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What drives the evolution of methane seeps communities? A deep time perspective

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The origin and possible antiquity of faunas at deep-sea hydrothermal vents and seeps have been debated since their discovery. I used the fossil record of seep mollusks to show that the living seep genera have significantly longer geologic ranges than the marine mollusks in general, but have ranges similar to deep-sea taxa, suggesting that seep faunas may be shaped by those factors that drive the evolution of life in the deep-sea in general. The data indicate that deep-sea anoxic/dysoxic events did not affect seep faunas, casting doubt on the suggested anoxic nature and/or global extent of these events (Kiel & Little, 2006).

It was hypothesized that sunken wood and whale carcasses (wood- and whale-fall) were evolutionary stepping stones for taxa that now inhabit hydrothermal vents and seeps. This hypothesis was tested using fossil evidence. Compared to modern whale-fall communities, the Eo-Oligocene examples lack those vent-type taxa that most heavily rely on sulphide produced by anaerobic breakdown of bone lipids, but are very similar in their trophic structure to contemporaneous wood-falls. This sheds doubt on the ‘stepping-stone’ hypothesis but suggests that the Eo-Oligocene whale-fall communities represent a new ecologic stage among whale-falls, coined ‘chemosymbiotic opportunist stage’, and that the ‘sulphophilic stage’ of modern whale-falls developed during the Early Miocene, resulting from a significant increase in both body size and/or oil content of bones among cetaceans during this time (Kiel & Goedert, 2006).

References:

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