

## ***Interactive comment on “Submarine groundwater discharge site in the First Salpausselkä ice-marginal formation, south Finland” by J. J. Virtasalo et al.***

**J. J. Virtasalo et al.**

joonas.virtasalo@gtk.fi

Received and published: 7 February 2019

We thank the referee Jutta Winsemann for insightful and constructive comments that help improve the manuscript. Winsemann's main concern is our use of terminology regarding the description and interpretation of depositional systems, which she finds somewhat confusing. We think this confusion is partly due to slight differences in vocabulary between the marine geological and glacial geological communities. For example, the term “mud drift” has a clear meaning among marine geologists, which is quite different from the meaning of “drift” (till) among glacial geologists. Winsemann correctly points out that the terms “glaciofluvial” and “foreset” should not be used in the

C1

context of subaqueous ice-contact fans. We will carefully check, clarify and correct terminology in the revised manuscript. The annotations to the manuscript kindly provided by Winsemann will help.

Another point raised by Winsemann is our interpretation that the studied pockmarks are caused by groundwater discharge and not by gas. Indeed, pockmarks often are interpreted to be produced by gas seepage from the seafloor; however, they are also known to form as a result of submarine groundwater discharge (for a useful review, see for example: Hovland et al. 2002: The significance of pockmarks to understanding fluid flow processes and geohazards. *Geofluids* 2, 127-136). The measured high Rn concentrations at the pockmark locations strongly indicate that the studied pockmarks are produced by groundwater discharge. Furthermore, the studied glacial sediments are poor in organic material, which makes significant methane flux less likely. We will elaborate this in the revised manuscript. Finally, we would like to mention our as yet unpublished multielement,  $\delta^{2}\text{H}$  and  $\delta^{18}\text{O}$  data that demonstrate the dominance of groundwater in the pockmark porewaters.

Kind regards on behalf of all co-authors,

Joonas Virtasalo, Geological Survey of Finland

---

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-131>, 2018.

C2