

How useful is a linearized ozone scheme for global climate modelling?

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Chemical feedbacks can alter the atmospheric circulation and the climate. Nowack et al. (2014) identified a 1 K decrease in equilibrium climate sensitivity when interactive chemistry was included in their model. Chiodo and Polvani (2016) found a reduction of tropospheric circulation response to 4xCO₂ in their model with interactive ozone. However, atmospheric chemistry is still computationally expensive and hence, is often neglected in Earth system models. Especially, for higher horizontal and vertical resolution computational efficiency is a big issue. Chemistry parameterizations could overcome this drawback but have not yet been evaluated for global climate modelling.

Here, we analyze the impact of stratospheric ozone feedbacks on atmospheric circulation and climate with the Cariolle linearized ozone scheme (Cariolle and Teyssèdre, 2007). We use both the general circulation and chemistry model HAMMONIA and the Earth system model ICON. The focus lies on the evaluation of the performance of linearized ozone scheme in comparison with a full chemistry scheme.

Key words: Stratospheric ozone, interactive chemistry, Cariolle ozone scheme.

References

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