Full Proposals for International Polar Year 2007-2008 Activities

Proposed IPY Activity Details

1.0 PROPOSER INFORMATION

(Activity ID No: 40)

1.1 Title of Activity
Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies

1.2 Short Form Title of Proposed Activity
DAMOCLES

1.3 Activity Leader Details
Jean-Claude Gascard
Université Pierre et Marie Curie
France

1.4 Lead International Organisation(s) (if applicable)
The European Commission 6th Framework Program
NULL
NULL
NULL

1.5 Other Countries involved in the activity
Norway
Sweden
Germany
Finland
UK
Denmark
Poland
Russia
Greece
Estonia
Belgium
US
Canada
Japan
NULL
NULL

1.6 Expression of Intent ID #'s brought together in this proposed activity
80

1.7 Location of Field Activities
Arctic

1.8 Which IPY themes are addressed
1. Current state of the environment
2. Change in the polar regions
3. Polar-global linkages/tele-connections
4. Exploring new frontiers

1.9 What is the main IPY target addressed by this activity
4. Legacy

2.0 SUMMARY OF THE ACTIVITY

The main objective of DAMOCLES is to reduce the uncertainties in our understanding of climate change in the Arctic and in the impacts thereof. To meet this objective DAMOCLES will, following the approach of Numerical Weather Prediction Centers, develop an integrated system for obtaining relevant geophysical observations, transferring them to a central databank, distributing them to the modelling centers, and producing nowcasts and forecasts of the Arctic climate. But since there exists no such thing as an Arctic Ocean Observing System, nor fully validated models for Arctic climate, nor accepted methods for forecasting of climate, a number of specific objectives need to be met in DAMOCLES:
1.Synoptic observational coverage of the Arctic Ocean sea-ice cover
The variability of sea-ice thickness, extent, concentration, ice-type and drift will be monitored by remote and in-situ systems in near real-time. Sea-ice dynamics and thermodynamics will be scrutinized to better understand their role for the large-scale ice-atmosphere-ocean system
2.Synoptic observation and investigation of atmospheric key processes
Aimed at a better predictability of the Arctic weather and climate key processes are investigated in a combined observational/process-modelling effort: the effects of Arctic cyclone on sea-ice in terms of heat and moisture transport, an improvement of boundary-layer physics over ice and ocean, an improvement of the radiative transfers and its interaction with snow and sea-ice
3.Synoptic observation of the Arctic Ocean circulation and key processes
An observational system will be set up with the aim to improve the understanding of the large-scale circulation of the Arctic Ocean and its vertical and lateral exchanges as well as the communication between central basins and the shelves. New techniques will be used to assess synoptically the state of the ocean under the ice and the fluxes of heat, salt and volume across the boundaries.
4.Integration and assimilation of observations with large-scale models
Model sensitivities will be investigated and performance be improved by model-model and model-data comparison, aiming at an improved predictability.
Observations will be enhanced by a set of assimilation activities to deliver re-analysed Arctic variables in time and space
To address the question of potential impacts of climate change in the Arctic the following specific objective of DAMOCLES can be formulated:
5.Assessment of impact on environment and humans
The observationally supported model improvements, the model sensitivities and past ranges of variability will be combined with new field data. The aim is to evaluate improved predictability and its consequences, as well as the impact of projected changes on adaptation capabilities and vulnerability of the environment and human activities.
Exploitation and dissemination of the results are key elements of the project. Thus, a 6th specific objective is:
6.User-friendly return of information to the community
A website will be available; giving the community updated information about the state of the Arctic (e.g. real-time information of key atmospheric, ice and ocean variables) as well as information about the progress of the science of DAMOCLES. Education will be provided, through workshops and student scholarships. Results will be published, both in scientific journals and in the popular-scientific press. The PIs will generally make themselves available to the public to the best of their ability.

2.1 What is the evidence of inter-disciplinarity in this activity?
The evidence of inter-disciplinarity in DAMOCLES comes from the fact meteorologists, glaciologists and oceanographers are deeply involved and integrated in the same program both from an observational and modelling point of views.

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?
DAMOCLES will for the first time achieve a systematic approach to observing, understanding and quantifying climate change in the Arctic through
- Developing and deploying an advanced observing system that provides for the synoptic, continuous and long-term monitoring of the lower atmosphere, sea-ice and the upper ocean,
- Evaluating and improving global and regional climate forecasting models based on validation by, and assimilation and integration of observed data
- designing and testing an integrated ice-atmosphere-ocean monitoring and forecasting system.
The ultimate deliverable will be to lengthen the lead-time of extreme climate changes predicted to occur in the Arctic within this century and thus to improve the ability of society to mitigate for their impacts.
DAMOCLES research will provide a substantial step forward from the present state-of-the-art by:
- improving monitoring capabilities of the Arctic ocean, ice and atmosphere through innovative technological advances
- improving the data transfer from instruments to users, through innovative technological advances, the use of an operational databank, and unprecedented data delivery and format agreements between all partners.
- increasing the knowledge concerning dynamics and thermodynamics of the Arctic Ocean Sea-ice cover and the understanding of its interaction with the Ocean and the Atmosphere in the northern hemisphere climate system,
- improving significantly the ability to predict extreme climate events in the Arctic, such as the disappearance of the perennial ice-cover,
- contributing to the development and implementation of observing and forecasting systems to make long-term systematic observations of marine and atmospheric parameters of the Arctic Environment necessary for global change research and management strategies,
- improving the knowledge on the adaptive capacity and vulnerability of human activities and the environment with respect to such an event, and thus enhance the European Union’s preparedness in terms of environmental and societal terms.

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

Locations	Coordindates
Central Arctic Basin/ transpolar Drift	
Eurasian continental slope	
Fram Strait and Nordic Seas	

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

Arctic Fieldwork time frame(s)	Antarctic Fieldwork time frame(s)
09/06 - 09/10	

2.5 What major logistic support/facilities will be required for this project?
Icebreaker
Ice strengthened research ship
Autonomous Underwater Vehicle
Multi-instrumented platforms
Helicopters
Fixed wing transport aircraft

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	Y	
Own national polar operator		
Another national polar operator	Y	
National agency	Y	
Military support		
Commercial operator	Y	
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 pulse of activity during 2007-2009 within an existing programme

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

3.2 How will the activity be organised and managed? Describe the proposed management structure and means for coordinating across the cluster
The activities of Damocles have a unified goal. They have been divided into WPs for the sake of efficiency. These WPs are in charge of running the various items of the JPA. However, as a whole, Damocles needs that the WPs be well coordinated and that the contributions of the contractors be integrated towards the common goals.
Moreover the specific topics of Damocles demand that an integrated network of measuring devices be purchased, modified to fit with the Scientific and Technical requirements and ran and maintained by several contractors towards the acquisition of common database and this over a period much longer than the EU contract. This requires both decision and commitments of the partners of the consortium.
Therefore the governance is quite an important part of Damocles which has to combine a strong executive with the participation and the commitment of any contractor.
It is run through different levels with a final making up of the main decisions including all the contractors, an executive body in charge of the setting up of the decisions, their preparation and of the coordination and integration of the activities of the WP. This executive is chaired by a Project Leader assisted by dedicated working groups. The activities are monitored and performed by WP groups, chaired by WP leaders. Advisory groups assist the project leader and the executive on topics requiring specific skills (IPR, financial issues...) or in updating the Scientific and Technological activity programs.

DAMOCLES is an European Integrated Project and is composed of:

- The General Assembly
It is the body in which every contractor can participate with a representative having a decision power delegated by the decision body of the contractor. The administrative coordinator is in charge of looking after the internal regulation of the GA. The general assembly deliberates on subjects prepared by the Steering Committee and which commit the contractors (budget, ownership and management of collective equipment during and after the contract, updating of and

contributions to the tasks of the JPA…).

- The Steering Committee
It is the executive body, and as so it prepares most of the decisions on which the GA has to deliberate. It coordinates and integrates the activities of the WPs. It takes decisions needing no deliberation of the GA. It has a key role in the governance of the Consortium and thus allows a core group of contractors to monitor Damocles. It is therefore composed chiefly of the WP leaders and of the Executive Board consisting notably in the Project Leader and co-leaders and the Coordinator.

- The Project office and the executive Board
The Project Leader from Paris VI University has cumulated a thorough experience of EU contracts through the previous framework programs and is already involved in EU FP consortia. He will be assisted in the Executive Board by two co-project Leaders Dr. Cecilie Mauritzen from the Meteorological Institute in Norway (Oslo) and Dr. Ralf Doescher from the Swedish Meteorological and Hydrological Institute (SMHI) in Norrköping. Dr C. Mauritzen is member of the CliC SSG and Chair of the CliC Arctic Climate panel. Dr R. Doescher is involved in several EU FP consortia and expert in numerical modelling in particular for the Arctic and Sub-Arctic regions.

The project leader is the chairman of the SC and GA. It has to look after the good functioning of the SC and prepares the SC's agendas and plans. It is responsible for the follow up of the deliverables and milestones. For this it is assisted by an Executive Board including two co-project Leaders, and the Coordinator.
For the day-to-day work, the Project Leader and the Executive Board are assisted by a Project Office, including chiefly the Scientific and Technical Manager and the Administrative Coordinator.

The Scientific and Technical Manager is a person appointed to assist the Project Leader in his scientific and technical tasks.

- The Administrative Coordinator
It is in charge of all the responsibilities detailed in the FP6 provisions. It also advises the Consortium about various issues (Consortium Agreement, finances, amendments to the contract...). It is in charge of the financial and administrative management and organizes a 1st step help desk to assist Contractors and team leaders on their administrative, financial and activities integration issues.

3.3 Will the activity leave a legacy of infrastructure and if so in what form?
The goal is that the legacy of this project will be a long-term monitoring system for the Arctic. Such a system would include technological solutions for obtaining and calibrating observations in cold and ice-covered environments, a functioning data management system, technological solutions to transfer data near-real time from ocean, ice and atmosphere to that data bank, and the design, based on a deep understanding of information transfer within the climate system, of the least-costly, yet sufficient for decision-making, observing system for the Arctic. This system would merge into a global monitoring system, used to improve our understanding and forecasting skills of our physical climate system and its impact on the overall Arctic system, in general. The funding of a long-term monitoring system for the Arctic will depend on future commitment from the national operational agencies. It is the objective of DAMOCLES to determine how it can be done, practically.

3.4 Will the activity involve nations other than traditional polar nations? How will this be addressed?
There is a developing interest by the Asian nations not bordering the Arctic, but interested in the climate change impacts as they influence their own countries climate and natural system. Opportunities for coordinated use and servicing of Arctic observatory platforms and joint oceanographic cruises and/or ice camps will enhance the international collaboration potential of DAMOCLES. The DAMOCLES Consortium is well diversified including Mediterranean

Countries such as Greece and France

3.5 Will this activity be linked with other IPY core activities? If yes please specify
Since DAMOCLES is focused on the Arctic ocean domain (although including the sea ice and atmosphere above) it is natural that it creates strong links with core programs that consider the atmosphere and cryosphere without lateral boundaries. In particular we will link with iAOOS, CARE, SEARCH and ISAC. Since DAMOCLES is focused on the natural sciences primarily, we will also ensure strong links with "Change: Adaptation and Vulnerability; coupled human-environment systems". This later collaboration will expand the relationship between the physical climate system and the ecosystem-human response aspects of a changing Arctic.

3.6 How will the activity manage its data? Is there a viable plan and which data management organisations/structures will be involved?
During the project large amounts of various types of data describing the sea ice, atmosphere and ocean will be collected. Proper management of the data flow and access is an essential part of a successful project.
DAMOCLES will build on the experience gained in projects like EUMETSAT OSISAF HL (Ocean and Sea Ice Satellite Application Facility, High Latitude centre) and EU projects ESOP, IMSI, IWICOS and IOMASA. Common data formats (e.g. NCSA HDF5, netCDF, XML) will be defined and filters created were appropriate. End products which are generated in WP 1, 2 and 3 will be presented to the users by use of web technology. This presentation will both be a higher order web based visualisation system like [http://seaice.dk] and access to metadata and data files using HTTP/FTP e.g. [http://saf.met.no] and OpeNDAP [http://opendap.org] technology. Using the above mentionned technology and standardizing formats for the data collected, easy data access for the user community is achieved. Standardizing file formats early in the project period, and delegating the responsibility of delivering standardized input to the data management and distribution system to the WPs producing data, is of vital importance to keep this work package slim and efficient.
The DAMOCLES data management has to be designed in a generic way, ensuring it is able to handle various types of data (e.g. gridded, point, transects, other types). Similarly the distribution system should be able to both support a central database, and if feasible also a distributed system. Furthermore it is essential to identify how the data collected in DAMOCLES is taken care of after the project ends. The possibility to continue operation of the DAMOCLES Data management and distribution system (this requires some sort of funding) has to be evaluated along with the possibility of transferring data to other entities (e.g ICES, OSISAF, NSIDC, etc.).
The Norwegian Meteorological Institute and the Danish Meteorological Institute are partners in the EUMETSAT OSISAF project and will as such promote successful and relevant DAMOCLES end products through the OSISAF management body. If accepted by OSISAF management (and EUMETSAT) this could imply that DAMOCLES end products could be accessible through OSISAF distribution systems (e.g. the high latitude centre). The long-term policy of the OSISAF also allows assessment of the long-term consistency, in terms of continuous assessment of the data products.
The concept of letting the data collector take care of as much of the processing chain as possible is essential for the success of this activity. However, this should not prevent data from being distributed to other partners and the European/global community. The DAMOCLES data management and distribution system assumes that the data collector in addition to data collection (including potential satellite links etc.) takes care of data consistency check, backup of raw data and Internet link (push or pull technology by choice of the data collector) of data to the Data management and distribution system.
The DAMOCLES Data management and distribution system will subsequently provide potential users (internal or external) with access to DAMOCLES deliverables (data files, documentation, visual presentation) as well as backup of the data.

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.?
Development of a state-of-the-art monitoring system for the Arctic requires significant technological development and requires thus the expertise of a new generation of engineers and scientists. We do, however, recognize the many obstacles for new scientists who wishes to work in an environment so specialized in terms of equipment needed etc. We therefore encourage all traditional polar researchers contributing to DAMOCLES to entrain younger scientists as well as specialists from fields complementing that of polar science, whenever possible.

3.9 How will this activity address education, outreach and communication issues outlined in the Framework document?
We plan a range of interactive websites and semi-permanent exhibits as well as educational summer schools, including on board icebreakers, for communication and outreach. In general, the DAMOCLES scientists are encouraged to make themselves available to the media. For 2-way interaction with indigenous communities, we identify two Groups as our primary advisors/collaborators on 'human dimension' issues. These are the International Network of Arctic Indigenous Community-based Environmental Monitoring and Information Stations (AICEMI) and the Arctic Residents Network (ARN).

3.10 What are the proposed sources of funding for this activity?
DAMOCLES is an Integrated project funded by the EU under the 6th Framework Program.

3.11 Additional Comments

4.0 CONSORTIUM INFORMATION

4.1 Contact Details

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4.2 Other significant consortium members and their affiliation

Name	Organisation	Country
Jean Claude Gascard	Université Pierre et Marie Curie	France

Ursula Schauer	Alfred Wegener Institute for Polar and Marine Research	Germany
Ralf Doscher	Swedish Meteorological and Hydrological Institute	Sweden
Stein Sandven	Nansen Environmental and Remote Sensing Center	Norway
Bert Rudels	Finnish Institute of Marine Research	Finland
Oystein Godoy	Meteorologisk Institut	Norway
Edmond Hansen	Norwegian Polar Institute	Norway
Monica Tennberg	Arctic Centre University of Lapland	Finland
Harald Loeng	Institute of Marine Research	Norway
Stephen Dye	The Secretary of State for Environment food and rural Affairs Acting through the centre for Environment, Fisheries and Aquacukture Science	United kingdom
Soren Andersen	Danish Meteorological Institute	Denmark
Peter Wadhams	The Chancellor, Masters, and Scholars of the University of Cambridge	United Kingdom
Georg Heygster	University of Bremen	Germany
Seymour Laxon	University College London	United Kingdom
Michael Tjernstrom	Stockholm University	Sweden
Peter Haugan	University of Bergen	Norway
Emmanuel Skarsoulis	Foundation for Research and Technology-Hellas	Greece
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David Marsan	Université de Savoie	France
Alain Desautez	Institut Polaire Français – Paul Emile Victor	France
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Rene Forsberg	Danish National space Center	Denmark
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Jeremy Wilkinson	Scottish Association for Marine Science	United Kingdom
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