



Salinity and Stratification at the Sea Ice Edge (SASSIE)

<https://salinity.oceansciences.org/sassie.htm>

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SASSIE is a 2022 NASA experiment focused on understanding the dynamics and impacts of near-surface anomalies generated by melting sea ice.

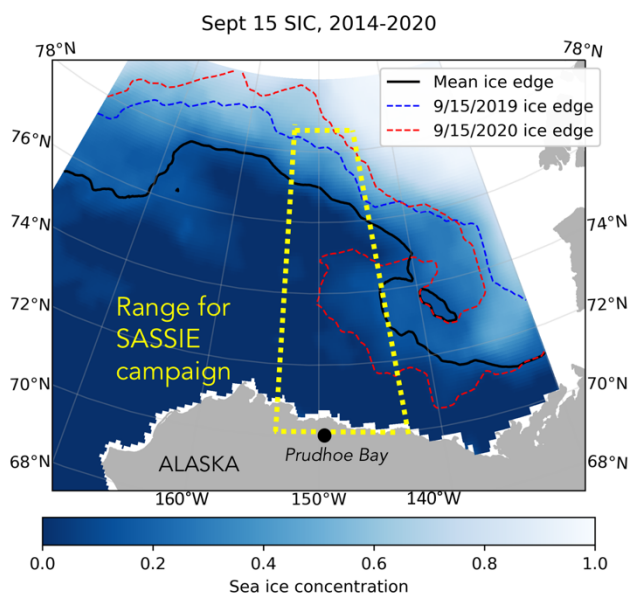
Overview:

In the western Arctic, salinity controls upper ocean stratification and heat is stored subsurface. Melting sea ice leaves a thin, stable layer of fresh water on the sea surface that can isolate this heat. SASSIE will test the hypothesis that in areas where the fresh layers generated by summer ice melt persist, the ocean surface cools quickly, creating conditions favorable for rapid ice advance in autumn.

Major science questions:

- What are the salinity anomalies generated by melting ice, how do they evolve in time in space, and how do they impact stratification, heat storage, sea surface temperature (SST), and subsequent sea ice advance?
- How do wind, waves, heat fluxes, and ocean dynamics affect the evolution of meltwater-induced stratification?
- How can satellite salinity and SST inform us about Arctic upper ocean evolution and sea ice advance?

Experiment overview: SASSIE will sample the transition from summer melt to autumn ice advance in the Beaufort Sea in August-October 2022, making intensive in situ and remote sensing observations within ~200 km of the sea ice edge. Detailed measurements of upper ocean and surface salinity and temperature, air-sea fluxes, surface waves, and sea ice properties will be collected from ship-based sensors and numerous autonomous assets. Airborne sensors will measure SST, SSS, wind speed, and visible imagery of sea ice. Satellite measurements of SST, SSS, and sea ice will provide information about the larger scales. A series of high-resolution simulations using the ECCO model will be used for gaining a detailed understanding of the coupled ocean-atmosphere-ice dynamics.



SASSIE will take place in the Beaufort Sea within ~200 km of the ice edge, roughly within the yellow box outlined at the left. The exact site will depend on the sea ice conditions in 2022. This map shows the mean September 15 sea ice concentration from 2014-2020, and contours of the mean, 2019, and 2020 ice edge locations, illustrating the wide range of ice edge positions and therefore campaign locations.



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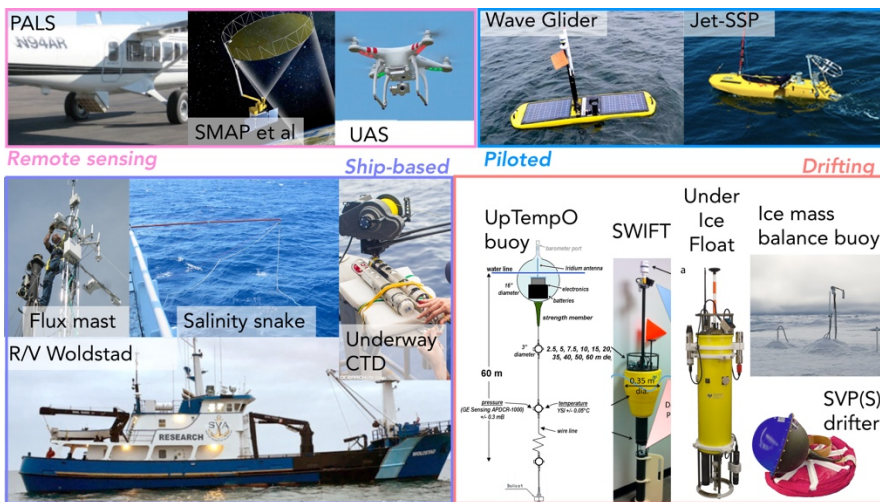
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In situ sampling platforms:

- Ship *R/V Woldstad*, equipped with air-sea flux mast, salinity snake, Underway CTD, TSG and ADCP
- Wave Gliders (5)
- Under Ice Float
- Jet-SSP
- SWIFT drifters (6)
- SVP drifters with salinity (10)
- UpTempO buoys (2)
- Seasonal Ice Mass Balance buoys (tbd) (5)

Airborne platforms:

- Basler BT-67 aircraft equipped with Passive/Active L-band System (PALS), C-/X-band radiometer, and visible/IR imagers
- Unmanned aircraft systems with visible imagers



Timeline:

- August 2022: emerging open waters of the Beaufort Sea sampled with Wave Gliders as the sea ice retreats and meltwater layers form.
- September 2022: Intensive campaign near the ice edge with ship, autonomous and drifting assets, and aircraft surveys to sample the transition from melting to freezing.
- October 2022: Drifters remain in the water to sample the freeze-up.

