Reviewer #2

We thank Dr. Stephanie Kampf for her constructive comments and valuable contribution to our manuscript. Below, we answered the line-by-line comments in blue font and indicated if, how, and where we introduced changes in the revised manuscript in a colored font.

This manuscript is an interesting multi-scale, multi-method evaluation of evaporation and water balance at the Salar del Huasco in Chile. The paper contributes insight into climate drivers of evaporation variability and illustrates how dominant controls on evaporation vary with time scale. The manuscript is well-written, with methods carefully documented.

My suggestion of major revisions is due to concerns about influences on evaporation that appear to be neglected:

1) Salinity reduces evaporation rates, and as far as I can tell this effect is not included in the site-adapted Penman equation. See Mor et al. 2018 WRR.

Answer: Indeed salinity reduces evaporation rates. We demonstrated this for the wet-salt surfaces in the Salar del Huasco (Suarez et al., 2020; Lobos-Roco et al., 2021) and Mor et al., 2018 (Dead Sea) is a good reference as well. In contrast to what Mor et al., 2018 describe for the Dead Sea, in the Salar del Huasco surface runoff is negligible (see also point 2 to our reply of reviewer 1). Due to its shallowness (~15 cm) it is safe to assume that the lake is well-mixed (de la Fuente and Niño, 2010) and the salinity therefore uniform in depth and space.
In our approach, the salinity effect is implicitly included as we fit empirical model constants in our adapted Penman model to the locally measured evaporation fluxes over the saline water surface (see Suárez et al., 2020 and Lobos-Roco et al., 2021). It is important to mention that based on the data available we cannot include the salinity effect based on first-order physical principles. We recall that that is our aim to study the long-term evaporation variability from basic meteorological data provided by ERA5, with which it is not possible to represent the effect of salinity explicitly.

Action taken: we have included a sentence in Appendix A in line 520 to clarify this point: "Note that some physical processes such as the effect of salinity on evaporation, are implicitly included in the site-adapted Penman equation as The empirical coefficients in the model are obtained using evaporation fluxes measured over the saline water surface (Suárez et al, 2020; Lobos-Roco et al., 2021). "

2) Although open water evaporation rates are likely highest, water can also evaporate from areas with salt crusts (see Kampf et al. 2005 JOH, though probably some more recent references are also available). Because the salt crust areas may be large relative to the open water, they likely do have a substantial effect on the basin water balance. An interesting study on salt crust changes over time in Bowen et al. 2017, Geomorphology.

Answer: We fully agree with dr. Kampf. Open water surfaces are not the most extended evaporation pathways in the Atacama desert. Different types of salty crusts (Kampf et al., 2005), which cover larger areas than open water surfaces can contribute significantly to the basin's water balance, although their evaporation rates are considerably lower compared to open waters. The salt crust found in the Salar del Huasco has a particularly low evaporation (< 50 W m^{-2}, e.g., see Lobos-Roco et al., 2021, Fig. 3b). In addition, our research focuses on the open water surface (line 88), where we study the multi-scale, temporal changes. Our simple approach to the water balance of the lake does not include other surfaces that can contribute as well to the water balance of the entire basin. In the conclusions section, we recommend that further research should be carried out to find site adapted Penman coefficients that allow an extension of our method to different surfaces, such as wet salty crusts and wetlands.

Action taken: to clarify this point, we have introduced the following sentences in the results and discussion section, line 350:
"Different types of salty crusts (Kampf et al., 2005), which cover larger areas than open water surfaces, can contribute significantly to the basin's water balance, although their evaporation rates are considerably lower compared to open waters. The salt crust found in the Salar del Huasco has particularly low evaporation (< 50 W m^{-2}, e.g., see Lobos-Roco et al., 2021, Fig. 3b).".

Please incorporate these effects into the analysis, or explain why they can be neglected.

Other minor suggestions:

line 214: "Evaporation estimates are obtained from the downscaled ERA5 and precipitation" - presumably precipitation data are not used to calculate evaporation. Should this state "precipitation-adjusted evaporation estimates"?

Answer: This is indeed confusing. Precipitation data were not used to estimate evaporation. However, these data were used to estimate the long-term water balance in the saline lake. Evaporation estimates were obtained using the site-adapted Penman equation (2.3.2) and the downscaled meteorological data from ERA5. Precipitation was taken from the raw ERA5 data (not downscaled).

Action taken: to clarify this, we have introduced the following changes in line 214: "Evaporation estimates are obtained using data from the downscaled ERA5 and the site-adapted Penman equation (section 2.3.2), whereas precipitation data were obtained from the raw ERA5."

line 215: how is the lake depth determined?

Answer: The lake depth was measured during the field-experiment, which is described in Suarez et al., 2020 and Lobos-Roco et al., 2021. Consistent depths were also reported by de la Fuente & Meruane 2017 and de la Fuente et al., 2014 in the same saline lake.

Action taken: no actions have been taken, as this is well-described in section 2.1 (study area, line 115).

lines 257-258: "we observe that and coefficients". Should the "and" be deleted here, or is another word missing?

Answer: comment accepted.

Action taken: the word "and" has been removed.

Table 2, 1st row: "addapted"

Answer: comment accepted.

Action taken: the word "addapted" was changed to "adapted".

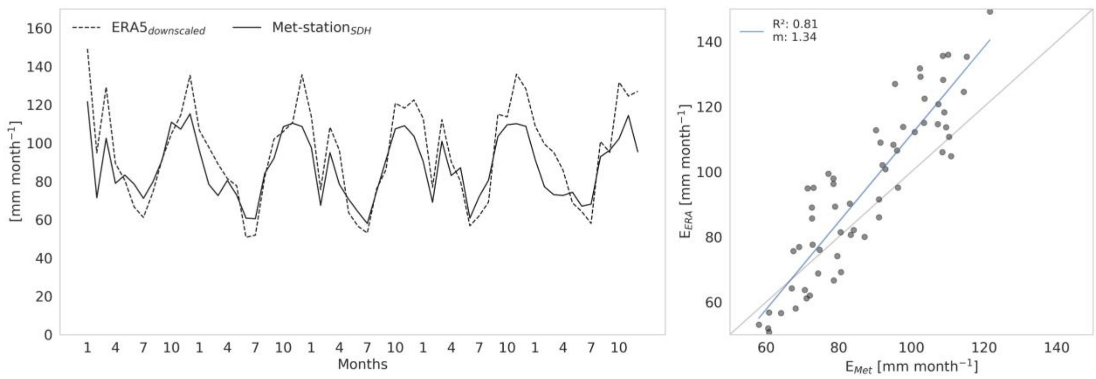
Table 2, what is "m" column?

Answer: m is the slope of the orthogonal regression.

Action taken: we have added this information at the end of the caption of Table 2. “m represents the slope of the orthogonal regression between EC_{water} and estimated through the Penman equation.”

Figure 5: Time series are great to see, but I would suggest (1) plotting as lines rather than columns for easier viewing, and (2) paring this with a scatterplot of met station vs ERA5, so the reader can more easily evaluate the performance comparison. Consider also adding precipitation to the time series to visualize how these changes in evaporation correspond with year-to-year and seasonal variability in precipitation. This time series information about precipitation would be a helpful addition to the combined year precipitation data in Fig 6.

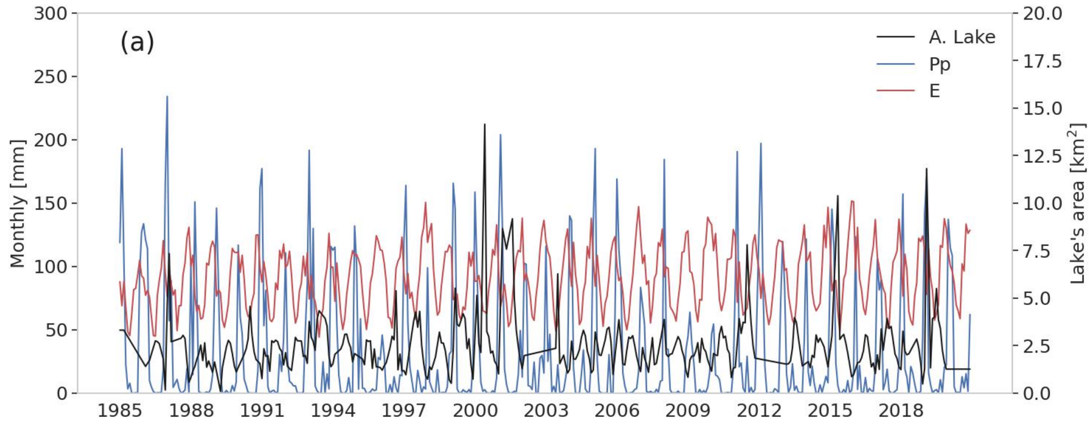
Answer: We thank Dr. Kampf for her suggestions regarding the visualization of Figure 5. The suggested plots are given below. We do not see a significant difference using lines instead of bars. In fact, we think that the line plot makes it a more difficult to appreciate the difference between the two variables (evaporation from ERA5 & met-stat). We agree that a scatter plot would also be useful for the comparison. However, because of the large number of figures and sub-figures in the manuscript, we opted to simplify this plot by only showing the comparison over the years, which fits better with the message, and include the orthogonal regression coefficients in the text (R^2: 0.81 and m , line 273). Finally, we opt not to include precipitation in this plot for two reasons. The first one is that Figure 5 is part of the section "Diurnal cycle perspectives of evaporation", where daily precipitation is not a main driver. The second is that this information is included in Figure 6 with a more robust statistic.



Action taken: no actions has been taken.

Figure 9: Similarly, I am curious what these patterns look like as a time series rather than aggregated to monthly means and ranges. The complete time series (or an example series of years) would illustrate how much the lake area changes from year to year & how those area changes relate to precipitation and evaporation.

Answer: The Figure below shows the information displayed in Figure 9 as a time series of monthly data. Because of the high variability, it is more difficult to identify the relation between the three components. In addition to this, section where we present Figure 9 is focused on seasonal cycles of evaporation and not interannual ones (the section after). The seasonal cycle of evaporation and its role on the water balance of the saline lake is better represented using monthly aggregated means.



Action taken: no actions have been taken.

Lake water balance, paragraph starting line 369: I am not entirely following the water balance calculations and results. Could you show the water balance graphically?

Answer: Our long-term water balance calculation is clearly explained in lines 213/225 (section 2.3.5). Again to avoid an even larger number of figures and the manuscript's scope we opted not to include a graphic on water balance.

Action taken: no actions have been taken.

Figure 9: b and c are plotting mean monthly values? Related to the comment above about showing full time series - this monthly aggregation illustrates the average role of evaporation in determining lake surface area, but it misses the interannual variability and how precipitation influences area. If the lake surface area lags behind the precipitation because of the slower moving groundwater, then comparing one month's area to the same month's precipitation will not necessarily be helpful. You could try correlations between precipitation and area using the full time series, but instead of comparing same months, lag the lake area month until you find the lag time at which precipitation and lake area are best correlated.

Answer: Please, see the answer to the previous comment in Figure 9 regarding monthly aggregation v/s interannual time series. We acknowledge that there is a lag between precipitation and groundwater recharge, which is possible to see in our data of lake area and precipitation. See the point we make in line 365: "However, analyzing the means (solid lines Fig. 9a), we observe that high precipitation rates do not directly impact the areal changes of the lake, which is reached 4 to 5 months after the rainy season". Here, we stress the point that our water balance of the lake is a first-order approximation, which aim is to show that evaporation plays an essential role in the water balance. Therefore, investigating the role of precipitation in the lake's water balance is beyond the scope of this manuscript.

Action taken: no actions have been taken.

A3: energy balance non-closure coefficient - from Figure A-3, it looks like this is the slope (m) in each scatter relationship? Please connect "m" from the figure to the energy balance non-closure coefficient variable.

Answer: yes, the coefficient is the slope.

Action taken: we have introduced the following changes at line 574/575 in Appendix A3: "Since the Penman equation assumes energy balance closure and the E-DATA field data show a significant energy imbalance (Suárez et al., 2020), we introduce an energy balance non-closure coefficient, c_{EBNC}, to correct for the observed imbalance, which is the regression slope (m)."

Ice coefficient: on what basis did you choose the number of hours below freezing for ice coefficient values? Did you consider salinity effects on freezing?

Answer: the number of freezing hours and their link to an evaporation reduction factor were determined empirically. The idea is that ice produced over longer time periods takes longer to melt. The data that we had available (November 2018) contained days with a maximum of eight hours under freezing conditions. To better underpin this coefficient longer EC time series are needed. Salinity is considered in the analysis since freezing hours are defined by temperatures lower than 270 K and not 273 K as it is for water.

Action taken: for clarity, we have introduced the following change at lines 586-587: "For this reason, we use an ice coefficient, c_{ice}, which ranges between 0 and 1, depending on the number of freezing hours per day (Table 1). The days are taken from midday to midday to include the night. The idea is that ice produced over longer periods takes longer to melt. We assumed that freezing occurs when the 2 m air temperature is below 270 K, slightly below the freezing temperature of clean water to include the effect of salinity. Based on this criterion, freezing days are distributed over the year as 6% in summer, 21% in fall, 41% in winter, and 31% in spring."