Signs of the total ozone recovery based on the satellite (MSR) data for the period 1979-2017

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The multi-sensor reanalysis (MSR) monthly mean total ozone data of global resolution (van der A, 2015), provided by KNMI Climate Explorer (https://climexp.knmi.nl/start.cgi) is examined for trend detection for the period 1979-2017. Sources of the total ozone variability are determined by means of a multiple regression model applied to the seasonal (3-month averages of the monthly data pertaining the calendar seasons) time series for 5° wide zonal belts and 10°(longitude) x 5°(latitude) boxes covering the whole globe. The interannual total ozone variations are resolved by using standard proxies (QBO, ENSO, heat flux, solar radio flux, Antarctic and Arctic Oscillations, stratospheric aerosols thickness). The long-term component of the series is computed assuming linear pattern consisting of joint or disjoint segments. The former trend pattern, the piecewise linear trend (PLT), was commonly used in many past trend analyses. The latter one, independent linear trend (ILT), has been recently proposed by Weber et al. (2018). Here to have more flexible trend pattern, instead of previously commonly examined 2-segment trend pattern with fixed turnaround date, we use 3 segments with no predefined turnaround years. These are derived by the least squares methodology. We expect that in the extratropic the first segment represents ozone decline phase forced by stratospheric halogen increase, the second segment is for an overturning phase (recovery) around the turn of the century, and the last one may show a continuation or weakening of the recovery in very recent total ozone. Negative trends are found for the extratropics in the first period. In most cases the trends are insignificant in the second and third period. However, for some latitudes and regions the statistically significant positive trends are found in the last two phases. Surprisingly, both ILT and PWL model reveal regional hot spots with continuation of the ozone decline in the second or in the third period.

References

Weber and Couthors, 2018: *Atmos. Chem.Phys.*, **18**, 2097-2117

Van der A and Coauthors, 2015: *Atmos.Meas.Tech.*, **8**, 3021-3035.