

## **Stability requirements on long-term (satellite) ozone observations and their implication for trend detection**

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Due to the successful phase-out of ozone-depleting substances (ODS) abiding by the Montreal Protocol, ozone is supposed to slowly recover. As the stratospheric halogen (resulting from ODS) is decreasing at a slow rate (as compared to the rate of increase before the 1990s), ozone recovery will be quite slow. Due to the large year-to-year variability in ozone, ODS related trends are thus difficult to establish. So far positive ozone trends since 2000 were only statistically significant in the upper stratosphere according to the recent WMO ozone assessment. In addition to the high variability in ozone potential instrumental drifts in satellite data add to trend uncertainty. Stability requirements from 1%/decade (total ozone) to 5%/decade (ozone profiles) have been specified, however, the rationale behind these numbers is not always clear.

Satellite measurements of ozone are available for nearly four decades. The single lifetime of a typical satellite instrument is on the order of 5-7 years, the longest single instrument record was from SAGE II operating for nearly twenty years. Uncertainties from combining or merging multiple datasets to obtain long-term time series also add to trend uncertainties. The connection between stability requirements and trend detection limits from multiple satellites are quantified by using simple Monte Carlo simulations. Uncertainties from sampling issues (in time and space) are also investigated.