

The manuscript entitled “Multi-scale temporal analysis of evaporation on a saline lake in the Atacama Desert” by Felipe Lobos-Roco, O. Hartogensis, F. Suárez, A. Huerta-Viso, I. Benedict, A. de la Fuente and J. Vilà-Guerau de Arellano explores the magnitude and driving processes of evaporation from the Salar del Huasco, an endorheic salt flat located on the Altiplano Plateau, on different temporal scales, combining local observations, ERA5 reanalysis and different model approaches. The authors show that drivers of evaporation change from sub-diurnal scale (wind turbulence), to seasonal (net radiation) and interannual scale (global temperature, ENSO). Further, the authors assessed the lake water balance, demonstrating that evaporation controls lake level changes and groundwater recharge is significant. The results of this study are of high significance for water resource management in the context of industrial use and climate change, as well as for protection of biodiversity.

I would recommend moderate revisions to improve the presentation of the manuscript. Key issues need to be addressed as follows.

The authors precisely and clearly describe the performed experiments, datasets, calculations and obtained results. I acknowledge that the authors attempt to better guide the reader through the number of applied methods and obtained results by introductory paragraphs to each subsection. However, by this, many information are repeated several times, making the text lengthy. The information in these introductory paragraphs becomes most times already clear from the titles of the subsections. Thus, I suggest to remove these lines to make the text more concise and go straight to the point. I specify the respective lines below in the line-by-line comments. In general, the very detailed description and the number of applied analyses makes it, however, difficult for the reader to identify key messages. When revising the manuscript, the authors should check for redundancies of information and try to be more concise. The authors may also consider to separate results (including downscaling, variability of evaporation on sub-diurnal, seasonal and interannual scales, and precipitation moisture sources) from the discussion (comparison/discussion of driving processes of evaporation on different timescales, lake water balance, large-scale implications (see comment below)).

The authors estimate the monthly water loss from the lake based on their evaporation estimates and lake area. Can the authors also estimate the amount of groundwater recharge based on the seasonal changes in the lake surface area and evaporation, and/or show if there is seasonal variability in the groundwater influx? Or is this beyond the limitations of the approach? As the precipitation amount is low and less variable in the autumn/winter months, the groundwater recharge may be estimated with sufficient precision. Also, the authors do not consider runoff from the catchment caused by precipitation, which may increase the contribution of precipitation (directly + indirectly) significantly. When taking runoff into account, may the amount of groundwater recharge necessary be reduced?

The discussion of the results in a broader context is limited. To which extent are the obtained results applicable to other salar systems in the Altiplano Plateau? Which implications have the increase in evaporation rate / decrease in precipitation for saline lakes in the Atacama Desert and water resource management in this region? I would acknowledge if the authors can add a short paragraph on this subject, at least as part of the outlook in the Conclusion.

Line-by-line comments:

Line 31: “[...] within the Atacama Desert where rainfall provides a source of water for northern Chile” => sense of the phrase unclear; In the Atacama Desert, precipitation is generally scarce and groundwater, rather than precipitation, the major water source.

Line 38 ff.: The authors refer here mainly to previous studies at the Salar del Huasco done by the authors of this study. However, there are a number of other studies in recent years at the Salar del Huasco, which investigated, for example, the groundwater regime (e.g. Johnson et al., 2010; Jayne et al., 2016; Scheihing et al., 2017), or the hydrological functioning of the salar (Voigt et al., 2021). The authors may consider to mention them too as the results of the present study are of major relevance for them.

Line 64/65: consider specifying the sentence to “This dependence of precipitation on climatic factors implies that [...]”.

Line 88-102: The first and the second half of this paragraph contain kind of similar information. I recommend to merge them to avoid redundancies.

Line 107: With 135 km distance and ~4 km asl the Salar del Huasco is not really close to the ocean. It’s rather the ocean-land thermal contrast that forces the atmospheric flow from the Pacific to the Altiplano in the afternoon hours.

Line 173: add that  $EC_{\text{water}}$  takes measurements “above the saline lake” in contrast to met-stations<sub>SDH</sub>, which takes measurements above bare soil.

Line 187: As stated here, freezing is an important variable as it leads to a reduction of evaporation. It would be great if the authors can add some information on the periods of freezing at the Salar del Huasco and seasonal differences (e.g., how many days per season).

Line 203/204: May be combined with the first sentence of the paragraph to avoid redundancies.

Line 210: suggestion: Seasonal averages of moisture sources are “evaluated” rather than “shown”

Line 212: suggestion: “long-term water balance” rather than “mass balance”

Line 216: The lake’s area estimates are obtained from de la Fuente et al. (2021)? Add reference.

Line 227-232: I think this paragraph is redundant. There is no need for an introductory paragraph. That results obtained on i) diurnal, ii) seasonal, and iii) interannual scales are subsequently presents becomes already clear from the titles of the subsections.

Line 234-236: redundant. Go straight to the point. “Fig. 4 shows ...”

Line 308: The authors highlight that local evaporation provides a significant moisture source for precipitation in the rainy season. Does this imply that evaporation forces precipitation, leading to the positive correlation between both (both high in austral summer, low in winter)? How may this be interpreted in terms of the anti-correlation between evaporation and precipitation observed on interannual scales?

Line 368: In the sentences before, the authors argue against precipitation as the main driver of lake recharge. Thus, only groundwater should remain as an alternative explanation.

Line 386-388: As mentioned before, for me, there is no need for an introductory paragraph to each section. The authors may consider to remove these lines.

Line 401/402: Redundant, see comment before. The authors may consider to remove these lines.

Line 482/483: doubling the information that seasonal changes are dominated by radiation (mentioned in line 479/480).

Line 503-505: Consider to merge the two sentences.

Line 587: ice melting occurs when air temperatures are “above” 270K rather than “below”?