DRAFT Preparation Form for Proposed IPY Activity

This WORD template is to assist in developing an agreed document for submission to IPY by June 30, 2005. Submissions to the IPO are to be made ONLY via the online version of this form which will be available at www.ipy.org.

1.0 PROPOSER INFORMATION

1.1 Title of Activity

Synoptic Antarctic Shelf-Slope Interactions Study

1.2 Short Form Title of Proposed Activity

SASSI

1.3 Activity Leader Details

First Name	Surname
Karen	Heywood
Affiliation	**Country**
School of Environmental Sciences, University of East Anglia	UK

1.4 Lead International Organisation(s) (if applicable)

iAnZone	CLIVAR/CliC/SCAR Southern Ocean Implementation Panel

1.5 Other Countries involved in the activity

USA	Brazil	Spain	Italy
Germany	Australia	Norway	France
Japan	Argentina		

1.6 Expression of Intent ID #'s brought together in the proposed activity(Lead first)

9	57	232	237	310	485	573	585	596	635
911									

1.7 Location of Field Activities (Arctic, Antarctic or Bipolar)

Antarctic

1.8 Which IPY themes are addressed (insert X where appropriate)

1. Current state of the environment	X	4. Exploring new frontiers	X
2. Change in the polar regions	X	5. The polar regions as vantage points	
3. Polar-global linkages/tele-connections	X	6. The human dimension in polar regions	

1.9 What is the main IPY target addressed by this activity (insert X for 1 choice)

1. Natural or social science	X	3. Education, Outreach, Communication	
2. Data management		4. Legacy	

2.0 SUMMARY OF THE ACTIVITY *(maximum of 1 page A4)*

Short synoptic transects will be undertaken circumpolarly and will radiate outwards across the Antarctic continental shelf and slope. Transects will incorporate insofar as possible:
* Closely-spaced CTD/ADCP stations plus PAR irradiance, bio-optical properties and fluorescence (EoI 9, 57, 310, 573, 585, 596, 635, 911).
* Collection throughout the water column at stations of water samples for tracer, chemical and biological analyses including oxygen isotopes, carbon parameters, inorganic and organic nutrients and trace gases, and for biomass on deck incubation experiments to evaluate auto and heterotrophic activities (EoI 9, 573, 585, 596, 635, 911).
* Deployment of moored instruments along each transect to measure temperature, salinity, current velocities, sedimentary fluxes and sea level for at least one year (EoI 9, 57, 310, 573, 585, 596, 635).
* Deployment on the shelf of autonomous water samplers to collect weekly samples for tracer analyses (EoI 9).
* Deployment of ice-hardened surface ocean drifters across the coastal and slope break current systems, measuring temperature, salinity, sea level pressure and location (EoI 9, 310, 573).
* Air-sea heat and freshwater flux and meteorological measurements (EoI 9, 573, 585).
* Swath bathymetric surveys of the complex shelf and slope terrain, both to assess local circulation and mixing processes, and to detect geological/glaciological phenomena such as iceberg scour (EoI 9, 237, 310, 573, 596).
* Sedimentological observations including coring and biostratigraphy (EoI 596, 635)
* Turbulent mixing measurements (EoI 9, 310, 573).
* Continuation of hydrographic sections poleward beneath ice shelves and/or sea ice using autonomous underwater vehicles (AUVs) such as Autosub (EoI 9) and hot-water drilled access holes (EoI 310).
* Use of AUVs to measure sea ice thickness distribution on the Antarctic shelf and slope (EoI 57)
* Use of autonomous underwater vehicles and/or instrumented pelagic marine mammals to penetrate beneath sea ice and ice shelves to measure hydrographic and dynamical properties (EoI 9, 585), marine geological, chemical and biological characteristics (EoI 237)

Additionally:
* We will deploy subsurface Lagrangian floats to be tracked acoustically beneath the seasonal sea ice throughout the winter (EoI 9, 485, 573, 596). These will provide profiles of temperature and salinity, and geographical location, every 10 days. Plans are already in hand to ensonify the Weddell Sea, the offshore region of the Wilkes-Adelie Land and the western margin of the Antarctic Peninsula, and to enable use of such floats. Extension of this tracking network to other regions surrounding Antarctica will be undertaken through SASSI to provide polar coverage to the global Argo programme.

* Visible, passive microwave and synthetic aperture radar remote sensing (EoI 57, 585, 911) will be used to assess the seasonal/interannual variability of circumpolar coastal polynyas and of phytoplankton biomass. SAR, passive microwave and Cryosat altimetry will allow large scale monitoring of sea ice.

* Numerical models will be developed to quantitatively study heat & freshwater fluxes and water mass transformations, and impacts of large iceberg calving events (EoI 57), processes of exchange between ice shelves and the open ocean (EoI 232), tides (EoI 573), biogeochemical cycling of C, N and P (EoI 635), short-term mesoscale instabilities, mixing processes and mass transports associated with gravity plumes across sloping bathymetry (EoI 596). Coupled ice-ocean models (EoI 585) will be analysed, and will assist in developing parameterisation for climate models..

* Hot-water drilling through floating ice shelves (EoI 232, 310) will allow sub-ice-shelf CTD profiling and mooring deployment, together with acoustic determinations of basal melt rate.

2.1 What is the evidence of inter-disciplinarity in this activity?

The activity will combine physical oceanography with glaciology, marine biology, biogeochemistry and geology. This broadens the programme and optimises use of research platforms and logistics. The instrumenting of marine mammals provides information for both biologists and physicists.

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

Theme 1: SASSI will provide a unique synoptic snapshot of the Antarctic continental shelf and slope environment, including physical (iAnZone), biogeochemical (GEOTRACES, SOLAS, IMBER) and biodiversity (CoML, GLOBEC) measurements. This delivers a baseline for assessing current ocean climate processes, effectively a legacy against which to measure future change.
Theme 2: SASSI aims to understand continental shelf and slope processes, a critical component to understanding global climate variability, adequately to allow their accurate representation in climate models, that can then be used to predict this variability. Interannual and seasonal variability will be documented for the first time in many locations.
Theme 3: SASSI is designed to understand the role of the physical, biological and biogeochemical polar processes in global climate, including the efficiency of the biological pump in the carbon cycle and the carbon budget. The planned snapshot will help us to assess present-day conditions and likely future changes in the context of global modes of variability such as Antarctic Circumpolar Waves, the Southern Annular Mode, and the El Nino - Southern Oscillation.
Theme 4: SASSI will make observations in geographical regions never intensively studied. The first sub-ice observations using moored instrumentation, under-ice floats, and AUV/ROVs have the potential to radically alter our view of the Antarctic system.

SASSI will:
1. Obtain a circumpolar synoptic view of Antarctic shelf and slope oceanography
2. Assess quantitatively the properties and amount of inflow of warm, saline deep water onto the continental shelf, with a focus in regions known to be active sites for water transformation.
3. Assess the role of onshore oceanic heat transport in melting sea ice and ice shelves
4. Determine where, when and how this oceanic inflow is transformed, through net cooling and freshwater fluxes during the seasonal sea ice melting/freezing cycle over the shelf domain into dense Shelf Water and its subsequent derivative Antarctic Bottom Water
5. Assess the importance of ice shelves in the net upper ocean freshening process including iceberg calving and melting, and determination of basal melt rates.
6. Assess the importance of coastal polynyas to water mass transformations
7. Better understand the dynamics of the coastal current and slope front systems, and how they influence the exchanges between sea ice, glacial ice, coastal and deep ocean waters
8. Quantify freshwater transports around Antarctica through both currents and atmosphere-ocean-ice interaction
9. Determine down-slope dynamics and associated meridional transports, integrating physical, geological and geophysical records with the currents in the bottom boundary layer
10. Assess the degree to which present coupled ocean-ice models represent the shelf system and its variability
11. Design a long-term monitoring system over the Antarctic continental margins that can act as an early indicator of global climate-related changes
12. Identify key Antarctic shelf/slope processes that should be included or parameterised in future climate models
13. Explore and document the geology, chemistry and biology of underwater volcanic hot vents
14. Obtain a swath bathymetry map of the Antarctic continental shelf and slope, including beneath ice shelves.
15. Assess the role of the microbial biomass and processes in regulating the carbon biological pump efficiency for the carbon sequestration on the Antarctic continental shelf.
16. Understand the bio-optical processes that affect the ocean colour signal in the Southern Ocean.

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

Location(s)	Coordinates
Antarctic continental shelf and slope to the abyss, circumpolar locations, as many as possible logistically, including coastal polynyas, both narrow and wide shelves and slopes, and under ice shelves and sea ice.	

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

Arctic Fieldwork time frame(s)	**Antarctic** Fieldwork time frame(s)
	01-03/2008 primary sections
	01/2007 - 03/2009 moored instrumentation deployment/recovery and associated CTD surveys
	01/2007 - 03/2009 under ice floats and surface drifters

2.5 What major logistic support/facilities will be required for this project? (see notes)

Ice strengthened research vessels	Ice drilling capability
Ship recovery of buoys etc	Fuel depots
Autonomous Underwater Vehicles	Helicopters
	Snow terrain vehicles
Further details – Sharing of research cruises is likely with GEOTRACES, CASO and marine biological IPY work.	

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

Source of logistic support	X for likely potential sources	X where support agreed
Consortium of national polar operators		
Own national polar operator	X	X
Another national polar operator	X	
National agency	X	X
Military support	X	X
Commercial operator		
Own support		
Other sources of support (details)		

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

Not applicable

3.0 STRUCTURE OF THE ACTIVITY

3.1 Origin of the activity(X for one choice)

Is this a new activity developed for the IPY period?	X
Is this activity the start of a new programme that will outlive IPY?	
Is this a pulse of activity during 2007-2009 within an existing programme?	
If part of an existing programme please name the programme -	

3.2 How will the activity be organised and managed? Describe the proposed management structure and means for coordinating across the cluster

iAnZone has organised collaborative Antarctic projects before and the organisational infrastructure is already in place. We have a regularly-rotating SCOR-approved steering committee with current members from Japan, Finland, New Zealand, China, Italy, USA, Brazil, Germany, Australia and Russia, currently chaired by the UK. The iAnZone biennial meetings, workshops and mailing list are open to all. See the website at http://www.ldeo.columbia.edu/res/fac/physocean/ianzone/.

Use will be made of the existing iAnZone mailing list, website, steering committee and organisational structure. There is a regular rotation of Steering Committee members and the Chairs (as required by our affiliation organisations, SCOR and SCAR) and it is anticipated that the steering committee would be adapted to include representatives from other cluster members. Formal meetings are held biennially but much of the business is dealt with by email. Additional open planning workshops for SASSI will be organised as has occurred for previous iAnZone projects, the next workshop being that in Venice in October 2005. A major advantage of SCOR and SCAR affiliation is availability of funding to support scientists from less wealthy nations at the meetings (for example, funding is being provided by SCOR for Brazilian and Russian attendees in 2005).

At a higher level, SASSI will work closely with the CLIVAR/CliC/SCAR Southern Ocean Implementation Panel to make appropriate links and oversee the climate related Southern Ocean effort as a coherent whole.

3.3 Will the activity leave a legacy of infrastructure and if so in what form?

Detailed bathymetric data from selected areas of the Antarctic continental shelf and slope, including under ice environments, for use by future scientist of all disciplines. These will be crucial for future efforts to numerically model pertinent shelf-scale processes and to incorporate these processes into global climate models.

Design for a climate observing system on the Antarctic continental shelf and slope. Additionally, some of the planned instrumentation will remain deployed after IPY, providing all year-round long time series of marine currents and hydrographic properties. These observations will allow regional validation of future global climate models.

3.4 Will the activity involve nations other than traditional polar nations? How will this be addressed?

We will particularly welcome nations new to Antarctic research who wish to use IPY to develop their own expertise, for example by participating in short sections on their own vessels or those of other nations. Those with limited resources might wish to participate simply by contributing floats or drifters. The short hydrographic sections are specifically designed so that nations with only limited science time or expertise available on Antarctic supply vessels can make a full and important contribution.

3.5 Will this activity be linked with other IPY core activities? If yes please specify

Yes, SASSI will be linked with CASO-Oceans and with BIAC.
The CLIVAR/CliC/SCOR/SCAR Southern Ocean Panel will provide a forum for interaction and a means for strengthening links.

3.6 How will the activity manage its data? Is there a viable plan and which data management organisations/structures will be involved?

Agreement has been reached with CLIVAR that they will accept the oceanographic data to be collected during SASSI, since this will be one of the activities overseen by the CLIVAR/CliC/SCAR Southern Ocean Implementation Panel.

Under-ice and bathymetric profiling data will be archived with IBSCO coordinated at AWI.

Once established, under ice float data are anticipated to follow the ARGO route of both real time availability and long term data archiving.

Hydrological and current data as well as information on field activities (metadata) will be made available through project web pages integrated/mirrored to the Joint Committee for Antarctic Data Management (JCADM) portal.

3.7 Data Policy Agreement (Place X in box for agreement)

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

3.8 How will the activity contribute to developing the next generation of polar scientists, logisticians, etc.?

The SASSI fieldwork is designed to be possible even from Antarctic supply vessels, so nations with limited resources can use the programme to develop future expertise. Training of young people and those from developing nations will be undertaken through participating in cruises alongside more experienced scientists, and through encouraging the exchange and visits of people from the different groups involved during the data analysis phases.

3.9 How will this activity address education, outreach and communication issues outlined in the Framework document?

Educational outreach will be coordinated with the new SCAR IPY education committee.
Participation in SASSI provides ideal training for students, young scientists and people from developing nations. The iAnZone website will be maintained and developed. The iAnZone mailing list will remain open to all subscribers.
Participation in cruises and fieldwork by Masters and PhD students, and by school teachers.
National and individual programme websites as specified by most national agencies.
We anticipate and will encourage interest from television programme makers.
Further outreach efforts will be subject to funding for webpage or secretarial support.

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

National programmes and funding agencies. For some nations this funding is already in place. For the majority, funding is being requested. EU funding will be explored. The project sections are designed to be achievable even by nations with few resources, by taking advantage of Antarctic supply ships. Other nations may play a full part by contributing moored arrays, floats or drifters.

3.11 Additional Comments

SASSI provides a framework for close cooperation and collaboration with other programmes. We are already working with other international programmes such as GEOTRACES, SOLAS, GLOBEC, CoML and IMBER. For example, SOLAS will make measurements of the carbonate system along the SASSI sections.
There will be a workshop to develop the SASSI project at the next iAnZone biennial meeting, to be held in Venice in October 2005 in conjunction with the Ross Sea conference.

4.0 CONSORTIUM INFORMATION

4.1 Contact Details

	Lead Contact	Second Contact
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4.2 Other significant consortium members and their affiliation

Name	Organisation	Country
Enrico Zambianchi	University of Naples	Italy
Ole Andres Nost	Norwegian Polar Institute	Norway
Gerald Spain	Scripps Institution of Oceanography	USA
Lars Smedsrud	Geophysical Institute, University of Bergen	Norway
Kevin Speer	Florida State University	USA
Rebecca Woodgate	University of Washington	USA
Marie-Noelle Houssais	LODYC	France
Beniamino Bruno Manca	National Institute of Oceanography and Experimental Geophysics - OGS, Trieste	Italy
Giulio Catalano	CNR - Institute for Marine Sciences, Trieste	Italy
Carlos Garcia	University of Rio Grande	Brazil
Damia Gomis	Institut Mediterrani d'Estudis Avancats	Spain
M. Mar Flexas	Institut Mediterrani d'Estudis Avancats	Spain
Alejandro Orsi	Texas A & M University	USA
Arnold Gordon	Lamont-Doherty Earth Obs of Columbia University	USA
Robin Muench	Earth and Space Research	USA
Mariangela Ravaioli	CNR - Institute for Marine Sciences, Trieste	Italy
Pierre-Marie Poulain	National Institute of Oceanography and Experimental Geophysics - OGS, Trieste	Italy
Mauricio Mata	University of Rio Grande	Brazil
Ilana Wainer	University of Sao Paulo	Brazil
Michael Meredith	British Antarctic Survey	UK