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Methane release and past climate change in the Arctic during the last ca 30,000 years

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Methane release and past climate change in the Arctic during the last ca 30,000 years

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Gas hydrates contain more carbon than any other global reservoirs and are abundant in continental margins worldwide. Methane hydrate provinces are common in Arctic regions, but their ability and contribution of carbon releases to the atmosphere and their stability and longevity through time is unknown. It is therefore important to understand the effects of climate warming and ocean circulation change in the Arctic region in relation to the stability of gas hydrates and release of methane gas.
We are presently investigating a suite of cores collected from Vestnesa Ridge (west of Svalbard at ∼79o N) from a water depth of ∼1200m in an area with several active methane gas flares. The Vestnesa Ridge is a large sediment drift in the Fram Strait and represents one of the northernmost gas hydrate provinces that exist along the Arctic continental margins. The purpose of the investigation is to study the seepage of methane through time in relation to oceanographic and climatic change from the late glacial period to today. The study is based on the distribution patterns of benthic and planktic foraminifera species and d13C in their shells together with other geochemical, sedimentological and physical parameters. Benthic foraminifera are an important component of seafloor communities, and are important as direct bioindicators of physico-chemical conditions at the sea-bottom, and indirectly of the water column features. Numerous species of benthic foraminifera have been found in different methane rich marine settings and have proved to be good biosensors of methane releases as they prefer to feed on rich bacterial food sources at methane seeps. Stable isotope geochemistry shows that the carbonate of foraminiferal tests in areas of methane release and gas hydrate dissociation is characterised by distinctly negative δ13C values.
The study focus on two cores: one collected from an active methane seep (494cm length) and one from a non-seep area (control sample, 380cm). The magnetic susceptibility record of the control core shows a pattern with values typical for western Svalbard margin (Jessen et al., 2010) and that it covers the last ca 30,000 years. The core from the active seep area shows almost constant values of very low magnetic susceptibility. This core is characterised by strong H2S odour in the upper part with numerous gas bubbles present in the sediment above ca 370 cm downcore. Gas bubbles are scarse to absent in the lower part (270cm). A distinct layer of large bivalves separates the two two parts and probably marks the time when the seep became active. Preliminary correlation of the lithology to other well dated records from the Svalbard margin (Jessen et al., 2010) indicates that the vents most likely became active at the start or during the deglaciation.

References
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