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Geophysical and geochemical controls on the megafaunal community of a high Arctic cold seep

Sen A et al.

This manuscript presents data on the megafaunal community structure associated with cold seep sites in the western Barents Sea inferred from high resolution seabed imagery, and relates these data to available geochemical information. The manuscript is well-written, and as information on the ecology and biogeochemistry of cold seeps in the Arctic is still quite rare, it makes an important contribution to the field.

At the same time, there are some methodological constraints that limit the interpretability of the data. In particular, the conclusions drawn with regard to microhabitats are in my view not fully supported by the available data and the respective part of the discussion could be shortened.

Seepage rates/ volumes at cold seep sites often vary strongly over small spatial scales, and the seafloor pictures shown in this ms indicate that the same seems to be true for the GHPs under study, with patches of bacterial mats, for example, probably indicating higher than average methane/ sulphide availability. In fact colonisation by bacterial mats and certain megafauna species (*Calyptogena*, *Acharax*; siboglinids etc), are often linked to relative flux rates (e.g. at HMMV or Hydrate Ridge) and can even serve as (crude) indicators for seepage intensity. The limited number of sediment cores taken in this study (and I fully accept the limits that can be placed on sampling in Arctic and deep waters) will likely not have been sufficient to resolve this spatial pattern which is likely to impact on microhabitat preferences.

In addition, temporal variability of seepage - even at sites considerably deeper than those under investigation here - is often strongly linked to tidal rhythms and longer term observations are likely to be necessary to conclude with certainty whether active seepage occurs at a specific site or not.

In this context I was also surprised to see that all pictures taken along each of the specific transects seem to have been 'lumped together' for analysis and no attempt was made to distinguish between fauna at more or less active seepage sites.

Judging from fig. 1, the photographic transects seem to have included (or at least could have been extended to include) reference areas without seepage and I was disappointed to see no comparison between fauna at seep and reference sites. Is there a reason for this ? This would add a very valuable and relevant dimension to the manuscript.

While it is likely that AOM consortia provide the sulphide utilised by chemoautotrophic bacteria, it seems unlikely that sulphide can be both abundant enough to support the bacterial mats visible in the photographs while being removed so efficiently from the substrate that concentrations in the upper sediment and bottom water were below detection limit. Could this be an analytical error ?