

SCAR Scientific Research Program

SUBGLACIAL ANTARCTIC LAKE ENVIRONMENTS (SALE)

FOUR YEAR IMPLEMENTATION PLAN – 2005 to 2008

Submitted to the SCAR Executive Committee: June 1, 2005

Introduction – The final revision of the Subglacial Antarctic Lake Environments (SALE) proposal was approved as a SCAR Scientific Research Program at the XXVIII SCAR Delegates Meeting in Bremerhaven, Germany, October, 2004.

The first meeting of SALE was convened from 22 -23 April 2005 and a web site has been established (http://salepo.tamu.edu/scar_sale). Subject to SCAR Executive Committee approval of the membership roster, J Priscu and M Kennicutt II have agreed to continue as Convener and Secretary of SALE, respectively. The Secretary has also been assigned the duties of SALE Treasurer and maintainer of the SALE web site.

A recommended membership list has been provided to the SCAR Executive for consideration. The proposed SALE membership has been expanded from the SALEGOS members to include F Pattyn (Belgium) and C Mayer (Germany). Consideration of membership, balance, and national representation will be a standing agenda item for each SALE program meeting.

The SALE-Unified International Team for Exploration and Discovery (SALE-UNITED) Expression of Interest (EoI) has been identified as a potential “core program” by the ICSU/WMO joint Committee for the IPY 2007-2008. SALE-UNITED will work closely with SCAR SALE and assist in the coordination of SALE activities during the IPY 2007-2008.

Deliverables - SALE will:

- *maintain and make widely available an up-to-date inventory of subglacial lake features;*
- *devise a standard identification scheme for subglacial lake environments;*
- *maintain a current bibliography of relevant articles from peer reviewed journals, meeting reports and the lay press;*
- *provide a website with links to all activities related to subglacial lake environments including national programs, meetings, and reports acting as a portal to data held by others (http://salepo.tamu.edu/scar_sale);*
- *convene methodology and technology workshops in response to community needs;*
- *establish expert groups on clean sampling technologies and other environmental stewardship issues in response to community needs;*
- *organize workshops, scientific sessions, and symposia;*
- *review CEEs for SALE projects and field activities as requested;*
- *advise SCAR on all aspects of SALE as requested including convening of expert groups when additional expertise is needed;*
- *develop and distribute promotional materials, a web site, an available speaker and topics list, interactive tools for educating the public, a bibliography (including press releases and articles in the print and visual media), meeting reports, contact information for the media; and*
- *promote and advocate common protocols and standards for data management that ensure quality and comparability across programs.*

Administrative Milestones - Workshops, symposia and special sessions at major conferences are important for fostering collaboration and communication. The exchange of ideas in the furtherance of planning and coordination will be a primary mission of SALE. The following administrative milestones are expected based on a calendar years.

- **2005** – Program Meeting - I; review/revise terms of reference, metrics of performance, scientific objectives, etc.; elect program officers; and report progress to SCAR – **1st SALE Meeting, April 22-23, 2005, Vienna, Austria - COMPLETE**

- **2006**– Program Meeting - II; organize and hold a workshop in Grenoble France – April, 2006; promote and organize SALE sessions at appropriate scientific meetings; develop a session for the SCAR Science Conference in Hobart, Tasmania and report progress to SCAR.
- **2007** - Program Meeting - III; promote and organize SALE sessions at appropriate scientific meetings; develop a popular science article on SALE, and report progress to SCAR.
- **2008** - Program Meeting - IV; organize and hold a workshop; promote and organize SALE sessions at appropriate scientific meetings; develop a popular science article on SALE, develop a session for the SCAR Science Conference in St Petersburg, Russia; and report progress to SCAR. *Begin a staggered rotation of SALE membership.*
- **2009** – Program Meeting - V; promote and organize SALE sessions at appropriate scientific meetings, organize a major SALE international symposium.
- **2010** – Program Meeting - VI; promote and organize SALE sessions at appropriate scientific meetings; develop a popular science article on SALE, develop a session for the SCAR Science Conference; and report progress to SCAR.
- **2011** – Program Meeting - VII, organize publication of a SALE book, promote and organize SALE sessions at appropriate scientific meetings; develop a popular science article on SALE; and report progress to SCAR.
- **2012**– Program Meeting - VIII, publish the SALE book; develop a major keynote session for the SCAR Science Conference; and report progress to SCAR.

This timetable and the deliverables will be reviewed and revised as necessary at each SALE meeting.

Metrics of Success - The measures of success of a program that serves primarily in an advocacy role are difficult to quantitatively define. However, it is important to develop metrics of performance that provide SCAR with some indication of a program's impact. The following are proposed to measure the performance of SALE:

- workshops held, attendance, and reports produced;
- sessions on exploration and research of subglacial environments (number and quality) at national and international meetings, attendance, and resulting proceedings publications;
- peer-reviewed publications each year (number and quality) related to subglacial environment exploration and research;
- articles in the popular press including numbers of interviews given by SALE members
- number of web site hits each year; and
- procurement of funds from other sources.

The SALE leadership will regularly compile these statistics for annual performance reviews.

Data Management and Information Systems – SALE will adhere to all SCAR data management policies and procedures. A data management strategy is being developed under the auspices of SALE–UNITED for the IPY, which will coordinate among national data management programs and provide a central portal to data sets across all SALE programs. SALE promotes open access to all data and will assist in developing common data formats.

While SALE will not retain data, its web site will serve as a portal to member nations that do, making data widely available. SALE will develop a set of data management protocols and standards that all participants can agree to adhere to, to ensure comparability of data across all projects and programs. The standards will be developed by a SALE Subcommittee for Data Management Protocols and Standards in consultation with JCADM and other relevant organizations.

Education, Outreach and Communication – SALE will adhere to the SCAR Communications Plan and coordinate with the centralized outreach and education activities of the ICSU/WMO IPY Program Office and the British Antarctic Survey.

To provide a focus for SALE outreach, a Subcommittee on Communication, Education, and Outreach will be formed to explore outreach and education options and develop a comprehensive communication, education, and information dissemination plan for SALE based on the SCAR plan. SALE's outreach efforts will include, but not be limited to: the creation of promotional materials, developing an available speaker and topics list, creating interactive tools for educating the public, posting of meeting reports, and providing contact information for the media

Conclusion - A detailed table of meetings and scientific and technological milestones is provided for the first four years of SALE in Appendix A. A review, revision, and updating of these milestone will be a standing agenda item at each SALE program meeting. The metrics of success will be summarized each year as a regular component of the SALE meeting report. All of these documents will be readily accessible on the SCAR SALE web site at http://salepo.tamu.edu/scar_sale.

Appendix A - SCAR Scientific Research Program
Subglacial Antarctic Lake Environments
Implementation Plan – 2005

(Key - S- Scientific Milestone, T- Technological Milestone, M – Meeting, **BOLD - completed**)

Month	Type	Activity	Responsible Party	Comments
April	M	1st SALE Meeting – Vienna, Austria	SCAR –SALE	April 22-23, 2005
April	M	Representatives attend ACE meeting	M Kennicutt	April 25, 2005
July	M	Representative attend EBA Meeting	J Priscu, M. Kennicutt	July, 2005
July	M	French-Russian Lake Vostok Meeting (GDRE)	S Bulat	July 5-8, 2005, St Petersburg
Oct-Nov	M	International Lake Vostok Meeting – Science and Environmental Issues	V Lukin (RosHydroMet)	Under development
Dec	M	AGU Fall Meeting, San Francisco – Oral and Poster Session	R Bell	Under development
Jan-Dec	S	Study of the organic carbon content and its origins in	Russia, US, France	On-going studies

		Subglacial Lake Vostok (SLV) accreted ice. Define the possible sources of microbial communities in these environments and test the hypothesis of ultra-low DOC in SLV.		
Jan-Dec	S	Study the solid mineral inclusions in the SLV accretion ice to decode the depositional conditions, geological ages, and to test the hypothesis of hydrothermal contributions to SLV.	Russia	On-going studies
Jan-Dec	S	Update the inventory of subglacial features.	UK	M Siegert - complete
Sep-Dec	S	Compile available LV data and generate new modeling data sets	Germany	C. Mayer
Jan-Dec	S	Retrieval of further SLV accretion ice for further study by deepening the hole 50 meters	Russia	Postponed until 2005-2006 season
Jan-Dec	S	Over snow radar profiling and reflection seismic experiments near SLV to study lake boundaries, shore bedrock topography, lake bathymetry, sub-ice environments, and to model ice sheet and water	Russia	On-going Studies

		circulation, and ice sheet/water interactions		
	S	Assess the biological contents preserved in East Antarctica ice cores to record the biological emissions from the oceans and continents to estimate DNA survival in ice	France, Russia, Denmark	On-going Studies
Jan-Dec	S	Assess the microbial content linked to <i>in situ</i> biological activity within the ice sheet and the basal ice of deep cores	France, Russia, US Denmark	On-going studies
Jan-Dec	S	Assess the major chemical elements, organic carbon compounds, heavy metals, and gases in SLV accretion ice.	France Russia, US, Italy	On-going Studies
Jan-Dec	S	Assess SLV heat and mass balance using geochemical tracers, constrain geothermal flux, the exchange of water and heat with the overlying glacier, and the water circulation	France, Russia, US and the UK	On-going studies
Jan-Dec	S	Assess the origin and evolution of SLV and the underlying sediments.(link with ACE)	France, Russia, and the US	On-going studies

Aug-Dec	S	Numerical modeling of ice/water interface in subglacial water bodies and sensitivity to changes in surface slope	Belgium, UK	F. Pattyn M Siegert
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Jan-Dec	T	Development of a vibrating drill to sample 20 m thick ice cover over Lake Vida	US	J Priscu
Jan-Dec	T	Development of clean drilling technologies for entry into LV	Russia	On-going projects – Reported on by V Lukin April, 2005
Jan-Dec	T	Design drill head for a fast drill system in ice	France	JR Petit
Jan-Dec	T	Design clean technologies and procedures and drilling fluids compatible with SALE	France	JR Petit
Jan-Dec	T	Contribute to the ice borne and ice-related DNA signatures in open gene databases	All	All
Jan-Dec	T	Development and construction of an ROV system, sediment coring system, and observatory	USA	Funded and underway – R Powell USA
Jan-Dec	T	Development of an AUV for use in the Dry valleys.	USA	Not funded – J Priscu
Jan-Dec	S/T	Development of optical devices to characterize biotic and abiotic particles in ice cores	USA	J Priscu – funded and underway

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(Key - S- Scientific Milestone, T- Technological Milestone, M – Meeting, BOLD - completed)

Month	Type	Activity	Responsible Party	Comments
April	M	2nd SALE Meeting/International Workshop – Grenoble, France,	SALE Kennicutt/ Petit	Proposals to NSF and CNRS
April	M		SALE	TBD
June	M	EGU –Oral/Poster Session French-Russian Lake Vostok	S Bulat, JR Petit	TBD
July	M	Meeting (GDRE) SCAR Open Science Conference, Hobart,	SALE	TBD
Oct-Nov	M	Tasmania Poster and Oral sessions	Kennicutt	Proposal to Tinker Foundation
Dec		SALE International Workshop, Buenos Aires AGU Fall Meeting, San Francisco – Oral and Poster Session		R Bell to arrange

Jan-Dec	S	Characterize the origins of surface and basal ice recovered in the Vostok ice core and radar along the flow line	US, France
Jan-Dec	S	Assess the biological contents preserved in East Antarctica ice cores to record the biological emissions from ocean and continent, estimate DNA survival time in ice.	France Russia, and Denmark
Jan-Dec	S	Retrieval of further SLV accretion ice for further study by deepening the hole 50 meters	Russia

Jan-Dec	S	Over snow radar profiling and reflection seismic experiments near SLV to study lake boundaries, shore bedrock topography, lake bathymetry, sub-ice environments, and to model ice sheet and water circulation, and ice sheet/water interactions	Russia
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Jan-Dec	S	Assess the origin and evolution of SLV and the underlying sediments(link with ACE)	France, Russia, US	
Jan-Dec	S	Numerical Modeling of ice/water interface in subglacial water bodies and sensitivity to changes in slope	Belgium, UK	F Pattyn M Siegert
Jan-Dec	S	Numerical modeling of lake water – ice sheet interaction	Germany	C Mayer
Jan-Dec	T	Development of clean drilling technologies for entry into SLV including ecologically clean observatories an sampling devices	Russia	
Jan-Dec	T	Develop a hot water drill capable of melting a borehole through 3.5 km of ice in West Antarctica	UK	M Siegert,
		Design a mechanical fast drill with 4 KM capability for East Antarctica	France	JR Petit
Jan-Dec	T	Develop equipment and sensors for an observatory deployment in a subglacial lake	UK	M Siegert
Jan-Dec	T	Develop a subglacial lake exploration probe with tether and communications	UK	M Siegert
Jan-Dec	T	Field operations and testing	USA	R Powell

of an ROV system through
the Ross Ice Shelf

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Implementation Plan – 2007

(Key - S- Scientific Milestone, T- Technological Milestone, M – Meeting, BOLD - completed)

Month	Type	Activity	Responsible Party	Comments
March	M	EGU – Oral and Poster Session	SALE	TBD
July	M	3 rd SALE Meeting	SALE	TBD
July	M	French-Russian Lake Vostok Meeting (GDRE)	S Bulat	TBD
Aug-Sept	M	ISAES Meeting – Keynote, oral and poster session	SALE	Aug 27-Sept 1, Santa Barbara, CA
Dec	M	AGU Fall Meeting, San Francisco – Oral and Poster Session	SALE	TBD
Jan-Dec	S	Geophysical Surveys of Lake Ellsworth	UK	M Siegert
Jan-Dec	S	Characterize ice flow and ice accumulation over Subglacial Lake Ellsworth	UK	M Siegert
Jan-Dec	S	Determination of water circulation in Subglacial Lake Ellsworth using computational fluid	UK	M Siegert

			dynamics modeling and data acquisition		
Jan-Dec	S	Airborne geophysical surveys over Princess Elizabeth Land to study bedrock topography, sub-ice environments, and subglacial lake distributions	Russia	V Lukin	
Jan-Dec	S	Lake entry of Subglacial Lake Vostok	Russia	V Lukin	
Jan –Dec	S	Assess the biological contents of the water at the sea-ice interface in SLV	Russia and France		
Jan-Dec	S	Modeling grounding line migration in subglacial lakes	Belgium	F. Pattyn	
Jan-Dec	S	Modeling the relation between ice sheet development and lake dynamics	Germany	C Mayer	

Jan-Dec	T	Development of ecologically clean drilling techniques, lake sampling techniques and lake observatories	Russia	
Jan-Dec	T	Continue to develop a fast drill with 4 km capability for East Antarctica including compatible ice drilling fluids	France	JR Petit

SCAR Scientific Research Program
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(Key - S- Scientific Milestone, T- Technological Milestone, M – Meeting, BOLD - completed)

Month	Type	Activity	Responsible Party	Comments
March	M	EGU – Oral and Poster Session	SALE	TBD
July	M	4th SALE Meeting	SALE	TBD
July	M	SCAR Open Science Conference – Keynote, oral and poster presentations	SALE	Aug 27-Sept 1, Santa Barbara, CA
July	M	French-Russian Lake Vostok Meeting	S. Bulat	TBD
Dec	M	AGU Fall Meeting, San Francisco – Oral and Poster Session	SALE	TBD
Jan-Dec	S	Geophysical survey of Lake Ellsworth	UK	M Siegert
Jan-Dec	S	Determination of geochemistry, microbiology, and sedimentary records in Subglacial Lake Ellsworth from direct sampling	UK	M Siegert

Jan-Dec	S	Continue Airborne geophysical surveys over Princess Elizabeth Land to study bedrock topography, sub-ice environments, and subglacial lake distributions	Russia	V Lukin
Jan-Dec	S	Continue geophysical observations over SLV to study lake boundaries, shore bedrock topography, sub-ice environments	Russia	V Lukin
Jan-Dec	S	Lake Concordia region survey including shallow ice drilling to 200m	Italy, France linked with TASTE-IDEA)	JR Petit
Jan-Dec	S	Modeling of ice flow around and near Lake Ellsworth	UK, Belgium	M Siegert F Pattyn

Jan-Dec	T	Development of ecologically clean drilling techniques, lake sampling techniques and lake observatories	Russia	V Lukin
Jan-Dec	T	Continue to develop a hot fast drill with 4 km capabilities in East Antarctica including compatible ice drilling fluids	France	JR Petit
Jan-Dec	T	Refinement of existing higher-order ice sheet models to cope with ice flow across small subglacial lakes(e.g. Lake Ellsworth	Belgium, UK	F Pattyn M Siegert