

Interactive comment on “Solar Forcing for CMIP6 (v3.1)” by Katja Matthes et al.

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This is an important contribution which provides crucial datasets for future modelling. Nevertheless, the manuscript does not address a key issue which needs to be resolved before a new generation of climate models commences.

According to the IPCC AR5 report, chapter 5.3.5. of the Physical Science Basis, climate models still struggle to reproduce key climatic events such as the warm phase of the Medieval Climate Anomaly. This major deficiency and challenge has been recently confirmed by e.g. Wilson et al. 2016 and Luterbacher et al. 2016. <http://www.sciencedirect.com/science/article/pii/S0277379115301888?np=y> <http://iopscience.iop.org/article/10.1088/1748-9326/11/2/024001>

The simulations are essentially running too cold and do not reach the high temperature levels during the Medieval Climate Anomaly which are reconstructed based on palaeo-

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proxies. This may indicate that the radiative forcing assigned to solar activity changes in the climate models may actually be too low and needs an upward adjustment. It is clear that climate models and the value for solar radiative forcing need to first prove themselves in the hindcast before qualifying for future climate predictions.

The current manuscript, unfortunately, fails to address this important issue by starting key datasets only at 1850, i.e. the end of the Little Ice Age. In order to compare apples to apples it is necessary, however, to compare the current warm phase with the previous warm phase, i.e. the Medieval Climate Anomaly / Medieval Warm Period.

On page 48, lines 20/21 the authors write:

"For those groups that are interested, we also provide a 1000-year solar forcing time series with 11-year solar cycle variability included but without long-term trend".

Notably, this long-term trend is effectively the key to the problem, therefore it is counterproductive that this trend is cut out. Millennial-scale solar cycles of Eddy and Hallstatt nature deserve much greater importance, especially as Holocene climate fluctuations have been documented (e.g. Bond cycles) to operate on similar time scales.

I encourage the authors to openly address the hindcast and solar radiative forcing challenge. Long-term trends in solar activity need to be added for the past 1000-2000 years, in order to enable modellers to tackle the problem.

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