

Comparison of metal enrichment in pyrite framboids from a metal-enriched and metal-poor estuary

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ABSTRACT

The accumulation of metals and metalloids in diagenetic pyrite framboids is of interest because framboids can be a sink for heavy metal contaminants, a source of metals in ore deposits, and a tool to interpret paleo-ocean chemistry. In this study, we have used laser ablation-inductively coupled plasma-mass spectrometry (LA-ICPMS) to analyze pyrite framboids from both the contaminated Derwent Estuary and the uncontaminated Huon Estuary in Tasmania, Australia. While the enrichment of many trace metals in the Huon Estuary followed expected trends, the trends in the Derwent were quite different. In addition to the expected high contents of Pb, Zn, and Cu in the contaminated interval it was found that several elements are not as strongly incorporated into pyrite within the contaminated zone. It is suggested that this is due to over-competition for adsorption sites on the growing iron sulfides in the contaminated zone resulting in diffusion of several elements to deeper levels in the sediments. This results in an increase of these elements in pyrite below the zone of major contamination. The LA-ICPMS technique also provided the opportunity to obtain accurate data on gold, silver, and tellurium in pyrite, something rarely achieved in sequential leach extractions due to the low concentrations of these metals observed in nature.

Keywords: Diagenetic, pyrite, trace metals, framboid, metal contamination, LA-ICPMS