

**ARCTIC OCEAN SCIENCES BOARD: NATIONAL REPORT 2008  
FINLAND**

***General Remark:***

Much of the Finnish activity in the Arctic has been conducted at the Finnish Institute of Marine Research (FIMR). As of the first of January 2009, FIMR no longer exists. The FIMR scientists involved in Arctic Research are now at the Finnish Meteorological Institute (FMI). The email addresses give below, relevant for 2008, should be changed to [firstname.lastname@fmi.fi](mailto:firstname.lastname@fmi.fi).

***Remote sensing, sea-ice.***

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Time frame: Ongoing

Sponsoring Organisations: FIMR, ESA (2005-)

**Activity:**

Ari Seinä has worked mainly under ESA's GMES project Polar View. The project is coordinated by C-Core (Canada) and it has about 40 partners from Europe and Canada. The overall goal for Polar View is to be the World's leader providing EO services and products for environmental monitoring and security for the Polar Regions. That goal will be reached by building a cohesive international network meeting the following objectives: 1) engage a wide spectrum of end users who can be convinced of the value of the services and products, 2) provide a suite of desirable EO-related services and products to governmental users, 3) provide additional EO-related services and products to industrial users, 4) interface in a mutually beneficial way with the cryospheric science and climate change community; and 5) generate revenues, either directly or indirectly, from the provision of the suite of services to sustain Polar View.

Polar View structure has nodes for the Baltic (land and sea ice), Europe and Russia (the Euro-Arctic Node), and North America. Each node is a consortium in itself and managed by a Node Manager. Operational Service Providers report to the Node Managers in their region; the Node Managers report to the Program Manager who in turn reports to ESA. Pan-Arctic activities were initiated within the International Programs. Baltic Node is lead by Ari Seinä, FIMR.

FIMR's Polar View operational services could be found at: <http://polarview.fimr.fi>.

FIMR has been active in of International Ice Charting Working Group (IICWG) in October in Luleå, Sweden.

FIMR has signed contract with Baltic Icebreaking Management (BIM), and provided ice information and services to BIM web at <http://www.baltice.com>.

FIMR has provided operational services to JCOMM-ETSI IPY Ice Logistical Portal. See: <http://www.ipy-ice-portal.com/>.

FIMR has been active in European Ice Services (EIS) aiming better coordination and cooperation of European ice services, where one general meeting, and one board meeting were held.

***Meteorology***

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Time frame: Ongoing

Sponsoring Organisations: FMI, EU (DAMOCLES (2005-2009))

**Activity:**

Atmosphere-ice interaction in conditions of warm-air advection was studied on the basis of aircraft observations (University of Hamburg) and modelling (Tisler et al., 2008).

The effect of leads on the air temperature in winter was studied in collaboration with AWI applying a column model (Lüpkes et al., 2008).

Atmospheric forcing on modelling of snow and ice thermodynamics in the Arctic was studied (Cheng et al., 2008).

Meteorological and surface flux data from the Tara field campaign were analysed in collaboration with the University of Tartu (Vihma et al., 2008).

The Arctic atmospheric moisture budget was analysed on the basis of ERA-40 data in collaboration with the University of Tartu (Jakobson and Vihma, submitted).

Regional surface albedo of sea ice and open water was studied applying radiative transfer models (Pirazzini and Räisänen, 2008)

Boundary-layer processes during a flow parallel to the sea-ice edge in the Barents Sea were studied on the basis of aircraft observations (AWI) and modelling.

Studies on the atmospheric forcing on the drift of Arctic sea ice were started.

Studies on the meteorological factors controlling the inter-annual variability of the spring onset of snowmelt on the Arctic sea ice were started with Universitet Pierre et Marie Curie, Paris.

### ***Sea ice dynamics and thermodynamics.***

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Time frame: Ongoing

Sponsoring Organisations. FIMR, EU (DAMOCLES (2005-2009))

#### Activity:

FIMR have contributed to the Damocles sea-ice research in several ways. FIMR have continued analysis of the Tara measurement, modeling of sea-ice thermodynamic and conducted sea-ice field measurements as part of the CHINARE field expedition.

We have studies seasonal changes of the sea-ice and snow surface based on the sea-ice coring data, thermistor string data and time-lapse camera data. One particular new result is a time-series of fractional area of melt ponds at Tara, coinciding with the rather fast changes in the physical properties of sea ice.

The first model results on snow and ice thermodynamics in the Arctic Ocean with CHINARE 2003 data have been accepted for the publication in the Journal of Geophysical Research. The HIGHTSI has been applied also for the Tara period. The preliminary results were obtained and compared with the measurements carried out by the Ice- Mass Balance Buoys (IMBs). The results suggested that during the early spring the ice thickness was modeled quite well. During the melting season (snow free period), HIGHTSI calculated some 75cm ice melting, which is comparable to e.g. SHEBA (~ 70cm). There is only 40cm surface melting detected by the IMBs (Possibility due to the localized effect). It is unclear so far why the IMBs suggested ice bottom growth during the summer (quality control of the IMB data may needed). Therefore the difference between modeled and observed ice thickness is large. We need to investigate this matter more closely. In the current modeling trail, the snow is prescribed, due to lack of precipitation data, and the snow-ice and superimposed ice was not taken into account in the model run, which may overestimate the net ice thickness. Nevertheless, the modeling error during summer is in general larger than during the cold period. Attention will be given to; a) snow effects, b) albedo impact and c) accuracy of the forcing data.

The third Chinese National Arctic Research Expedition was carried out in summer-fall season in 2008. DAMOCLES was a key partner of CHINARE2008. We deployed the TriOS-Ramser radiometers during the Ice Camp period. We also deployed the pyranometer and pyrgeometers to measure the surface radiative fluxes at various locations during the Ice Camp. The spatial variability of surface albedo was monitored and will be investigated. The sea ice and snow properties at 10 short terms Ice stations were measured during the whole CHINARE2008 cruise.

FIMR has also utilized the Damocles IPY data in the validation studies of the HELMI (HELsinki Multi-category sea-Ice) model. Several numerical experiments for simulation of the evolution of sea ice during the year 2007 have been conducted and the modelled sea-ice motions have been validated using the three new Damocles datasets of sea-ice motion. We have used the observations of the array of buoys deployed around the Tara ice station (Uni Hamburg) and two satellite derived sea-ice motion datasets provided by IFREMER and DTU.

### ***Oceanography***

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Time frame: Ongoing

Sponsoring Organisations: FIMR, Department of Physics, University of Helsinki, EU (DAMOCLES (2005-2009), Academy of Finland (2005-2008))

#### Activity:

During 2008 the main oceanographic Arctic field activity at FIMR was the participation in the Chinese IPY expedition CHINARE2008, where FIMR took part in the oceanographic (CTD) studies in the

Canada Basin. Most of the other work has been with analyzing the observations obtained during the cruises in the last few years, especially the field activities conducted within DAMOCLES, and during IPY in 2007. The research has been concentrated on three topics: 1) The freshwater transport from the Arctic Ocean, 2) the circulation and transformation of the Atlantic water in the Arctic Ocean, and 3) the impact of the Barents Sea branch on the water mass characteristics of the Arctic Ocean. In December the EU project THOR (ThermoHaline Overturning at Risk?) project started. This will make it possible for the group to continue the studies of the freshwater fluxes from the Arctic Ocean and the nature of the Denmark Strait overflow.

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