

Letters of Intent: Lau Basin
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Particulate Matter Collection and Analysis from Hydrothermal Plumes at the Lau Basin ISS

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I will propose to join the hydrothermal plume chemists (Edmonds and German) of the Lagmuir et al Lau Basin study. This low cost addition will increase the geo-chemical information obtained during the CTD work proposed in the Lanmuir et al. proposal. Particulate matter will be collected from the water samples collected during this study. The particulate matter samples will be collected by in line positive pressure whole bottle filtration. Samples will be dried and analyzed ashore for particulate sulfur and metals using energy dispersive X-ray fluorescence spectrometry (Feely et al., 1991). The chemical and mineralogical composition of particles suspended in hydrothermal plumes is highly diagnostic of the source chemistry of fluids exiting vents in a given study area. For example, particulate sulfur (PS) is formed by the oxidation of H₂S both by biota and through inorganic reactions, and elevated concentrations of PS have been observed almost exclusively at recently (<~ 3 yr) erupted sites rich in microbial debris and CH₄ (e.g., Urabe et al., 1995; Feely et al., 1999). Particulate Cu and Zn are found almost exclusively in areas of high temperature (>300C) venting (Feely et al., 1994), allowing us to evaluate areas of high versus lower temperature venting. The presence of particulate Al appears to be indicative of the presence of very acidic fluids presumably rich in sulfuric acid. These fluids completely strip the source rocks of their major cations producing plumes rich in iron and aluminum.