

## **Biogeochemical processes at cold seeps and whale falls favoring sulfide dependent chemoautotrophic communities**

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Cold seeps and whale falls are characterized by high hydrogen sulfide fluxes. The sulfide is utilized by chemoautotrophic communities such as free-living sulfide-oxidizing bacteria or symbiotic bivalves and tubeworms harboring sulfide-oxidizing bacteria in their body. However, the sulfide-producing processes in these environments are based on different sources. At cold seeps, sulfide is produced during the microbial degradation of methane and sometimes higher hydrocarbons, which rise from deeper fossil reservoirs. The responsible processes are anaerobic oxidation of methane (AOM) and sulfate reduction. Depending on the volume of the fossil reservoir, such environments may last for centuries to millions of years. At whale falls, sulfide is produced during the microbial degradation of whale biomass such as the whale-bone lipids or whale tissue. Estimates based on radiometric dating and lipid depletion rates indicate that the sulfophilic stage may last >70 years. Whale falls have been discussed as stepping stones for the distribution of chemoautotrophic communities between cold seeps as well as hot vents. Here, we give a first direct comparison of biogeochemical characteristics of cold-seep and whale-fall environments, which lead to the establishment of sulfide-dependent chemosynthetic communities. Sediment sulfate reduction rates as well as sulfide and oxygen fluxes are compared between the cold seep environment of Hydrate Ridge, Oregon (800 m water depth) and the sulfophilic stage of a gray whale carcass in the Santa Cruz Basin, California (1600 m water depth). This is a contribution in the framework of the CoML project ChEss (Biogeography of Chemosynthetic Ecosystems), as well as of the EU 6<sup>th</sup> FP project EXOCET/D (EXtreme ecosystem studies in the deep OCEan: Technological Developments).

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