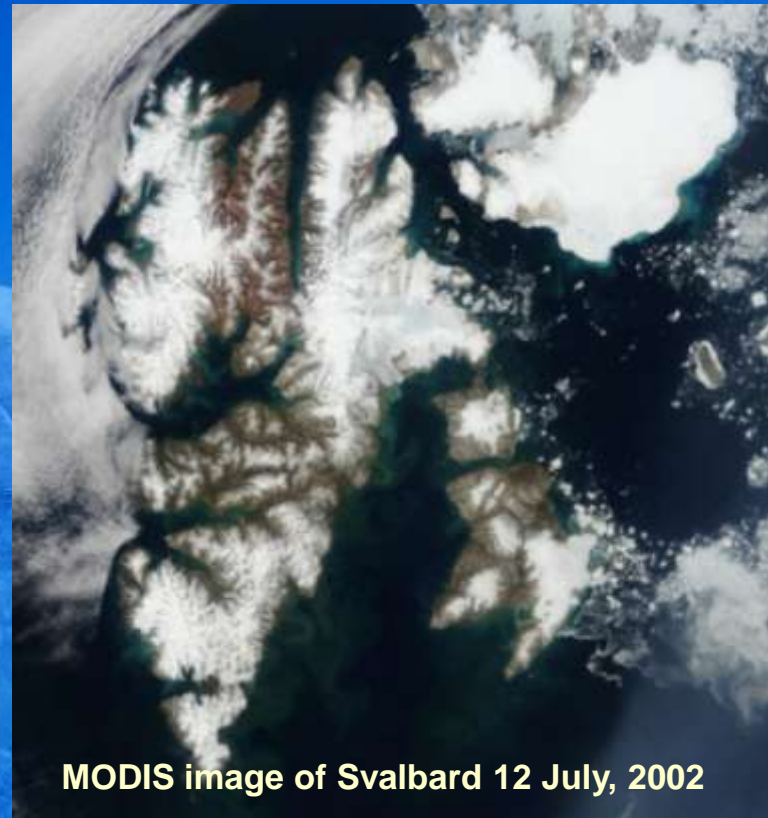


The Svalbard Integrated Arctic Earth Observing System (SIOS) ESFRI initiative

A possible future cornerstone of European Arctic research

The main goal of SIOS

- One of 44 proposals in the 2008 roadmap of the European Strategy Forum on Research Infrastructures (**ESFRI**)
- Establish an **(Arctic) Earth System Observing Facility** on and around Svalbard that covers meteorological, geophysical, hydrological, cryospheric and biological processes from a set of platforms **matching Earth System models (ESM)**.
- Establish a first important node in the envisaged Sustained Arctic Observing Network (**SAON**).

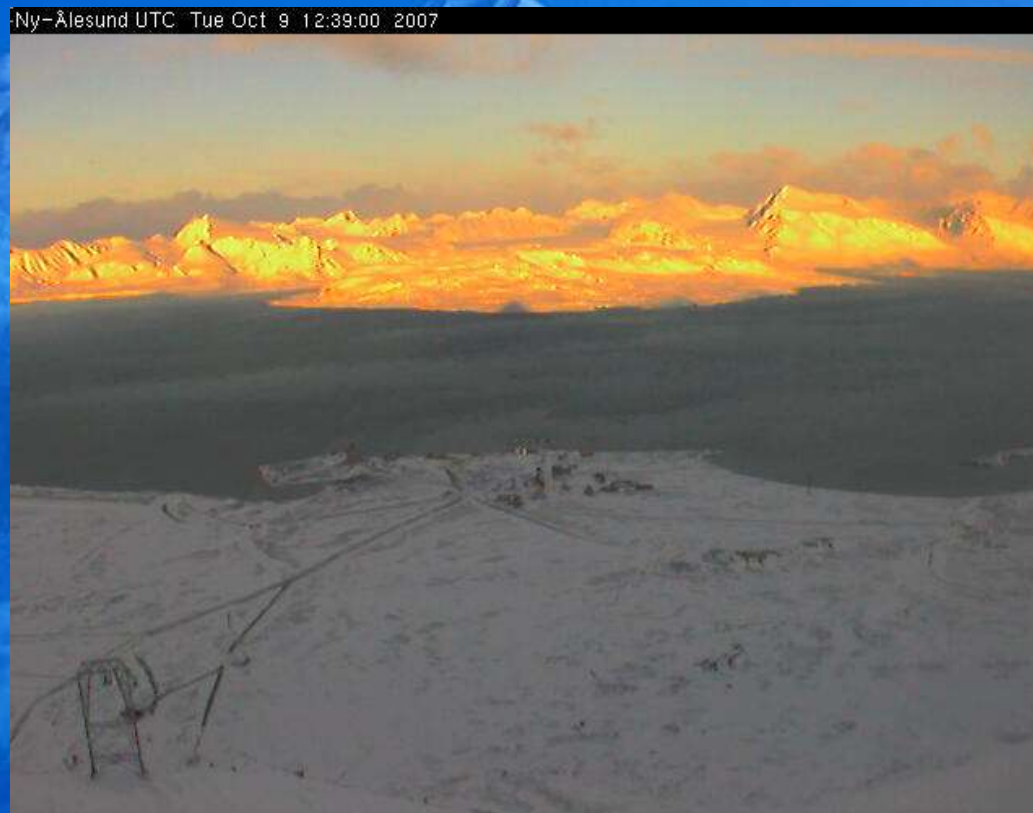


MODIS image of Svalbard 12 July, 2002



Why such a system on Svalbard?

- Earth System Models have to be applied and tested in regions where changes are expected to be most pronounced and system coupling is assumed to be strongest, i.e. in the Arctic. Svalbard is a region with especially large changes/variability in the Arctic

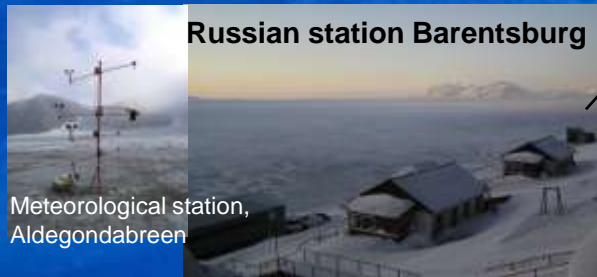
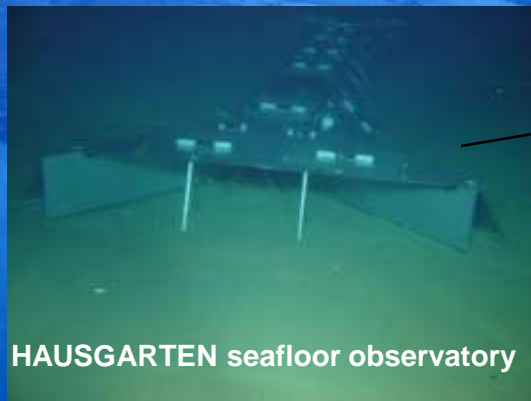


Major steps towards this goal:

1. Assess the present infrastructure and activities in Svalbard to identify **gaps and weaknesses** related to the needs of **Earth System Models (ESM)**. Invest in additional infrastructure and activities to close these gaps
2. Organize all relevant infrastructure and all research and monitoring activities into observation platforms which are most appropriate w.r.t. practical and organisational aspects
3. Establish a **Knowledge Centre** in Longyearbyen for data collection/aggregation/access, education and outreach, cooperative efforts, and input to Earth System modeling
4. Take action to coordinate the SIOS initiative with complementary ESFRI environmental initiatives as well as other global and Arctic observation systems and related modelling efforts



Existing Research Facilities



Meteorological station, Aldegondabreen



The SIOS Knowledge Centre



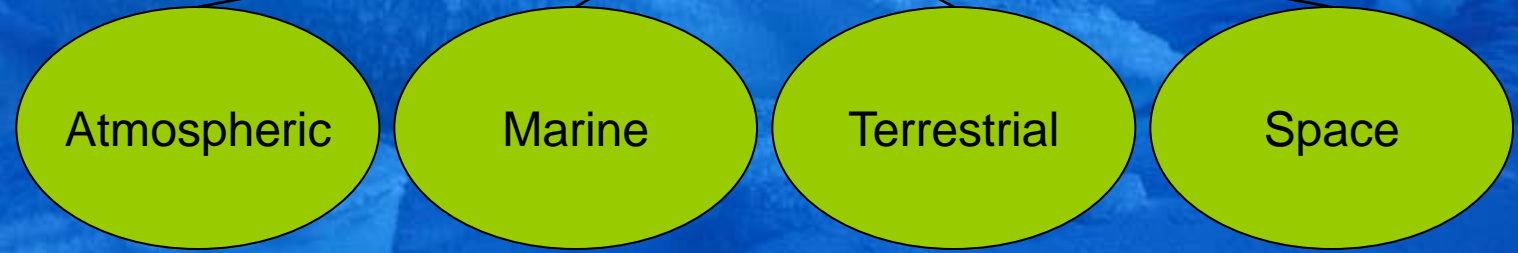
Selected end users: Policy makers, NGOs



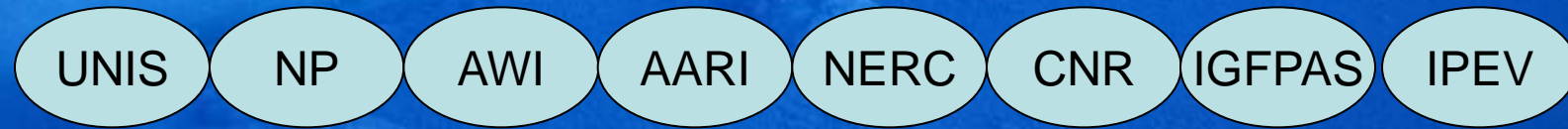
Integrating platform



Observational platforms



Selected contributing organizations



What are the challenges?

- History of establishment of the various polar stations:
 - topics, character, size determined in advance at national level
 - cooperation opportunities investigated after establishment
 - Svalbard Treaty freedom



Can one build an integrated autonomous facility out of this?

- Choice of research sites: determined by historical factors (coal mining, not scientific suitability): all along the west coast; to a large degree cemented by today's environmental jurisdiction

Will it be possible to build the required network with these practical limitations?

- Interdisciplinary character ("intellectual barriers"): between disciplines based on history (e.g., lower – upper atmosphere), ways of working and thinking, logistical approaches

Can SIOS achieve what numerous previous initiatives didn't?



... but more: the opportunities?

- Genuine interest of all nations present in Svalbard to integrate activities
- SIOS already influences other cooperation initiatives in Svalbard, e.g., Ny-Ålesund flagship projects
- Much more effective use of financial resources
- Fronting as an EU large research infrastructure
- Already today great interest from countries not present in Svalbard: Denmark, USA, Canada
 - excellent conditions for contributing to a pan-Arctic cooperation
- SIOS can be a true node/glue between most of the environment-related ESFRI projects: EMSO – ERICON AB – ICOS – LIFEWATCH – EISCAT-3D – EPOS – EURO-ARGO



SIOS – Time Schedule

- 9 December, 2008: SIOS on revised ESFRI Roadmap
- 3 December, 2009: submission of SIOS Preparatory Phase proposal
- March 2010: proposal accepted, contract negotiations with EC
- Summer 2010 – summer 2013: SIOS Preparatory Phase project: clarification of legal status, governance structure and financial strategy and business plan, plus other strategic processes
- From 2013 (at latest): SIOS implementation phase
- From end of 2013: SIOS operational phase (since much infrastructure already in place)

The SIOS-PP consortium



International Partners:

- Alfred Wegener Institute for Polar and Marine Research, Germany
- Institute of Geophysics - PAS, Poland
- National Research Council, Italy
- National Environmental Research Council (NERC), UK
- Arctic and Antarctic Research Institute (AARI), Russia
- Finnish Meteorological Institute, Finland
- Aarhus University - National Environmental Research Institute, Denmark
- University of Groningen, Netherlands
- Korea Polar Research Institute, Korea
- Polar Research Institute of China, China
- Institut Polaire Paul Emile Victor, France
- Institute of Oceanology – PAS, Poland
- Polar Geophysical Institute – RAS, Russia
- ITM, Stockholm University, Sweden
- National Institute of Polar Research, Japan
- National Centre for Antarctic & Ocean Research, India
- National Science Foundation, USA
- Spanish Ministry of Science and Innovation, Spain
- Institute of Botany – Czech Academy of Sciences, Czech Republic
- Scottish Association for Marine Science, UK
- EISCAT Scientific Association
- Arctic Centre, University of Lapland, Finland
- University of Leicester, UK
- Kola Science Center – RAS, Russia
- Geophysical Survey – RAS, Russia

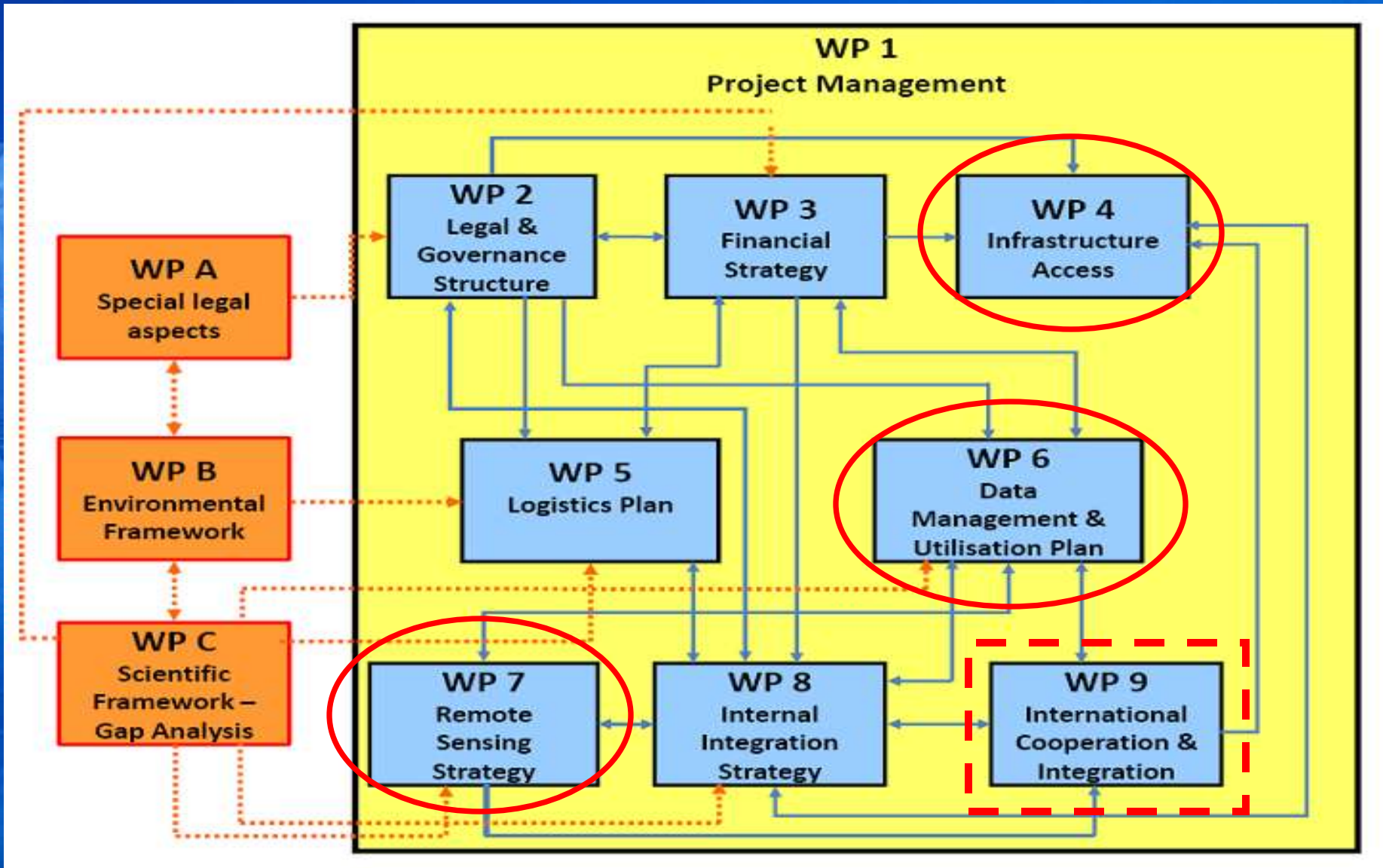
Norwegian Partners:

- Research Council of Norway (coordinator)
- Norwegian Polar Institute
- University Centre in Svalbard
- Norwegian Space Centre
- University of Tromsø/Tromsø Geophysical Observatory
- Norwegian Meteorological Institute
- Nansen Environmental & Remote Sensing Center
- Norwegian Institute for Air Research
- Institute of Marine Research
- University of Bergen
- Andøya Rocket Range
- Norwegian Mapping Authority
- NORSAR
- Norwegian Institute of Water Research
- Kings Bay AS
- Akvaplan-niva AS
- University of Oslo
- Norwegian Institute of Nature Research
- Norwegian University of Science & Technology
- Norwegian Directorate of Energy and Water Resources
- Kongsberg Satellite Services AS
- Northern Research Institute Tromsø
- Norwegian Ministry of Education and Research
- The Governor of Svalbard

(full SIOS-PP partners, associated partners)



CNR role in SIOS-PP



Infrastructures CNR intends/could include in SIOS

Infrastructure	Studies/services	Location	Status
Amundsen-Nobile Climate Change Tower (CCT)	ABL dynamic characteristics. Radiation and energy budget Surface albedo/reflectance characteriz. Fluxes of heat, moisture momentum, gases and aerosols at the surface interface (snow/land/air) and exchange with the troposphere	Kolhaugen area - NYA	4 levels temperature/moisture wind measurements radiation, energy and albedo measurements will start fall 2009
Physico chemical lab at sea level for aerosols and processes involving gases and SLPs at the snow/land/air interface (LARGE CONTRIBUTION TO)	Aerosols physico-chemical characterizations. SLPs studies Exchange of gases and aerosols between the snow/land/air interface Vertical exchange and advective transport processes. Education and outreach Support to field campaigns	Gruvebadet building - NYA	A first nucleus of the lab installations will be implemented during spring 2010.
Network of shallow boreholes surrounding a 30 m deep permafrost borehole	Monitoring thermal state of permafrost (TSP) following protocols defined in the frame of the Global Terrestrial Network for Permafrost (GTN-P). Development of the activity to include active layer monitoring following CALM network protocols.	To be identified not far from CCT	Survey to identify site planned in 2010 drilling and installation possibly in 2011. Plan for CALM activities related to budgets and success of proposals.



Physical/biological mooring in the Kongsfjord area, also equipped to investigate sea/air interface processes. (LARGE CONTRIBUTION TO)	Thermal structure and marine circulation in the inner Kongsfjord Wind distribution at the sea/air interface Measurements of biological parameters Undersea transmission system cabled to the Marine Lab.	Kongsfjord, Data acquisition based in the Marine Lab and Dirigibile Italia station.	Tests of real time data transmission using a network of underwater acoustic low cost modems planned in summer 2010.
Contribution to Marine Lab facility	Rent of hours to support activities of Italian research groups in marine biology	Marine Lab - NYA	Operative since 2006
Microbiological lab facility	Provide a support to all groups carrying out researches in terrestrial ecosystems.	Dirigibile Italia station - NYA	Under discussion its feasibility also through support of other countries.

Other ideas/dreams are highly welcome.

Amundsen-Nobile Climate Change Tower



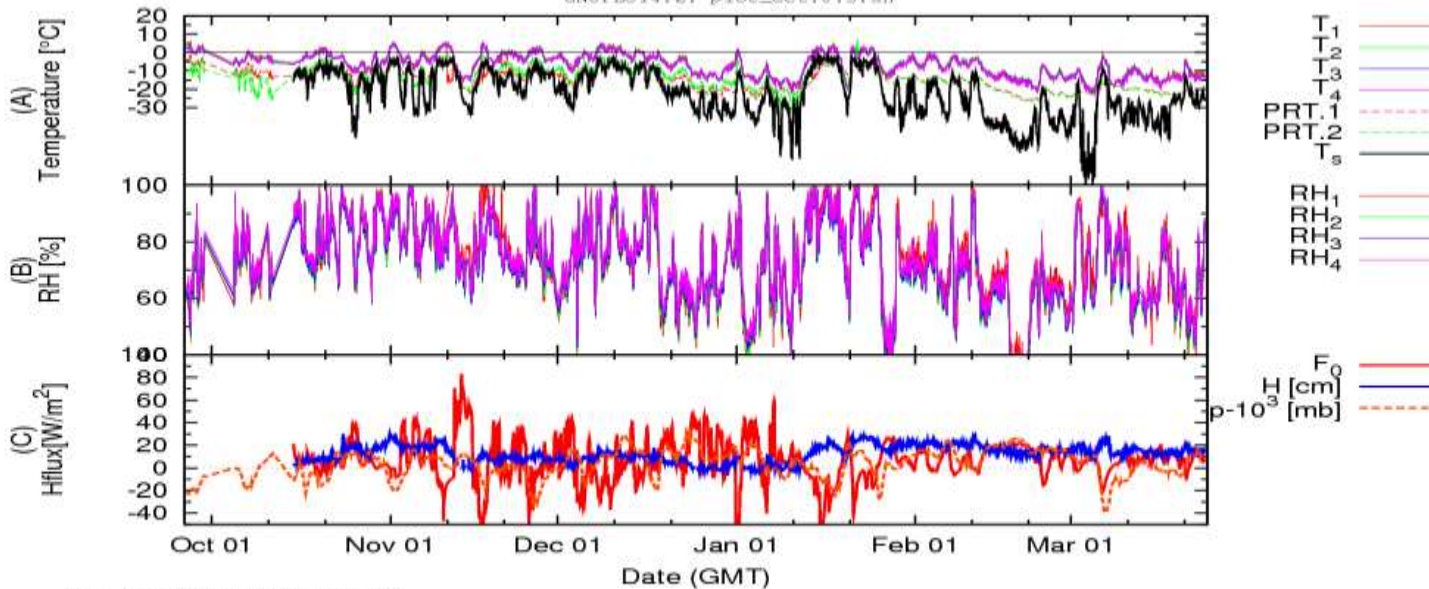


CCT-IP sites position



Climate Change Tower raw data acquisition - LAST 180 DAYS -
 DLog: CR3000, A.Temperatures, B.Hygro, C.Hflux/Snow-Height

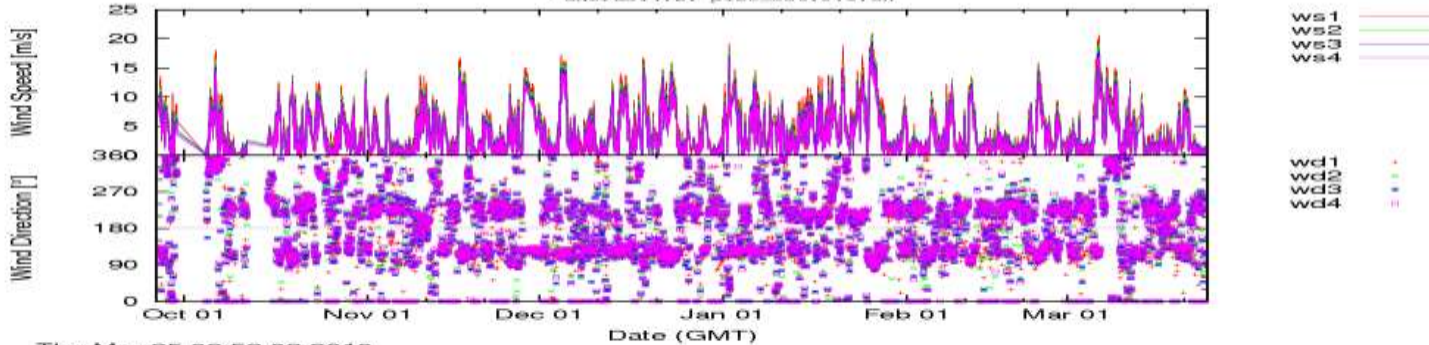
GNUPLLOT4.2: plot_cct.0.3.sh



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Climate Change Tower raw data acquisition - LAST 180 DAYS -
 DLog: CR3000, Young anemometers

GNUPLLOT4.2: plot_cct.0.3.sh

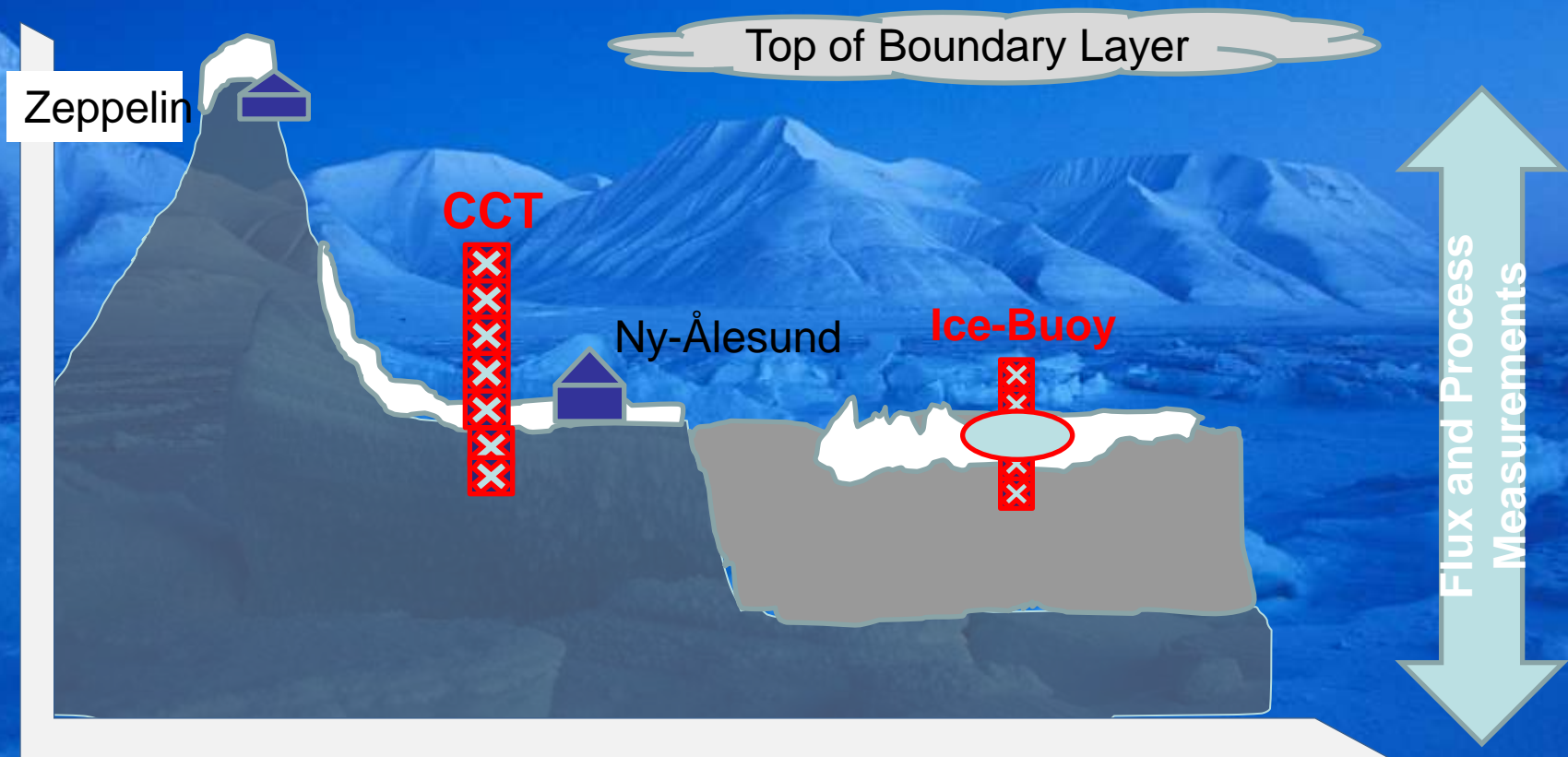


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<http://www.isac.cnr.it/~radiclim/CCTower/Dati>

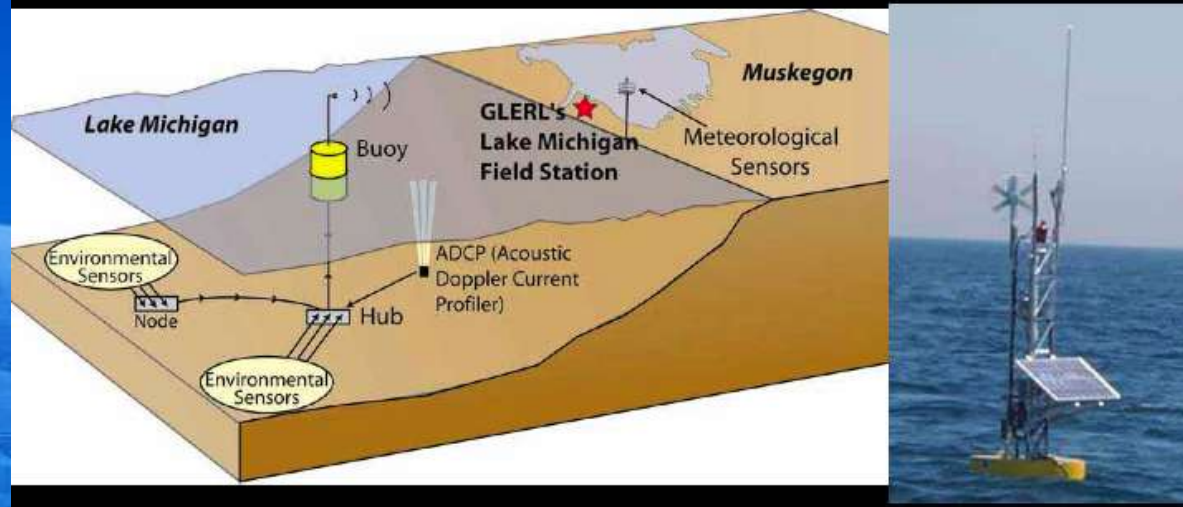


Super - site for long-term process studies



Book of Dreams

Wireless Environmental Observatory Concept



- to start in 2010 oceanographic time series to follow changes in Kongsfiord
- Test real-time transmission

To explore marine Arctic ecosystem functioning

- Bio-physical coupling - benthos
- Sedimentation



3. Mooring system

3 moorings at Sea in 2010 in Svalbards

2 inside Kongsfiord

1 off Kongsfiord

Real-time temporary exp. summer 2010

Over winter 2010 with sediment traps

At sea now HERMIONE EC projects



Grazie per la vostra attenzione

