1st SCAR SALE MEETING 22-23 April, 2005 - Vienna, Austria

Attendees: J Priscu (Convenor), M Kennicutt (Secretary), R Bell, S Bulat, V Lukin, JR Petit, R Powell, M Seigert, I Tabacco

Not in Attendance: C Ellis-Evans

SCAR SALE PROPOSED MEMBERSHIP

Name	Affiliation	Expertise	Term End	Contact Information
J Priscu (USA), Conevner	Department of Land Resources and Environmental Sciences, Montana State University	Microbial Ecology, Limnology	2008	jpriscu@montana.edu
M Kennicutt(USA), Secretary	Office of the Vice President for Research	Chemical Oceanography, Environmental Protocols	2008	m-kennicutt@tamu.edu
R Bell(USA)	Lamont-Doherty Earth Observatory	Geophysical Surveys, Geology	2008	robinb@ldeo.columbia.edu
S Bulat (RUS)	Department of Molecular and Radiation Biophysics, Petersburg Nuclear Physics Institute RAS	Microbial Genomics	2008	bulat@omrb.pnpi.spb.ru
C Ellis-Evans (UK)	British Antarctic Survey	Limnology, Ecology	2008	jcel@bas.ac.uk
V Lukin (RUS)	Artic & Antarctic Research Institute	Glaciology, Ice Drilling Technology	2008	lukin@raexp.spb.su
C Mayer (GER)	Commission for Glaciology, Bavarian Academy of Sciences	Glaciology, Ice Modeling	2008	Christoph.Mayer@lrz.badw-muenchen.de
F Pattyn (BEL)	Department of Geography, Vrijie Universiteit Brussels	Glaciologist, Modeling	2008	fpattyn@vub.ac.be
R Powell (USA)	Department of Geology and Environmental Geosciences	Geology, Paleoclimate	2008	ross@geol.niu.edu
JR Petit (FRA)	LGGE-CNRS BP 96	Glaciologist, Geochemistry		petit@glaciog.ujf-grenoble.fr
M Siegert (UK)	Bristol Glaciology Centre, University of Bristol	Glaciology, Geology	2008	m.j.siegert@bristol.ac.uk
I Tabacco (ITA)	DST Geofisca	Glaciology	2008	ignazio.tabacco@unimi.it

Observers: K Eremenko (Marco Polo Film AG), F Pattyn (Vrije Universitet Brussel), C Summerhayes (SCAR)

1.0 Introduction

The meeting was called to order by J Priscu, SALE Convener. Committee members and observers were introduced. The agenda of the meeting was amended and approved. A brief reprise of the accomplishments of the Subglacial Antarctic Lake Exploration Group of Specialists (SALEGOS), the progenitor of SALE, was provided by the Convenor.

SCAR SALE Meeting #1 - Agenda

2.0 Old Business

C. Summerhayes, Executive Director of SCAR, agreed to provide a final resolution of the pending SALEGOS recommendations at the next SCAR Executive Meeting.

SALEGOS Recommendations - Disposition

3.0 Program Administration

As the inaugural meeting of SALE; the organization, management and structure of the SALE program was discussed.

It was agreed that J Priscu and M Kennicutt continue as Convener and Secretary for the program, respectively.

It was agreed that the two additional members would be added to the SALE membership list will be submitted to the SCAR Executive – F Pattyn, Vrjie Universitet Brussels and Christoph Mayer, Alfred Wegner Institute. Additional members will be considered based on gaps in expertise, national affiliation, commitment to SALE activities and budgetary limitations. It was recognized that the intent was for SCAR Scientific Research Program membership to be open to all SCAR countries however, there are budgetary limits to the provision of travel support. It was recognized that too large a group would hinder productivity and effectiveness, particularly if the members did not actively participate in program activities. Prolonged inactivity or non-responsiveness to requests for input can result in the removal of a member. Each new application for membership will be considered individually as they arise. Members will be asked to cover their own travel expenses to program meetings whenever possible.

It was recognized that the SALE program needed to broaden its participation. Various mechanisms to encourage greater participation were discussed. It was generally agreed that expansion of the group core membership was not budgetarily feasible. An active web site, a news and activity notification system (email), and sponsorship of scientific meeting sessions, workshops, and participation in other meeting were some of the mechanisms engage a larger audience.

To better organize and promote SALE activities, it was agreed to that subcommittees would be formed to focus SALE activities in specific areas. Initially three committees were formed:

- Data Management and Accessibility- R Bell (Chair, Geophysics), R Powell (Geology), C Ellis-Evans (Biology), JR Petit (Chemistry).
- Education, Outreach and Communications – I Tabbaco (Chair)
- Technology – R Powell (Chair)

SALE will abide by and adhere to the "SCAR Communications Plan" and the "SCAR Strategy for Capacity Building and Education"

- SCAR Communications Plan
  http://www.scar.org/about/introduction/strategicplan/communication.html
- SCAR Capacity Building Plan and Education
  http://www.scar.org/about/capacitybuilding/index.html

M Kennicutt reminded the group, that as a small organization it was important that each member actively participate in all activities. To this end, it is important that all members provide information in a timely manner as requested for meetings and reports, represent and report back to colleagues in their respective countries, and act as proponents of the program in all venues. Members that do not remain actively involved with SALE activities may be replaced by a vote of the program membership.

It was agreed that Texas A&M University will host the SCAR SALE web site which will be transferred from Montana State University where it was developed in support of SALEGOS activities. The SCAR SALE program will be co-located with the US SALE Program Office and SALE-UNITED program office for efficiency and ease of access.

SALE SCAR http://salepo.tamu.edu/scar_sale

SALE Program Office http://salepo.tamu.edu/

SALE-UNITED http://salepo.tamu.edu/sale_united

A SALE Implementation Plan is due to the SCAR Executive by June 1, 2005. Each member country was asked to update the scientific and technology milestones provided in the SALE SRP proposal. In addition, each member was asked to identify any meetings, conferences, and/or workshops that will include SALE activities in the next four to five years for inclusion in the implementation plan. Based on the input received the implementation plan was submitted on June 14, 2005.

SCAR SALE Implementation Plan

Future SALE meeting agendas will have a series of standing items to be considered each time:

1. Introductions
2. Program Administration - Membership, Organization, and Committees
3. SALE Implementation Plan –Progress and Update
4. Committee Reports – Data Management and Accessibility; Education, Outreach, and Communications; and Technology
5. IPY Update
6. National Activity Reports
7. Program Performance –Update Metrics
8. Other Matters Arising
9. Action Items
10. Next Meeting

Additional items will be added to the agenda as they arise. Meeting books will be prepared before the meeting and include all relevant documents for discussion.

4.0 SALE in the International Polar Year 2007-2008

SALE membership agreed to participate as a group in the IPY 2007-2008 as the SALE- Unified Team for Exploration and Discovery (UNITED). SALE-UNITED will include the members of the SCAR SALE and the two programs will be tightly coupled. SALE-UNITED will be organized by M Kennicutt. A SALE-UNITED Expression of Interest (EoI) was submitted to the ICSU/WMOP Joint Committee for the IPY. M Kennicutt was notified by the JC that SALE-UNITED had been identified as a potential “core“ project and possible lead for the IPY under the theme exploration of new frontiers. The other two EoIs (M Siegert – Lake Ellsworth and F Pattyn, ASPI) in the SALE cluster agreed to join the SALE-UNITED for submission of the full proposal to the ICSU/WMO JC due June 30, 2005.

SALE-UNITED Expression of Interest (EoI) http://salepo.tamu.edu/sale_united/icsuwmojc

ICSU/WMO IPY Joint Committee Web Site http://www.ipy.org/

5.0 National Activity Reports

RUSSIA

In early January 2005 the RAE established an air link between Progress station, Prydz Bay and Vostok station. Six flights from Progress-Vostok-Progress have been made by BT67 Basler aircraft. This has enabled the conduct of summer season research of Subglacial Lake Vostok (SLV). First, drilling equipment was repaired and the 5G borehole condition was inspected. At present everything is ready for further drilling. On 20 January 2005 a permit from th e Russian Federation interministerial commission was issued to drill and additional 50 meters in the 5G borehole from 3623 to 3673 m. Drilling will start in December, 2005.

A tractor-sledge convoy supported SLV research including characterization of the lake's coastal line, overlying ice sheet, underlying water layers and basal sediment rock thickness. Methods include radar echo sounding and seismic sounding. The investigations found that the ice height in the central and northern parts of the lake varies from 2460 to 4350 meters. The maximum ice tickness was in the area where sounds and embayments occur in the north and north-west portions of the lake. At the lake's eastern coast the ice thickened as much as 80 - 100 m, most likely due to glacier flow from Dome B to the east. For the same reason, barriers to glacier flow such as capes and peninsulas cause ice thickening along the lake's west coast. The maximum measured ice thickness was 4350 m. Ice thickness within the subglacial lake varies approximately from 3600 m in the southern part to 4350 m in the northern one. The subglacial lake surface is likely to be sloping, dissected by shallow relief forms, probably caused by freezing/melting processes and inherited glacial forms. Beyond the lake boundaries the ice cover is thins due to the character of subglacial relief. Considerable reduction of glacier thickness, up to 2460 and 2600 m was observed in the western and eastern parts of the lake, respectively.

Radar sounding was continued beyond the lake basin, along the Vostok - Mirny transport convoy route. The measurements were performed on those route sites where no ice thickness data was available. Where data was available along the route, the measurements were carried out on parallel tracks within 50 km of the main route. Along the convoy route, radar profiles provided faint reflections from the bedrock. The wave character suggests moraine material is occluded in the glacier body.

In 2003/2004 summer season in the area of Pionerskaya station (69 44.785 S 95 32.197 E) a reflection from a water surface was discovered by radar sounding. That area was again studied during the 2004/2005 season. Reflections from a water surface were continuously registered over a distance of about 2 km on tracks parallel to those in 2003/2004. The data suggest the presence of a small subglacier lake in the vicinity of the Golicyn mountains. The lake is of oval shape. Eight radar sounding surveys totally 29.9 km of acquisition were collected.

In order to measure the thickness of water layer of the subglacial lake seismic soundings were made to clearly detect the lake bottom. This was not successful. Radar profiles showed that the glacier thickness varied from 1600 to 2500 m. The lake is situated in 300 m deep U-shaped valley that extends from north to the east. The valley bottom is situated is about 400 m. The valley slopes mostly exceed 400 m/km (over 22 deg.). From north and south the valley is adjoined by dome-shaped uplifts of over 800 m.

Seismic research using the reflection wave method of pulse drive technology was tested by the RAE in 1995/96. 25 seismic soundings collected at Pionerskayae found that the ice-water boundary at 4050-4120 m depth in the western part of the feature. To the west and east the ice thickness thins to 3200 to 3900 m, respectively. In the western part of the profile the basement is at 4650-4770 m. An embayment 9.4 km wide occurs in this area. The water layer thick varies from 580 to 650 m.The ice cover thickness at Pionerskaya station is approximately 2380 m.

Seismology data obtained from Vostok station area was analyzed in 2004. In 2002/03 summer season 3 seismic lines crossed through Vostok Station. The profile length was 25 km with 2 stations over western and eastern Vostok lake slopes and one directly over the center of deep water basin. The stations registered over 130 earthquakes suitable for the analysis. The results of the analysis were used to specify the abyssal

structure of the lake basin and that the thickness of consolidated sediments was 34 to 36 km. The thickness displacement with respect to the Moha layer suggested that the central part of the profile exhibited mantle elevation. These results are indicative of a rift origin for the Vostok lake basin

In discussion of the presentation by V Lukin, C Summerhayes noted that the CEP had advised ATCM-XXVI that the draft Lake Vostok CEE circulated in February 2003 had some shortcomings that needed to be addressed, and that revisions were needed in the final CEE; that advice had been accepted by XXVI ATCM. V Lukin indicated that the 50 M deepening of the hole was intended to gather the additonal technical information needed to finalize the Comprehensive Envrionemental Evaluation (CEE) for entry into the lake. C Summerhayes indicated that at SCAR XXVII (Shanghai, 2002) Recommendation 20 called for additional studies to be carried out before further drilling proceed. S Bulat indicated that research would be conducted on younger acceretion ice to further characterize the biological and chemical character of the lake. These further investigations may satisfy SCAR's recommendations once the results are known and assessed. C Summerhayes indicated it would be useful for SCAR's discussions of SALE if the Russians could provide a comprehensive summary of what had been done to meet SCAR Recommendation 20.

S Bulat -"Plans for Subglacial Lake Research"

ITALY

More than 35 subglacial lakes have been detected in the Dome CC-Vostok area. The lakes are found in basal two zones - Zone 1- the eastern flank of Subglacial Lake Vostok, far as the Aurora Trench, characterised by dry rock-ice interfaces and only one small lake and Zone 2 - East of the Aurora Trench, over the Belgica Subglacial Highlands and part of the Aurora and Vincennes Subglacial Basin> Data from this region suggests the presence of at least 34 lakes (the largest, Lake Concordia, is about 900 km^2) in areas with wet rock-ice interfaces. The Italian research program has two primary reseach foci: a) the study of the subglacial lake district and b) characterization of Lake Concordia.

Subglacial lake district. - Airborne Radio Echo Sounding (RES) profiles will provide new infromation for the lake inventory over the Belgica Highlands and Aurora and Vincennes basins. The RES program will be extended to the area West of the Aurora Trench to see if the "lack" of lakes is "true" or due to the poor coverage of geophysical information. The distribution of lakes and "wet " basal interfaces suggest that the geology, tectonic and geothermal flux of the area play a decisive role in the location of lakes. Airborne magnetic and gravimetric survey, in collaboration with British Antarctic Survey BAS, will be used to develop regional tectonic models and to explore the Belgica Highlands for narrow magnetic anomalies that may be related to the position of small lakes in the area. The results will be used to prepare a numerical model of tectonics and lake settings.

Lake Concordia characterisation. - The goal is to verify if Lake Concordia is as a good candidate for "lake entry and exploration". The research will:

(i) develop a detailed lake physiography;
(ii) delineate the lake's glaciological, and geologic and tectonic context;
(iii) define the chemical, geochemical, bio-chemical and taxon characterisctics of snow, firn and shallow ice, over the lake;
(iv) define the atmospheric contribution to energy and material flux to the lake region; and
(v) develop numerical models of ice flux and lake water circulation.

Lake Physiography. A radar survey will be carried out to map the lake and its boundaries and to determine the water column depth and sediment thickness using multichannel seismic reflection techniques.

Glaciological, geologic and tectonic context. The glaciological context will be studied over a large region adjacent to Dome C, and over a restricted area of the lake itself. Ice accumulation rate and ice surface velocity (over the lake) will be measured. The thermal condition of the basal ice wil be evaluated and a model of the sub-ice hydrologic network developed (over the Belgica HighLands and the Vincennes Basin). The measurements will be done by mean of a network of stakes (strain-net), shallow trenches, ground-based (snow radar) radar, and the analysis of the strength of basal radar reflections. Detailed

airborne magnetic and gravimetric surveys, in collaboration with British Antarctic Survey BAS, will be carried out to develop tectonic models and to understand the lake geological setting. The results will allow the preparation of an evolutionary numerical model of the role played by tectonics and Concordia basement morphology, as well as indications on the propagation velocity of deformations in the ice-cap.

Chemistry, geochemistry,and bio-chemistry of snow, firn and shallow firn cores (10-150 m depth) will be drilled into the ice accumulation area upstream of Concordia Lake to characterize the temporal and spatial variability of snow deposition. Major and trace elements (anions, cations, some organic acids and some metals) will be measured by IC and CFA, to decipher the different sources: sea spray (Na, Mg), crustal (Ca, Al, Fe), marine biogenic (sulphate, MSA, ammonium, HCHO, carboxilic acids), tropospheric and/or stratospheric (nitrate, H_2O_2). Particular attention will be paid in the evaluation of the soluble fraction (or "availability" at the measurement conditions) of Fe, with respect to the total content, in order to characterize its main bio-available fraction, considering its key-role in the processes of superficial oceanic fertilization and atmospheric CO_2 uptake. Studies will be carried out to isolate and taxonomically/biochemically characterize microorganisms found in firn/ice at 10-150 m of the area of lakes Vostok and Concordia. These data will be correlated with the chemicals that play important roles in metabolism. These studies will be carried out in collaboration with J Priscu.

Atmospheric contribution to energy and material flux. Aerosol, superficial snow and firn samples will be chemically characterized to detect atmospheric precipitations (wet and dry) over the ice accumulation area upstream Concordia Lake. Net depositional fluxes will be calculated (micro-nutrients, oligo-elements, oxygen-donors). Post-depositional processes produce chemical transformation or re-emissions will be considered. The sulphur (sulphate, MSA), nitrogen (ammonium, nitrate) and carbon cycles (HCHO and short-chain carboxilic acids) will be correlated with sources and aerosol transport.

Numerical modeling of ice flux and water circulation. Geophysical and glaciological data will be used for numerical modeling of the ice flux and of the water circulation.

I Tabacco - "Concordia Station Survey Plans"

I Tabacco -" Lake District Surveys - Lake Concordia"

BELGIUM

The Antarctic Subglacial Processes and Interaction (ASPI) program objectives are to: (1) clarify the interactions between the ice sheet and the subglacial environment, (2) to elucidate the effect of these interactions on the transient behavior of the Antarctic ice sheet with changing climate, and (3) to understand the ice flow complexity involved so that paleo-records (ice cores, erosional imprints and sedimentary remnants on the Antarctic shelves) can be better understood and interpreted more accurately.

ASPI seeks to investigate subglacial processes and interactions with the ice sheet, through a multidisciplinary approach. This comprises numerical ice-sheet modeling, ice-core analysis and continental shelf investigations. Such multidisciplinary approach will facilitate the glaciodynamic study of the subglacial interface in its broad sense, such as interactions with subglacial and proglacial lakes, basal hydrology, ice streams, grounding line dynamics, and the imprints (erosional) and remnants (glacial sedimentation) of past basal ice presences on the continental shelves. All these summed-up interfaces are characterized by a distinct transition zone between different types of ice flow and result in complex dynamical systems that have an impact on the global behavior of ice sheets, ice drainage and global sea-level changes. Recent investigations show that inland ice flow is much more complex than previously thought: enhanced ice flow penetrates far inland, associated with onsets of fast and/or complex ice flow. Ice analysis from cold-based glaciers shows that water freezing can play a major role in the formation and deformation of the basal ice layers despite the low temperature of their base. Enhanced ice flow is the result of a dynamical interaction of the ice sheet with subglacial processes such as basal melting and refreezing, subglacial sediment deformation, subglacial hydrology and the presence of weak spots within the basal substrate.

Therefore, ASPI envisages the development, refinement and application of higher-order thermomechanical ice sheet models. Modelling will focus on the interaction of the ice sheet with subglacial lakes, the representation of grounding line motion in ice sheet models, and the influence of enhanced ice flow on the stability of the ice sheet. Basal ice cores of will be retrieved and analyzed on their ionic, gas and isotopic composition, and crystal fabrics and texture. Some of these cores will come from the McMurdo Dry Valleys area. Interpretation of results from other deep ice cores (such as Vostok ice core) in combination with ice-sheet and isotopic modeling will add to a better understanding of the processes linked with subglacial lake interactions. Seismic and bathymetric investigations in combination with ice-sheet modeling will be carried out on the continental shelf in areas close to the edge of the ice sheet (grounding lines) and in areas previously (i.e., during the LGM) covered by the ice sheet.

The collaborating teams have been involved for many years in the development and application of ice-sheet models that also cope with complex ice flow, in the analysis of the basal ice sequence of all major deep ice-core drillings from Greenland and Antarctica, and in high-resolution geophysical studies of the morphology, internal structure and evolution of Antarctic continental shelves and margins. In the latter context a Remotely Operated Vehicle (ROV) has been purchased that allows for in situ sampling of the continental shelf in the vicinity of grounding lines.

F Pattyn - "Could subglacial Lake Vostok Survive the Build-up of the Antarctic Ice Sheet?"

F Pattyn - "ASPI: Antarctic Subglacial Processes and Interactions"

UNITED STATES

The Priscu Research Group is presently conducting research on (1) Vostok meteoric and accretion to assess the potential for life within the lake itself, (2) the fate of jet fuel in permanent lake ice and the potential for biodegradation of the fuel, (3) long-term ecological changes in the physics, chemistry and biology of the permanently ice-covered lakes in the McMurdo Dry Valleys, (4) microbial diversity and physiological function in the lakes of the McMurdo Dry Valleys, (5) particle characterization in deep ice cores and (6) the potential for the frozen environments on Mars to support microbial life. Background and progress on these projects can be found on the following websites:

http://www.homepage.montana.edu/~lkbonney/

http://www.mcm-dvlakesmo.montana.edu

http://huey.colorado.edu/LTER

J Priscu - "Research Update: Priscu Research Group"

The Powell Research Group is designing and constructing a new style of remotely operated submersible vehicle (ROV) through the new Analytical Center for Climate and Environmental Change (ACCEC) that has recently been established at Northern Illinois University, USA. The vehicle has a slim-line design so that it can be lowered through a hot water drill hole made through floating ice and then work beneath the ice in the sea or a lake. It has the capability of auto-navigation so that it can do systematic, programmed surveys; but it also has the advantage of sending real-time imaging and data-feeding to the surface to enable investigations and sampling of processes and materials in unknown settings in limited space of a water-cavity. The ROV is equipped with 12 separate data sensors, six separate imaging units, and three recoverable sample types (water, sediment, ice) that will provide the data-base for experiments and investigations into sub-ice glaciology, oceanography/limnology, biology, geophysics and sedimentology. The plan is to conduct investigations under ice shelves for scientific purposes and to establish a technology for subglacial lake exploration.

R Powell - "Development of an ROV for Subglaical Observations"

Studies of the Subglacial Research Group at Lamont Doherty Earth Observatory at Columbia University of R Bell, M Studinger and others focuses on:

1. The process of melting and freezing both in Subglacail Lakes Vostok (SLV) and Concordia (SLC). The TIkku et al paper defining the patterns of melting and freezing in SLC is in press (Journal of Glaciology). This is the first demonstration of active melting and freezing in a lake other than SLV.
2. The flow lines across SLV derived from the structures in the internal layers. These flow trajectories demonstrate that the flow direction has been very constant over SLV for the past 40-70,000 years (TIkku et al, 2004, EPSL). The directions in the southern end of SLV are parallel to the modern GPS observations. Both the paleoflow directions and the surface GPS observations are distinctly different from SAR results by Kwok et al, implying an error in the interferonmetric solution.
3. The identification of a distinct shoreline deposit along the western edge of SLV can be traced to the Vostok Core at an interval between 60-70,000 years (Leonard et al , 2004). The horizontal traces of these shoreline deposits along the full length of SLV provide insights into the paleovelocities that appear to be significantly slower during the interglacial (~1m/year) relative to the modern velocity of ~2m/yr.
4. The combined information from the trajectories and the paleovelocites enables us to trace the age and origin of the accretion ice in SLV. We find that the inclusion rich layer formed along shorelined while cleaner ice formed in the deeper water both in the western embayment and over the main lake. (Bell et al, 2005).
5. The Studinger et al (2004) paper robustly defining the morphology of Lake Vostok for the first time has been published. The 2 SLV basins are very distinct and the northern basin is dominated by melting processes while the southern basin is dominated by freezing processes. Based on the inversion of gravity data this work significantly extends the Russian seismic results. The ecosystems and sedimentary records in the 2 basins may be very different.

The Lamont group has developed a proposal to look at the Gamburtsev Mountains with six US institutions – University of Kansas, University of New Hampshire, USGS, Elizabeth City State University, Penn State University and Washington University as part of the IPY. The US contribution will involve aerogeophsyical surveys and a passive seismic imaging of the earth's interior. The IPY program – the International Expedition to the Gamburtsev Mountains is emerging as a major partnership between scientists from the US, China, Australia, Germany and Russia. This program targeted at understanding the origin of the Gamburtsev Mountains will also address the question of the controls on the formation and stability of subglacial lakes. The group has also submitted a proposal to study the Vostok ice core flowline from the western grounded ice across SLV to the core site.

R Bell - Vienna SALE Meeting Presentation

UNITED KINGDOM

A number of subglacial lakes have been identified in Antarctica. These lakes have been isolated from the surface for considerable periods of time and each represents a unique environment. Life in subglacial lakes must adapt to total darkness, low nutrient levels, high water pressures and isolation from the atmosphere. Subglacial lakes thus represent unique biological habitats.

Drilling, sampling and studying subglacial lakes remotely and without causing their contamination represents a considerable physical and technological challenge. In this regard the exploration of ice lakes represents a good analogue for the exploration of planets and satellites such as Europa.

One subglacial lake in West Antarctica, named Lake Ellsworth, is well suited to exploratory research. The following website presents information on a UK-led plan to survey, measure and sample this unique environment.

http://www.ggy.bris.ac.uk/ellsworth

A team involving 10 UK universities and research institutions has been set up to plan future exploratory research in Lake Ellsworth. Its aim is to understand how life may function in this unique and extreme

environment, and to measure climate records that may exist in sediments on the lake floor.

The research plan involves two stages. The first is to undertake geophysical surveying of the lake. To this end a proposal has been submitted to the Antarctic Funding Initiative (Round 07). Fieldwork is planned for 2006-7. Stage two is to explore and sample the lake. This may be achieved within the International Polar Year (2007-8). Plans on how to undertake the exploration of Lake Ellsworth are being addressed at a series of meetings being held in 2004/5.

M Seigert - "The Exploration of Subglacial Lake Ellsworth, West Antarctica"

FRANCE

French research on subglacial environments has been focused on the study of Subglacial Lake Vostok (SLV)accretion ice samples. The objectives of the studies are to investigate possible hydrothermal contributions and the presence of thermophylic bacteria related to seismo-tectonic activity in the area (Bulat et al, 2004). Research has also been conducted to detect life in glacier ice to evaluate potential geochemical and molecular biological records of past events. Researchers will analyze samples from various drilling sites in Antarctica (Vostok, Epica Dome C), ice cores from the Andes and ice from the Alps.

Geochemical analysis of accretion ice samples from SLV detected salt-rich inclusions entrapped by refrozen lake water. These results suggest that SLV Lake Vostok is above an ancient evaporitic reservoir now buried by lake sediments (de Angelis et al, 2004). Seismo-tectonic events and the presence of faults connecting the deep subsurface to the base of the glacier may be conduits for the transfer of salt to accretion ice while preventing its dissolution in lake water.

Research on subglacial environments is the basis of a continuing French and Russian collaboration that was recently extended for a period of four years (Groupement De Recherche Européen -GDRE). This French portion of the GDRE is supported by CNRS.

The new Concordia Station at Dome C (see the presentation below) officially opened for the first winter over February 1, 2005. The station was built by Italy and France who share the expense of operating the facility. Concordia Station will operate year round and act as a new earth observatory. It will be also be a logistical center for deploying new technologies and supporting international projects to explore the East Antarctic plateau as well as numerous nearby subglacial lakes.

The EPICA Dome C deep ice drilling program recently reached bed rock at 3201 meters depth. The first 3100 m provided 800,000 years of climate record. Subglacial environment will be studied at the bedrock/ice interface and the potential for life will be estimated. Geophysical data from the deep hole (e.g., temperature profiles) and surface surveys will be used to constrain numerical simulations of the regional ice sheet and contribute to estimates of local ice mass balance. Dating of the ice cores will assist in better characterizing subglacial environments.

Amongst subglacial lakes, SLV is the largest. More than a dozen smaller lakes have been detected in the vicinity of Concordia Station providing an important opportunity for exploration. In addition to the identification of biological organisms in snow and ice, studies will investigate nearby sub-glacial lakes (Concordia Lake located 160 km from the station). Further surveys will identify new potential exploration targets. Geophysical surveys performed by Italian researchers, including radar investigations, have located more than 40 subglacial lakes in the Dome C region (Belgica Highlands, Aurora and Vincennes Basins) suggesting that a subglacial hydrological network is present.

Glaciological and paleoclimatological studies will benefit from the availability of the new station facilities. Concordia Station will support logistics for traverses in the area (e.g. IPY-traverse program) as well as air-borne and other types of surveys of inland study sites (e.g. ice core drillings in selected areas, radar geophysical surveys, subglacial lake studies, and others).

A preliminary plan for exploration of the east Antarctic plateau by traverse and collection of ice at various depths (down to 180m) by shallow drilling for paleoclimate and subglacial lake studies are under discussion between France, Italy and Russia. Of interest to SALE is a series of shallow cores (200 m) planned in the northern part of SLV and over Lake Concordia. This project will be a contribution to the IPY.

Jean Robert Petite - Vienna Presentation

6.0 Other Matters Arising

A SALE feature article has been accepted by EOS.

SALE EOS Feature Article

SALE was described in the SCAR Delegate Meeting report in EOS.

The formation of the US SALE Program was announced in EOS. http://salepo.tamu.edu/press

A workshop has been proposed for 2006 to launch SALE in the IPY. This workshop is tentatively scheduled for April 2006 in Grenoble, France hosted by LGGE. M Kennicutt will submit a proposal to the US National Science Foundation to support US participation. JR Petit will submit a proposal to CNRS to primarily support hosting of the workshop and French participation the meetings. The SALE budget will be used to supplement the workshop and the next SALE meeting will be in Grenoble, France whether or not the workshops are funded.

7.0 Action Items

1. Identify other EoIs submitted to the ICSU/WMO JC that might be interact with SALE – R Bell – 5/15/05 - **COMPLETED**
2. Write a letter to the EoI leads identified above proposing a collaboration with SALE during the IPY through SALE-UNITED – M Kennicutt 5/20/05 **COMPLETED**
3. Organize and submit the SALE Implementation Plan to the SCAR Executive Committee – M Kennicutt 6/1/05 **-COMPLETED**
4. Submit a revised recommendation SALE membership including the two new members to the SCAR Executive Director - J Priscu 6/1/05 - **COMPLETED**
5. Provide the SCAR Executive Director with copies of the SALEGOS recommendations for final resolution – J Priscu 6/1/05 - **COMPLETED**
6. Transfer and establish the SALE web site – M Kennicutt 6/1/05 - **COMPLETED**

8.0 Next Meeting

The next SALE meeting will be in Grenoble, France in April, 2006 with final dates to be arranged.

Appendix A. Acronyms

http://www.scar.org/about/introduction/strategicplan/annex8.html

SCAR SCIENTIFIC RESEARCH PROGRAM SUBGLACIAL ANTARCTIC LAKE ENVIRONMENTS MEMBERS - APRIL, 20005, VIENNA, AUSTRIA

(From Left to Right - S Bulat, V Lukin, J Priscu [Convenor}, R Bell, I Tabacco, M Siegert, JR Petit, R Powell, M Kennicutt, and F Pattyn)