

Uncertainty on the ozone radiative forcing from rate constant uncertainties: A global model perspective

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Atmospheric chemistry models solve complex chemistry schemes using multiple rate constants that are provided by the laboratory kinetics community. These rate constants have associated errors, which are often ignored in the modelling. We run a series of model simulations using the GEOS-Chem⁽¹⁾ Chemistry Transport Model perturbing these rate constants to investigate these uncertainties on the present day and pre-industrial tropospheric ozone burden and global mean OH. We study 60, mainly inorganic, rate constants and photolysis rates. We show these can have a significant impact on the simulated composition of the atmosphere with around 10 reactions dominating the uncertainty. The associated uncertainty on tropospheric ozone radiative forcing is also large. Efforts to reduce the uncertainty in the 'well known' inorganic reactions central to atmospheric chemistry may provide significantly reduced uncertainties in our abilities to understand the past, present and future composition of the atmosphere.

References

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