

**OPAG-WWRP**

**THORPEX IPY Cluster**

*(submitted by Chair OPAG EPAC)*

Purpose of Document and Major Decision(s) Requested

The document describes the activities in the IPY-THORPEX cluster

**Summary of Activity**

This document is originally submitted to the INTERNATIONAL CORE STEERING COMMITTEE FOR THORPEX and its Seventh Session in Geneva, Switzerland (18 – 20 November 2008) by the cluster coordinator Thor Erik Nordeng, Norwegian Meteorological Institute.

The IPY-THORPEX project cluster projects from nine countries with the following main objectives:

- Explore the use of satellite data and optimized observations to improve high-impact weather forecasts (for Polar THORPEX Regional Campaigns (TReCs) and/or provide additional observations in real-time over the WMO Global Telecommunication System
- Better understand physical/ dynamical processes in Polar Regions
- Achieve a better understanding of small -scale weather phenomena
- Utilize improved forecasts to the benefit of society, the economy and the environment
- Utilize the THORPEX Interactive Grand Global Ensemble (TIGGE) of weather forecasts for polar prediction

A Research and Implementation Plan has been written to help coordinate overall activities. The cluster was presented in the WMO Bulletin of October 2007. The projects span a number of scientific issues from climate research to weather prediction.

In brief they comprise:

**The Greenland flow Distortion Experiment** - The focus is upon Greenland tip jets, air-sea interactions, barrier winds and meso-scale cyclones; the field campaign took place in February 2007 (Ian Renfrew, University of East Anglia, United Kingdom).

**Storm Studies of the Arctic** - Includes enhanced observations in the eastern Canadian Arctic, gap flow, air-sea interactions, orographic precipitation, interaction of cyclones with topography etc. (John Hanesiak, University of Manitoba, and Ron Stewart, McGill University, Canada).

**Concordiasi** - Infrared Atmospheric Sounding Interferometer (IASI) assimilation in the Antarctic, assimilation of dropsondes launched from driftsondes, polar processes, the circumpolar vortex, using IASI data for climate monitoring, stable boundary layers, polar clouds and ozone, etc. (Florence Rabier, Météo-France).

**Norwegian IPY-THORPEX** - Optimization of new satellite data, improved modelling of the latent heat cycle, extreme weather, improved operational NWP, ensemble simulations. (Jon Egill Kristjansson, University of Oslo, Norway).

**THORPEX Arctic Weather and Environmental Prediction Initiative (TAWEPI)** - Study of various aspects of Arctic weather and the Arctic climate system (snow processes, polar clouds, sea-ice and ozone layer); develop and validate a regional weather prediction model and the use of satellite observations over the Arctic. The research will be done in various Canadian provinces, through collaboration between government, universities and northern communities. The research will also improve science's understanding of the Arctic and its influence on world weather (Ayrton Zadra, Environment Canada).

**Greenland jets** - Will consider meso-scale flows, including orographic disturbances, meso-cyclones and surface fluxes. Observations were carried out with the DLR aircraft in connection with the Norwegian IPY-THORPEX in March 2008. (Andreas Dornbrack, German Aerospace Centre in collaboration with Haraldur Olafsson, University of Iceland and University of Bergen).

**GREENEX / ICEEX** - Considers forecasting of small-scale weather phenomena, including extremes, meso- and fine-scale flows in the vicinity of orography and sea ice and downstream weather development as well as scale interactions. The project includes several smaller projects with focus on field observations in Iceland in July/August 2007; monitoring of the Atmospheric Boundary Layer in the Arctic; and precipitation observations in dense networks in Iceland. Airborne observations in GREENEX / ICEEX were carried out in collaboration with the Norwegian IPY-THORPEX in March 2008 and with the GFDex project. (Haraldur Olafsson, Iceland and Norway in cooperation with the German Aerospace Centre).

**Arctic Regional Climate Model Intercomparison Project** - Targeted observations from the North Pole station over the Arctic Ocean; feedback between the planetary boundary layer and meso-cyclones; climate processes and feedbacks within the coupled Arctic climate system (Klaus Dethloff, Alfred-Wegener Institute, Germany).

**Impacts of surface fluxes on severe Arctic storms, climate change and Arctic coastal orographic processes** - Includes studies of storm activity in the western Arctic in the context of surface fluxes from changing ice, ocean and land-surface conditions. Studies of coastal ocean processes and assessment of severe weather and climate factors that can impact human communities (Will Perrie, Bedford Institute of Oceanography, Canada).

**THORPEX Pacific Asian Regional Campaign (TPARC)** - Includes studies of extra-tropical transition) and links between tropical/ mid-latitude and polar weather (David Parsons, National Centre for Atmospheric Research, USA).

IPY-THORPEX is supported by EUCOS and ECMWF. ECMWF provides targeted runs and assimilate observations from field campaigns.

As can be seen, these activities are mainly focused on the Arctic region. CONCORDIASI however, has its focus on the Antarctic and one of its aims is to validate and improve the assimilation of Atmospheric Infrared Sounder/IASI satellite data in numerical models with emphasis on polar latitudes. Other important issues that will be investigated in IPYTHORPEX are the role of Greenland in terms of flow distortion and its effect on local and middle-latitude weather prediction, as well as the thermohaline circulation in the ocean; comparison of Arctic regional climate models; exploration of the use of satellite data and optimized observations to improve high-impact weather forecasts and improved

understanding of physical/dynamical processes in polar regions with emphasis on small-scale weather phenomena.

It is planned to gather and present results at the J03 session (convenors: Michel Béland, IAMAS; Ian Allison, IACSO; and Karen Heywood, IAPSO) of the IAMAS/IACSO/IAPSO meeting in Montreal (20-24 July 2009). This symposium is the first opportunity after the official end of the IPY observing period (1 March 2007 to 1 March 2009) to report new results from IPY projects. See <http://www.iamas-iapso-iacs-2009-montreal.ca/>