Full Proposals for International Polar Year 2007-2008 Activities

Proposed IPY Activity Details

1.0 PROPOSER INFORMATION

(Activity ID No: 88)

1.1 Title of Activity
Antarctic Surface Accumulation and Ice Discharge (ASAID)

1.2 Short Form Title of Proposed Activity
ASAID

1.3 Activity Leader Details
Robert Bindschadler
NASA
USA

1.4 Lead International Organisation(s) (if applicable)
NULL
NULL
NULL
NULL

1.5 Other Countries involved in the activity
Italy
Germany
Australia
United Kingdom
Russia
Japan
New Zealand
Brazil
Chile
Norway
Sweden
Canada
France
NULL
NULL
NULL

1.6 Expression of Intent ID #'s brought together in this proposed activity
351, 232, 37, 384, 301, 359, 178, 486, 579, 593, 812, 823

1.7 Location of Field Activities
Antarctic

1.8 Which IPY themes are addressed
1. Current state of the environment
2. Change in the polar regions
4. Exploring new frontiers

1.9 What is the main IPY target addressed by this activity
1. Natural or social science

2.0 SUMMARY OF THE ACTIVITY

This project makes use of the unique focus of IPY cooperation to synthesize, collect, analyze and produce comprehensive data sets on the spatial and temporal patterns of accumulation of snow and the perimeter discharge of ice from the Antarctic ice sheet. The work can be subdivided into three major activities, each requiring a distinctly different approach. 1) Spatial and Temporal Pattern of Net surface Accumulation. Various successful ITASE traverses of the Antarctic over the past decade have begun the process of collecting high-frequency radar soundings that, when tied to dated ice cores, provide a continuous transect of accumulation history by following dated radar horizons. We will expand these observations in two ways: by encouraging the collection of more data as part of any IPY or post-IPY traverse across Antarctica including identifying commercially available equipment that can be used to begin standardizing the international data set; and by collecting additional data with an existing airborne high-frequency radar system flown in areas that both fill in major gaps in coverage and increase the number of intersecting transect tie-points. The distributed product from this activity will be a three-dimensional mapping of numerous isochrones that represent the spatial and temporal variability of Antarctic accumulation at an unprecedented level of detail. 2) Position and Velocity at the Grounding Line. These will be determined exclusively from satellite data using proven techniques. Interferometric SAR analysis has already determined many segments of the grounding line and SAR data are presently being analyzed to determine surface ice velocity over the region north of 72S. Two other satellite data sets will assist in this analysis: Landsat data, made available through a planned map mosaicing activity, will be examined to help in the delineation of the grounding line and flow rate; and satellite altimetry will provide additional indications of the grounding line transition. These data provide an earlier epoch measurement. It is hoped that a new collection of interferometric quality SAR data will be part of IPY to allow a common epoch for the data sets of surface velocity and ice thickness. The comparison of this new velocity data with the previous large-scale mapping of ice speed, as well as a wealth of isolated older measurements, will provide useful indications of the temporal variation of ice discharge and grounding line position along large portions of the Antarctic's grounded perimeter. 3) Ice Thickness at the Grounding Line. These data are required to complete the calculation of ice discharge. Our goal is to make direct measurements as nearly coincident with the flow measurements, as possible. This is a very challenging task. Negotiations are continuing in countries that have operational airborne ice penetrating radars that can measure ice thickness of more than one kilometer. Some other IPY programs (e.g., ACE, PET and GIGAGAP) have indicated a willingness to include needed measurements as part of their field program. Where new measurements are not possible during IPY, or perhaps immediately thereafter, older measurements will be used. There are many existing data sets for portions of the Antarctic perimeter—the largest being from the Italian program. Additionally, we will develop the means to use satellite altimetry (ICESat and possibly Cryosat) to provide more widely spaced measurements of ice thickness inferred from surface elevations on floating ice immediately adjacent to the grounding line.

2.1 What is the evidence of inter-disciplinarity in this activity?
Our studies of net accumulation are inherently atmospheric science combining with the shape of the ice sheet, while the ice discharge component is first and foremost glaciology.

2.2 What will be the significant advances/developments from this activity? What will be the major deliverables? What are the outputs for your peers?

We seek to produce four unprecedented data sets. Our compilation of existing and new measurements of internal layering will be converted to continental-scale maps of net surface accumulation in as much detail in space and time as the data allow. Our ice discharge study will draw together various satellite and field data to produce vector files of position, ice thickness and velocity along the grounding line. These data sets will serve as benchmark data sets for future studies of change. In addition, we will attempt to gain additional discharge measurements along the 1500 meter elevation contour across major outlet glaciers and ice streams.

2.3 Outline the geographical location(s) for the proposed field work (approximate coordinates will be helpful if possible)

Locations	Coordindates
Antarctica (along all surface traverse routes and along the grounding line perimeter)	N/A

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

Arctic Fieldwork time frame(s)	Antarctic Fieldwork time frame(s)
	10/07 - 03/08
	10/08 - 03/09

2.5 What major logistic support/facilities will be required for this project?
Fixed wing geophysical aircraft
Fixed wing transport aircraft
Snow terrain vehicles
Existing field stations

Further details – Accumulation layer mapping will "piggy-back" on traverses planned primarily for other purposes. These traverses will use existing traverse vehicles originating and supported by existing national Antarctic bases. Ice thickness flights will use existing light and moderate-range aircraft operating from a combination of existing national bases and fuel depots

2.6 How will the required logistics be supplied? Have operators been approached?

Source of logistic support	Likely potential sources	Support agreed
Consortium of national polar operators		
Own national polar operator	Y	
Another national polar operator	Y	
National agency	Y	
Military support		
Commercial operator		
Own support		
Other		

2.7 If working in the Arctic regions, has there been contact with local indigenous groups or relevant authorities regarding access?

3.0 STRUCTURE OF THE ACTIVITY

3.1 Origin of the activity
This is a new activity developed for the IPY period

If part of an existing programme please name the programme – ITASE

3.2 How will the activity be organised and managed? Describe the proposed management structure and means for coordinating across the cluster
The project is organized into three distinct activities, each managed by a deputy who reports to the overall project leader and leads an international team of experts. 1) The net surface accumulation team draws heavily from the successful ITASE program and includes persons involved in the planning and execution of the related cluster activities.2) The grounding line position and velocity team is more autonomous as is permitted by their almost exclusive reliance on satellite data. These team members are chosen based on their familiarity with and access to the necessary data. 3) The grounding line thickness team is chosen from people who are, for the most part, already integrated within some cluster activity to increase the likelihood of influencing cluster activities to collect the necessary field data.

3.3 Will the activity leave a legacy of infrastructure and if so in what form?
Some countries will acquire new instrumentation. The data sets produced will be benchmarks for future comparisons and can be augmented by future measurements.

3.4 Will the activity involve nations other than traditional polar nations? How will this be addressed?
Not at this time. It remains possible that participants in the data processing might originate from non-polar nations.

3.5 Will this activity be linked with other IPY core activities? If yes please specify
The net surface accumulation activity is heavily leveraged against ITASE, an ongoing and already successful SCAR-sponsored activity. The ice-thickness activity will gain some of its data from ACE, GIGAGAP and APICS.

3.6 How will the activity manage its data? Is there a viable plan and which data management organisations/structures will be involved?
Our intended product is benchmark data sets. These will be distributed to international data centers, such as NSIDC, when complete.

3.7 Data Policy Agreement
Will this activity sign up to the IPY draft Data Policy (see website)
Yes

3.8 How will the activity contribute to developing the next generation of polar scientists, logisticians, etc.?
We plan to engage the energy of young scientists at universities and polar institutues around the world in the reduction of our field, aircraft and satellite data. In the US, in particular, the tight connection between the Center for Remote Sensing of Ice Sheets and minority and native education will provide new opportunities to expose young people unfamiliar with the polar regions to the excitement and challenge of polar research.

3.9 How will this activity address education, outreach and communication issues outlined in the Framework document?
The project leader is closely tied to the education and outreach capabilities of NASA and accepted their request to use the activities of this project as a major thrust of their public communication activities during IPY.In addition, the project leader and various members of the three activity teams are affiliated with the Center for Remote Sensing of Ice Sheets which has a very strong education and outreach responsibility that will be annually reviewed by NSF.Education and outreach activities in non-US countries will rely on the inventiveness and creativity of the international team members.

3.10 What are the proposed sources of funding for this activity?
National funding agencies.

3.11 Additional Comments

Some of the EoIs listed in item 1.6 remain independent activities and are included to indicate cooperation between this project and theirs.

4.0 CONSORTIUM INFORMATION

4.1 Contact Details

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4.2 Other significant consortium members and their affiliation

Name	Organisation	Country
Gordon Hamilton (deputy)	University of Maine	USA
Steve Arcone	CRREL	USA
Massimo Frezzotti	ENEA CLIM-OSS	Italy
Ian Goodwin	University of Newcastle	Australia
Jefferson Simoes	UFRGS	Brazil
Gino Casassa	CECS	Chile
Hans Oerter	AWI	Germany
Nancy Bertler	Victoria University	New Zealand
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