SPARC Workshop SHARP2016

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

Dr. Mark Weber, Dr. Nabiz Rahpoe, Prof. Dr. John P. Burrows

University of Bremen

weber@uni-bremen.de

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 also quite slow. Due to the large 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. In this talk the stability of satellites and reported stability requirements are reviewed. The connection between stability requirements and trend detection limits from multiple satellites are to some extent quantified by using simple Monte Carlo simulations.