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High-frequency measurement of CO₂ in seawater

The objective is to expand and continue the only high-frequency time-series of parameters of the carbonate chemistry system to document ocean acidification and air-sea CO₂ fluxes at the AWIPEV CO₂ observatory in Ny-Ålesund, Svalbard.

In the subsea observatory water is pumped from 12 m depth to the AWIPEV research station in Ny-Ålesund. From the water samples O₂, pH, salinity and temperature are measured every minute. Discrete measurements of dissolved inorganic carbon and total alkalinity are done weekly. The data are disseminated in near realtime to users. There is regular maintenance of the system twice per year. But due to COVID-19 the maintenance of the system in 2020 was delayed.

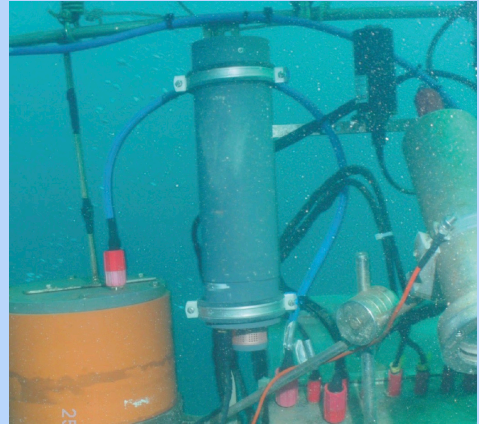


Figure 1. Some of the instruments, including the pH sensor, mounted on the profiling platform (0 to 11 m).

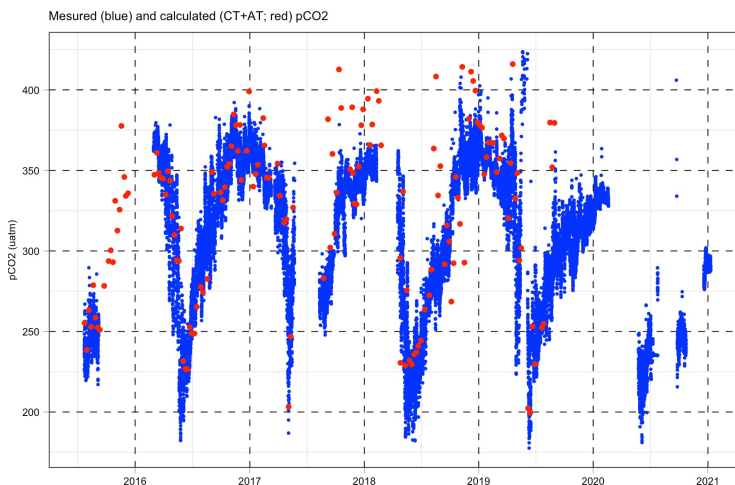


Figure 2. Partial pressure of CO₂ in seawater Kongsfjorden.

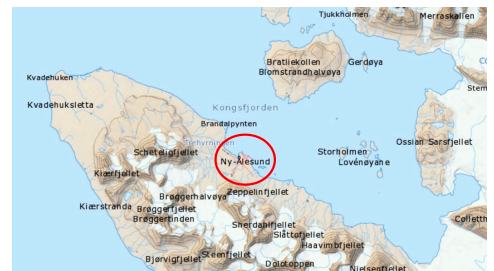


Figure 3. Map of Kongsfjorden, showing Ny-Ålesund

There are very few high frequency data in the long term. Yet, these data are essential to document air-sea CO₂ fluxes and the rate at which the Arctic Ocean acidifies, with major potential consequences on the ecosystem, including commercial species. These data mostly benefit the scientific community.

