

UNESCO/IUGS International Geoscience Programme

United Kingdom National Committee Report (2019)

From: UK National Committee to the International Geoscience Programme (*External Relations Committee of the Geological Society of London*)

To: UNESCO Earth Sciences and Geo-Hazards Risk Reduction, International Union of Geological Sciences, Council of the Geological Society of London.

Executive Summary

This report summarises the engagement of UK-based scientists in the UNESCO/IUGS International Geoscience Programme. In 2019, UK-based scientists were project leaders in at least seven IGCP projects, and participated in at least eight further projects (**Sections 3 and 4**). The UK National Committee supported two new project proposals by UK scientists in 2019 (**Section 5**), on themes of carbon in peat and sustainable mining. We are pleased to note Professor Iain Stewart's ongoing work as UNESCO Chair on Geoscience in Society (**Section 6**).

We highlight two areas of general feedback to improve reporting (**Section 7**), namely that UNESCO (i) consider how to make relevant project reports available to National Committees after submission to ease the production of national committee reports, and that (ii) general guidance to all committees on the purpose and audience of this report and the information they would like presented is issued.

1. The IGCP

UNESCO supports research and capacity-building in geology and geophysics through the [International Geoscience Programme](#) (IGCP), one of two components of UNESCO's [International Geoscience and Geoparks Programme](#) (IGGP). The IGCP, with co-funding principally from the [International Union of Geological Sciences](#) (IUGS) and the Jeju Province Development Corporation (JPDC) from the Republic of Korea, financed 25 projects in 2019. A further 6 projects remain active, with no financing.

IGCP projects fall into one of five themes:

- Earth Resources: Sustaining our Society;
- Global Change: Evidence from the geological record;
- Geohazards: Mitigating the risks;
- Hydrogeology: Geoscience of the water cycle;
- Geodynamic: Control our environment.

The IGCP research programme is administered by a Secretariat at UNESCO and directed by a [Scientific Board](#), responsible for assessing proposals and quality control of projects. The Scientific Board reports annually in February to the assembly of [National Committees](#). National Committees liaise with IGCP projects in each country and seek to sustain linkages between national geological institutions and individuals. The National Committees:

- endorse new IGCP project proposals coming from the country's geoscientific community before they are sent to the IGCP Secretariat;
- propose candidates for the IGCP Scientific Board;
- stimulate the participation of their country's geoscientists in new IGCP projects and enable them to share the ongoing international relevant geoscience research.

2. UK National Committee

The IGCP National Committee for the UK is the [External Relations Committee](#) of the Geological Society of London. Members in 2019/20 are:

- Dr Sarah Gordon (chair), Satarla
- Dr Joel Gill, British Geological Survey
- Ms Lesley Dunlop, Northumbria University
- Emeritus Professor Chris King, Keele University
- Ms Gemma Sherwood
- Dr Helen Smyth, Halliburton Landmark
- Dr Alex Whittaker, Imperial College, London
- Mr Hugh Barron
- Ms Marie Fleming, Arup
- Mr Pete Loader, Aquinas College
- Mr Nick Pierpoint
- Dr Martin Smith MBE, British Geological Survey

Geological Society Staff members are: Dr Richard Hughes (Executive Secretary), Dr Alicia Newton (Director of Science and Communications), Florence Bullough (Head of Policy and Engagement) and George Jameson (External Relations Officer)

The role of this committee is to raise public awareness and understanding of geoscience, and the professional activities of geoscientists, including the relevance of the science and profession in aiding policy and decision making concerning wealth creation, provision of resources, sustainability, environmental protection and conservation.

The committee and staff undertook a wide range of activities in these areas in 2019. Activities of the Geological Society in 2019 that were particularly relevant to the mission of IGCP included co-organising the ‘[Geoscience and Society Summit](#)’ (Stockholm, March 2019), hosting a conference on ‘Health, Wellbeing and Sustainable Development’ organised by the NGO [Geology for Global Development](#), and publishing an [educational resource](#) on the links between geoscience and the Sustainable Development Goals.

3. UK participation in IGCP

The following UK scientists sit on the Scientific Board (*Geohazards*):

- Prof Andy Cundy, University of Southampton.

UK-based scientists are project leaders in at least the following seven IGCP projects:

- 639: Sea Level Change from Minutes to Millennia (*Dr Simon Engelhart, Durham University*) ([Website](#)).
- 640: Significance of Modern and Ancient Submarine Slope and Landslides (*Dr Aggeliki Georgiopoulou, University of Brighton and Dr Michael Clare, National Oceanography Centre*) ([Website](#))
- 653: The onset of the Great Ordovician Biodiversification Event (*Professor David A. T. Harper, Durham University*) ([Website](#)).
- 662: Orogenic Architecture and Crustal Growth from Accretion to Collision (*Professor Reimar Seltmann, Natural History Museum*) ([Website](#))

- 665: Sustainable use of black soil critical zone (*Dr Wang Lei, British Geological Survey and [Unknown] at the University of Leeds*) ([Website](#)).
- 672: Himalayan glaciers: assessing risks to local communities from debris cover and lake changes using new satellite data (*Dr Adina E. Racoviteanu, Aberystwyth University*) ([Website](#)).
- 685: Geology for Sustainable Development (*Professor Iain Stewart, Plymouth University and Dr Joel C. Gill, British Geological Survey*) ([Website](#)).

The UK National Committee note an increase in UK project-leadership within the International Geoscience Programme, with active projects within four of the five major IGCP themes. There are now three IGCP projects with UK-based primary leaders, and a further four projects (at least) with UK-based co-leaders.

UK-based scientists have also participated in and advised on the activities of other IGCP projects, including (but not limited to):

- 632: Continental crises of the Jurassic ([website](#))
- 637: Heritage stone designation ([website](#)).
- 641: Deformation and fissuring caused by exploitation of subsurface fluids ([website](#))
- 648: Supercontinent Cycles and Global Geodynamics ([website](#))
- 652: Reading geologic time in Paleozoic sedimentary rocks ([website](#))
- 655: The Toarcian Oceanic Anoxic Event: Impact on marine carbon cycle and ecosystems ([website](#))
- 668: Equatorial Gondwanan history and Early Palaeozoic Evolutionary Dynamics ([website](#))
- 673: The End of A Supereon - Winners and Losers at the Precambrian-Phanerozoic Transition ([website](#))

4. Examples of key IGCP activities supported by UK-led projects

In this section, we describe examples of key activities by the projects with UK leadership (project leaders or co-leaders). This list is not exhaustive, but illustrates the range of ways by which UK-based scientists are contributing to the IGCP programme.

639: Sea Level Change from Minutes to Millennia

This project provides a platform for the development of integrated records of sea-level change and coastal hazards obtained from instrumental, historical, archaeological, and geological records. This project will place a particular focus on integrating disparate records in growth regions for science, namely in Africa, South America, and the Middle East, expanding upon previous coastal (495, 588) and delta IGCP projects (475) that focused for the most part on Europe and Asia. This project will result in a coastal hazard toolkit that can be applied by those most at risk from future coastal inundation.

640: Significance of Modern and Ancient Submarine Slope and Landslides

This project seeks to create an international and multidisciplinary platform allowing geoscientists from academia and industry to sustain a dialogue conducive to the integration of findings from different fields into a more cohesive understanding of submarine landslides.

In 2019, the project coordinated a special session on *Subaqueous Mass Movements and Their Consequences: from Scientific Knowledge to Geohazard Assessment* at the 34th IAS Meeting of Sedimentology (Rome, Italy), and a workshop on *Subaqueous Landslides and Morphometric Parameters* (Colorado, USA), in conjunction with the 7th International Conference on Debris-Flow Hazards Mitigation.

653: The onset of the Great Ordovician Biodiversification Event

The project has resulted in improved understanding of, and of the significant of, the Great Ordovician Biodiversification Event (GOBE), an event in the Ordovician that ultimately led to the development of modern marine ecosystems.

The main annual meeting took place at Novosibirsk, Russia, in July 2019, with 75 participants, coming from 14 countries (including three developing countries). The meeting was focused on our IGCP, and thus focused on our research question (what is and what triggered the Ordovician biodiversification), but it was also the congress of the Ordovician Subcommittee on Stratigraphy (ISOS, ICS, IUGS).

IGCP 653 related sessions were also organised at the North American Paleontological Convention (NAPC) in June 2019, at Riverside California, and at the Geological Society of America Meeting in Phoenix, Arizona, USA, September 2019. Without a specific session, IGCP 653 participants presented their results also at the Annual Meeting of the Palaeontological Association in Valencia, Spain, in December 2019, where 25 of them joint at a formal IGCP 653 business dinner.

Some of the leaders of Project 653 have given keynote talks at major international congresses to present the main ideas about the onset of the GOBE (i.e., Professor D. Harper at the 1st International Congress of Asian Palaeontology, Beijing, November 2019).

662: Orogenic Architecture and Crustal Growth from Accretion to Collision

The project focuses particularly on comparative studies of the *Central Asian Orogenic Belt (CAOB)*, the world's largest Phanerozoic accretionary orogeny, and the *Tethyan orogenic belt*, the world's youngest extensive collisional and metallogenic belt. In 2019, this project has:

- Organised a workshop in Ulaanbaatar (Mongolia) with 80 participants (China, Mongolia, Russia, Czech Republic, Australia, South Korea, Japan, Brazil, Pakistan and Vietnam) and a post-conference fieldtrip in western Mongolia,
- Convened a session at EGU and co-organised an international symposium "Geology of Eurasia" at GFZ Potsdam.
- Participated in an IUGS-recognised International Big Science Program (Deep-Time Digital Earth).
- Contributed to 45 papers, showing scientific knowledge contribution to the research in the Central Asian Orogenic belt and the Tethyan Orogenic belt.

665: Sustainable use of black soil critical zone

This project investigates how *black soil* forms and evolves, what it looks like now and where we should go for its sustainable use. An observation system using remote sensing, geochemistry and critical zone observatories will be established for a comprehensive understanding of the black soil critical zone and its mutual impacts with global change. The outcomes including data and observatories will be open to the public for education and research purposes.

In October 2019, IGCP 665 coordinated the third workshop of Global Black Soil Critical Zone Geo-ecological Survey, with themes including:

- Multi-scale remote sensing and monitoring of global black soil critical zone;
- Spectral and Multi-scale geochemical survey of global black soil critical zone;
- Northeast China black soil Critical zone observatory construction and comparative study with global black soil critical zone;
- To study integrated modelling system of global black soil critical zone based on multidisciplinary collaboration;
- To study the carbon cycle of black soil and its relationship with climate change and human activities;
- Microbial research of global black soil critical zone;

- Establish an international platform for extensive communication and cooperation, data and information sharing in global black soil critical zone.

672: Himalayan glaciers: assessing risks to local communities from debris cover and lake changes using new satellite data

IGCP project 672 focuses on systematic monitoring of hazardous glacier lakes in the Himalaya using remote sensing, and disseminating methodologies developed via training and workshops to local institutions.

The main scientific achievement this year was summarising and advancing the knowledge on debris covered glacier evolution and associated hazards particularly in the Eastern Himalaya. IGCP 672 organised

- A 10-day field training on Ponkar Glacier in Nepal, from November 6 – 16th 2019 for a group of 7 MSc and PhD students from Nepal and Sikkim (2 male and 5 female). Two UK geomorphology experts contributed to field teaching.
- An [expert meeting on debris-covered glaciers](#), hosted by the Geological Society of London, to explore the current state of the science on debris-covered glaciers in high mountain environments through a series of talks and working groups. Participants collaborated on developing workshop material for future capacity building training packages as well as on the effective deployment of the growing earth science social media presence of High Mountain based communities and organisations.

685: Geology for Sustainable Development

This first year of IGCP Project 685 has focused on communicating the emerging profile of ‘sustainable geoscience’ across a variety of sectors. There has been excellent linkage with international geo-energy organisations that are actively engaging with the challenges of the ‘energy transition’. IGCP leadership now is part of the American Association of Petroleum Geologist’s working group on Sustainable Development and has participated in a number of AAPG-sponsored ‘energy and sustainability’ events during the year. Other strong relationships have been established with the European Association of Geologists and Engineers (EAGE) and the Society of Exploration Geophysicists (SEG). Funding proposals with the AAPG are being prepared and a research proposal for \$100k was submitted to the SEG’s ‘Geoscientists Without Borders’ funding programme.

Another focus in this kick-off year has been to raise UN / UNESCO awareness of Earth science expertise and understanding in the Sustainable Development arena. Co –leader Joel Gill presented at the UN Forum on Science, Technology and Innovation for the SDGs. Co-leader Iain Stewart presented on sustainable geoscience at the Natural Sciences Sector’s ‘Strategy for Science’ meeting (16 - 17 July), and at a showcase meeting on the International Geoscience and Geoparks Programme (20 Sept), both at the UNESCO Headquarters. A chapter on ‘Geology for Society’ was invited for the UNESCO sustainability education report Humanistic Futures of Learning and an invitation received for a keynote talk on geology for sustainable development at the major International Union for Conservation of Nature policy forum (June 2020).

The leadership of Project 685 were also involved in a range of international meetings:

- Geoscience and Society Summit: Bridges to Global Health, Resilience and Sustainability (Stockholm, Sweden – 18-21 March)
- AAPG ACE 2019 - A Sustainable Future in Petroleum Energy (San Antonio, USA – 20-24 May)
- ATV Soil and Groundwater conference (Vingsted, Denmark, 5 Mar)

- 4th UN Forum on Science, Technology and Innovation for the SDGs (New York, 14-15 May 2019) IGCP project 685 had an international delegation of early-career female geoscientists.
- European Association of Geologists and Engineers (London, 4-6 June)
- PESGB Africa Conference (London, 2 Oct)
- Energy Transition Forum: A New Era for Geoscience (Edinburgh, 15-16 Oct)
- 7th GfGD Annual Conference - Earth Science, Health & Wellbeing (London, Nov). Hosted by the Geological Society of London, this gathered 80 geoscientists (~50 students) to explore the role of geoscientists in delivering SDG 3 (good health and wellbeing).
- American Association of Petroleum Geologists (AAPG) Latin American and Caribbean chapter - 1st Energy and Sustainability Summit (Cartagena, Colombia – 20 Dec) - keynote presentation and participation of IGCP-sponsored ECR and students.

5. New project proposal

In the 2019 round of IGCP project proposals the UK Committee supported two new projects by UK scientists:

- Carbon in Peat on Earth through Time: Tropical peatland processes and ecosystem services (*Project Leader: Dr Angela V. Gallego-Sala, University of Exeter*). The project will focus on understanding tropical peatlands. The team are interested in (1) developing a better understanding of the palaeo-peatland records in tropics and their associations with recent climatic changes (2) connecting their work with land-use change analysis, (3) developing, along with stakeholders concerned with peatland resource management.
- NextMine: Piloting a sustainability atlas for mining in southern Africa (*Project Leader: Professor WD Maier, School of Earth and Ocean Sciences, Cardiff University*). This project aims to produce a sustainability atlas for two mining-intensive regions in southern Africa, the Bushveld Complex of South Africa and the Great Dyke of Zimbabwe. The atlas will serve as a framework for decision support providing information on relative sustainability performance and development consequences of mining for a variety of geological, environmental and socio-economic scenarios.

There is clearly scope for greater promotion of IGCP opportunities in the UK geoscience community, and the UK National Committee will explore how this can be taken forward. In 2019, we wrote [this blog](#) following the IGCP Council Meeting and shared it with diverse stakeholders.

6. UNESCO Chair on Geoscience in Society, at the University of Plymouth

Professor Iain Stewart MBE FRSE FGS, Director of the Sustainable Earth Institute, was appointed a UNESCO Chair in Geoscience and Society in late 2017. The initiative supports research, training and international collaboration relevant to many of the Sustainable Development Goals, notably in disaster risk reduction, geo-energy, resource management and environmental degradation. This Chair supports new research partnerships and links with professionals in the energy, mining and construction sectors, while enhancing geoscience awareness among communities and the public.

7. General Comments and Suggestions

The UK National Committee thank those project leaders who responded for a request for information, but note that not all projects made this available on request and the extent of UK engagement is not clear from all project websites. To support report writing, we suggest that UNESCO consider how to make relevant project reports available to National Committees after submission, or the steps they can take to encourage project leaders to engage with their respective National Committees.

While this reporting exercise gives a helpful synthesis to the UK National Committee of how UK-based scientists are supporting and contributing to IGCP projects, it is not immediately clear what UNESCO would like or get out of this reporting. Most of the information collated here is from information in reports submitted directly to UNESCO. We would therefore encourage UNESCO to provide general guidance to all committees on the purpose and audience of this report and the information they would like presented. UNESCO may also wish to reflect on whether there is additional information that could be submitted through this report (e.g., related initiatives, feedback).

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*On behalf of the External Relations Committee
The Geological Society of London*

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