# SCAR newsletter

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**Welcome to the mid-year edition of the SCAR Newsletter.**

*A View beyond the Horizon: Future Directions in Antarctic Science* is the chosen theme of the first SCAR Science Horizon Scan (http://www.scar.org/horizonscanning/). The first solicitation for questions has got off to a great start, with almost 800 key questions identified. The next stage will involve you identifying who you believe are your communities' experts, leaders and visionaries in Antarctic and Southern Ocean science to take leadership roles in this enterprise. Watch this space!

Over the last three months, as well as science in the Antarctic region, a major theme has been the provision of scientific advice to policy-makers. The Antarctic Treaty and Committee for Environmental Protection met this year in May in Brussels, Belgium. SCAR submitted several papers, all of which are available from: http://www.scar.org/treaty/atcmxxxvi/. The SCAR Lecture, jointly prepared by Chuck Kennicutt and Jemma Wadham on '*Probing the Limits of Technology: Exploration of Subglacial Aquatic Environments*' is also available from http://www.scar.org/communications/.

Julian Gutt (AnT-ERA chief officer), Paco Navarro (ISMASS co-chair) and myself also gave presentations at the last UNFCCC meeting held in Bonn, Germany, coinciding with the release of the Antarctic Climate Change and the Environment (ACCE) update. See the SCAR website or http://www.youtube.com/watch?v=ixChRFvBmdE&feature=youtu.be

Two new SCAR Products have recently been released. BEDMAP 2, coordinated by British Antarctic Survey, is a new suite of gridded products describing surface elevation, ice-thickness and the sea floor and subglacial bed elevation of the Antarctic south of 60°S. IBCSO, Version 1.0 is the new International Bathymetric Chart of the Southern Ocean, and is led by the Alfred Wegener Institute. See *SCAR Focus on…* for more details.

Those of us 'enjoying' the northern European summer (or lack of it!) have yet one more reason to attend the upcoming SCAR Biology Symposium on the 15-19 July in Barcelona, Spain. Although, of course, with such a packed and interesting programme you may decide you have little time for sightseeing… We'll look forward to seeing many of you there. For further details, see: http://www.icm.csic.es/XIthSCARBiologySymposium/

The SCAR Chief Officers will also meet on Saturday 20 July to discuss interactions between the various SCAR groups, in particular the new SCAR Scientific Research Programmes (http://www.scar.org/researchgroups/progplanning/). This will be followed by a meeting of the SCAR Executive Committee on the 22nd/23rd.

Finally I would like to congratulate Professor Martin Siegert on being the 2013 recipient of the Martha T Muse Prize for Science and Policy in Antarctica!

Mike Sparrow
Executive Director, SCAR

*Francesca Pasotti at the Belgian Science Fair organised by APECS Belgium during the ATCM*

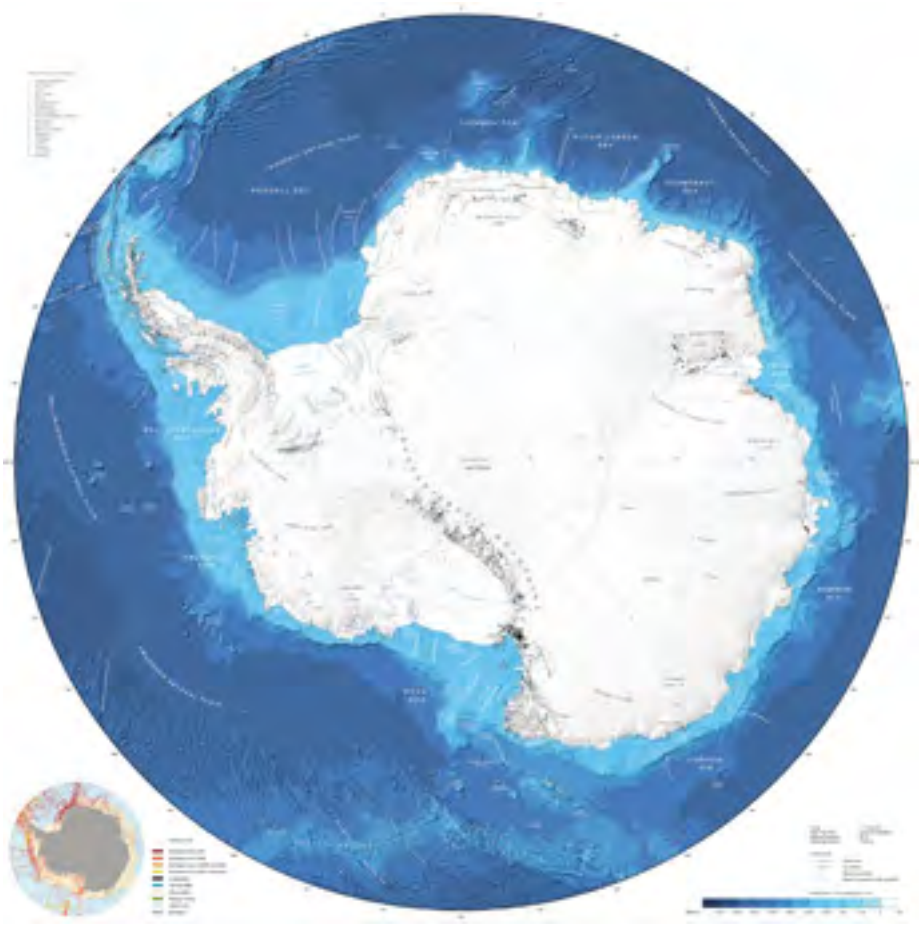
## Highlights in this issue

# *SCAR focus on* . . . . New Products: IBCSO and Bedmap2

## *The International Bathymetric Chart of the Southern Ocean (IBCSO)*

**The International Bathymetric Chart of the Southern Ocean (IBCSO) project was initiated in 2006 with the objective to design and implement an enhanced digital database that contains bathymetric data available south of 60°S latitude.** IBCSO is a regional mapping project of the General Bathymetric Chart of the Oceans (GEBCO) and is endorsed by international organizations such as the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the International Hydrographic Organization (IHO), and the Scientific Committee on Antarctic Research (SCAR).

Access to high quality Southern Ocean bathymetry information is key to understanding a range of ocean and cryospheric processes. Sea floor topography controls ocean circulation and ocean mixing - and has strong influence on global climate. For example, it is critical for understanding and modelling oceanic gateways and barriers, the nature of the thermohaline circulation and the flow of Antarctic bottom water and the stability of the Antarctic ice sheets.



In April 2013, IBCSO Version 1.0 was released by the Alfred-Wegener-Institute (AWI), in Germany. AWI hosts the data repository and the IBCSO website and over the years has been responsible for populating the database and quality control to rigorous standards. The digital bathymetric model of IBCSO Version 1.0 has a 500m x 500m resolution based on a Polar Stereographic projection for the area south of 60° S. The IBCSO database currently consists of more than 4200 million data points contributed by more than 30 institutions from 15 countries. It is foreseen that this database forms the nucleus upon which to build and to include future bathymetric data in order to further enhance the knowledge of Southern Ocean topography.

A final map was also generated at AWI and further details can be found in Arndt (2013). The map and data are now available for download. More details can be found at: http://www.ibcso.org

*Reference:*

Arndt, J.E., H. W. Schenke, M. Jakobsson, F. Nitsche, G. Buys, B. Goleby, M. Rebesco, F. Bohoyo, J.K. Hong, J. Black, R. Greku, G. Udintsev, F. Barrios, W. Reynoso-Peralta, T. Morishita, R. Wigley. 2013. *The International Bathymetric Chart of the Southern Ocean (IBCSO) Version 1.0 - A new bathymetric compilation covering circum-Antarctic waters*, Geophysical Research Letters, doi: 10.1002/grl.50413

**For further information on SCAR Products, see http://www.scar.org/researchgroups/productsandservices/**

## *A View Beyond the Horizon: Future Directions in Antarctic Science*

**SCAR is embarking on a unique and exciting project to identify the most important and compelling questions in Antarctic and Southern Ocean science over the next two decades.**

A collective, community-based vision of the 100 highest priority scientific questions will be developed to assist in strategic planning; influence future directions in Antarctic research; highlight opportunities for collaborations and synergies; identify future critical infrastructure, logistical, and technological needs; and inform international decisions about investments in the Antarctic scientific enterprise. For this project to be successful, we need your opinion and insight on what are or will be the scientific questions that, once answered, will measurably improve our understanding of Antarctica and the Southern Ocean and its connections to the Earth and climate systems and beyond.

For further details, please visit the Horizon Scan website: http://www.scar.org/horizonscanning/

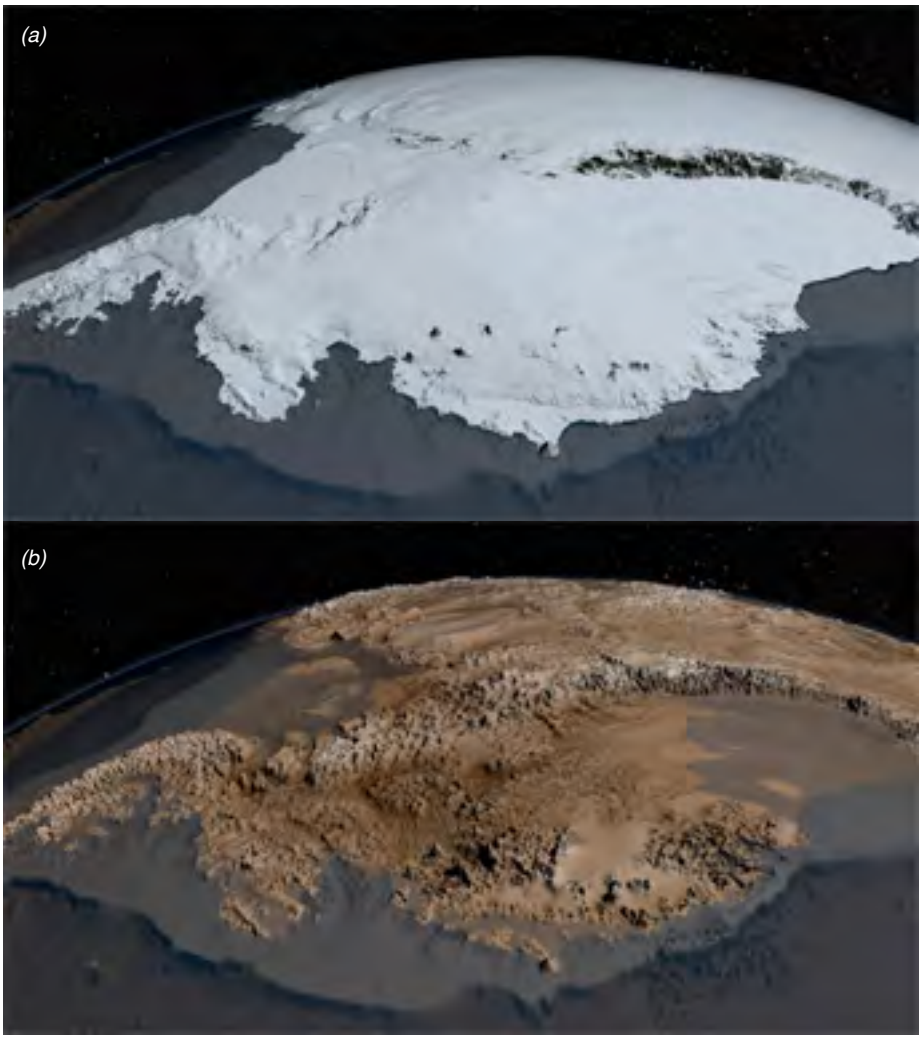
# *SCAR focus on* . . . . New Products: IBCSO and Bedmap2

## *Bedmap2 - Improved ice bed, surface and thickness datasets for Antarctica*

**Bedmap2 is a new suite of gridded products describing surface elevation, ice-thickness and the sea floor and subglacial bed elevation of the Antarctic south of 60°S.** These products were derived using data from a variety of sources, including many substantial surveys completed since the original Bedmap compilation (Bedmap1) in 2001. In particular, the Bedmap2 ice thickness grid is made from 25 million measurements, over two orders of magnitude more than were used in Bedmap1.

In most parts of Antarctica, the subglacial landscape is visible in much greater detail than was previously available and the improved data coverage has in many areas revealed the full scale of mountain ranges, valleys, basins and troughs, only fragments of which were previously indicated in local surveys. The derived statistics for Bedmap2 show that the volume of ice contained in the Antarctic ice sheet (27 million km$^3$) and its potential contribution to sea-level rise (58m) are similar to those of Bedmap1, but the Bedmap2 compilation highlights several areas beneath the ice sheet where the bed elevation is substantially lower than the deepest bed indicated by Bedmap1. These products, along with grids of data coverage and uncertainty, provide new opportunities for detailed modelling of the past and future evolution of the Antarctic ice sheets.

A total of 60 authors from 35 institutions in 14 countries were involved in the production of the Bedmap2 publication, which is available from the website of the journal *The Cryosphere* (http://www.the-cryosphere.net/7/375/2013/tc-7-375-2013.pdf).




*(a) The surface of the Antarctic ice sheet and (b) the underlying topography from Bedmap2. Images: NASA's Goddard Space Flight Center*

More information is available on the Bedmap2 website: http://www.antarctica.ac.uk/bas_research/our_research/az/bedmap2/index.php

## *SCAR Merchandise*

**Did you know that SCAR has a number of items for sale on its website, with prices which include worldwide delivery?**

In addition to the original SCAR tie, we now have two new designs, handmade in 100% silk and costing just £15 each (see http://www.scar.org/merchandise/ for more details). We are currently in the process of commissioning a fabulous scarf, which should be available later in the year. Watch this space for more details!

For some time, two major SCAR publications have been available to purchase. '*Antarctic Climate Change and the Environment*', published in 2009, provides the first comprehensive review of the state of Antarctica's climate and its relationship to the global climate system. The full-colour volume is freely available to download (http://www.scar.org/publications/occasionals/acce.html) but hard copies may be purchased for £30 (includes black and white illustrations only).

The SCAR History '*Science in the Snow - Fifty years of international collaboration through the Scientific Committee on Antarctic Research*' provides a broad overview of SCAR's principal activities as well as a guide to major scientific initiatives and developments over its 50 year history. Costing £24, it includes many colour photographs of SCAR activities.

For more information on both publications, see http://www.scar.org/publications/purchase/.

# News from SCAR

## New report highlights the complexity of climate change across the Antarctic


**A new report by the Scientific Committee on Antarctic Research (SCAR) reveals that while large climatic changes are taking place in parts of the Antarctic, such as the Antarctic Peninsula and West Antarctica, much of the continent has experienced little change.** Such a pattern is consistent with the impact of the ozone hole and influences from the tropical Pacific Ocean, such as El Nino.

Published in April in the journal *Polar Record*, the Antarctic Climate Change and the Environment (ACCE) report provides an update on the scientific advances made since the last report in 2009.

Important areas in which the science has rapidly advanced include the debate on whether the Antarctic ice sheet is growing or shrinking, and separating the signals of human-induced change from natural variations in the climate system.

Professor John Turner, editor of the ACCE update, said "the ACCE update allowed us to bring many of the rapidly advancing topics of Antarctic Science up to date and produce a handy summary for people who want to know the latest advances in the science."

A short video interview introducing the report, by the editor Prof. John Turner, is available on YouTube.

For more information, visit the SCAR ACCE Report page on the SCAR website (http://www.scar.org/publications/occasionals/acce.html) or read the article in *Polar Record*: http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8896603

## *SCAR renews agreements with APECS, CliC and IACS*

**During the Arctic Science Summit Week in Krakow, Poland, the SCAR President, Jeronimo Lopez-Martinez, signed three important agreements renewing SCAR's commitment to work with our partners** from the Association of Polar Early Career Scientists (APECS), the WCRP Climate and Cryosphere Project (CliC) and the International Association of Cryospheric Sciences (IACS). The individual agreements may be viewed via our Partnerships page (http://www.scar.org/about/partnerships/).

Partnerships with organizations with complementary skills, technologies and interests bring added value to SCAR's activities. Such partnerships support SCAR's goals to provide authoritative scientific advice to policy makers, expand its advisory sphere of influence on global issues, develop the capacity of students and early career scientists, and encourage cooperation with Arctic counterparts.

*David Hik (IASC President), Alexey Pavlov (APECS Director) and Jerónimo López- Martínez (SCAR President) after signing the MoU between SCAR, IASC and APECS.*
*Photo credit: Volker Rachold*

## International Forum on '*Polar Data Activities in Global Data Systems*'

**An International Forum on '*Polar Data Activities in Global Data Systems*' will take place at the National Museum of Nature and Science in Tokyo, Japan on 15–16 October 2013.**

To manage the considerable data legacy of the International Polar Year (IPY), National Antarctic Data Centres under SCAR initiated several dedicated data-services. To construct an effective framework for long-term stewardship, data must be made available promptly, and adequate technologies should be employed (e.g., a repository service, such as the Polar Information Commons (PIC)).

In addition to activities conducted within the communities of SCAR and the International Arctic Science Committee (IASC), stronger links must be established in the post-IPY era with other crosscutting scientific data-management bodies under the umbrella of the International Council for science (ICSU), namely, the Committee on Data for Science and Technology (CODATA) and the World Data System (ICSU-WDS). To this end, SCAR's Standing Committee on Antarctic Data Management (SCADM), the WDS Scientific Committee, and IASC are planning a Joint International Forum on '*Polar Data Activities in Global Data Systems*'.

The Forum will address effective polar data management, including submission of metadata and data, sharing of data to facilitate new interdisciplinary science, and long-term preservation and stewardship of data at the international level. To ensure the IPY data legacy, presentations on the successes and challenges encountered during IPY will highlight not only the best practices but also the shortcomings. This event is open to all scientific disciplines, and interdisciplinary data management topics are especially encouraged. A significant outcome of the Forum will be the development of a new strategy and structure for the Arctic Data Network under the auspices of SAON, IASC, and the Arctic Council. Discussions involving the different communities will provide a strong foundation to forge interdisciplinary connections and explore new horizons for polar data management. In particular, an updated plan for polar data archives, including as the PIC cloud system, will be discussed.

For more information about the Polar Data Forum, please visit the website:
http://www.polar-data-forum.org/

# News from SCAR

## Prof Martin Siegert awarded the 2013 Martha T Muse Prize

**Professor Martin Siegert of the University of Bristol has been awarded the 2013 Muse Prize for his innovative research on Antarctic subglacial lakes and the reconstruction of Antarctic glacial history.** His research in this field is multidisciplinary and collaborative, and has received significant world-wide attention, which Siegert has cultivated to promote public awareness of Antarctic earth and environmental sciences.

He has maintained a successful and diverse research programme, involving multiple multidisciplinary international collaborations. His work has supported the development of early career scientists (e.g. his airborne geophysics research, and his convening of major international meetings), international collaborations (e.g. the ICECAP and subglacial lakes activities) and the public understanding of science (through outreach work on subglacial lakes, and in international symposia).

The venue of the Prize Ceremony will be announced at a later date on the Muse Prize website: http://www.museprize.org/

*Prof Martin Siegert at Lake Ellsworth*
*Image: http://www.ellsworthlive.org.uk/*

## SCAR Lecture to the 2013 Antarctic Treaty Meeting now available

**The 2013 Antarctic Treaty Science Lecture, given by Prof Chuck Kennicutt and jointly authored with Prof Jemma Wadham, '*Probing the Limits of Technology: Exploration of Subglacial Aquatic Environments*', is now available to download** (http://www.scar.org/treaty/atcmxxxvi/).

Antarctic Subglacial Aquatic Environments (SAEs) are recognized as central to many processes that have shaped the polar ice sheets both today and in the past. They include a range of features that differ in geologic setting, age, evolutionary history, hydrological conditions and size, and include subglacial lakes, ponds, swamps, intermittently flowing rivers and thick sediments. These environments are "natural" earth-bound macrocosms, which in some instances trace their origins to a time before Antarctica became encased in ice.

Antarctic SAEs remain the least explored sector of the cold biosphere, yet are now known to be viable habitats for microbial life despite the harsh environmental conditions. Within these sub-surface aquatic environments, microbial life drives chemical weathering, which in turn exports dissolved nutrients and carbon to downstream ecosystems and greenhouse gases to the atmosphere. The full spectrum of sub-ice environments present beneath the Antarctic continent provides an unparalleled opportunity to explore and study one of Earth's last frontiers and decipher fundamental clues to the planet's history, climate and biology.

The last 10 years has witnessed a dramatic increase in the profile of Antarctic SAEs and the impetus for their study. This raised profile was linked strongly to the activity of SCAR via SALE, AG-CCER-SAE and ATHENA. It culminated in the funding of four campaigns to access and directly sample SAEs (the Lake Vostok, WISSARD, Lake Ellsworth and BEAMISH programmes). The next phase of Antarctic SAE exploration is very likely to be shaped by the availability of technology for addressing core science goals. This lecture aims first, to identify the science questions driving technology development for the future exploration of subglacial aquatic ecosystems and second, to present the current status of available technologies for sub-Antarctic science.

A paper further expanding on the work of the SCAR ATHENA Expert Group (Advancing TecHnologies and ENvironmental stewardship in Antarctica) was submitted to the Treaty Meeting: IP082 - Advancing technologies for exploring subglacial Antarctic aquatic ecosystems (SAEs). See http://www.scar.org/treaty/atcmxxxvi/ to view all the papers submitted by SCAR.

## UNFCCC talk on Antarctica and Global Climate

**A talk by the SCAR Executive Director on '*Antarctica and Global Climate'*, was given at the UNFCCC side event '*Rapid Climate Change in Polar and Mountain Regions'* at the Bonn Climate Change Meeting in June.** It is available to download (note, it is ~100 MB) from:

For PCs: https://t.co/hX0okM4lLz
For MACs: https://t.co/eo8mS1YwDg

For coverage of selected side events at the Bonn Climate Change Conference, including Mike Sparrow's talk, please visit the IISD Reporting Service website: http://www.iisd.ca/climate/sb38/enbots/12jun.html

*SCAR Past President, Chuck Kennicutt, who also gave the 2013 Antarctic Treaty Science Lecture*

## Videos of SCAR Past President Chuck Kennicutt

**Videos of the SCAR Past President Chuck Kennicutt discussing Antarctica and the Southern Ocean, the Antarctic Treaty System and human impacts on the polar regions have been released on Askimo:**

***Antarctica and the Southern Ocean***
http://www.askimo.com/pages/PlayVideo.aspx?vid=4113

***The Antarctic Treaty System***
http://www.askimo.com/pages/PlayVideo.aspx?vid=4114

***Human Impact on Polar Regions***
http://www.askimo.com/pages/PlayVideo.aspx?vid=4115

# SCAR and Antarctic Science

## SCAR '*Biogeographic Atlas of the Southern Ocean*' shares Cosmos Prize

**The Cosmos Prize, established by the International Osaka Expo'90 Commemorative Foundation, was awarded to the Census of Marine Life (CoML), which included the regional programme Census of Antarctic Marine Life (CAML) supported by SCAR**.

The prize money from this prestigious international award was in turn awarded to a few select projects that represent significant CoML legacies. The SCAR '*Biogeographic Atlas of the Southern Ocean*', a joint output of CAML and the SCAR Marine Biodiversity Information Network (SCAR-MarBIN), was selected and shared the prize.

Biogeographic information is of primary importance for discovering marine biodiversity hotspots, detecting impacts of environmental changes, modelling future distributions, monitoring biodiversity, and supporting conservation and management strategies. The extensive exploration and assessment of biodiversity by CAML, and the intense compilation and validation efforts of Southern Ocean biogeographic data by the SCAR-MarBIN/biodiversity.aq networks, provided a unique opportunity to assess and synthesize the current knowledge on Southern Ocean biogeography.

The Atlas covers the geographic distribution patterns and processes of the phyto- and zooplankton, macroalgae and zoobenthos, nekton, birds and mammals south of 40°S. It will significantly contribute to the modelling of biogeographic distributions in the context of environmental changes.

More than 120 scientists (biogeographers, taxonomists, ecologists, molecular biologists, IT experts, environmental dataset providers, modellers, GIS experts) have contributed to the Atlas, which will be published under the aegis of SCAR in the latter part of 2013. A dynamic online version hosted by biodiversity.aq will follow.

## Antarctic nematodes and climate change

**Climate change affects not only air temperature and sea levels, but soil as well. Diana Wall, a previous SCAR medal winner, is on an award-winning quest to reverse the damage.**

The frozen desert valleys of Antarctica are among the world's most inhospitable environments. The landscape is so barren that just 30 years ago, experts did not think it could support life. But beneath the surface, microscopic worms called nematodes thrive in a unique ecosystem - and they are helping researchers understand the effects of climate change.

Diana Wall has spent two decades studying Antarctic nematodes, ground-breaking work that this year earned her one of science's top awards - the Tyler Prize for Environmental Achievement.

For more information, see the article on the *BBC News Magazine* website: http://www.bbc.co.uk/news/magazine-22177221

*Lake Chad and the Seuss Glacier, McMurdo Dry Valleys*
*Photo Credit: Rebecca Witherow*
*© 2006 McMurdo Dry Valleys LTER*

## Ice-sheet mass balance and climate change

**A recent key paper has been published in the journal *Nature*, following from the ISMASS workshop held at the XXXII SCAR Open Science Conference and Meetings, in Portland, Oregon in July 2012.**

Since the 2007 Intergovernmental Panel on Climate Change Fourth Assessment Report, new observations of ice-sheet mass balance and improved computer simulations of ice-sheet response to continuing climate change have been published.

Whereas Greenland is losing ice mass at an increasing pace, current Antarctic ice loss is likely to be less than some recently published estimates. It remains unclear whether East Antarctica has been gaining or losing ice mass over the past 20 years, and uncertainties in ice-mass change for West Antarctica and the Antarctic Peninsula remain large. The review discusses the past six years of progress and examines the key problems that remain.

For more information, see the full review article in *Nature:* http://www.nature.com/nature/journal/v498/n7452/full/nature12238.html

## Further breakup of Wilkins Ice Shelf

*A satellite image showing floating chunks of ice from the 2008 Wilkins Ice Shelf collapse. Credit: National Snow & Ice Data Center*

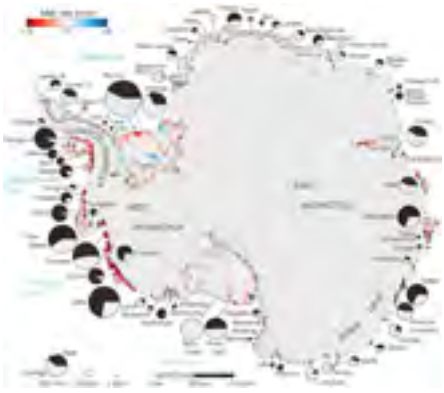
**An ice shelf is a thick plate of ice attached to a coastline on one side and floating over the ocean on the other side.** Many ice shelves fringe Antarctica, including the Wilkins Ice Shelf on the Antarctic Peninsula, which underwent a series of breakup events in 1998, 2008, and 2009.

Just as earthquakes can sometimes leave landscapes more prone to future quakes, the breakups on the Wilkins Ice Shelf left it vulnerable to further disintegration. In addition, the sea ice that had long pressed the shelf up against the coastline moved out, putting the remnants of the shelf in direct contact with open water. Ocean waves went to work on the ice, and in early 2013 the fracturing continued.

For further details, see the article on the NASA Earth Observatory website: http://earthobservatory.nasa.gov/IOTD/view.php?id=81174&src=eoa-iotd

# Antarctic Science

## Oceans melt Antarctica's ice from below



*Basal melt rates of Antarctic ice shelves colour coded from < –5 m/year (freezing) to > +5 m/year (melting) and overlaid on a 2009 MODIS mosaic of Antarctica*

**More than half of the melting of Antarctica's ice occurs at just ten small ice shelves.**

Ice shelves are portions of the larger ice sheet that extend over the ocean, floating on seawater. Conventional wisdom once held that calving, the break off of large chunks of ice, was the main factor driving ice-shelf dynamics, but recent research has underscored the role of melting from below, or 'basal' melting.

Capitalizing on newly available monitoring data as well as recent modelling, a team of scientists led by Eric Rignot at the University of California, Irvine, has for the first time quantified this effect for the entire continent. The results, which appear in *Science*, suggest that warm ocean currents are melting ice shelves predominantly at certain locations around the continent, to an extent that accounts for 55% of the annual meltwater. The findings will help scientists to tackle larger questions about how the Antarctic ice sheet might change in future and its contribution to global sea-level rise.

Rignot, E., Jacobs, S., Mouginot, J. & Scheuchl, B. Science DOI: 10.1126/science.1235798

For more information, see *Nature News* (http://www.nature.com/news/oceans-melt-antarctica-s-ice-from-below-1.13200) or read the full *Science* paper (http://www.sciencemag.org/content/early/2013/06/12/science.1235798).

## Antarctic Peninsula melting season is getting longer

**The summer melting season in the Antarctic Peninsula has lengthened over the last 60 years, new research shows. This is contributing to sea-level rise, and may be linked to the rapid break-up of ice shelves in the area.**

The Antarctic Peninsula, a mountainous finger of land pointing northwards towards South America, is warming much faster than the rest of Antarctica. Temperatures have risen by almost 3°C since the 1950s – three times faster than the global average. Scientists think this is because local westerly winds are getting stronger, pushing warmer air from the sea up and over the peninsula. Unusually for Antarctica, summer temperatures in the warmest few months are often high enough for snow to melt.

Melted snow running into the sea causes sea-levels to rise, but the longer melting season can have other important effects. Meltwater gathers in cracks in floating ice shelves, where the sheer weight of water can enlarge the cracks and shatter the ice, leading to retreat or collapse of the ice shelf.

With the physical barrier of the ice shelf removed, glaciers can flow into the sea faster, with a further impact on sea level. Also, melting and refreezing causes snow layers to become thinner and denser, affecting the height of the snow surface above sea level. Scientists need to know this so they can interpret satellite data correctly.

For more information, see the item on the *NERC Planet Earth Online* website: http://planetearth.nerc.ac.uk/news/story.aspx?id=1424
or read the full article in the *Journal of Geophysical Research: Earth Surface:* http://onlinelibrary.wiley.com/doi/10.1029/2012JF002559/abstract

## Important role for ocean warming in Antarctic sea-ice expansion

**Global warming is expanding the extent of sea ice around Antarctica in winter in a paradoxical shift caused by cold plumes of summer melt water that re-freeze fast when temperatures drop, a recent study has shown**.

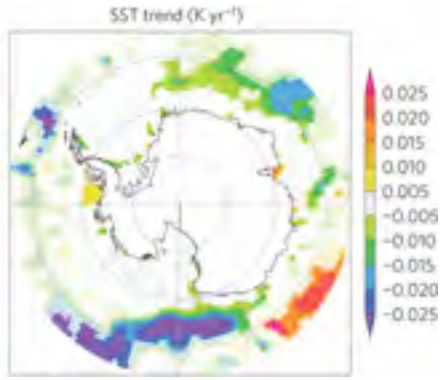
An increasing summer thaw of ice on the edges of Antarctica, twinned with less than expected snowfall on the frozen continent, is also adding slightly to sea level rise in a threat to low-lying areas around the world, the study said.

Scientists have been struggling to explain why sea ice around Antarctica has been growing, reaching a record extent in the winter of 2010, when ice on the Arctic Ocean at the other end of the planet shrank to a record low in 2012.

"Sea ice around Antarctica is increasing despite the warming global climate," said Richard Bintanja, lead author of the study at the Royal Netherlands Meteorological Institute. "This is caused by melting of the ice sheets from below," he said of the findings in the journal *Nature Geoscience*.

Ice is made of fresh water and, when ice shelves on the fringes of Antarctica thaw in summer because of upwellings of warming sea water, the meltwater forms a cool layer that floats on the denser, warmer salty sea water below, the study said. In winter, the melt water readily turns to ice because it freezes at zero degrees Celsius, above sea water at -2C (28.4F).

For more information, see the item on the Reuters website (http://www.reuters.com/article/2013/03/31/us-climate-antarctica-idUSBRE92U05A20130331) or read the original article in *Nature Geoscience* (http://www.nature.com/ngeo/journal/v6/n5/full/ngeo1767.html).




*Sea surface temperature trends over the period 1985–2010. Colouring (bright or faint) indicates whether the trends are significant.*

# Antarctic Science

## Rapid climate change and the role of the Southern Ocean

**Research published in April, in the journal *Nature Geoscience*, concludes that oceanographic reorganisations and biological processes are linked to the supply of airborne dust in the Southern Ocean** and this connection played a key role in past rapid fluctuations of atmospheric carbon dioxide levels, an important component in the climate system.

The scientists studied a marine sediment core from the Southern Ocean and reconstructed chemical signatures at different water depths using stable isotope ratios in the shells of foraminifera, single-celled marine organisms. They found that the chemical difference between intermediate level and deep waters over the last 300,000 years closely resembled the changes in atmospheric carbon dioxide levels and the input of windblown dust.

For further details, see the *Science Daily* website (http://www.sciencedaily.com/releases/2013/04/130408133752.htm) or read the full article in *Nature Geoscience* (http://www.nature.com/ngeo/journal/v6/n6/full/ngeo1782.html).

## Organisms in 33.6 million year old ice pack evolved to survive

**Researchers publishing a paper in the journal *Science* in May have found, through Antarctic planktonic ice core examinations, that the continental ice cap formed more than 33 million years ago.**

The ice cap was formed during the Oligocene (33.6 million years ago), according to carbon dating of the research data. Prior to the Oligocene, the southern continent had a warm tropical climate, teeming with life. However, when the cold came, most life forms died. Those that were able to adapt to the change, survived throughout time to the present age.

The paleoclimatic information was obtained through the work of the Integrated Ocean Drilling Program (IODP) expedition, which bore down into the sediment strata of the Antarctic depths to the preserved fossils. Carlota Escutia, co-chief officer of the new SCAR SRP Past Antarctic Ice Sheet Dynamics (PAIS), said the "fossil record of dinoflagellate cyst communities reflects the substantial reduction and specialization of these species that took place when the ice cap became established and, with it, marked seasonal ice-pack formation and melting began."

Dinoflagellates evolved into more simplified organisms enabling them to survive the formation of the Antarctic ice cap as well as thrive in the continual melting and freezing of the ice sheet during the seasonal changes. Over the course of millions of years, the dinoflagellates continued to evolve to assume their present-day form.

As the ice-pack melts during the approaching summer, an increase in productivity of endemic plankton communities occurs. The ice melt frees the nutrients it has accumulated throughout the previous year and releases it for consumption by plankton. "This phenomenon influences the dynamics of global primary productivity," said Dr. Escutia in a statement.

The dinoflagellate communities have continued to evolve throughout history of the ice pack. However, Escutia thinks: "the great change came when the species simplified their form and found they were forced to adapt to the new climatic conditions."


*Antarctic topography, circum-Antarctic paleogeography at 34 Ma and the location of sites considered in this study. Light blue areas represent shelf environments; green areas represent Antarctic lowland areas. The black circle indicates 60°S.*

For more information, read the item on the *Red Orbit* website (http://www.redorbit.com/news/science/1112857830/antarctic-ice-pack-formed-millions-years-organisms-evolve-052813/) or read the original paper in *Science* (http://www.sciencemag.org/content/340/6130/341.abstract).

## Building block for life found in Mars meteorite

**Scientists have found a potential building block for life in a Martian meteorite recovered from Antarctica.**

Parts of the rock contain rich concentrations of boron, which biochemists suspect played a key role in the development of ribonucleic acid, or RNA.

Read more on the *News Discovery* website: http://news.discovery.com/space/asteroids-meteors-meteorites/mars-meteorite-life-building-blocks-130617.htm

## Puzzle of why penguin cannot fly 'solved'

**The puzzle of why the penguin is unable to fly may have finally been solved. Researchers believe that the bird's underwater prowess may have cost it its ability to fly.**

A study published in the *Proceedings of the National Academy of Sciences*, looked at seabirds closely related to the penguin. The study's authors confirmed that a wing that is good for flying cannot also be good for diving and swimming.

Professor John Speakman, from the University of Aberdeen and the Chinese Academy of Sciences, said: "Like many people, I've always been interested in penguins, and seeing them do these phenomenal marches across the ice, I've often thought: 'Why don't they just fly?'"

For more information, see the item on the *BBC News - Science and Environment* site (http://www.bbc.co.uk/news/science-environment-22601223)
or read the full article on the *PNAS* website (http://www.pnas.org/content/early/2013/05/16/1304838110).

# Antarctic Science

## Big brains may help baby seals survive under ice

**Weddell seals (Leptonychotes weddellii) are the only mammal that dares to swim long distances under sea ice, travelling up to 20 kilometres in hour-long bursts as they scan for air holes and an eventual exit somewhere in the midst of vast Antarctic sheets**. There, mothers give birth so that their pups will be safe from leopard seals and killer whales.

But how do those pups learn to navigate the risky underwater terrain so quickly? They're born with big brains, according to a study published online and in the journal *Marine Mammal Science*.

Researchers measured 12 carcasses and found that the brains of newborn pups are 70% the size of adult brains — the largest percentage of any mammal. In comparison, the brains of human babies are only 25% the size of adults. Good thing our trekking doesn't start until much later in life!

For more details, see the *Science Shot* (http://news.sciencemag.org/sciencenow/2013/05/scienceshot-big-brains-may-help-.html) or read the full article in *Marine Mammal Science* (http://onlinelibrary.wiley.com/doi/10.1111/mms.12033/abstract).

*Baby Weddell Seal in Adélie Land, Antarctica*
*Photo © Samuel Blanc / www.sblanc.com*

## New deep-sea fish species found in Antarctica

**To catch Antarctic toothfish, you must bait your hook with Peruvian squid and cast it into the depths of the Ross Sea.**

This is what a team of Ukrainians did on a fishing trip near Antarctica. But sometimes, Mother Nature trips you up. Sometimes, you catch a hopbeard plunderfish.

*The Hopbeard Plunderfish (Pogonophryne neyelovi). Credit: Gennadiy Shandikov & Richard Eakin / ZooKeys*

In 2009-10, Ukrainian mariners happened to pull up three fish that looked unfamiliar. Further analysis found that they were a previously undiscovered species, dubbed the hopbeard plunderfish and described in a study published online on 29 April in the journal *ZooKeys*. The fish bear the scientific name Pogonophryne neyelovi.

The strange-looking denizens of the deep have brownish-splotched bodies and are shaped somewhat like tadpoles, especially when young, according to the study. They have sharp dorsal fins that extend along the top of their bodies and strange "barbels," which resemble dirty Q-tips, that extend from their chins.
The longest of the three specimens measured 14 inches (35.5 centimetres). And they really like to live in the deep — they were pulled from depths of up to 4,560 feet (1,390 metres). Currently, next to nothing is known about their behaviour, diet or what they do down there in the depths.

For more details, please read the article on the *Live Science* website (http://www.livescience.com/29456-strange-new-fish-antarctica.html?cmpid=514645) or read the full paper in *ZooKeys* (http://www.pensoft.net/journals/zookeys/article/4295/abstract/).

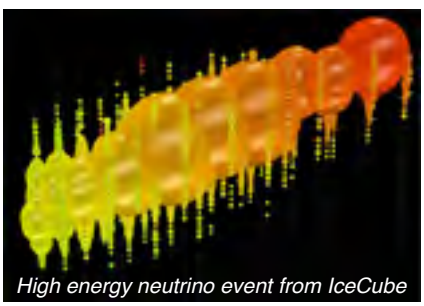
## Antarctic Neutrino Observatory detects unexplained high-energy particles

**Two ultra-high-energy neutrinos, captured by the IceCube experiment at the South Pole Neutrino Observatory, probably came from outside the Galaxy**, according to an analysis posted by the collaboration in April. They are the two highest-energy neutrinos ever observed.

IceCube consists of 86 strings of detectors, sunk in a cubic kilometre of ice near the South Pole, which pick up the light emitted when neutrinos and other particles pass through.

Scientists unveiled preliminary data showing that they also registered the signal of 26 additional high-energy neutrinos. The newfound neutrinos are somewhat less energetic than the two record-setters but nonetheless appear to carry more energy than would be expected if created by cosmic rays hitting the atmosphere — a prodigious source of neutrinos raining down on Earth. The particles thus may point to unknown energetic astrophysical processes deeper in the cosmos.

For more information, see the items on the *Nature News Blog* (http://blogs.nature.com/news/2013/04/icecube-neutrinos-came-from-outer-space.html) and the *Scientific American* website (http://www.scientificamerican.com/article.cfm?id=icecube-neutrinos-space) or visit the IceCube Neutrino Observatory website (http://icecube.wisc.edu/).



*High energy neutrino event from IceCube*

## Yeti crab hitched ride on ocean super-highway

**A hairy crab, named after actor David Hasselhoff, hitched a ride on an ocean "super-highway" to cross from the Pacific to the Atlantic millions of years ago.**

Roterman et al propose that the "Hoff crab" probably originated around the vents on mid-ocean ridges in the eastern Pacific Ocean. It then expanded into the Atlantic through the Drake Passage that separates South America and Antarctica, spreading along now-extinct volcanic vent regions and exploiting the Antarctic Circumpolar Current (ACC), which flows clockwise west to east around Antarctica, through the Drake Passage.

For more information, see *BBC News - Science and Environment* (http://www.bbc.co.uk/news/science-environment-22952728) or read the full paper in the *Proceedings of the Royal Society B*:
http://rspb.royalsocietypublishing.org/content/280/1764/20130718

# Polar News and Announcements

## Obituary: Eberhard Fahrbach

**Eberhard Fahrbach, a tropical and polar oceanographer who worked at the Alfred Wegener Institute (AWI) in Germany, passed away recently after many months of illness at the age of 65.**

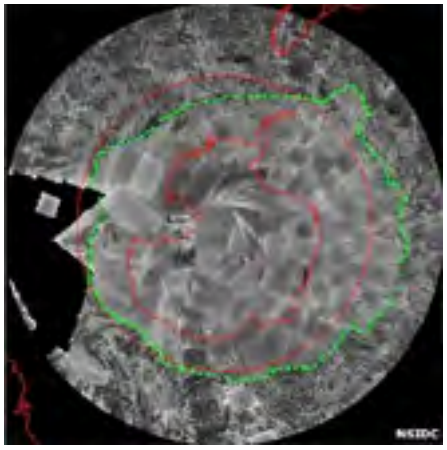
Eberhard was a dedicated scientist. With huge enthusiasm and energy, he greatly increased the body of observations of the polar oceans, which he considered a prerequisite for understanding our planet.

As well as making numerous important contributions to international research and to AWI, Eberhard was also involved with many SCAR activities, including serving as the first chair of the SCAR/SCOR Oceanography Expert Group (now the SOOS Steering Committee - http://www.soos.aq/index.php/about-us/ssc).

Science was very important to him, but even more so were the people surrounding him: onboard his numerous expeditions, at AWI, and in international committees. Marine scientists all around the globe have lost a dear and esteemed friend.

Our thoughts are with his family and friends.

## Earliest satellite maps of Arctic and Antarctic sea-ice



*NSIDC map of Antarctic sea-ice extent in September 1964*

**The earliest satellite maps of Arctic and Antarctic sea-ice have been assembled by scientists.** They were made using data from NASA's Nimbus-1 spacecraft, which was launched in 1964 to test new technologies for imaging weather systems from orbit.

The satellite's old pictures have now been re-analysed to determine the extent of the marine ice at the poles in the September of that year. Regular mapping from space did not begin until 1978. One key finding is that marine floes around the White Continent in the 1960s were probably just as extensive as they are today.

The new snapshot, published in the journal *The Cryosphere*, therefore helps put current ice conditions into a longer-term context, say researchers at the US National Snow and Ice Data Centre (NSIDC).

It is also just a fascinating story of how old scientific data can be given a new lease of life.

For more information, please see the item on the *BBC News - Science and Environment* website (http://www.bbc.co.uk/news/science-environment-22271972) or read the full article in *The Cryosphere* (http://www.the-cryosphere.net/7/699/2013/tc-7-699-2013.html).

## Recent Publications on the History of Antarctic Expeditions from Germany and Russia

**A shortened reprint of Erich vonDrygalski's travel account of the first German South-Polar Expedition 1901-1903 has recently been published.**

Edited by Cornelia Lüdecke, chair of the SCAR History Expert Group, it includes her introduction giving the background of the expedition.


Erich von Drygalski, Zum Kontinent des eisigen Südens - Die erste deutsche Südpolarexpedition 1901-1903. Herausgegeben von Cornelia Lüdecke, Edition Erdmann,
Marix Verlag, Wiesbaden (2013), 366 S.

ISBN: 978-3-86539-856-7

Cost: €24.00

**Soviet historiography dealing with the progress, significance and results of the First Russian Antarctic expedition (1819-1821) was remarkably inconsistent in the 1920s to1940s.**


Despite the dominant ideology of the Soviet state, research methods, interpretative models, analysis and assessments of Soviet experts - historians and geographers - concerning the discovery of Antarctica by the Bellingshausen/Lazarev expedition were not unequivocal, even after the General meeting of the Geographical Society of the USSR held in Leningrad in 1949.

Many of these experts overtly or covertly disputed the assertion that Antarctica was discovered by the First Russian Antarctic expedition. An attempt to uncover their motives and reasons is the purpose of this monograph by Alexander Ovlashchenko.

## APECS News and Updates

**Spring 2013 has been quite active in terms of APECS news and activities.** APECS participated in the Antarctic Treaty Consultative Meeting (ATCM) on May 20-29 in Brussels, Belgium, where APECS Belgium organized a 2-day education and outreach (E&O) event – a Science Fair for the wider audience. During this event young scientists led experiments and transferred their enthusiasm about the poles and science to the general public. This event was organized with the kind support of the Belgian Science Policy Office and SCAR, and brought in up to 400 visitors and participants. Belgium set a great example of how we can work to interject E&O activities into these bigger scientific forums and we look forward to similar events coordinated by other national branches of APECS. For details about the Science Fair, go to http://apecs.is/atcm-brussels-science-fair. The next ATCM will take place in Brazil and due to the success of E&O during the ATCM in Belgium, APECS-Brazil has now been invited to participate in the general organization of the event by the Ministry of External Relations.

Also in May, Tosca Ballerini, an APECS representative to the Southern Ocean Observing System (SOOS) Scientific Steering Committee, participated in the first Asian workshop of the SOOS in Shanghai, China where she organized a broadcast of the workshop. The recording will be made available online soon.

At the beginning of June, the Climate and Cryosphere Project (CliC) initiated a sea ice modelling and observing workshop that brought together Arctic and Antarctic sea ice scientists to discuss the gaps in knowledge found with sea ice data. APECS members worked in conjunction with senior sea ice modellers and observers from the Arctic (Ice Watch) and the Antarctic (ASPeCt) to develop targeted activities within working groups. For more information, go to http://www.climate-cryosphere.org/meetings/seaice2013.

**We are excited to announce two great opportunities for APECS members from SCAR.** APECS Council members Tristy Vick-Majors and Anton Van de Putte will be representing APECS on the International Scientific Organizing Committee (ISOC) for the SCAR Open Science Conference (OSC) that will take place in Auckland, New Zealand from 25-29 August 2014 (read more at http://apecs.is/apecs-reps-isoc-scar-osc-2014). Anton and Tristy are working with Sira Engelbertz, our APECS representative to the conference Local Organizing Committee, to make the upcoming SCAR OSC a great venue for Antarctic early career researchers (ECRs).

We are also glad to announce that another APECS Council member, Alia Khan will be representing APECS as a member of the Antarctic Climate 21 (AntClim$^{21}$) Scientific Research Programme of SCAR. This programme aims to understand Antarctic environmental changes over the 21$^{st}$ Century through quantification of Antarctic climate variability, climate model verification for the Antarctic region, and Antarctic climate projections to 2100 AD. Alia is excited to serve in this role for the next 2 to 3 years. Find out more about Alia at http://apecs.is/alia-khan-antclim21.

**There are a number of upcoming APECS activities with our National Committees scheduled in the next few months.** On June 28, APECS Oceania is organizing a workshop entitled "*Leadership in Science*" during the "*Strategic Science in Antarctica*" Conference. For details go to http://apecs.is/leadership-in-science.

APECS Spain is working on a workshop "*Tips for young researchers: Discovering the life of a Polar researcher*" on July 14, prior to the XIth SCAR Biology Symposium in Barcelona. For more details check http://apecsspain.wordpress.com/.

In late August, APECS will help to bring ECRs to Tromsø, Norway for the interdisciplinary Antarctic Ice Rises Workshop and will hold a panel discussion there. For more info visit http://www.climate-cryosphere.org/meetings/ice-rises-2013 and follow APECS news.

APECS Chile is taking the lead in organizing a one-day APECS workshop during the VII Latin American Congress of Antarctic Science (http://www.inach.cl/clca2013/en/).

On September 1, the Amazon will host "*Antarctica going to the Amazon*", which will involve more than 300 teachers and students from different educational levels of the Amazon region in an APECS-Brazil day of activities on polar science.

The International Polar Week (IPW) takes place from September 15-21, and will integrate ECRs with the general public through polar activities (http://apecs.is/outreach/polar-week/polar-week-september-2013).

Between 17 to 20 September, the Ist Career Development Workshop organized by APECS-Brazil will be held in Rio de Janeiro (http://www.apecsbrasil.com/simposios/i-dc-workshop/). This workshop will be integrated with IPW and will be open to the general public. A traveling multimedia expedition "*The UERJ (Rio de Janeiro State University) at Antarctica*", with the support of APECS-Brazil, will promote scientific activities developed in Antarctica over the past decades by bringing together scientific movies, polar clothing and equipment. The exposition will "travel" through the state of Rio de Janeiro from October 14 to November 14 (http://www.apecsbrasil.com/news/a-uerj-na-antartica/).

**This summer brings other important news** – the transition of the APECS Director. After June 31 2013, our current Director, Alexey Pavlov, is leaving the APECS International Directorate Office in Tromsø (http://apecs.is/news-director-transition) and we expect that a new director will be in place by late August or early September. We would like to thank Alexey for all the great work he has done for APECS in this last year and wish him the best in his future endeavors. Stay tuned for more news!

*Contributed by APECS Belgium, APECS Brazil, APECS Chile, APECS Spain, APECS Oceania, APECS Council and Executive Committee.*

# Forthcoming Events

## International Forum on "Polar Data Activities in Global Data Systems"

***15 - 16 October 2013, National Museum of Nature and Science, Tokyo, Japan***

SCAR's Standing Committee on Antarctic Data Management (SCADM), the World Data System (WDS) Scientific Committee, and the International Arctic Science Committee (IASC) are planning a Joint International Forum. It will address effective polar data management, including submission of metadata and data, sharing of data to facilitate new interdisciplinary science, and long-term preservation and stewardship of data at the international level.

Registration open: **1 July - 30 September**

Abstract submission deadline: **31 July**

For more information, please visit the website: http://www.polar-data-forum.org/

## International Workshop on Antarctic Ice Rises

***26 - 29 August 2013, Tromsø, Norway***

Recent studies have highlighted the important role of the ice rises (grounded ice surrounded by ice shelves), in supporting ice shelves and buttressing upstream glaciers. This is particularly significant in Antarctic coastal regions, seen as crucial foci of continental changes in ice mass balance.

The goal of this international workshop is to develop a summary of the current challenges of ice-rise research and recommend future directions of collaborative interdisciplinary work.

For more details, please visit http://www.climate-cryosphere.org/index.php/meetings/ice-rises-2013/

## AntClim21 Workshop on "Quantification of Antarctic Climate Variability"

***23 - 25 September 2013, Castine, Maine, USA***

The goal of this workshop will be to quantify and understand natural and anthropogenically-forced climate variability and change over the last few hundred years by utilising observational data, proxy records, and climate models.

Attendees will consist of invited scientists working with climate models, paleoclimate data, instrumental measurements and satellite data.

Local arrangements are being made by Prof. Paul Mayewski (paul.mayewski@maine.edu).

## 7th Latin American Congress of Antarctic Science

***4 - 6 September 2013, La Serena, Chile***

The 7th Latin American Congress of Antarctic Science provides the opportunity for the presentation of results of research conducted around Antarctica and its associated ecosystems, and for the formation of multidisciplinary networks and international collaborative work.

For more information, please visit the Congress website: http://www.inach.cl/clca2013/en

## 6th Malaysian International Seminar on Antarctica (MISA6 2013)

***8 - 9 October 2013, Penang, Malaysia***

The theme of MISA6, '*Antarctica: Science and Geopolitics in response to Climate Change*' is in line with the rationale that the Poles play an integral part in the global Earth system as they are the origin of important climatic, biological and physical processes. The programmes scheduled include oral and poster presentations on policy, heritage and legacy, logistics and biological and physical sciences.

For more information, please visit http://misa6.webstarts.com/

SCAR BIOLOGY SYMPOSIUM

## XIIth SCAR Biology Symposium
## 'Life in Antarctica: Boundaries and Gradients in a Changing Environment'

***15-19 July 2013, Barcelona, Spain***

For more information, visit the Symposium website:
**www.icm.csic.es/XIIthSCARBiologySymposium/**

For details of further events, please visit: http://www.scar.org/events/

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