SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR) - NATIONAL REPORTS 2008-2009 MEMBER COUNTRY: UNITED KINGDOM

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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS

Success of XXXII ACTM in Baltimore, April 2009

Two ministerial declarations were signed, reaffirming commitment to the Antarctic Treaty and both reaffirming and recognising their commitment to science and the role that that plays in society. In addition, CEP is now welcoming a wider view from SCAR on a number of key issues and looking at how to improve collaboration between science and policy makers. The FCO is very keen to work with SCAR and the Science Community to improve such collaboration and develop a wider and stronger science base.

ACE

An ACE book, including 13 chapters on the Cenozoic history of the Antarctic ice sheet, was successfully published in March 2009. From the back cover: "Antarctic Climate Evolution" is the first book dedicated to the developing knowledge on how the world's largest ice sheet formed and changed over its ~34million years history.

ACE was also strongly represented in the January 2009 PAGES newsletter, entitled Paleoscience at the Poles, including an article by M. Bentley and D. Hodgson on "Antarctic Ice Sheet and climate history since the Last Glacial Maximum". A review of "The Antarctic palaeo record and its role in improving predictions of future Antarctic Ice Sheet change" has just appeared on-line in a Special Issue of Journal of Quaternary Science that is dedicated to assessing palaeo-science in the aftermath of the most recent IPCC report.

Antarctica's Gamburtsev Province (International Collaboration) – F. Ferraccioli (BAS)

The US-UKChina-German AGAP project acquired over 120,000 km of flight track radar, magnetics and gravity data over the Gamburtsev Mountains region of East Antarctica. Datasets are being processed at present. The outcome will be a much enhanced appreciation of the subglacial bed in East Antarctica, which will be used in the forthcoming BEDMAP II project.

Antarctica's record of deglaciation

Onshore field investigations of the last deglaciation have continued to yield important datasets for constraining numerical models of the Antarctic ice sheet. The technique of cosmogenic surface exposure dating is being applied more widely across the continent. Crucially, work is expanding beyond the Ross Sea and Antarctic Peninsula regions and the deglacial history of the East Antarctic Ice Sheet is seeing more comprehensive study than hitherto.

ACE-related work by the Durham group this year has focused on investigations of deglaciation and the timing of ice stream and ice shelf retreat from West Antarctic Peninsula shelf. This research on will feed into a recently funded project which combines numerical ice sheet modelling with marine geophysical observations and dating to determine the controlling factors on marine ice stream retreat. Empirical data from a number of different Antarctic palaeo-ice stream systems from the Antarctic Peninsula, West Antarctica and East Antarctica will provide the physical setting for the numerical model and, crucially, contrasting retreat histories for comparison to the model simulations. This research involves partnership between Durham, Cambridge, Bristol, BAS and Rice University, USA.

Terminal Cretaceous climate change (AFI project) – F. Haywood (Leeds)

This project has investigated an exceptionally thick sequence of sediments of latest Cretaceous age (~70 million years) on Seymour Island, Antarctic Peninsula. Palynological, sedimentological and geochemical analyses indicate that this region, situated at 65°S in the latest Cretaceous, experienced generally warm climates that suited warm-cool temperate floras and kept sea surfaces temperatures above freezing. Palaeoclimatemodels also show that large ice caps would not have been able to exist under the latest Cretaceous global climate scenario.

ICECAP (International Collaboration) – M. Siegert (Edinburgh)

The US-UK-Australian ICECAP project gathered over 30,000 km of geophysics data from the Aurora Basin of East Antarctica. Datasets are being processed at present. The outcome will be a much enhanced appreciation of the subglacial bed in East Antarctica, which will be used in the forthcoming BEDMAP II project. This project was supported by a NERC Standard grant. Future field seasons include two more ICECAP surveys of the Aurora and Wilkes basins, and a newly funded NERC-AFI survey of the Institute and Moller ice streams in West Antarctica.

SALE and Lake Ellsworth – M. Siegert (Edinburgh)

After planning the exploration of subglacial lake environments for around 10 years, SALE now includes three funded projects. The UK is leading the exploration of subglacial Lake Ellsworth. This project has two fundamental scientific aims: (1) to determine whether, and in what form, microbial life exists in Antarctic subglacial lakes, and (2) to reveal the post-Pliocene history of the West Antarctic Ice Sheet. The exploration will be undertaken in 2012/13. A comprehensive Environmental Evaluation is currently being written by a SCAR Action Group on the 'Code of conduct for the exploration and research of subglacial aquatic environments'. It will be discussed with the FCO shortly and submitted for debate at the ATCM in May 2010 I Uruguay. SALE will need to ensure that the proper environmental protection of subglacial lakes is carried out in the future.

EBA

Work on the evolutionary history of Antarctic marine organisms has confirmed a high incidence of species level endemism, marked regionalisation of fauna and decreasing South American affinity in a circumpolar manner away from the Antarctic Peninsula, all point to a long and continuous existence of a marine fauna in at least some locations on the shelf.

BIOPEARL

The BIOPEARL project led by Katrin Linse at the British Antarctic Survey, with collaborators from across EBA, has recently published a series of papers on a cruise to the Scotia Sea (Antarctic Science 2008, 20, 3 – special issue) looking at the evolutionary history of Antarctica and its marine fauna. Surveys of the faunal richness in marine, intertidal, freshwater, terrestrial and parasitic realms in the South Orkney Islands (Barnes et al. *Journal of Biogeography* 2008) reveal a rich regional biodiversity with more species than the Galapagos! As suspected but never quantified, the marine benthos dominates polar biodiversity, at least at the South Orkney Islands.

A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS cont/d

AGCS - Mike Meredith (BAS)

Progress has been made on understanding the importance of eddy resolution in the representation of a range of key processes in the Southern Ocean. Regional modelling groups currently focussing on shelf-slope processes.

ICESTAR – Martin Füllekrug (Bath)

The study of Umran et al. (2007) has demonstrated with combined observations from VLF-antennas, lightning detection system, and DEMETER satellite that there really exists a causal relationship between lightning and electron precipitation events. During strong solar wind forcing substorms tend to appear as quasi-periodic activations called sawtooth events. The analysis of Kavanagh et al. reveals that first activations during sawtooth sequences can resemble very much isolated substorms from ionospheric viewpoint. This programme ends in 2009 and will be replaces by the new Scientific Research Programme AAA – see below.

AAA - Phil Anderson (BAS)

Astronomy & Astrophysics from Antarctica is looking to become established as a Scientific Research Programme within SCAR, starting in 2010. It will facilitate international astronomical programsin Antarctica. These programs are aimed at understanding the overarching ecological processes in the Universe, from the birth of stars and of planetary systems around other stars, to the return of heavy-element enriched materials to the interstellar medium, and the formation of new molecular clouds.

Standing Committee on Antarctic Data Management - Helen Campbell (BAS)

JCADM has been replaced by the Standing Committee on Antarctic Data Management (SCADM), which is now entirely responsible for the Antarctic Data Management System (ADMS). SCADM have taken a leadership role in data management for the International Polar Year, with the past Chief Officer of JCADM performing the Co. Chair role in the IPY Data Subcommittee. SCADM is essentially a coordinating body, comprising over 30 representatives from countries with an interest in SCAR data management. The Committee meets annually in various Member countries, on a rotational basis, although only a sub-set of member states (usually less than a 1/3) generally fund participation in these meetings.

As a follow on from the data management for the IPY, ICSU have funded the establishment of the Polar Information Commons.

Antarctic Funding Initiative

The Antarctic Funding Initiative (AFI) is a non-thematic initiative of the UK Natural Environment Research Council (NERC) and is supported logistically by the British Antarctic Survey (BAS). Its objective is to promote wider participation in Antarctic research by UK universities and other academic institutions. Since 1998, 52 science projects have been funded to a total value of just under £14 million. In 2009, Round 10 of AFI funded four proposals, including the exploration of Lake Ellsworth. However, funding cannot be guaranteed in the future and AFI may be dissolved into an open science/non-thematic competition.