Long term total ozone trend analysis for the years 1979 - 2011 from merged data sets of various satellites.

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The study presents a long term trend analysis of total ozone data sets obtained from various satellites. A multi-variate linear regression is applied to annual mean zonal mean data using various explanatory variables that represent the dynamical and chemical processes which modify global ozone distributions in a changing climate.

The total ozone data sets comprise SBUV/TOMS/TOMI merged data (1979 – 2011) MOD V8 and GOME/SCIAMACHY/GOME-2 ("GSG") WFDOAS (Weighting Function DOAS) merged data (1995 – 2011). A sensitivity study is carried out by comparing SBUV/TOMS/OMI merged time series (1979 – 2011) and a merged data set containing SBUV/TOMS OMI (1979 – 1995) and GOME/SCIAMACHY/GOME-2 (1995 – 2011) in the regression analysis in order to investigate the uncertainty in the long-term trends due to the use of different ozone datasets.

The aim of this study is to identify the fingerprint and its statistical significance of the onset of ozone recovery as expected from the turnaround and slow decrease in stratospheric halogen after measures introduced by the Montreal Protocol and amendments to phase out ozone depleting substances (ODS). Total ozone changes reflect changes in lower stratospheric ozone that is governed by chemical and dynamical short-term as well as long-term variability. Using different approaches to separate chemical and dynamical changes in total ozone, the onset of ozone recovery can be quantified.