

Arctic Observing Summit (31st March – 2nd April 1010, Akureyri, Iceland); Svalbard Integrated Arctic Earth Observing System (SIOS) statement

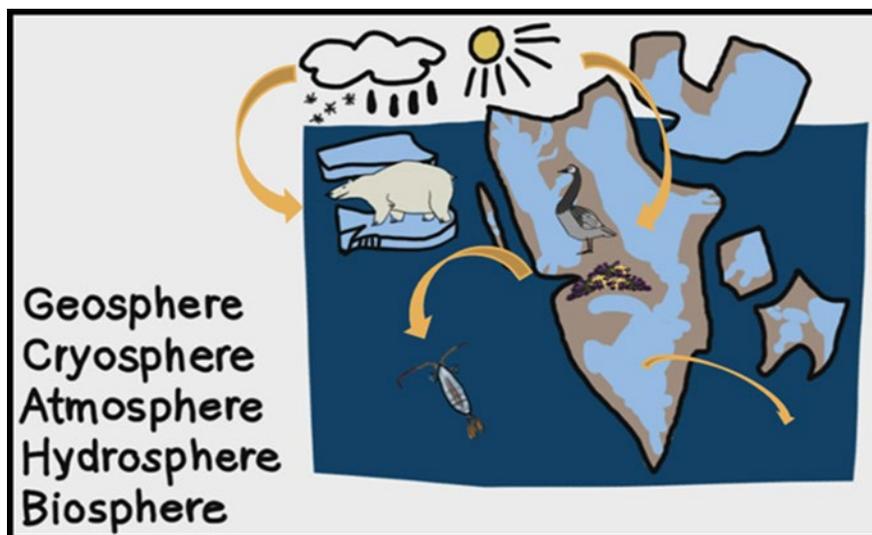
Coordinating a distributed multidisciplinary observing system – lessons learned from Svalbard

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The Svalbard Integrated Arctic Earth Observing System (SIOS) is a collaborative effort to develop and maintain a regional observing system for long-term measurements in and around Svalbard, addressing Earth System Science questions. The observing system builds on the extensive and well established network of world-class research infrastructure already established by many international institutions. This also includes a substantial capability for utilising remote sensing resources to complement ground-based observations. SIOS is a multidomain distributed infrastructure which focuses on processes and the interactions between the spheres that make up the Earth system (biosphere, geosphere, atmosphere, cryosphere, and hydrosphere). Currently 25 institutions from 10 countries are partners in SIOS.



To coordinate such a distributed observing system, one needs both a bottom-up commitment and a top-down prioritisation mechanism. To achieve this dual approach, SIOS has enamoured the concept of adaptive monitoring (Lindenmayer and Likens 2009) in a refined way. The structures created (and described below) are built both to facilitate and stimulate the involvement of the entire decentralized research community in the adaptive evolution of the observation system.

The process of integration and improving the observing system is based on several pillars. Working groups and task forces, consisting of representatives of the international SIOS member community, shall secure the involvement of scientists and other experts of the member institutions and secure their impact on the development of the observing system. The SIOS Polar Night Week, an annual meeting of all contributing partners, is used to summarise and relate all activities and to nurture the mutual understanding of the diverse cultures and disciplines. Close collaboration and user surveys with different modelling and remote sensing communities assure the user perspective. The strategic overview, optimisation and integration of the observing system is handled at the science manager level. The final decisions are made by the General Assembly, after recommendations from the Board of Directors who in turn are guided by the Science Optimisation Advisory Group and other working groups.

The SIOS data access point with its access to standardised data as well the SIOS research infrastructure access programme facilitate the integration between different research fields and nations, and promotes the efficient use of existing data and research infrastructure through better usage.

The State of Environmental Science in Svalbard (SESS) report is the ultimate tool for research-based guidance towards optimisation of the Svalbard Observing System for Earth System Science. Annual calls for contributions allow research groups to present the state of current knowledge in their field of Earth System Science and present long-term monitoring data that form the core of the observing system.

The SESS report is now in its second year of publication and thus still in its infancy, but it is developing towards its anticipated role of strengthening the focus on integrating datasets of several spheres, encouraging new thinking about connections between measured parameters and pursuing quantitative links.

In addition to evaluating the state of current knowledge, the SESS report outlines the questions that remain unanswered and recommends ways to answer these questions. Solutions may include investing in new research infrastructure to collect new long-term data series or making changes to existing monitoring. This could mean adjusting the temporal or spatial resolution of measurements, or even changing the monitoring location to co-locate different types of measurements, such that datasets can be more easily combined.

The unsolved research questions that need attention in future research endeavours described by the authors are put in context with recommendations for the prioritisation of research infrastructure needed to monitor relevant parameters. The SESS report is thus an open access application process and the basis for developing the observing system. This leads to a transparent decision making and constructive dialogue that enables us to make the difficult prioritisation decisions in a concerted and civilised manner.

Lindenmayer, D.B., and Likens, G.E. 2009. Adaptive monitoring: a new paradigm for long-term research and monitoring. *Trends in Ecology & Evolution*. 24(9):482-6.

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