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European Polar Board Newsletter

June 2011

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Editorial

This issue of the Newsletter comes at a crucial moment in the life of the European Science Foundation and the European Polar Board (EPB). Important decisions are on the horizon that could change the framework within which the European Polar Board and other ESF Expert Boards and Committees have worked so far.

EPB has worked to favour coordination among European countries with polar traditions and to facilitate access of new countries joining the European Union. EPB has been able to develop new ideas and challenging projects, such as ERICON-AB, for example, the idea to make a new generation of research icebreaker (AURORA BOREALIS) available to the European polar community as a common platform for multidisciplinary research. The European Polar Consortium, an ERA-NET programme, was established with the financial support of the European Commission for networking scientific initiatives amongst national programmes. A complete inventory of polar facilities was the starting point for developing a strategy of networking towards the integration of these European facilities of the INFRAPOLAR and EU-POLARIS projects. Among the political and strategic initiatives of EPB we can highlight the Memorandum of Understanding 'European Polar Framework', and the Position Paper on the Future of European Research in the Polar Regions.

Distinct features of the European Polar Board have been:

- a bipolar vision
- a European context
- a composite membership (a mix of scientific competence and managerial skill)
- actions to support scientific cooperation and networking of polar facilities and field operations.

These features make EPB different from any other existing international polar body. EPB has played and can continue to play an important role in influencing European and national institutions and supranational actors and organisms in regard to research investment and strategies in the polar regions. I am confident that the EPB Member Organisations will continue to maintain a strong European organisation for the coordination and promotion of polar research, open to all European countries and visible in the international context.

Professor Carlo Alberto Ricci
Chair of the European Polar Board



Cover
The Lake Vostok project leader V. Lipenkov (AARI) with a core of accreted (lake) ice recovered from 3720 m depth at Vostok Station, Antarctica (January 2011).
© Alexey Ekaykin (AARI)

In memory of Teodor Negoiţă

On behalf of the European Polar Board, I would like to commemorate Dr Teodor Gheorghe Negoiță, who passed away on 23 March 2011.
Dr Negoiță was a great and unique leader of Romanian polar research and always strove in a dedicated and untiring manner to advance visibility and development of Romanian research in the Polar Regions, especially the Antarctic where his heart was. He was also a friend and colleague who will be very sadly missed by all. He was a very active member of the European Polar Consortium and the European Research Icebreaker Consortium and contributed significantly to the actions of these projects over the last years. Dr Negoiță will be remembered for his friendly tenacity, his deep concern for people, his dedication and his strength.





Signature of the Memorandum of Understanding 'European Polar Framework' at the European Polar Summit, June 2009. Dr Gérard Jugie, Chair of the EUROPOLAR project (left), and Professor Carlo Alberto Ricci, Chair of the European Polar Board (right).

EPB Position Paper on Polar Science Perspectives

The last decade has put the polar world under the spotlight of the public and media and, among many other actions, the programmes implemented during the 4th International Polar Year (IPY) acted as spurs to demonstrate the key role played by these regions in our daily life for several societal issues (*e.g.*, global climate change, ozone depletion, potential rise of sea levels) and to make politicians wake up to the importance of scientific research in these fields.

We can be proud of the eminent catalytic role played by EPB and its members during this period. As a collateral result, our Board noted an increase in its members and an awareness of the tremendous potential of Europe in this matter, both in terms of logistical means and in terms of the richness of the scientific programmes. The weakness of the cooperation between states and of the sharing of the main objectives was also pointed out and tentatively explained by the diversity of national policy as well as by the practices of the communities.

In that context, at the level of the Executive Committee and of its Executive Director, a strategy was built, discussed and shared by most of the countries around the table. The EPB General Assembly decided to support the idea of using one of the tools of the EU, the ERA-NET, and to apply for this specific support which led to the success and the creation of the European Polar Consortium.

Following a pragmatic approach, several strategic actions were decided with the aim of improving shared knowledge, including items as different as the perimeter of the different assets or being informed on different national strategies, with a view to sharing best practices and to reinforcing the links between the different partners.

'Defining the strategy of the coming years of European research activities in the Polar Regions.'

This long and hard work found concrete results in the signature of a Memorandum of Understanding between 25 national polar entities belonging to 19 nations. This document, if properly used, will be the basis for collaboration between the European countries integrating all the tools, from basic logistics to the implementation of ambitious scientific programmes.

Last but not least, a political position document has been carefully elaborated with the aim of defining the strategy of the coming years of European research activities in the Polar Regions. This document should be the reference handbook not only for the polar national organisations but overall for political guidance in this matter.

Dr Gérard Jugie, International Relations,
Observatoire océanologique de Banyuls-sur-mer, France



Launch of the Green Paper event on 7 December 2010 in Brussels

Launch of the European Polar Board Green Paper

On 7 December 2010 the Green Paper edited by the European Polar Board, 'European Research in the Polar Regions: Relevance, strategic context and setting future directions in the European Research Area', was officially presented to the public and the media.

Representatives of the European Commission, European Environment Agency attended the event as well as representatives of a number of European scientific institutions and of the press.

Introducing the Green Paper, Professor Carlo Alberto Ricci, Chair of the European Polar Board, stressed that polar research must become an integral part of the European Union's research activities if Europe wants to benefit from the dramatically changing face of the Polar Regions. Professor Ricci also said that Europe needs an ambitious and broad strategy for investment in research activities in the Polar Regions which will also serve to increase the weight of European science within the international polar science effort.



Paul Egerton, Head of the ESF Life, Earth, Environment and Polar Sciences Unit, highlighted that European research in the Polar Regions is significant, amounting to over 300 M€ per year in recognition of the regions' key role as driver of the Earth's climate and the functioning of the oceans. Nevertheless, European research is often fragmented with overlap between the various participating nations and it needs to improve coordination and optimisation of resources.

Dr Gérard Jugie, former Chair of the European Polar Board, mentioned the strategic role played by the EPB in supporting the European Polar Consortium (EU FP6 funded) that was the first nucleus of a new European entity for Polar research. EUROPOLAR highlighted the huge capacity of the Polar system as a whole and generated important joint scientific initiatives.

Dr Karin Lochte, Director of the Alfred Wegner Institute, stressed that as climate change dramatically increases accessibility of the Polar Regions and opens up enormous new opportunities in fisheries, tourism, oil, gas and transport, this could seriously affect the environment. Therefore a special effort to coordinate European research activities in the Arctic and in Antarctica, through common programmes, shared resources and networking of scientific infrastructures, is urgently requested.

Dr Roberto Azzolini and Dr Gonçalo Viera respectively drew attention to the EPB's initiatives for sharing and coordinating the polar infrastructures, such as the Memorandum of Understanding on European Polar Framework, and the Joint Climate Call, and the crucial importance of outreach and education in the European Polar Framework to train new generations in the preservation of the polar environment and to answer global scientific questions affecting the dynamic Earth system itself.

Dr Roberto Azzolini, European Science Foundation

People Inhabit the North: The Importance of Integrating Social and Human Science Research into an Arctic Agenda

The Polar Regions are changing at a rapid rate. Climate change is resulting in massive environmental impacts, which have repercussions on the daily lives of Arctic residents, from transportation to subsistence activities to resource development. These changes pose risks and challenges. Still, we are facing major economic and cultural impacts that may lead to social, cultural and economic disruptions for Arctic people and societies. Whatever the future may hold, it is critical that the natural and social trajectories of change in the North be assessed within an integrated research agenda.

The Arctic Climate Impact Assessment (ACIA), carried out under the auspices of the Arctic Council and issued in November 2004, identified a number of key findings that have implications for European society and for polar research for the next decades, and which a new European Polar Strategy has to take into account. Among these, ACIA indicated that the more and more increasingly rapid Arctic warming has worldwide implications and determines multiple influences affecting people and ecosystems. The Arctic vegetation zones are projected



Aerial view of Kivalina, Alaska, August 2009. The rock revetment or seawall is visible in the foreground. It was designed to protect the village from high waves and erosion.
© Patrick Durrer

to shift, bringing wide-ranging impacts; the animal species' diversity ranges and distribution will change. Many coastal communities and facilities face increasing exposure to storms. Elevated ultraviolet radiation levels will affect people, plants and animals. Thawing ground will disrupt transportation, buildings and other infrastructure. At the same time, while reduced sea ice creates hazards for indigenous sea-mammal hunters, it will increase marine transport and access to resources.

'The more and more increasingly rapid Arctic warming has worldwide implications and determines multiple influences affecting people and ecosystems.'

Similarly, the Arctic Council's Arctic Human Development Report (AHDR, 2004) highlighted a number of major challenges facing the Arctic. The report contains a large number of policy-relevant conclusions, but two broad propositions stand out. One is that Arctic societies have a well-deserved reputation for resilience in the face of change. The other is that today these societies are facing an unprecedented combination of rapid and stressful vectors of change involving environmental, cultural, economic, industrial and political processes, which might overextend the capacity of Arctic societies to adapt.

Recently, the International Arctic Science Committee (IASC) created a Social and Human Sciences Working Group to reflect the growing importance of humans in the Arctic system. This working group will pursue cross-cutting issues in concert with natural scientists. The priority list contains 'Human Health, Wellbeing and Ecosystem Change', 'Competing Forms of Resource Use in a Changing Environment', 'Collaborative Community Research on Climate Change', 'People and Coastal Processes' and 'Perception and Representation of Arctic Science'.

Europe and the rest of the world cannot afford to ignore the complex processes of rapid change confronting the indigenous and non-indigenous residents of the North. After all, the Arctic serves here as an early warning system for global processes and as a testing ground for new relations between science, society and policy making. The integration of these research vectors into a coordinated programme involving Arctic and non-Arctic states needs to become a common goal for all stakeholders.

Professor Peter Schweitzer, Professor of Anthropology, University of Fairbanks, Alaska, Chair of the IASC Social and Human Sciences Working Group

Perspectives from the EPB Executive Committee Meeting in Seoul, 28 March 2011

The EPB Executive Board meeting in Seoul addressed a number of important topics related to the future of the European Polar Board and the development of its most recent strategic initiatives.

Professor Carlo Alberto Ricci, Chair of the European Polar Board, and Paul Egerton, Head of the ESF Life, Earth, Environment and Polar Sciences Unit, explained the situation of the integration process between ESF and EUROHORCS, which could lead either to the formation of a new legal entity called SCIENCE EUROPE or to the transformation of the ESF into a new organisation with headquarters in Strasbourg and a strategic office in Brussels.

In this scenario, the Executive Members and observers present at the meeting (the Netherlands and Sweden) reiterated the need for a strong and authoritative body to coordinate and give a voice to European polar research. This body could be guided and supported by a core group of institutions which have greater weight in European polar research, and undertake to provide a platform for European polar research open to any collaboration and in particular to that of other European countries.

Currently, European polar research takes advantage of a number of coordinated initiatives, including two major Arctic networks, SIOS (led by Norway) and SCANNET (led by Sweden). Recently, six European polar institutions (BAS, PNRA, IPEV, AWI, AARI, NPI) proposed the establishment of a European scientific platform in Antarctica (EU-POLARIS) and committed themselves to achieve it. In addition, the Memorandum of Understanding, 'European Polar Framework', signed in Brussels in June 2009 by 25 European polar operators is a further element to implement an effective strategic and operational coordination of European polar research and infrastructure and to strengthen the leading role of European countries.



Coex building, Seoul, Korea, venue of the ASSW 2011.

Among the various issues raised in Seoul, the European Polar Board discussed two important strategies: the launch of the next Joint Call on Polar Biology (PolarLIFE) and the implementation of a Forward Look on polar marine research.

The joint call PolarLIFE had attracted the interest of several EPB Member Organisations. The Executive Board recommended setting up a Scoping Group with all those institutions which had expressed their interest in the call, to convene in June to outline the scientific contents of the call and consolidate its financial support. At the same time, the Executive Board noted the interest of some funding agencies (*i.e.*, Norway, Italy, UK, Germany, France) to integrate the themes of CAREX in the call and asked the Polar Unit to explore this possibility.

Finally, the Executive Board recommended proceeding with the launch of an ESF Forward Look, confirmed that polar marine research perspectives must be the focus of the initiative and asked the Polar Unit to establish a working group within the Polar Board with the mandate to prepare the proposal in due time.

Dr Roberto Azzolini, European Science Foundation

EPB and Marine EUROCORES: new perspectives for wider cooperation

The Life, Earth, Environment and Polar Sciences (LESC) Unit has recently tightened its collaboration with the European Polar Board within the European Science Foundation, due to a number of naturally overlapping research areas connected to geosciences and marine sciences.

In this new framework, the current year brought a good opportunity for a joint EPB-LESC action, 2011 being a crucial milestone for the conclusion of several EUROCORES and Research Networking Programmes initiated under LEEPS and dealing with marine cores, marine biology, ecosystems, biodiversity and climate changes.

A dedicated workshop was organised in Cascais, Portugal, on 10-11 February 2011, aimed at bringing together representatives of several marine EUROCORES Programmes, like EURODIVERSITY (Challenges of Biodiversity Science), EUROMARC (European Collaboration for Implementation of Marine Research on Cores), EURODEEP (Ecosystem Functioning and Biodiversity in the Deep Sea) and EUROTRACES (European Trans-Atlantic Coral Ecosystem Study), as well as polar research experts.



Coral-reef. © wallpapers.pixxp.com

Representatives from international projects like CAREX (Coordination Action for Research on Life in Extreme Environments), EBA (Evolution and Biodiversity in Antarctica), IMBER (Integrated Marine Biogeochemistry and Ecosystem Research), ICED (Integrating Climate and Ecosystem Dynamics in the Southern Ocean), IODP (Integrated Ocean Drilling Program), CCAMLR (Convention on the Conservation of Antarctic Marine Living Resources) and ANDRILL (Antarctic Geological Drilling) actively contributed, together with the marine EUROCORES and polar researchers to exploring potential connections and research priorities in common research themes, like climate evolution, biodiversity, life response to changes and life in the Polar Regions.

During the workshop it soon became evident that potential cross-cutting themes linking marine EUROCORES, polar research and CAREX fall under dynamics of global changes, ecology, biological systems, biogeochemical cycles, biodiversity and adaptation, and life in extreme environments. In particular, themes associated to life in extreme environments would certainly be a part of the larger umbrella of research topics shared between EuroDIVERSITY, EuroMARC, EuroDEEP, EuroTRACES and the polar research communities.

The implementation of a joint EPB-LESC roadmap for future synergies among the above-mentioned scientific communities and a number of recommendations on the best strategy which might boost the implementation of new scientific collaborations in cutting-edge topics is currently under development.

A possible way to integrate this new type of cooperation on cross-cutting research topics might be the forthcoming PolarLIFE Call initiative of the European Polar Board.

Dr Paola Campus, European Science Foundation

Progress in Polar Life Initiative

After the successful initiative of the PolarCLIMATE Call, the European Polar Board definitively endorsed the launch of a new initiative, the European Partnership in Life Science (PolarLIFE), managed by the European Science Foundation.

PolarLIFE aims at promoting the highest number of pan-European collaborative research projects based on the coordinated use of existing national polar infrastructures. It is also finalised to facilitate the access and exchange of scientists.

This approach is expected to implement the MoU 'European Polar Framework' signed in Brussels in June 2009 and produce an efficient connection between the different participating funding agencies and infrastructures.

PolarLIFE will address key research topics in the field of life in polar environments, including biodiversity, life response to stressors (resilience, sensitivity, adaptation and evolution and climate change), as well as overarching topics related to life in the Polar Regions. The use of cross-cutting themes has the potential of joining under a common umbrella various scientific communities studying the biology, ecology and responses to climate change of marine and terrestrial extreme environments.

EPB members and MoU signatory institutions have been asked for a preliminary commitment, including the indicative amount of money that each supporting agency is planning to allocate to support national individual projects, as well as the maximum number of individual projects (ideally more than one) to be potentially supported.

The PolarLIFE Call encompasses different scientific communities working in polar research. In February 2011 a strategic brainstorming workshop was convened by the ESF-LEEPS in Cascais, Portugal. The workshop led to the identification of the scientific priorities and potential connections between the marine EUROCORES, CAREX and international projects on climate evolution, biodiversity, life response to changes and life in the Polar Regions. Input and participation to the PolarLIFE Call are expected to come from this initiative.

In particular, the ESF-managed CAREX project is an EU FP7 funded Coordination Action (www.carex-eu.org) coordinated by the British Antarctic Survey. The main objectives of CAREX are to strengthen the structure of the (European) community involved in life in extreme environments research and to further the knowledge of life in extreme environments by developing a strategic research agenda in this field. CAREX has published a roadmap for European research on this topic which identifies four

major cross-cutting themes to facilitate research across environments and to integrate disciplines. The roadmap is proposed as a framework for a trans-national activity on extreme environments and could readily be linked to the PolarLIFE Call. CAREX discussions with agencies to date have revealed a majority agency preference to focus on polar issues and this results in a significant overlap of the CAREX and PolarLIFE targets.

Moreover, some of CAREX's participating agencies are also members of the European Polar Board. Therefore, the development of a programme based on the CAREX roadmap structure, especially focussing on polar areas, and on the European Polar Board Green Paper strategy, meets with interest of various Scientific Organizations.

The EPB Executive Board, at its meeting in Seoul on 28 March 2011, welcomed the possible participation of CAREX in the PolarLIFE Call, to be implemented in the course of 2012 if a significant number of participating funding agencies is reached. It decided to establish a PolarLIFE Scoping Group including all those agencies which communicated a potential interest in the Joint Call, also including representatives from CAREX. A meeting between the EPB Polar Unit and the CAREX coordinator and Executive Director was held in Strasbourg on 18 April to finalise the mutual cooperation in a possible EPB-CAREX Joint Call in Polar Life. A joint list of potentially supporting agencies has been supplied. They will be asked to be part of the Scoping Group and to convene in a scoping meeting to be held possibly in September 2011.

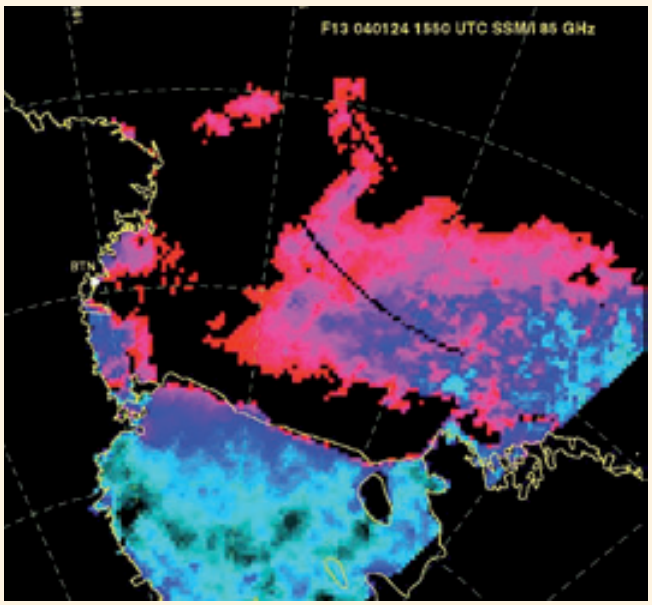
Roberto Azzolini, European Science Foundation

PolarCLIMATE

The FP6-funded EUROPOLAR ERA-NET Consortium (formed by 25 ministries, funding agencies and national polar research authorities from 19 European countries and by the ESF/European Polar Board) ended in February 2009, but left long-term durable partnerships within Europe and internationally. The EUROPOLAR Consortium set the scientific, technical and legal conditions for launching pan-European joint polar projects, the first of which was the European Partnership in Polar Climate Research (PolarCLIMATE).

PolarCLIMATE was the first step towards joint implementation of programmes utilising research stations and climate observatories in the Arctic and Antarctic. In the framework of this initiative, three core research themes were identified:

- Climate variability – northern and southern hemisphere oscillations, the scales and indicators of change and the forecasting of future threats and possibilities;
- The current status of snow and ice in the Polar Regions, the spatial distribution and magnitude of cryospheric stability;
- Impacts of climate modification on ecosystems, bio-systems and human communities in extreme environments (Arctic and Antarctic).



Ice distribution in the Ross sea. © PNRA

In Autumn 2008 PolarCLIMATE was officially initiated and coordinated by the European Polar Board.

The PolarCLIMATE Call, based on the three core themes, led to the submission of 19 full proposals (with participants from 28 countries) and to the final selection of six research projects (IMCOAST, Germany; SvalGlac, Poland; SATICE, Spain; HOLOCLIP, Italy; CryoCARB, Austria; CLIMSLIP, Norway). The funding was approximately 10 M€ allocated through the financial commitments of the funding agencies.

IMCOAST – Impact of climate induced glacier melt on marine coastal systems in the West Antarctic Peninsula region – is an interdisciplinary research project, linking causes and effects within the presently observed rapid climate change in the marine coastal environment of the Antarctic Peninsula. IMCOAST is planned as a high-resolution investigation focusing on two pilot areas on King George Island (KGI). The project is coordinated by Professor Doris Abele (Alfred Wegener Institute for Polar and Marine Research, Germany).

SvalGlac – Sensitivity of Svalbard glaciers to climate change – will estimate how changes in climate can affect the future mass balance of Svalbard glaciers and, con-

sequently, the contribution to sea-level rise. The project is coordinated by Professor Jacek Jania (University of Silesia) and Professor Francisco Navarro (Technical University of Madrid).

SATICE – Arctic Ocean sea ice and ocean circulation changes using satellite – will estimate spatio-temporal variations of ocean dynamic topography in the Arctic Ocean, ocean circulation, ocean tides, sea ice freeboard heights, ice thickness and ice mass balance using *in situ*, novel high-precision Global Positioning System (GPS) observations of sea-ice motions, satellite-based radar and lidar sea ice altimetry and satellite gravity. The project is coordinated by Dr Pedro Elosegui (Institute for Space Sciences, Spain).

'PolarCLIMATE contributed to the development of a strategic common vision for polar climate research.'

HOLOCLIP – Holocene climate variability at high-southern latitudes: an integrated perspective – aims to bring together the ice core, the sediment core and the modelling scientific communities to understand the processes linking different components of the climate system and linking climatic response to external forcing over the Holocene. The project is coordinated by Dr Barbara Stenni (University of Trieste, Italy).

A short summary of the four above-mentioned projects will be given in this issue.

CryoCARB – Long-term carbon storage in cryoturbated Arctic soils – is a project which aims to advance organic carbon estimates for cryoturbated soils including the carbon stored in the permafrost, to identify the major SOC stabilisation mechanisms, focusing on organic matter quality, microbial community composition and on abiotic factors, and to assess the vulnerability of Arctic carbon stocks in a future climate. CryoCARB is coordinated by Professor Andreas Richter (University of Vienna, Austria).

CLIMSLIP – Climate impacts of short-lived pollutants in the Polar Regions – aims to understand the radiative forcing in the Arctic caused by Short-Lived Pollutants (SLPs) accurately enough to reliably guide climate policy. The overall CLIMSLIP target is to reduce uncertainties of the impact of SLPs, particularly of Black Carbon (BC) aerosols, on polar climate. The project is coordinated by Dr Andreas Stohl (Norwegian Institute for Air Research, Norway).

A summary of the two above-mentioned projects will be given in the next issue.

PolarCLIMATE contributed to the development of a strategic common vision for polar climate research during and after the International Polar Year.

On 1 June, a meeting in Bologna together with the PolarCLIMATE funding agencies was convened and chaired by the ESF Polar Unit (Dr Bonnie Wolff-Boenisch) to discuss the proceedings and further steps and achievements of the PolarCLIMATE projects.

The European Polar Board is now planning to launch a new initiative linked to the themes developed by the European Polar Consortium EUROPOLAR ERA-NET. **This initiative is the European Partnership in Life Science (PolarLIFE).** The initiative is expected to be carried out jointly with CAREX and could also include issues connected to human and social sciences.

Dr Bonnie Wolff-Boenisch and **Dr Roberto Azzolini,**
European Science Foundation

IMCOAST – Impact of climate induced glacier melt on marine coastal systems in the West Antarctic Peninsula region

IMCOAST is an interdisciplinary activity which investigates the environmental and biotic change in an Antarctic fjord and bay system on King George Island (KGI) in Western Antarctica. The research group includes the European core projects and associated projects from South America and Europe with financing outside ESF. Both coastal systems, Potter Cove near the Argentinean Jubany Station and Admiralty Bay fronting the Polish Arctowski Station, have been under investigation for the past 15-20 years. An initial task in IMCOAST has therefore been to unearth and secure earlier data sets into the data bank PANGAEA (http://www.pangaea.de).

IMCOAST's approach in field research is to quantify the dynamics of ice mass loss and of sedimentary coastal run-off, characterise the biogeochemical fate of eroded trace elements (nutrients and metals) and the recent sedimentary environment (the top layer of the sediment column). First results indicate melting to be most pronounced in the lower parts of the glaciers, with massive ice loss in the first 250m height above ground. Near coast sediment accumulation rates have tripled since the 1940s and were 0.66g cm^{-2} y^{-1} in 2006. The present climate effects on local sedimentation are pronounced and differ from earlier warming signals during the Medieval Warm Period



Sampling of sediment pore water profiles in the laboratories at Jubany Station. © Doris Abele

(MWP), with larger mean grain size of the eroded material (16 µm diameter compared to <14 µm during MWP). Melt water and sediment discharge from the island over time are highly variable and peak in years with highest air temperatures and precipitation.

Coastal run-off enhances water column stratification and shading of the coastal water column light climate, with a strong effect on the biota. Decreasing surface salinity favours growth of tiny phyto-flagellates over larger diatoms, and krill, previously abundant in both experimental areas, have been entirely replaced by salps in recent summers. Benthic population shifts are observed with an increase in abundance of sediment tolerating bivalves and sea pens. Bivalves living adjacent to glacier discharge creeks carry significantly elevated iron loads in blood cells, with tissues and shells under investigation. More sediment-sensitive species such as stalked ascidians are declining in numbers. Limpets of the genus *Nacella*, abundant in the shallow subtidal, extend the summer season in intertidal areas and have developed special adaptations to survive tidal emersion stress.

IMCOAST is following the system change, reading different archives such as sediment cores and bivalve shells, as well as by interpreting cause-effect relationships of shifts observed in the benthic and pelagic communities, based on experimental studies.

Dr Doris Abele, IMCOAST project coordinator,
Alfred-Wegener Institute for Polar and Marine Research,
Germany

SvalGlac – Sensitivity of Svalbard glaciers to climate change

Project partners have prepared meteorological meta-data charts from the key regions of Svalbard (Nordaustlandet, NW Spitsbergen, Central Spitsbergen and Southern Spitsbergen) from classical stations and automatic weather stations (AWS). The data are used for climate studies and modelling of snow distribution on glaciers. Similarly, a glaciological database has been compiled from archive maps and recent high resolution satellite images showing fluctuations of front of glaciers with special reference to tidewater glaciers. Special attention has been paid to radio echo sounding (RES) of the thickness of glaciers. RES profiles date from the last decade and were supplemented in 2010. Special progress was made in Southern Spitsbergen in April 2011. Unique helicopter-borne RES was performed over badly crevassed glaciers where access by snow scooters is impossible. Spanish VIRL 20 MHz radar was used with success, covering a large portion of Amundsenisen glacier system. All radar data will be used for a glacier thickness inventory to find the volume-area ratio for glaciers to estimate total volume of ice masses stored in Svalbard.

Dynamics of key tidewater glaciers (Nordenskiöldbreen and Hansbreen) by the GPS method has been continued. Time lapse cameras and panoramic radar have been used during the whole year, including the polar



night period. Speeded-up events were noted even during dark winter. Similarly, a continuous record by GPS of fast-flowing outlet glaciers of Austfonna (NE Svalbard) has been made.

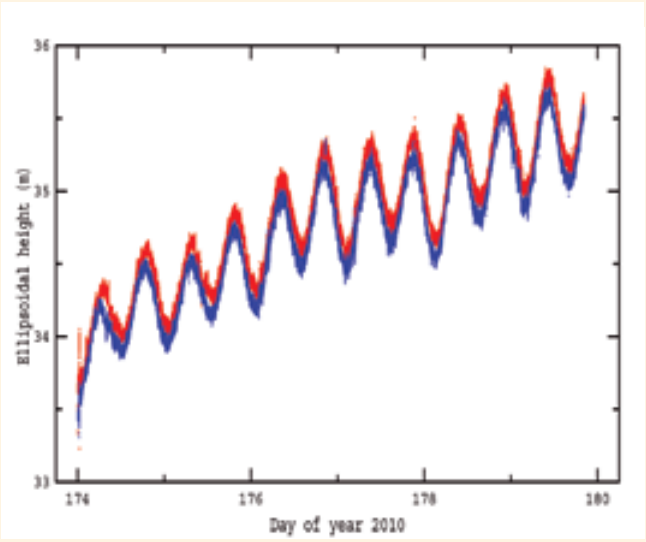
A novel remote sensing procedure using daily MODIS satellite products in order to account for cloud coverage over Vestfonna and surface albedo values was developed. Based upon meteorological data from AWS-es, regional atmospheric models have been prepared. A finite element full Stokes ice flow model for Vestfonna ice cap, which is one of the most advanced models presently existing worldwide, has been developed. The model successfully resolves the rapid outlet glaciers, and produces realistic ice velocities.

The bulk of unique results of field, remote sensing and modelling studies have been obtained after one year of the project. All research efforts are aimed at obtaining information on changes of Svalbard glaciers, taking into account mass balance and dynamics. Having in mind the current progress of research, modelling of sensitivity of ice masses for different climate scenarios will be achieved. The recent contribution of Svalbard glaciers to global sea level rise is close to being ready and predictions will be completed before the end of the project.

Professor Jacek Jana and **Professor Francisco Navarro,**
SvalGLAC project coordinators, University of Silesia and Technical University of Madrid



Helicopter AS350 over the Polish Polar Station in Hornsund, Southern Spitsbergen. The Spanish VIRL radar equipment was mounted underneath of this type helicopter for unique sounding of ice thickness of badly crevassed parts of glaciers in April 2011.
© J.A. Jania



Example of high-rate position estimates above the WGS84 ellipsoid from continuous measurements acquired by two high-precision GPS buoy prototypes deployed on a drifting ice floe over the Yermak Plateau, Arctic Ocean, for a period of ~6 days during the boreal summer season of 2010. The standard deviation of position differences is 2.8 cm, a measure of precision.

SATICE – Arctic Ocean sea ice and ocean circulation changes using satellite methods

Recent observations and model predictions paint a picture of profound transformation in the marine environment of the Arctic Ocean. The change is probably best illustrated by the rapid decline in sea ice extent and volume during the boreal summer. The focus of SATICE is to understand how sea ice is changing in this region by using a combined observational and modelling approach. A core component of SATICE is the development of a new autonomous observing platform that can bring Space Geodesy to the challenging Arctic Ocean environment. High-precision sea ice position estimates, and in particular those of vertical motions, can uniquely be used to constrain sea ice dynamic models, improve ocean tide models, examine ocean dynamic topography, and calibrate sea ice freeboard data. Currently, there is no system that has this capability.

SATICE has developed a functional prototype of an autonomous polar buoy built around a geodetic-quality, GPS receiving system. Several prototype systems have been deployed during fieldwork opportunities in both the Arctic Ocean and the Southern Ocean during the boreal and austral summers of 2010, respectively. Data from these prototypes demonstrate the feasibility of continuous, three-dimensional, cm-level positioning of fast sea ice motions. For example, GPS systems deployed on sea ice floes in the Arctic Ocean revealed, with 2-cm vertical precision, the combined expression of the change in the

geoid, ocean dynamic topography, semidiurnal ocean tides and sea ice freeboard as they drifted, for about five days, south-westward from the Yermak Plateau.

The project's team is currently finalising the fabrication of a generation of GPS buoy systems that also incorporate an integrated freeboard subsystem. (Freeboard is defined as the height sea ice sits above the ocean surface.) This subsystem combines measurements from sensors such as snow depth, water level, and sea ice-mass balance to provide freeboard and sea ice thickness estimates in the reference frame defined by the high-precision GPS observations. Two of these GPS buoys, which will be deployed in the coming months in the Chukchi Sea, will enable us to examine in detail the global mean dynamic topography image derived from the GOCE geoid and altimetric mean sea surface, compared freeboard estimates obtained from the CryoSat mission, and constrain high-resolution ocean-sea ice hindcasts using NAOSIM, all ongoing efforts.

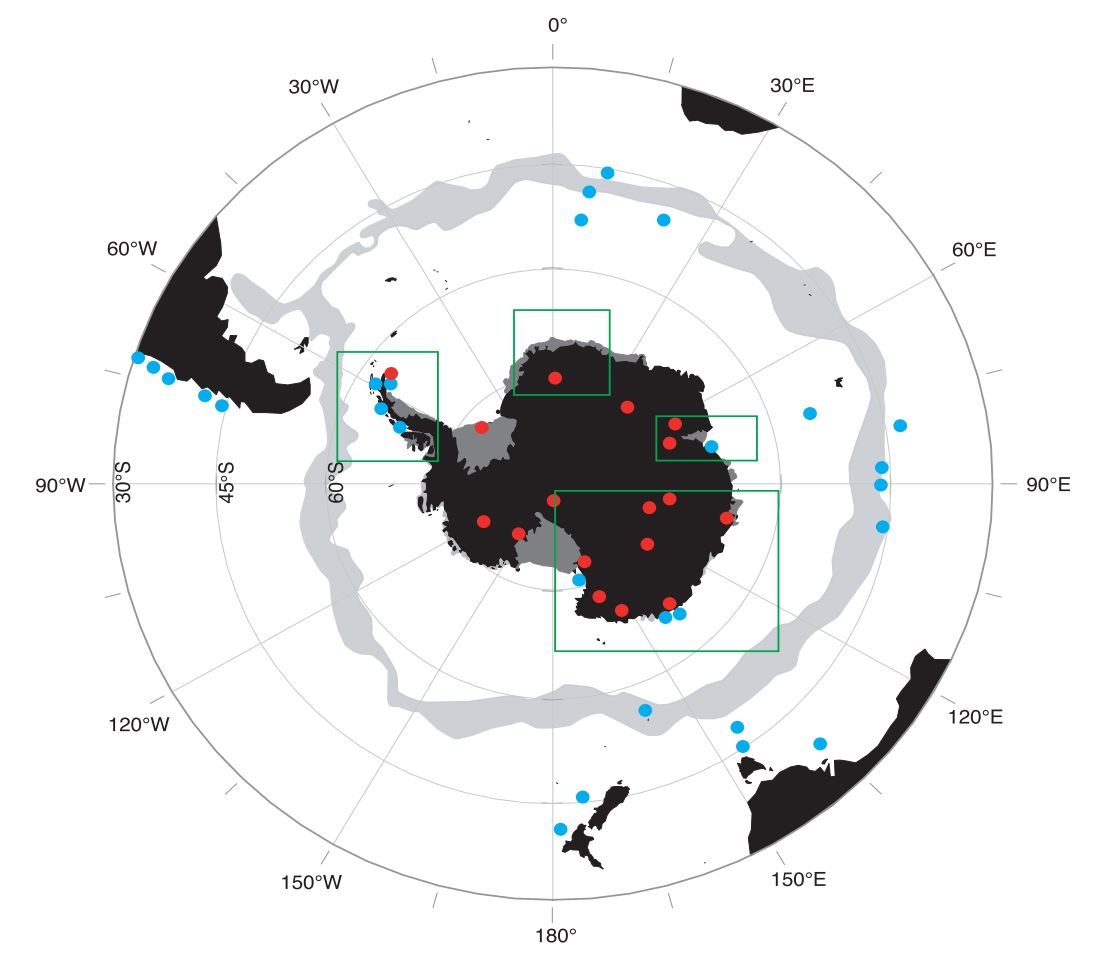
Dr Pedro Elosegui, SATICE project coordinator,
Institute for Space Sciences (ICE) and Marine Technology Unit (UTM), CSIC, Barcelona, Spain

HOLOCLIP – Holocene climate variability at high-southern latitudes: an integrated perspective

HOLOCLIP brings together the ice core, marine sediment core and the climate modelling communities to study Holocene (last 12,000 years BP) climate variability at high latitudes of the Southern Hemisphere (SH). This Joint Research Project consists of three Work Packages (WP).

WP 1 deals with the calibration of proxies used in palaeoclimate reconstructions. Interface and gravity cores and sediment traps were retrieved in Adélie Land (East Antarctica). A seasonal record of diatom and Highly Branched Isoprenoid concentrations from Adélie Land was used to develop a qualitative proxy for the reconstruction of sea ice presence. Ice core research included air-mass back-trajectory analyses at four Antarctic sites showing that the Atlantic-Indian and Ross-Pacific oceans were the main provenances of precipitation in Wilkes and Victoria Land, respectively.

WP 2 deals with the documentation of Holocene climate changes in the SH. A global view of existing



The investigated areas (green boxes) are reported on a map showing the ice (red dots) and marine (blue dots) core locations. The grey shadow area is the position of the modern polar front zone.

records of site temperatures, sea-surface temperatures (SST) and sea ice cover (SIC) is in the processes of being compiled. The data are being organised in a database on the HOLOCLIP website (www.holoclip.org). Synthesis of Antarctic ice core records highlights some common features like an early-Holocene (10-11.5 BP) warm period, a colder period around 8 ka BP and a secondary warming at 4 ka, as well as regional variability. The SST and SIC records are concentrated in the mid-latitudes of the Southern Ocean (SO) and SST patterns from mid-low and high southern latitudes differ significantly, as do trends in SST records from the Antarctic Peninsula and the Adélie Land region. JRP partners also participated in IODP Expedition 318 to the Wilkes Land margin, where recovered cores allow for seasonal to annual resolution studies.

WP 3 deals with the integration of ice and marine data with models. A data assimilation method has been tested and adapted to Holocene conditions. The method has been applied at 6 ka BP, showing that the first-order signal in the model is related to its response to the forcing but with data assimilation bringing some corrections, particularly on the changes in atmospheric circulation and regional temperature. Atmospheric concentrations of greenhouse gases (GHG) and solar forcing scenarios have been constructed for the last 9,000 years. Scenarios for the meltwater-flux of the West Antarctic Ice Sheet (WAIS) have also been established. Tests performed using those scenarios in the LOVECLIM model show that the WAIS melting had a distinct cooling influence in the SO, and that the uncertainty in GHG forcing has a clear impact on the uncertainty of the model results in the SO.

Dr Barbara Stenni, HOLOCLIP project coordinator,
University of Trieste, Italy

News from the ERICON AURORA BOREALIS Project

The **ERICON AURORA BOREALIS** Consortium (ERICON-AB) is now entering the last year of its preparatory phase. From November 2010 till May 2011 important documents for the concept of a pan-European research icebreaker were finalised.

They encompassed:

- A proposal handling system, which in addition integrates drilling proposals arriving from the Integrated Ocean Drilling Program;
- A business plan, which focuses on the generation of financial scenarios for construction, operation and models for stakeholder nations to financially commit to supporting the implementation;
- An organisational structure with a decision making and advisory process viable for a pan-European research icebreaker, and which is also applicable to any 'floating' single-sited research infrastructure;
- A report including scenarios for different legal instruments for a pan-European polar research vessel.



AURORA BOREALIS Research Icebreaker © AWI

In the remaining nine months, important deliverables will deal with, among others:

- The question of how polar research facilities can contribute to an environmental monitoring and support system in the Polar Regions;
- The creation of a 15-year Science Plan for a future large research icebreaker in the Arctic and Antarctic;
- The provision of essential research services related to a dedicated polar research icebreaker;
- The operational barriers to future usage of a pan-European research vessel.

All published reports and all relevant documents produced in the future will serve as reference documents for the unique concept and will be made available for all interested parties in the polar and marine domain.

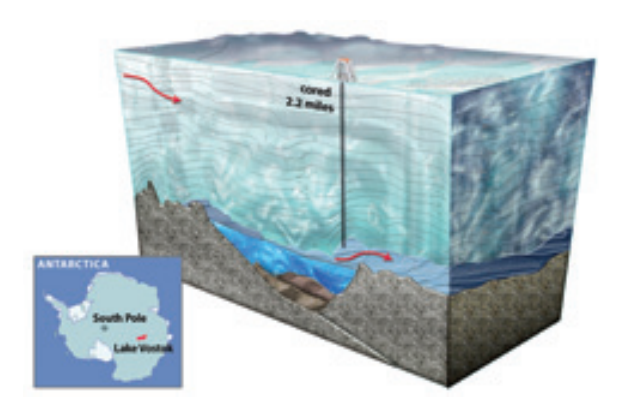
Dr Bonnie Wolff-Boenisch, ERICON Coordinator,
European Science Foundation

A Short History of Subglacial Lakes

The first hypothesis of the possible existence of subglacial lakes dates back to the 1970s. In those years SPRI-DK-US acquired a huge amount of radar data directed to the study of Antarctic ice caps, their thickness and bedrock morphology.

Near the Russian base of Vostok, some sections of the radar profile, a total of little more than a few tens of km, had two curious anomalies: reflectors of the bottom plain, continuous and nearly horizontal, and reflective amplitudes greater than 8-12 dB over the 'normal' ones. In 1973 Oswald and Robin[1] gave a possible interpretation. They showed that at the base of the ice cover, the ice-rock contact would produce weaker radar reflections, at least about 8 dB, compared to those produced by a hypothetical ice-water contact. The anomalous spans with high reflectivity were then attributed to the presence of water at the base of the ice cap. The shape of the flat, nearly horizontal reflectors was easily explained by the presence of water collected in a basin: in a lake.

This hypothesis was accepted and considered reasonable by the scientific community. In the 1990s, with satellite measurements of the European ERS-1 project, there was a big step forward. The surface topography of the ice caps, determined with decimeter accuracy, showed some anomalous areas characterised by perfectly flat trends with near zero slopes. Some of them, elongated (hundreds of km) and occasionally branched, were attributed to areas of ice divides, where the flow speeds of the ice are almost zero. Others, on the contrary, showed closed shapes; the most significant, in the form of a 'pea', located in the Vostok area, had a length of about 240 km and a maximum width of about 50 km with an area of over 12,000 km^2. It was noted that within this area were those spans of the radar profiles that were shown as evidence of the existence of a subglacial lake. This correspondence was not considered as random; in 1991, Jeff Ridley gave a possible explanation. The ice cap, as it flows over the rocky bottom, is deformed and the base deformation, although weakened, is transmitted to the surface. If, on the contrary, the cover slips over a lake, the baseline deformations are zero and the appearance of the ice surface will be flat and undisturbed. His conclusion then suggested the existence of a close relationship between surface anomaly and subglacial lake. This was the first independent confirmation of the possible existence of Lake Vostok. Later radar surveys confirmed in detail this hypothesis from which it follows that Lake Vostok by its extension is among the largest lakes on the planet – a conclusion that had a great impact on the scientific community, in the 1990s, which addressed its efforts to the study of those lakes.

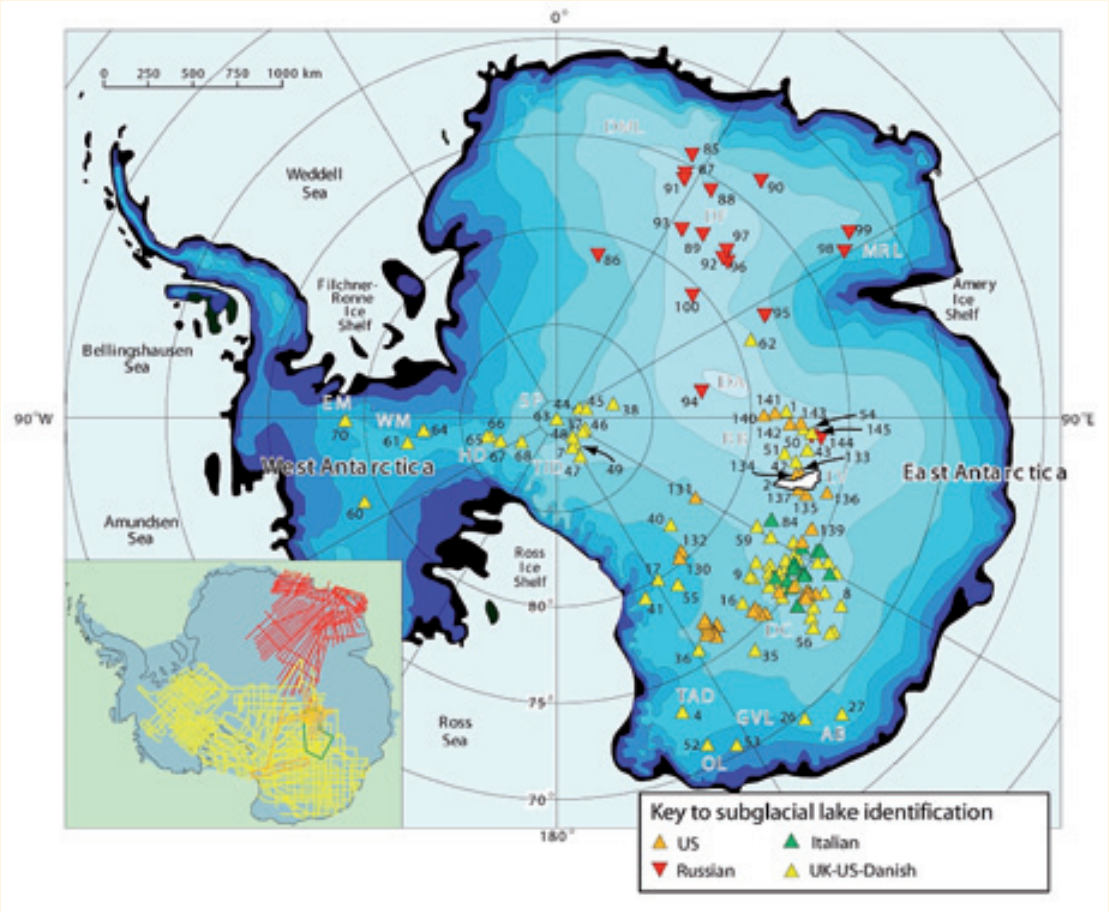


Lake Vostok image – Graphic illustrating the setting of subglacial lake Vostok, its accreted lake water ice and sediment deposits. A Russian drilling project is approaching the lake surface."
© Nicole Fuller, National Science Foundation

At first, some data collected in the past were re-analysed. In particular, some seismic surveys close to the Vostok Base, carried out by the Russians in the 1960s, which had left some doubts as to the interpretation, were reprocessed. Kapitza in 1993, reworked them in the light of the possible existence of lakes, identifying the three seismic horizons derived from the surveys, with the ice-water contact, water-sediment and sediment-bedrock. The maximum depth of water was calculated to be approximately 800 m. With the seismic survey they got then the second independent confirmation of the existence of the lake. The old radar profiles of SPRI were also looked at again, which led to the identification of over thirty lakes that had escaped the first survey. It was then confirmed that Vostok was not the only lake and that Antarctica could be the site of an intense subglacial hydrology. In the second half of the 1990s, during drilling of the ice cap at Vostok to study the palaeoclimate, it was observed that beyond the depth of 3539 m to 3623 m the ice suddenly changed appearance: its crystal size from decimetre, typical of the ice of meteoric origin, switches to metric sizes, typical of ice formed by re-freezing of water. The more than 200 m of ice accreted to the base of the ice cap was not only the third independent confirmation of the existence of the lake, but also a strong indication of a considerable water circulation that could lead super cold water to refreeze at the base of the ice sheet.

Starting from the late 1990s and during all of the following years, research was intensified. Explorations were resumed, especially those by radar, which led to the discovery of about 200 lakes and the first determination of

1. Os. K. A. and Robin, G. de Q. (1973) Lakes beneath the Antarctic Ice Sheet. *Nature* **245** (5423): 251–254.



A revised inventory of Antarctic subglacial lakes

Siegert, M.J., Carter, S., Tabacco, I., Popov, S. and Blankenship, D.D. (2005) *Antarctic Science* **17** *(3), 453–460* © Antarctic Science Ltd. Printed in the UK DOI: 10.1017/S0954102005002889

a widespread subglacial hydrological network that can connect the lakes between each other and heavily impact on the ablative processes of the ice cap.

The research made itself felt in another field. Biologists in fact put the question of the possibility that life forms could exist in the subglacial lakes, in an ecosystem characterised by pressure of 400 atmospheres, total darkness, water temperatures below -2 °C, lack of nutrients and isolation from the terrestrial biosphere for at least one million years. In 2000, SCAR formed a Group of Specialists 'SALE-GOS' which was given the task of stimulating and coordinating research on lakes and in particular on lake biology. In a short time, the studies produced a huge amount of new information and scientific insights. It became urgent to access the lakes, especially Vostok, to probe samples of water, lake sediments and bedrock. Nevertheless, research over the last five to six years has suffered a partial slowdown due to the willingness expressed by SALE to subordinate access to the lakes to the development of 'clean' drilling and the trial of sample systems to avoid the danger of polluting a pristine system.

The slowdown of the research is only partial. In 2012-2103, accessing Lake Vostok is planned with the recovery, in the form of ice, of water rising into the hole. Over the next two years tests will be carried out with a 'clean' robot capable of entering the lake and collecting and transmitting a first set of data.

The race to access the lake with the recovery of samples is pressing, even if the push to be the first to enter the subglacial lakes is very strong and may become a danger.

I believe, however, that no nation, left alone, has the economic means, the scientific capability and the people needed to safely reach the goals that the entire international scientific community is aiming at. In the spirit and the letter of the Antarctic Treaty, I believe and hope that SCAR and SALE will promote and convince national organisations to ally in a single Joint Project, such as EPICA and ANDRILL, and work together in competition, not between them, but against all that still is unknown and we want to discover.



Professor Ignazio Tabacco,
Italian Antarctic Program (PNRA),
University of Milan,
Dept of Earth Sciences

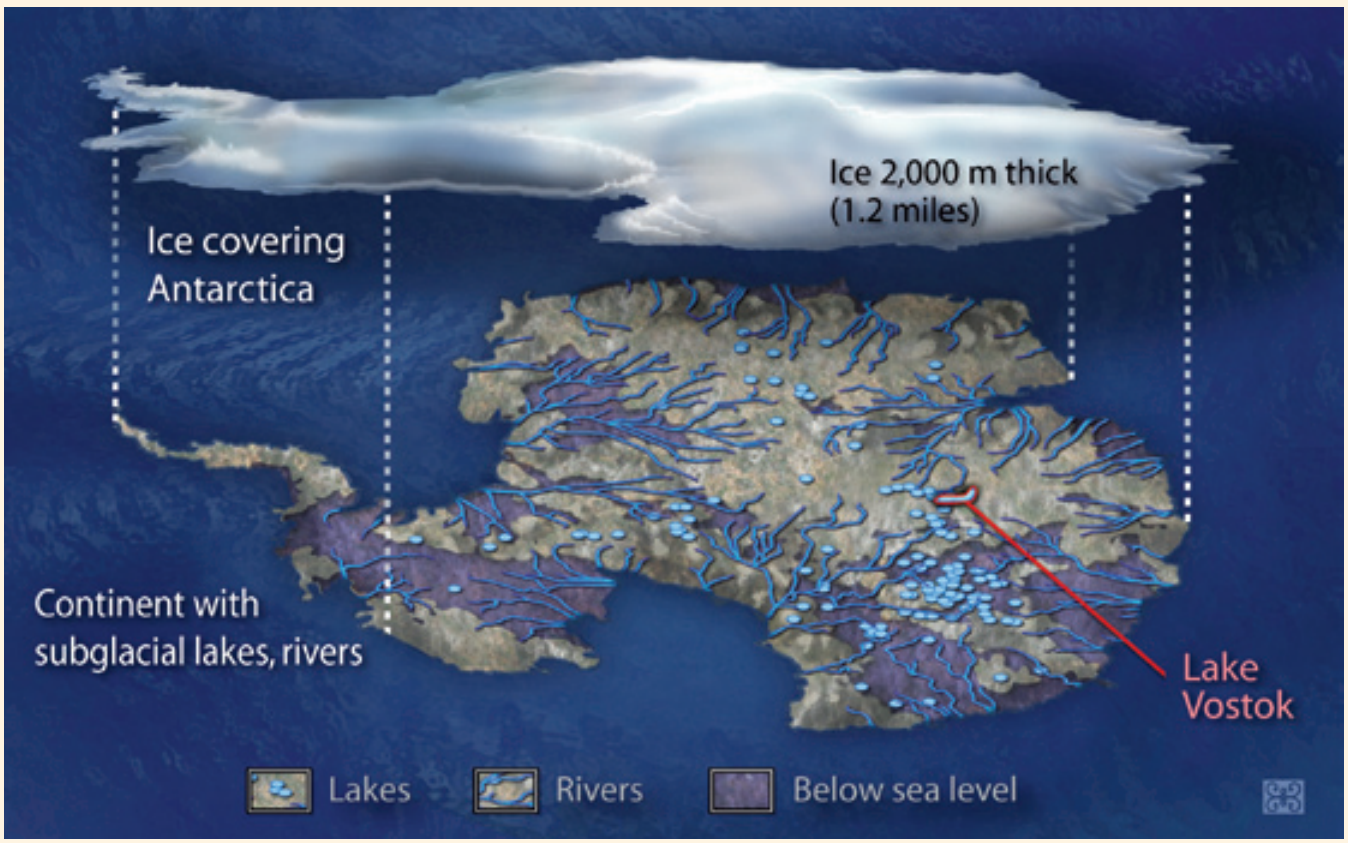
Subglacial Polar Environments – current developments

The early view of subglacial lakes being isolated, relatively static environments with limited impact on the overlying ice sheet has changed dramatically. Recent research has established the existence of an extensive subglacial hydrological system under much of the Antarctic ice sheet and linking many of the subglacial lakes already identified. The use of satellite remote sensing has demonstrated that this system is far from static with evidence of repeated drainage and filling of these lakes and the stream connections between lakes flowing intermittently. Geomorphological evidence of past catastrophic draining of subglacial lakes has now been identified in several locations around the perimeter of the Antarctic ice sheet. The presence or absence of flowing water under the ice sheet has been shown to influence the dynamics of ice streams and is driving a substantial re-evaluation of existing ice sheet dynamics models. We have yet to penetrate a subglacial lake but are continuing to acquire knowledge of the life likely to be present in these environments through study of microbes trapped in 'accreted' ice, produced by lake water freezing to the base of the ice sheet. Subglacial lakes are extreme environments for life and offer an analogue for possible extraterrestrial life.

There have been activities on several fronts within the international subglacial research community and these are: the continuing Russian-led activities at Vostok Station in East Antarctica and two developing projects in West Antarctica targeting subglacial Lake Ellsworth and the Whillans Ice Stream.

Subglacial Lake Vostok

There has been renewed activity by the Russian drilling team during the recent 2010-11 summer season. Using the existing electro-mechanical drilling system the Russians are making very slow progress in the 'warm' accreted ice that underlies the 3+ km glacial ice cover. Only around 1 m of ice penetration was possible each day and there were continuing technical problems with the drill bit. The drill finished the past season approximately 60 m above the lake water/ice interface and the difficult drilling conditions are unlikely to improve over the remaining distance as the ice status changes. It is proposed to continue drilling in the 2011-12 season. On breakthrough into the lake, which is highly pressurised, lake water surging into



Antarctic Lakes – Graphic illustrating the distribution of subglacial lakes and the continental scale hydrological network beneath the Antarctic ice sheet © Zina Deretsky, National Science Foundation



Glaciologist Alexey Ekaykin (AARI) is extracting a 1.5 m long piece of accreted ice from the drill. The accreted ice originates from the Lake Vostok water that re-freezes on the base of the ice sheet as it moves across the lake. The studies of the ice core recovered from the deepest penetration of the Vostok borehole are expected to provide further evidence of biological residents, geochemical conditions and hydrological regime of this uncharted aquatic environment.
Vladimir Lipenkov (AARI)

the drill hole will be allowed to freeze and then cored to obtain water samples for chemical and biological analysis.

Lake Ellsworth exploration plans

The current timetable for exploring this much smaller lake is to undertake a drilling project during the 2012-13 field season and preparations are well advanced in building a sophisticated hot water drilling system (capable of penetrating 3 km of ice) and water filtering system which aims to minimise chances of lake contamination. The plan is to melt a hole through the ice sheet and then insert an *in situ* sensing and water sampling probe to profile the water column conditions. Returned samples will be analysed for evidence of life using modern molecular techniques. A coring device is also being constructed to sample the lake sediments and return an intact 4 m core of the lake history. The lake is located in a fjord feature and could potentially have an invaluable sediment record of freshwater and marine transitions that relate to the establishment and breakout of the West Antarctic Ice Sheet as well as further evidence of life forms.

The Whillans Ice Stream Subglacial Access Research Drilling (WISSARD) project

This is a six-year (2009-2015) US-funded integrated study of marine ice sheet stability and subglacial life habitats focused on the hydrological continuum beneath the Whillans Ice Stream in West Antarctica and is working collaboratively with the Ellsworth group on drilling technologies. One sub-project aims to improve computer models of ice sheet dynamics by introducing realistic treatments of subglacial water flow and its control on fast ice motion. In addition, samples of subglacial sediments and basal ice will provide an opportunity to study the history and evolution of Antarctic subglacial lakes and of the ice sheet itself. A second sub-project is focused on the stability of the fast flowing Whillans Ice Stream grounding zone which is where the ice, ocean waters and sea floor interact; where the ice is being melted by or is freezing seawater, and where debris below and in the ice and streams flowing under the ice are released and discharge their loads. The third sub-project will integrate genomic and biogeochemical information from the subglacial environment to define the relationship between structure and function of this previously unexplored ecosystem.

These three major activities and existing information obtained from major projects conducted during the International Polar Year are set to significantly advance our knowledge of these remarkable systems and their significance for ice sheet dynamics, Antarctic glacial history and the science of life in extreme environments.



Professor Cynan Ellis-Evans,
British Antarctic Survey

Dutch-British cooperation at Rothera intensifies

Nederlandse Organisatie voor Wetenschappelijk Onderzoek

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Dutch Antarctic Research

Dutch researchers have been active in the Polar Regions for decades, researching the ice, the (past) climate, the polar oceans, terrestrial and marine ecology and human intervention in the past and present. This has resulted in fruitful collaborations between the Netherlands and international partners in polar science. The British Antarctic Survey and the Netherlands Organisation for Scientific Research will intensify their collaboration by building a mobile research facility at Rothera Research Station, located at Adelaide Island on the Antarctic Peninsula. The concept of this research facility is to create flexible laboratory modules that will be connected to a docking station (Figure 1).

A Flexible Laboratory

Sea containers have been fitted with these modules which are, in fact, compact laboratories tailored to the needs of scientific researchers. The British Antarctic Survey will provide the necessary facilities (power/water supply, discharge, protection) with the construction of the docking station. Design and preparation of the lab modules will take place at the Royal Netherlands Institute for Sea Research (NIOZ) in the Netherlands. This concept enables a flexible approach for research in the Antarctic. When a project ends, the lab module can be replaced by another module, from the Netherlands or the UK. In the long run, involvement of other partners will be encouraged.

Five mobile laboratories will be constructed:

- a temperature controlled dry lab container suitable for analytical instruments;
- a wet lab cultivation container (*e.g.*, for incubation set up);
- a clean room lab container equipped with special filters in air handling system;
- a workshop lab container (*e.g.*, for preparation of field work/storage of equipment);
- a measuring/storage container for various atmospheric analyses instrumentation.

All mobile lab units will be provided with basic, relevant equipment. Staffing and specific equipment will be selected during an open science call. Which proposals of the first call will be funded will be decided in the Spring of 2011 (see www.nwo.nl/subsidyguide).

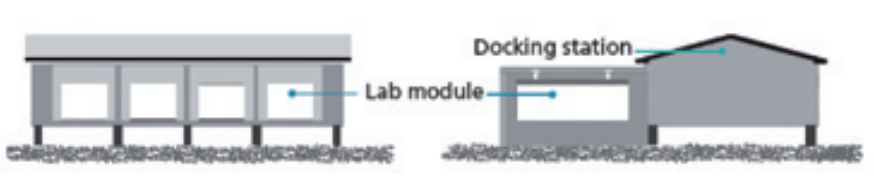


Figure 1. Model of docking station with containerised laboratories. Model by BAS – figure by C. Renard, NWO.

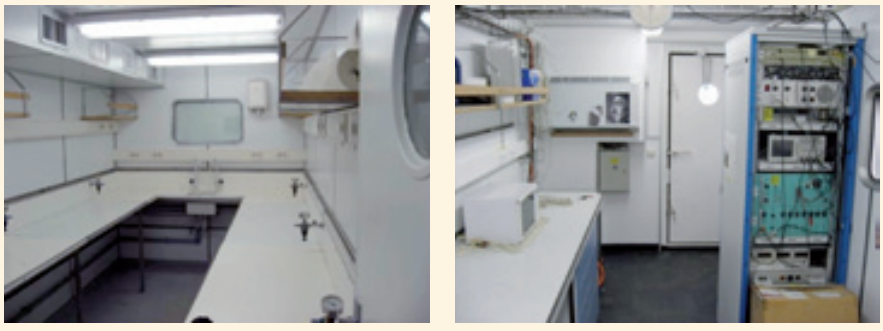


Figure 2. Inside of a mobile lab. Pictures by NIOZ



Figure 3. Construction of foundation for the docking station. © Marck Smit, NIOZ

Time frame

After the legal and environmental issues had been taken care of, the first building phase started at the end of 2010. The concrete foundation for the docking station was finished in March this year (Figure 3). The steel and cladding material for the docking station arrived in March as well. The actual construction of the docking station will begin in the austral summer of 2011-2012. During that time, the lab containers will be designed and built in the Netherlands. The first container lab has been tendered and ordered and will be delivered in June this year. The science projects are scheduled to start in 2012.

Liesbeth Noor,
Netherlands Organisation for Scientific Research (NWO)



The Bulgarian-Portugues-Spanish-USA-German Team in the Bulgarian Antarctic Base "St. Kliment Ohridski", January 2011

Permafrost and Climate Change in the Maritime Antarctic

Five years of permafrost research at the St Kliment Ohridski Station in Livingston Island

Collaborative research between Bulgaria, Portugal and Spain on permafrost started in 2006 in the vicinity of the St Kliment Ohridski Station in Livingston Island (South Shetlands, Antarctic). Initial field activities focused on ground and air temperature monitoring for studying microscale influence on the active layer thermal regime. These activities complemented the Portuguese collaboration with Spain that started in 2000 in the vicinity of the Spanish Station Juan Carlos I. The integration of the Bulgarian Antarctic Institute in the permafrost monitoring programme conducted by the Universities of Lisbon and Alcalá de Henares allowed the study area to be widened to new sites in Hurd Peninsula. Currently, five years after the start of the joint programme, the Bulgarian Antarctic Institute provides logistical and technical support to permafrost and active layer monitoring activities, framed within a collaboration with Earth scientists from the University of Sofia. The St Kliment Ohridski Station provides maintenance to three permafrost and active layer boreholes integrated in the Global Terrestrial Network for Permafrost (GTN-P), to one meteorological station and to snow cover monitoring time-lapse cameras. Also, in the framework of the project PERMANTAR-2 - Permafrost and Climate Change in the Maritime Antarctic, other research activities are taking place with the collaboration of the Bulgarian Antarctic Institute. Research emphasis is on: i) monitoring changes in the terrestrial permafrost environment; ii) soil research; iii) snow cover monitoring using SAR and optical remote sensing; iv) terrain deformation monitoring by field geodetical techniques and DINSAR; and v) detection of frozen ground using electrical resistivity tomography surveying. In the framework of these activities, the St Kliment Ohridski Station has recently hosted researchers from the Universities of Lisbon and Évora (Portugal) and Wisconsin Madison (USA).

Christo Pimpirev,
Bulgarian Antarctic Institute
Gonçalo Vieira,
Foundation for Science and Technology, Portugal

Focus on Belspo

The Belgian Federal Science Policy Office (BELSPO) became a new member of the European Polar Board in 2010. This article focuses on the main activities of BELSPO in Antarctica.

BELSPO has been financing Antarctic research since 1985. Terrain work has been carried out thanks to the participation of Belgian scientists in campaigns organised by other countries. Since 2008 Belgian – and international scientists – can go to the Belgian Princess Elisabeth Station in Dronning Maud Land for their field work. The newly-established Belgian Polar Secretariat – created in 2009 as a State department with separated management within BELSPO – is responsible for the management and maintenance of the station. Nine projects are currently financed by BELSPO, for a total of 8.7 M€. Field work is carried out either at the Princess Elisabeth Station or aboard other research infrastructures.

Glaciology

The **BELISSIMA** project investigates the processes occurring at the interface between the ice sheet, ice shelf and the ocean and aims at quantifying mass changes in the coastal area near the Princess Elisabeth station. Two field campaigns have been carried out in collaboration with Kenichi Matsuoka (NPI, Norway) and Bryn Hubbard (University of Aberystwyth, UK). ***Coordination:*** **Frank Pattyn & Jean-Louis Tison, ULB (http://ulbonice.blogspot.com/)**



BELDIVA: air filtration experiment.
© Zorigto Namsaraev – ULG

Climatology

The **BELATMOS** project monitors ozone and related gases, UV radiation and aerosols at the Princess Elisabeth Station in support of atmospheric chemistry and climate research. Data of total concentration of particles and polluting particles, ozone concentration, UV index and the extinction of solar radiation caused by aerosols are obtained. ***Coordination:*** **Hugo de Backer, RMI (http://belatmos.blogspot.com; http://ozone.meteo.be/meteo/view/en/1550481-ANTARCTIC.html)**

HYDRANT evaluates evaporation from the surface, water vapour transport into Antarctica, cloud formation and precipitation by means of ground-based measurements at the Princess Elisabeth base. An Automatic Wether Station (AWS) provides hourly data on meteorology, radiative fluxes, snow height and temperature down to 1 m depth. Ground-based remote sensing instruments detect clouds as well as precipitations. The project is carried out in collaboration with IMAU and KNMI (Netherlands). ***Coordination:*** **Nicole Van Lipzig, KUL (http://ees.kuleuven.be/hydrant/)**

Geophysics

GIANT-LISSA studies the physical environment of Antarctica at the Belgian Princess Elisabeth Station. GIANT combines GPS and absolute and relative gravity measurements in order to separate the lithospheric movements induced by the post-glacial adjustment and by the present-day ice mass changes. LISSA studies the deep structure of Antarctica and the intraplate seismicity through the detection of local earth and ice-related seismic events. Measurements are carried out in collaboration with the University of Luxemburg. ***Coordination:*** **Thierry Camelbeeck – ROB (http://homepage.oma.be/lombardi/)**

Geology

SAMBA is a Belgian project, in close collaboration with Japan, searching for meteorites in the Northwest part of the 'Nansen' blue ice field. 218 specimens have been collected. First, the meteorites are sent to the NIPR in Tokyo for classification. Then they come back to Belgium where they are made available by the Royal Belgian Institute of Natural Sciences to the international scientific community. ***Coordination:*** **Philippe Claeys, VUB (http://we.vub.ac.be/~dglg/Web/Claeys/Claeys.htm)**

Microbiodiversity

BELDIVA studies the biodiversity, the effects of future climate warming on (microbial) communities and adaptations and specific genes related to stress in this extreme environment. Experiments are conducted with Open Top Chambers, air filtration, photosynthetic efficiency of biofilms and the study of cryoconites. ***Coordination:*** **Wim Vyverman, UG (www.antarcticabelgium.blogspot.com)**

Belgian universities and the British Antarctic Survey cooperate in the **AMBIO** and **ANTAR-IMPACT** project to study the biodiversity in the Transantarctic Mountains and around the Princess Elisabeth Station. Results have been presented at an international workshop, organised in cooperation with SCAR-EBA: 'Antarctic Biodiversity: status and trends' (31 May 2011 - University of Liège - awilmotte@ulg.ac.be). ***Coordination:*** **Annick Wilmotte – ULg (www.ambio.ulg.ac.be / ww.antar-impact.ulg.ac.be).**

Marine biodiversity

In the framework of the **BIANZO II** project, Belgian researchers participated in the ANT-XXVII/3 Polarstern expedition to investigate the possible effects of climate change on biodiversity and ecosystem functioning in sub and high Antarctic regions. The impact of ice cover loss and ice scouring on the smaller organisms



HYDRANT: set-up of the automatic weather station. © Irina Gorodetskaya – KUL

inhabiting the sea floor was assessed as well as the recovery potential of the nematodes after climate-induced changes in their environment. Biodiversity and phylogeographic patterns of scavenger amphipod groups were also investigated. ***Coordination:*** **Ann Vanreusel – UG (http://biobel.biodiversity.be/project/show/2968)**

Biogeochemistry

Researchers from the **BELCANTO III** project participated in different campaigns coordinated by other countries to assess export of organic carbon through the biological pump and the remineralisation of this carbon during transit through the mesopelagic depth region. This will lead to improvements in our capability to predict the SO response to future increase of atmospheric CO_2 and temperature, acidification and changes in oceanic circulation. The team will continue its work in the **BIGSOUTH** project for measuring carbon fluxes and related processes during the KEOPS 2 expedition (2011) in collaboration with France and Australia. ***Coordination:*** **Frank Dehairs – VUB (http://www.co2.ulg.ac.be/belcanto/)**
www.belspo.be/antar

Maaike Vancauwenberghe,
Belgian Science Policy Office

News from Portuguese Polar Science

FCT
Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

Advances in the consolidation of Portuguese polar research have been significant since the start of the International Polar Year 2007-08. Annual conferences organised by the research community and funded by the FCT have been the main national fora for discussing new results, as well as for strategical planning. On 13 April 2011 the 3rd Portuguese Conference on Polar Science was organised at Coimbra by the Institute of Marine Sciences and Centre of Geophysics of the University of Coimbra, with the collaboration of the CEG/IGOT of the University of Lisbon. The President of the Republic supported the event, which brought together 98 participants, with 49 oral and poster presentations from 14 national institutions and 17 collaborating countries. Volker Rachold (IASC) and Mike Sparrow (SCAR) presented key-note lectures on activities from both institutions, emphasising ways to collaborate with Portuguese scientists. The main areas represented at the conference were life sciences, Earth and environmental sciences, atmospheric sciences and planetary sciences. Research focused both on the Antarctic (mainly from South Georgia to Antarctic Peninsula) and the Arctic (Svalbard and Arctic Canada). The abstracts of the 3rd Conference on Portuguese Polar Science are available at http://cienciapolar.weebly.com/programa.html. On 12 April, preceding the conference, an APECS-Portugal workshop was organised, bringing together about 50 students and early career researchers and showing that polar science is sustainably growing in Portugal. A new international mobility grants programme for young polar researchers for 2011-12, coordinated by the Portuguese Polar Committee and sponsored by Caixa Geral de Depósitos, has been announced. This programme focuses on the internationalisation of research and will have three objectives: i) international conferences; ii) internships at foreign institutions; and iii) travel support for polar field work.

Gonçalo Vieira,
Foundation for Science and Technology, Portugal



Participants of the 3rd Portuguese Conference on Polar Science at the University of Coimbra
© Ana Salomé David

Spotlight on events

Research urgencies in the Polar Regions and their links to the ICSU Grand Challenges in Global Sustainability

A two day symposium in Siena (Italy) in the context of the ICSU General Assembly 2011 and the ICSU Earth System visioning process

Siena, Italy – 23-24 September 2011

Sponsored by the ICSU organisations SCAR, IASC and IACS

Supported by PNRA/MIUR, CNR and MNA

Hosted by the University of Siena

Introduction

ICSU, along with the World Meteorological Organization (WMO), cosponsored the recently completed International Polar Year 2007-2008 (IPY). IPY was an ambitious multidisciplinary and international collaboration in polar regions in the domain of Earth system sciences and social sciences. IPY was the largest planetary coordinated research effort in the past 50 years, engaging thousands of scientists, often from 'non polar' countries. The two years of IPY-concentrated polar research yielded unprecedented achievements and critical data sets that advanced our understanding of the polar regions and are directly relevant to and supportive of the ICSU Grand Challenges in Global Sustainability.

This two-day symposium for 80-100 persons will be held in the historic city of Siena, Tuscany, prior to the ICSU General Assembly in Rome beginning on 26 September 2011. It will focus on the functioning of the Earth System in the Arctic and Antarctic, the major drivers of pervasive change and the as yet unaddressed research issues in polar regions. These global issues will be considered in the context of the ICSU Grand Challenges and the research priorities of the Scientific Committee on Antarctic Research (SCAR), the International Arctic Science Committee (IASC) and other ICSU Unions and Interdisciplinary Scientific Bodies with interests in polar sciences.

IPY 2012 conference

Montréal, 22-27 April 2012

International Polar Year, Canada

The IPY 2012 Conference *From Knowledge to Action* is the final conference for International Polar Year 2007-2008. Building on the results of the IPY St Petersburg Conference in 2008 and the IPY Oslo Science Conference in 2010, the focus of this conference is to apply the findings and knowledge gained from IPY to policies, programmes, practices and other actions.

For more information, please consult the website: http://www.ipy2012montreal.ca/001_welcome_e.shtml



On the way to the outcrop for geological sampling, Hurd Glacier, Livingston Island.
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Major meetings on Polar Science

8-10 JUNE 2011

CTBTO, Science and Technology 2011
Hofburg Palace, Vienna, Austria

19-21 JUNE 2011

The Arctic Imperative Conference
Alyeska Resort, Girdwood, Alaska

20 JUNE – 1 JULY 2011

ATCM XXXIV – CEP XIV
Buenos Aires, Argentina
http://www.ats.aq/devAS/ats_meetings.aspx?lang=e

22-24 JUNE 2011

6th Antarctic Meteorological Observational, Modelling and Forecasting Workshop
Hobart, Tasmania, Australia

22-26 JUNE 2011

ICASS VII: Circumpolar Prospectives in Global Dialogue: Social Sciences beyond the IPY
Akureyri, Iceland

27 JUNE 2011

APECS Early-Career Scientist Development Workshop
Melbourne, Australia

10-16 JULY 2011

11th International Symposium on Antarctic Earth Sciences (ISAES)
Edinburgh, Scotland
http://www.isaes2011.org.uk/

20-22 JULY 2011

Remote Sensing for Polar Scientists
University of Reading, Reading, UK

20-27 JULY 2011

XVIII International Union for Quaternary Research (INQUA) Conference
Bern, Switzerland

20-27 JULY 2011

INQUAA 2011 Session: Thermokarst and permafrost dynamics: feedbacks with climate change at the XVIII INQUA-Congress
Bern, Switzerland

20-27 JULY 2011

INQUAA 2011 Session: Holocene Glacier Variability from the Tropics to the Poles
Bern, Switzerland

26-29 JULY 2011

7th SCAR History Workshop – 'Antarctic History: probing the unknown'
Stellenbosch Institute for Advanced Study, Stellenbosch, South Africa

1 SEPTEMBER 2011

Northern Research Forum 6th Open Assembly 'Our Ice Dependent World'
Oslo and Kirkenes, Norway

7-9 SEPTEMBER 2011

8th Symposium on Polar Studies
Palma de Mallorca, Spain
http://www.uibcongres.org/congresos/ficha.en.html?cc=207

14-16 SEPTEMBER 2011

UK Arctic Science Conference
University of Leeds, Leeds, UK

20-23 SEPTEMBER 2011

Advanced Workshop on Oil Spills in Sea Ice: Past, Present and Future
Istituto Geografico Polare 'Silvio Zavatti', Fermo, Italy

21-24 SEPTEMBER 2011

2011 Arctic Science Conference 'Ecosystems: Understanding the Cycles'
Dillingham, Alaska

23-24 SEPTEMBER 2011

ICSU Polar Science Symposium: Research Urgencies in the Polar Regions and their Links to the ICSU Grand Challenges in Global Sustainability
Siena, Italy
http://www.mna.it/english/News/ICSU_symposium/

18-20 OCTOBER 2011

CAREX Conference on Life in Extreme Environments
Stillorgan Park Hotel, Dublin, Ireland

24 OCTOBER – 4 NOVEMBER 2011

CCAMLR-XXX and SC-CAMLR-XXX Meetings
Hobart, Tasmania
http://www.ccamlr.org/pu/e/sched-of-mtgs.htm

EPB/ERICON meetings

20-21 JUNE 2011

European Polar Board Executive Committee Meeting
Frankfurt Airport, Germany
(This meeting is open to EPB Executive members only)

SEPTEMBER 2011

ERICON Technical Steering Committee Meeting
Banyuls-sur-Mer, France
(This meeting is open to ERICON Technical Steering Committee members only)

12-13 OCTOBER 2011

European Polar Board Plenary Meeting
Sofia, Bulgaria
(This meeting is open to EPB Delegates only)

25 OCTOBER 2011

ERICON Stakeholder Council Meeting
Rome, Italy
(This meeting is open to ERICON Stakeholder Council members only)

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The European Polar Board (EPB) is Europe's strategic advisory body on science policy in the Polar Regions. Established in 1995, it acts as a voice and high-level facilitator for cooperation between European national funding agencies, national polar institutes and research organisations.

The EPB is concerned with major strategic priorities in the Arctic and Antarctic and has members from national operators and research institutes in 20 countries. The Board is taking a central role in the coordination and management of Polar Initiatives at a European level.

The EPB is actively liaising with major polar programmes outside Europe including those in the USA, Russia and Canada.

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