Geographic and bathymetric comparisons of trace metal concentrations (Cd, Cu, Fe, Mn, and Zn) in deep-sea Lysianassoid amphipods from abyssal and hadal depths across the Pacific Ocean

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Running Head: Trace metals in deep-sea amphipods

Abstract

Spatial patterns in trace metal (Cd, Cu, Fe, Mn, and Zn) bioavailability were in analysed in deep-sea lysianassoid amphipods (*Eurythenes gryllus* and *Hirondellea* spp) from three subduction trenches; the Izu-Bonin (8000-9000 m), Kermadec (3000-10,000 m) and Peru-Chile trenches (4500-6000 m). Geographical differences in metal concentrations were evident. Iron and Mn concentrations were higher in *H. gigas* from the Izu-Bonin Trench compared to the *H. dubia* from the Kermadec Trench. Copper and Cd were higher in the *E. gryllus* in the Peru-Chile Trench compared to Kermadec Trench. There were significant interactions between trench and depth for a number of metals. This was evident in the tissues of the genus *Hirondellea* where there was an interaction between trench and depth for Cu and Zn. Both these metals were found in higher concentrations at approximately 8000 m in the Izu-Bonin Trench compared to the same depth in the Kermadec Trench. At deeper depths, however, the opposite occurred. An interaction between trench and depth also occurred for Fe and Mn in *E. gryllus* where Fe and Mn were found in higher concentrations at approximately 4500m in the Kermadec Trench compared to the Peru-Chile Trench but the opposite was true at deeper depths. This indicated that the relation between metals and depth were not consistent over the depth ranges sampled. Cadmium in *H. dubia* from Kermadec Trench was the only metal that decreased in concentration across the depths sampled whereas Mn and Zn increased in concentrations with depth within this species and trench. The high concentrations of Cd within these amphipods suggested that the Cd-anomaly observed in polar amphipods could potentially be extended to deep-sea amphipods. Furthermore the low levels of Cu in *E. gryllus* may indicate Cu-deficiencies. These results indicated a complex relationship between depth and trench and metal