



EXPRESSION OF INTENT FOR ACTIVITIES IN IPY 2007-2008.

Deadline for Submission - January 14, 2005

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1.0 PROPOSAL INFORMATION

1.1 Title of proposed activity

The Exploration of Subglacial Lake Ellsworth

1.2 Acronym or short form title of proposed activity

Lake Ellsworth Exploration

1.3 Concise outline of proposed activity

400 words max

The aim of the project is to quantify physical, chemical and microbiological processes within Lake Ellsworth, a 10 km long West Antarctic subglacial lake, through direct measurement and sampling of lake water and sediment (and laboratory analysis). The following five objectives are required to meet the project's aim.

(1) To undertake a comprehensive geophysical survey of the lake and its locale. A proposal has been submitted to the UK-NERC Antarctic Funding Initiative. Fieldwork, involving seismic and radar sounding of the lake floor and ice base, and surface measurements of the flow and accumulation of ice, is planned for 2006-7. The outcome will be the characterisation of Lake Ellsworth's physiography, and the establishment of a location for lake entry.

(2) To develop instruments necessary for measurement (and sampling) of the lake environment, and their installation within a probe (including a tether and communication system). This work has already started; we intend to use instruments developed by project members for astrobiology. Completion of this objective, including testing, will be in 2007-8.

(3) To develop a hot-water drill capable of creating a 30 cm wide, 3.5 km deep, borehole above Lake Ellsworth, and maintaining it for 36 hours. Around 400 m of water will be taken from the borehole prior to lake entry, to ensure melt water does not enter the lake. This work will be completed (and tested) in 2007-8.

(4) To undertake the direct measurement and sampling of Lake Ellsworth. The probe (which will be sterilised) will be sent through the borehole into the lake, whereupon it will be lowered through the water column to the lake floor, and then back to the lake surface. Measurements of the lake water will be taken continuously. Samples of water and sediments will also be taken. The field experiment will take around 24 hours to complete. (If the hole can be kept open for long enough we may be able to deploy a sediment corer into the lake and to leave an instrument string in the lake with a hardwire to a surface data logger.) This objective could take place in 2007-8, provided all testing of equipment is satisfactory. It may be more prudent, however, to plan this work in 2008-9.

(5) To conduct laboratory analyses of lake samples. In conjunction with the direct measurements, laboratory analysis of samples will define the lake water chemistry, and the nature of the lacustrine microbiological community. If a sediment core is recovered, laboratory analysis will reveal the palaeoenvironment history recorded within it. This work will be complete within six months of the fieldwork.

Contamination control is an essential component of the project. We will seek advice from the SALE-UNITED umbrella IPY programme on this issue. We note that hot water drilling has been used on several occasions to access and sample the base of the West Antarctic Ice Sheet.

1.4 Which IPY 2007-2008 theme(s) will be addressed by the project (see Note 1)

Theme 1 – The current state of the polar environment	N
Theme 2 - Change in the polar regions	N
Theme 3 - Polar-global linkages and interaction	N
Theme 4 - Investigating new frontiers	Y
Theme 5 -The polar regions as vantage points	N
Theme 6 - Human societies in polar regions	N

1.5 What is the major target of the proposed activity (specify one – see Note 1)

Natural or social science research	Y
Education/Outreach and Communication	N
Data Management	N

Legacy	N
Other Targets	N

- 1.6 What significant advance(s) in relation to the IPY themes and targets can be anticipated from this project?

100 words max

Subglacial lake environments have been hypothesised as habitats for unique, extremophile microbial life during the past decade. Direct sampling and measurements is the only way to test this hypothesis unequivocally. No subglacial lake has been analysed in this way, however. These environments are, therefore, at the frontiers of science and exploration.

The exploration of Lake Ellsworth will make major advances in understanding the form and diversity of microbial communities in subglacial lakes, and how such life may function in this extreme environment. The work will also establish the nature of ice-sheet and climate records held in lake floor sediments.

- 1.7 What international collaboration is involved in this project? (see Note 2)

50 words max

The project is a component of the SALE-UNITED proposal to conduct multidisciplinary research on a variety of Antarctic subglacial lake environments.

Lake Ellsworth Exploration benefits from the involvement of over twenty UK scientists from ten institutions, and colleagues from Belgium, Germany, Sweden, New Zealand and the USA.

2.0 FIELD ACTIVITY DETAILS

- 2.1 Outline the geographical location(s) for the proposed field work (see Note 3)

50 words max

Subglacial Lake Ellsworth is located in Ellsworth Land in West Antarctica. Its coordinates are: Latitude, 79.00 S; Longitude, 90.50 W.

It may also be a useful, cost-efficient and scientifically interesting experiment to test equipment within the subglacial lake at Vatnajökull, Iceland, which adds a bi-polar dimension to the project.

- 2.2 Define the approximate timeframe(s) for proposed field activities?

Arctic Fieldwork time frame(s)	Antarctic Fieldwork time frame(s)
Field testing of equipment 06/07 –08/07	Field testing of equipment 09/07 –02/08

	Exploration of Lake Ellsworth 11/08 – 01/09

2.3 What significant logistic support/facilities will be required for this project?
Can these resources be usefully shared with other projects? (see Note 4)

50 words max

Fuel and equipment deposit (including housing etc.) is required in West Antarctica. Establishment of an infrastructure to deliver such items (e.g. an ice runway in West Antarctica and/or surface tractor-trains) could be shared with other projects operating in this sector of Antarctica.

2.4 Will the project leave a legacy of infrastructure? (see Note 1)

50 words max

The project will prove whether unique microbial life exists in subglacial lake environments. If successful, it will lead to future (potentially more sophisticated) research in Lake Ellsworth and other subglacial lakes. The technology designed for lake access, measurement and sampling could be used for future research.

2.5 How is it envisaged that the required logistics will be secured? (one or more options can be identified)

Consortium of national polar operators	Y
Own national polar operator	Y
Another national polar operator	Y
National agency	Y
Military support	Y or N
Commercial operator	(Y)
Own support	Y or N
Other sources of support	Y or N
Further details - 50 words max	
Advice from the British Antarctic Survey indicates that it can provide logistical support, but that it may not be available in the IPY timeframe. Consequently, an internationally-coordinated logistics programme, possibly involving commercial operators, may be required.	

2.6 Has the project been "endorsed" at national or international level (see Note 5)

Y or N?	Further details – 50 words max This project is an endorsed element of the SALE-UNITED IPY proposal, and SALE (Subglacial Antarctic Lake Environments), which is a full international scientific research programme of the Scientific Committee on Antarctic Research (SCAR).
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3.0 PROJECT MANAGEMENT AND STRUCTURE

3.1 Is the project a component (established over the IPY 2007-2008 timeframe) of an existing plan, programme or initiative or is it a new autonomous proposal?

New Project YES	Component of an existing or planned activity NO
Further details – 50 words max This project is new and autonomous project. However, it benefits greatly from its endorsement in the SALE-UNITED proposal, and also in the numerous existing programmes from which instruments and background information will be provided.	

3.2 How will the project be organised and managed? (see Note 6)

100 words max The project will be managed by the Lake Ellsworth committee, chaired by Siegert, who will liaise with SALE-UNITED. The committee met twice in 2004 and will meet for a third time on 8 th March 2005 (agenda and minutes are available from www.ggy.bris.ac.uk/ellsworth). The project is organised into five elements, with named leaders and completion dates as follows: (1) Geophysical survey (Martin Siegert, 2006-7); (2) Instrument development (John Parnell, Mark Sims, 2007-8); (3) Probe development (Matt Mowlem, 2007-8); (4) Drill development and Lake exploration (Keith Makinson, 2008-9); (5) Post-fieldwork laboratory analysis (David Pearce, Martyn Tranter, 2009).

3.3 What are the initial plans of the project for addressing the education, outreach and communication issues outlined in the Framework document? (see Note 7)

50 words max A high level of public interest in the project has already been shown (see www.ggy.bris.ac.uk/ellsworth). Endemol, a TV production company, is interested in 'live' broadcasting of the fieldwork, and making a documentary (with an accompanying educational CD ROM). Press releases and 'outreach' will be coordinated with the SALE-UNITED umbrella programme.
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3.4 What are the initial plans of the project to address data management issues (as outlined in the Framework document)? (see Note 8)

50 words max

Data will be managed by the project leaders. Raw data (e.g. samples and measurements), which are likely to have a significant scientific value, will be made available to the international community via the project's links to SALE-UNITED. Data storage and archiving will also be undertaken in conjunction with SALE-UNITED.

3.5 How is it proposed to fund the project? (see Note 9)

50 words max

A UK-NERC Antarctic Funding Initiative bid has been submitted to conduct the geophysical survey.

Following endorsement of the project by IPY, a UK cross-council 'consortium bid' will be submitted to build equipment and undertake fieldwork.

Similar applications may be submitted by international partners, the coordination of which can take place within the SCAR-SALE umbrella project.

3.6 Is there additional information you wish to provide?

100 words max

The establishment of equipment necessary for subglacial lake exploration in West Antarctica makes it possible to conduct similar research in other places. For example, Andrew Smith (British Antarctic Survey) has plans to drill to the ice sheet base south of the Antarctic Peninsula. In addition, it may also be possible to use the equipment designed for Lake Ellsworth in other subglacial lakes. Consequently, given the effort needed to assemble the logistics for entry to Lake Ellsworth, and that the experiment will last less than two weeks, it may be cost-effective to deploy the equipment elsewhere during IPY.

4.0 PROPOSER DETAILS

4.1 Lead Contact for the Expression of Intent

Title **Professor**
 First Name **Martin**
 Surname **Siegert**
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4.2 List up to six other project members and their affiliation.

Name 1 **John Parnell**
 Organisation **University of Aberdeen**
 Name 2 **Mark Sims**
 Organisation **University of Leicester**
 Name 3 **Matt Mowlem**
 Organisation **Southampton Oceanography Centre**
 Name 4 **David Pearce**
 Organisation **British Antarctic Survey**
 Name 5 **Keith Makinson**
 Organisation **British Antarctic Survey**
 Name 6 **John Priscu**
 Organisation **Montana State University**

Accompanying Notes for submission of IPY 2007-2008 Expressions of Intent

Note 1 – IPY projects can take a number of forms.

a) 1.4 - They may address one or more of the IPY 2007-2008 themes and if so will be expected to have component activities addressing education, outreach, data management and possibly legacy.

b) 1.5 - The main focus can be on science or on one or more aspects of education, outreach and communicating the Polar Year, an activity that addresses data management or that explicitly leaves a legacy (such as building a new polar facility or establishing new systems).

Note 2 - An important characteristic of IPY 2007-2008 projects will be their international structure in order to facilitate research impractical for a single nation to undertake. Whilst project components are likely to be primarily funded at a national level, the projects are expected to be established and coordinated internationally. The Joint Committee will be looking for evidence of international collaborations developing in the Expressions of Intent and established by the June 2005 full proposal deadline.

Note 3 – The geographic locations need not be precise but logistic operators will want to broadly know where activities will occur, e.g. West Antarctic Ice Sheet, Weddell Sea, Svalbard, Greenland, etc. If you have more detail please supply. An IPY project can also be one that involves no field activities.

Note 4 - This refers to major facilities and infrastructure and some examples (not comprehensive) are given below.

Ice-breaker	Multi-instrumented platforms	Snow terrain vehicles
Ice strengthened research ship	Helicopters	Existing field stations
Ship-based drilling capability	Fixed wing geophysical aircraft	New field station
Ship recovery of buoys etc	Fixed wing transport aircraft	Observatories
Submarines	Rockets	Fuel depots
Autonomous Underwater Vehicle	Satellites	Ice drilling capability
Remotely Operated Vehicle	Radars	Rock-drilling capability

Please note if your project will share facilities with other IPY activities, or if there is capacity to support other projects as part of your activity (e.g. a marine biodiversity cruise could feasibly offer to deploy or recover buoys, moorings, etc., for an ocean/climate project)

Note 5 - All IPY projects will ultimately be subject to assessment by National (and/or International) funding agencies. However it will be important to establish coordination of IPY 2007-2008 at the national and international level. Both National IPY Committees and International bodies supporting IPY 2007-2008 will have an important role in this. Contact with these bodies may occur before January 14 2005 but should certainly take place before the June 2005 deadline for full proposals.

Note 6 – The Joint Committee for IPY 2007-2008 will be overseeing Polar Year activities but will not be managing the individual projects. It is anticipated that IPY projects will be self-managed, free-standing activities or be part of a planned or existing programme that has an established management structure. The JC will need to be satisfied that all proposals have realistic plans for structuring and managing activities. For the larger proposals the JC anticipates that a Project Steering Committee will be established.

Note 7 – It will be a requirement of IPY proposals that there is a clear plan for Education, Outreach and Communication (EOC) activities in the full proposal for the June 2005 deadline. If initial ideas for EOC have been established these can be outlined in the Expression of Intent.

Note 8 – It will be a requirement of IPY proposals that there is a clear plan for the management of project data, including its early availability to the community, presented in the full proposal for the June 2005 deadline. Initial ideas for data management should be outlined in the Expression of Intent, including which data organisations are likely to be involved, e.g. ICSU World Data Centres, Joint Committee for Antarctic Data Management, WCRP, etc.

Note 9 – It is anticipated that funding for IPY 2007-2008 will be primarily obtained through national funding agencies but in some cases will involve international funding agencies (e.g. European Union) and in some cases will come from private sources. Certain projects will be part of programmes already funded and if so these can be identified here.