

Clim. Past Discuss., referee comment RC2
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Comment on cp-2021-156

Anonymous Referee #2

Referee comment on "Influence of long-term changes in solar irradiance forcing on the Southern Annular Mode" by Nicky M. Wright et al., Clim. Past Discuss.,
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The paper discusses the sensitivity of the SAM to solar irradiance variations in the context of a palaeoclimate reconstructions and last millennium simulations. This is an important area of work, and SAM and its impacts are very nicely described in the Introduction. The main conclusions of the paper are that the inclusion of solar forcing in transient last millennium simulations appears to improve agreements to proxy-based SAM reconstructions. The paper is clearly written, the figures well presented, and the references are up to date and include relevant and recent literature. I have just a few minor comments that may help to improve this already impressive manuscript below:

- It might be worth mentioning in the abstract why solar irradiance is being investigated. It is covered well in the introduction, but the abstract jumps straight in.
- The SAM minima at 1400 CE does have a striking resemblance to the big decrease in solar irradiance (Fig. 1) at a similar time. I would be interested to see if it is this feature that is largely driving the correlation?
- Is it worth briefly mentioning the statistical tests used in the methods?
- I would be interested if you looked into any (centennial scale) periodic aspect of solar variability. There are a number of studies (in Patagonia and the South Atlantic) that claim to determine some periodicity in westerly wind behaviour, and some ascribe this to a possible solar forcing. Is there any reason to expect a periodic component of solar variability on a longer timescale than the well-known 11yr cycle?