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A new approach to linear ozone modelling

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Full stratospheric chemistry models are moderately expensive, and not suitable for high resolution ensemble forecasting at long lead times. Linear ozone models are cheap, but can suffer from biases compared to the latest ozone reanalyses, since they are traditionally calculated by linearizing a full chemistry model which is itself imperfect. These biases are an obstacle to using interactive ozone in the model radiative calculations. An alternative approach is to base the coefficients of a linear scheme on the latest re-analyses of ozone and temperature. Such a scheme is introduced, based on a hybrid approach combining mean terms derived from analyses and sensitivity coefficients derived from full chemistry models. Particular attention is given to deriving the mean production term from analysis data, and to ensuring consistency between all terms.

Results are highly encouraging, with the ozone model reproducing not only the analysed mean state, but also interannual and synoptic variability. Some of the benefits of including ozone variability in the model radiative calculations are illustrated. The benefits of other model improvements, such as the impact of increased vertical resolution on the QBO, will also be briefly discussed.

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