

## **Integrating the environmental data for the Arctic: from observations to applications**

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Particularly the Arctic is facing rapid changes in the coming decades. Driven by demographic development and globalization, particularly the Arctic societies, in particular, are facing several grand challenges, such as air, soil and water pollution, climate change, higher demand for resource extraction in these regions, increased anthropogenic emissions due to year-round shipping in the seas of the Arctic Ocean, and other local sources, and long-range transported pollution from Europe, Asia and North America. These activities will put the fragile Arctic environment and the population living in this area in a vulnerable position. The changes will pose unpredictable environmental consequences (e.g. Arnold et al. 2016).

In order to address the current state of the environment in the Arctic and to provide fact-based decision-making tools for the society in the future, comprehensive, open, high-quality observations following harmonization e.g. through various European Environmental Research Infrastructure in a co-located manner (e.g. Hari et al. 2016) are required in concert with Earth Observations (EO) from space (Petäjä et al. 2014). The results obtained allow us e.g. to evaluate the impact of pollutants in the Arctic system and provide an important input for the development scenarios of Arctic environment. The picture needs to be harmonized and supported with complementary multi-scale modeling.

Through circumpolar collaboration, we need to support and maintain existing comprehensive observations in an interoperable manner at the same time, establish gap-filling long-term, coherent and coordinated observations and research activities on environmental quality and natural resources in the Arctic. Subsequently we need to develop novel, integrated, quality-controlled and harmonized in-situ observations, satellite data and community-based monitoring in the Arctic, and to develop pilot services to a suite of end users in a localized manner (e.g. Petäjä et al. 2019).

### **References:**

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