

Interactive comment on “Retention time of lakes in the Larsemann Hills oasis, East Antarctica” by Elena Shevnina et al.

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Martin Truffer gives useful general comments in his review and provides detailed suggestions in order to improve the manuscript in the review supplement. Almost all the suggestions were implemented in the new version of the manuscript.

Further, we answer the general comments listed by Martin Truffer:

“1) The manuscript needs to be very carefully checked for language and grammar. . .
” The text of the manuscript will be checked for typos, and in the final revised version will be prepared within next couple of weeks. We will English language will be also improved by a professional translator in order to fit the UK English standard. We have attached the re-considered text of the manuscript to the answer, and this version of the

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manuscript is not yet checked.

“2) Results and Discussion should not be mixed into one section. . . ” In the new version of the manuscript, Discussion section was separated from Results section. Discussion is now extended with the explanations: how our results fit to the past scientific records (lines 401-443); why the hydrological observations on the Antarctic lakes are important for a global scale prediction afterwards, specially in fast climate warming (lines 381-388); and what is the next step in the further study of water balance and thermal regime of the glacial lakes (lines 444-451).

“3) The Methods section would benefit from a table that shows which method was used for which lake. . . “ We have included the new table (Table 2) in the section Methods in the new version of the manuscript. We also explain improved Figure 1 and Figure 2 (both given in the attachment) by given scale bar and legend.

“4) The numbers provided in the tables in ‘Results’ need to be provided with some amount of error estimates. . . “ It is difficult to provide the numbers in the tables with the precise estimates of the errors inherent to them because this needs a separate study. The errors in the LRT include the uncertainties coming from measuring techniques and methods used to evaluate the terms of the water balance equation, as well as the surface area and volume of the lakes. However we include in the revised text of the manuscript the estimates of uncertainties for the water discharge measurements, area/ volume (lines 283-295) and evaporation (lines 328-333).

“5) The Conclusions should contain some sort of statement of what can be learned from these results in terms of how these lakes function. Do these retention times come as a surprise? Do they change the way we need to think about these lakes?

In the revised version of the manuscript, the section Conclusions is new, and it is includes answers to the questions: What is specific for water exchange for the epiglacial and land-locked lakes? (lines 463-469) What needs to be monitored on the lakes and streams? (lines 470-476)

We added the following references in the revised version of the manuscript:

Bell R., Banwell A., Trusel L., Kingslake J. Antarctic surface hydrology and impacts on the ice-sheet mass balance. *Nature climate change*, 2019, doi: 10.1038/s41558-018-0326-3.

Borgini F., Colacevich A., Loiselle S., Bargagi R., Short-term dynamics of physico-chemical and biological features in a shallow evaporative Antarctic lakes, *Polar Biol*, 36: 1147-1160, 2013, doi: 10.1007/s00300-013-1336-2

Kaup, E., and Burgess, J.S.: Natural and human impacted stratification in the lakes of the Larsemann Hills, Antarctica. In: Huiskes, A.H.L., Gieskes, W.W.C., Rozema, J., Schorno, R.M.L., van der Vries, S.M. & Wolff, W.J.. *Antarctic Biology in Global context*, Leiden, The Netherlands: Backhuys Publishers, pp. 313-318, 2003.

Leppäranta, M., Luttinen, A., Arvola, L.: Physics and geochemistry of lakes in Vestfjella, Dronning Maud Land. *Antarctic Science*, 32(1), 29-42. doi:10.1017/S0954102019000555, 2020.

Popov, S.V., Sukhanova A.A., Polyakov, S.P.: Using georadar profiling techniques for the safety of transport operations of the Russian Antarctic Expedition // *Meteorologiya i Gidrologiya*, 2020, # 2, 126– 131 pp. [In Russian]

Shevnina E., Kourzeneva E., Potes M.: Evaporation over lakes of the Schirmacher oasis, East Antarctica. In book of abstracts “Complex investigation of the natural environment of the Arctic and Antarctica”, St. Petersburg, Russia, 2-4 March, 2020, doi: 10.13140/RG.2.2.33613.38883

Zhelezhnjakov G. V., Danilevich B.B.: Accuracy of the hydrological measurements and estimations. *Lenigrad, Gidrometeoizdat*, 1966, 240 p. [In Russian]

We thank Martin Truffer for his corrections and suggestions, they helped to improve our manuscript a lot.

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Elena Shevnina, on behalf of the authors

Please also note the supplement to this comment:

<https://tc.copernicus.org/preprints/tc-2020-205/tc-2020-205-AC3-supplement.pdf>

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-205>, 2020.

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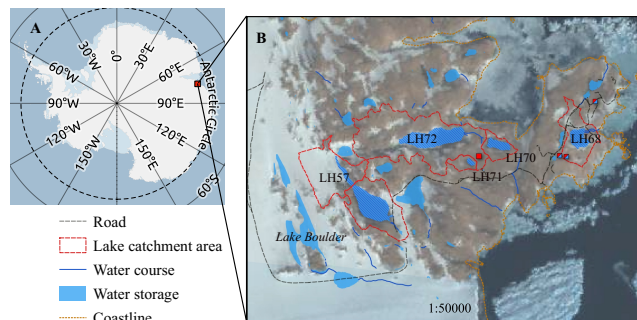


Fig. 1.

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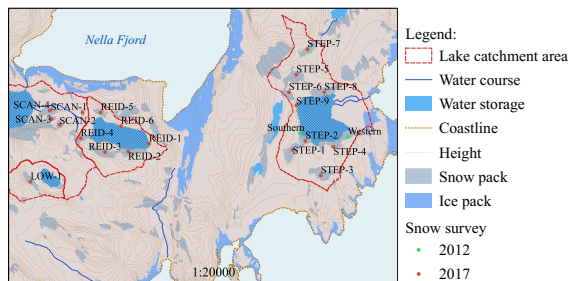


Fig. 2.

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