

The manuscript “Mountain water cellars: a chemical characterization and quantification of the hydrological processes and contributions from snow, glaciers and groundwater to the Upper Mendoza River basin ( $\sim 32^\circ \text{S}$ ), Argentina” reports on different hydrological and chemical analysis of data collected in the Cordillera Principal. These analysis cover streamflow, environmental variables, hydrochemical properties, electrical conductivity, isotopic composition and other statistical analysis, such as Principal Component analysis, the application of a Generalized linear mixed effect model or an end member mixing analysis. The analysis performed in the manuscript is based on data generated in a comprehensive measurement campaign covering about 5 to 6 months. Generally, the content can be of interest for potential HESS-readers. However, there are substantial deficits, which must be addressed by the authors:

- (1) An English proofreading must be performed for the manuscript, also including the figure captures. It is out of scope of this review to address the frequent grammatical deficits or the necessity to rephrase sentences (e.g. “Cuevas, Vacas and Tupungato rivers when join in Punta de Vacas, form the Mendoza River.” (P22L7-8) should be “Cuevas, Vacas and Tupungato rivers form the Mendoza River in Punta de Vacas”. It is unclear, what “The logo of Copernicus Publications” means in this figure capture.). There are many examples which could be provided here.
- (2) The manuscript is generally quite long and it would be helpful to streamline the text and to leave out parts which are not essential.
- (3) Many measurements were performed and are used in the analysis presented in the manuscript. It would therefore be good to add a section “Study Area and Data Basis” to the manuscript. Here, the authors should add a table summarizing all the measurements performed, which will help the reader to keep an overview. Additionally, the general hydrological characteristics and setting should be described (i.e. long-term mean values of precipitation, discharge, evapotranspiration, temperature etc.). After this overview, it is easier to describe the methods applied, without having to refer to settings of the measurements (as is the case now).
- (4) All locations and regions mentioned in the manuscript, figures and figure captions should be consistent (what is currently not the case, e.g. in Fig. 5 and 6; in Fig. 4, for the first time, the Colorado river and Uspallata Stream are mentioned, without further references in the text).

- (5) In Fig. 1 an overview map is given. Here, substantial improvements are necessary, also in the context of giving the reader a better overview. In the map, measurement locations presented in the table (see (3)) should be displayed. From the map, the topography is not easily understandable – adding a hillshade layer and using different elevation colours would help in this context. The colours and symbology used should be adopted for easier readability (e.g. The boundary colour of the Horcoques River Basin is basically the same as the ice bodies). “References” should be “Legend”. Other relevant information and locations, which are mentioned in the text, should be included in the map (e.g. Punta de Vacas).
- (6) The quality of the figures needs to be improved. The font sizes are frequently too small and cannot be read easily. The x-axis labels in Fig. 5 & 6 should be consistent. Adding vertical grid lines, e.g. at every month, would help to analyse the temporal dynamics (e.g. begin of snow melt, glacier melt) described in the text. Using colours in Fig. 10, 11 and 12 would be helpful. Also adding a legend in the Fig. 10 and 11 is necessary.
- (7) Figure 3: It is not clear, what is meant with “Ice covered basin efficiency” and “Efficiency related to Cuevas river in %”.
- (8) Tab. 1 & 2: No significant variables are marked in bold.
- (9) Tab. 4: Table caption is one of the examples where a rephrasing is needed. The term “rate per month” is not appropriate.
- (10) Methodology: Are all sub-sections necessary?
- (11) The term for “Height-discharge calibration curves” in Hydrology is “rating curves”. The authors present on P4L25 and P5L3 equations for Mt. Tolosa rock glacier and the Horcoques Inferior Glacier (in the text it also called Horcoques Inferior debris covered glacier). The equations should be consistently formatted as shown in Eq. 1. In general, I think that these equations do not have an added values for the reader.
- (12) P4L26-27: “The determination coefficient between calculated and observed streamflow was 0.95, for  $y = 0.999x - 2E-05$ ”. It is unclear what  $y = 0.999x - 2E-05$  means in this context.
- (13) P5L4: For what is this equation? What is the difference between measured flow ( $Q_m$ ) and calculated flow ( $Q_{calc}$ ), since  $Q_m$  is also calculated as a function of  $h$ ?
- (14) P6L3-6: Was the data of these totalizer used in the study?

- (15) P9L6-7: The equations should be formatted as shown in Eq. 1. The naming of the variables should be improved, e.g. TMD air (France) is an odd naming for a variable.
- (16) Section 3.1: What other variables were analysed apart from air temperature? I am surprised that the authors do not mention any relationship between glacier melt and solar radiation.
- (17) Section 3.2.1: What does “Glacier covered basins performance” mean? Does the mentioned Cuevas River Basin here refer to Punta de Vacas? Some interesting results, e.g. what is the percentage (not weighted by area) of the contribution of the glacier to the total runoff, is not given here, but can only be found in the discussion. Maybe it would also make sense to merge the results and discussion part.
- (18) Section: 3.2.2.: The naming of the section needs rephrasing. For what is Fig. 4d, since it is not referred to in the text?
- (19) Section 3.4: Fig. 13 is not in the manuscript.
- (20) It would be good to change the “Conclusions” into “Summary and Conclusion” and to add here the main findings and quantitative results from the manuscript, e.g. the contributions of the different water sources to the total flow. These numbers are also missing in the abstract.
- (21) In section 5, the authors write “By deepening our understanding about the delivery and depletion dynamics of different water sources influencing the hydrological processes of the Mendoza River basin, the vital artery of this arid and fragile territory, these tools are expected to serve to decision makers and to generate the necessary mitigation policies for an improved water resources administration along the actual and future climate change scenarios.” (By the way - Word is giving me a warning: “Long sentence (consider revising)”). It is unclear, what is meant with “tools” in this context. What would be an example, how decision makers can generate the necessary mitigation policies for an improved water resources administration along the actual and future climate change scenarios from the results? Are these not empty phrases, which the world anyway has too many?