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Impact of geoengineering on global climate - Earth System Model simulations within IMPLICC

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In recent years, several methods have been suggested for "geoengineering" the climate to limit global temperature increase. One of these assumed geoengineering techniques tries to reduce the incoming solar radiation through space-born reflectors at the Lagrangian point, a second tries to reduce global warming via the emission of SO2 into the stratosphere. Using an earth system model (MPI-ESM), that consists of the GCM ECHAM6 coupled to the ocean model MPIOM, simulations have been performed to balance an CO2 increase assumed in different CMIP5 scenarios, by reducing the incoming solar radiation. The simulations were performed within the EU project IMPLICC and follow the suggestions of the GeoMIP initiative. We will present results balancing a 4x CO2 increase as well as an increase of 1\% CO2 per year. First results show a global decrease of precipitation of roughly 4\%, with locally stronger impacts e.g. over Eurasia and North America as well as an impact on the surface pressure causing implications on regional weather regimes. A less theoretical approach is the GeoMIP G3 experiment. Here the increase of future greenhouse gases is to be balanced with stratospheric sulfate aerosols. The aerosols are included in the MPI-ESM via optical parameters, which are derived from aerosol micro-physical simulations (ECHAM5-HAM).