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Organic complexation of Ni in the hydrothermal plume of the Rainbow vent field.

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Organic ligands are well-known to be one of the major controlling factors for trace-metal fluxes at marine geochemical interfaces. They prevent the removal of dissolved ions entering the ocean where solubility in seawater is much lower than for example under the typically hot, acidic conditions of hydrothermal fluids. Datasets covering the organic complexation of biologically relevant trace metals like iron (Fe), Copper (Cu), or Nickel (Ni) however remain small due to the constraints on sampling sufficiently large volumes under sufficiently clean conditions and the long time and amount of manual labor required for the available analytical methods. Analysis of Ni concentrations for this study was carried out by adsorptive cathodic stripping voltammetric (AdCSV) measurements while the organic complexation of Ni was measured by competitive ligand exchange adsorptive cathodic stripping voltammetry (CLE-AdCSV) using dimethyl glyoxime as the artificial reference ligand. All measurements were carried out using an automated sample transfer system and a custom PTFE measurement cell that reduces the required measurement volume from 10 to 2 mL. Here, we present measurements of concentration and organic complexation of Ni in samples from the hydrothermal plumes of the Rainbow vent field that is located at the Mid-Atlantic Ridge at 36°14'N, 34° 5' W in ~2300 m depth [1] and is characterized by very low pH, high H_2, and high trace metal concentrations. Samples were acquired during research cruise M176-2 (RV Meteor) in 2021 using a trace-metal clean sampling rosette and filtered and subsampled on board in a clean lab container. With Ni concentrations as high as 3.6 µM in the hydrothermal end-member [2] compared to 2 nM in surface seawater [3], a wide range of Ni concentrations can be expected in the hydrothermal plume. Data from this study will give valuable insights into the fate of hydrothermal Ni from the Rainbow system during transport and dilution into the ocean regarding the role of organic ligands in stabilizing dissolved Ni.

[1] German, Klinkhammer & Rudnicki (1996), *Geophysical Research Letters,* 23(21), 2979-2982.

[2] Douville et al. (2002), *Chemical Geology*, 184(1-2), 37-48.

[3] Boyle, Huested & Jones (1981), *Journal of Geophysical Research: Oceans*, 86(C9), 8048-8066.