

***Interactive comment on “Influence of the sunspot cycle on the Northern Hemisphere wintertime circulation from long upper-air data sets” by Y. Brugnara et al.***

**Anonymous Referee #2**

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General comments:

The paper contains very interesting results with first long-term evidence of the 11-year solar cycle influence on NH wintertime circulations. The authors use three different types of historic upper air reconstructions of geopotential height, winds and temperatures as well as two different methods, namely composite mean differences and multiple linear regression. The paper is careful and well-written and finds a significant solar signal in particular in the European region over the last 7 solar cycles. The results fill the gap of longer observational evidence of solar influence on climate typically limited to 3 solar cycles of the satellite era in the upper atmosphere. The authors provide im-

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portant evidence for solar influence on climate during late winter and spring in Europe. The results can be used as very valuable comparison with modeling studies testing physical mechanisms for the transfer of the solar signal. I recommend publication after some minor points indicated below have been taken into account by the authors.

Specific comments:

- Introduction: sometimes the impression is that paper references are not very well balanced: many papers are mentioned in the Gray et al. (2010) and are not explicitly pointed out again, but some papers are. Please make sure that this balance is well suited.
- Vertical cross sections of some variables (e.g., temperature and wind from 850 to 100hPa) would be very valuable especially for comparison with model results. Even though it might not be possible for all three reconstructions, it would be worth showing it for a few.
- I am missing a more indepth discussion of solar NAO links previously suggested in e.g. Kodera 2002/2003 or Ineson et al. 2011. A brief discussion is done in section 4.2 and in the discussion later on but a more detailed discussion should be included in the last part of the paper.
- The summary of findings regarding smaller (bigger) amplitude of the stationary planetary wave has to be supported by a discussion of the results before – currently it is only briefly mentioned. May be the climatological mean features of stationary waves can be included in the plots as was done for the upper tropospheric winds. The paper would also benefit form a discussion of blockings and their dependence on the solar cycle.

Technical comments:

Figure 11a: The colour bar should be extended to positive temperature differences above 1.5K, currently it is gray, resulting in a "hole" in the temperature signal over

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eastern Europe

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