EGU22-12547
https://doi.org/10.5194/egusphere-egu22-12547
EGU General Assembly 2022


# Climate at various global warming levels: importance of scenario differences

**Andrea Dittus**[1], Ed Hawkins[1], Matthew Collins[2], and David Sexton[3]
[1]University of Reading, National Centre for Atmospheric Science and Department of Meteorology, United Kingdom of Great Britain – England, Scotland, Wales
[2]University of Exeter, Exeter, United Kingdom of Great Britain – England, Scotland, Wales
[3]Met Office Hadley Centre, Exeter, United Kingdom of Great Britain – England, Scotland, Wales

In recent years, there has been increasing interest in how possible future climates at different stabilised, policy relevant global warming levels above pre-industrial might look like. Modelling groups are designing novel climate model simulations to investigate these questions and help answer important questions on the linearity of future climate change across warming levels, tipping points, and climate extremes, among others. A key question is how these projected changes are dependent on scenario choices, particularly the role of future anthropogenic aerosol emissions.

Here, we present the results of new “quasi-stable” climate model simulations with UKESM1.0. Six multi-century simulations have been run under fixed forcings, branching-off from ScenarioMIP simulations of the same model. These simulations explore a range of global warming levels, from approximately 1.5 to 5°C above pre-industrial. In addition, they also explore the role of different balances of forcings for achieving the same target warming level, in particular different combinations of greenhouse gas concentrations and anthropogenic aerosols. In this presentation, we describe how the climate evolves in each of these simulations. We focus on two key aspects: 1) differences between a more stable climate vs. transient climate change at the same warming level and 2) importance of scenario differences, in particular differences in anthropogenic aerosol emissions at the same warming level.

We discuss various aspects of how climate changes in each of the above simulations, including climate extremes, which arguably are one of the most important aspects to consider when assessing the socio-economic impacts of possible future climate conditions at different warming levels and under different scenarios.