

## ***Interactive comment on “A collection of sub-daily pressure and temperature observations for the early instrumental period with a focus on the “year without a summer” 1816” by Y. Brugnara et al.***

**Anonymous Referee #1**

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The paper “A collection of sub-daily pressure and temperature observations for the early instrumental period with a focus on the ‘year without a summer’ 1816” by Brugnara et al. represents an interesting data rescue effort focused on the early instrumental period. It demonstrates that climate reconstructions based on instrumental data are still far to be considered a closed work, being the unexploited data stored in the archives probably more than those already used for the early instrumental period.

The paper contains no sensational scientific results: the pressure probably is not the most suitable variable to highlight the uniqueness of the event in 1816 and it would be useful to give equal importance to temperature and precipitation data too (many data are available for both these variables in Europe). However, it is a fair job of data

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recovery that may attract the attention of the scientific community on the still open issue of early instrumental period and that, thanks to the supplementary material, provides excellent suggestions for an extension of the data rescue activity. For these reasons I suggest the present paper for a publication on Climate of the Past.

I have few corrections to suggest to the authors before the final publication.

Page 1746 lines 26-27: “Another difficulty arises from data quality, in particular for temperature: the homogenisation with modern data is usually not an easy task”. I do not completely agree with this sentence: recent results on the application of a wide set of homogenization tools to a benchmarking data-set (see Venema et al., 2012, published on this same Journal <http://www.clim-past.net/8/89/2012/cp-8-89-2012.html>) proved that almost all relative homogenization algorithms improved the homogeneity of the temperature data. In the present case, however, the digitization of few years instead of the complete temporal series does not permit the application of the most common homogenization procedures.

Page 1754 lines 20-21: “We assumed all times to refer to local solar time, since official standardised times did not exist.” Is this valid also for ship data? Please clarify this point.

Page 1756 lines 10-13: “At some observatories, however, the barometer hung in a heated room, in which case we will have an unknown error, usually with some seasonal cycle. Note that we rarely know the location of the barometer from metadata.” It is not clear to me for which observatory the location is known and for which others it isn't, is it possible to specify the three possibilities (outside, inside unheated and inside heated) in table 1? For barometers located inside into a heated room the use of outside temperature probably does not produce better results than using a constant temperature value equal to the annual mean (assuming that heating maintain a constant temperature through the year).

Page 1760 lines 6-7: “To achieve this, we linearly interpolated all pressure observa-

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tions to four daily equally-spaced time steps: 00:00, 06:00, 12:00 and 18:00 UTC.” Why linearly? Daily cycle should be better fitted by a trigonometric function. Is this due to the low number of sub-daily observations?

Page 1763 lines 1-3: replace “much lower variability” with “much lower spatial variability”; Figure 4 should be figure 7 (both at line 1 and 3).

Page 1767 lines 7-10: this sentence should demonstrate that an average 2p.m. temperature of 19°C for summer 1816 is representative of an heatwave, but its comparison with the absolute maximum of 34°C over the 1800-1825 period does not convince.

Table 1: move “Y = available, N = not available” into a parenthesis after “Loc = exact location (within 100 m) from metadata”; move “TB = temperature of the barometer, TA = outside air temperature, CL = outside temperature climatology, CO = observations already corrected for temperature” into a parenthesis after “TCorr = data used for temperature correction”

In figure 4 a comparisons with other data-sets with available data for that period, such as the Berkley Earth Surface Temperature (available for Europe since mid 18th century) and the HISTALP data-set (available for the Greater Alpine region since mid 18th century), would be welcome to strengthen the conclusion of the authors.

Ship data were presented but never used in the analysis. It would be interesting to exploit also these data, at least showing a case study that make use of them. Maybe those available around India could be useful to validate the hypothesis that a delayed summer monsoon caused late torrential rains there.

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