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Evaluation of the new EMAC-SWIFT chemistry climate model

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It is well known that the representation of atmospheric ozone chemistry in weather and climate models is essential for a realistic simulation of the atmospheric state. Including atmospheric ozone chemistry into climate simulations is usually done by prescribing a climatological ozone field, by including a fast linear ozone scheme into the model or by using a climate model with complex interactive chemistry. While prescribed climatological ozone fields are often not aligned with the modelled dynamics, a linear ozone scheme may not be applicable for a wide range of climatological conditions. Although interactive chemistry provides a realistic representation of atmospheric chemistry such model simulations are computationally very expensive and hence not suitable for ensemble simulations or simulations with multiple climate change scenarios.
A new approach to represent atmospheric chemistry in climate models which can cope with non-linearities in ozone chemistry and is applicable to a wide range of climatic states is the Semi-empirical Weighted Iterative Fit Technique (SWIFT) that is driven by reanalysis data and has been validated against observational satellite data and runs of a full Chemistry and Transport Model. SWIFT has recently been implemented into the ECHAM/MESSy (EMAC) chemistry climate model that uses a modular approach to climate modelling where individual model components can be switched on and off. Here, we show first results of EMAC-SWIFT simulations and validate these against EMAC simulations using the complex interactive chemistry scheme MECCA, and against observations.