

review of ‘On misleading solar-climate relationship’ by B. Legras, O. Mestre, E. Bard and P. Yiou.

The authors present a study in which the conclusions of an earlier study, which shows strong correlations between solar activity and meteorology, are refuted. The authors argue that a critical look at the data quality and an adequate statistical approach are of paramount importance when analyzing the sun-weather relationship.

The issue of a sun-weather relationship is strongly debated in the scientific literature and this debate reaches well beyond the pages of scientific journals. The authors should therefore be applauded for their attempt to remove confusion in the scientific debate concerning this issue. The authors’ initiative to strive for complete transparency by making available the data and the analysis tools is applauded as well.

The approach is original and informative. It is a valuable contribution to the field and deserves to be published in *Clim. Past*. However, the ms. needs small revisions to meet the standard of *Clim. Past*.

Below are a few points which require modification before the ms. is publishable. I’d like to note that there are quite a few typos and grammar problems which are likely to have surfaced with a simple check with standard available software. The ms. needs to be returned to the authors for a *MINOR* revision.

Points to modify are:

- The title of the study (“On misleading solar-climate relationship”) does not quite relate to the arguments the authors make. The authors argue that a solar-climate relationship does not really exist - at least that it cannot be convincingly shown that it differs from randomness. The point I like to make is that a non-existing relationship cannot be misleading. My suggestion would be to change the title to something like “A critical look at solar-climate relationship” (although I realize that this might remind readers to the work of Pittock (1978)).
- Part of the discussion in the current paper and the paper by Le Mouél *et al.* (2010) boils down to the correct estimation of the error bars around the grouped and low-pass filtered yearly temperatures of the stations. The claim in the present paper is that a correct estimation of the error bars is much larger (a factor of ca. 5) than the estimates of Le Mouél *et al.* (2010). Due to the absence of a clear recipe for the calculations of the error bars in the latter study, I could not compare the two recipes. However, the current paper seems to reproduce the error bars of Le Mouél *et al.* (2010) quite well in their fig. 5.

The point I would like to make here is that I found it hard to arrive at equation (3) of the current paper. It seems it is possible to reproduce this formula, but not without a strong assumption. This concern relates to the appearance of the factor $(1/N^H + 1/N^L)$. The authors need to make this step clear so that even the less statistically-inclined reader is able to follow and reproduce the steps.

A strong point of the current paper is that the estimates of confidence intervals is done by a bootstrapping method as well. The authors should be more specific in the actual paper concerning the precise procedure taken in this bootstrapping.

Other points

- page 768, lines 24, 25: The variations in the 10.7 cm solar flux, an index often used for the solar cycle [4], are much more than suggested. The

variations range from ca. 70 units for solar minima to ca. 200 units for solar maxima [1].

- page 774, line 12: consulting the ECA&D staff made clear that the policy changes were at the side of the Belgian Met. Office (KMI) rather than ECA&D. This point also relates the remark made at page 778, line 8.
- page 776, lines 15-18: in order to assess the homogeneity of the Bologna series, the authors need to make clear that their reference series do not suffer from inhomogeneities. One option to do this would be to give the homogeneity information provided by the ECA&D webpages, but other approaches are possible as well.

Minor points

- p. 768, line 2: add "The" before "Solar-climate"
- p. 768, line 3: add "an" between "and" and "adequate"
- p. 769, line 2: typo: Another
- p. 769, line 9: add "an" between "versus" and "alternative"
- p. 769, line 10: change the sentence to: "...interpret correlations as significant which..."
- p. 769, line 18: typo: importance
- p. 780, line 18: typo: "on" should be "in"
- p. 784, line 25: typo: indeed
- p. 788, line 16: typo: influence
- p. 788, line 34: typo: Demarée
- p. 797: typo: bootstrapping (twice)

References

- [1] K. Labitzke. The global signal of the 11-year sunspot cycle in the stratosphere: Differences between solar maxima and minima. *Met. Zeit.*, 10:83–90, 2001. doi:10.1127/0941-2948/2001/0010-0083.
- [2] J.-L. Le Mouél, V. Kossobokov, and V. Courtillot. A solar pattern in the longest temperature series from three stations in Europe. *J. Atmos. Solar Terr. Phys.*, 72:62–76, 2010. doi:10.1016/j.jastp.2009.10.009.
- [3] A. B. Pittcock. A Critical Look at Long-Term Sun-Weather Relationships. *Rev. Geophys. Space Phys.*, 16:400–420, 1978.
- [4] H. van Loon and D. J. Shea. The global 11-year solar cycle in July-August. *Geophys. Res. Lett.*, 27:2965–2968, 2000.