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Copper-binding ligands in Fram Strait and the Greenland shelf (GEOTRACES cruise GN05)

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Scarce information exists about the Cu complexation and Cu-binding ligands in the Arctic region despite of its importance for the global ocean. In fact, the Fram Strait represents the major gateway of Arctic Ocean waters toward the Nordic Seas and North Atlantic Ocean and is a key region to study the impact of climate change on biogeochemical cycles. This current investigation shows the concentrations and conditional stability constants of copper-binding ligands (L_{Cu} and log $K_{condCu2+L}$), measured by Competitive Ligand Exchange-Adsorptive Cathodic Stripping Voltammetry (CLE-ACSV), in the Fram Strait and the Greenland shelf (GEOTRACES cruise GN05).

According to the results, three provinces were considered (coast, shelf and Fram Strait) with differences on water masses and hydrodynamic characteristics. The strongest variability of L_{Cu} was detected in surface waters, with increasing concentrations (mean values: Fram Strait=2.55±1.03 nM; shelf=5.23±1.25 nM; coast= 6.36±0.77 nM) and decreasing log $K_{condCu2+L}$ (mean values: Fram Strait=15.56±0.31; shelf=15.17±0.29; coast=14.81±0.27) toward the west. A coastal source of L_{Cu} to the surface waters where identified above the Greenland shelf to the Polar Surface Water (PSW) which is an addition to the ligand exported from the Central Arctic to the Fram Strait. Several processes were suggested to explain the L_{Cu} and log $K_{condCu2+L}$ differences observed between shelf and coastal samples, such as biological activity in sea-ice, phytoplankton bloom in surface waters, bacterial degradation, and meltwater discharge from 79NG glacier terminus.