

Radiative forcing of the direct aerosol effect from AeroCom Phase II simulations

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Abstract

We report on the AeroCom Phase II direct aerosol effect (DAE) experiment where 15 detailed global aerosol models have been used to simulate the changes in the aerosol distribution over the industrial era. All 15 models have estimated the radiative forcing (RF) of the anthropogenic DAE, and have taken into account anthropogenic sulphate, black carbon (BC) and organic aerosols (OA) from fossil fuel, biofuel, and biomass burning emissions. In addition several models have simulated the DAE of anthropogenic nitrate and anthropogenic influenced secondary organic aerosols (SOA). The model simulated all-sky RF of the DAE from total anthropogenic aerosols has a range from -0.58 to -0.02 Wm^{-2} , with a mean of -0.30 Wm^{-2} for the 15 models. Several models did not include nitrate or SOA and modifying the estimate by accounting for this with information from the other AeroCom models reduces the range and slightly strengthens the mean. Modifying the model estimates for missing aerosol components and for the time period 1750 to 2010 results in a mean RF for the DAE of -0.39 Wm^{-2} . The spread in results for the individual aerosol components is substantial, and can be divided into diversities in burden, mass extinction coefficient (MEC), and normalized RF with respect to AOD. We find that these three factors give similar contributions to the spread in results.

Oral presentation is preferred. Presenter G. Myhre (gunnar.myhre@cicero.uio.no)