



Impact of climate-engineering techniques on global climate

U. Niemeier and H. Schmidt

Max Planck Institute for Meteorology, Atmosphere in the Earth System, Hamburg, Germany (ulrike.niemeier@zmaw.de)

In recent years, several methods have been suggested for "climate-engineering" (CE) the climate to limit global temperature increase. In one of these assumed climate-engineering techniques the incoming solar radiation should be reduced through space-born reflectors at the Lagrangian point. Reducing the amount of short wave radiation at the surface via the emission of SO₂ into the stratosphere and via the artificial emission of sea-salt are further techniques.

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 increase of CO₂ and other greenhouse gases assumed in different CMIP5 scenarios. The simulations were performed within the EU project IMPLICC and follow the suggestions of the GeoMIP initiative. We will present results of different geoengineering assumptions to balancing a GHG increase: SO₂ injections, reduction of solar constant, sea salt emissions into stratocumulous clouds and compare the impact on the climate. Results show a slight global decrease of precipitation compared to year 2020 conditions. The amount varies between the different techniques. Regional impacts depend on season as well as on CE-technique.

SO₂ concentrations, necessary to balance a CO₂ increase, have been estimated using results of injection studies with a detailed aerosol micro-physical model. Results depend strongly on the emission strategy.