

## ***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 #3**

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This article by Brugnara et al. presents a valuable new set of historical subdaily pressure and temperature observations spanning the US and Europe for an early period of the 19th century. After presenting a detailed description of the data preparation, the authors focus their attention on the years following the famous Tambora volcanic eruption, using the recovered data to explore case studies of synoptic scale circulation and temperature patterns experienced from 1815 to 1817.

The authors have clearly done a lot of work in collating and preparing the early instrumental observations for analysis. The level of detail that they describe will be very helpful for future historical climatology studies. The exploration of the 1815 to 1817 extreme events are also make for fascinating reading, and provides another timely ex-

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ample of the value of historical data.

Overall, I enjoyed reading this paper, and believe that it is worthy of publication in *Climate of the Past*, subject to some minor revisions.

General comments.

1. I think that more could be said about the new data provided by this work that lies outside the 1815 to 1817 period. This could be provided by adding some explanation at the start of section 3 on why the post-Tambora period is being studied, or in the concluding remarks.

2. Several of the figures would be much easier to understand if they were re-created using different colour schemes.

3. A lot of corrections and adjustments are made to the pressure observations. This is clearly important, but the relative size of each adjustment is not always clear. Additionally, I am unsure as to how the first round of data processing compares to the statistical corrections applied. If feasible, it might be worth creating a schematic, that outlines these steps and clarifies the average size/importance of the adjustments made, or provides an example from one source.

Below are some specific comments, as well as some technical suggestions to help improve readability.

Specific comments

Pg 1747, final paragraph: This section seems a bit disjointed and specific, compared with the rest of the introduction. It might be better to move this information to section 2.3.3. An overview of the paper structure would be a better way to conclude the introduction.

Pg 1749, final paragraph: I understand why you removed the 1816–1817 Paris data from the University of Barcelona, but how did these removed observations correlate

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with the data digitised by the University of Bern? Even giving a correlation coefficient would give future data users more confidence in the full 1811-1820 series.

Section 2.2. Please provide a couple of references to support your comments about the history of barometers. Alternatively, expand the sentence referring the reader to Middleton (1964) to indicate that you obtained all of this information from his work.

Pg 1752 Eq 1: Where did this equation come from?

Pg 1755 L13: Why did you choose 2pm for the assumed local observation time?

Section 2.3.4: Can you estimate the average difference that the correction to local gravity made on the pressure readings?

Section 2.3.7. Similarly, can you provide some basic statistics on the impact that the interpolation step had on the data? It would be good to know the range of adjustments made during this stage. Also, how did you linearly interpolate data for stations that only had one observation per day?

Section 3.3.1. Did you re-interpolate the statistically corrected data back to the synoptic hours mentioned in section 2.3.7, or apply the adjustments to the already interpolated values? This is not clear.

Pg 1764 L12: What is the resolution of the 20CR?

Section 3.3.3: The tenses are a bit confusing in this section.

Section 4, second last paragraph: I think it is a good idea to remind the reader of the supplementary section here. Most of the analysis is only on 1815–1817, but you are actually providing a lot more data to the ISPD.

Figure 1: If you can, it would be helpful to add an inset map showing some of the places mentioned in the text (Exeter, Paris, Ylitornio, St Petersburg etc), for non-European readers. The colours of the ship routes are also very confusing. Maybe try a graded scale instead (from light to dark).

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Figure 6: Define SD in the caption, as well as the text.

Figure 8: Could you specify the stations that have the largest corrections? It might also be interesting to explain these differences in the text.

Figures 9-10, 12-13: The colours used are very difficult to distinguish. Have a look at <http://colorbrewer2.org/> and see if you can use a diverging scale that can be more easily understood.

Technical comments

Pg 1744, L23: 'the first', rather than 'a first'

Pg 1745, L4: 'Some of these professionals', instead of 'Some of them'

Pg 1745, L6: 'universities', not 'university'. It would also be good to see a reference here, for those interested in reading more on the role of meteorological observations and the role of the upper class. Maybe Golinski (2007)?

Pg 1745, L6: 'begun' not 'began'

Pg 1745 L8: 'on board', not 'on board of'

Pg 1745 L9: 'French Revolution' is capitalised

Pg 1745 L14: A reference here would also be nice.

Pg 1745 L28: Add reference to Cram et al. (2015).

Pg 1746 L29: Perhaps say 'does not require such specific exposure', instead of 'does not have to be outside'. Also provide a reference for this.

Pg 1747 L4: add 'historical' before 'observations' just to clarify.

Pg 1747 L8: Similarly, I would add 'in the early instrumental period' after 'most of the data'.

Pg 1748 L6: add 'and' after the University of Bern

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Pg 1748 L9-10: 'with the exception of a few stations'

Pg 1748 L24: 'give an idea of', not 'give an idea on'

Pg 1751 L8: 'among', rather than 'inside'

Pg 1751 L9: 'exposure' rather than 'exposition'

Pg 1753 L12: 'of a few year', rather than 'of few years'

Pg 1756 L27: Add a comma between 'summer' and 'differences'

Pg 1762 L1: Do you have a more recent reference for storm track analysis? Maybe Matulla et al. (2008)?

Pg 1763 L7: 'suspicion' rather than 'suspect'

Pg 1763 L11: I suggest rewriting to read '...among the variability of most of the series, the lack of metadata...' or something similar. The current sentence is hard to understand.

Pg 1764 L2: 'the data are', rather than 'the data is'

Pg 1764 L20: 'relative', not 'relatively'

#### References

Golinski J. 2007. British weather and the climate of Enlightenment. The University of Chicago Press, Chicago, 284 pp.

Cram, T. A., G. P. Compo, X. Yin, R. J. Allan, C. McColl, R. S. Vose, J. S. Whitaker, N. Matsui, L. Ashcroft, R. Auchmann, P. Bessemoulin, T. Brandsma, P. Brohan, M. Brunet, J. Comeaux, R. Crouthamel, B. E. Gleason Jr., P. Y. Groisman, H. Hersbach, P. D. Jones, T. Jónsson, S. Jourdain, G. Kelly, K. R. Knapp, A. Kruger, H. Kubota, G. Lentini, A. Lorrey, N. Lott, S. J. Lubker, J. Luterbacher, G. J. Marshall, M. Maugeri, C. J. Mock, H. Y. Mok, Ø. Nordli, M. Rodwell, T. F. Ross, D. Schuster, L. Srnec, M. A. Valente, Z. Vizi, X. L. Wang, N. Westcott, J. S. Woollen, S. J. Worley, 2015: The International

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Matulla, C., Schöner, W., Alexandersson, H., von Storch, H., & Wang, X. L. 2008. European storminess: late nineteenth century to present. *Climate Dynamics*, 31(2-3), 125–130. doi:10.1007/s00382-007-0333-y

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**CPD**

11, C713–C718, 2015

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