

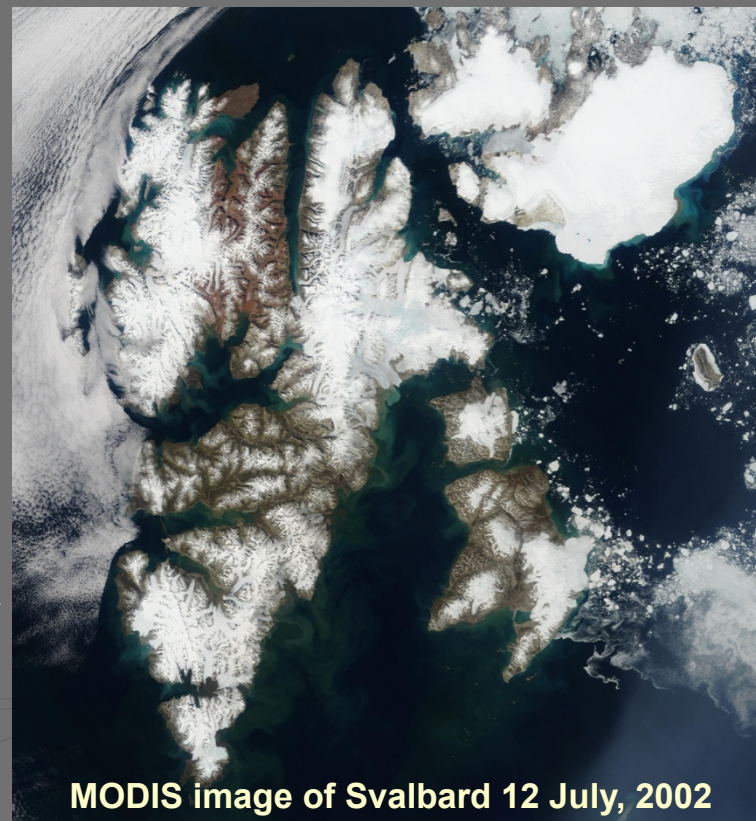
SIOS (Svalbard Integrated Arctic Earth Observing System) Remote Sensing Strategy

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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).



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

Ny-Ålesund UTC Tue Oct 9 12:39:00 2007



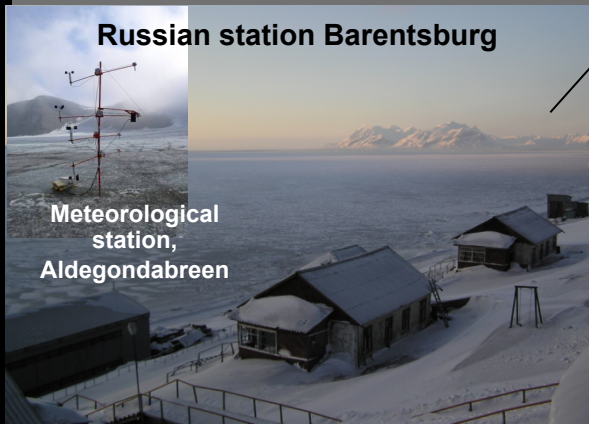
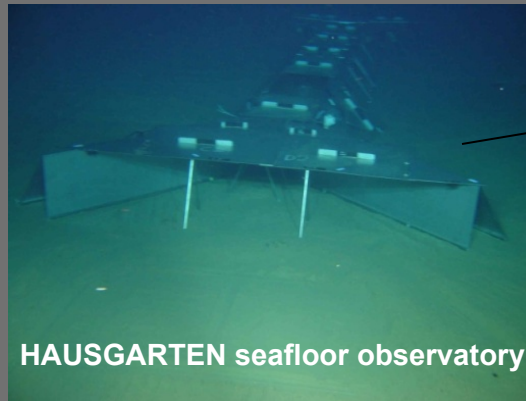
- Observation systems: not as systematically developed as Earth System modeling, but in Svalbard many elements already in place: **We needn't start from scratch!**
- Scientific activities in Svalbard are characterized by extensive international cooperation with a strong European core (**ARCFAC**) and growing global participation
- Svalbard was a major hub of IPY activities, and SIOS will contribute to secure the **heritage of IPY**
- SIOS will follow up the **EU Arctic Communication** (November 2008)

Extensive infrastructure in place



- Research organizations from 15 countries are present on a regular basis, operating a wide variety of land and sea-based facilities.
- Norway has established an international university in Longyearbyen with students and staff from 25 countries.
- Ny-Ålesund has been developed into an international, high standard field station focusing on environmental and climate research.
- Svalbard is accessible all year round because of its advanced community infrastructure and its relatively mild climate.
- Svalbard has the highest available data bandwidth in the High Arctic.

Existing Research Facilities



The SIOS Knowledge Centre

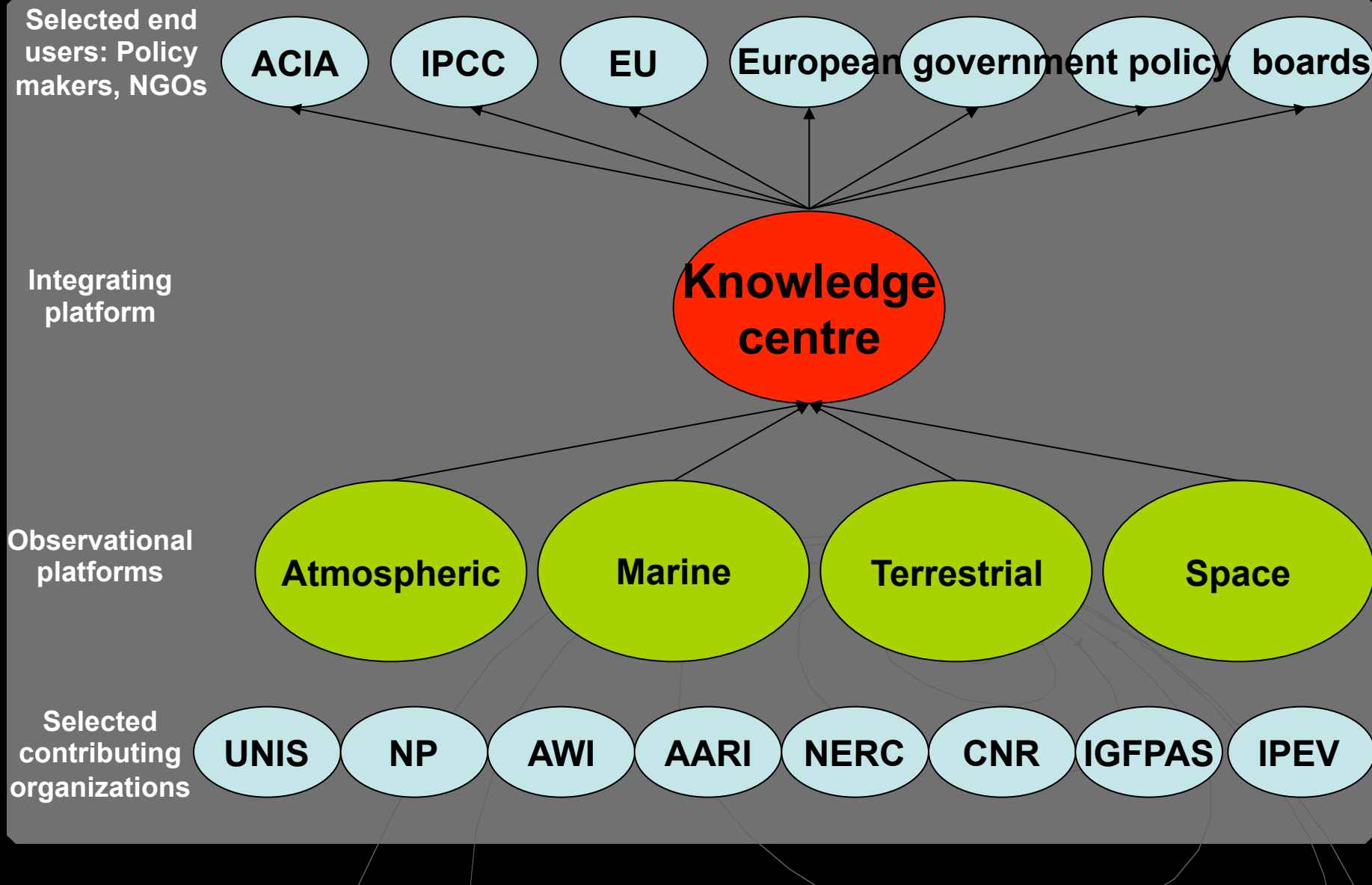


The main integrating element and exhibition window of SIOS

- Data handling, storage and delivery (mostly as a portal, but with option of physical data centre), including access to Earth Observation segment (satellite data)
- Interface between scientific platforms and user/stakeholder community
- Facilitator for scientific integration (interdisciplinary activities, ESS)
- Education and training on graduate and under-graduate levels
- Public outreach activities
- Coordination and service functions



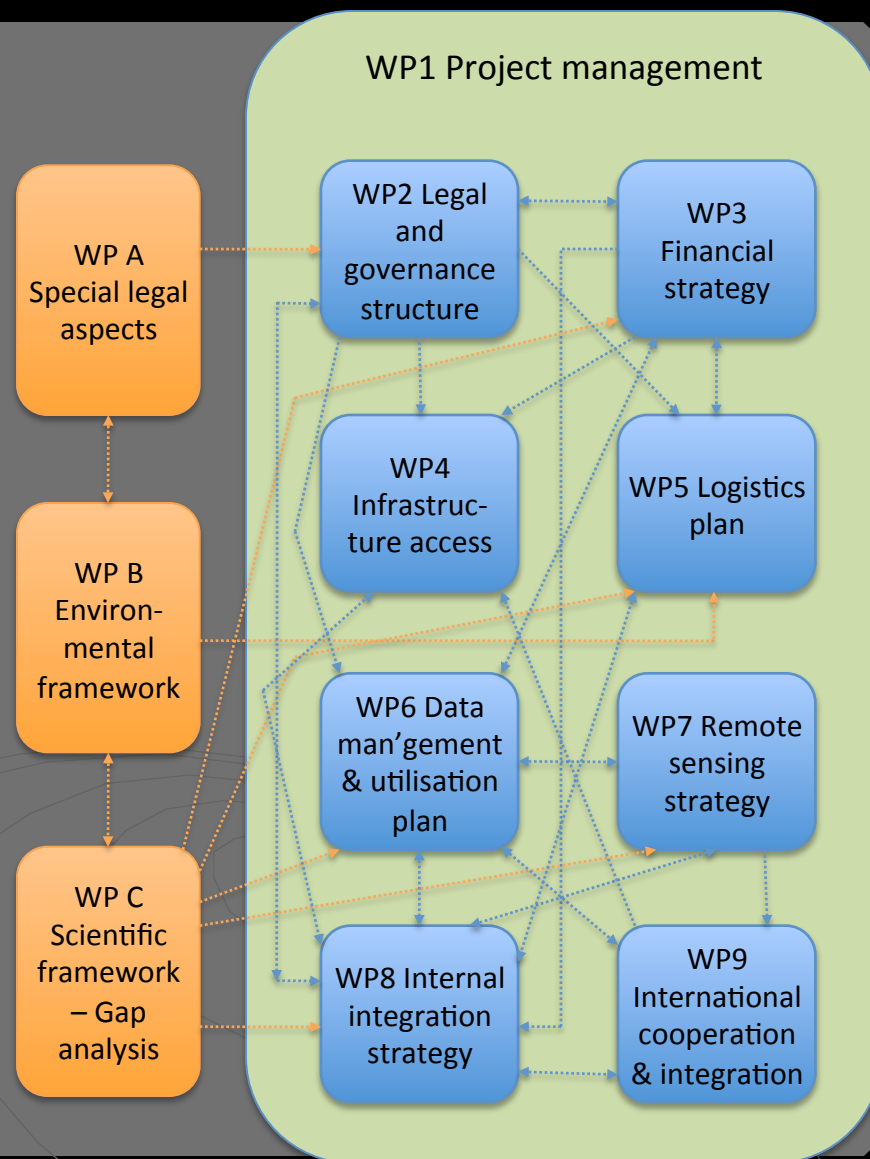
The SIOS Knowledge Centre



SIOS-PP project structure



- Preparatory project 2010-2013, 5-6 M€
- Goal: establish the formal framework needed to operate a geographically distributed multi-national research infrastructure across Svalbard and provide a research node to contribute effectively to future circum-Arctic monitoring
- Coordinated by Norwegian Research Council, having 26 partners from 14 countries
- **Funding:** EU FP7/ESFRI and national contributions for WP 1-9. WP A/B/C are funded by Norway
- WP 7 is the Remote Sensing Strategy
- WP C is important for setting priorities in WP 7



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)

SIOS Key Topics



- ✚ KT1. Vertical coupling in the arctic atmosphere and coupling to space
- ✚ KT2. The Arctic lower atmosphere – boundary layer system: dynamical and radiation feedback processes
- ✚ KT3. Oceanic and sea ice
- ✚ KT4. Marine transport of energy, nutrients and pollution (horizontally, vertically and through the food chain)
- ✚ KT5. Glacier and ice cap mass balance and dynamics
- ✚ KT6. Greenhouse gas processes and feedbacks in the Arctic climate system
- ✚ KT7. Arctic permafrost, periglacial geomorphological processes including geohazards related to periglacial landscape development
- ✚ KT8. Isostasy and changes in Solid Earth's local and regional stress field
- ✚ KT9. Direct human impact on the Arctic System
- ✚ KT10. Inter-compartmental transition processes related to pollutants and impact of climate change
- ✚ KT11. Arctic ecosystem resilience to climate variability and change

WP 7 Remote Sensing Strategy Objective



- To develop a dedicated remote sensing strategy for SIOS, covering both satellite observations and near-surface activities, such as air-borne, balloon- and rocket-borne observations
- The Remote Sensing strategy will feed into all the other platforms and the Knowledge Centre, and will be a major new asset made available through SIOS
- It will enable the SIOS infrastructure and, in a more general sense, Svalbard to gain a leading role in providing quality controlled remote sensing data for polar research
- With a coordinated and tailored data management facility for a wide range of remote sensing data, SIOS will be ideally suited to validate and promote use of satellite and other remote sensing products over land, sea, cryosphere and atmosphere/space for research and monitoring in the Arctic

Subtasks

- Task 7.1: Inventory and application of relevant satellite missions
- Task 7.2: Investigation of satellite validation needs in the Arctic
- Task 7.3: Development of long-term validation and cooperation agreements with satellite owners
- Task 7.4: Integration of SIOS in international remote sensing long-term strategies, e.g. GMES and GEOSS
- Task 7.5: UAV-, rocket and balloon-based observations



Overarching goals for WP7



- All field work within SIOS covered with relevant satellite information.
- Access to time series of defined satellite information at all coordinates in the SIOS area.
- Common data ordering and data access for all satellite information.
- Satellite Earth Observation is an overarching methodology to develop earth system science

