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Long-term dynamical and chemical changes of stratospheric ozone: numerical modelling and statistical trend analysis

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The SLIMCAT chemical-transport model is run with full chemistry and simplified stratospheric ozone schemes from 1958 to 2005 driven by the ECMWF ERA-40 and operational analyses. The full chemistry integration is updated with sulphuric acid fields from major volcanic eruptions and the model bottom boundary (at 350K) is overwritten by time-varying source gases (halogens, nitrous oxide and methane) concentrations. The Cariolle ozone parameterisation is also used in order to reveal the meteorogically-driven variations. The chemical and dynamical contributions of past long-term changes in ozone during the last 3 decades are assessed with multiple linear regression analysis of ozone from both model ozone schemes and satellite observations. The SLIMCAT ozone trends are also discussed with the help of results from a stratospheric version of the Met. Office's UM model with a similar parameterised ozone chemistry and forced by observed (AMIP II) sea surface temperatures (SSTs).