

## ***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 #1**

Received and published: 13 April 2017

Only since about 20 years ago have ocean scientists fully appreciated the potential for submarine groundwater discharge to supply substantial quantities of nutrients and carbon to the coastal ocean. Here Charkin and co workers provide exciting new data on the potential for SGD to contribute material fluxes to the coastal Arctic Ocean, an ocean basin that is arguably undergoing the most significant changes due to climate shifts. The paper is generally well written and the topic is timely, for the reasons above. I have only one major criticism, and that is the paper is much too qualitative, given that the authors appear to have sufficient data to try and calculate SGD fluxes for this region. Perhaps the authors were rushed in their analysis of the data set in order to meet a

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deadline for this special issue? In any case, the data are underutilized for reasons that are not fully explained. Other comments are listed in order of appearance:

-Abstract line 20: this sentence mentions freshwater then SGD, and we know that SGD often includes only a minor fraction of freshwater. The rest of the manuscript is good about making this distinction, but the first sentence should be reworked regardless.

-p. 3 line 17: The methods here talk about the Ra quartet, but only the short-lived Ra isotope data are presented in Table 1. One 226 and 228 value each are cited on p. 8 lines 23-24, so clearly these data exist, but it's unclear why they're not used in the paper or presented in the table. Please use and publish these data!

-p. 5 methods: Where the groundwater samples (and surface water for that matter) filtered or unfiltered? If unfiltered, I am concerned about contamination of the short-lived isotopes from particulate Th isotopes (228 and 227).

-p. 7 results: the radon data are hardly used in the manuscript.

-p. 8, line 12: sediment diffusion could supply short-lived Ra isotopes to the bottom water. How is it "clear" that SGD can be the only source? Please provide a calculation to support this statement.

p. 8, section 3.4; The short lived isotopes can be highly modified by decay in addition to mixing. The linear mixing lines in Figure 11 are deceiving.

Fig. 9: axis labels are unreadable as is the legend.

Fig. 11: Salinity is the dependent variable, it should be on the x-axis.

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Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2017-33, 2017.

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