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Mineralogy and Geochemistry in the Arctic crust near Loki's Castle, 74 degrees N (South Knipovich Ridge)

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The Loki's Castle hydrothermal vent field is composed of several active, over 10 m tall chimneys, producing up to 320°C fluid. The main sulfides in chimneys are sphalerite, pyrite and pyrrhothite, with generally lesser chalcopyrite. Alteration products collected adjacent to chimneys contain much anhydrite, gypsum and talc. Quartz, anhydrite, gypsum and barite are also present, and locally abundant. Rhythmically zoned sphalerites suggest pulsating hydrothermal activity.

Here we report the preliminary results of a detailed study (in progress) of sequential extraction and analyses of metals from sediments in the vicinity of Loki's Castle, in order to detect correlations with microbial populations and/or subseafloor mineralized intervals. The results expose numerous anomalies. Some consist of isolated high values of metals such as Cu or Zn, whereas others contain clusters of high values of several metals in the same interval. The former correspond to bedded fallout, from nearby hydrothermal activity (in a not too distant past), but the latter may correspond to intersections of hydrothermal plumes ascending through (variably) porous sediment. This may have an effect on the microbial population (deep biosphere).