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Connecting Upper Ocean Dissolved Gas Measurements from Gliders and a Profiling Mooring

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The Canadian VITALS (Ventilation, Interactions, Transport Across the Labrador Sea) project utilised a variety of measurement and modelling approaches to study the atmosphere-ocean exchange of CO_2 and O_2 in the Central Labrador Sea during 2016. These included measurements at two fixed locations: the long-term German (GEOMAR) K1 mooring and the prototype, Canadian "SeaCycler" profiling mooring. The latter included a custom underwater winch and sensor float for high-frequency profiling of the upper 150m of the water column. Both moorings were deployed during May 2016 in the Central Labrador Sea. The moored measurements were supplemented from September through late December, by a 1000m glider which was deployed on the Labrador shelf. The glider transitted to the central Labrador Sea where it flew around the two oceanographic moorings while measuring temperature, salinity, CO_2 (with an Aanderaa pCO_2 optode) and dissolved oxygen. The gliders were used to resolve spatial gradients in the vicinity of the fixed-point measurements, and allow for comparisons between biogeochemical sensors deployed on the two moorings. For the latter, the gliders measured "staircase" profiles corresponding to discrete depths sampled by K1's fixed sensors and the SeaCycler profiler's "stop depths". The results of the multi-sensor, multi-platform approach to intercomparison of sensors (including pCO_2 sensors) with relatively long response-times and variable accuracy characteristics will be presented.The data are also being used to investigate the impact of internal waves on dissolved gas measurements made with slow-responding sensors sampling through steep property gradients.