

Interactive comment on “Discovery and characterization of submarine groundwater discharge in the Siberian Arctic seas: A case study in Buor-Khaya Gulf, Laptev Sea” by Alexander N. Charkin et al.

Anonymous Referee #3

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The manuscript Discovery and characterization of submarine groundwater discharge in the Siberian Arctic seas: A case study in Buor-Khaya Gulf, Laptev Sea coauthored by Charkin et al. presents the first evidences of the presence of SGD along the Eurasian Arctic margin. In my opinion the data provided in this manuscript is really interesting and will be the first step for other new studies. The paper is well written and the arguments are clear and well presented, although some parts of the text are difficult to follow. I recommend the publication of the manuscript after include some comments to the text. I have two major comments to the manuscript:

C1

o Why the study is so descriptive? The text describes the distribution of short-lived Ra isotopes and Rn but does not go deeply in the use of these radionuclides as a traces to estimate SGD fluxes or transit times.

o The second comment is for me the one that I can not understand. Where is the long-lived Ra data? I guess the authors have them and maybe they want to use in another manuscript. I feel that the long-lived Ra data will help to understand SGD sources and discharge processes. For example, recently Rodellas et al (GCA, 2017) have published how the combination of short- and long-lived Ra isotopes can be used to distinguish sources of submarine groundwater discharge: fresh groundwater vs sea-water recirculation through sediments that is the case of part of the study. How you can discard that the short-lived Ra isotopes are not coming from recirculation or sediment resuspension?

Some other technical corrections are:

o Do you have any sample for Ra-isotopes and Rn that can be compared between winter and summer? o Line 35 pag 5. Do you need the two dots after Radiometer?

o Review the text because sometimes you write “kilometers” or “meters” and others you write “km” and “m”.

o I suggest rewriting the sentence of the Line 20 Pag 6 as: These TEM results agree well with data provided by Imaev et al (2004) for this region.

o Line 22 Page 6. Remove a space between 162, and 5 meters.

o 3.2 Features of the thermohaline water structure and SGD fate. In this chapter authors explained the features of the thermohaline water structure but there is not any comparison or relation with SGD. Is this a correct tittle?

o In the chapter 3.3 the units of Ra-223, Ra-224 and Rn are wrong. It is “dpmÅ100L-1” or “dpm/100L”. Check the document and Figures.

C2

- o Line 25 Page 8. Add a space between the numbers and “m” as you do for “km” or other units.
- o Line 10 to 13 Pag 8. Maybe the 228/226 AR provides information about the SGD fluxes.
- o Line 10 page 9. Maybe this is a possible explanation, but what about the increase due to resuspension processes? Is it a possibility? Maybe the long-lived Ra isotopes can help you to understand the origin of this high 224/223 AR.
- o Line 33 page 9. Correct the 100L-1.
- o Line 20 page 10. Can you explain why this water is saltier?
- o Line 38 page 10. Here you notice: The fact that the summertime and wintertime SGD springs were found on a line parallel to the fault once again points to the connection between the tectonogenic talik and the SGD. Here you talk about summertime and wintertime SGD springs. Why the seasonality is not shown in the text?
- o Table 1. Add the uncertainties to the 224/223 AR and review the significant figures of the Ra-223 and Ra-224.
- o Figure 11. What is the meaning of the equation of the upper plot?
- o Figure 13. I guess there is a mistake in the Figure referred to CSW in the plot and RFS in the caption.

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