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Sedimentary noble metal signals as tracers for hydrothermal vent input

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Interactions among water, rock, and heat lead to high concentrations of noble metals such as gold, silver, platinum, and palladium in hydrothermal vent fluids[1]. There are very few other sources in marine environments for these metals making them ideal tracers of hydrothermal activity. This study aims to explore if noble metals can help identify hydrothermal vent inputs to surrounding sediment and establish the noble metal provenance relative to their vent source. Solid-phase multicore samples were collected from surrounding hydrothermal vent sediments from the East Scotia Ridge (ESR) at two different ridge segments during the R/V *Polarstern* research expedition PS119 to the South Scotia Sea[2]. Ridge segments E2 (northern segment) and E9 (southern segment) were chosen because of their contrasting chemical environments, such as the lower chloride concentrations, less acidity, and higher H_2S concentrations at segment E9 compared to segment E2 in the fluids[2]. Our preliminary data indicate that sites west of the ESR at segment E2 are depleted in noble metals, while sites to the east are enriched in these metals, which coordinates with the west-to-east prevailing current. Our data also show a significant difference between the northern sites at segment E2 (Te ranging from 21.2 to 134.1 ppb) and the southern segment E9 (Te ranging from 75.1 to 663.6 ppb), where noble metals are further enriched. The chemical differences in the hydrothermal vent fluids listed above, likely related to the differences in parental material may have caused a larger enrichment of noble metals in surrounding sediments collected at segment E9. Overall, our data indicate that the distribution patterns of noble metals deposited from vent plumes show higher accumulations closer to the vent systems, but the magnitude of the enrichments is further influenced by the vent type.

[1][PaÅ¡ava, J. et al. 2007. Mineralium Deposita, 42(4), pp.423-431.]

[2][Bohrmann, G. 2019. Reports on polar and marine research, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 736, 236 p. doi: 10.2312/BzPM_0736_2019.]