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# In situ measurement of microbial activity in cold seep sediments

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Cold seeps are generally characterized by high methane concentrations in the sediment favoring the microbial process of anaerobic oxidation of methane (AOM). The dissolution of methane in situ depends mainly on hydrostatic pressure but also on temperature, for example the saturation concentration at the cold seep Hydrate Ridge is around 80 mM at 600 m water depth and 4˚C. Methane is much less soluble at atmospheric pressure, so a respective sample would degas to 1 mM methane concentration, losing a volume of more than 1 L methane from an average push core. Hence, AOM rate measurements after sample recovery from larger water depths always bear the danger of underestimations due to methane losses after decompression, since the activity of the microbes is depending on methane concentration. Furthermore, escaping gas will be replaced by bottom water influx or sediment collapsing, so the in situ gradients will also change. Therefore future investigations should focus rather on in situ than ex situ incubations to gain realistic methane turnover rates and budgets of cold seeps. Our poster will discuss the principal technical and physiological problems of ex situ/ in situ AOM measurements at cold seeps. We will further present a prototype of an in situ incubator to measure AOM activity with radiotracer techniques that can be deployed by submersibles or ROVs. Such an instrument, with the ability to inject radiotracers, could be useful not only for the determination of in situ AOM rates but also for every other kind of in situ measurement that is based on injection into the sediment.