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Examination of Climate Response to Historical and Projected Forcings Over Years 850-4000 with the MIT IGSM.

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The MIT IGSM is used for a study of the climate response to various historical and projected forcings over the period 850-4000 AD. The MIT IGSM includes a zonally-averaged atmospheric model coupled to land and ocean models. Both land and ocean models simulate carbon cycle. Two configurations of the IGSM were used in the simulations; one with the MIT 3D OGCM and other with anomaly diffusing ocean model.
Over the period 850-2005, a historical run with all time-varying natural and anthropogenic forcings is compared to a set of runs where only a single component of the forcing time series is varied. Over 2005-3000, climate projections as forced by four different Representation Concentration Pathways are compared. These projections are extended by decreasing forcings back to pre-industrial levels over years 3000-4000. In addition to changes in surface air temperature, carbon uptake in the ocean and land systems and changes in the oceans' large-scale circulation are a focus in analyses of these simulations. Simulations with interactive carbon cycle and prescribed carbon emissions were also carried out.
Dependency of the projected changes on assumptions about climate system parameters, such as climate sensitivity, rate of oceanic heat uptake and aerosol forcing were studied using the IGSM with simplified ocean model.