The Use of GOME Total Ozone for Longterm Trend Assessment

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- **Background:**
  - Uncertainties exist about continuation of longterm ozone trends in midlatitudes and about possible first signs of recovery as a consequence of measures according to Montreal Protocol and its amendments
  - Inconsistencies between TOMS and groundbased Dobson trends after mid-nineties (WMO Report 1998)

- **How can GOME data help in this issue?**
  - GOME time series (~5 years) is still too short for longterm trend studies

  BUT:

  - ... is filling part of the TOMS data gap 1994-1996
  - ... long enough to be usable to complement TOMS and groundbased NDSC/GAW data record for the purpose of data homogenization

    short-term perspective
  - ... a new improved data version of GOME total ozone GDP Version 3.0 will be available end of this year

    mid-term perspective
  - ... eventually (and hopefully) the combination of GOME1, SCIAMACHY, and second generation GOME2/METOP will provide an unique (European) longterm record spanning more than a decade, which will complement international satellite ozone monitoring

    longterm perspective

Overview of presentation

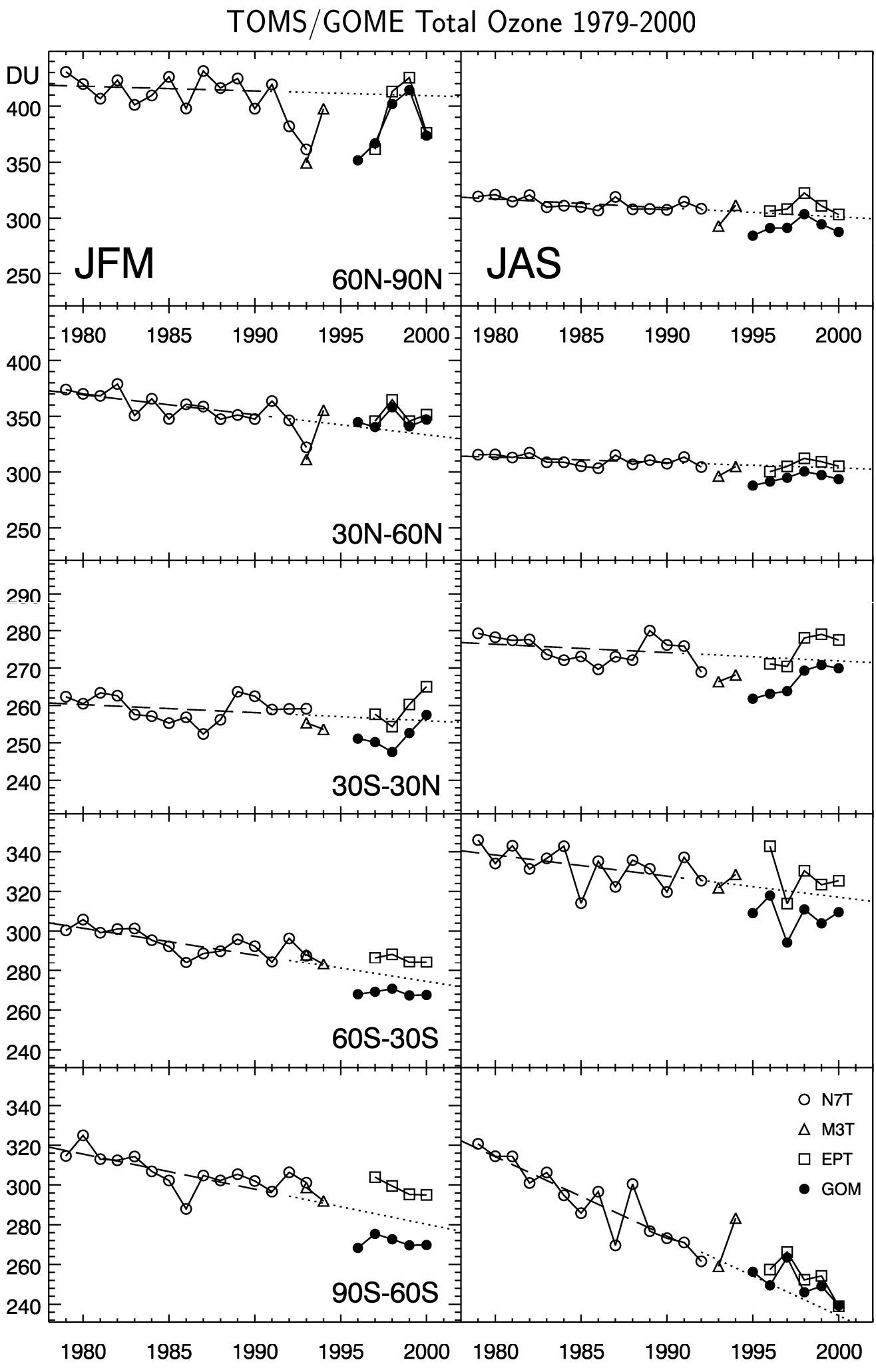
- Comparison of GOME total ozone with TOMS and groundbased data (NDSC/GAW)
- Zonal time series and the effect of homogenization
- New data version(s) of GOME total ozone

Current Data Versions

- TOMS Version 7
- GOME GDP (GOME Data Processor) Version 2.7

Groundbased data

- NDSC/GAW/WMO network: zenith sky UV/visible, Brewer, Dobson
- WOUDC Dobson data archive


TOMS/GOME Total Ozone 1979-2000
DU
JFM
JAS
60N-90N
30N-60N
30S-30N
60S-30S
90S-60S
N7T
M3T
EPT
GOM
1980
1985
1990
1995
2000

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GOME GDP V. 2.7 vs. GAW/NDSC 1996-1999

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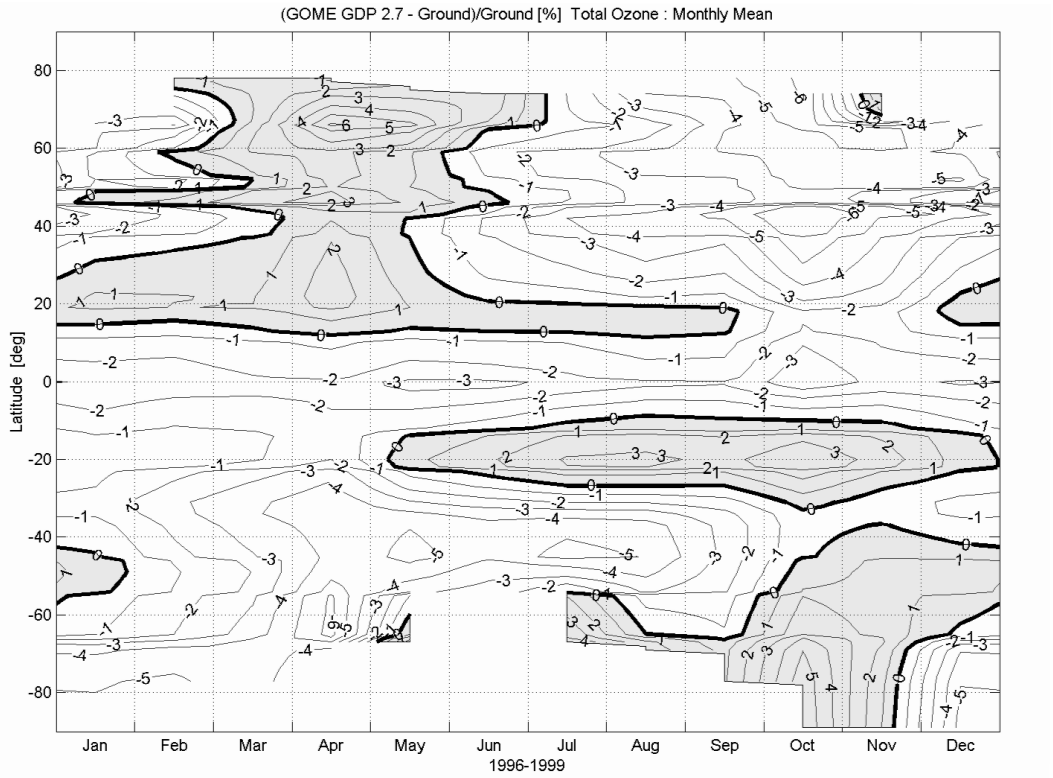
ERS-2 GOME vs. Ground-based Total Ozone



Mean relative difference between ERS-2 GOME and GAW ground-based networks (NDSC and Dobson/Brewer) total ozone. Shaded areas highlight positive deviations of GOME from ground-based data.

Jean-Christopher.Lambert@iasb.be – May 2000

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GOME GDP V. 2.7 vs. GAW/NDSC 1996-1999: Part II

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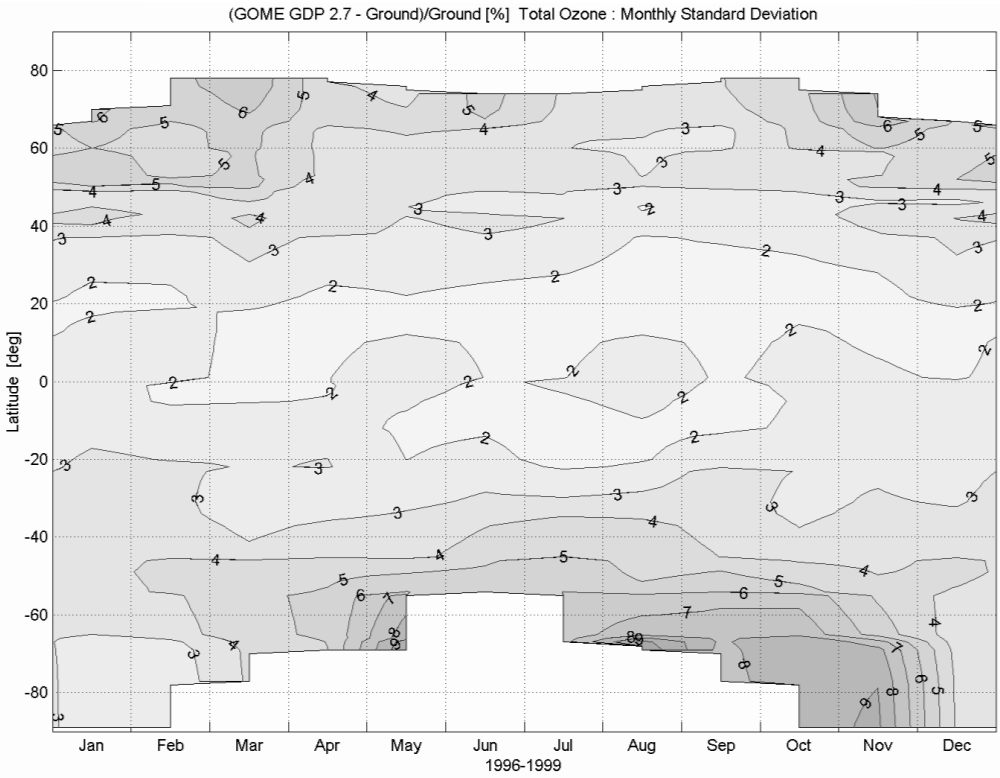
ERS-2 GOME vs. Ground-based Total Ozone



Scatter (1σ) between ERS-2 GOME and GAW ground-based networks (NDSC and Dobson/Brewer) total ozone, after removal of the monthly mean relative difference.

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EP TOMS V7 vs. GAW/NDSC 1996-1999

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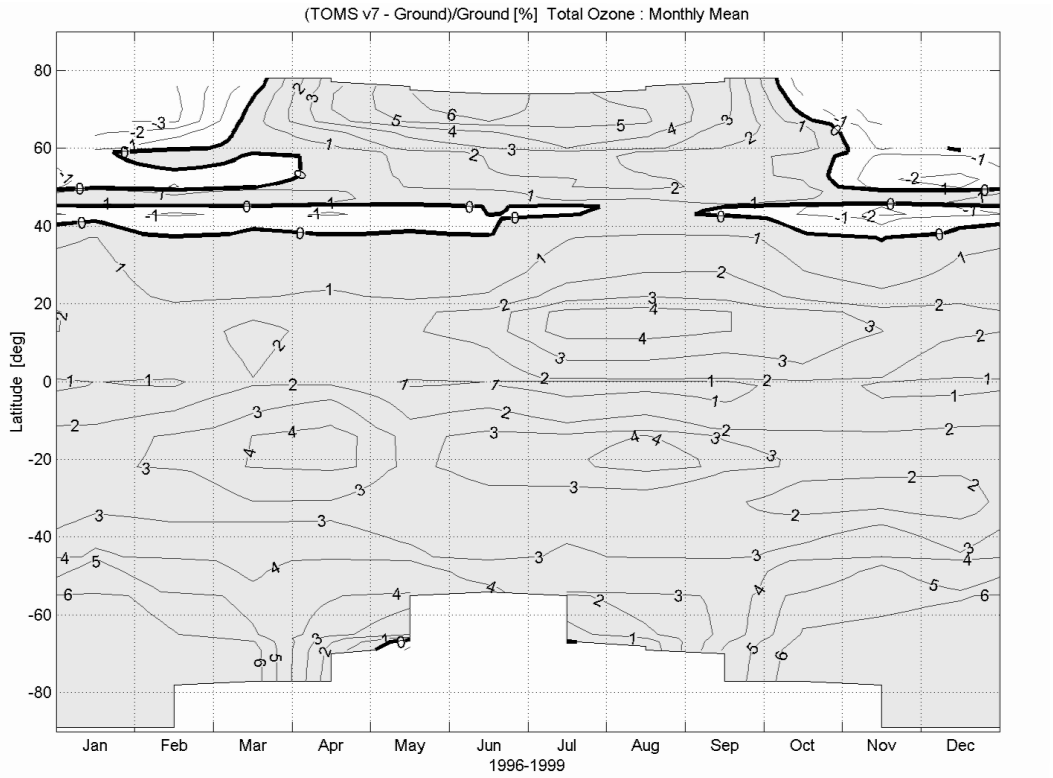
EP-TOMS vs. Ground-based Total Ozone



Mean relative difference between Earth Probe TOMS and GAW ground-based networks (NDSC and Dobson/Brewer) total ozone. Shaded areas highlight positive deviations of TOMS from ground-based data.

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EP TOMS V7 vs. GAW/NDSC 1996-1999: Part II

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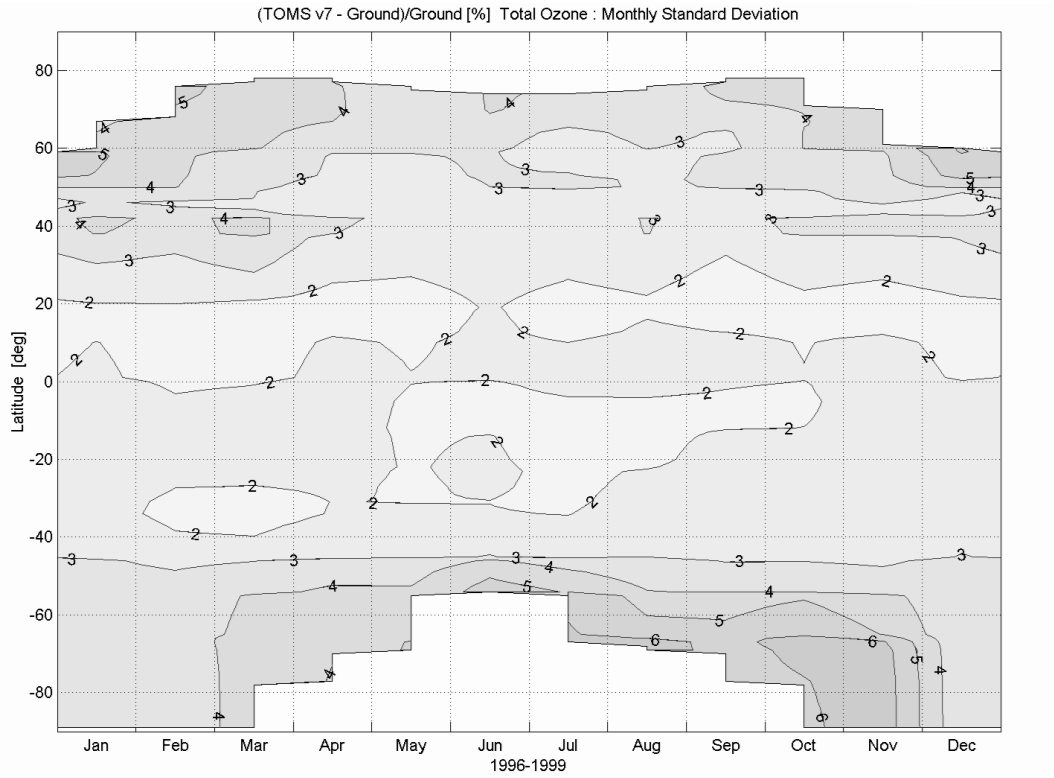
EP-TOMS vs. Ground-based Total Ozone



Scatter (1σ) between Earth Probe TOMS and GAW ground-based networks (NDSC and Dobson/Brewer) total ozone, after removal of the monthly mean relative difference.

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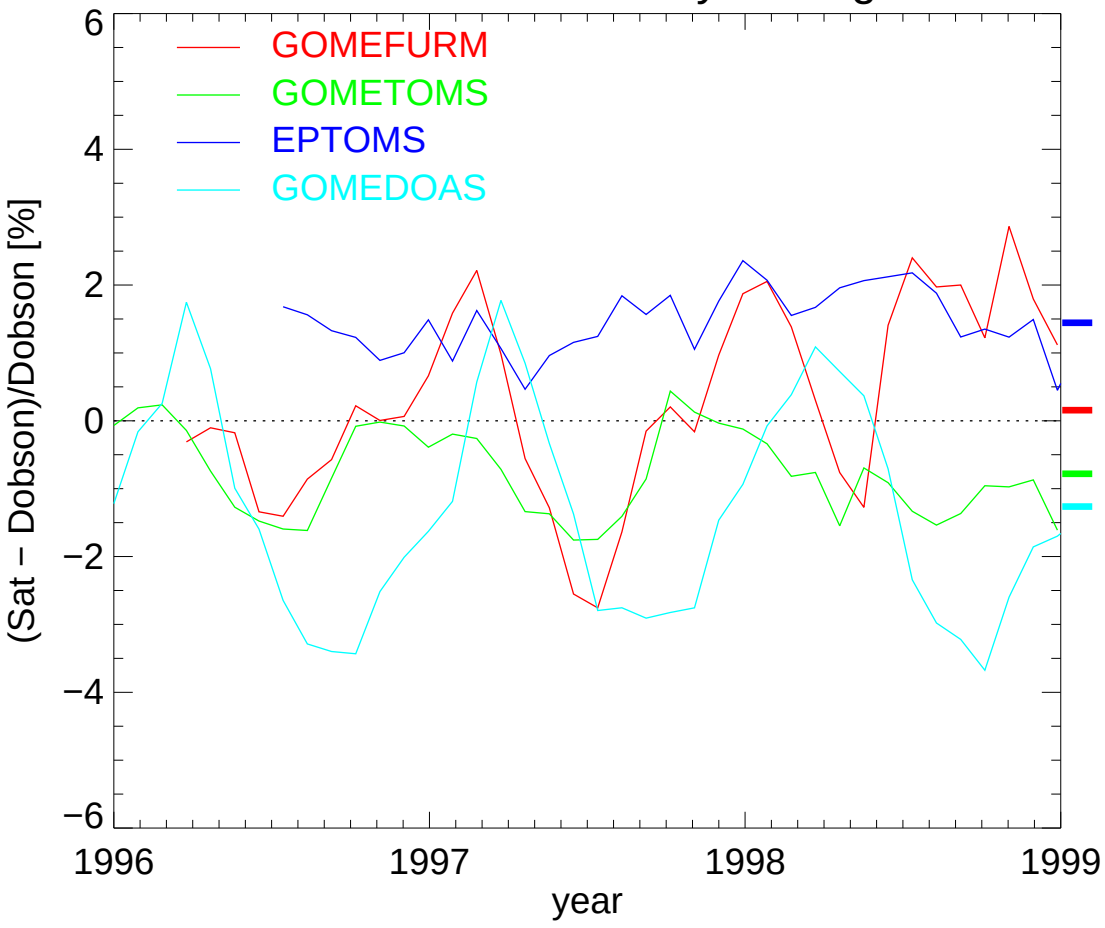
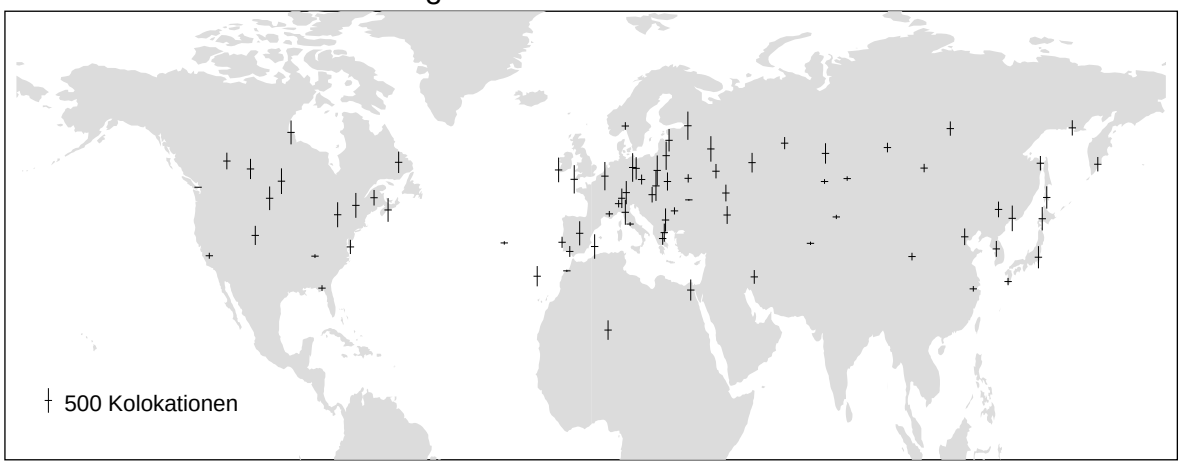
Total Ozone : Monthly Average

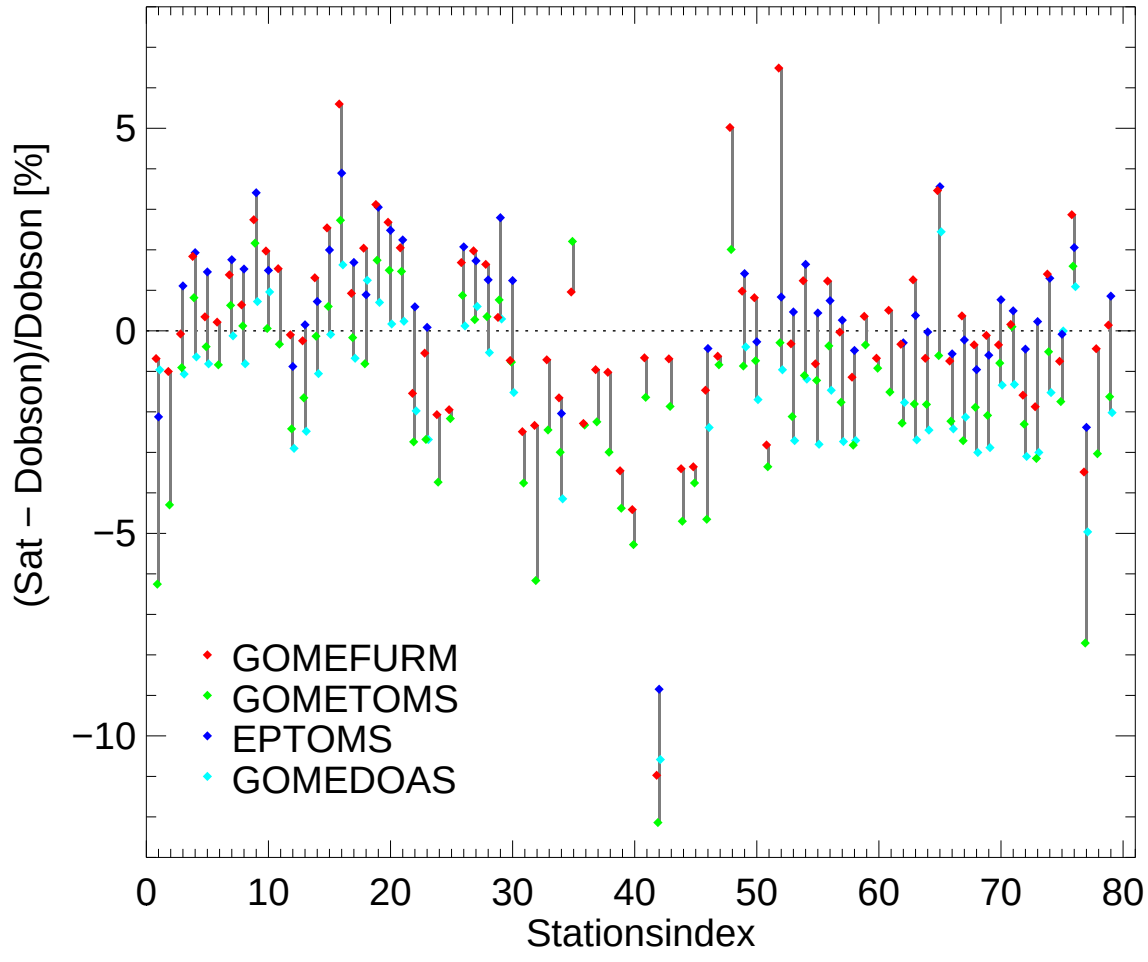


Tot. O_3 : DOBSON Stationen



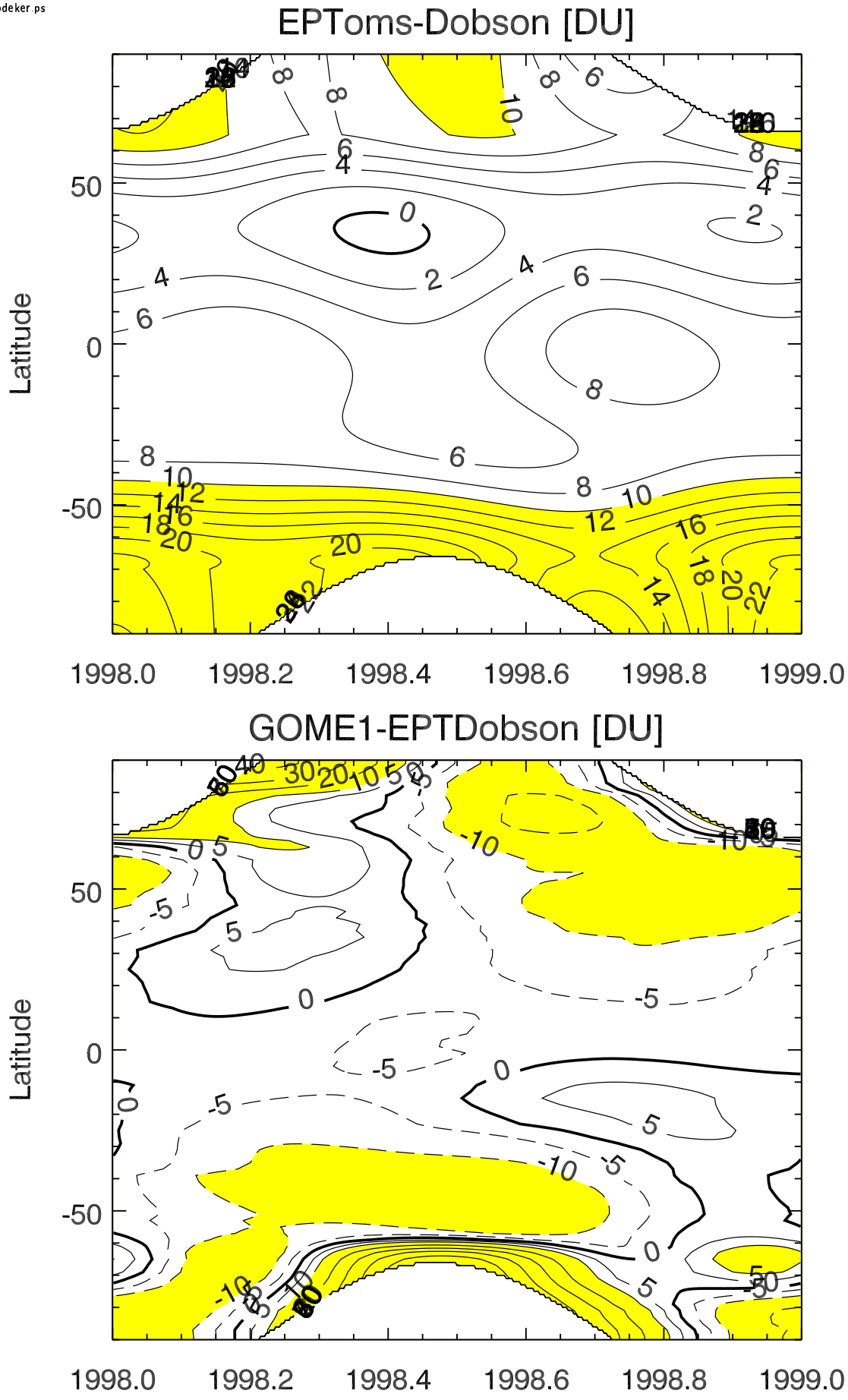
K. Bramstedt

	Mean deviation [DU]	StDev [DU]	Mean deviation [%]	StDev [%]	#
GOMEFURM	-0.16	21.66	0.16	6.45	26053
GOMETOMS (V7)	-3.12	17.42	-0.78	5.62	51363
EPTOMS (V7)	3.69	15.18	1.44	5.28	58321
GOMEDOAS (GDP 2.7)	-4.33	17.83	-1.26	5.85	42656



K. Bramstedt

bodeker.ps



after Bodeker et al. 2001

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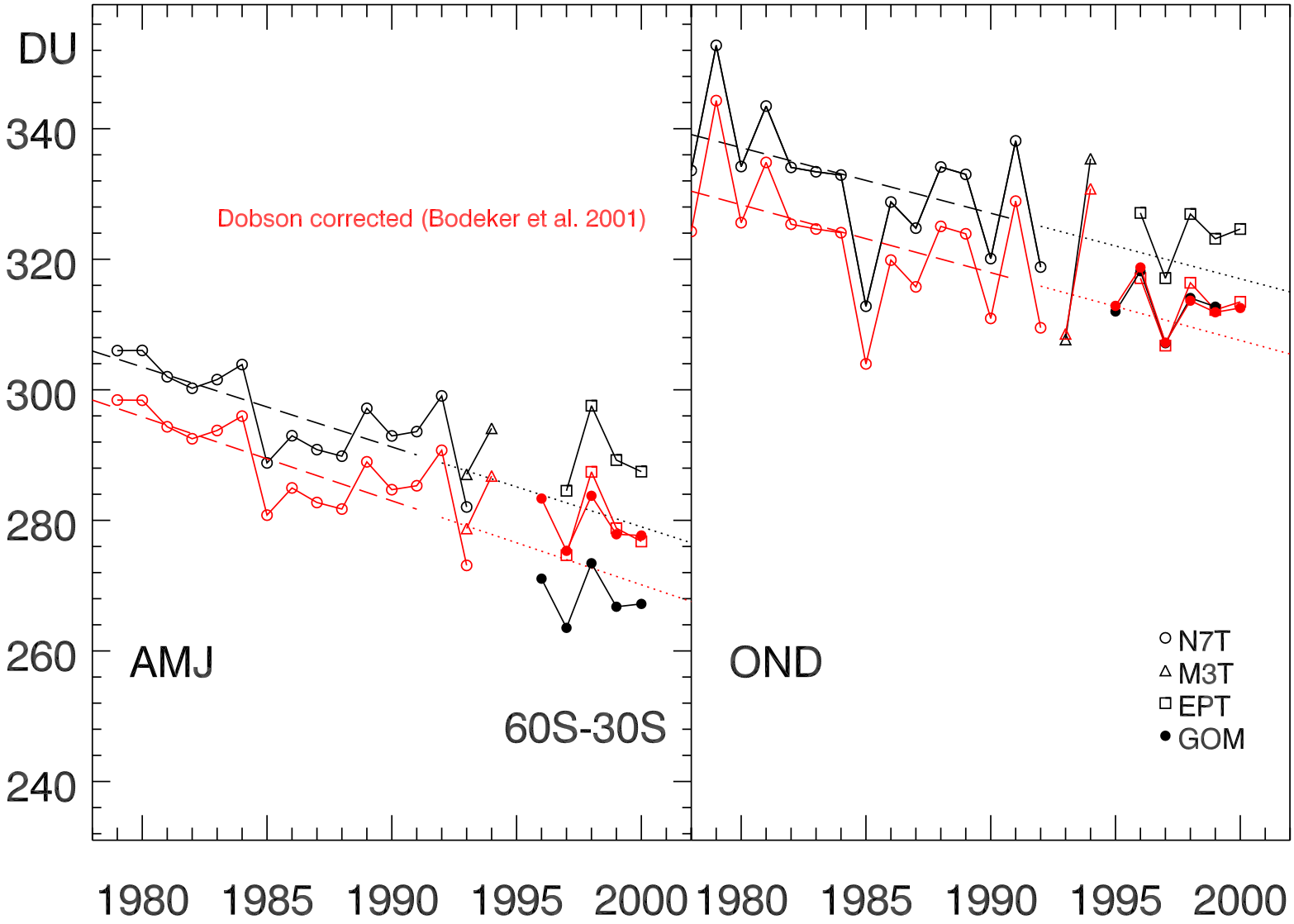
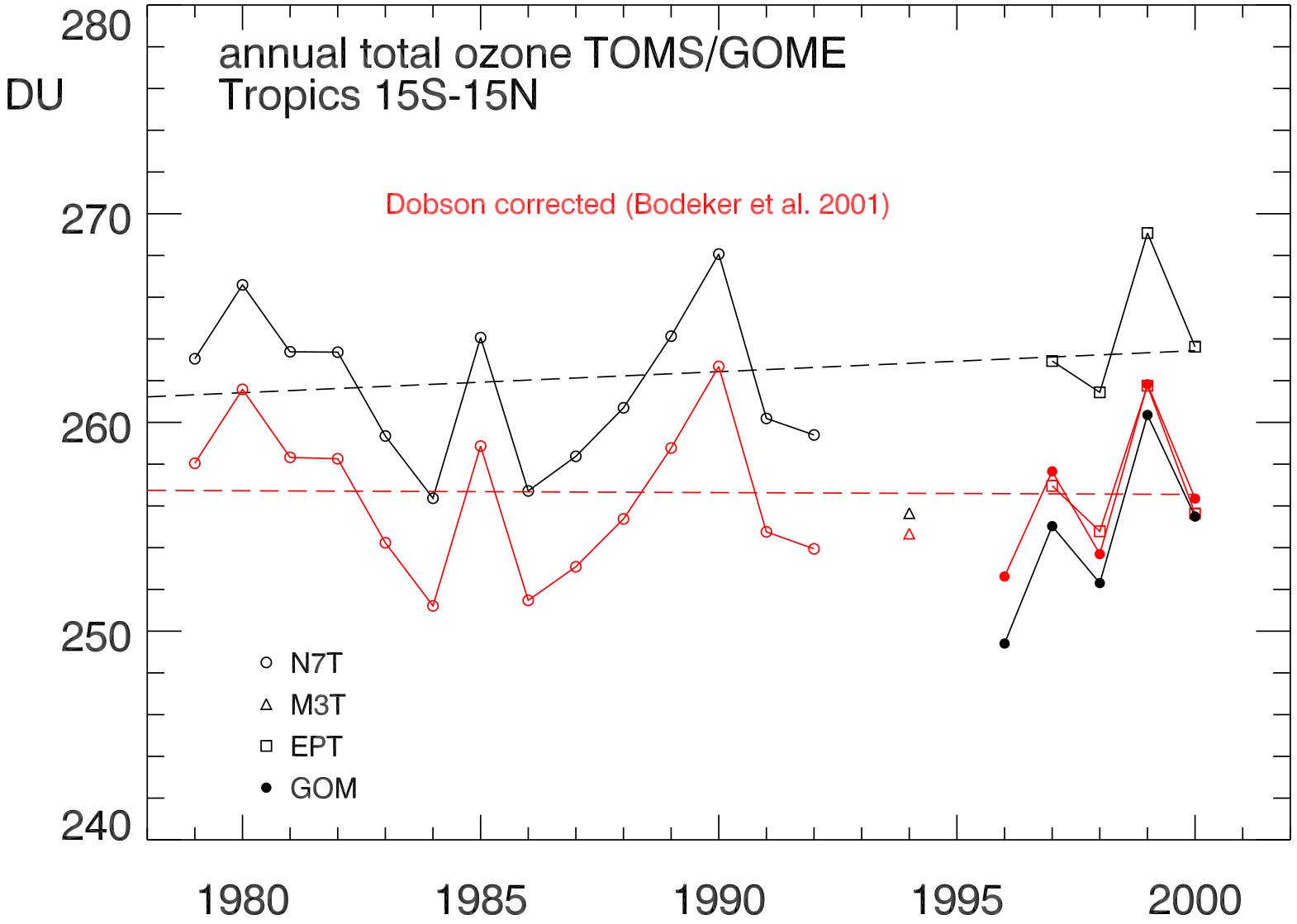
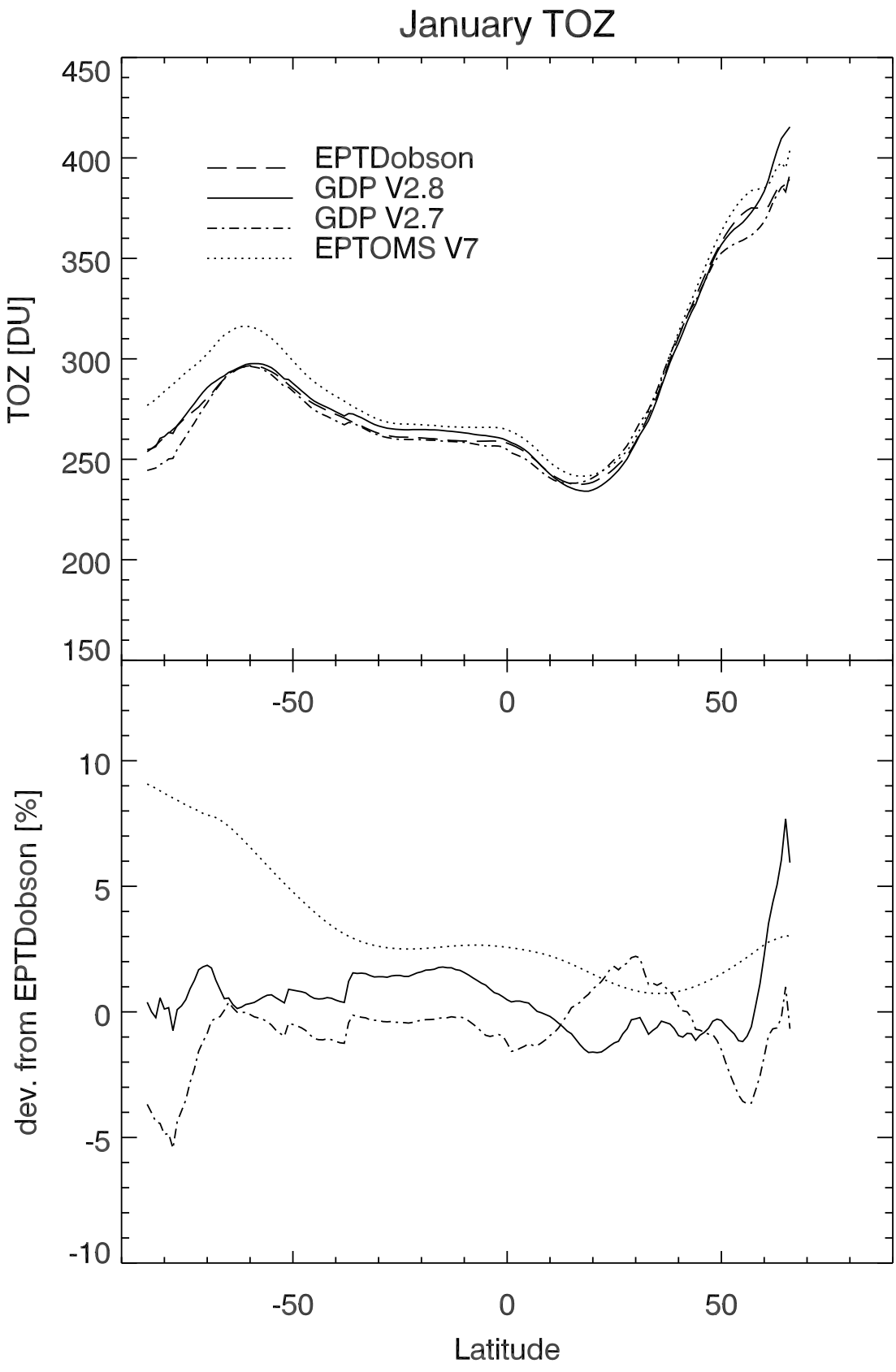


trend_trop.tex





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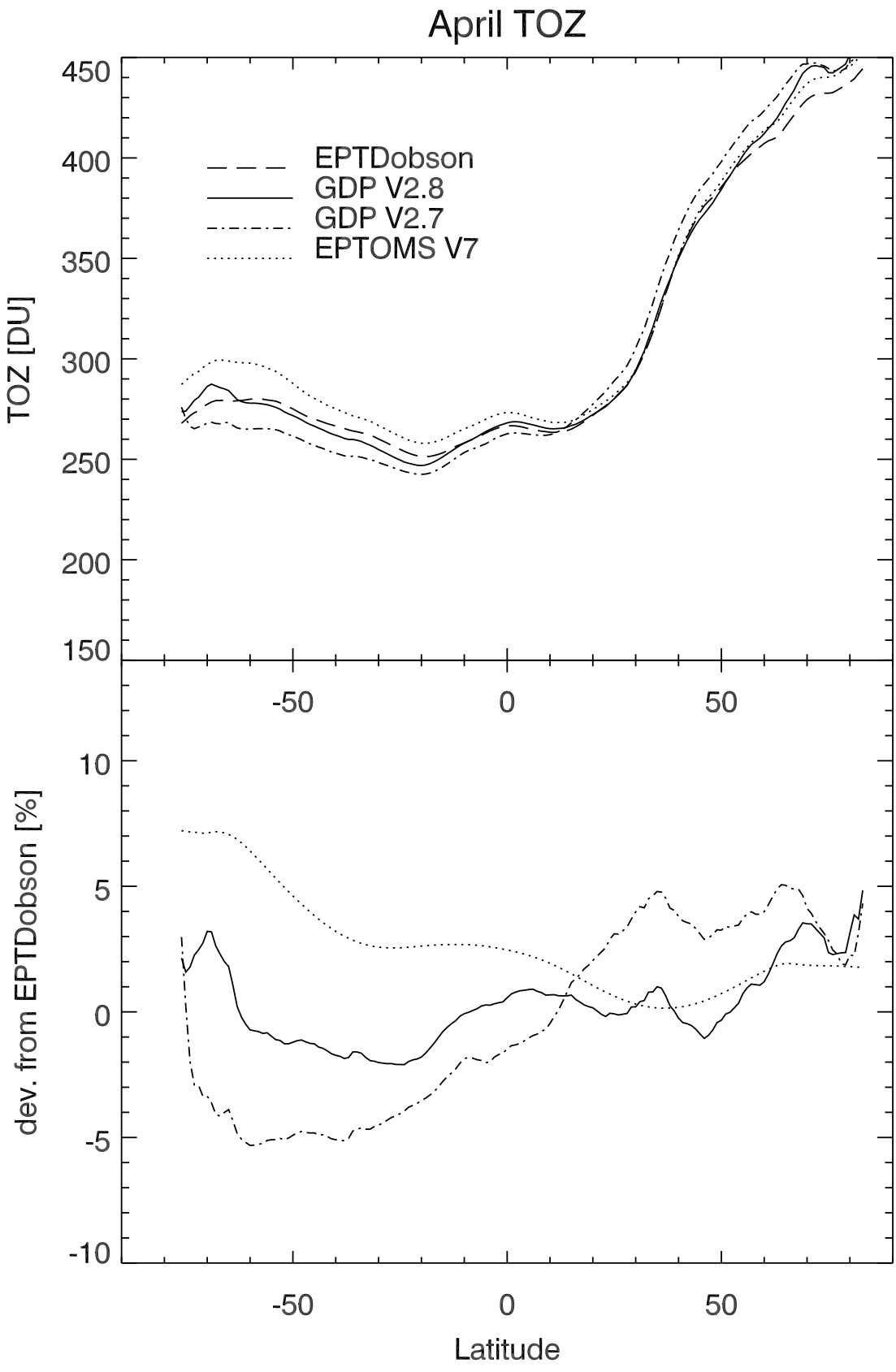

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Conclusion for GOME:

- New iterative neural net AMF algorithm (V2.8) for GOME looks very promising and seems to remove part of the seasonalities seen in the deviation of the GOME data with respect to ground based data

- Larger deviations are observed at large SZA >80°. (generally problematic for UV/VIS observations)

- overestimation of GOME TOZ at small total columns under ozone hole conditions

- There are insignificant differences between GDP Version 2.7 and GDP Version 2.4 (at least for zonal means).

- Future improvements towards GDP V3.0 will include:

    1. Iterative AMF calculation (V.2.8)

    2. Two ozone temperature X-section fit

    3. Choice of appropriate Ring Spectra

- **Both current data version of TOMS and GOME differ from each other and each also with respect to groundbased measurements, this has to be accounted for in the assessment of long-term trends.**