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Decoupled anaerobic oxidation of methane and sulfate reduction within the methanogenic zone of Arctic sediments (Beaufort Sea, Alaska)?

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Piston cores taken at two stations along a depth transect on the continental margin of the Beaufort Sea (Alaska) revealed an at first sight "classical" sulfate-methane transition zone (SMTZ) with organoclastic sulfate reduction on top, followed by an intermediate zone of anaerobic methane consumption, and a methanogenic zone at the bottom. Surprisingly, however, sulfate did not completely disappear within the methanogenic zone but concentrations remained at levels around 300-500 μM. Further investigations revealed that sulfate reduction and anaerobic oxidation of methane (AOM) activity was still detectable and deeply distributed within the methanogenic zone, and that the two processes were probably not coupled. This poster will discuss (1) potential mineralogical sources of sulfur that could support sulfate reduction in the methanogenic zone, (2) potential electron acceptors of AOM, and (3) thermodynamic considerations about the unusual co-presence of sulfate reduction, AOM, and methanogenesis in the very same sediment zone.