

Continuous pCO₂ time series from Ocean Networks Canada cabled observatories at the northeast Pacific shelf edge and in the sub-tidal Arctic

S. Kim Juniper (1), Akash Sastri (1), Steven Mihaly (1), Patrick Duke (2), Brent Else (2), Helmuth Thomas (3), and Lisa Miller (4)

(1) Ocean Networks Canada, University of Victoria, Canada, (2) Department of Geography, University of Calgary, Canada, (3) Department of Oceanography, Dalhousie University, Canada, (4) Institute of Ocean Sciences, Department of Fisheries and Oceans, Canada

Marine pCO₂ sensor technology has progressed to the point where months-long time series from remotely-deployed pCO₂ sensors can be used to document seasonal and higher frequency variability in pCO₂ and its relationship to oceanographic processes. Ocean Networks Canada recently deployed pCO₂ sensors on two cabled platforms: a bottom-moored (400 m depth), vertical profiler at the edge of the northeast Pacific continental shelf off Vancouver Island, Canada, and a subtidal seafloor platform in the Canadian High Arctic (69° N) at Cambridge Bay, Nunavut. Both platforms streamed continuous data to a shore-based archive from Pro-Oceanus pCO₂ sensors and other oceanographic instruments. The vertical profiler time series revealed substantial intrusions of corrosive (high CO₂/low O₂), saltier, colder water masses during the summertime upwelling season and during winter-time reversals of along-slope currents. Step-wise profiles during the downcast provided the most reliable pCO₂ data, permitting the sensor to equilibrate to the broad range of pCO₂ concentrations encountered over the 400 metre depth interval. The Arctic pCO₂ sensor was deployed in August 2015. Reversing seasonal trends in pCO₂ and dissolved oxygen values can be related to the changing balance of photosynthesis and respiration under sea ice, as influenced by irradiance. Correlation of pCO₂ and dissolved oxygen sensor data and the collection of calibration samples have permitted evaluation of sensor performance in relation to operational conditions encountered in vertical profiling and lengthy exposure to subzero seawater.