

Subglacial Antarctic Lake Environments

Unified International Team for Exploration and Discovery

SALE-UNITED in the IPY 2007-2009

ICSU and various national IPY planning committees include references to subglacial lake environments as a potential IPY 2007-2009 activity under the exploring new frontiers theme. To coordinate the multiple ideas submitted to ICSU and national committees as part of the IPY planning process, SALEGOS proposes that all nations with interests in subglacial lake environments join together under the auspices of the SCAR SALE SRP to promote international collaboration and partnerships. This alliance is referred to as **SALE – Unified International Team for Exploration and Discovery (UNITED)** and its mission and terms of reference are provided below.

Subglacial Antarctic lake environments are emerging as a premier, new frontier for exploration during the IPY 2007-2009. Several coordinated campaigns by various nations are in the early stages of planning and implementation. It is suggested that these efforts be coordinated under the auspices of the SCAR Scientific Research Program (SRP) - Subglacial Antarctic Lake Environments (SALE). Under the leadership of the SCAR SRP SALE, these programs would join together to promote and advance common scientific, technological, and logistical issues in close consultation with COMNAP. The coalition approach recognizes that the ambitious interdisciplinary objectives of SALE, as internationally agreed during a series of workshops, and extensive discussions of the SCAR Group of Specialists (SALEGOS), can only be realized by multiple exploration programs that will investigate exemplars of the diverse subglacial environments over the next decade or more. The IPY provides an opportunity for an intensive period of initial exploration that will advance scientific discoveries in glaciology, biogeochemistry, paleoclimate, biology, geology and tectonics, and ecology to a new level that could not otherwise be achieved by a single nation or program.

Each program will be an independently managed campaign with specific scientific objectives, logistical requirements, and management structure that will contribute to, and accrue added value from, a common international research agenda. Synergy is provided by the pooling of resources where appropriate, the sharing of experiences and expertise, the coordination of logistics and technological developments, and a shared vision. The SCAR SRP SALE will serve as the international science and technology steering committee with a subcommittee structure representing the major scientific disciplines and technological needs. The steering committee (SALE) will be comprised of the leaders of each program supplemented by international experts as needed.

The following are brief summaries of the projects being pursued by groups that have tentatively agreed to join SALE-UNITED:

- **Russia/France** – Lake Vostok accretion ice retrieval, drilling technology development and lake entry and water sampling,

- **Italy** – Detailed surveys and glaciological investigations of Dome C and the Dome C “Lake District”,
- **France/Italy** – Dome C glaciology, chemistry and ice dynamics studies,
- **Russia** – analogous lake studies for microbiology and genomics,
- **US** – Geophysical surveys, lake evolution studies and modeling, and ice sheet interactions concentrating on the Lake Vostok region,
- **US/France/Italy/Germany** – Subglacial Lake Concordia as a site for exploration, technology development including lake entry and sampling, and microbiological, geochemical, and genomic studies (in collaboration with the German IDEA traverse project).
- **United Kingdom/US** – UK researchers and partners are conducting a diverse set of projects that are expected to continue during and after IPY 2007-2009 including: numerical models of hydrological processes of subglacial environments; in collaboration with the US, studies of ‘accreted’ ice particles dynamics and origins in subglacial environments using models; studies of subglacial topography to establish basin origins; surveys and inventory of subglacial lakes continent-wide; and surveys of and entry into Subglacial Lake Ellsworth in West Antarctica to be conducted by a coalition of 9 UK universities and research institutions.
- **US** - ROV development for ice grounding studies including water and sediment sampling, and
- **US** – AUV development for intra-lake surveys that include physical, chemical, and biological efforts.

A common effort will be the development, implementation and promotion of environmentally benign procedures for subglacial lake environment exploration and research programs properly vetted through national and ATCM procedures. With proper planning and careful and methodical technology development and testing SALE can be an exemplar of environmental stewardship.

The concerted multi-target approach will assure the widest possible characterization of subglacial lake environments beneath the East and West Antarctic Ice Sheets. This will advance our understanding of the range of possible lake evolutionary histories; the character of the physical, chemical, and biological niches; the interconnectivity of subglacial lake environments; the coupling of the ice sheet, climate and the evolution of life under the ice; the tectonic setting; and the interplay of biogeochemical cycles. Research and exploration programs spanning the continent will allow for complementary investigations of subglacial lake environments of differing ages, evolutionary histories, and biogeochemical settings providing a holistic view of these environments over millions of years and under changing climatic conditions. While early discoveries and exciting findings are expected during the IPY 2007-2009, a long term sustained program of research and exploration will continue far beyond 2009.

To form a mutually beneficial network of programs, SALE – UNITED will operate under these guiding principles:

- Members retain autonomy to make decisions in the best interests of their program while taking into consideration the interests of other programs and the potential for synergies.
- Programs will pursue funding through their national procedures while looking for opportunities to develop joint funding across programs.
- Open and timely access to data and samples will be provided for other SALE-UNITED programs and the broader scientific community while protecting the intellectual property of individual investigators and programs.
- Participation in inter-comparisons and inter-calibrations of techniques and methodologies will be conducted to ensure quality and comparability of information across SALE-UNITED programs.
- Agreed data management protocols and standards will be adopted.
- Technological developments and “lessons learned” will be shared while protecting ownership and/or proprietary information.
- When appropriate joint publications and presentations will be encouraged when all involved stand to accrue benefits.
- Due consideration of “add-on” or “spin-off” projects by others will be provided when it does not compromise individual programmatic efforts but advances the common SALE-United mission.
- Assist in the promotion and communication of SALE-United goals, accomplishments, and findings.
- Respect and value the contributions of all SALE-UNITED members.