EGU23-14430
https://doi.org/10.5194/egusphere-egu23-14430
EGU General Assembly 2023

New technologies and insights from a real-time monitoring system of sea ice and oceanographic conditions in Northeast Greenland

Wieter Boone[1], Leandro Ponsoni[1], Geoffrey Johnen[1], and Søren Rysgaard[2]
[1]Flanders Marine Institute, Marine Robotics Centre, (wieter.boone@vliz.be)
[2]Arctic Research Centre, Aarhus University, Aarhus C, Denmark

Due to climate change, the Arctic environment has rapidly evolved in the last decades. Glaciers are melting at unprecedented rates, sea ice is forming later and melting earlier in the season, multiyear sea ice is being replaced by yearly sea ice, and the freshwater content in the ocean has increased. All this has impacts other large-scale, ocean-climate-related phenomena such as the water mass (trans)formation, ocean currents, and salinity fronts. The natural variability of the Arctic system itself has been reported to be bound to change. Apart from that, Arctic ecosystems are also expected to respond to evolving environmental conditions.

Besides the importance of these changes at a regional and global scale, long-term and continuous environmental observations are still scarce both in time and space. Hard accessibility of Arctic regions, makes observational initiatives logistically difficult, time-consuming, and costly. In addition to providing environmental information, near-real-time and long lasting observing systems are key for supporting data to local communities, mariners and also for model assimilation and verification in the context of operational forecast systems.

With the advent of new technologies, low-cost solutions for continuous and long-term coastal observations are possible. In this work, we introduce two systems. Firstly, a near-real-time observing system for sea ice and oceanographic conditions deployed in Northeast Greenland in the framework of the Greenland Integrated Observing System (GIOS.org). These systems are composed of mobile observatories powered by sun and wind allowing the near-real-time measurements of atmospheric, terrestrial and oceanographic drivers of the coastal ocean. The system measures several sea ice (e.g., sea ice thickness, images) and oceanographic (e.g., salinity, temperature, and currents) parameters. In practical terms, oceanographic sensors deployed for 2 years on underwater moorings collect data and transmit it via an inductive link to in-land containerized unities and transmit near-real-time data over satellite. Secondly, we present low-cost IoT (Internet of Things) units that enable transmission of a limited set of parameters via satellite from sensors dispersed in the landscape. For both systems, the data, once transmitted, enters a customized data processing system which allows displaying the post-processed

environmental conditions in near-real-time via an open online dashboard. To conclude, this work will introduces new analysis methods and preliminary results based on real time data from the field on sea ice formation and melting and how these are directly influenced by oceanographic and atmospheric conditions.