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# Lead as a tracer for magmatic input of metals in seafloor hydrothermal systems

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We have examined the Pb budget of melt inclusions from nine modern seafloor settings representing back-arcs, mid-ocean ridges and seamounts as a tracer for the source of metals. Volatile- and fluid-mobile element-rich melt inclusions in the eastern Manus and the Okinawa Trough back-arc basins reflect a robust contribution of elements from the subducting slab. At the back-arc Bransfield Strait, on the other hand, melt inclusions are volatile-poor and fluid-mobile element ratios are similar to mid-ocean ridge values indicating little or no contribution from the slab. Metal budgets for seamounts located on and nearby the axis of mid-ocean ridge segments appear to be independent of any input of mantle plume material. Results from the southern Explorer ridge (strong lower mantle influence, transitional- and enriched-MORBs), Pito and Axial seamounts (moderate lower mantle influence, transitional-MORBs) and a Foundation near-ridge seamount (little to no mantle influence, normal-MORB) show that, despite similar tectonic environments and varying contributions of mantle plume material, Cu, Zn and Pb values do not vary significantly between the enriched and non-enriched magma components of a given setting. Determining the availability of Pb in the parent magmas of seafloor hydrothermal systems is the first step in evaluating the potential of direct metal contribution by magmatic degassing. Back-arcs as a whole have the most Pb-rich sulfide deposits on the seafloor relative to other tectonic settings. These Pb-rich sulfide systems are associated with Pb-enriched magmas relative to those from non-back arc settings. It is proposed that there is a direct correlation between the Pb concentrations in the parent magmas as observed in melt inclusion data, the potential for magmatic degassing of metals and the final concentration of Pb in the hydrothermal precipitates. We continue to test this hypothesis for the other ore elements, Cu,

Zn, Ag and Au.