

A potential source of Fe and other metals from the hydrothermal sediments in the southern Okinawa Trough

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Hydrothermal input is often considered as one of the major components contributing to the total marine elemental budget. However, the contribution of the elemental diffusive flow in sediments in vicinity of the hydrothermal vent is seldom studied. Four short sediment cores were collected from an active hydrothermal field in the southern Okinawa Trough (OT) using a remotely operated vehicle (ROV). We measured vertical profiles of Fe, Mn, and other redox-sensitive metals (Mo, U, and V) in sediments and pore water. The vertical dissolved profiles allowed calculation of diffusive benthic fluxes using PROFILE code. Metal speciation in sediment cores were also investigated using sequential extraction method. We detected high dissolved iron concentration ($\sim 140 \mu\text{mol L}^{-1}$) in surficial pore water at ROV10-1 (the station adjacent to the vent). In addition, we detect higher reactive fractions of Fe, Mo, U in sediments of ROV 10-1 than three other sediment cores. Geochemical processes in the area adjacent to hydrothermal vent were significantly different than other marine sediments and have led to significant upward benthic Fe flux (ca. $111 \mu\text{mol m}^{-2} \text{day}^{-1}$). This calculated flux was in the high end of the ones found in coastal or reducing sediments, and much higher compared to the ones found in deep ocean sediments. Such upward benthic fluxes of Fe and other metals (Mn, Mo) from hydrothermal influenced sediments in the OT may be potentially important, yet not well recognized, metal sources to the waters of Northwest Pacific.