



Does observed and simulated cloudiness decadal variability in the Iberian Peninsula explain sunshine behavior?



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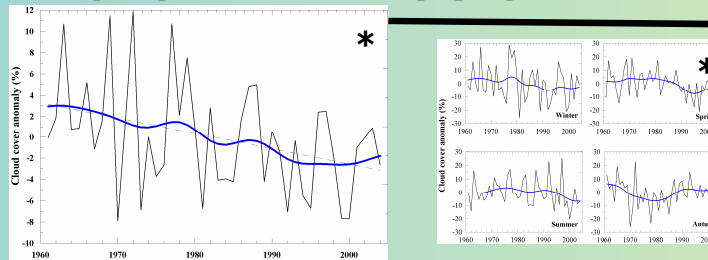
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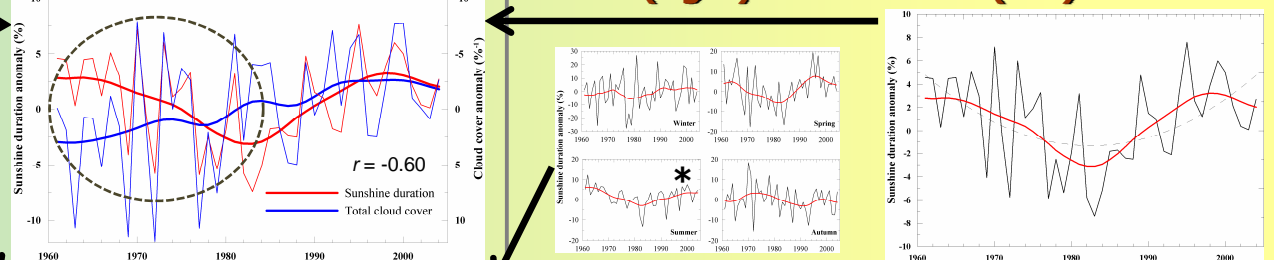
OBJECTIVE and DATA

- This work assesses the similarity in the decadal variability of **total cloud cover (TCC)** and **sunshine duration (SunDu)**, a surrogate of solar radiation data, over the **Iberian Peninsula (IP)** during the **1961-2004 period**. The database is described with detail by Sanchez-Lorenzo et al. (2007) and Sanchez-Lorenzo et al. (This volume, EGU2008-A-06695).
- We check the results from instrumental data with the **climate simulations** obtained with the latest version of the **Community Atmospheric Model (CAM3)**, developed at the NCAR. We use five-member ensemble integrations with a **resolution of 1.4°** and **forced** by observed **SST plus greenhouse gases (GHG), ozone, volcanic and sulfate aerosols, and solar variability**.
- Trends are calculated by least-squares linear fitting; for checking the significance ($\geq 95\%$) we use the **Mann-Kendall nonparametric test** (graphs marked with * have significant trends).

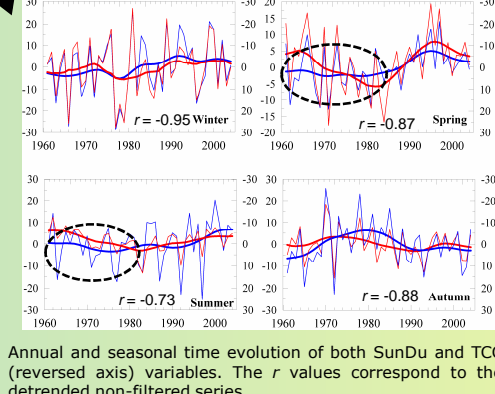
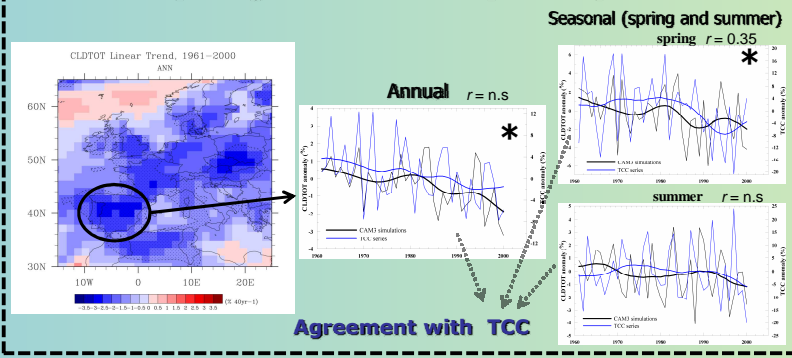
Annual (left) and seasonal (right) TCC series



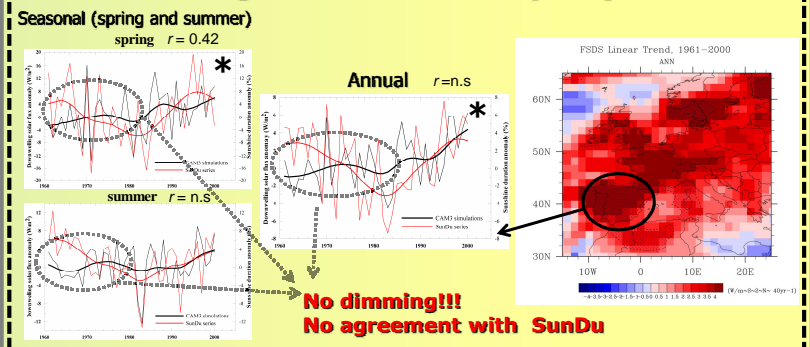
Annual (right) and seasonal (left) SunDu series



Vertically-integrated total cloud (CLDTOT) - CAM3



Downwelling solar flux at surface (FSDS) - CAM3



CONCLUSIONS

- We have presented an annual and seasonal comparison between TCC and SunDU time evolution and trends over the IP, based on more than 70 series covering the 1961-2004 period.
- The annual SunDu shows a clear dimming from 1960s to 1980s, with a subsequent brightening period until present; similarly to previous results obtained in other areas of the World (Stanhill and Cohen, 2001; Wild *et al.*, 2005). Contrarily, the annual TCC shows a significant decrease over the analyzed period, with the paradox that we detect a decrease of both variables from 1960s to 1980s.
- Spring and summer are the seasons that show the most evident disagreement between SunDu and TCC from 1960s to 1980s: a clear dimming but an almost constant TCC.
- The simulated CLDTOT shows trends that are consistent with the observations (TCC), meanwhile the FSDS did not show, unlike SunDu, a dimming period from 1960s to 1980s.

References:

• Sanchez-Lorenzo *et al.* (2007): Recent spatial and temporal variability and trends of sunshine duration over the Iberian Peninsula from a homogenized data set. *J. Geophys. Res.*, 112, D20115, doi:10.1029/2007JD008677.
 • Stanhill, G. and S. Cohen (2001): Global dimming: A review of the evidence for a widespread and significant reduction in global radiation with discussion of its probable causes and possible agricultural consequences. *Agric. For. Meteorol.*, 107, 255-278.
 • Wild, M. *et al.* (2005): From dimming to brightening: decadal changes in solar radiation at Earth's surface. *Science*, 308, 847-850.

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