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Parametric uncertainty in solar radiation management geoengineering

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Solar radiation management (SRM) geoengineering has been proposed as a means to ameliorate the impacts of global warming by reducing the solar radiation absorbed by the planet, which would cool the planet but would cause other complex changes in the climate. There are large uncertainties in climate model projections of future climate change and the results of a single GCM must be treated with caution. We present SRM geoengineering results from a 28 member non-flux-adjusted perturbed parameter ensemble (PPE) of the HadCM3 AOGCM. We simulate 2 experiments from the geoengineering model intercomparison project (geoMIP), a project to compare the SRM geoengineering results of a range of AOGCMs. We investigate the 'sunshade' geoengineering G1 and G2 geoMIP experiments where a reduction in insolation is specified which is sufficient to maintain pre-industrial top of atmosphere radiative balance whilst CO_2 levels are instantly quadrupled or raised by 1% per annum, respectively. These results are analyzed to find which aspects of the climate response to sunshade geoengineering are robust to parametric uncertainty and which are not. Comparisons to previously published GCM studies of sunshade geoengineering are also made to determine whether there is broader agreement on which aspects of the climate response are robust and which are uncertain.