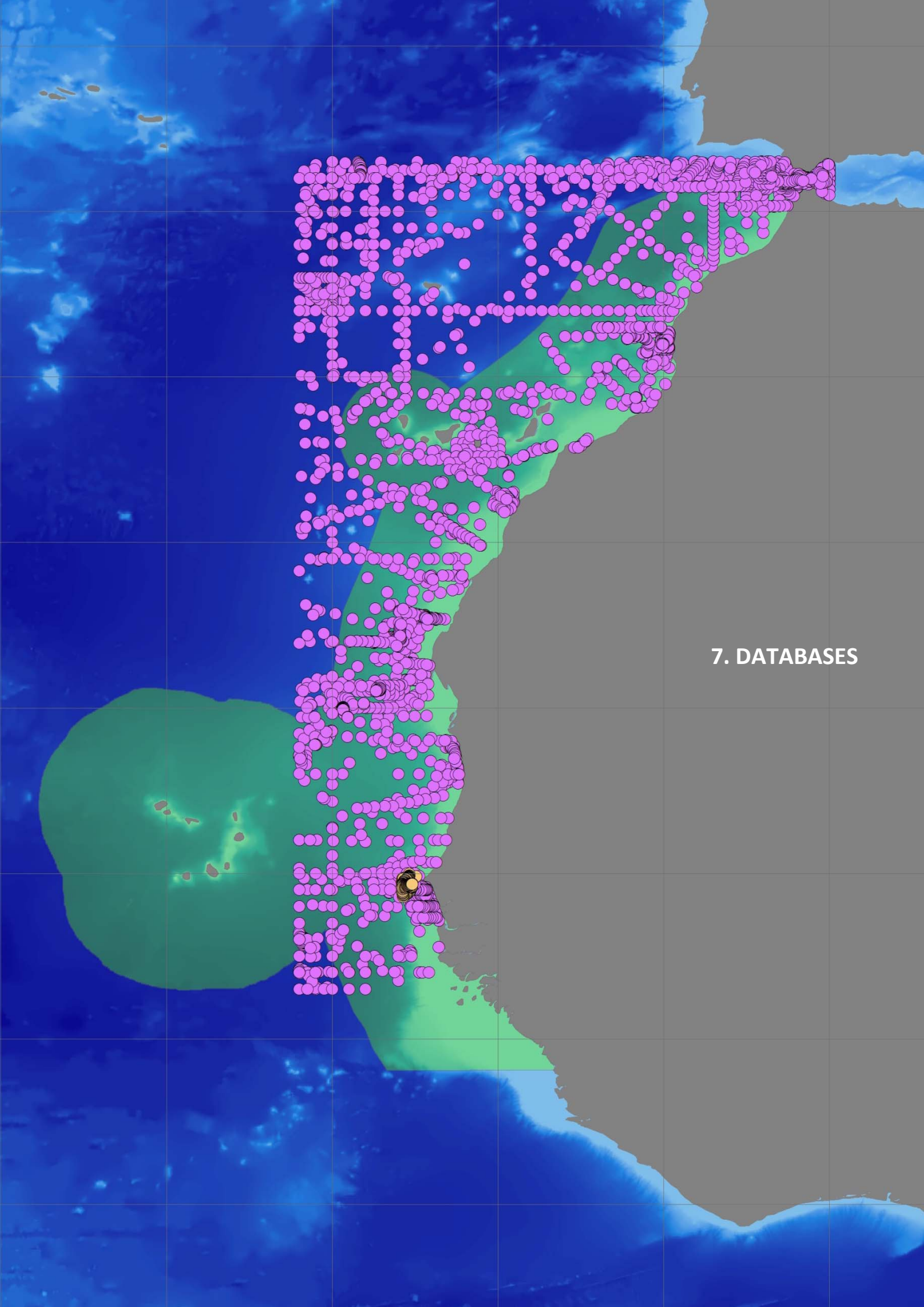
- To estimate the biomass of coastal pelagic fish stocks, including *Balistes carolinensis*, on the continental shelf (from 20 m to 200 m)
- To cartography stocks distribution in the studied area
- To start systematic research in this field and to enhance the cooperation between scientists and institutions participating in the programme, as well as with other institutions in the Committee for the Eastern Central Atlantic Fisheries (CECAF) area
- To create capacities among scientist from CECAF coastal countries in the evaluation of fishes populations through acoustic methods
- To accomplish complementary studies of hydrologic characteristics in the zone.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data:	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
	Taxonomic identification	
	Depth range	
	Species distribution	
Geographic location:	17.5250°W – 11.7483°W	6.8333°N – 12.7167°N
Spatial resolution:	15 stations	
Temporal extent:	1979-09-14 / 1979-09-27	
Temporal resolution:	n/a	
Depth range/resolution:	From 22 m to 136 m depth	

Conditions for access & use: Agreement with the Instituto Español de Oceanografía (IEO)
Limitations on public access: Yes
Responsible organisation: Instituto Español de Oceanografía, Madrid, Spain
Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Data format: Digital (plain text and survey report in PDF format)
References: Bravo-de-Laguna, J. 1981. *Informe sobre la campaña "Pelagos 7909": Prospección acústica de peces pelágicos en aguas de Sierra Leona, Guinea Conakry, Guinea Bissau y sur de Senegal*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain. (unpublished).

Additional information:

This survey was carried out on the R/V *Capricorne*. The gear used during this survey was the Cornide kind.



7. DATABASES

*Some data extracted from WOD 2013 in an area including the CCLME (in green).
The violet circles show CTD stations.
The orange circles show the trajectory of one glider.*

GLOBAL MARINE INFORMATION SYSTEM – GMIS –
INSTITUTE FOR ENVIRONMENT & SUSTAINABILITY, JOINT RESEARCH CENTRE, EUROPEAN COMMISSION

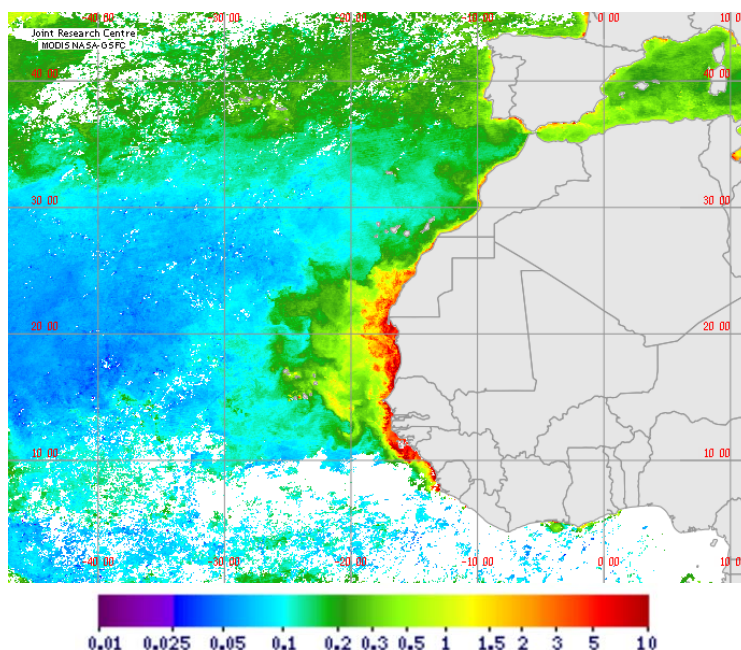


Figure 140. Monthly mean surface chlorophyll a (mg/m^3 , December 2012) in the CCLME (MODIS-AQUA 9 km resolution). Source: Joint Research Centre (GMIS Discovery tool: <http://gmis.jrc.ec.europa.eu/gis.php>, accessed 30 March 2016)

Resource abstract:

The Global Marine Information System has been developed to provide the scientific community and other users with an appropriate set of bio-physical information to monitor and conduct water quality assessment in the coastal and marine waters. The bulk of environmental analysis in GMIS relies on Earth Observation data, and the provision of continuous, detailed and accurate information on relevant marine biophysical parameters as derived from optical and infrared satellite sensors.

GMIS is an activity of the European Commission – DG Joint Research Centre (JRC), developed within the Water Resources Unit of the Institute for Environment and Sustainability (IES). The Global Environment Monitoring Unit at JRC processes, analyzes and distributes these data at various levels of information. The satellite products are retrieved using standard (space agency-related) and in house peer-reviewed algorithms, which have been implemented in a fully operational processing chain for applications in African waters.

Resource language: eng

Keyword values: Environmental monitoring facilities; Oceanographic geographical features

Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Sea surface temperature (SST)	Anomalies
	Bathymetry (GEBCO)	
	Absorption coefficient	
	Particulate backscatter coefficient	
	Diffuse attenuation coefficient	

Chlorophyll concentration
 Surface productive layer
 Primary production

Geographic location: Global ocean coverage

Spatial resolution: 4 km and 9 km

Temporal extent: 1978-10 / 2012-12-31

Temporal resolution: n/a

Depth range/resolution: n/a

Conditions for access & use: The GMIS Datasets are available as a Web Map Service (WMS). No conditions apply to access and use

Limitations on public access: No

Responsible organisation: Global Marine Information System, Institute for Environment & Sustainability, Joint Research Centre, European Commission

Data via: GMIS Discovery tool:
http://gmis.jrc.ec.europa.eu/gmis_6_0.php
<http://gmis.jrc.ec.europa.eu/gis.php>

Contact: emis@jrc.ec.europa.eu

Global Marine Information System, Institute for Environment & Sustainability, Joint Research Centre, European Commission

Data format: Digital (GIS digital format, netCDF format, WMS PNG image, WCS GeoTIFF format, XML format)

Additional information:

The JRC developed an Observatory for Sustainable Development with its primary focus on Africa. This provides policy makers with recent information on specific locations regarding condition and evolution of environmental resources, as well as on potential conflicts linked to resource exploitation, water resource management and climate change impacts.

The GMIS WMS is accessible in 2 dataset resolutions (4 km or 9 km) for several sensors at the global, Africa, Pacific, Caribbean scales. In both cases, data are derived from the following satellite sensors: MODIS-AQUA, MODIS-TERRA, SeaWiFS, PATHFINDER and MERIS.

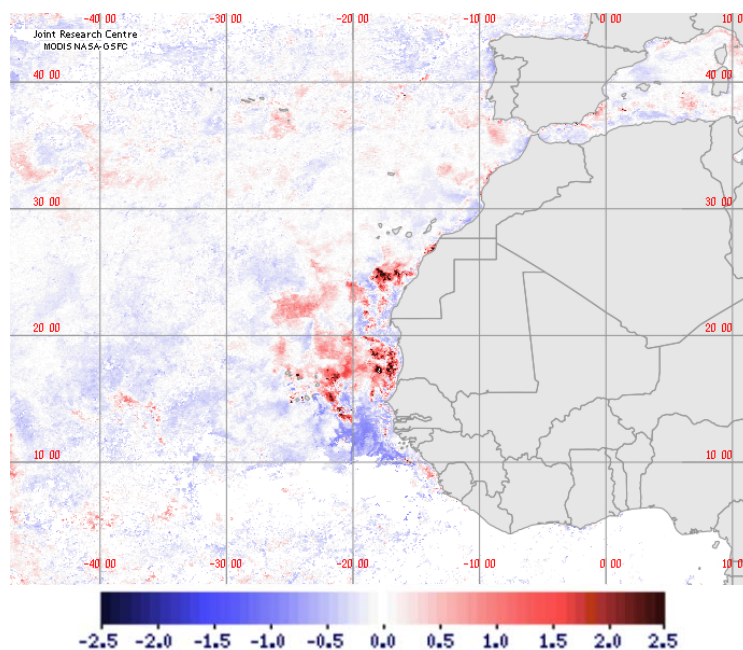


Figure 141. Monthly anomalies of sea surface chlorophyll a (%), December 2012) in the CCLME (MODIS-AQUA 9 km resolution). Source: Joint Research Centre (GMIS Discovery tool: <http://gmis.jrc.ec.europa.eu/gis.php>, accessed 30 March 2016)

**GENERAL BATHYMETRIC CHART OF THE OCEAN – GEBCO –
GEBCO**

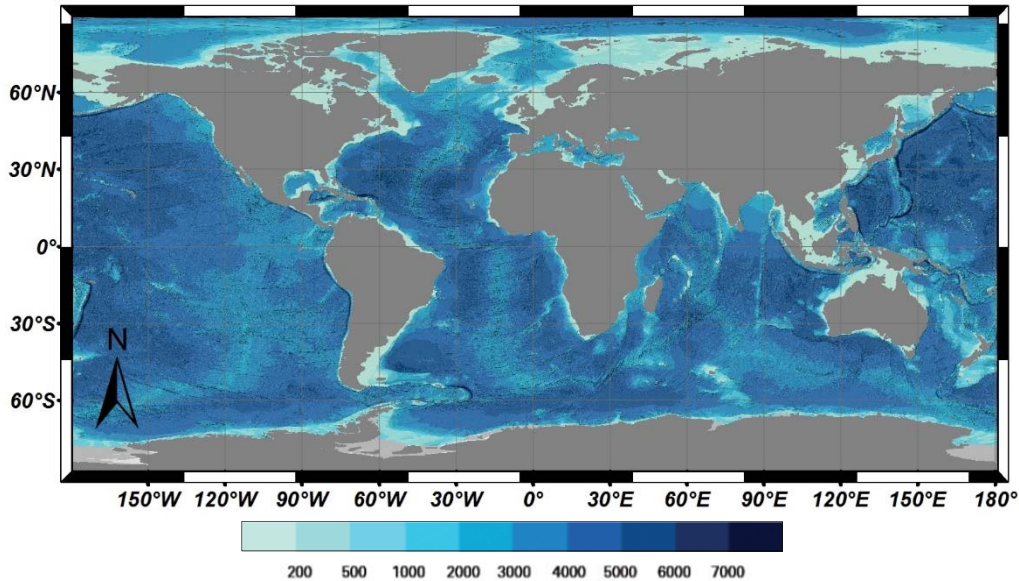


Figure 142. GEBCO World Ocean Bathymetry. The scale shows the depths in corrected meters below mean sea level. Image reproduced from GEBCO_2014 Grid, version 20150318, <http://www.gebco.net> (accessed 14 February 2016)

Resource abstract:

The General Bathymetric Chart of the Oceans (GEBCO) consists of an international group of experts who work on the development of a range of bathymetric datasets and data products, including gridded bathymetric data sets, the GEBCO Digital Atlas, the GEBCO world map and the GEBCO Gazetteer of Undersea Feature Names. Their aim is to provide the most authoritative publicly-available bathymetry of the world's oceans.

GEBCO operates under the joint auspices of the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Hydrographic Organization (IHO), and it is directed by a Guiding Committee and supported by sub-committees on ocean mapping and undersea feature names plus *ad hoc* working groups.

Resource language:	eng	
Keyword values:	Elevation	
Variables available:	Observed variables	Derived variables
	Bathymetry of the world's ocean	Bathymetric contours
		Geographic names of undersea features

Geographic location:	Global Ocean Coverage
Spatial resolution:	30 arc-seconds – 1 arc-minute
Temporal extent:	1903 / present
Temporal resolution:	n/a
Depth range/resolution:	From 200 m depth to the seabed
Conditions for access & use:	Providing the source material is properly credited, the reproduction of the gridded bathymetry data sets in derivative form for scientific research, environmental conservation, education or other non-commercial purposes is authorised without prior permission. GEBCO encourages downloading gridded datasets from their web site rather than providing the grids to third parties themselves. This

allows GEBCO to keep statistics on the use of GEBCO gridded data. Users who intend to use GEBCO's gridded data for commercial purposes are kindly asked to seek GEBCO prior permission

Limitations on public access:

No

Responsible organisation:

Intergovernmental Oceanographic Commission of UNESCO,
Paris, France

International Hydrographic Organisation, Monaco

Data via:

GEBCO Gridded bathymetry data:

http://www.gebco.net/data_and_products/gridded_bathymetry_data

IHO-IOC GEBCO Gazetteer of Undersea Feature Names:

<http://www.ngdc.noaa.gov/gazetteer/>

Data format:

Contact: http://www.gebco.net/about_us/contact_us/

Digital: 2D CF-netCDF, 1D netCDF, Esri ASCII raster, INT16 data GeoTIFF and WMS images. The data format available depends on the product. The Undersea Feature Names are available as a WMS images, KML and ArcGIS layer

References:

If the datasets are used in a presentation or publication the source must be acknowledged. This should be of the form (including the appropriate version number):

For the GEBCO_2014 Grid: 'The GEBCO_2014 Grid, version 20150318, <http://www.gebco.net>'.

For the GEBCO_2014 SID Grid: 'The GEBCO_2014 SID Grid, version 20150318, <http://www.gebco.net>'.

The version number of the grid is given in the header information within the grid file.

If imagery from the WMS is included in web sites, reports and digital and printed imagery the source of the data set must be acknowledged and be of the form: "Imagery reproduced from the GEBCO_2014 Grid, version 20150318, www.gebco.net".

Please include the following citation when data from the gazetteer are used or reproduced in reports, presentations and other products: "IHO-IOC GEBCO Gazetteer of Undersea Feature Names, www.gebco.net"

Additional information:

Traditionally GEBCO had focused on providing bathymetric datasets and maps for areas deeper than 200 m. However, they have been working to improve gridded bathymetric datasets in shallower water. Shallow water bathymetry data are being incorporated into the GEBCO gridded datasets and products as the data become available.

Data about the Waters off the West Coast of Africa were used to update the original GEBCO_08 base grid, upon which the GEBCO_2014 Grid is based. These data were included in the version 20141103 of the GEBCO_2014 Grid, released in November 2014 (http://www.gebco.net/data_and_products/gridded_bathymetry_data/documents/gebco_2014.pdf, accessed 28 January 2016).

Dataset coverage: 18.50°W – 7.50°W / 8.00°N – 34.00°N

This dataset is largely focussed in shallower water areas.

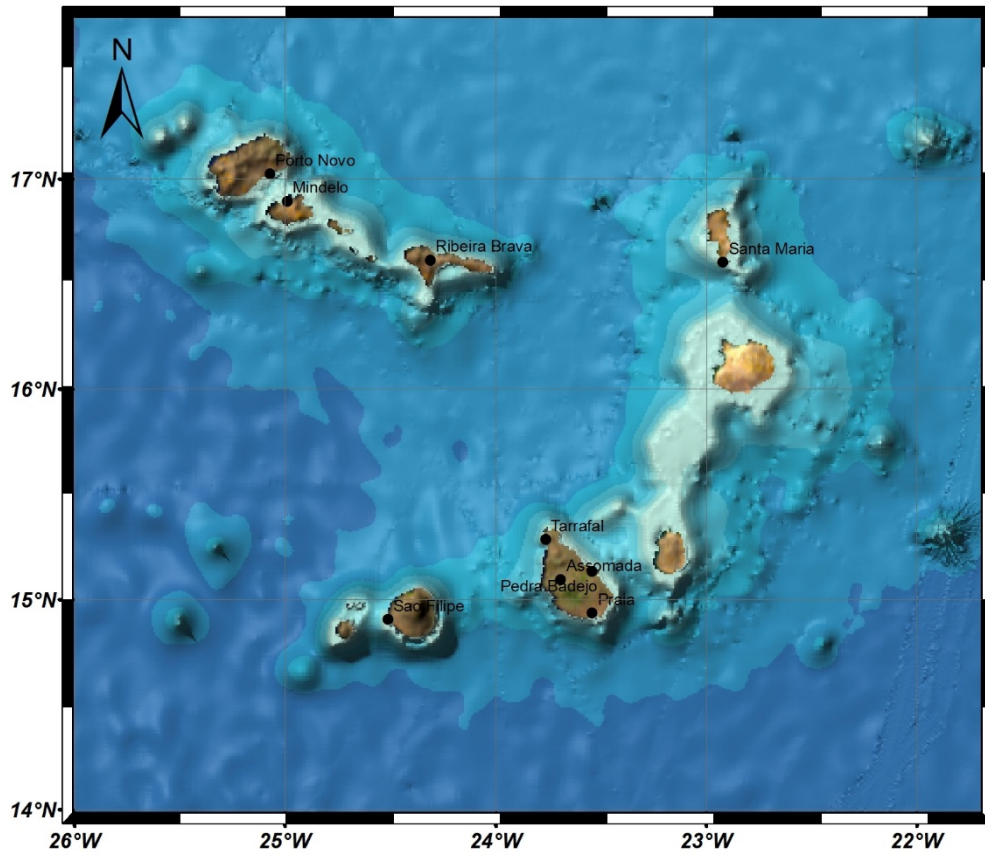


Figure 143. Bathymetry around Cabo Verde archipelago. Numerous seamounts are observable. Imagery reproduced from the GEBCO_2014 Grid, version 20150318, <http://www.gebco.net> (accessed 14 February 2016)

**INTERNATIONAL COMPREHENSIVE OCEAN-ATMOSPHERE DATA SET – ICOADS –
DIFFERENT DATA PROVIDERS**

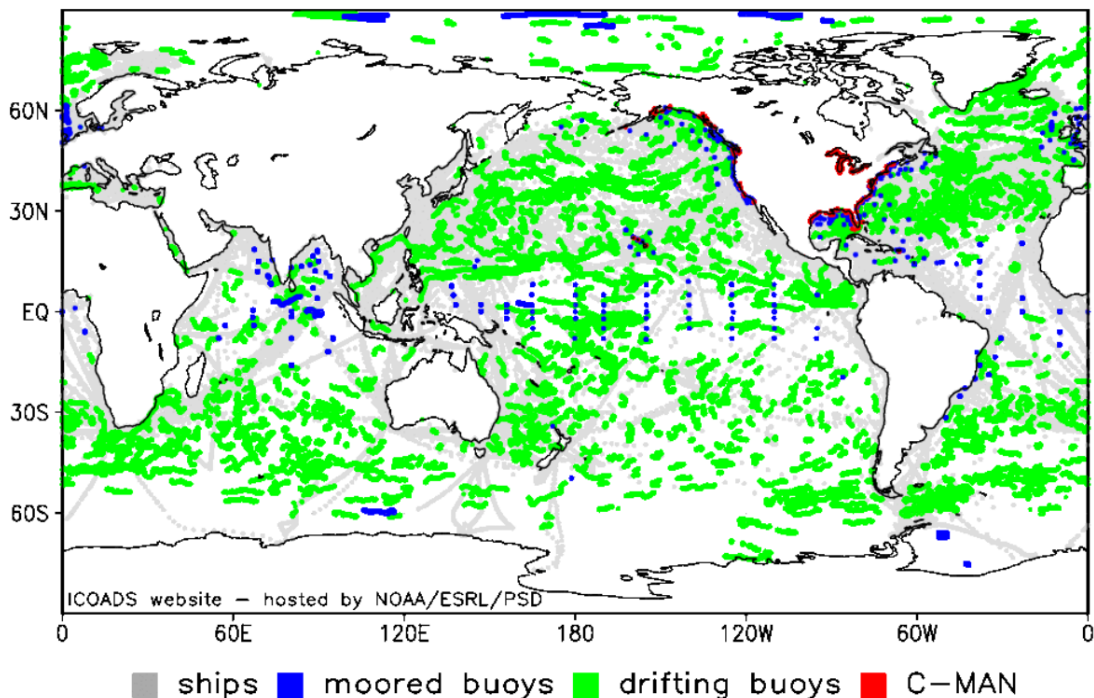


Figure 144. ICOADS preliminary marine reports (based on NOAA/NCEP data) stratified by platform type (February 2016). Source: ICOADS web information page. <http://icoads.noaa.gov/> (accessed 11 March 2016)

Resource abstract:

The International Comprehensive Ocean-Atmosphere Data Set (ICOADS) is a global ocean marine meteorological and surface ocean dataset. It is formed by merging many national and international data sources that contain measurements and visual observations from ships (commercial, navy and research), moored and drifting buoys, coastal stations, and other marine platforms.

ICOADS Release 2.5 (R2.5) was completed in May 2009 with data covering 1662-2007, plus preliminary data and products for 2008 to near-real-time (GTS data with minimal quality control which will be subject to change in new releases).

ICOADS data are made available in two main forms:

- Observations: Surface marine reports from ships, buoys, and other platform types. Each report contains individual observations of meteorological and oceanographic variables, such as sea surface and air temperatures, wind, pressure, humidity, and cloudiness
- Monthly summary statistics: Ten statistics (such as the mean and median) are calculated for each of 22 observed and derived variables, using 2° latitude x 2° longitude boxes back to 1800 (and 1° x 1° boxes since 1960).

Resource language: eng
Keyword values: Oceanographic geographical features
Variables available: Observed variables
 Air temperature
 Cloud amount/frequency
 Cloud height
 Cloud types
 Dew point temperature

	Humidity
	Ice edges
	Precipitation amount
	Pressure tendency
	Sea ice concentration
	Sea level pressure
	Sea surface temperature (SST)
	Surface winds
	Swells
	Visibility
	Wave frequency
	Wave height
	Wave speed/direction
Geographic location:	Global ocean coverage
Spatial resolution:	Varies depending on date and geographic position relative to shipping routes and ocean observing systems. 2° latitude x 2° longitude boxes back to 1800, and 1° x 1° boxes since 1960
Temporal extent:	1662-10-15 / present
Temporal resolution:	n/a
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use, but user registration is required in NCAR/UCAR Research Data Archive
Limitations on public access:	No
Responsible organisation:	Physical Sciences Division (PSD), Earth System Research Laboratory (ESRL), NOAA, USA National Centers for Environmental Information (NCEI), NOAA, USA National Science Foundation's National Center for Atmospheric Research (NCAR), USA
Data via:	http://icoads.noaa.gov/products.html
	Contact: Eric.Freeman@noaa.gov Eric Freeman. Team STG, Inc./ERT, NOAA National Centers for Environmental Information (NCEI)
	Contact: Scott.D.Woodruff@noaa.gov Scott Woodruff. CIRES/Univ. of Colorado, NOAA National Centers for Environmental Information (NCEI)
	Contact: worley@ucar.edu Steven Worley. Data Support Section, Computational and Information Systems Laboratory (CISL), National Center for Atmospheric Research (NCAR)
Data format:	Digital (ASCII and netCDF format)
References:	For further information about ICOADS Release 2.5 citation and redistribution information: http://icoads.noaa.gov/e-doc/R2.5-citation.pdf
	National Climatic Data Center/NESDIS/NOAA/U.S. Department of Commerce, Data Support Section/Computational and Information Systems Laboratory/National Center for Atmospheric Research/University Corporation for

Atmospheric Research, Earth System Research Laboratory/NOAA/U.S. Department of Commerce and Cooperative Institute for Research in Environmental Sciences/University of Colorado. 1984. Updated monthly. International Comprehensive Ocean-Atmosphere Data Set (ICOADS) Release 2.5, Individual Observations. Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory. <http://dx.doi.org/10.5065/D6H70CSV>. Accessed dd mmm YYYY.

Additional information:

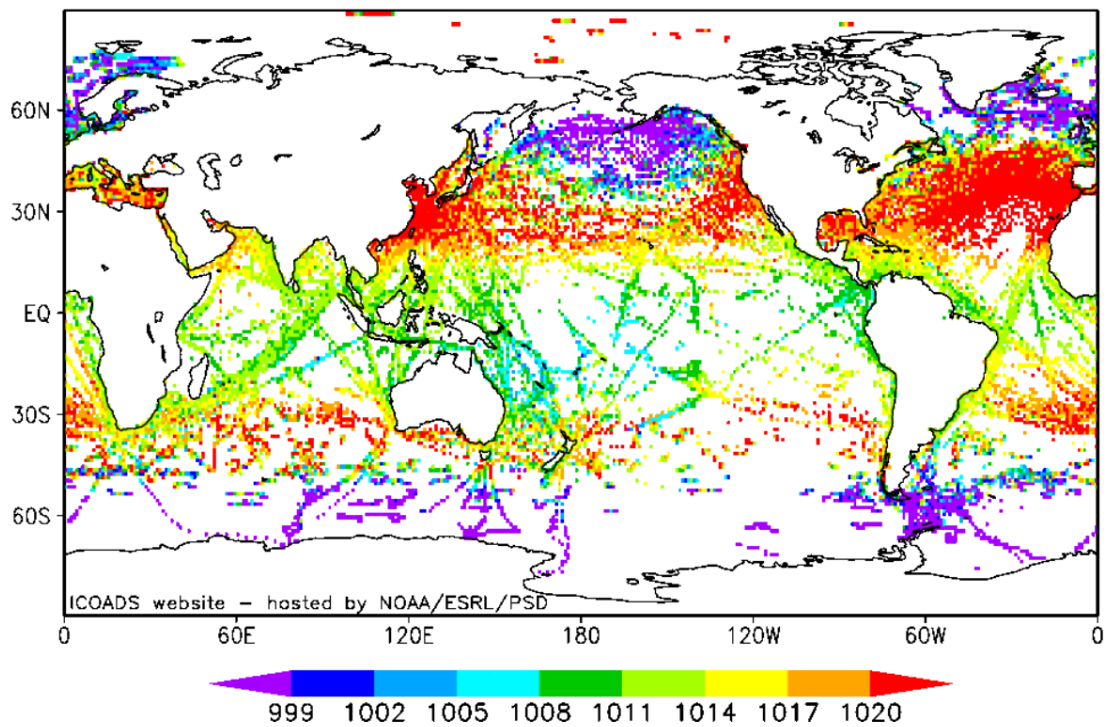


Figure 145. Cumulated sampling for February 2016, provided by 1° monthly summaries and departures (based on mean values for sea level pressure in hPa; departures are with respect to 1971-2000 long-term mean based on Release 2.5). Source: ICOADS web information page. <http://icoads.noaa.gov/> (accessed 11 March 2016)

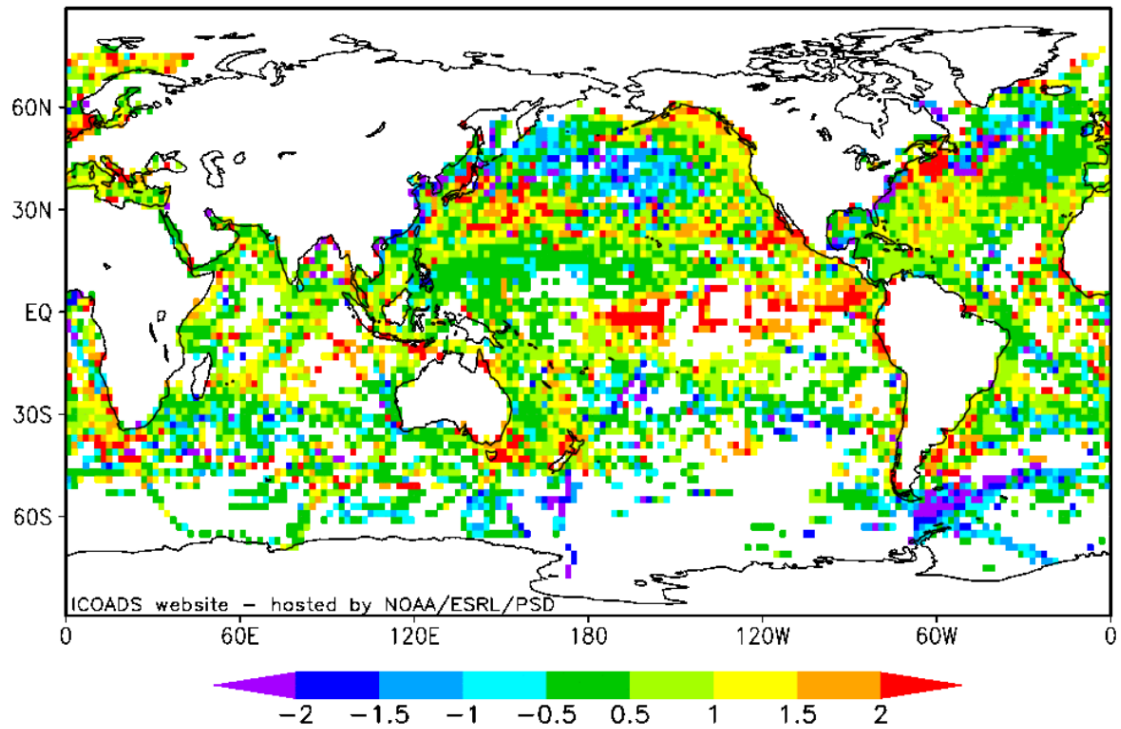


Figure 146. Cumulated sampling for February 2016, provided by 2° monthly summaries and departures (based on mean values for sea surface temperature in °C; departures are with respect to 1971-2000 long-term mean based on Release 2.5). Source: ICOADS web information page. <http://icoads.noaa.gov/> (accessed 11 March 2016)

OCEANCOLOR WEB

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), UNITED STATES OF AMERICA

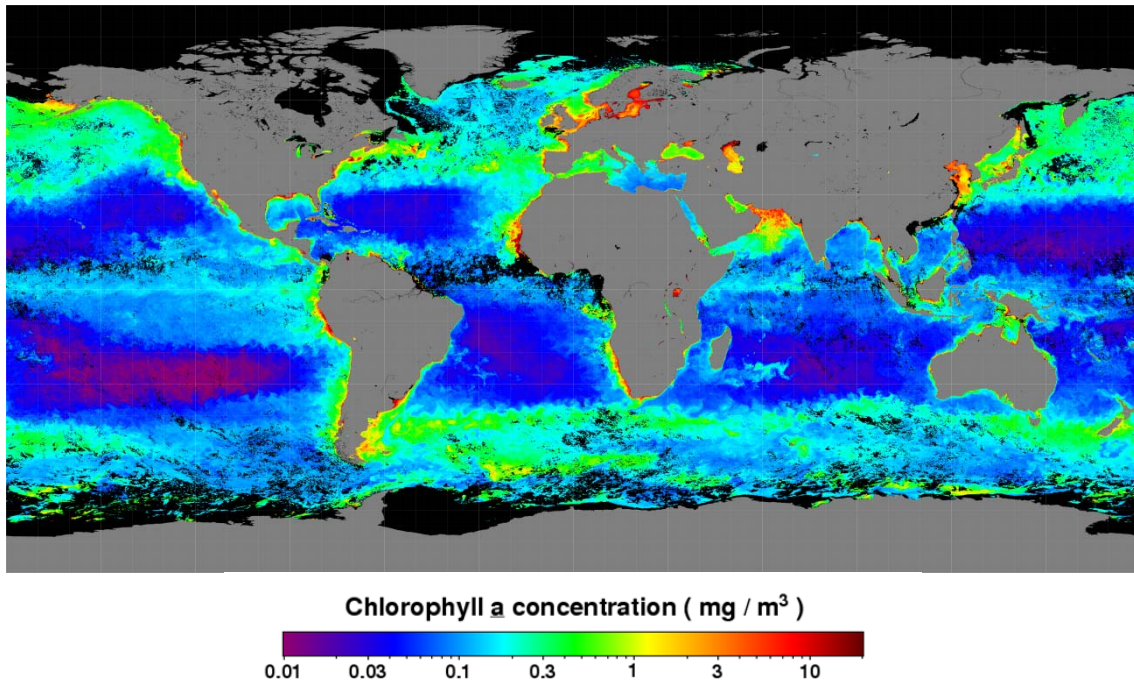


Figure 147. Chlorophyll a concentration (MODIS-A) on 4 km grid in March 2014 (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014a). Source: OceanColor Web L3 visual browser. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

Resource abstract:

The OceanColor website contains open access information on ocean colour data and products at various levels of information. Data are derived from the following satellite sensors:

- CZCS: Coastal Zone Color Scanner Experiment
- OBPG OCTS GAC Data Set: The Ocean Color and Temperature Scanner calibrated and processed by the Ocean Biology Processing Group Global Area Coverage Data Set
- SeaWiFS: Sea-viewing Wide Field-of-view Sensor
- MODIS-AQUA and MODIS-TERRA: Moderate Resolution Imaging Spectroradiometer
- MERIS: MEdium Resolution Imaging Spectrometer
- Aquarius: Sea Surface Salinity from Space
- VIIRS: Visible and Infrared Imager/Radiometer Suite
- HICO: Hyperspectral Imager for the Coastal Ocean

Resource language:

eng

Keyword values:

Oceanographic geographical features

Variables available:

<i>Observed variables</i>	<i>Derived variables</i>
Global ocean color	Ocean productivity
Sea surface temperature (SST)	Particulate Inorganic Carbon (PIC)
Sea surface salinity (SSS)	Particulate Organic Carbon (POC)
Diffuse attenuation coefficient at 490 nm	
Photosynthetically Active Radiation (PAR)	
etc	

Geographic location: Global ocean coverage
Spatial resolution: Variable
Temporal extent: 1978-10 / present
Temporal resolution: n/a
Depth range/resolution: Surface
Conditions for access & use: No conditions apply to access and use
Limitations on public access: No
Responsible organisation: National Aeronautics and Space Administration (NASA), USA
Data via: Data L1/2 visual browser:

<http://oceancolor.gsfc.nasa.gov/cgi/browse.pl>

Data L3 visual browser: <http://oceancolor.gsfc.nasa.gov/cgi/l3>

Data archives: <http://oceandata.sci.gsfc.nasa.gov/>

Contact: gene.c.feldman@nasa.gov

Gene Carl Feldman. Oceanographer, NASA/Goddard Space Flight Center

Data format: Digital (HDF format and netCDF format)

References: Information about citation and acknowledgements in:

<http://oceancolor.gsfc.nasa.gov/cms/citations>

Additional information:

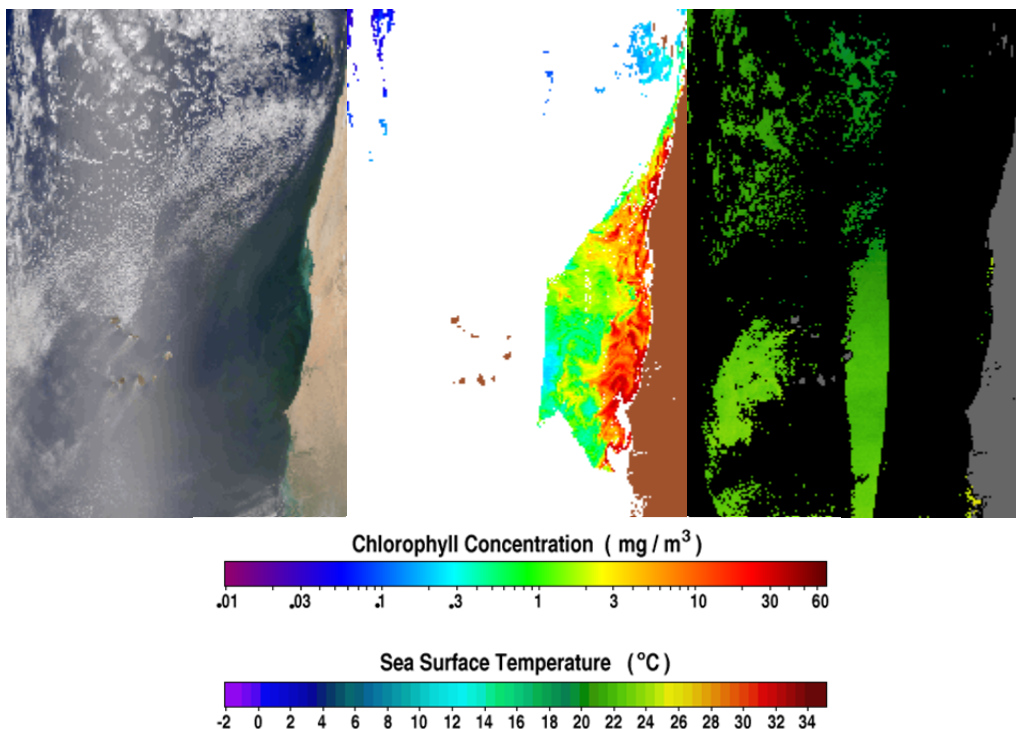


Figure 148. From the left to the right: Quasi True Colour, chlorophyll concentration (mg/m^3) and sea surface temperature ($^{\circ}\text{C}$) (11μ) MODIS-A on 26 April 2014 (daytime) covering the marine area around Western Sahara, Mauritania, Senegal, The Gambia, Guinea-Bissau and Cape Verde (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014f,g). Source: OceanColor Web L1/2 visual browser. <http://oceancolor.gsfc.nasa.gov> (accessed 25 March 2016)

**EXTENDED RECONSTRUCTED SEA SURFACE TEMPERATURE – ERSST –
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA**

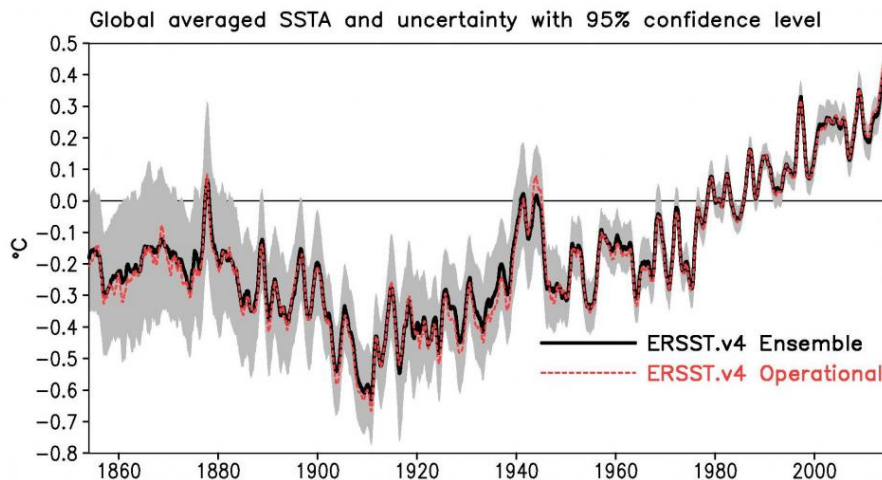


Figure 149. Monthly and globally averaged ERSST.v4 anomaly (°C) from 1854-2014. Note that the data is more reliable after the 1940's. The magnitude of the temperature increase in recent decades is much greater than the uncertainty in the data. Source: NOAA/NESDIS/NCEI. <https://www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst-v4> (accessed 03 March 2016)

Resource abstract:

The most recent version of the Extended Reconstructed Sea Surface Temperature (ERSST) analysis is version 4 (v4) which has been revised from version 3b (ERSST.v3 is described in Smith et al., 2008). The analysis is based on the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) release 2.5 and uses improved analysis methods. One of the most significant improvements involves corrections to account for the rapid increase in the number of ocean buoys in the mid-1970s; buoy measurements are systematically cooler than ship measurements of SST, and in ERSST v4 a new correction accounts for ship-buoy differences thereby compensating for the cool bias to make them compatible with historical ship observations. ERSST.v4 is described in Huang et al. (2015a,b) and Liu et al. (2015).

The monthly analysis extends from January 1854 to the present, but because of sparse data in the early years, the analyzed signal is damped before 1880. After 1880, the strength of the signal is more consistent over time. ERSST is suitable for long-term global and basin wide studies; local and short-term variations have been smoothed in ERSST. The anomalies are computed with respect to a 1971-2000 month climatology (Xue et al., 2003).

Resource language:	eng				
Keyword values:	Oceanographic geographical features				
Variables available:	<table border="0" style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 5px;"><i>Observed variables</i></td> <td><i>Derived variables</i></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">Extended Reconstructed Sea Surface Temperature (ERSST)</td> <td>Anomalies</td> </tr> </table>	<i>Observed variables</i>	<i>Derived variables</i>	Extended Reconstructed Sea Surface Temperature (ERSST)	Anomalies
<i>Observed variables</i>	<i>Derived variables</i>				
Extended Reconstructed Sea Surface Temperature (ERSST)	Anomalies				
Geographic location:	Global ocean coverage				
Spatial resolution:	2° grid				
Temporal extent:	1854 / present. After 1880, the strength of the signal is more consistent over time				
Temporal resolution:	Monthly means				
Depth range/resolution:	Surface				
Conditions for access & use:	No constraints on data access or use				
Limitations on public access:	No				
Responsible organisation:	National Centers for Environmental Information (NCEI), NOAA,				

Data via:

Asheville, USA
Physical Sciences Division (PSD), NOAA, Boulder, USA
NOAA NCEI: <http://www.ncdc.noaa.gov/ersst/>
Contact: Boyin.Huang@noaa.gov
Boyin Huang. NOAA

Contact: Tom.Smith@noaa.gov
Tom Smith. NOAA

NOAA PSD:
<http://www.esrl.noaa.gov/psd/data/gridded/data.noaa.ersst.v4.html>

Data format:

Contact: esrl.psd.data@noaa.gov
Digital (ASCII format, netCDF format)

References:

When acquiring NOAA_ERSST_V4 data products from Physical Sciences Division, they must be acknowledged in the use of the data. This may be done by including text such as "NOAA_ERSST_V4 data provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA, from their Web site at <http://www.esrl.noaa.gov/psd/>" in any documents or publications using these data

Additional information:

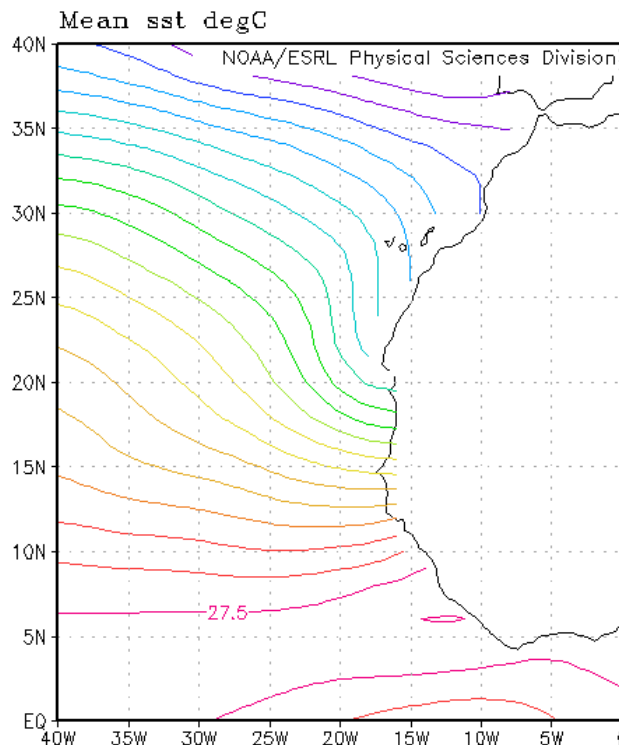


Figure 150. Contour map of mean ERSST.v4 (°C) from January 1966 to January 2016. The contour interval is 0.5°C, ranging from 18.5°C (purple) to 28°C (pink) in this map. Source: NOAA/OAR/ESRL PSD. <http://www.esrl.noaa.gov/psd/> (accessed 09 March 2016)

Temporal extent: 1933 / present
Temporal resolution: Monthly and annual
Depth range/resolution: Surface
Conditions for access & use: The free access to data by users is central to the PSMSL's mission, and conversely no supplier is ever paid for their data, nor are licensing terms ever entered into
Limitations on public access: No
Responsible organisation: Permanent Service for Mean Sea Level, Liverpool, United Kingdom
Data via: <http://www.psmsl.org/data/obtaining>

Data format: Contact: psmsl@noc.ac.uk
Permanent Service for Mean Sea Level
Digital (data files in txt format and plots in PNG format)
References: When using the tide gauge data set from the PSMSL, PSMSL request to reference the last paper describing the data set, as well as the data set itself. As an example, "the tide gauge data [Holgate et al., 2013; PSMSL, 2014] show that ..."
Permanent Service for Mean Sea Level (PSMSL), 2014, "Tide Gauge Data", Retrieved 28 Apr 2014 from <http://www.psmsl.org/data/obtaining/>.
Holgate, S. J., Matthews, A., Woodworth, P. L., Rickards, L. J., Tamisiea, M. E., Bradshaw, E., Foden, P. R., Gordon, K. M., Jevrejeva, S. and Pugh, J. 2013. New Data Systems and Products at the Permanent Service for Mean Sea Level. *Journal of Coastal Research*, Vol. 29 (3), pp. 493-504. doi:10.2112/JCOASTRES-D-12-00175.
Note above that the "Retrieved" date above should correspond to the "Extracted from Database" date on the data page. This date and advice is also distributed in the zip files that contain the whole data set. While bibliographic requirements will vary from journal to journal, PSMSL believe that is important to include the "Extracted from Database" date.

Additional information:

The metadata includes descriptions of benchmarks and their locations, types of instrumentation and frequency of data collection (where available) as well as notes on other issues that the users should be aware of (e.g. earthquakes that are known to have occurred in the vicinity or subsidence due to local groundwater extraction).

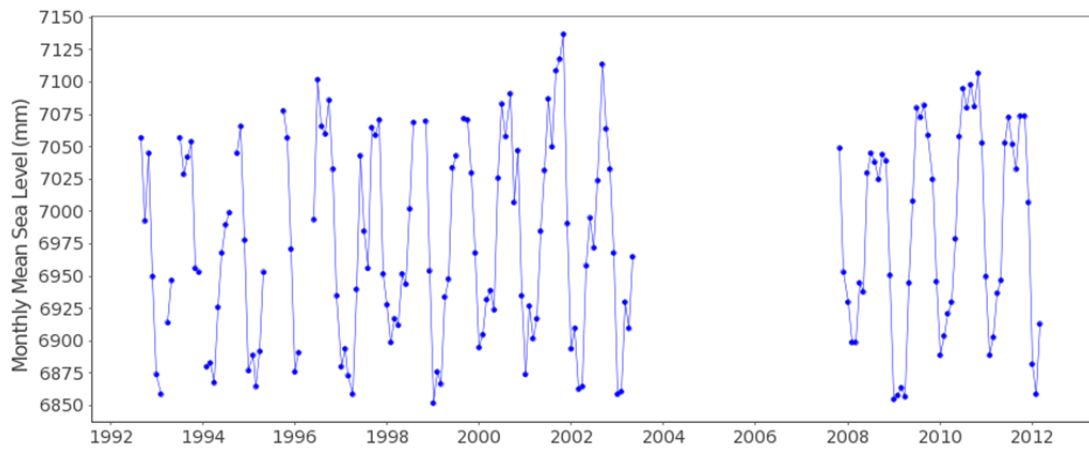


Figure 152. Time-series of monthly mean sea level (mm) at Dakar 2 tide gauge, covering the time period 1992-2012. Monthly mean value is not computed between 2003-2007 because there are very little data and the interpolation is impossible (Holgate et al., 2013; PSMSL, 2014)

WORLD OCEAN DATABASE 2013 – WOD13 –
NATIONAL OCEANOGRAPHIC DATA CENTER (NODC), UNITED STATES OF AMERICA

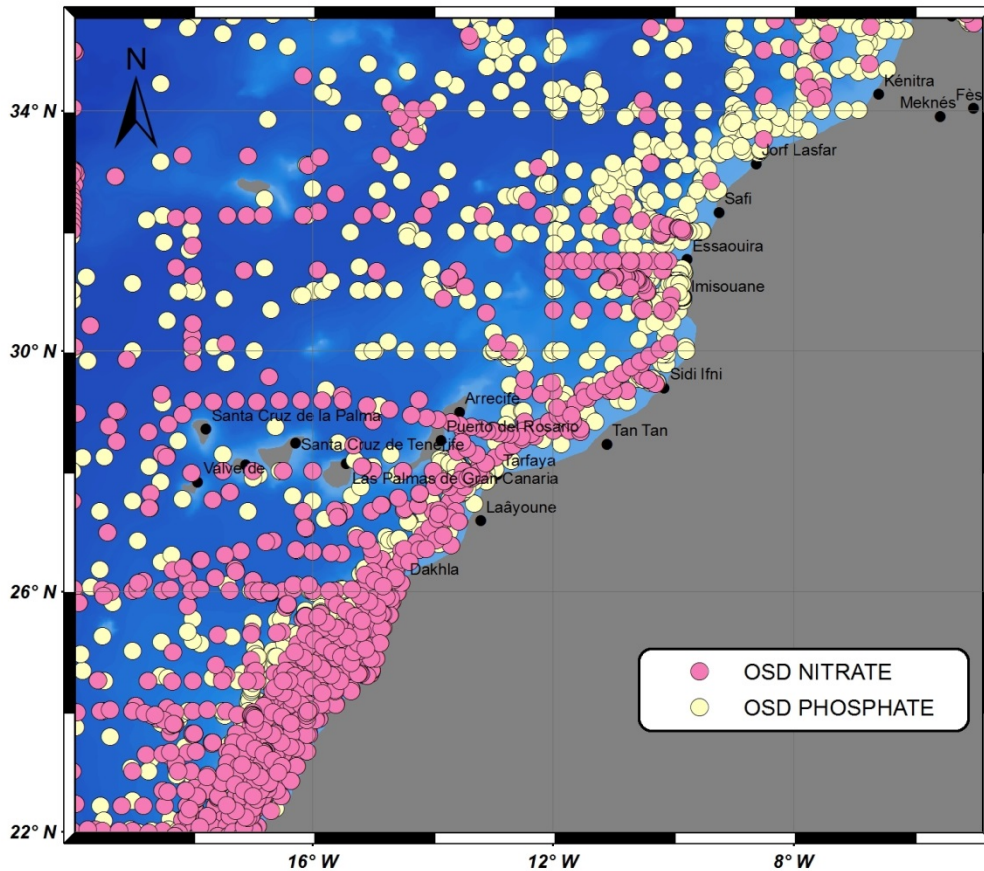


Figure 153. NOAA CTD stations in an area including the CCLME. Data source: WOD13

Resource abstract:

The World Ocean Database 2013 is a powerful tool for studying climate and the ocean environment, providing uniform, easy, and quality-assured access to nearly 19000 datasets consisting of more than 200000 oceanographic cruises from the National Oceanographic Data Center archive. The WOD13 contains nearly 13 million temperature profiles, and almost 8 million salinity measurements.

With records dating as far back as 1772, the World Ocean Database integrates ocean profile data from approximately 90 countries around the world, collected from buoys, ships, gliders, and other instruments. WOD13 development and distribution goal is to make available to anyone, without restriction, the most complete set of historical ocean profile data and plankton measurements possible in digital form along with ancillary metadata and quality control flags.

The oceanographic data that comprise WOD13 have been acquired through many sources and projects as well as from individual scientists.

Resource language: eng
Keyword values: Oceanographic geographical features; Species distribution
Variables available: Observed variables
 Beam attenuation coefficient (BAC)
 Chlorophyll
 Oxygen
 Salinity

	Temperature
	Alkalinity
	Argon
	CFC113
	deltaC14
	Helium
	Neon
	Nitrate
	Oxy18
	pCO2
	Phosphate
	Silicate
	tCO2
	deltaC13
	Ocean currents
	Sea level
	Waves
	etc
Geographic location:	Global ocean coverage
Spatial resolution:	Data are organized by World Meteorological Organization (WMO) 10 degree squares
Temporal extent:	1772 / 2012
Temporal resolution:	n/a
Depth range/resolution:	From surface to seabed
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organisation:	National Oceanographic Data Center (NODC), Silver Spring, United States of America
Data via:	http://www.nodc.noaa.gov/OC5/SELECT/dbsearch/dbsearch.html
	Contact: nodc.services@noaa.gov
Data format:	National Oceanographic Data Center, NOAA Digital (netCDF format, CSV format and ASCII format)
References:	Boyer, T. P., Antonov, J. I., Baranova, O. K., Coleman C., Garcia, H. E., Grodsky, A., Johnson, D. R., Locarnini, R. A., Mishonov, A. V., O'Brien, T. D., Paver, C. R., Reagan, J. R., Seidov, D., Smolyar, I. V. and Zweng, M. M. 2013. World Ocean Database 2013. In: <i>NOAA Atlas NESDIS 72</i> . Levitus, S. (ed.) and Mishonov, A. (technical ed.). Silver Spring, MD: 209 pp.

Additional information:

Each individual data value and each profile in WOD13 has quality control flags associated with it.

Table 2. Instrument types in the WOD13. Source: Boyer et al. (2013)

DATASET	SOURCE
OSD	Bottle, low-resolution Conductivity-Temperature-Depth (CTD), low-resolution XCTD data, and plankton data
CTD	High-resolution Conductivity-Temperature-Depth (CTD) data and high-resolution XCTD data
MBT	Mechanical Bathythermograph (MBT) data, DBT, micro-BT
XBT	Expendable (XBT) data
SUR	Surface only data (bucket, thermosalinograph)
APB	Autonomous Pinniped Bathythermograph - Time-Temperature-Depth recorders attached to elephant seals
MRB	Moored buoy data from TAO (Tropical Atmosphere-Ocean), PIRATA (moored array in the tropical Atlantic), MARNET, and TRITON (Japan-JAMSTEC)
PFL	Profiling float data
DRB	Drifting buoy data from surface drifting buoys with thermistor chains
UOR	Undulating Oceanographic Recorder data from a Conductivity/Temperature/Depth probe mounted on a towed undulating vehicle
GLD	Glider data

Table 3. Meteorological and Sea-state parameters stored in the WOD13. Source: Boyer et al. (2013)

Variables	OSD	MBT	XBT	CTD	MRB	Total
Bottom depth (m)	1,720,643	615,999	457,760	465,218		3,259,620
Water color (Forel-Ule color scale)	282,109	12,412	476	10,000		304,997
Secchi disk visibility depth (m)	446,737	12,150	452	14,944		474,283
Wave direction (WMO 0877)	360,534	30,005	30,587	6,822		427,948
Wave height (WMO 1555)	228,123	114,322	50,568	24,813		417,826
Sea state (WMO 3700)	570,029	478,174	53,969	29,851		1,132,023
Wind force (Beaufort Scale)	604,615	14,444	3,264	3,945		626,268
Wave period (WMO 3155 or NODC 0378)	133,298	34,385	40,819	15,508		224,010
Wind direction (WMO 0877)	1,242,924	653,670	156,191	51,571	494,299	2,621,216
Wind speed (in knots)	607,232	673,374	157,098	56,132	499,361	1,993,197
Barometric pressure (millibar)	761,775	338,204	29,534	69,301		1,198,814
Dry bulb temperature (°C)	1,148,663	622,892	139,625	59,471	530,374	2,501,025
Wet bulb temperature (°C)	231,664	495,850	51,969	37,461		816,944
Weather condition (WMO 4501 and WMO 4677)	655,166	514,896	45,925	39,889		1,255,876
Cloud type (WMO 0500)	363,125	25,589	14,328	24,424		427,466
Cloud cover (WMO 2700)	706,432	524,097	28,596	42,779		1,301,904
Horizontal visibility (WMO 4300)	102,627	185,593	863	23,409		312,492
Reference/Sea surface temperature (°C)	23,384	1,171,291	117,066	391		1,312,132
Absolute air humidity (g m ⁻³)	95,550	1,768		677		97,995
Sea surface salinity		2,556	11,656			14,214

**FISHERIES GLOBAL INFORMATION SYSTEM – FIGIS –
DIFFERENT DATA PROVIDERS**

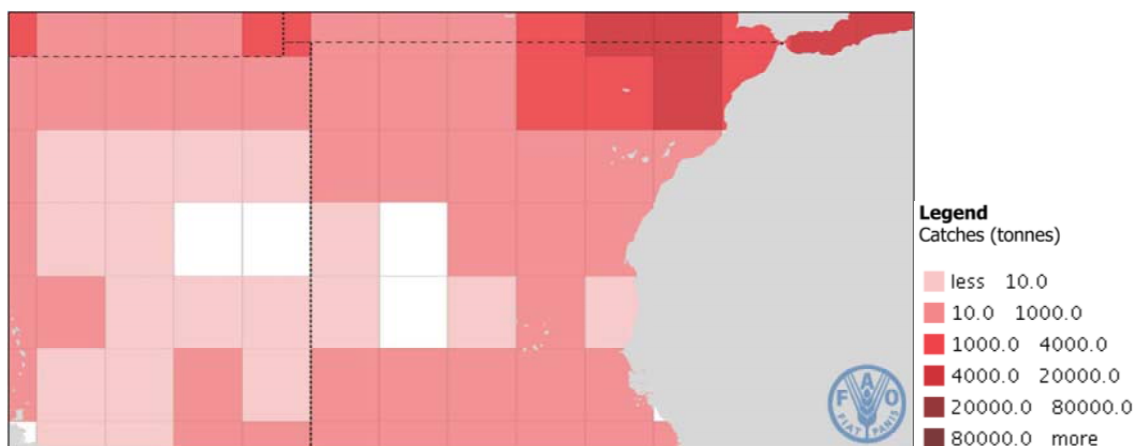


Figure 154. Cumulative Atlantic bluefin tuna (*Thunnus thynnus*) yearly catches during the period 1976-2006, using the longline gear. The dashed lines delimitate FAO fishing areas in the Atlantic Ocean. From the left to the right and from the top to the bottom: Northwest; Northeast; Western Central; and Eastern Central. Source: Atlas of Tuna and Billfish Catches. <http://www.fao.org/figis/geoserver/tunaatlas/> (accessed 30 March 2016)

Resource abstract:

FIGIS is an information management tool that interconnects groups of institutional partnerships to build up a network of subsystems. FIGIS, as part of the Food and Agriculture Organisation (FAO) Fisheries and Aquaculture Department's regular activities acts as a framework with reference to FAO information management policy. FIGIS delivers expert knowledge, a set of software tools, collaborative mechanisms, and interoperability solutions to a broad range of needs in fisheries information.

With the adoption by the Committee on Fisheries of the Strategy for Improving Information on Status and Trends of Capture Fisheries (STF) on 28 February 2003, FIGIS becomes one of the privileged tools for its implementation (<http://www.fao.org/fishery/figis/en>, accessed 30 March 2016).

FIGIS is designed according to guiding principles:

- to promote policy change towards the sustainable development of the world's fishery resources by highlighting major issues, presenting possible solutions and providing the best scientific information available;
- to offer a single and unique entry point to an integrated system comprising strategic data, information, analyses and reviews of issues and trends on a broad range of fisheries subjects;
- to provide integrated, quality-controlled, harmonized, streamlined and comprehensive information.

Resource language:	eng	
Keyword values:	Species distribution	
Variables available:	Observed variables	Derived variables
	Aquatic species distribution	Fishing effort
	Distribution of catches of tuna and tuna-like species	
	Total catches	
Geographic location:	Global coverage	

Spatial resolution: 5° latitude by 5° longitude for tuna and tuna-like catches distribution

Temporal extent: 1950 / present

Temporal resolution: n/a

Depth range/resolution: n/a

Conditions for access & use: No conditions apply for access and use

Limitations on public access: No

Responsible organisation: Food and Agriculture Organisation (FAO)

Data via: Aquatic Species Distribution Map Viewer:
<http://www.fao.org/fishery/species/distribution>

Atlas of Tuna and Billfish Catches:
<http://www.fao.org/fishery/statistics/tuna-atlas/query>

Fishery Resources Monitoring System:
<http://firms.fao.org/firms/search/institution/cecaf/en>

Regional Fishery Bodies Map Viewer:
<http://www.fao.org/fishery/rfb/mapviewer>

Contact: figis-comments@fao.org
Fisheries Global Information System, FAO

Data format: Digital

**HERBARIO BOTÁNICA CIENCIAS DEL MAR – BCM HERBARIUM –
UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN**

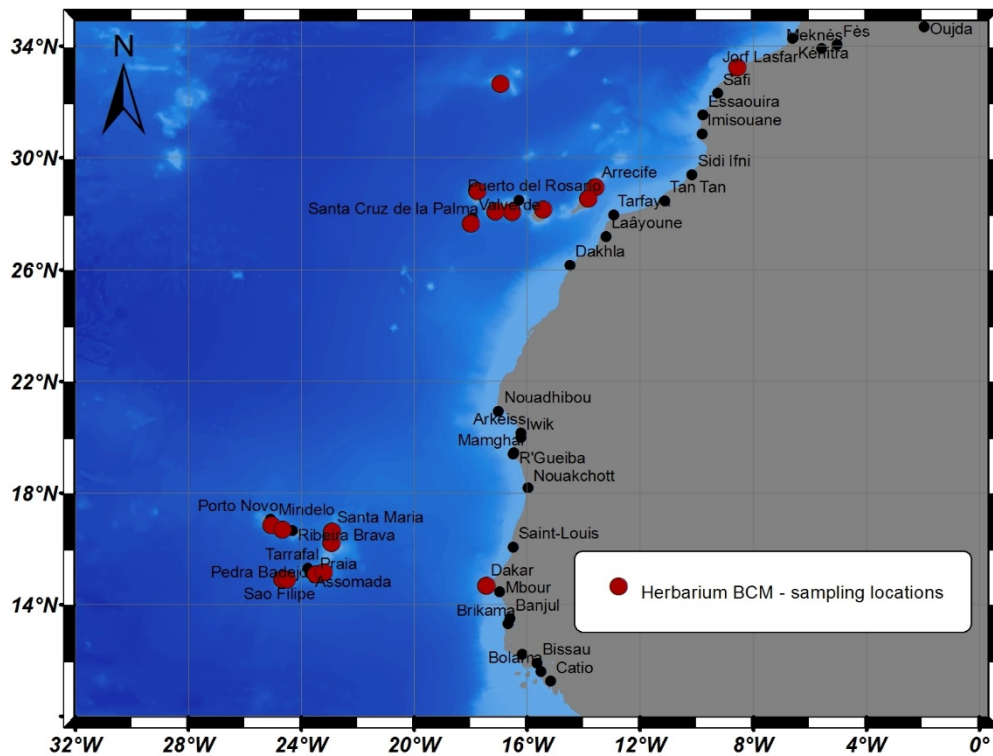


Figure 155. Sampling location areas for the BCM Herbarium (the number of available voucher specimens varies in each area)

Resource abstract:

The herbarium of the Department of Biology of the ULPGC was created with the aim of having a database of marine macroalgae from de Canary Islands and a depot of marine plants of the Atlantic Ocean. The study and teaching of Botany is its main purpose. In 1993, the herbarium became part of the Index Herbariorum - entity that globally homologates and relates herbariums with a certain volume of specimens in their collections - under the acronym BCM (from Marine Science Botany, in Spanish).

Nowadays, the BCM Herbarium counts with more than 7000 specimens of marine macrophytes (phanerogams and seaweed) and a large database including all the information collected, i.e. oceanographic surveys in the Macaronesian region and periodic sampling in the coast of the Canary Islands. There also exist exchange relationships with herbariums from all around the World that have permitted the BCM Herbarium to have small collections from different locations around the globe (Cabo Verde, Morocco, Senegal, Japan, USA, Australia, Panama, etc.).

Resource language:

spa

Keyword values:

Species distribution; Habitats and biotopes

Variables available:

- Observed variables*
- Taxonomic identification
- Pictures collection
- Habitat
- Level/Depth range
- Nature of substrate
- Kind of sampling
- Type species

Useful DNA available
Geographic location: Temperate and tropical oceans coverage
Spatial resolution: n/a
Temporal extent: 1989-12-25 / present
Temporal resolution: n/a
Depth range/resolution: From surface to 120 m depth
Conditions for access & use: Data is provided free of charge
Limitations on public access: No
Responsible organisation: University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain
Data via: http://www.herbariobcm.org/doc_html/frameset_herbario_bcm.html

Contact: maria.viera@ulpgc.es
 María Ascensión Viera Rodríguez. Herbarium curator and professor, BCM Herbarium, University of Las Palmas de Gran Canaria

Contact: fco.suarezsantana@ulpgc.es
 Francisco Suárez Santana. Herbarium technician, BCM Herbarium, University of Las Palmas de Gran Canaria
 Paper and digital (netCDF)

Data format:

References: If you use data from the BCM Herbarium database, the following acknowledgment would be appreciated: "Data provided by the BCM Herbarium database. <http://www.herbariobcm.org>"

Additional information:

The BCM Herbarium includes in its collection some holotype species, the original specimen used to describe for the first time one genus or subgenus.

Voucher specimens from herbariums can be used in comparative studies over time. The BCM Herbarium preserves voucher specimens used in particular studies as data source, so the data can be available for future verifications (i.e. Robaina et al., 1995; Garcia-Jimenez et al., 1998). Another example is the use of *Padina pavonica* voucher specimens to study the effects of ocean acidification in severe (El Hierro submarine volcano eruption) and chronic events around the Canary Islands waters, concluding that this species can be implemented as a bio-indicator of ocean acidification at short and long time scales (Gil-Díaz et al., 2014).

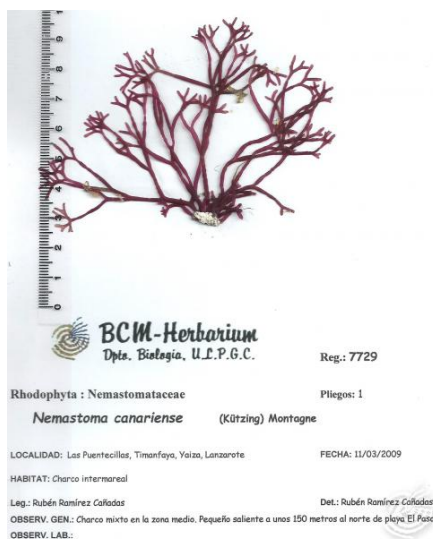


Figure 156. Picture of a BCM Herbarium voucher of *Nemastoma canariense* species, collected from an intertidal pool during a casual sampling (11 March 2009, Yaiza, Lanzarote Island, Spain). Source: BCM Herbarium. <http://www.herbariobcm.org> (accessed 17 March 2016)

IMPROVE SCIENTIFIC AND TECHNICAL ADVICES FOR FISHERIES MANAGEMENT PROJECT – ISTAM –

CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA CONAKRY

INSTITUT DE RECHERCHE POUR LE DEVELOPPEMENT (IRD), FRANCE

POLE HALIEUTIQUE AGROCAMPUS OUEST, FRANCE

INSTITUT FRANÇAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER (IFREMER), FRANCE

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

INSTITUT MAURITANIEN DE RECHERCHES OCEANOGRAPHIQUES ET DE PECHE (IMROP), MAURITANIA

CENTRE FOR THE ECONOMICS AND MANAGEMENT OF AQUATIC RESOURCES (CEMARE), UNITED KINGDOM

COMMISSION SOUS REGIONALE DES PECHE

UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN

INSTITUT UNIVERSITAIRE DE PECHE ET D'AQUACULTURE (IUPA), SENEGAL

INSTITUTO DE INVESTIGAÇÃO DAS PESCAS E DO MAR (IPIMAR), PORTUGAL

INSTITUTE OF MARINE RESEARCH (IMR), NORWAY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN



Figure 157. Surveyed area and sample stations described in the scientific surveys included in the Trawlbase-ISTAM. Source: database Trawlbase-Istam

Resource abstract:

The ISTAM project supports the coordination of scientific activities to ensure the methodological reinforcement of information systems and more generally to monitor, assess good practices on:

- The improvement of the quality and quantity of data used as the basis for stock assessments
- The harmonisation, in the general perspective of fisheries management, of stock assessments by promoting the use of the most suitable and best controlled assessment methods at appropriate geographical scales
- The improvement of the availability of validated and referenced datasets
- Dialogue for facilitate the identification of future research needs to improve the information that supports fisheries management

The project is broken down into six "WorkPackages" (WP). WP2 is named Subregional information systems. An inventory of the datasets is in progress.

Resource language:	eng	
Keyword values:	Area management/restriction/regulation zones and reporting units; Oceanographic geographical features; Species distribution	
Variables available:	<i>Observed variables</i>	<i>Derived variables</i>
	Georeferenced data for different species:	Ecological diversity index
	Taxonomic identification	Relative abundance
	Biomass	Catch rates (kg/trawling)
	Depth range	
	Density (kg/m ²)	
	Size, weight, sex and maturity by specimen	
Geographic location:	CECAF region (Committee for the Eastern Central Atlantic Fisheries)	
Spatial resolution:	Around 14000 stations	
Temporal extent:	1936 / 2008	
Depth range/resolution:	From surface to 4870 m depth	
Conditions for access & use:	Agreement with the country owner of the data. The users must follow the proposed Trawlbase-ISTAM data policy http://www.projet-istam.org/	
Limitations on public access:	Yes	
Responsible organisation:	Centre National des Sciences Halieutiques de Boussoura, Guinea Institut de Recherche pour le Développement, France Pôle halieutique Agrocampus Ouest, France Institut français de recherche pour l'exploitation de la mer, France Institut National de Recherche Halieutique, Morocco Institut Mauritanien de Recherches Océanographiques et de Pêches, Mauritanie Centre for the Economics and Management of Aquatic Resources, University of Portsmouth, United Kingdom University of Las Palmas de Gran Canaria, Spain Institut Universitaire de Pêche et d'Aquaculture, Senegal Instituto de Investigação das Pescas e do Mar, Portugal Instituto Español de Oceanografía, Spain	

Centre de Recherches Océanographiques de Dakar-Thiaroye, Senegal

Centro de Investigação Pesqueira Aplicada, Guinea Bissau
Department of Fisheries, Gambie

Institut National de Développement des Pêches, Cap Vert
Food and Agriculture Organization (FAO), Fisheries
Department, Italy - initial partners of the SIAP project

Data via:

<http://www.projet-istam.org/>

Contact: Jerome.Guitton@agrocampus-ouest.fr

Jérôme Guitton. Fisheries data specialist, Fisheries and aquatic sciences center Agrocampus Ouest

Data format:

Digital (plain text)

References:

In any written document (publications, rapports, memories), the data source must be cited in the text or in the acknowledges in the following or an equivalent way:

“Data source: Research centre XXX, City, Country; data have been extracted from database Trawlbase-Istam.”

In any other publication, the data responsible organization must be cited in the text or in the acknowledges as follows or in an equivalent way:

“The surveys XXX have been undertaken by yyy, Country.”

Additional information:

This project is financed by the European Union.

For further information and bibliography:

<http://halieutique.agrocampus-ouest.fr/projets.php?idproj=17> (accessed 30 March 2016).

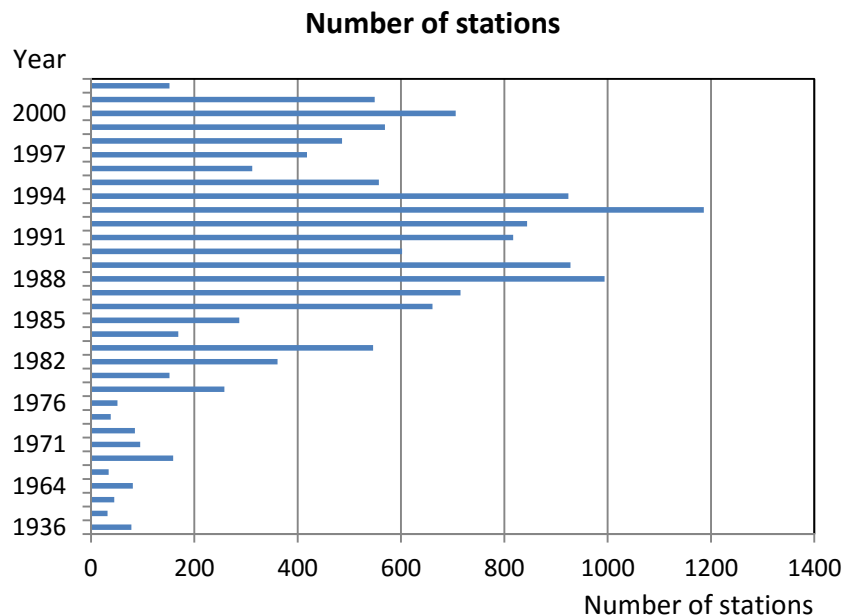


Figure 158. Number of stations recorded in Trawlbase-ISTAM per year. A total of around 14000 stations have been inventoried. Source: ISTAM project

**OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM – OBIS –
DIFFERENT DATA PROVIDERS**

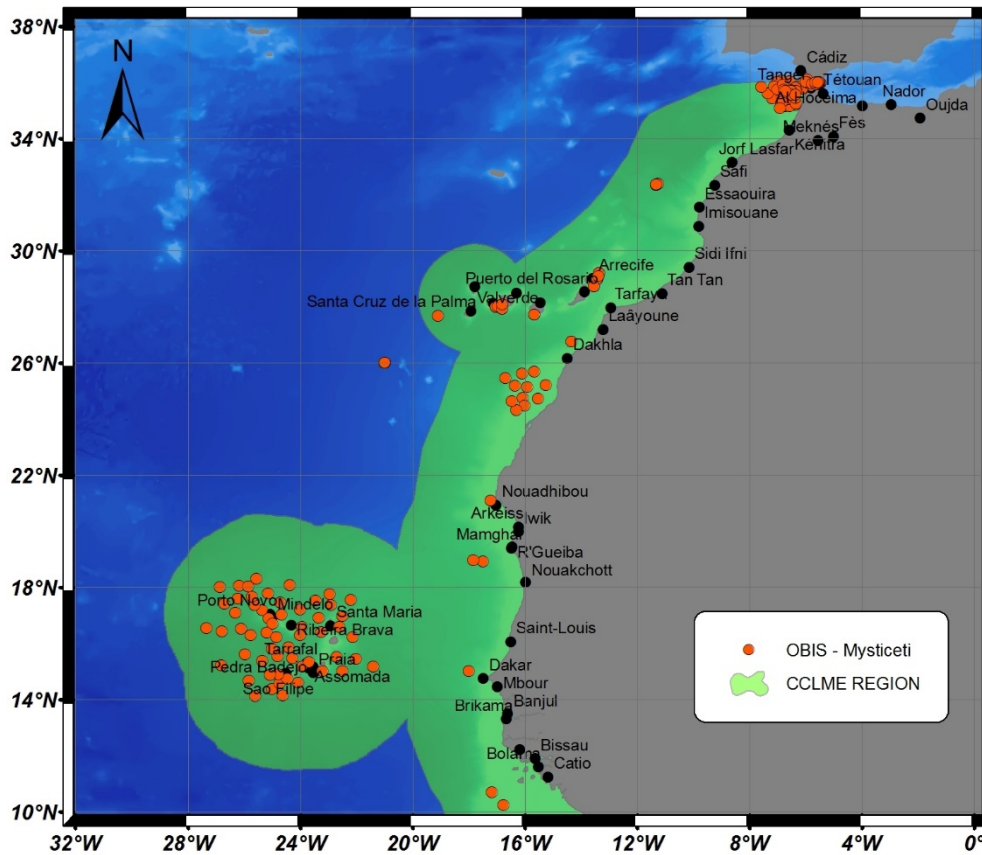


Figure 159. Distribution of georeferenced data for parvorder Mysticeti species (baleen whales) identified at the CCLME. Data source: OBIS. <http://www.iobis.org> (accessed 31 March 2016)

Resource abstract:

OBIS is an open-access database that allows users to search marine species datasets from the world's oceans and marginal seas.

OBIS site permits the access to:

- taxonomically and geographically resolved data on marine life and the ocean environment
- interoperability with similar databases
- software tools for data exploration and analysis.

Resource language:

eng

Keyword values:

Species distribution

Variables available:

Observed variables

- Record distribution by taxon
- Date collected/observed
- Bottom depth
- Sample depth
- Temperature
- Nitrate
- Salinity
- Oxygen
- Phosphate
- Silicate

Derived variables

- Shannon Diversity Index
- ES 50
- Simpson Diversity Index
- Hill1 and Hill2 index
- Chao2 index + completeness
- Number of species, records and sampling days
- Number of IUCN Redlist species

Geographic location:	Global ocean coverage
Spatial resolution:	n/a
Temporal extent:	1611-2014
Temporal resolution:	n/a
Depth range/resolution:	From surface to 10900 m depth
Conditions for access & use:	The OBIS Datasets are available online as well as via Web Map Service (WMS/WFS). Cite the original data contributors
Limitations on public access:	No
Responsible organisation:	OBIS Secretariat, UNESCO-IOC Project Office for IODE, Oostende, Belgium
Data via:	http://iobis.org/mapper/ Visit the Search Interface ('Search Data' menu) and search OBIS data by species, higher taxon, geographic area and/or other options. Then, in the Search Interface, open up the Show Results window and switch to [Download] tab where you can choose data type and data format to download.
Data format:	Contact: info@iobis.org OBIS Secretariat, UNESCO-IOC Project Office for IODE Digital (CSV format, XML format, KML format and WMS image: GIF, JPEG, PNG, SVG, TIFF)
References:	For database citations: When using OBIS data, please cite the relevant data sources. A suggested citation is included in the metadata for most datasets. When using data from many data sources so that citing the specific data sources becomes highly impractical, or you use the biodiversity indices maps, which are based on >1000 datasets, you can cite as follows (e.g.): OBIS (YEAR). Global biodiversity indices from the Ocean Biogeographic Information System. Intergovernmental Oceanographic Commission of UNESCO. Web. http://www.iobis.org (consulted on YYYY/MM/DD) or, OBIS (YEAR). Data from the Ocean Biogeographic Information System. Intergovernmental Oceanographic Commission of UNESCO. Web. http://www.iobis.org (consulted on YYYY/MM/DD). For general citation of the OBIS website: Intergovernmental Oceanographic Commission (IOC) of UNESCO. The Ocean Biogeographic Information System. Web. http://www.iobis.org . (Consulted on dd/mm/yy) For webpage citations: Intergovernmental Oceanographic Commission (IOC) of UNESCO. "Title". OBIS. Date of publication or recent update: dd/mm/yy. Web. (Consulted on dd/mm/yy) <i>When the author is well identified:</i> Family name, first name. "Title". UNESCO/IOC/OBIS. Date of publication or recent update: dd/mm/yy. Web. (Consulted on dd/mm/yy)

Additional information:

Data published through OBIS must come from credible, authoritative sources. The scientists and institutions responsible for collecting and managing the data are clearly named. Before publication, the data must pass through a series of technical controls, and these are repeated every time the data are crawled again from its source. Any errors, such as species name misspellings, names not recognised in OBIS, and possible mapping errors, are reported to the data provider to review, and if necessary, correct.

**OCEAN DATA AND INFORMATION NETWORK FOR AFRICA – ODINAFRICA –
DIFFERENT DATA PROVIDERS**

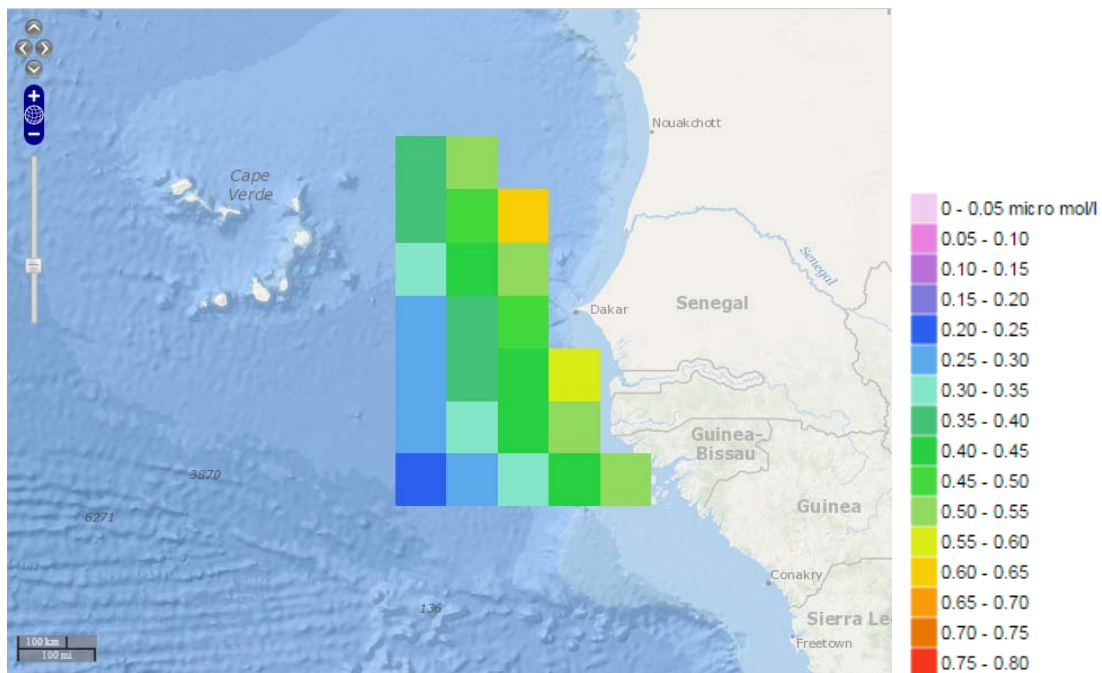


Figure 160. Example of monthly average in Senegal (April) of phosphates concentration in squares on 1° grid (extracted from Garcia et al., 2006). Source: ODINAFRICA. <http://www.africanmarineatlas.org/> (accessed 2 December 2014)

Resource abstract:

The Ocean Data and Information Network for Africa (ODINAFRICA) brings together more than 40 marine related institutions from twenty-five countries in Africa (Algeria, Angola, Benin, Cameroon, Comoros, Congo, Cote d'Ivoire, Egypt, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania, Togo and Tunisia). With the support of the Intergovernmental Oceanographic Commission of UNESCO and the Government of Flanders (Kingdom of Belgium) the network strives to address the challenges faced in ensuring that ocean and coastal data and information generated in national, regional and global programmes are readily available to a wide range of users in an easily understandable format.

Starting with the implementation of the project on Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean region (RECOSCIX-WIO) in 1989, IODE has focussed on the development of the capacity and infrastructure for the collection, processing, archival, analysis, interpretation and dissemination of data and information products.

Resource language:

eng

Keyword values:

Atmospheric conditions; Meteorological geographical features; Species distribution; Habitats and biotopes; Area management/restriction/regulation zones and reporting units; Oceanographic geographical features; Environmental monitoring facilities

Variables available:

Observed variables

Air temperature
Rainfall
Relative humidity
Chlorophyll
Nitrate

Derived variables

Apparent oxygen utilization (AOU)

	Oxygen	
	Phosphate	
	Salinity	
	Sea temperature	
	Silicate	
	Fish species distribution	
	Current speed and direction	
Geographic location:	30.00°W – 80.00°E	50.00°S – 40.00°N
Spatial resolution:	n/a	
Temporal extent:	n/a	
Temporal resolution:	n/a	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	No conditions apply for access and use	
Limitations on public access:	No	
Responsible organisation:	The International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO	
Data via:	Ocean Data Collections and Catalogues (metadatabases): http://geonetwork.iode.org/geonetworkAMA	
	Sea level data collection: www.ioc-sealevelmonitoring.org	
	Coastal and Marine Atlases: http://www.africanmarineatlas.org	
	Coastal and Marine Atlases continental maps and data sets: http://omap.africanmarineatlas.org	
	African Register of Marine Species: http://www.marinespecies.org/afremas/	
	African Union list of Journals from information centers: http://www.iamslic.org/unionlist/africa/index.php	
	OceanDocs-Africa: http://www.oceandocs.net/handle/1834/1337	
	Directories of experts and institutions: http://ioc-africa.org/searchDetails/index.php	
	African Oceans Portal: http://www.africanoceans.net/	
	Contact: m.odido@unesco.org Mika Odido. Coordinator, IOC Sub Commission for Africa and the Adjacent Island States, IOC-UNESCO	
Data format:	Digital (image format in the website linked to the datasets in their original format: plain text, excel, access, PDF format, netCDF format, etc)	
References:	The dataset from the African Marine Atlas will be cited as follows: “UNESCO-IOC [date retrieved], [map title/data set title], Retrieved [date] from African Marine Atlas, www.africanmarineatlas.org ”	

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Also in the IOC-UNESCO Technical Series:

***Oceanographic and biological features
in the Canary Current Large Marine Ecosystem***
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The Canary Current Large Marine Ecosystem (CCLME) is an eastern boundary upwelling system, in fact one of the 4 major upwelling systems in the world. The CCLME extends from the Strait of Gibraltar (around 36°N 5°W) to Bissagos Islands in the South of Guinea-Bissau (around 11°N 16°W), embracing the coasts and Economic Exclusive Zones of Morocco, Western Sahara, Mauritania, Senegal, Gambia, Guinea-Bissau and Spain (Canary Islands). Also Cape Verde and Guinea are under the area of influence of the Canary Current, and therefore are considered as part of the CCLME in this publication.

A complete characterization of the CCLME was achieved thanks to the dedication of 54 scientists from 25 institutions who have reviewed and shared the scientific information accumulated in the CCLME during decades.

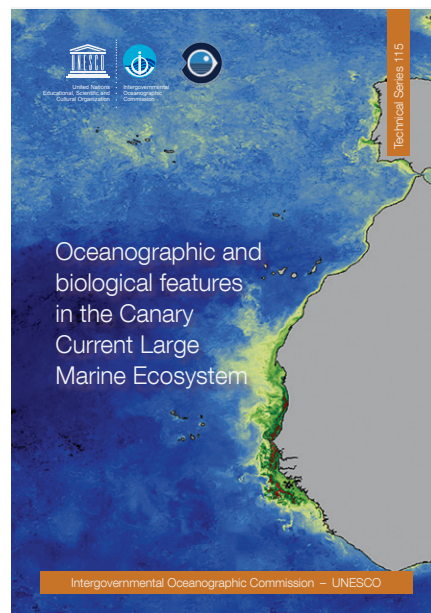
An active and fruitful collaboration has been established with our partner in this project, the Instituto Español de Oceanografía (IEO). Twelve of its experts have contributed as authors or co-authors of many of the articles. In their articles they have not only shared their expertise, but the know-how gained by the IEO throughout decades of international cooperation programs with African countries.

Oceanographic and biological features in the Canary Current Large Marine Ecosystem consists in 28 articles structured in the following sections: (i) the ocean geomorphology and geological materials; (ii) the hydrographic structure and the ocean circulation; (iii) the biogeochemical characteristics of the marine environment; (iv) the life in the sea; (v) and the interannual, interdecadal and long-term variability.

The main findings are highlighted in the Executive Summary together with an indication of the gaps left in the scientific knowledge in the CCLME, evoking ideas on the topics in need of a deeper scientific research and management goals in the CCLME.

Such a complex publication would not be possible without the generous financial support of a donor. The Spanish Agency for International Development Cooperation (AECID) has funded the project *Enhancing oceanography capacities on Western Africa countries*.

Oceanographic and biological features in the Canary Current Large Marine Ecosystem is also available on-line at: <http://www.unesco.org/new/en/ioc/ts115>



Cover photo: Phytoplanktonic blooms along the coast of Northwest Africa and Iberian Peninsula, as seen from the concentration of chlorophyll-a, in March 2013, deduced from the data of the MODIS sensor. Numerous mesoscale features such as fronts and filaments can be observed. Image by Hervé Demarcq, IRD



The Canary Current Large Marine Ecosystem (CCLME) is a major upwelling region off the coast of northwest Africa. It extends southwards from Canary Islands (Spain) and the Atlantic coast of Morocco, Western Sahara, Mauritania, Senegal, Gambia and Guinea-Bissau, but also Cape Verde and the waters of Guinea are considered adjacent areas within the zone of influence of the CCLME.

A total of 429 datasets, 30 databases and 21 time-series sites have been identified in the area. A substantial part of them were rescued from archives supported in paper copy. The current directory refers to 107 datasets, databases and time-series sites.

This catalogue and the recovered data offer an exceptional opportunity for the researchers in the CCLME to study the dynamics and trends of a multiplicity of variables, and will enable them to explore different data sources and create their own baselines and climatologies under a spatial and temporal perspective.

The *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem* will be reviewed on a systematic and routine basis and the updates to the publication will be available online at: http://www.unesco.org/new/ioc_ts110

A close collaboration has been established with different institutions in order to rescue, review and quality control the information, and to fill and to validate the fiches compiled in this directory.

The compilation of such a complex directory by the Intergovernmental Oceanographic Commission and the Instituto Español de Oceanografía would not have been possible without the financial support given by the Spanish Agency for International Development Cooperation (AECID) to the project entitled *Enhancing oceanography capacities on Western Africa countries*. The revision and the update of the technical report take place under the frame of the project *Enhancing oceanography capacities on CCLME Western Africa countries Phase II*, also funded by the AECID.



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