



## **The solar influence on the troposphere: Regression and GCM studies**

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Regression analysis has earlier shown statistically significant solar influences on the troposphere in the NCEP/NCAR and ERA reanalysis data sets. Here, a comparative analysis is presented between two separate model experiments, forced by various solar fluctuations, and reanalysis results.

The first set of model results is from a multi-century simulation using the coupled model ECHAM4-OPYC3, driven with all relevant natural and anthropogenic forcings. The influence from solar irradiance fluctuations is visible in this data set and is compared to that of the reanalysis data. It is found that at low latitudes the full solar signal is recovered, while the mid-latitude response seen in Nature is absent in the GLIMPSE model data.

The second set of model results are from the ARPEGE global atmosphere model which does not include a responsive ocean representation. We force this model with 1% solar irradiance changes, divided into two spectral bands, and make experimental runs of 40 full seasonal cycles. The resulting tropospheric response in temperature is statistically significant throughout the tropics and parts of the subtropical region. In general the temperature response is about half the observed in the reanalysis data. Some of the observed features close to the tropopause are also seen in the experiment. In the stratosphere there are indications that the boreal polar night jet is displaced poleward. The polarity and amplitude of the Arctic Oscillation have earlier been shown to be connected to the position of the polar night jet.