

Clams 'n' Trends 'n' Marine Sulfate Concentrations: Ocean Chemistry and Macroevolution through Earth History

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Trends in life habits and body size, as well as faunal turnovers among seep-inhabiting mollusks during the last 130 million years indicate that macroecologic and evolutionary patterns of the seep fauna are driven by changing marine sulfate concentrations. The majority of animals at seeps live in symbiosis with sulfide-oxidizing bacteria. The ultimate source of sulfide at seeps is seawater sulfate, via the anaerobic oxidation of methane, thus changes in marine sulfate concentrations directly affects the main food source of seep animals. The same applies to chemosymbiotic taxa at whale and wood falls, which rely on sulfide generated by the oxidation of organic matter via sulfate reduction. It applies partly also to animals living at vents, because a significant fraction of the sulfide emitted at vents is derived from the reduction of seawater sulfate during its interaction with the oceanic crust. Marine sulfate concentrations beyond 130 million years ago are poorly constraint, but may have played a role in making seeps suitable for the colonization by brachiopods in the more distant geologic past.