

Review for Earth System Science Data

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Title: Glaciological and meteorological monitoring at LTER sites Mullwitzkees and Venedigerkees, Austria, 2006–2022

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In the submitted paper the authors present a very detailed and rich monitoring data set from glaciological mass balance and meteorological observation acquired during the last two decades at two glacier monitoring sites in the Austrian Alps. The data is accompanied by important insights into data acquisition, evaluation, and storage, as well as a transparent and well described analysis of themselves. The manuscript is well structured, and the methodology follows an established approach (Geibel et al., 2022), which is further developed where necessary. Uncertainties are openly and transparently addressed, recognized and reflected in the data collection. The results are well described and convincing, accompanied by nice figures and lead to important findings for mass balance measurements and related data storage. The paper is already in a very good shape and almost ready to publish. I do not have major issues to correct, but some comments and questions (mainly on the figures) that may be addressed by the authors when preparing a next version.

L 68: Is it possible or even useful to show the outline of the Hohe Tauern National Park in Figure 1?

L 94: GI3 is the third glacier inventory of Austria? You could introduce this abbreviation here, as it will also be referred to later in the manuscript (e.g. in Fig. 1).

L 95: Do you know in which year Venedigerkees became disconnected from Obersulzbachkees?

L 123-124, **Figure 1**: The chapter 2.1 Study Sites and Figure 1 are closely linked together, when reading the chapter, it is of great help to consult Figure 1 in parallel. Figure 1 may be improved with (i) Showing the boundaries of Hohe Tauern National Park (if useful), (ii) adding a scale bar, (iii) indicating the height of Grossvenediger, (iv) indicating the height of the weather stations. The caption of the figure may be complemented with the full name of the glaciers: "Outlines of Venedigerkees (VK) and Mullwitzkees (MWK) for 2018 in red."

L 214-215, **Table 1**: I am not sure if the information in Table 1 is of great use like this. I can see that there is an enormous number of measurements available for both study sites and an average value per year is indicated. However, I have difficulties to bring the values from Table 1 in relation to Figure 2 and 3. Furthermore I don't know if the measurements are evenly distributed to the years (as the average value suggests), or if there is a bias.

L 214-215, **Figure 2** and **Figure 3**: This are important figures to show the dense monitoring networks at the two sites. However, it would be nice to see a little bit more about the context of the two glaciers in relation to their environment. It is maybe possible use contour lines or a hill shade of the relief to transport more information (e.g. to make obvious where steep or flat glacier parts are located). In addition, I think there is no reference to both figures in the text of the manuscript. Maybe you should add in the caption the statement "Coordinate reference system: MGI / Austria GK Central (EPSG:31255)" as you have it in Fig. 7ff.

L 245-249: You use the contour line method for spatial integration of the point mass balance. How is the expert knowledge gained that is incorporated? How many evaluators draw the lines? Did you ever compare results from different evaluators?

L 295: add "Table": ...is provided in Table 4.

L 316-317; 331-332: Use italics when explaining the variables in the equation.

L 354-355: Should these values correspond with the values from Table 1?

L 372-373, **Figure 4**: I also like this Figure and showing the readings of 2022 in red is an enriching detail. For a better reading, I would like, if the panels could be labelled with a), b), and c). And I think it would be of value, to label the black vertical lines indicating April 30 and September 30 directly in the graph of panel a).

L 372-373, **Figure 5**: Maybe also here, labelling of the vertical line indicating September 30 would help to capture the timescale of the x-axis at first glance.

Maybe you could complement the titles of the panels with the height information of the stake? And would it be possible, to locate and name these three stakes in Figure 2 and Figure 3 respectively, to know where these stakes are located?

L 374-275: This statement refers to counting's per year?

L 410: I guess the contour line at MWK are also manually derived? Maybe complement the sentence with this information.

L 421-422, **Figure 7** and **Figure 9**: Complement the caption of both figures with the information that you used contour lines to derive the zones of mass balance. What are the steps (in mm w.e.) between the different mass balance elevation zones?

L 421-422, **Figure 8** and **Figure 10**: The small points of snow depth probing are really hard to see. What are the steps (in mm w.e.) between the different mass balance elevation zones?

L 421-422, **Figure 7**, **Figure 8**, **Figure 9**, **Figure 10**: At first glance the label of the y-axis I interpreted the "m" as "E".

L 440-441, **Figure 12**: I really like this figure that gives an integrated and complete overview on the mass balance measurements and the related evaluation on both study sites. However, I think it's a pity to squeeze the results of both glaciers in into one figure. Wouldn't it be of additional value and easier to interpret the results, if you present it in two figures?

L 473-474, **Figure 13**, **Figure S3**: The readability of the figure would be improved by adding minor tick marks on the x-axis for the single months.

Data Quality: I was struggling a bit, to download all the data related to the paper, as some were already easily accessible through PANGAEA and for others tokens and further links had to be used. However, at the end I think I managed to get all the data, but must say, that it is not easy to keep the overview on all the different packages. I hope this will be improved, as soon as the paper is accepted and the data published.

From all the ten data package provided via PANGAEA I checked at least one dataset. As far as I could see, the data sets are set up as explained in the paper (with quality flags and uncertainties) and seem to be complete and of great use for further studies.

References:

Geibel, L., Huss, M., Kurzböck, C., Hodel, E., Bauder, A., & Farinotti, D. (2022). Rescue and homogenisation of 140 years of glacier mass balance data in Switzerland. *Earth System Science Data Discussions*, February 1–30. <https://doi.org/10.5194/essd-2022-56>