

# CHALLENGES IN THE ARCTIC

OCEAN SCIENCE DAY  
PARIS, 17 JUNE 2015



**Volker Rachold**

*International Arctic Science Committee*

# Integrating Arctic Research *a Roadmap for the Future*

3<sup>rd</sup> International Conference on Arctic Research Planning  
**(ICARP III)**



3RD INTERNATIONAL CONFERENCE  
ON ARCTIC RESEARCH PLANNING

# current ICARP III partners



UArctic

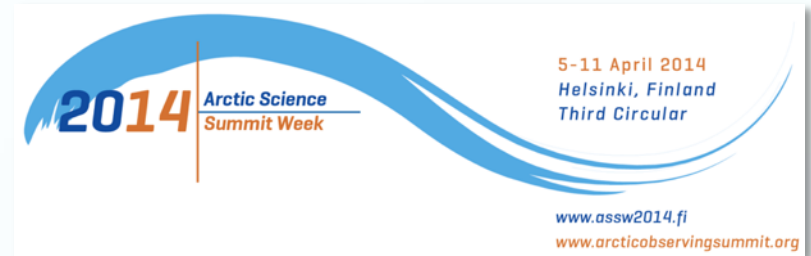


Northern Research Forum



# The program

- ⊙ **formal launch at the Arctic Science Summit Week (ASSW) 2014 in Helsinki, Finland;**
- ⊙ **many meetings and events during 2014/15;**
- ⊙ **culminating in a final conference during ASSW 2015 in Toyama, Japan**



<http://www.assw2014.fi/>



<http://www.assw2015.org/>



# ICARP III Activities

include workshops, writing team meetings, conference sessions, townhall meetings, outreach and capacity building events etc., organized around 4 themes:

- ③ Climate System and Transformations
- ③ Societies and Ecosystems
- ③ Observing, Technology, Logistics and Service
- ③ Outreach and Capacity Building



**ICARP III Launch at the ASSW 2014**

ICARP III will be formally launched at the ASSW 2014, which will be held in Helsinki, Finland, on 11-14 April 2014. The kick-off event will be during the ASSW 2014 Common Day on 8 April 2014, 14.00-18.00.

**ICARP III Events & Activities**

On the following two pages, we are providing an overview of currently planned ICARP III events and activities. The list is still growing as more events, in particular by ICARP II partner organizations, are being planned and a constantly updated portfolio will be available on the ICARP III website.

**ICARP III Final Conference at the ASSW 2015**

The ASSW 2015 will be held at the Toyota International Conference Center in Toyama, Japan, on 28-30 April 2015. It will include the final ICARP III Conference and the International Symposium on the Arctic Research (ISAR-4).

**ICARP III Themes**

- Theme 1: Climate System and Transformations
- Theme 2: Observing, Technology, Logistics, Services
- Theme 3: Societies and Ecosystems
- Theme 4: Outreach and Capacity Building



**IASC PROGRESS**  
Fall 2014

**Integrating Arctic Research - A Roadmap for the Future**

With this special issue of its newsletter, IASC is providing another update on the development of the 3rd International Conference on Arctic Research Planning (ICARP III). The initial ICARP III plans had been presented at the Arctic Science Summit Week (ASSW) 2014 (Cottonwood Day in Helsinki, Finland) last April. Since then, a number of ICARP III activities have already taken place and this newsletter includes:

- short summaries of ICARP III events that occurred during the last few months,
- an outlook on upcoming activities,
- the perspectives of new ICARP III partner organizations and
- an introduction to the forward-looking Horizon Scan conducted by the Scientific Committee on Arctic Research (SCAR).

The outcome of ICARP III will be an inventory of reports and recommendations of the various ICARP III activities, with the key messages feeding into a consensus statement identifying the most important Arctic research needs for the next decade and a roadmap for research priorities and partnerships. This concluding ICARP III statement will be presented at the main ICARP III conference held during the ASSW 2015.

**4<sup>th</sup> European Marine Board Forum**  
Brussels (Belgium), 12 March 2014

Representatives of 64 organizations gathered at the 4<sup>th</sup> European Marine Board (EMB) Forum to discuss how to best manage the consequences of a changing Arctic Ocean. The forum delegates represented a wide range of stakeholders, spanning industry, policy, and academia as well as NGOs and consultancies. The forum included sessions on "Living with a Changing Arctic Ocean", "Arctic Ocean Resources" and "Shipping and Managing Arctic Ocean Resources". Forum participants stressed the need for industry and science to work together, with the main priorities requiring collaboration identified as concerted data collection and analysis, which would contribute to sustainable management of the Arctic Ocean by providing data for mitigating the impacts and addressing the opportunities posed by current environmental changes in the region.

**Key Messages of the 4<sup>th</sup> EMB Forum:**

- A strategic plan for data collection in the Arctic.
- Arctic Ocean research investment requires multidisciplinary and cross-sector partnership for securing long-term strategic funding.
- With the Arctic being perceived as a new market by the shipping industry, associated activities like maritime trade, tourism and transport are likely to emerge faster than the necessary infrastructure for safe, secure and reliable shipping in the Arctic Ocean. Therefore, it is critical to anticipate infrastructure changes in the Arctic rather than respond to them.

# What will be the outcomes of ICARP III?

## Activity Summaries & Reports



All ICARP III partners will play a role in shaping the future of Arctic research needs

## Consensus Statement



**ASSW 2015  
Conference Statement**

### Primary audience:

- Science funders and decision makers
- Policy makers

### Users:

- Indigenous and Local people
- Scientific community
- Next Generation

## Roadmap





# ASSW 2015 CONFERENCE STATEMENT



April 23-30, 2015

Toyama International Conference Center, Toyama, Japan

30 April 2015 - For Immediate Release



## TOYAMA CONFERENCE STATEMENT

### INTEGRATING ARCTIC RESEARCH: A ROADMAP FOR THE FUTURE

Arctic Science Summit Week 2015 in Toyama, Japan (23–30 April) brought together nearly 700 international scientists, students, policy makers, research managers, Indigenous Peoples and others interested in developing, prioritizing and coordinating plans for future Arctic research. The Conference was organized by the International Arctic Science Committee and the Science Council of Japan, with the support of many other international partners ([www.assw2015.org](http://www.assw2015.org)).

#### Several overarching messages emerged during the Conference:

- Changes in the Arctic are challenging our understanding of their consequences and our ability to provide knowledge for decision-makers.
- There needs to be a greater sense of urgency among decision-makers and awareness by the general public regarding the global importance of changes taking place in the Arctic.
- It is critical to anticipate changes in the Arctic rather than respond to them, but to do this requires sustained observations and improved understanding of local, regional and global processes. These research challenges must be addressed in a coordinated and timely manner to ensure sustainable development and resilient Arctic communities and ecosystems.
- The rapidly changing Arctic initiates changes that cascade through the global system impacting weather, commerce and ecosystems in the more temperate regions. Linkages across disciplines, scales, and diverse knowledge systems must be addressed in future research activities.
- Understanding the vulnerability and resilience of Arctic environments and societies requires increased international scientific cooperation, including contributions from non-Arctic states.
- More effective use must be made of local and traditional knowledge by engaging northern and Indigenous communities in setting priorities, the co-design and co-production of research, and the dissemination of this knowledge by ensuring appropriate access to research data and results.
- It is essential to build long-term human capacity to support relevant observations and research among scientists, decision-makers and Arctic residents, including Indigenous Peoples, through education and effective public engagement, and by adopting shared principles to guide research activities.
- New markets for Arctic resources and associated activities, including trade, tourism and transportation, will likely emerge faster than the necessary infrastructures on land and sea. Sustainable infrastructure development and innovation to strengthen the resilience of Arctic communities requires a collaborative approach involving scientists, communities, governments, and industry.

The Toyama Conference was a critical step in an international Arctic research planning process involving hundreds of scientists from 27 countries working to improve our understanding of the consequences of changes taking place in the Arctic region, and their connection to global environmental, economic and social processes. These rapid transformations occurring in the Arctic are affecting the entire Earth system, including its climate and weather extremes, through increased temperatures and the continuing loss of ice, glaciers, snow and permafrost. New economic interests in the Arctic have established the region as a larger player in the global economy, but also with very significant local effects. In spite of rapid environmental and social change, the Arctic remains a region of geopolitical stability which is a pre-condition for sustaining Arctic research.

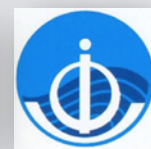
The Final Report from the Conference, guided by discussions and contributions from many partner organizations, will be completed later in 2015. This Report will catalyze and inform the implementation of critical, cooperative, international Arctic research programs over the next decade.



Volker Rachold

International Arctic Science Committee

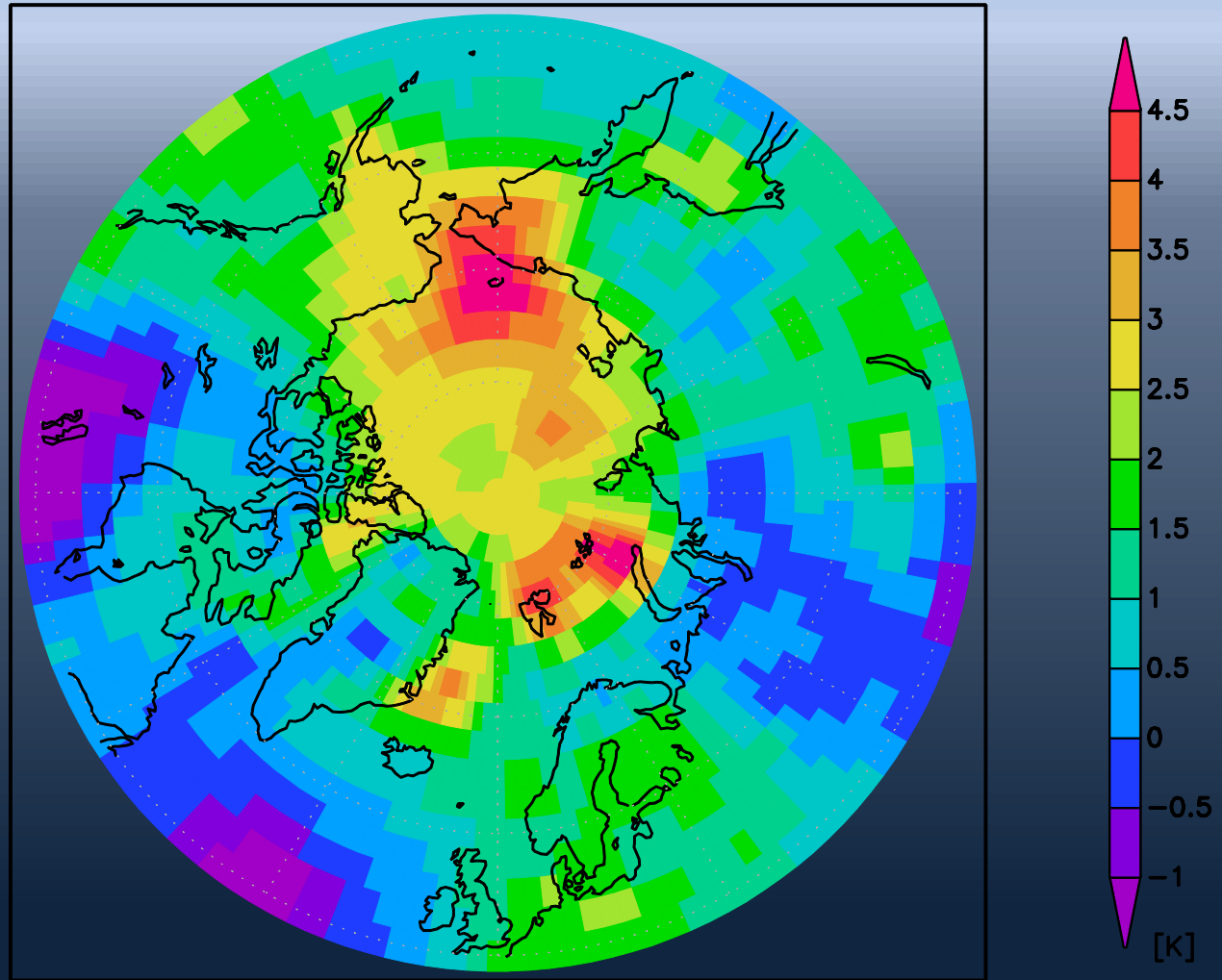
# International Polar Partnership Initiative (IPPI)





# Annual anomaly of 2 m air temperature (°C) for year 2014

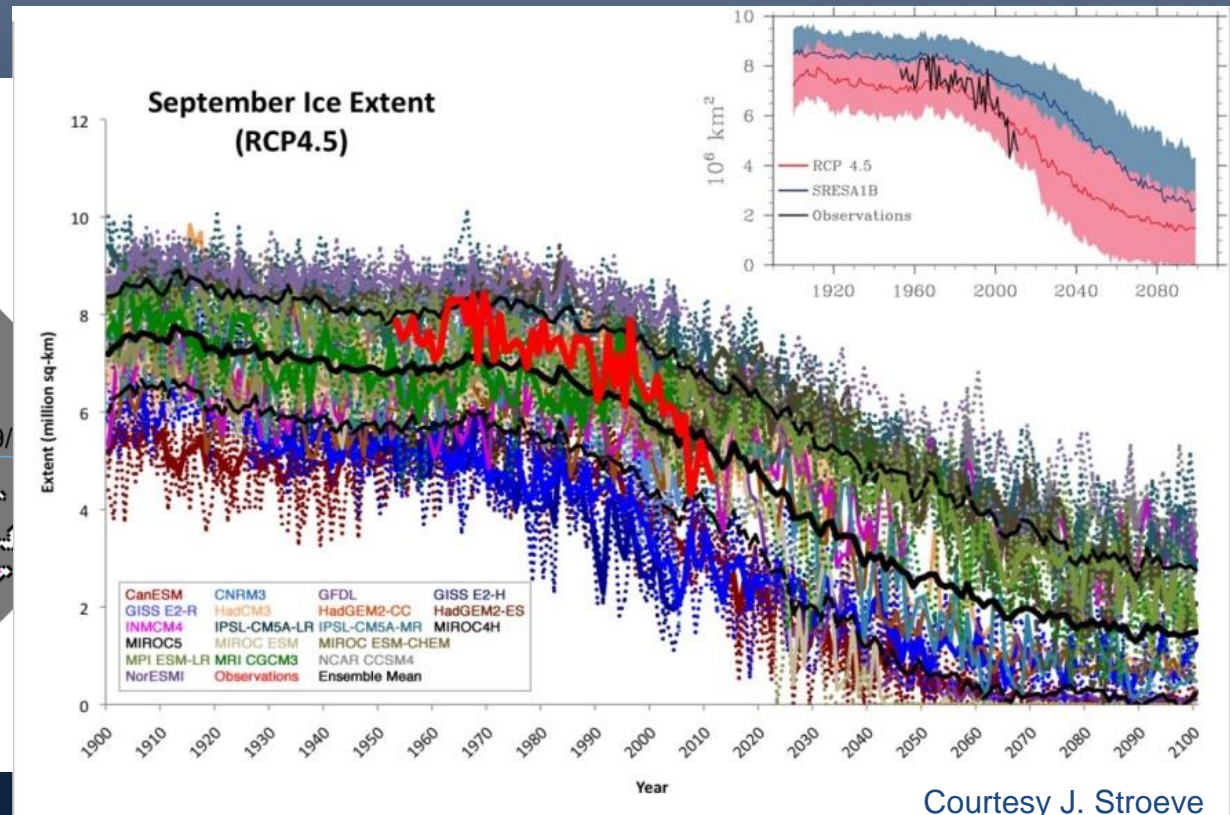
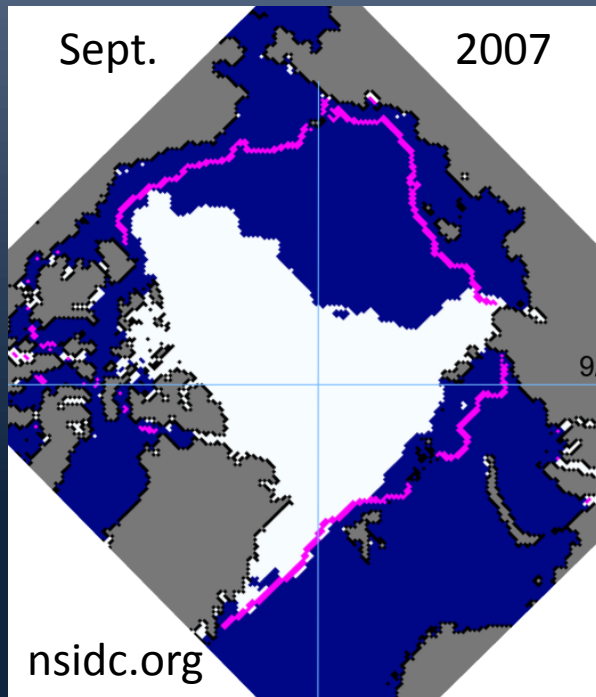
NCEP annual mean 2014 minus climatology (1984–2014)



**Warmer Arctic Ocean & colder mid-latitudes → Arctic in transition  
→ What are the drivers for Arctic amplification?**

# Arctic in transition

- The central Arctic is changing dramatically.
- Major sea-ice decline and shift to more younger ice.
- Do we know why and how?

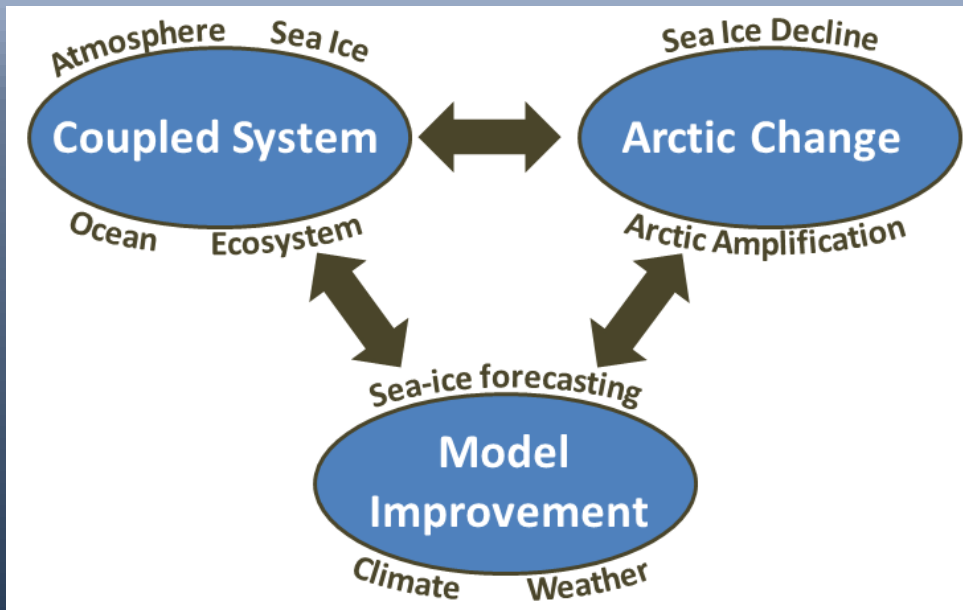


Courtesy J. Stroeve

# MOSAiC

*Multidisciplinary drifting Observatory  
for the Study of Arctic Climate*

M. Shupe, K. Dethloff, and an international, interdisciplinary team



## *Coupled, Sea Ice System Science Themes*

**Sea-ice Energy Budget**  
**Ice Motion / Deformation**  
**Clouds / Precip / Aerosols**  
**BioGeoChem Processes**  
**Large-scale Implications**

## What is MOSAic?

**Interdisciplinary process study in central Arctic sea ice (2018>2019):**

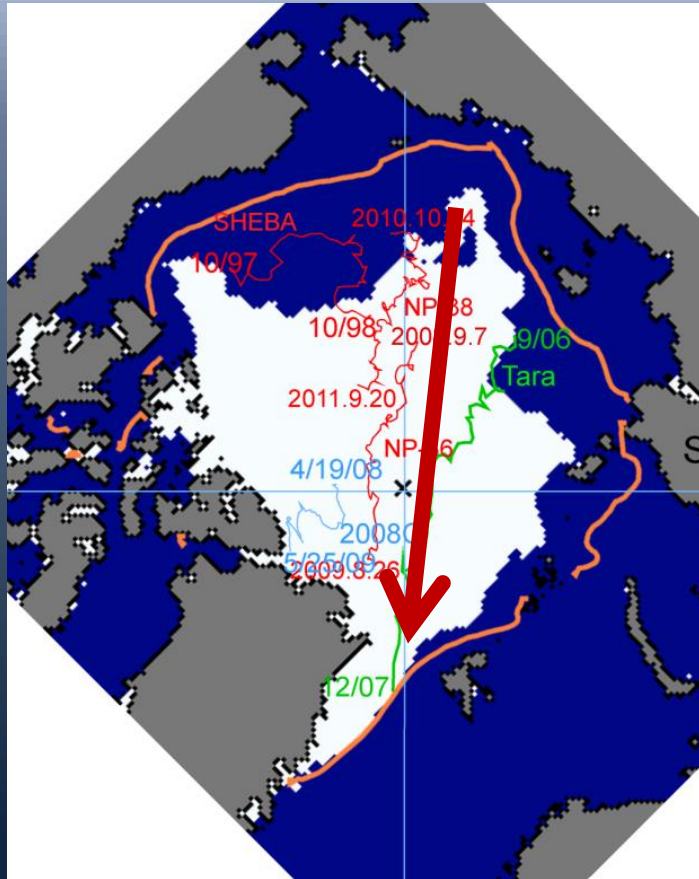
- 1) Central Observatory: Atmos-ice-ocean-ecosystem observations**
- 2) Distributed Network: Heterogeneity on model grid-box scale**
- 3) Coordinated multi-scale analysis & modeling; Links with YOPP**



# MOSAIC

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**2018-2019, annual cycle  
Central Arctic Basin ice pack**

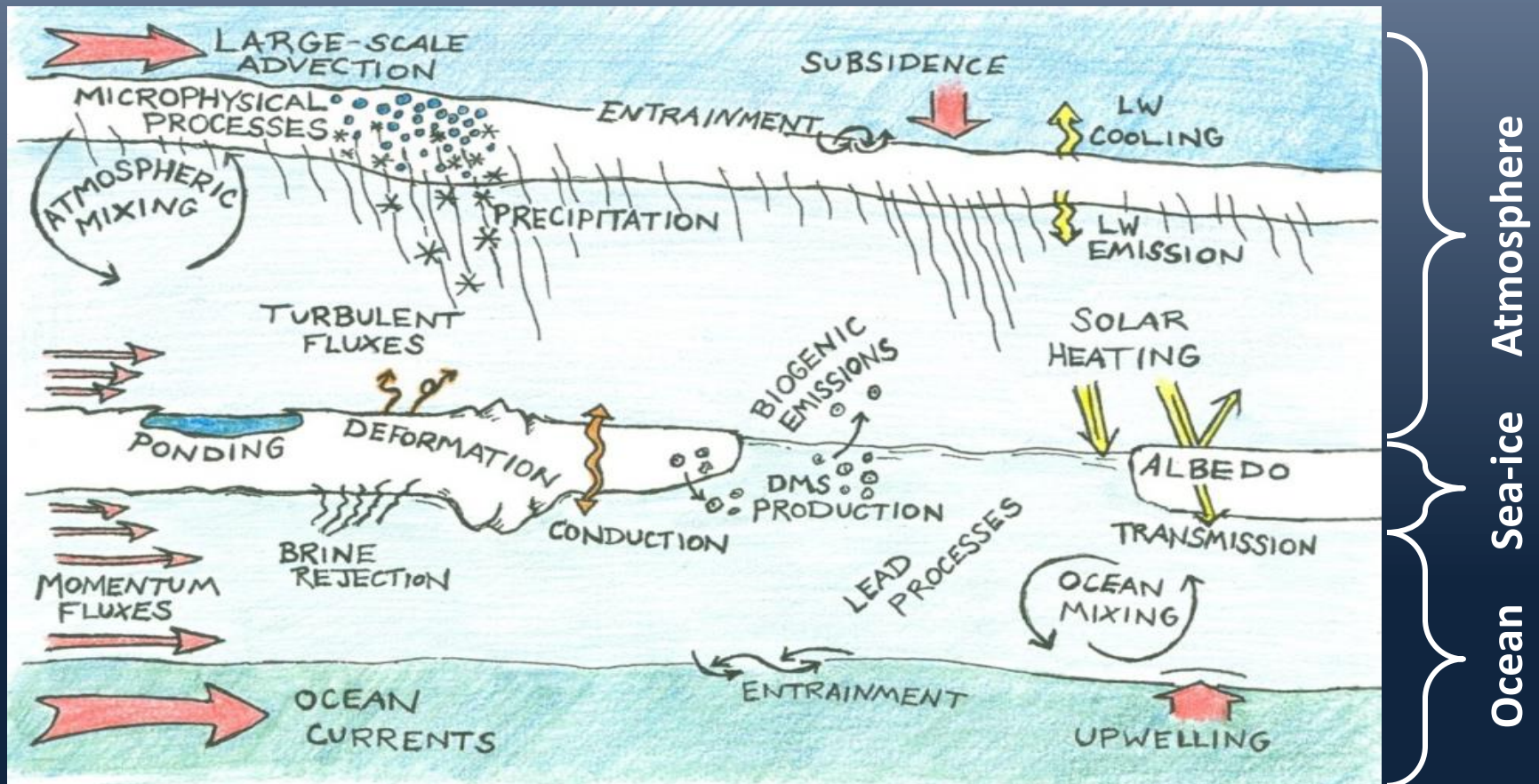
## Milestones for 2014-2015:

- First draft of Science Plan completed
- Positive Review of Polarstern proposal
- US Dept. of Energy has committed atmospheric measurement suite
- Relevant German, US, Japanese, EU proposals in preparation



# Process Perspective

- Complex measurements to characterize coupled processes
- Well suited to parameterization evaluation & development
- Distributed measurements for spatial variability & context



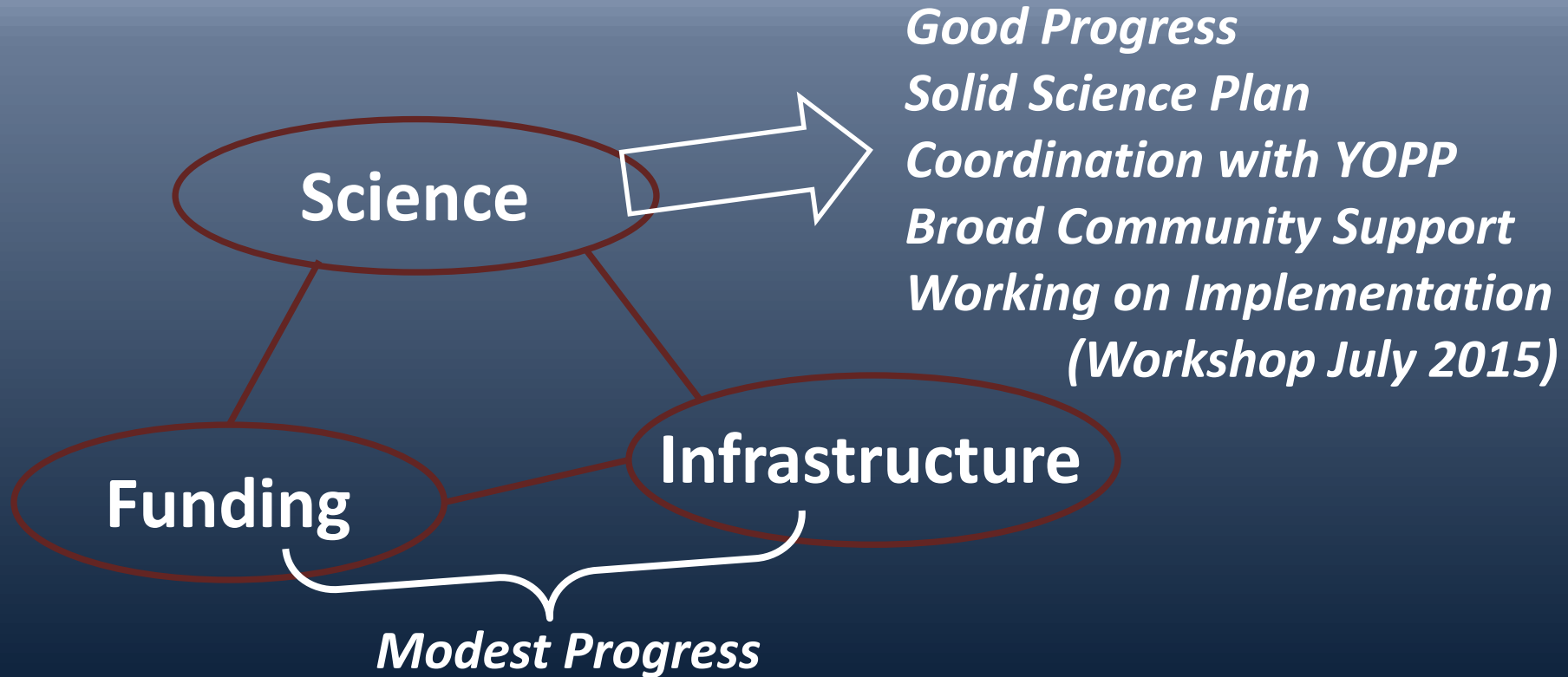
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## Continued Coordination Challenges



***Now is the time for Action!***