What do the latest reanalyses and models tell us about solar influences on climate?

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This talk gives a summary overview of the results and research questions of the SolarMIP project, which considers how solar influences are represented in the latest coupled ocean-atmosphere models, taken from the Coupled Model Inter-comparison Project, phases 5 (CMIP 5). In addition, we compare with the latest reanalysis data sets. The surface, troposphere and stratosphere are all assessed to understand how solar forcing can influence our climate system.

We use multiple linear regression techniques to extract the solar signal from each of the data sets, and in particular we analyse how the temperature, wind and ozone vary from both a dynamical and a radiative framework.

We find that for the 9 reanalyses data sets considered, there is consistent agreement for the principle features which are due to The Sun. However, for the CMIP 5 models, some of these features are absent, suggesting there are still some fundamental processes which are not captured in our latest climate models. For instance, we find no lower stratospheric equatorial temperature anomaly due to solar activity, and no modulation of the Holton-Tan relationship, two features which have been reported multiple times in observations.