Comment on essd-2022-290
Anonymous Referee #2

Referee comment on "Two new early instrumental records of air pressure and temperature for the southern European Alps" by Yuri Brugnara et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-290-RC2, 2022

Two early records of temperature and air pressure in two Italian cities were digitized and analyzed in this work. The quality of such records was evaluated, along with efforts conducted to homogenize and estimate the standard errors of these records. For one record (Bolzano/Bozen), two different digitization methods were used and the accuracy of these two methods were assessed.

While I found this work interesting and it is also important to obtain historical instrumental records, the objective and the methods applied in this work are confusing sometimes and discussions provided by the manuscript in its current form lack focus. Specifically, it is unclear whether the main objective of this work aimed to evaluate the obtained two historical records or to evaluate the two digitization methods. If the objective is to evaluate the two records with their observation times, data quality, and possible errors, it seems that the methods are not necessarily new and the methods from the previous work were often used and referenced without context of why these methods were used (e.g., the transformation of monthly corrections in Line 160 and error estimation using Brugnara et al. 2022a in Line 165). If the main objective is to compare the two digitization methods, the two approaches were only applied and assessed for half of the Bolzano record, which doesn’t seem to be adequate. Assessing machine learning methods of digitizing the handwritten Rovereto records may be a more difficult task but likely provides more scientific merit.

The revision of the manuscript is therefore recommended to focus on one and more clear objective. If the objective is to provide and assess the two historical records, the paper should be more clear on why the selected methods such as for data quality checks, homogenization, and error estimation were used and aimed to achieve, what are the merit and limitations of using these two records for future studies, and how these two records contribute to the existing knowledge on historical Southern Alps climate. If the objective is to compare the digitization methods, additional digitization of the two records and comparisons especially on the Rovereto record are recommended. Some additional comments are provided below.
Major comments:

- It may be useful to include a table listing all of the different historical records used and available in the region and the periods of these records. In addition to the two digitized records, the measurements from an anonymous observer mentioned in Line 189 and Milan, Padua, and 20CR data mentioned in Line 237 were also used for evaluation. Do such measurements (for example, the ones from the anonymous observer) are generally accepted to have a higher quality than the assessed two records?
- Similarly, a summarized table with a list of findings on the measurement time, accuracy, homogenization, and possible errors for the two time series of records would be useful to readers.

Minor comments:

- Line 168: please provide additional details on the individual errors and why the equations such as equation (5) can be used to estimate such errors.
- Figure 7a: there seems to be a sudden increase of temperature difference around July 1st, is there any reason why for such an increase?
- In Line 194, the “Bonfioli had a relatively fixed observation time” was summarized, while in Line 234, the reason listed is that the Rovereto record has “a larger variability of the observation times”. It seems to be inconsistent between these two sentences.
- Line 238: measurements of Bonfioli are of “remarkable quality for the time”, this is a subjective statement, needs some references or baselines to compare with.
- Line 240: 0.98 as a correlation coefficient for 1986-2000, need a citation here.
- Figures 12 and 13: it seems that the homogenization can largely improve the Rovereto record especially for the pre-1816 period, can a conclusion be drawn that the homogenized Rovereto record should be used?