SCAR newsletter

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Welcome to the first SCAR Newsletter of 2013!

Many of us are currently busy preparing for the **Antarctic Treaty meetings**, being held in Belgium in May this year. As part of SCAR's dual mission, we will be submitting several papers on subjects such as the recent update to the SCAR Antarctic Climate Change and the Environment Report (which will be available shortly on the online version of *Polar Record*), the Antarctic Conservation in the 21st Century initiative, an update on Ocean Acidification, progress with the Southern Ocean Observing System (see www.soos.aq), a paper on the technological aspects of subglacial exploration (also the subject of the SCAR Lecture, which will be given by Jemma Wadham of Bristol University) and the SCAR Science Horizon Scan (see the "Focus on…" article in this Newsletter). As well as the meeting itself, APECS-Belgium are organizing a weekend of polar related fun and frolics (on 25th and 26th May) in the middle of the Treaty meetings (see the related article on page 10).

I also wanted to take this opportunity to highlight a couple of SCAR awards. Firstly the popular **SCAR/ COMNAP Fellowships**. These fellowships (of up to $15,000) are designed to encourage the active involvement of early career scientists and engineers in Antarctic scientific research, and to build new connections and further strengthen international capacity and cooperation. This year they have been launched in tandem with the CCAMLR Scholarships. Applications close on 4 June 2013. For further details see: http://www.scar.org/awards/fellowships/information.html.

Another great opportunity is the **Martha T. Muse Prize for Science and Policy in Antarctica**. Sponsored by the Tinker Foundation and administered by SCAR, this is a US$ 100,000 unrestricted award presented to an individual in the fields of Antarctic science or policy who has demonstrated potential for sustained and significant contributions that will enhance the understanding and/ or preservation of Antarctica. Nominations close on 23 May 2013. See www.museprize.org for further details.

Finally, coming up in July we have the **SCAR Biology Symposium** (http://www.icm.csic.es/XIthSCAR-BiologySymposium/) in Barcelona, Spain. Early Bird registration closes at the end of April, so I encourage you to register soon!

Mike Sparrow,

Executive Director, SCAR

A new SCAR flag is flying over the Ridge A international observatory, seen here with the HEAT THz telescope and the essential solar panel. *Image: John Storey*

Highlights in this issue

SCAR focus on . . . . Scanning the Antarctic Science Horizon in 2014

What will Antarctic and Southern Ocean scientists be studying in 2035? Will technologies be so advanced that only occasional "feet-on-the-ground" expeditions will be needed to service continent–wide observing networks? Will space-borne sensors and year-round, 24/7 streaming data nodes tell us all that we need to know to predict planetary responses to forcings? Will interdisciplinary teams of scientists from around the globe deploy to international facilities to conduct experiments that challenge the frontiers of Antarctic and Southern Ocean science? Will policy makers routinely tap into the very latest scientific knowledge to ensure informed decision-making and environmental stewardship?

Are you, your research team, your students, and your national programmes positioned to be part of a dynamic, new world of science?

What can and should the Antarctic community be doing today to pave the way for tomorrow?

image: Mike Sparrow

SCAR invites you to be part of *"The 1st SCAR Antarctic and Southern Ocean Science Horizon Scan"*.

SCAR's missions to encourage and facilitate excellence in Antarctic science and provide authoritative scientific advice to policy makers can only be accomplished if the organization stays abreast of the latest developments in science that is being, and will be, conducted in the southern Polar Regions. A community-based "Science Horizon Scan" will be used for the first time to develop an international, community-wide view of the 100 most important scientific questions in Antarctic and Southern Ocean science in the next two decades.

"Horizon Scanning" is an iterative approach to process hundreds of scientific questions posed by the community through a series of methodical steps to arrive at a prioritized list of the most important and compelling scientific questions. The Science Horizon Scan will consult with the world's Antarctic scientists, policy makers, leaders, and visionaries to identify the most important scientific questions that will, or should, be addressed by research in Antarctica over the next two decades. Science Horizon Scan outcomes will assist in aligning international programmes, projects and resources to effectively support Antarctic and Southern Ocean science in the coming years.

The Scan process also provides an unprecedented opportunity to enhance existing partnerships, forge new relationships, mentor early career scientists, and communicate the importance of Antarctic and Southern Ocean science to the public and policy makers. Wide calls to the community for nominations for Scan invitees and to pose scientific questions will only work if you and your community see value in the exercise and choose to participate.

There will be many opportunities for participation in the process. The first opportunity will be a community-wide request to pose questions that you believe are most important in advancing Antarctic and Southern Ocean science. The second will be a request for your assistance in identifying those you believe should attend the Horizon Scan Retreat in 2014 where final prioritization of questions will occur.

Keep an eye out for opportunities for you to join in and influence the outcomes of this important community-based effort. The credibility and impact of the Scan will be largely dependent on the enthusiasm and the level of community support and participation!

For more information, please visit the SCAR website:
http://www.scar.org/horizonscanning/

News from SCAR

SCAR and COMNAP Antarctic Research Fellowships and CCAMLR Scientific Scholarships

SCAR, COMNAP (the Council of Managers of National Antarctic Programs) and CCAMLR (the Commission for the Conservation of Antarctic Marine Living Resources) are working together to attract talented early career researchers, scientists, engineers and other professionals to strengthen international capacity and cooperation in fields such as climate, biodiversity, conservation and astrophysics research.

SCAR and COMNAP have again joined forces to launch fellowships for early career researchers. The SCAR and COMNAP fellowships are worth up to US$15,000 each and up to five fellowships in total are on offer for 2013. The fellowships enable early career researchers to join a project team from another country, opening up new opportunities and often creating research partnerships that last many years and over many Antarctic research seasons. The deadline for SCAR and COMNAP applications is **4 June 2013**.

This year, the SCAR and COMNAP schemes are launched in conjunction with CCAMLR's Scientific Scholarship Scheme. The CCAMLR Scholarship provides funding of up to AU$ 30,000 to assist early career scientists to participate in the work of the CCAMLR Scientific Committee and its working groups over a period of two years. The scheme was established in 2010 and a maximum of three awards will be made in 2013. The objective of the scheme is to build capacity within the CCAMLR scientific community to help generate and sustain the scientific expertise needed to support the work of CCAMLR in the long-term. The deadline for CCAMLR applications is **1 October 2013**.

The SCAR Fellowship programme is for PhD students, or those within five years of having completed a PhD on the day of the deadline for applications, to undertake research at an institute in one of the 37 SCAR Member countries, which is different from both their country of origin and their current country of residence. Each award is intended to provide economy-class round-trip travel and a modest subsistence allowance for the fellowship period. Topics for support should make a contribution to the scientific objectives of SCAR as embodied in the Standing Scientific Groups and the current Scientific Research Programmes. This year, applications are to be submitted online and not by email, as in previous years.

All three schemes are being jointly promoted by the three organisations. For more information on SCAR and COMNAP Fellowships and for links to all three schemes, visit the Fellowships section of the SCAR website: http://www.scar.org/awards/fellowships/information.html.

The SCAR Visiting Professor Scheme

To promote partnerships that advance Antarctic research, SCAR has initiated the Visiting Professor Scheme. The scheme, commencing in 2013, will finance up to four Visiting Professor placements internationally.

The scheme is directed at mid- to late-career scientists and academics in Antarctic research. It offers opportunities to undertake short-term visits (from one to four weeks in duration) to any one of the 37 SCAR member countries. Awards will provide an international return flight and some contribution towards living expenses for the visiting period.

Awards are granted to individuals based on competitive criteria and enable successful candidates to contribute their experience towards strengthening the scientific research capacity of nations with smaller or less well-developed Antarctic research programmes. Selection criteria will give high priority to individuals whose visit 'fits' with SCAR's objectives and enables both applicant and host to be actively involved with Antarctic research, and to individuals who have already established links with the proposed host institute.

The closing date for applications for 2013 will be in August - the exact date is yet to be confirmed. For more information, see http://www.scar.org/about/visitingprofessor/

Southern Ocean Observing System (SOOS) Asian Workshop

The SOOS Asian Workshop, to be held on 23-24 May 2013 in Shanghai, China, is generously hosted and supported by the Polar Research Institute of China and aims to showcase Asian nations' Southern Ocean research and observation activities, and to stimulate discussion for further involvement in SOOS by Asian nations.

The Workshop will be held over two days. Day 1 is open to all interested parties (registration essential) and will see guest speakers from the Asian science community present their nation/organization's Southern Ocean observation and research activities. Members of the SOOS Scientific Steering Committee (SSC) will also present a brief overview of relevant SOOS activities. Day 2 is by invitation only (guest speakers, SSC members and other key representatives) and will provide an opportunity for working group discussions and strategic development planning.

SOOS
SOUTHERN OCEAN
OBSERVING SYSTEM

Anyone wishing to attend Day 1 of the Workshop is urged to register with SOOS (email: info@soos.aq) by **23 April 2013**, as numbers will be limited to 100 participants (due to the maximum capacity of the venue). Day 1 guest speakers and Day 2 working group participants will be contacted separately.

We look forward to welcoming colleagues from Asia with an interest in Southern Ocean research and who wish to learn more about how to become involved in SOOS.

For more information, visit www.soos.aq

News from SCAR

The "Martha T. Muse Prize for Science and Policy in Antarctica" is a US$ 100,000 unrestricted award presented to an individual in the fields of Antarctic science or policy who has demonstrated potential for sustained and significant contributions that will enhance the understanding and/or preservation of Antarctica.

The Prize is inspired by Martha T. Muse's passion for Antarctica and is intended to be a legacy of the International Polar Year 2007-2008.

The prize-winner can be from any country and work in any field of Antarctic science or policy. The goal is to provide recognition of the important work being done by the individual and to call attention to the significance of understanding Antarctica in a time of change.

A website with further details, including the process of nomination, closing date and information about the Selection Committee and previous recipients, is available at www.museprize.org.

The Prize is awarded by the Tinker Foundation and administered by SCAR.

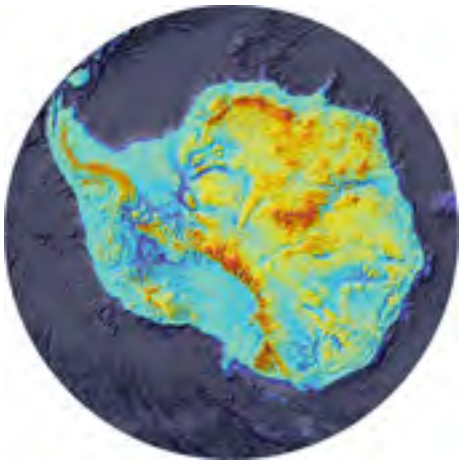
Nominations are open until **23 May 2013**: http://www.museprize.org/nominations.html

BEDMAP 2 published

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 km3) 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.*
More information is available on the Bedmap2 website: http://www.antarctica.ac.uk/bas_research/our_research/az/bedmap2/index.php

Dr Cornelia Lüdecke elected to the International Academy of the History of Science

SCAR would like to congratulate Dr Cornelia Lüdecke, chief officer of the SCAR History Group, who was elected as a corresponding member of the International Academy of the History of Science in Paris due to her work in the history of meteorology and history of polar research.

New co-chairs of the SCAR 2014 Open Science Conference

Jefferson Simões (Brazilian SCAR Delegate and Glaciologist) and Dana Bergstrom (Australian SCAR Delegate and terrestrial ecologist) will be the co-chairs of the International Scientific Organising Committee of the SCAR 2014 Open Science Conference.

For further details, see the Conference website: http://www.scar2014.com/

SCAR and Antarctic Science

Summary of Antarctic biodiversity data gathered by 90 expeditions since 1956

A new peer-reviewed data paper offers a comprehensive, open-access collection of geo-referenced biological information about the Antarctic macrobenthic communities. The term macrobenthic refers to the visible-to-the-eye organisms that live near or on the sea bottom such as echinoderms, sponges, ascidians, crustaceans. The paper will help in coordinating biodiversity research and conservation activities on species living near the ocean bottom of the Antarctic.

The paper provides unique geo-referenced biological basic information for the planning of future coordinated research activities, for example those under the umbrella of SCAR's biology programme Antarctic Thresholds - Ecosystem Resilience and Adaptation (AnT-ERA).

For more information, read the item on the *Science Daily* website (http://www.sciencedaily.com/releases/2013/02/130219102312.htm), or read the original article on the *Nature Conservation* website (http://www.pensoft.net/journals/natureconservation/article/4499/abstract/antarctic-macrobenthic-communities-a).

Image of ice fish by Julian Gutt

IPI Website

A new website for the proposed International Polar Initiative (IPI) is now available. This website will form a focal point for information on the IPI concept.

For more information on the IPI, please visit: http://www.internationalpolarinitiative.org/

Polar Educators International (PEI) endorsed by SCAR

As a growing global network promoting education in, for, and about the Polar Regions, PEI aligns with SCAR's education and outreach plans.

Through SCAR endorsement, PEI will gain important connections to SCAR member countries and institutions, and a strong message of legitimacy as an emerging organization for polar education. For PEI this endorsement will hopefully facilitate subsequent partnerships and proposals.

Together, SCAR and PEI will enhance their international impact and their ability to draw global attention to Antarctic science. For further details see the group's page on Facebook.

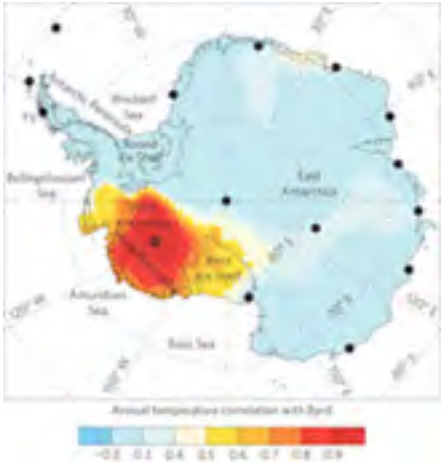
Invasive insects changing Antarctic landscape

An invasive species has the potential to drastically alter Antarctic ecosystems that have been isolated for millions of years, research suggests.

A species of midge was able to release large volumes of nutrients into the soil, changing the way native species had lived and evolved, a UK team found. They added that the species was well-suited to thrive in the extreme conditions.

"In terms of function, their job is litter turnover - they help things decay in the soil - and the population density of this thing in the area where it has been introduced is responsible for more litter turnover than the community that was already there," explained co-presenter of the research Peter Convey, of the British Antarctic Survey and co-chief officer of SCAR's EBA programme. "So basically it is bringing a function into an ecosystem that is not very active already. In principle, it can be a fundamental change in the way that ecosystem works."

For further details, please see the news item on the *BBC News - Science and Environment* website: http://www.bbc.co.uk/news/science-environment-20713186



The colour shadings show the correlation between the annual mean temperatures at Byrd and the annual mean temperatures at every other grid point in Antarctica.
(FV, Faraday/Vernadsky)

Study shows rapid warming on the West Antarctic Ice Sheet

In a discovery that raises further concerns about the future contribution of Antarctica to sea level rise, a new study finds that the western part of the ice sheet is experiencing nearly twice as much warming as previously thought.

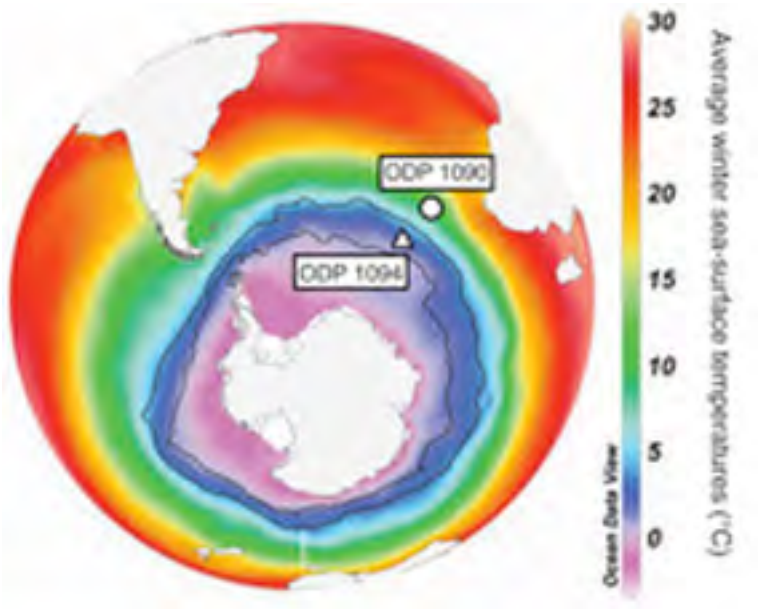
The temperature record from Byrd Station, a scientific outpost in the centre of the West Antarctic Ice Sheet (WAIS), demonstrates a marked increase of 4.3 degrees Fahrenheit (2.4 degrees Celsius) in average annual temperature since 1958 - that is, three times faster than the average temperature rise around the globe. This temperature increase is nearly double what previous research has suggested, and reveals - for the first time - warming trends during the summer months of the Southern Hemisphere (December through February), according to lead author David Bromwich. Professor Bromwich, Chief Officer of the SCAR Physical Sciences Group, is Professor of Geography at Ohio State University and senior research scientist at the Byrd Polar Research Center.

For more information on the study, please see the items on the *BBC News - Science and Environment* website (http://www.bbc.co.uk/news/science-environment-20804192) or the *EurekAlert* website (http://www.eurekalert.org/pub_releases/2012-12/osu-ssr122012.php), or read the original article in *Nature Geoscience* (http://www.nature.com/ngeo/journal/v6/n2/full/ngeo1671.html).

Antarctic Science News

Warming world caused Southern Ocean to exhale

The waters of the Southern Ocean now take up about 50% of the atmospheric carbon dioxide emitted by human activities, thanks in large part to the so-called "biological pump". Phytoplankton, tiny photosynthesizing organisms that bloom in the nutrient-rich waters of the Southern Ocean, suck up carbon dioxide from the atmosphere. When the creatures die, they sink to the ocean floor, effectively sequestering that carbon for hundreds or even thousands of years. It also helps that carbon dioxide is more soluble in colder waters, and that the churning winds mix the waters at the surface, allowing the gases to penetrate the waters more easily.



Colours show average sea surface temperatures from January to March from 1978 to 2010. Image credit: S. L. Jaccard et al., Science (2013)

There are signs, however, that the ocean's capacity to sequester atmospheric carbon dioxide has been decreasing over the past few decades. Previous ocean sediment records suggest that, as the world slipped into the last glacial period, less carbon overall reached the sediments of the Southern Ocean, coinciding with declining atmospheric carbon dioxide. During cold periods, increased sea-ice cover can keep gases trapped in the ocean and the drier, dustier conditions bring much-needed iron to phytoplankton in the sub-Antarctic portion of the Southern Ocean, feeding blooms that gobble down carbon dioxide from the atmosphere.

What happens when the world moves into a warm, interglacial period isn't certain, but in 2009, a paper published in *Science* by researchers found that upwelling in the Southern Ocean increased as the last ice age waned, correlated to a rapid rise in atmospheric carbon dioxide. Now, using two deep cores collected at two Ocean Drilling Program sites in the Southern Ocean, Jaccard and colleagues have reconstructed ocean records of productivity and vertical overturning reaching back a million years, through multiple glacial-interglacial cycles. This rapid increase in carbon dioxide as the world transitions from glacial to interglacial seems to be a pretty regular thing, they've found.

For more information, read the article on the *Science Now* website: http://news.sciencemag.org/sciencenow/2013/03/warming-world-caused-southern-oc.html?ref=em

The change of winds

As the combined effects of Antarctic stratospheric ozone depletion and climate warming have forced the westerly surface winds in the Southern Hemisphere to shift towards the pole, mixing between the upper ocean and deeper waters has also changed.

Waugh et al. now show that water originating at the surface at subtropical latitudes is mixing into the deeper ocean at a higher rate than 20 years ago, while the reverse is true for those originating at higher latitudes. The summer westerly winds that blow in the Southern Hemisphere have shifted toward the South Pole over the past several decades, but why?

Lee and Feldstein show that greenhouse gas forcing and ozone depletion impart different signatures to wind patterns and conclude that ozone depletion has been responsible for more than half of the observed shift.

For further details on both studies, please see the *Science* website:

Waugh et al - http://www.sciencemag.org/content/339/6119/568

Lee & Feldstein - http://www.sciencemag.org/content/339/6119/563

An expert judgement assessment of future sea level rise from the ice sheets

A major gap in predictive capability concerning the future evolution of the ice sheets was identified in the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change. As a consequence, it has been suggested that the AR4 estimates of future sea-level rise from this source may have been underestimated.

A recent study used a formalized pooling of expert views on uncertainties in the future contributions of melting ice sheets to sea-level rise, with a structured elicitation approach. Expert opinion is shown to be both very uncertain and undecided on the key issue of whether recent ice-sheet behaviour is a long-term trend or due to natural variability.

For more details, see the article in *Nature Climate Change*: http://www.nature.com/nclimate/journal/v3/n4/full/nclimate1778.html

Antarctic Science News

Life found deep under Antarctic ice for first time?

The US WISSARD (Whillans Ice Stream Subglacial Access Research Drilling) team found and collected microbes in a lake hidden under more than a half-mile of ice. Among other things, the discovery may shed light on what lies under the icy moons of Jupiter and Saturn.

The newfound life-forms have little connection to life on the earth's surface and many apparently survive by "eating rocks," team member Brent Christner said in an interview from the US McMurdo Station, after spending several weeks working at a remote field site at Lake Whillans. That may explain how life on other celestial objects - such as on the moons of Jupiter and Saturn - survive in the absence of available carbon.

"The conditions faced by organisms in Lake Whillans are quite parallel to what we think it would be like on those icy moons," Christner said. "What we found tells us a lot about extreme life on Earth," and how similar life beyond Earth might survive.

For further details, read the article on the *National Geographic - Daily News* website (http://news.nationalgeographic.com/news/2013/02/130205-antarctica-ice-life-moons-science-environment-lakes/) or visit the *WISSARD Project* website (http://www.wissard.org/).

Life may also have been found by the Russian team drilling at Lake Vostok. However, at present the data is still being analysed.

Sediments crumble as an underwater camera touches the bottom of Whillans Lake.

Image courtesy of Alberto Behar, JPL/ASU, and NSF/NASA

Tagged seals help find missing piece in global climate puzzle

Southern elephant seals fitted with satellite-linked instruments similar to the one above helped oceanographers map deep currents off Antarctica.

Image: Martin Biuw

By tracking the voyages of elephant seals off Antarctica, and with the help of satellite imaging and undersea sensors, researchers have discovered a long-elusive source for the deep-ocean streams of cold water that help to regulate the Earth's climate.

Three sources of Antarctic Bottom Water (AABW) were known until now. The first, in the Weddell Sea, was found in 1940; two others were found in the Ross Sea and along the Adélie Coast of East Antarctica in the 1960s and '70s. But for years, researchers have suggested that these were not the only ones. In particular, water samples from an area called the Weddell Gyre contain atmospheric pollutants known as chlorofluorocarbons (CFCs), indicating that the deep water came into contact with the air far too recently to have been carried there from one of the known AABW sinks.

Now, Kay Ohshima, a physical oceanographer at Hokkaido University in Sapporo, Japan, and his colleagues have traced that water to a fourth AABW source, in the Cape Darnley polynya. Their results are published in *Nature Geoscience*.

Dr Mike Meredith, a polar oceanographer at BAS and co-chair of the Southern Ocean Observing System (www.soos.aq), who wrote an accompanying commentary on the study, says that if the total rate of AABW formation declines, the resulting changes in cold-water circulation could have important effects on global climate, letting the ocean depths warm and thereby changing the rate of heat exchange between Antarctica and the tropics. Moreover, he says, sea levels could rise - owing to the fact that water expands as it warms - and temperature changes could affect deep-sea ecosystems

For further details, see the item on the *Nature - News* website (http://www.nature.com/news/tagged-seals-help-find-missing-piece-in-global-climate-puzzle-1.12488), read Mike Meredith's article in *Nature Geoscience - News and Views (http://www.nature.com/ngeo/journal/v6/n3/full/ngeo1743.html)* or read the full paper in *Nature Geoscience* (http://www.nature.com/ngeo/journal/v6/n3/full/ngeo1738.html).

Cameras reveal penguins' efficient hunting techniques

Details of Adelie penguin feeding behaviour have been filmed by Japanese scientists.

Using video cameras and accelerometers attached to free-swimming penguins, researchers have gained a unique insight into the birds' hunting techniques. Adelie penguins adopted different strategies depending on whether they were hunting fish or krill. The findings are published in the US journal *PNAS (Proceedings of the National Academy of Sciences)*.

Lead scientist Dr Yuuki Watanabe from the National Institute of Polar Research in Tokyo, Japan, told *BBC Nature*: "Foraging is the most basic activity of animals, but details of foraging behaviour are poorly known, especially in marine animals."

For more details, see the article on the *BBC Nature News* website (http://www.bbc.co.uk/nature/21125022) or read the original *PNAS* article (http://www.pnas.org/content/110/6/2199.full?sid=cd7a8e3d-8912-4c20-8fdb-57008fa8e7ef).

Antarctic Science News

Leads and lags at the end of the last Ice Age

In an article in *Science*, Ed Brook discusses how, over the course of Earth history, it is generally believed that atmospheric carbon dioxide (CO_2) and climate are closely coupled. The most direct evidence comes from polar ice cores.

Snow falling in Antarctica and Greenland gradually compacts to form solid ice and trap air. Polar ice also records past temperatures in the ratio of heavy to light isotopes in the water molecule. Ice core analyses have shown that Antarctic temperature and atmospheric CO_2 concentrations are highly correlated over the large-scale climate cycles of the past 800,000 years.

But which came first? Does CO_2 drive climate cycles or is it a feedback in the system that contributes to warming?

Image: Mike Sparrow

In another article in *Science*, Parrenin et al address this question in a study of CO_2 concentrations and Antarctic temperatures during the last deglaciation. They conclude that temperature and CO_2 changed synchronously.

For more information, read the articles on the *Science* website:

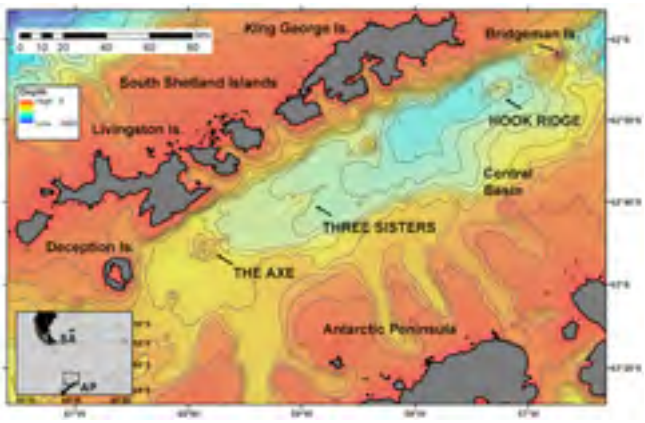
Edward J Brook - http://www.sciencemag.org/content/339/6123/1042.short

Parrenin et al - http://www.sciencemag.org/content/339/6123/1060.abstract

Researchers find odd, cold volcanic vent in Antarctic waters

A group of researchers from the National Oceanography Centre in Southampton has discovered a strange new deep-sea volcanic vent at Hook Ridge near the South Shetland Islands, Antarctica.

Hydrothermal vents are like hot springs, spewing jets of water from the seafloor out into the ocean. The expelled water, if hot enough, is rich in dissolved metals and other chemicals that can nourish a host of strange-looking life, via a process called 'chemosynthesis'. The hot water, being more buoyant than the surrounding cold seawater, rises up like a fountain or 'plume,' spreading the chemical signature up and out from the source.



Location map of the Bransfield Strait in the Southern Ocean with bathymetry of the central basin, showing the location of the submarine volcanic edifices Hook Ridge, Three Sisters and The Axe, and the subaerial volcanoes Deception and Bridgeman Islands. Map constructed using GEBCO bathymetry.
doi:10.1371/journal.pone.0054686.g001

The newly discovered vent, named the Hook Ridge vent, however, was found to lack the high temperatures and alien-like creatures that scientists associate with hot hydrothermal vents. Instead there was a low-lying plume of shimmering water, caused by differences relative to the surrounding seawater in certain properties, such as salinity.

"Geochemical measurements of the water column provided evidence of slightly reducing, localized plumes close to the seafloor at Hook Ridge," said Dr Alfred Aquilina, lead author of the study published in the journal *PLOS ONE*.

"We therefore went in with sled-mounted cameras towed behind the Royal Research Ship James Cook and saw shimmering water above the seafloor, evidence of hydrothermal fluid seeping through the sediment."

So why were there no strange creatures around the vent? The team investigated this particular area of the deep-sea because prior measurements of the water column above Hook Ridge detected chemical changes consistent with a hydrothermal plume. On investigation, there was also a small relict 'chimney' of precipitated minerals on the seafloor, which suggests that the hydrothermal fluid flowing from the vent was once warmer.

The researchers therefore propose that hydrothermal activity at Hook Ridge is too irregular to provide the vital chemicals that support chemosynthetic life.

"This region was investigated because hydrothermal systems in this part of the Southern Ocean may potentially act as stepping stones for genetic material migrating between separate areas in the world ocean," Dr Aquilina said. "The more hydrothermal vents we can find and investigate, the more we can understand about the evolution and dispersal of the creatures that live off the chemicals expelled in these dark, deep environments."

For further information, see the item on the *Sci-News* webite (http://www.sci-news.com/geology/article00879.html) or read the full research article on the *PLOS ONE* website (http://www.plosone.org/article/info:doi/10.1371/journal.pone.0054686).

Antarctic Science News

Antarctica's first whale skeleton found with 9 new deep-sea species

Marine biologists have, for the first time, found a whale skeleton on the ocean floor near Antarctica, giving new insights into life in the sea depths. The discovery was made almost a mile below the surface in an undersea crater and includes the find of at least nine new species of deep-sea organisms thriving on the bones.

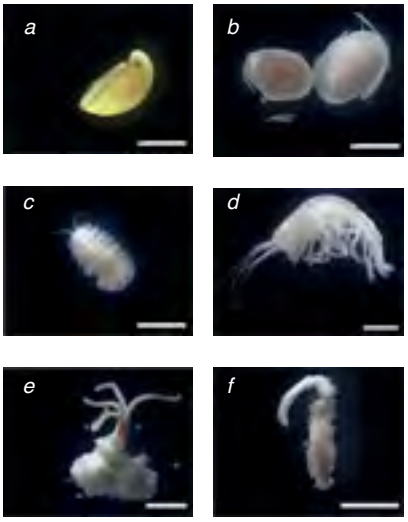
"The planet's largest animals are also a part of the ecology of the very deep ocean, providing a rich habitat of food and shelter for deep sea animals for many years after their death," says Diva Amon, lead author of the paper based at University of Southampton Ocean and Earth Science (which is based at the UK's National Oceanography Centre) and the Natural History Museum. "Examining the remains of this southern Minke whale gives insight into how nutrients are recycled in the ocean, which may be a globally important process in our oceans."

Worldwide, only six natural whale skeletons have ever been found on the seafloor. Scientists have previously studied whale carcasses, known as a 'whale fall', by sinking bones and whole carcasses. Despite large populations of whales in the Antarctic, whale falls have not been studied in this region until now.

When a whale dies and sinks to the ocean floor, scavengers quickly strip its flesh. Over time, other organisms then colonise the skeleton and gradually use up its remaining nutrients. Bacteria break down the fats stored in whale bones, for example, and in turn provide food for other marine life. Other animals commonly known as zombie worms can also digest whale bone.

"One of the great remaining mysteries of deep ocean biology is how these tiny invertebrates can spread between the isolated habitats these whale carcasses provide on the seafloor," says co-author Dr Adrian Glover at the Natural History Museum. 'Our discovery fills important gaps in this knowledge.'

For more information, read the full article in *Deep-Sea Research II: Topical Studies in Oceanography*: http://www.sciencedirect.com/science/article/pii/S0967064513000489



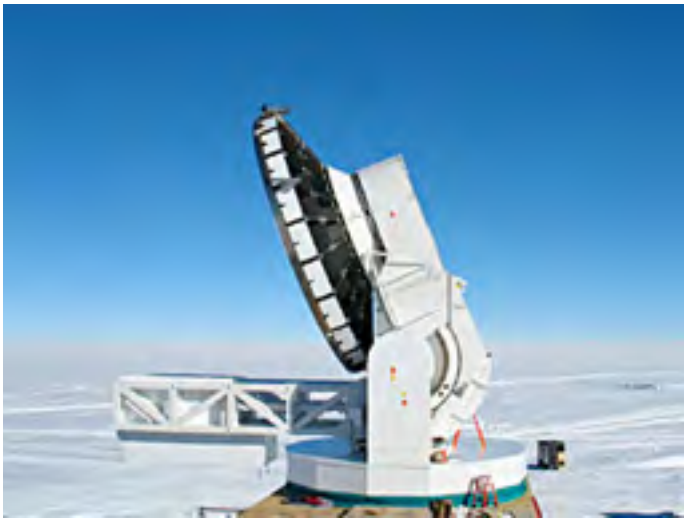
Fauna found on the whale bones include: (a) Lepetodrilus sp., (b) Osteopeltidae sp., (c) Jaera sp., (d) Lysianassidae sp., (e) Osedax sp., (f) Ophryotrocha sp. X. Scale is 2000 µm.

Telescopes in Antarctica and Chile discover starbursts in the early universe

Distant, dust-filled galaxies were bursting with newborn stars much earlier in cosmic history than previously thought, according to newly published research.

So-called "starburst galaxies" produce stars at the equivalent of a thousand new suns per year. Now, astronomers have found starbursts that were churning out stars when the universe was just a billion years old.

"I find that pretty amazing," said Joaquin Vieira, a postdoctoral scholar at the California Institute of Technology and leader of the study. "These aren't normal galaxies. These galaxies [reveal star formation] at an extraordinary rate, when the universe was very young. I don't think anyone expected us to find galaxies like this so early in the history of the universe."



The South Pole Telescope (SPT)
Image: John E. Carlstrom, University of Chicago
http://kicp.uchicago.edu/

An international team of astronomers, whose work is reported in the March 14 issue of the journal *Nature*, found dozens of these galaxies with the National Science Foundation (NSF)-funded South Pole Telescope (SPT). SPT is a 10-metre dish in Antarctica that surveys the sky in millimetre-wavelength light, whose waves fall between radio waves and infrared on the electromagnetic spectrum.

The team then took a more detailed look using the new Atacama Large Millimeter Array (ALMA) in Chile's Atacama Desert, which is funded in part by NSF. ALMA is an international facility and is a partnership between North America, Europe and East Asia in cooperation with the Republic of Chile.

"The new observations represent some of ALMA's most significant scientific results yet," Vieira said. "We couldn't have done this without the combination of SPT and ALMA. ALMA is so sensitive, it is going to change our view of the universe in many different ways."

For further details, see the press release on the NSF website (http://www.nsf.gov/news/news_summ.jsp?cntn_id=127335) or read the full article in *Nature Letters* (http://www.nature.com/nature/journal/v495/n7441/full/nature12001.html).

APECS News

APECS Belgium outreach event during the ATCM

Now that Belgium is hosting the Antarctic Treaty Consultative Meeting (ATCM) in Brussels (20 - 29 May 2013), APECS Belgium feels that it is time to get public attention for the poles, their protection, the historic role of Belgium in scientific research on Antarctica with pioneers such as Adrien de Gerlache, the importance of current research and global climate change. Therefore, we are planning a free outreach event on the weekend of 25 and 26 May 2013.

The event will be composed of a science fair (experiments), lectures and documentaries, open to everyone who is interested in our polar regions. APECS Belgium is in charge of the logistics and organizational part of the event and counts on its contacts and partners to provide the experiments throughout the weekend, targeting families, students and teachers.

Several lectures, on both the Arctic and Antarctic, will be given on various topics, suitable for a variety of age groups. By doing so, we hope also to attract politicians attending the Treaty Meeting.

This event is acknowledged and/or supported by SCAR, IASC (International Arctic Science Committee), The Belgian Antarctic Archives, New Belgica Project, APECS international, and the Belgian Science Policy office. By this action, (young) Belgian researchers hope to transfer some of their enthusiasm about the poles to a wider public and raise consciousness about the environmental changes that are happening there at a great speed.

APECS Belgium kindly recognizes the financial support of the Belgian Science Policy office, SCAR and APECS, and the help of Maaike Van Cauwenberghe.

Article by Ines Tavernier, Dagmar Obbels and Anton Van de Putte on behalf of APECS Belgium.

APECS News and Updates

Preparations by APECS members for several initiatives related to the Antarctic and the Southern Ocean are underway. APECS Belgium plans to organize a Science Fair in conjunction with the XXXVI Antarctic Treaty Consultative Meeting (ATCM) to be held in Brussels in late May 2013 (see the separate article above). Two upcoming events on the radars of the APECS Antarctic community are the first Asian Workshop of the Southern Ocean Observing System (SOOS) and the SCAR Biology Symposium.

APECS members and early career scientists from Asian countries are encouraged to participate in the first Asian Workshop of the Southern Ocean Observing System (SOOS) that will be held 23-24 May in Shanghai, China. The workshop, organized by SOOS together with the Polar Research Institute of China (PRIC), the State Key Laboratory of Numerical Modelling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), the Institute of Atmospheric Physics (IAP) and the Chinese Academy of Sciences, will provide an opportunity to highlight the research and observations being undertaken by Asian countries in the Southern Ocean and to stimulate discussion and foster further involvement from Asian countries in SOOS activities.

The first day of the Workshop (23 May) is open to all interested parties and the organizers warmly invite early career scientists from China and from other Asian countries to participate. Participating in the workshop will be an excellent way for early career scientists to network with colleagues at different career stages. Registration is essential and places are limited - please email info@soos.aq.

For those APECS members and early career scientists who cannot make it to Shanghai, APECS will broadcast the first day of the SOOS Asian workshop via the *GoToMeeting* teleconferencing system. *GoToMeeting* is limited to 26 people and places will be allocated on a first-come first-serve basis - to register for the *GoToMeeting* broadcast, early career scientists are invited to email Tosca Ballerini, an APECS ex-officio member on the SOOS Scientific Steering Committee (tosca.ballerini@univ-amu.fr). In addition, an informal APECS get-together will be held on the evening of the 23 May. For information on the time and location, check the APECS event page dedicated to the SOOS Asian Workshop (www.apecs.is/soos-2013).

Weather forecasts alert that there will be an extremely cold week this summer in Barcelona, Spain. The reason? The SCAR Biology Symposium, a fascinating venue for researchers working in Antarctica, will be held there from the 15-19 July. APECS, through its Spanish national branch, APECS-Spain, will organize a couple of events during that "cold" week.

On Sunday 14 July, APECS will organize a workshop to bring together early career researchers and mentors, to exchange ideas and share challenges in Antarctic research, which will be followed by a walk around Barcelona and lunch guided by our local early career scientists.

Later on during the Symposium, it is planned to hold a panel discussion, where a number of experts will share their views and perspectives on a particular topic related to Antarctic research (topic and speakers to be confirmed).

And finally, commemorating the 25 years of Spanish research in Antarctica, different activities will be also developed around the city to show to the general public the beauty and problems of this fascinating and vulnerable environment. So be alert to our final - and "cold" - agenda! More at www.icm.csic.es/XIthSCARBiologySymposium/.

Contributed by P. Echeveste, T. Ballerini, Y. Wang, P.Wagner and A.Pavlov

Forthcoming Events

SCAR AAA Second Workshop

24 - 26 July 2013, Siena, Italy

The second workshop of the SCAR "*Astronomy and Astrophysics from Antarctica*" programme will take place at Certosa di Pontignano, a former Carthusian Monastery near Siena, Italy.

This meeting builds upon the foundations laid at the Sydney meeting in 2011 and is themed around the four AAA Working Groups: Site testing, validation and data archiving; Arctic site testing; Science goals; and Major new facilities.

AAA's objectives are to coordinate astronomical activities in Antarctica in a way that ensures the best possible outcomes from international investment in Antarctic astronomy, and to maximize the opportunities for productive interaction with other disciplines. This meeting brings together the key players in Antarctic astronomy to review the implementation plans of the four AAA Working Groups, and to coordinate future activities.

On-line registration is now open on the workshop page of the AAA website: http://www.astronomy.scar.org/AAA2013/registration/

Space at the venue is limited and early registration is highly recommended to secure a place. For further information, please email Silvia Masi (silvia.masi@roma1.infn.it).

Joint SCAR History EG / Social Sciences AG Workshop

1-5 July 2013, Cambridge, UK

The SCAR History Expert Group and Social Sciences Action Group will hold a joint workshop focusing on the past, present and future of human connections to the Antarctic (and the polar regions in general).

We welcome contributions and participation from Antarctic researchers and our Arctic colleagues to stimulate debate, academic engagement and future dialogue.

For more information, please contact: Conny Luedecke (C.Luedecke@lrz.uni-muenchen.de) or Daniela Liggett (daniela.liggett@canterbury.ac.nz).

SOOS Asian Workshop

23 - 24 May 2013, Shanghai, China

For details, see the article on Page 3 or visit the SOOS website: www.soos.aq

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

15-19 July 2013, Barcelona, Spain

This symposium links the functional importance of land and water ecosystems and their biocomplexity under an ecosystemic perspective in order to understand the Antarctic trophic web, effects of human impacts such as the ozone hole, climate change, the increase in tourism activities, the flexible boundaries and dynamic gradients in the Antarctic ecosystem, and Antarctic marine biodiversity through its patterns, processes and trends.

An important aspect of the symposium is outreach and education, emphasizing the importance of communication between polar researchers and educators to improve understanding and connections between scientists and society. The general public will be able to take an active part in post-symposium hands-on activities, open lectures, seminars, courses and exhibitions. APECS Spain will organize round table sessions and prepare outreach content.

The symposium will also show the final results of the SCAR EBA programme and outline the objectives of the two new SCAR programmes, AntEco and AnT-ERA.

Registration is open - Early Bird ends 30 April:
www.icm.csic.es/XIthSCARBiologySymposium/registration.php

Second Circular is available:
www.icm.csic.es/XIthSCARBiologySymposium/documents/second_circular.pdf

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

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

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