

## Answers to Report 1 (labelled as Report #2, Referee #1: Philip Jones) – Our replies in bold

### Comment 1

I wasn't asking you to revise and quality check Polli's monthly means from the 1951 paper. You are making many arguments for not doing something that is quite simple. Just compare with the 1841-1950 monthly mean SLP values in the publication.

Some of the points you are making about Polli would be useful, if they could be briefly expressed in your paper. You have spent a lot of time writing almost a page of comments about what Polli did. These comments will be completely forgotten if you don't do anything with them.

The point of a review is not for the authors to give more detail to the reviewer, but to help the authors produce a better paper for readers of the paper in the future.

You have effectively produced a difference series, when you say Polli's data (for 1841-1950) differs by more than 1mm of Hg (presumably this is Hg, as SLP is normally given in hPa) 4% of the time. A histogram of the values would be all that is needed. Then you can explain that the bigger values (10 or 20mm) are clearly typos in Polli's series from 1951. This is all that would be needed. You don't need to do a revision of Polli's 1951 paper, but what you have done allows you to put in the paper the extra work you have done.

**The reason for providing details to the reviewer only is that we interpreted the 'discussion' stage as an opportunity to go beyond simple responses to reviewers' comments and explain our viewpoints more extensively. In a 'traditional' peer-review process we would not have behaved this way. If we were wrong, we apologize.**

**To respond to the reviewer's remark, we included the new Section 3.3 (page 12, lines 7-20, of the marked-up version):**

### ***3.3 Comparison with previous monthly Trieste time series***

***A time series of mean daily pressure is discussed in this work for the first time, however, in the past monthly time series were already produced by different authors (Kreil, 1854; Jelinek, 1867; Osnaghi, 1874; Mazelle, 1886). Much more recently, Polli (1951-1952) summarized the monthly pressures, reduced to the MSL, for 1841-1950.***

***Figure 8 displays the differences between the monthly means from the present work and those in Polli (1951-1952), that were originally reported in millimetres of mercury (mmHg). The red dots highlight the absolute differences exceeding 1 mmHg, corresponding to about 1.33 hPa, which occur in 53 months out of 1320, i.e. 4%.***

***Discrepancies up to a few tenths of a mmHg are found in most cases, generally due to small differences in calculations or rounding. The data from March 1844 to May 1846 obviously differ as a consequence of the corrections discussed in Sect. 3.2. The step-like discontinuities in 1865, 1868, 1876 and 1903 correspond to changes of the barometer height (Table 3) and are related to the reduction to the MSL. In fact, for each height, average annual corrections were used until 1902, and constant monthly corrections from 1903 onwards. By contrast, we reduced the individual pressure values before further calculations. At least in four cases, pressure was too high or too low by exactly 10 or 20 mmHg due to misprints. In several cases Polli's data and those in the original data source do not match. Finally, some mistakes may have occurred in the original calculations.***

**The new Figure 8 and related caption appear at page 12, lines 1-4, of the marked-up version:**

***Figure 8: Differences between monthly pressures from this work and from Polli (1951-1952). Those exceeding 1 mmHg, i.e. about 1.33 hPa, are highlighted by red dots.***

### Comment 2

Zagreb is likely too far away, but it is quite easy to adjust it to mean sea level. It is nearer than Milan though. I just felt that you needed to make more of the comparisons with Padua, as it is much

nearer than Milan. You could just mention that Zagreb is available, and also that an early series might be available for Udine. Udine is available as monthly averages (and is in the list given in Bronnimann et al., 2019), but even at this timescale this might be good enough. You don't have to sort out either Zagreb or Udine, just state that they might be useful in determining the long-term consistency of your Trieste series. You have shown that Polli's data for Trieste only differed from your new series for 4% of the time.

You mention that Padua looks incorrect during the 1990s and I agree with you based on your series and also that from Milan. PD, MI and TS aren't the only series in this part of Italy taking meteorological measurements though. There are likely SLP observations available from the Italian Meteorological Service in Rome, for places such as Verona or Venice Airport. They might be hard to obtain though.

**Please note that the Udine time series from the databank cited in Broennimann et al. (2019) only provide pressure data since 1957, therefore we did not follow the reviewer's suggestion. Another time series was used instead.**

**In Sect. 3.2 the following text was added (page 11, lines 25-29, of the marked-up version):**

*Besides the time series used for the daily data comparisons, monthly time series are available from other stations close to Trieste, namely Zagreb-Grić (Croatia, 1862-2007) and Ljubljana (Slovenia, 1854-2009), both available from the HISTALP data base (Auer et al., 2007), and Udine (Italy, 1803-1855; Meteorologisch Jaarboek, 1871). Overall, these time series allow to corroborate the conclusions drawn from the comparisons with Milan and Padua daily data. In particular, Udine is coherent with Milan and Padua in 1841-1855, thus confirming the anomalous behaviour of Trieste.*

**New relevant references:**

**(Page 16, lines 21-25, of the marked-up version):**

*Auer, I., Böhm, R., Jurkovic, A., Lipa, W., Orlik, A., Potzmann, R., Schöner, W., Ungersböck, M., Matulla, C., Briffa, K., Jones, P., Efthymiadis, D., Brunetti, M., Nanni, T., Maugeri, M., Mercalli, L., Mestre, O., Moisselin, J.-M., Begert, M., Müller-Westermeier, G., Kveton, V., Bochnicek, O., Stastny, P., Lapin, M., Szalai, S., Szentimrey, T., Cegnar, T., Dolinar, M., Gajic-Capka, M., Zaninovic, K., Majstorovic, Z., and Nieplova, E.: HISTALP—Historical instrumental climatological surface time series of the greater Alpine region, *Int. J. Climatol.*, 27, 17–46, doi: 10.1002/joc.1377, 2007.*

**(Page 18, lines 32-34, of the marked-up version):**

*Meteorologisch Jaarboek: Meteorologisch Jaarboek voor 1870, Koninklijk Nederlandsch Meteorologisch Instituut, Utrecht, The Netherlands, available at: <https://opacplus.bsb-muenchen.de/Vta2/bsb11035259/bsb:43925481871> (last access 2 June 2021), 1871.*

Comment 3

It is worth mentioning that you might work on the earlier data – in the paper, not just to me. I agree that developing a long temperature series would be much more work, but it would be a useful piece of work. There are likely more long-term temperature series in the region than there are SLP ones.

**As explained above, the answers to the reviewer were also meant to be a 'discussion'. We do not agree with the reviewer on both points.**

**1) He suggests to mention a work that was not done (although it might be in the future). As explained at page 4, lines 16-17, we did not do it due to the lack of metadata and auxiliary information.**

**2) Secondly, reconstructing a temperature time series is completely out of the scope of the paper. We also believe that a pressure time series is more valuable exactly because there are fewer of them compared to temperature, as the reviewer said. For these reasons, the text was not changed.**

Comment 4

Thanks for the revisions about the diurnal cycles, and also possible ideas about the missing observations.

**No answer.**

Comment 5

There is still the issue of the long-term homogeneity of the record before 1865. You're presenting a series that clearly has a problem. You have added some text, but it would be useful to mention that your series must have an issue before 1865 when compared to Padua and Milan.

**The whole section 3.2 is devoted to comparisons with Padua and Milan. Near the end of the section (now at page 11, lines 20-21, of the marked-up version) we wrote: "We can conclude that Trieste pressure of the 1841–1864 period should be considered suspect, ...". In our opinion, that sentence contains what the reviewer asks for.**

Comment 6

20CR/20CRv3 might be a dynamically coherent product, but if it takes in your Trieste data before 1865 it is likely to be wrong. The differences are not that large, and it isn't formally looking for relatively small systematic anomalies. I suppose you are OK if you're not releasing the sub-daily data, but can you be sure of this into the future? In recent decades (since 1980), 20CRv3 will be taking in data from Milan, Padua and stations put into SYNOP messages by the Italian Met Service. This could include Trieste, but maybe a different site from yours.

**The Trieste data in SYNOP messages come from the station attended by the Met. Service of the Italian Air Force, which was close to ours in the past and was moved to a different site, several kilometres away, about 20 years ago.**

**We do not understand the other reviewer's remarks.**

**1) "... if it takes in your Trieste data before 1865 it is likely to be wrong". In Fig. 7a the black curve shows that TS-TS(20c) is coherent with TS-PD and TS-MI. If the 20CR curve was wrong because it ingested Trieste data, the black curve should have been much closer to zero. We rely on the fact that the data assimilation can detect too anomalous data, and gets rid of them or minimizes their impact.**

**2) "I suppose you are OK if you're not releasing the sub-daily data, but can you be sure of this into the future?". In fact, sub-daily data were not released. As for future developments, they will be considered for another work.**

**Answers to Report 2 (labelled as Report #1, Anonymous Referee #2) – Our replies in bold**

**As the reviewer's assessment is 'accepted as is', we thank him/her.**