

SeaGuard and Exo

The Perfect Match

NEWSFLASH

Barrow Canyon is one of the main gateways for Pacific Ocean water flowing into the Arctic basins through the Bering Strait. It is an area known for its rich wildlife with marine mammals and birds which are fueled by high marine biological production during the Arctic summer.

[JAMSTEC](#) has been maintaining instruments and sediment trap moorings to monitor environmental changes in this region since 2010. The nearby deeper Chukchi and Northwind Abyssal Plains (NAP, Fig. 1) are important sites for accumulating suspended organic and minerogenic particles from the shelf areas.

The combined instruments measured high-quality physical, chemical, and biological parameters.

To better understand the response of the ecosystem to decreasing trends in sea-ice formation and acidification (lowering in pH), a [SeaGuard/EXO](#) combination (Fig. 2) was deployed for 13 months at 170 m depth in a long mooring with multiple instruments and sediment traps.

The combined instruments measured high-quality physical ([Current](#), [Salinity](#), [Temperature](#), [Particles](#), [Depth](#), [Mooring movements](#), [Turbidity](#)), chemical ([O₂](#), [pCO₂](#), [pH](#), [ORP](#)), and biological ([Chlorophyll](#), [Blue Green Algae](#)) parameters at 0.5-2 h intervals.

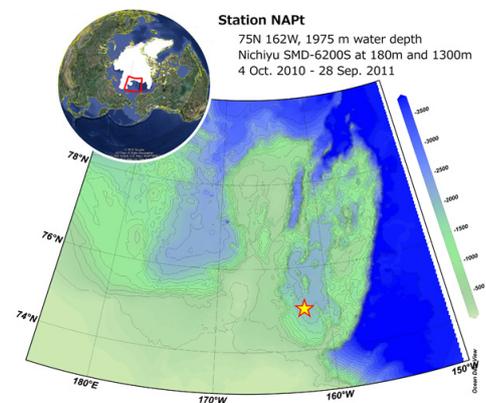


Figure 1: Map over the area with the location of the NAP mooring marked with a star.



Figure 2: SeaGuard and EXO2 clamped together for the deployment

A recent [scientific paper](#) presented results from the first part of these investigations, which focused on settling of particles and on ocean circulation.

It was found that peaks in settling particles were related to the passing of several oceanic eddies in which particles are concentrated (Fig. 3) and to the seasonal biological production. A clear correlation was found between the acoustic backscatter from the single-point [Doppler Current Sensor](#) and the intermittent samples collected by the sediment traps. SeaGuard and EXO have also been combined in other projects including in [fjord studies](#).

In ongoing work, the chemical processes, including the effects of acidification, are studied in detail.

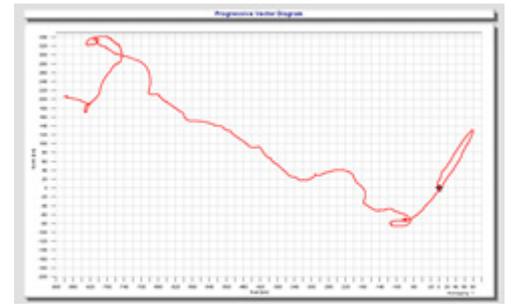


Figure 3: Progressive vector diagram of currents with occasional eddies passing.

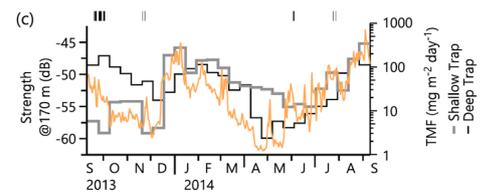


Figure 4*: Signal strength (orange) vs. Total Mass Flux (log scale) from sediment traps (shallow at about 200 m and deep at about 1300 m).

* Figure copied from Onodera et al. (2021). Interannual variation of settling particles reflects upper-ocean circulation in the southern Chukchi Borderland, 2010-2014. *Journal of Geophysical Research: Oceans*, 126, e2021JC017431. <https://doi.org/10.1029/2021JC017431>