



Solar dimming and brightening over Europe in observations and AR4 global climate models

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Measurements of downward solar radiation at the surface over Europe from the Global Energy Balance Archive (GEBA) show a decrease until 1984 and an increase after 1992 once radiative effects of cloud cover variations are removed. This solar "dimming" and "brightening" is presumably caused by changes in direct and indirect radiative forcing by anthropogenic aerosol, something that has previously been difficult to quantify due to lack of observations and appropriate analysis. Output from "Twentieth Century" simulations made by a variety of global climate models contributing to the IPCC AR4 is examined to determine whether the models can reproduce the observed "dimming" and "brightening" over Europe when supplied with best-guess aerosol emissions and other historical forcings. This will enable evaluation of the representation of aerosol-cloud-radiative effects in the models, one of the biggest uncertainties in our understanding of twentieth century climate change since aerosol cooling has offset greenhouse warming to an unknown extent.

Ref. Norris, J.R., and Wild, M., 2006: Trends in direct and indirect aerosol radiative effects over Europe inferred from observed solar "dimming" and "brightening", *J. Geophys. Res.* (in press).