NASA

Studying the Coupled Arctic System

NOAA Physical Sciences Division Contributes to SODA

The Arctic is changing before our eyes. Recent decades have seen persistent decreases in the extent and thickness of Arctic sea ice, impacting commerce, weather and climate. Modeling the autumn freeze-up, a pivotal seasonal development for Arctic residents and industry, is proving to be a challenge.

Improving prediction of the fall freeze-up is one goal of the U.S. Office of Naval Research Directed Research Initiative "**Stratified Ocean Dynamics of the Arctic**" or **SODA**. SODA aims to improve understanding of upper oceanic stratification in the Arctic, a central driver in the formation and melt of sea ice. The Physical Sciences Division (PSD) of NOAA's Earth Systems Research Laboratory is poised to make important contributions to this effort.

Current sea ice models lack desired skill over longer periods. Some models have struggled with an incomplete understanding of the processes involved, while others are limited by data assimilation. Both issues stem from a shortfall of measurements in and over the Arctic Ocean.

The SODA strategy includes deployment of drifting ice-based buoys and instruments, fixed moorings, localized underwater glider sampling, floats and sounders and a ship-based process study, augmenting these components with remote-sensing and model studies. In combination, these tools provide comprehensive measurements of the Chukchi and Beaufort Seas.

NOAA and CU are developing mini instrument packages, which will be deployed from the University of Alaska SeaHunter UAS during SODA. *Photo courtesy: ACUASI*

What SODA currently lacks is a plan to obtain atmospheric measurements critical to understanding drivers of fall freeze-up, especially winds. To help the SODA team fill this gap, PSD plans to deploy instrumentation being developed jointly with the University of Colorado (CU) Boulder on the SeaHunter unmanned aircraft system that will be operated by the University of Alaska – Fairbanks. This will give us the opportunity to evaluate the utility of UAS to collect data beyond visual line of sight at high latitudes, something that has only been conducted in a very limited manner in the past.

Demonstrating the viability of this platform, particularly when paired with the fixed and mobile assets to be deployed under SODA, will contribute to our ability to understand the changing, coupled Arctic environmental system under Navigating the New Arctic, one of National Science Foundation's "10 big ideas".

CIRES* researcher Dr. Gijs de Boer of PSD will serve as principal investigator, coordinating project activities and team members to optimize SeaHunter sampling, and then directing analysis after completion of the measurement campaign. Dr. Christopher Cox (also CIRES and PSD) will design observing strategies and help with data quality control, evaluation and analysis. Dr. Dale Lawrence (CU) will help guide instrument evaluation and data preparation efforts. Three additional PSD scientists will be supporting this effort.

For more information about SODA, visit:
http://www.apl.washington.edu/project/project.php?id=soda

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