An update on trends in the vertical distribution of ozone

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Using data up to 2013, in some cases up to 2014, the last WMO ozone assessment (WMO, 2014) concluded that observations show significant ozone increase by about 3% per decade ($\pm 2\%$ per decade, 2σ) in the upper stratosphere since 2000, but no significant increase at other levels, or for total ozone. These findings are consistent with expectations from model simulations, e.g. from CCMVal2 (Eyring et al., 2010; WMO 2014).

Shortly after the assessment, results from the SI2N initiative (Harris et al., 2015) confirmed a tendency towards increasing ozone in the upper stratosphere. However, the SI2N results indicated smaller increases ($+1.5\%$ per decade) than the WMO assessment, and substantially larger uncertainties ($\pm 5\%$ per decade, 2σ). The SI2N initiative did use slightly different data-sets; a different time period, 1998 to 2012, compared to 2000 to 2013/14 for the assessment; and assumed substantially larger drift uncertainties, 6% per decade (1 to 2% per decade in the assessment). The different time period tends to reduce the magnitude of the increasing trend in the upper stratosphere. The assumed drift uncertainty (Hubert et al., 2015), and the data record selection have a large impact on the error bars.

In this contribution, we explore how two more years of data since 2013, and improvements in some of the records, change trend and uncertainty in the **upper stratosphere**. Main differences between the SI2N and WMO assessment trend findings will also be discussed. Unfortunately, the number of continuing long-term records has declined, especially since the ENVISAT platform failed in 2012. This contribution, therefore, relies on the ongoing observational records: The SBUV/2 merged data sets from NASA and NOAA, the Aura-MLS based GOZCARDS and SWOOSH data-sets, the merged SAGE-2 / ODIN-OSIRIS data-set, the ODIN-SMR instrument, the ground-based FTIR, microwave and lidar data from NDACC, and the emerging GOME/SCIAMACHY/GOME-2 nadir ozone profile data-set.

References

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