EGU21-195
https://doi.org/10.5194/egusphere-egu21-195
EGU General Assembly 2021

Global Climate Model Simulations of Natural Aerosols over the Southern Ocean

Yusuf Bhatti[1], Laura Revell[1], Adrian McDonald[1], and Jonny Willaims[2]
[1]University of Canterbury, School of Physics and Chemistry, Chrstchurch, New Zealand (yusuf.bhatti@pg.canterbury.ac.nz)
[2]National Institute of Water and Atmospheric Research, Wellington, New Zealand

We studied sulfate aerosols over the Southern Ocean using the atmosphere-only climate model HadGEM3-GA7.1. The model contains biases in the aerosol seasonal variability over the Southern Ocean (40°S to 60°S), which cascade to uncertainties in aerosol-cloud interactions. Aerosols over the Southern Ocean are primarily natural in origin, such as sea spray aerosol and sulfate aerosol formed by phytoplankton-produced dimethyl sulfide (DMS).

The current sulfate chemistry scheme implemented in the model simplifies the oxidation pathways for DMS, which has been identified as a major source of the seasonal bias present. The simulations performed here incorporate a comprehensive sulfate scheme in both the gas and aqueous-phase. An intermediate complexity biogeochemical dynamic model, MEDUSA, simulated a global climatology of seawater DMS, which is compared with a seawater DMS observational dataset from 2011. We compared the seasonality of sulfate aerosols over the Southern Ocean, and the global distribution using the two seawater DMS climatologies. Simulated aerosols over the Southern Ocean were evaluated against satellite and in-situ observations. The results show the impact of seawater DMS on sulfate aerosols and their influence on cloud formation.