Clim. Past Discuss., 6, C205–C207, 2010
www.clim-past-discuss.net/6/C205/2010/

Climate of the Past Discussions

Interactive comment on "Solar-forced shifts of the Southern Hemisphere Westerlies during the late Holocene" *by* V. Varma et al.

Anonymous Referee #2

Received and published: 26 May 2010

The paper by Varma and co-authors is an attempt to explore the link between total solar irradiance variability and southern westerlies using both proxy data and models.

This is a very interesting paper, well written, concise and up to date concerning key literature discussing solar (total or not) irradiance variability and possible impact on the climate system. The most interesting result concerns the correlation analyses between the iron content of the Chilean sediment core and Be10 and C14 TSI-proxy by Vonmoos et al (2006) and Solanki et al (2004) respectively. These 2 proxies for total solar irradiance variability are indeed considered as some of the most up to date and it is very intriguing to see that there seems to be some co-variability at centennial timescale between iron content in the marine core off the coast of Chile and TSI over the past 3000 years.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

The model result is also interesting and might help to shed some light on the physical processes linking TSI variations at centennial time scale and the Southern Westerlies. I have however one major criticism concerning the modelling procedure. Thresher (2002) has shown for the instrumental period that the time-scale for Southern Hemisphere mid latitude variability has a quasi-decadal component. However, no evaluation of the model skill related to such natural low frequency variability is shown for Southern Hemisphere mid latitude while it is fundamental to separate the signal due to the applied external solar forcing from the model internal low frequency variability which will have a strong control over the mean (a few decades average) climatology. It would be really useful to show how well the model is able to reproduce such SWW variability by showing time series of SWW intensity and position over the 70 years periods for example or any diagnostics that will help evaluate and separate the internal variability from the forced signal. This is also a pre requisite to characterise precisely the initial state for each sensitivity experiments. Indeed, the presented 70-years average anomalies between the sensitivity experiments and the control run don't prove anything until we have, in addition to some error-bar related to the model internal variability, some information on the initial state within any model decadal component from which the 70-years sensitivity runs start. The results shown on figure 3 and 4 could indeed be due do a change of phase within internal multi decadal cycles depending on a pre-selected initial state from the control run. In addition, the authors should give us some arguments in choosing the initial state (phase in SOI, Southern Annual Mode both known to impact the low frequency variations of the SWW). They should also discuss the possible impact of such initial state on the resulting mean climatology so we can be sure that the sensitivity experiments are really showing the influence of TSI on the mean climate.

To conclude, this is a good paper, very interesting, well written and up-to-date. However before publication, the author have to prove that the results shown on figure 3 and 4 are robust.

CPD
6, C205–C207, 2010

Interactive comment on Clim. Past Discuss., 6, 369, 2010.