Abstract: Optimisation Investigation on Stratospheric Climate Engineering Methods with Sulphur Aerosol

(Untersuchungen zur Optimierung von stratosphärischem Geo-Engineering mit Schwefelaerosol)

This study is a follow-on study to the EU 7th framework project IMPLICC and in particular to the results on aerosol microphysical implications obtained at the Max-Planck-Institute for Chemistry within this project. Investigations on the implications of subscale aerosol microphysical growth properties have revealed that non-volatile H_2SO_4 and volatile SO_2 show fundamentally different dynamical properties that lead to a very mechanism specific climate engineered aerosol layer. In relationship to that, the direct injection of sulphuric acid into a global model environment, which in its effect does not take into account subscale growth properties, leads to a substantial misrepresentation of the aerosol size distribution properties on the global scale.

In this study the repercussions of these findings are to be investigated on a global scale via a certain strategic choice on the main parameters, namely the height of injection and its geographical range, and the characteristics of sulphuric acid release into the stratosphere. Prospectively, deductions can be made as to the limitation of stratospheric sulphur climate engineering efficiency, as well as to an optimised injection strategy in terms of the order of magnitude of the resulting aerosol optical depth.

The simulations will be evaluated within the SIWA cluster of the IASS in Potsdam. Results should be of interest to the in-house interdisciplinary community, as well as to the national and international climate engineering community in terms of cost estimation and feasibility of stratospheric climate engineering.