Contributions for a roadmap

- *Collect relevant documents as background for the Roadmap (strategy **documents, implementation plans and other material** to build Arctic observing systems, a preliminary list is presented in Appendix, section 3). The Roadmap will also build on the deliverables from INTAROS*
  - WGCM: forcing obs, verification obs, grand challenges.
  - Needed: **gridded** data and updated **re-analyses** including the Arctic
  - D6.1 deliverable
    - **usefulness of SIC and SIT initialization**
  - Review article: Observational Needs for Improving Ocean and Coupled Reanalysis, S2S Prediction, and Decadal Prediction
    - “The requirements of an observing system change in the Arctic, where the **Argo float network** is limited due to seasonal ice cover and strong stratification and where satellite remote sensing is limited by heavy cloud cover. These environmental challenges, along with increasing recognition of the importance of seasonal changes in Arctic and their impact on weather systems, has led to rapid development of new instrument types. As regular data from these new instruments become available, evaluation of their impact on S2S forecasts will be needed.”
    - “high **potential for sea ice prediction** in the sub-seasonal timescales, especially for late summer forecasts, and advocate the need to reduce systematic seasonally dependent model biases and develop **advanced DA capabilities to constrain sea ice extent and sea ice thickness.**”
  - Review article: Climate Models as Guidance for the Design of Observing Systems: the Case of Polar Climate and Sea Ice Prediction (Massonet 2019)
    - “**climate models can feed the development of polar observational networks** by indicating the ty**pe, location, frequency, and timing of measurements** that would be most useful for answering a specific scientific question.”

- Designing the Climate Observing System of the Future (Weatherhead et al. 2017, NOAA)
  - “Observations set the stage for **initializing and testing climate models to enable predictions and projections** on various time scales (e.g., subseasonal, seasonal, interannual, decadal, centennial) (National Academies of Science [NAS], 2016). For example, global observations of the **subsurface ocean** improve the predictions of anomalies or extreme weather on decadal timescales. Sustained global observations will also aid in understanding the Earth system across the weather-climate interface (e.g., seasonal and interannual phenomena), allowing for societal planning on a large range of timescales.”
  - “WCRP's Climate and Ocean: Variability, Predictability and Change (**CLIVAR**) has developed and tested hypotheses for ocean observations with explicit goals of **developing parameterizations** that can go into climate models. **Deep Ocean Observing System** with their plans for Deep Ocean Observations, if fully supported, will likely make significant progress in providing data that will help **improve projection**s for all of the current Grand Challenges and may particularly help in **improving long-term forecasting”**
  - “COSPAR has prepared a new assessment and recommendations: “Observation and integrated earth system science: a roadmap for 2016–2025.” (COSPAR, 2015; Simmons et al., 2016). It focuses on the **combined use of observations and modeling** to address the functioning, predictability, and possible evolution of the Earth system on timescales out to a century or so. It discusses how **observations support integrated Earth system science** and its applications, and identifies planned enhancements to the contributing observing systems and other requirements for observations and their processing. However, it offers little prioritization of the broad range of climate observational needs, focuses only on the coming 10 years and primarily highlights the **role of space research in climate observations**.”
  - ...