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Zn isotope composition in hydrothermal systems on the mid-ocean ridge and its implication for oceanic cycling of Zinc

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Seafloor hydrothermal systems play an important role on the oceanic biogeochemical cycles of Zn and its isotopes. However, for the Zn isotopic systems in hydrothermal systems we know too little of the distribution of Zn isotopes in variable hydrothermal products and its impact on modern oceanic mass balance. We have measured Zn isotopes in hydrothermal products such as oxidation products of chimney sulfides and hydrothermal sediments from the active hydrothermal field on the Mid-Atlantic Ridge in order to better understand the oceanic biogeochemical cycles of Zn isotopes. We present isotopic data for Zn in sulfides and sediments, which yield δ66Zn=+0.11$\pm$0.08‰2SD [U+FF0C] $n = 23)and range from - 0.14‰ to + 0.38‰ We found that \delta$66Zn values of our samples were lighter or similar to chimney sulfides from the high-temperature hydrothermal vent, but much lighter than hydrothermal fluids and chimney sulfides from the low-temperature hydrothermal vent. We also compared our results with δ66Zn values of the Fe-Mn crusts, nodules and oceanic carbonate as heavy Zn isotope sink, which implies that Zn isotopes output to hydrothermal sediment and oxidation products of chimney sulfides as a missing light sink can explain the heavy isotopic composition of the oceans.