



Cold seeps from the deep continental slope, Gulf of Mexico and a comparison of microbial activity between shallow and deep water sites

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We examined sediment and brine fluid samples from brine, oil and gas seeps located along the deep continental slope between water depths of 1200m and 3300m in the Gulf of Mexico. Brine and oil stained sediments were abundant at all sites, as were dense chemosynthetic communities. While dense surface layers (mats) of sulfur oxidizing bacteria of the genus *Beggiatoa* and *Thiomargarita* are common at shallow slope seeps (water depth < 1000m), such mats were found at only the two most shallow deep slope sites. Depth integrated rates of sulfate reduction (SR), anaerobic oxidation of methane (AOM) and methanogenesis (MOG) in deep slope sediments were highest at brine-dominated cold seeps. The highest rates of SR were observed at a brine lake located beneath 2300 m of water. The highest rates of AOM were associated with sediments from pogonophoran meadows. Rates of MOG were generally much lower than AOM rates and exhibited substantial variability between sites. Rates of SR were much lower in deep slope sediments than in shallow slope sediments, suggesting that the flux of reduced substrates fueling microbial activity is greater at shallow sites. Rates of AOM showed less variability between shallow and deep sites and methane concentrations were similar in cores from both locations, suggesting that pore water methane concentrations regulate AOM rates.