

We thank Enn Kaup and Martin Truffer for their comments. They were almost all implemented into the text of the revised manuscript. Further, we listed the our answers to the comments and provided the information on the corrections done.

### **Answers to the specific comments given by Enn Kaup:**

#### 1. In the Introduction the purpose of the study should be indicated more clearly (f. ex. also to point out that it's the first such one in the Larsemann Hills).

“This study aims to evaluate the lake retention time of the lakes located in the Larsemann Hills oasis. We suggested to estimate the LRT from the outflow and inflow terms of the water balance equation depending on a type of lake (epiglacial and land-locked). ... This study gives the first estimations of the LRT for the lakes located in the Larsemann Hills.” (ll. 56-57).

#### 2. In section 2.1 elaborate a bit more on sublimation/ablation of snowpack and on it's influence on LRT.

We extended speculation on the errors connected to sublimation as following: “In this study, we neglected to the water sublimation over the ice covered parts of the epiglacial lakes and snow packs. It is assumed that, in summer it is small compare to others components of the lake water balance equation. However, to proof the assumption would need to a separate study. Not accounting of the water sublimation may lead to slight over- estimation of the LRT, especially for the land-locked lakes. (ll. 158-167).

#### 3. In section 2.2. it needs to be recognized the substantial sublimation of lake ice cover during all the year and mention it in the Conclusions.

To stress the substantial role of sublimation, we added some speculation in the section 2.2, as well as extend discussion section:

L. 200: "... water sublimation over ice covered surface of a lake ... "

Ll. 268-269: "Even it may be a substantial (Kaup and Haendel, 1995), the evaporation during the frozen period (water sublimation) was also not accounted because no observations were available for its evaluations."

Ll. 463-465: “Since the water sublimation over ice covered lakes depends on meteorological conditions (air temperature and humidity, wind speed) which are largely similar in the East Antarctic oases, our next study address to evaluation of water loss for ice free and ice covered lakes. We would expect that the over- estimation of the LRT due to neglected sublimation would not exceed 10 % (Shevnina et al., 2020).”

Ll. 490-493: "The role of the water sublimation over the ice-covered surface of the lakes should also be studied in details. It may be substantial component of a lake water balance equation integrated over the period of year. "

#### 4. Fig. 1 needs to be complemented (shown in text).

We added the missing parts of the catchment area for two epiglacial lakes (Progress and Nella/Scandrett).

#### 5. The references must be put correct (missing in the Reference list and vice versa)

We put the references in alphabetic order, and added new references.

Loopman A., Klovov V.: The formation of water runoff from the lake catchments of the Schirmacher oasis in East Antarctica during the summer season 1983 – 1984, in Limnological studies in Quin Maud Land (East Antarctic), Ed. by J. Martin (Valgus, Tallinn), 57–65, 1988.

Simonov, I.M., and Fedotov, V.I.: Ozera oasisa Schimachera. [Lakes of the Schirmacher oasis]. Informazionny bulleten Sovetskoy Antarktichesko Expedicii, 47, 19–23, 1964. [In Rissian].

Vershinin K., Shevnina E.: Technical report of the hydrological studies in the Larsemann Hills in the season 58 RAE, in: Series of reports of the Russian Antarctic Research Expedition (RAE), 45 p, 2013. [in Russian]

Kaup, E., Haendel, D.: Snow and ice cover of water bodies. In: P. Bormann and D. Fritsche (Eds). The Schirmacher Oasis, Queen Maud Land, East Antarctica, Gotha: Justus Perthes Verlag, 279–285, 1995.

Hermichen, W. D., P. Kowski, and U. Wand: Lake Untersee, a first isotope study of the largest freshwater lake in the interior of East Antarctica. Nature, 315, 131–133, doi: 10.1038/315131a0, 1985.

Tanny, J., Cohen, S., Assouline S., Lange F., Grava A., Berger D., Teltch B., Parlange M.B. 2008: Evaporation from a small water reservoir: Direct measurements and estimates. Journal of Hydrology, 351, 218–229, doi: <https://doi.org/10.1016/j.jhydrol.2007.12.012>

Shevnina, E., Kourzeneva, E., and Potes, M.: Evaporation over lakes of the Schirmacher oasis, East Antarctica, In proceedings of International Conference “Complex study of the Arctic and Antarctica”, March 2020, St. Petersburg, Russia, doi: 10.13140/RG.2.2.33613.38883, 2020.

We also added other changes in the text according to the comments given in the text:

Ll. 37-40: “Small land-locked lakes are fully ice-free for a period of 2–3 months in summer (Lakes Sarah Tarn and Lake Reid in Larsemann Hills, Lake Verhnee in Schirmacher oasis). Big land-locked lakes can stay partially ice covered in summer, and a number of such lakes are found in the Schirmacher oasis. Thalla Hills and Bunge Hills (Gibson et al., 2002; Loopman et al., 1988; Simonov and Fedotov, 1964). The land-locked lakes lose water mainly through the surface runoff in the outlet streams, and/or through evaporation over their surface.”

L53: corrected as following: "... lakes located in the Antarctic Dry Valleys, and ..."

L53: Loopman and Klokov, 1988 was added to the list of references.

L.125: Vershinin and Shevnina, 2013 is now added to the list of references.

Ll.152-153: corrected as following: ... “Using these SWE differences may ignore water sublimation of snow cover between the two surveys, it will lead to over-estimation of the LRT for the lakes. “

L. 233: corrected as “... Bunge ...”

L. 272: added the reference to Kaup and Haendel (1995) into the text, and we also included information on the measured water sublimation in the section of discussion.

L. 414: replaced to “... East ... “

L. 421: corrected to “... Schirmacher ... “

L. 444-445: corrected as “... Also, water loss through sublimation over the ice/snow cover in the catchment area can be substantial (Hermichen et al., 1985)... “

L. 451: corrected to “... East ...”

L. 460 we added Tanny et al., 2008 in the list of references.

### **Answers to the specific comments given by Martin Truffer:**

1. l.23: This statement could be a bit controversial: Just because all the water is frozen, that doesn't make the continent more sensitive to warming (compared to Greenland for example)

We have replaced the statement with "Climate warming enhances melting of the ice sheets and glaciers, and melted water accumulates in lakes and streams." (ll. 22-25).

2. Table 2: state the units (years) for LRT

The unit for the LRT was added to the table2. (l.267)

3. l.371: leaded -> led

We corrected the text. (l. 382)

4. l.484: it strikes me that the question 'how rapidly is water renewing in Antarctic lakes' is a somewhat odd question in the sense that the answer will surely be different, depending on size of the drainage basin and topography of the lake. For example, there is no good a-priori reason why two neighboring lakes should have similar LRTs

We have replaced the text with the statement: "We would consider our LRT estimates as a preliminary attempt suggest two versions of the water balance equation depending on a lake types namely for the epiglacial and land-locked lakes." (ll. 501-502).

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on behalf of the authors