A NEW METHOD TO RECONSTRUCT METHANE FLUXES: 34 S ISOTOPES OF BULK MARINE SEDIMENT

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ABSTRACT

Methane occurs in marine sediments along continental margins throughout the global oceans. This methane is produced by microbial degradation and thermal decomposition of organic carbon and once formed, it can reside, ephemerally, in gas hydrate reservoirs or leave the seafloor at methane seeps. The sulfate methane transition zone (SMTZ) is an interface in anoxic marine sediments where microbes drive the anaerobic oxidation of methane (AOM), precipitating pyrite and authigenic carbonates. There is a strong connection between the magnitude of upward methane flux and the position of the SMTZ within seafloor sediments. Understanding how the position of the SMTZ has migrated through time indicates how methane flux has changed through time. The purpose of this project is to develop a new method that uses 34S isotopes of bulk marine sediment to identify paleo-positions of the SMTZ. Previous efforts relied on a labor-intensive chemical treatment to isolate the mineral bound sulfur from the sediment. However, in sediments that have undergone full pyritization I believe that 34S isotopes from bulk sediment may be a sufficient indicator of paleo-SMTZ positions. To test my approach, I will analyze the sulfur isotope composition of paired bulk sediment and treated sediments from cores taken from Hydrate Ridge on the Cascadia margin. I will utilize records that have undergone full pyritization, have age models, and show some evidence of AOM. My results will allow me to reconstruct the timing and positions of paleo-SMTZs as a proxy for changing methane fluxes in this region through time.

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