Data analysis scheme for a mobile near-real-time monitoring system for sea ice and oceanographic conditions

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The Arctic region is both an indicator of the climate's health and a major player in the climate system. First, the accelerated melting of the continental ice sheet and sea ice observed in the last decades is an undeniable diagnostic of climate change. Second, key phenomena taking place in the Arctic have the potential to influence the weather and climate not only regionally, but also in mid-latitude regions through teleconnections. For instance, the increase of freshwater content from glaciers and sea ice melting has the potential to impact the water mass formation and ocean currents and, consequently, the ocean heat transport budget between high- and mid-latitude regions.

Therefore, an operational observing system of the Arctic environment is of utmost importance on different fronts, such as for understanding and forecasting regional weather and climate, large-scale teleconnections, and environmental hazards, including the increasing occurrence of extreme events. In addition, in situ observations are crucial for benchmarking satellite and model products. These are indispensable in large-scale studies by providing unique spatial-temporal coverage. Model developments and parameterizations, and satellite retrieval algorithms, often rely on in-situ-observed phenomena, while models can perform hindcasts, forecasts, and sensitivity experiments to isolate the effect of isolated phenomena on the climate. Moreover, satellites and models require observations for validation and assimilation purposes.

Besides the importance of monitoring the changes in the Arctic environment, long-term and continuous in situ observations have been historically scarce in time and space. The harshness and hard accessibility of Arctic regions make observational initiatives high-logistic, time-consuming, and costly. Nevertheless, with the advent of new technologies in the latest years, low-cost solutions for continuous and long-term observations are already possible. Within this context, we deployed two near-real-time observing systems for atmospheric, oceanographic, and sea ice conditions in Northeast Greenland as part of the Greenland Integrated Observing System (GIOS.org). These systems are composed of mobile observatories powered by sun and wind allowing near-real-time measurements of atmospheric and oceanographic drivers of the local conditions. The system provides several environmental parameters. In practical terms, from the oceanographic perspective, sensors deployed for already two years on underwater moorings collect data and transmit it via an inductive link to in-land containerized unities, which in turn transmit near-real-time data over satellite. Once transmitted, the data enters a customized data processing system that allows displaying the post-processed parameters in near-real-time via an open online dashboard. In summary, this presentation introduces the data analysis and methods

implemented in our near-real-time observing systems, with a focus on preliminary results regarding the influence of oceanographic and atmospheric forcings on sea ice formation and melting throughout the year.