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Global long-term ozone trends derived from different observed and modelled data sets

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The long-term behaviour of stratospheric ozone amounts during the past three decades is investigated on a global scale using different observed and modelled data sets.
Three European satellite sensors GOME/ERS-2, SCIAMACHY/ENVISAT, and GOME-2/METOP are combined and a merged global monthly mean total ozone product has been prepared using an inter-satellite calibration approach. The data set covers the 16-years period from June 1995 to June 2011 and it exhibits an excellent long-term stability, which is required for such trend studies. A multiple linear least-squares regression algorithm using different explanatory variables is applied to the time series and statistically significant positive trends are detected in the northern mid latitudes and subtropics. Global trends are also estimated using a second satellite-based Merged Ozone Data set (MOD) provided by NASA. For few selected geographical regions ozone trends are additionally calculated using well-maintained measurements of individual Dobson/Brewer ground-based instruments. A reasonable agreement in the spatial patterns of the trends is found amongst the European satellite, the NASA satellite, and the ground-based observations.
Furthermore, two long-term simulations obtained with the Chemistry-Climate Models E39C-A provided by German Aerospace Center and UMUKCA-UCAM provided by University of Cambridge are analysed.