EGU21-10722
https://doi.org/10.5194/egusphere-egu21-10722
EGU General Assembly 2021

Regional and global temperature response, in PDRMIP data from a energy balance perspective

Kalle Nordling[1], Joonas Merikanto[1], Jouni Räisänen[2], Bjørn Samset[3], and Hannele Korhonen[1]
[1]Finnish Meteorological Institute, HELSINKI, Finland (kalle.nordling@fmi.fi)
[2]University of Helsinki, Institute for Atmospheric and Earth System Research (INAR)
[3]CICERO Center of International Climate Research, Oslo, Norway

Modern climate models vary in their temperature responses to different climate forcers (such as CO2, methane, sulfate aerosols and black carbon). Here we study the reasons for model discrepancies between different forcers by analyzing Precipitation Driver Response Model Intercomparison Project (PDRMIP) data. PDRMIP contains four different experiments in addition to the present-day base case: 1) fivefold sulfur concentrations, 2) tenfold black carbon concentrations, 3) twofold CO2 concentrations, and 4) threefold methane concentrations We use a set of modern climate models from PRDMIP dataset to decompose the temperature responses to various energy budget terms, the longwave and shortwave, cloudy and clear sky components, surface terms and horizontal energy transport. This study allows us to better understand the key processes responsible for climate model discrepancies in estimates of anthropogenic climate change impacts. Preliminary results show that magnitude of the temperature response of each forcer is similar, and mechanisms causing temperature changes are similar between different forcers. Somewhat surprisingly most of the model spread originates from changes in long wave radiations. Here we investigate global and regional responses and model spread for different climate forcers.