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# Defining a solar-ozone response for CMIP6

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Variations in solar irradiance affect stratospheric ozone abundances through effects on photolysis rates and temperatures. This solar-ozone feedback enhances the warming of the upper stratosphere at solar maximum and is a key part of the atmospheric response to solar variability.

The potential to constrain the magnitude and structure of the solar-ozone feedback is partly limited by the paucity of long-term continuous satellite measurements. This raises issues around how to include the solar-ozone feedback in climate models. For CMIP5, models lacking interactive chemistry were recommended to use the SPARC AC&C ozone dataset. This included a solar-ozone feedback derived from SAGE II version 6.2 volume mixing ratio (vmr) data. We highlight that the solar-ozone signal in the new SAGE II v7.0 vmr data show a smaller peak near the tropical stratopause than in v6.2. However, the two versions show greater consistency in native number density coordinates, demonstrating that differences in the temperature data used for conversion to vmr must account for the major differences.

Analysis of an ensemble of chemistry-climate models reveals greater similarities across individual models than is found for the different satellite datasets. We therefore propose that the solar-ozone signal for CMIP6 be derived from these model simulations given their complete spatial and temporal sampling. This study is in support of the SolarMIP taskforce aimed at defining a solar-ozone feedback for the CMIP6 ozone database.