

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: 8 February 2019

We thank Referee #2 for thoughtful and constructive comments that help improve the manuscript.

Referee’s main concern is that too much emphasis in the manuscript is put in the description of geophysical data and sediment units, while the focus should be more on submarine groundwater discharge (SGD), and that the present balance is not in line with the title of the manuscript. However, our aim, as it is written in Introduction, is to “reconstruct the detailed stratigraphical architecture and aquifer geometry of a SGD site”, and we think that this focus on a SGD site is also clear in the title. Our pur-

C1

pose with the radon measurements is to demonstrate that SGD is taking place. We agree with Referee that SGD at the study site should be characterized better, and we are in the process of collecting hydrogeochemical data but that is a topic for another manuscript. We argue that in many SGD studies, the local geological structure is not particularly well established, although it would be crucial for successful hydrogeochemical modeling and flux estimates. We argue further that this shortcoming is largely due to difficulties in combining offshore and onshore data on the local geological structure that are collected using different techniques that are not directly inter-comparable. We have chosen a novel approach, allostratigraphy, to overcome these difficulties. Therefore, we have decided to maintain our original focus of the manuscript, but otherwise follow the suggestions kindly proposed by Referee.

Referee raises three specific comments that concern the better presentation of pockmarks, the usefulness of Section 5.1 about allostratigraphic classification, and the strength of our estimation of the SGD rate. In order to address these comments in the revised manuscript, we will include a better images of the pockmarks and provide more information about their structure. We intend to keep Section 5.1 because it presents a novel approach of correlating onshore and offshore sub-bottom profiles in order to establish the geological structure of a SGD site, which we believe will be found useful at many other locations. We also intend to keep our rough estimate of the SGD flux based on Rn measurements. This estimate may be simplistic, but we feel that it is useful to provide it as the first estimate because we can. The estimate will be improved as additional data becomes available later.

We will carefully follow the technical corrections Referee has kindly annotated in the manuscript.

Kind regards on behalf of all co-authors,

Joonas Virtasalo, Geological Survey of Finland