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Supplemental material to: Total ozone trends and variability during 1979 – 2012 from merged datasets of various satellites

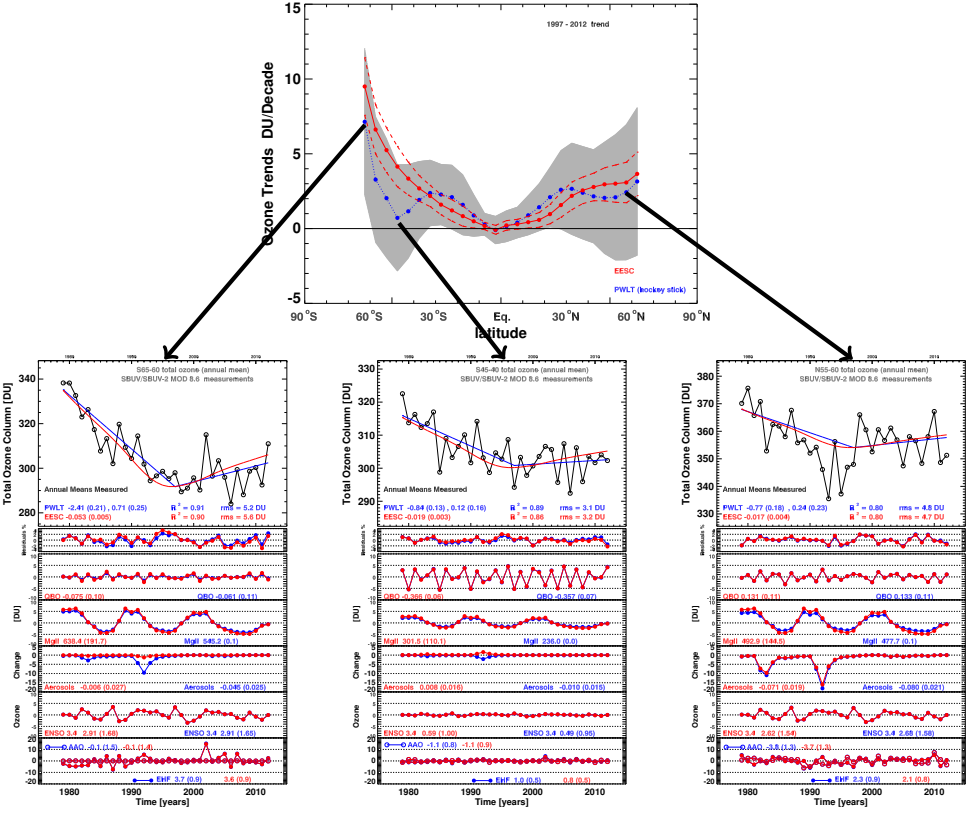
W. Chehade, M. Weber, and J. P. Burrows

Institute of Environmental Physics (IUP), University of Bremen, Bremen, Germany

Correspondence to: Wissam Chehade
(chehade@iup.physik.uni-bremen.de)

1 SBUV/SBUV-2 MOD 8.6 trends: EESC vs PWLT

This section provides a graphical overview of the differences between the EESC and PWLT based linear trends observed in the southern high latitudes in the MLR applied to SBUV merged V8.6 data. The upper panel shows the zonal distribution of the linear trends of ozone after 1997 in DU/decade units for the EESC (red) as well as the PWLT model (blue), the statistical significance at two sigma level is indicated as grey shades for PWLT and dashed lines for EESC. The bottom three panels show the magnitude of contributing factors obtained by multiple linear regression using EESC (red) and PWLT (blue) to parameterize the ODS abundances in the stratosphere for the in the 5° zonal bands centered around 62.5° S, 42.5° S, and 57.5° N. The MgII and aerosols coefficients are changed while the contributions of the other explanatory variables slightly altered. The aerosol signals of El Chichón and Mount Pinatubo are screened and picked up by the EESC term. The main reason for this masking effect is the fact that the EESC term shows a more shallow minimum than the continuous and piecewise linear trends.


1997 - 2012 trend
Ozone Trends DU/Decade
Latitude
90°S
60°S
30°S
Eq.
30°N
60°N
90°N
EESC
PWLT (hockey stick)
S65-60 total ozone (annual mean)
SBUV/SBUV-2 MOD 8.6 measurements
Annual Means Measured
Total Ozone Column [DU]
PWLT -2.41 (0.21) , 0.71 (0.25)
EESC -0.053 (0.005)
R² = 0.91
R² = 0.90
rms = 5.2 DU
rms = 5.6 DU
QBO -0.075 (0.10)
QBO -0.061 (0.11)
MgII 638.4 (191.7)
MgII 545.2 (0.1)
Aerosols -0.005 (0.027)
Aerosols -0.040 (0.025)
ENSO 3.4 2.91 (1.68)
ENSO 3.4 2.91 (1.68)
AAO -0.1 (1.5)
-0.1 (1.4)
EHF 3.7 (0.9)
3.6 (0.9)
S45-40 total ozone (annual mean)
SBUV/SBUV-2 MOD 8.6 measurements
Annual Means Measured
PWLT -0.84 (0.13) , 0.12 (0.16)
EESC -0.019 (0.003)
R² = 0.89
R² = 0.86
rms = 3.1 DU
rms = 3.2 DU
QBO -0.366 (0.06)
QBO -0.357 (0.07)
MgII 301.5 (110.1)
MgII 236.0 (0.0)
Aerosols 0.000 (0.015)
Aerosols -0.010 (0.015)
ENSO 3.4 0.09 (1.00)
ENSO 3.4 0.49 (0.95)
AAO -1.1 (0.8)
-1.1 (0.9)
EHF 1.0 (0.5)
0.8 (0.5)
M55-40 total ozone (annual mean)
SBUV/SBUV-2 MOD 8.6 measurements
Annual Means Measured
PWLT -0.77 (0.18) , 0.24 (0.23)
EESC -0.017 (0.004)
R² = 0.80
R² = 0.80
rms = 4.8 DU
rms = 4.7 DU
QBO 0.131 (0.11)
QBO 0.133 (0.11)
MgII 492.9 (144.5)
MgII 477.7 (0.1)
Aerosols -0.071 (0.019)
Aerosols -0.080 (0.021)
ENSO 3.4 2.62 (1.54)
ENSO 3.4 2.68 (1.58)
AAO -3.8 (1.3)
-3.7 (1.3)
EHF 2.3 (0.9)
2.1 (0.8)
Time [years]