



## EXPRESSION OF INTENT FOR ACTIVITIES IN IPY 2007-2008.

### Deadline for Submission – Open ended

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#### 1.0 PROPOSAL INFORMATION

##### 1.1 Title of proposed activity

Southern Hemisphere ocean-cryosphere interactions: model representation, analysis and projections.

##### 1.2 Acronym or short form title of proposed activity

SHOC

##### 1.3 Concise outline of proposed activity

In this project, output from global coupled climate models (IPCC AR4 coupled climate models) and a regional climate model that will be developed at the British Antarctic Survey will be compared with observations of the climate of Antarctic and the Southern Ocean circulation. Extensive additional observational data will be available during IPY. Data-model comparisons will help us understand the complex atmosphere-ocean-cryosphere system in the southern high latitudes.

We will first present the simulated water cycle in the southern hemisphere for the present-day climate. In particular, we will examine the water cycle related to sea ice brine rejection/freshwater release simulated in the global climate models and the BAS regional climate model. The regional climate model is also capable of representing the water cycle related to under-ice shelf melting. The circum-Antarctic sea ice volume measurement and the measurement of ice shelf melt and iceberg production during the IPY 2007-2008 will be used to validate the models. The interactions between the cryosphere-related water cycle and the Southern Ocean circulation will be investigated. Projections of future water cycles under various climate-change scenarios and their impacts on Southern Ocean circulation will also be analyzed.

Since extensive observational work will be carried out for the Weddell Gyre during the IPY 2007-2008, we will also compare the modelled Weddell Gyre with the observed one. By analysing the model results first, we will determine the factors that drive the Weddell Gyre and investigate links between the Weddell Gyre, sea ice circulation and ocean circulation.

IPY 2007-2008 will also provide valuable ocean current data for the Antarctic

## ANNEX I

Circumpolar Current-topography interaction study (Project 173: Transport through gaps across the Kerguelen Plateau and inter-basin exchange). These data will also be used for validating topographic steering effects on the Antarctic Circumpolar Current in the coupled climate models.

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

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

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

<b>Natural or social science research</b>	Y
<b>Education/Outreach and Communication</b>	N
<b>Data Management</b>	N
<b>Legacy</b>	N
<b>Other Targets</b>	N

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

<p>Theme 1: present environment status of the polar regions This project will document the current status of the Southern Ocean simulation in climate models and analyse physical processes and mechanisms in the models.</p> <p>Theme 2: to understand change and improve predictions The project is especially helpful to the understanding of the polar environment change and the project will help improve the model performance and hence projections of future climate change.</p> <p>Theme 3: polar-global teleconnections The project will look into the causes from the rest of the world of model biases in the polar region.</p> <p>Theme 4: unknowns at the frontiers of science The project will use the observed data to validate the simulated large-scale water cycle related to the cryosphere for the first time. The link between the water cycle and the Southern Ocean circulation will be analyzed.</p>
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1.7 What international collaboration is involved in this project? (see Note 2)

<p>This project is a contribution to an international project CASO (Climate of Antarctic and Southern Ocean). International collaborations with many other projects under the umbrella of CASO and Antarctic Climate and Atmospheric Circulation will be carried out.</p>
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## 2.0 FIELD ACTIVITY DETAILS

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

No field activities.

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

Arctic Fieldwork time frame(s)	Antarctic Fieldwork time frame(s)
mm/yy – mm/yy	mm/yy – mm/yy
mm/yy – mm/yy	mm/yy – mm/yy
mm/yy – mm/yy	mm/yy – mm/yy

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)

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

The project will provide valuable insights into the understanding and improving of the Southern Ocean simulations in coupled climate models. A regional climate model will be developed at BAS and it will be an important tool for the simulation of the Southern Ocean circulation and climate.
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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	N
Own national polar operator	Y
Another national polar operator	N
National agency	N
Military support	N
Commercial operator	N
Own support	Y
Other sources of support	N

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

Y or N?	Not yet.
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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	Component of an existing plan CASO

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

It is self-managed. Both email and face-to-face communications will help project members to exchange ideas and report progress.

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)

3.4 What are the initial plans of the project to address data management issues (as outlined in the Framework document)? (see Note 8)

N.A.

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

Funding is already available.

3.6 Is there additional information you wish to provide?

No.

#### 4.0 PROPOSER DETAILS

4.1 Lead Contact for the Expression of Intent

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First Name Zhaomin  
Surname Wang  
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Fax +44(0)1223221279  
Email zwa@bas.ac.uk  
Repeat Email zwa@bas.ac.uk

4.2 List up to six other project members and their affiliation.

Name 1 Dr. Tom Bracegirdle  
Organisation British Antarctic Survey  
Name 2 Dr. Todd Arbetter  
Organisation British Antarctic Survey  
Name 3 Dr. John Turner  
Organisation British Antarctic Survey  
Name 4  
Organisation  
Name 5  
Organisation  
Name 6  
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