Is stratospheric ozone recovering as we expect? Results of the SPARC LOTUS analyses.

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WMO/UNEP Ozone Assessment 2018 relies an accurate evaluation of ozone profile trends. These trend results are of utmost importance in order to evaluate the success of the Montreal Protocol and determine the path to the future recovery of the ozone layer. The SPARC LOTUS activity was set up two years ago to evaluate quality of observational records, evaluate statistical trend models and determine approach to evaluate the uncertainties in the combined trends from satellite and ground-based records. Multiple satellite ozone records were advanced in recent years by correction of drifts (I.e. OSIRIS and MIPAS), reduction in the sampling biases (i.e. SAGE II), addition of four extra years in established satellite records (i.e. Aura MLS, Aura OMI, etc.), addition of new satellites (i.e. NPP OMPS). The SPARC LOTUS activity compared combined satellite and ground-based ozone data records with CCMI-REF2 models and found general agreement in long-term changes, with the exception of ozone changes found in the lower stratosphere. Comparisons of multiple regression models through sensitivity tests lead to designing a consensus regression model that was used in the LOTUS activity to process all records for trends. Assessment of stability in the combined satellite and ground-based records and evaluation of representativeness of the ground-based records in the broad-band trends helped to interpret results of trend analyses. All analyzed records produce similar spatial patterns in stratospheric trends. The LOTUS assessment finds high confidence in positive trends of ~3% per decade in upper stratosphere over the Northern middle latitudes, while lower confidence is found for positive trends of ~2.1% and ~1.3% per decade in the middle latitudes of the Southern Hemisphere and Tropics respectively. This presentation will provide overview of the LOTUS results and discuss the pass forward for future trend analyses.

Key words: ozone trends, upper stratosphere, satellite observations, ground-based observations

References

WMO/UNEP Ozone Assessment, 2018.
SPARC LOTUS Report, 2018.