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**SULFUR GEOCHEMISTRY AND DIAGENESIS IN A GAS HYDRATE
TERRANE, CASCADIA MARGIN, OFFSHORE OREGON: ROLE OF
ANAEROBIC METHANE OXIDATION**

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We present sulfide mineral data from south Hydrate Ridge located in a gas hydrate terrane, offshore Oregon. Sulfide sulfur concentration and the isotopic composition of sulfur ($\delta^{34}\text{S}$) in authigenic sulfide minerals are analyzed from sediment samples collected on Ocean Drilling Project (ODP) Leg 204. Shallow sediment samples (<25 mbsf) assess the relative importance of anaerobic methane oxidation (AMO) as a biogeochemical process, both here and at the Blake Ridge, another well known gas hydrate terrane offshore southeastern United States. Deep samples (>25 mbsf) are used to evaluate sulfur diagenesis and its controls from early Pleistocene to the present.

AMO, a microbially-mediated, sulfate-depleting process, creates an environment conducive to interstitial, authigenic sulfide mineral formation. When AMO is an important process, sulfide minerals are likely to be focused near the sulfate-methane interface (SMI) and become more enriched in heavy sulfur (^{34}S). Preliminary data from two of three shallow sites show high authigenic sulfide sulfur levels (0.27 and 0.7 weight percent sulfur) immediately above the SMI compared to lower concentrations (0.12 and 0.41 weight percent sulfur) just below the SMI. The remaining site has no discernable pattern to the vertical distribution of sulfide sulfur concentration, but shows peak amounts of 0.52 weight percent sulfur above the SMI.

Based on results from other sites in the region, we hypothesize that peak amounts of sulfide sulfur are likely precipitated due to production via AMO, but that sulfate reduction of sedimentary organic matter is also responsible for sulfide mineralization within the sediments. The identification and timing of heavy sulfur enrichments (^{34}S) in deep samples may have implications to the recognition of past gas hydrate occurrences and identify periods of significant methane transport.

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