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Testing GeoMIP

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To investigate the climate response to stratospheric geoengineering, particularly in the hydrological cycle, standardized experiments for climate models have been proposed as part of a project called GeoMIP. Proposals for sulfate or other aerosols have been widely discussed, but GeoMIP proposes one experiment to simply reduce the solar constant to compensate for increased radiative forcing from carbon dioxide as a simpler test that will be easier to implement and interpret in different climate models. There are two such proposals, building on experiments that will already be conducted as part of the CMIP5 suite of experiments. In one, the solar constant will be reduced so as to keep global average surface air temperature constant as CO_2 increases at 1% per year starting from a control run. In the other, the solar constant will be reduced so as to keep global average surface air temperature constant in response to a step change of 4 times CO_2. Each experiment has advantages and disadvantages. Here we will perform both experiments with the new NASA GISS climate model, the next version of ModelE, that will be used for the CMIP5 experiments, and diagnose the results to both compare them to each other, but also to learn how representative they are as compared to more realistic experiments that actually produce stratospheric aerosols and calculate the climate response.