Plans to combine long term European total ozone date sets with USA data sets

CEOS ACC Meeting, ESRIN/Frascati, 28 April 2014

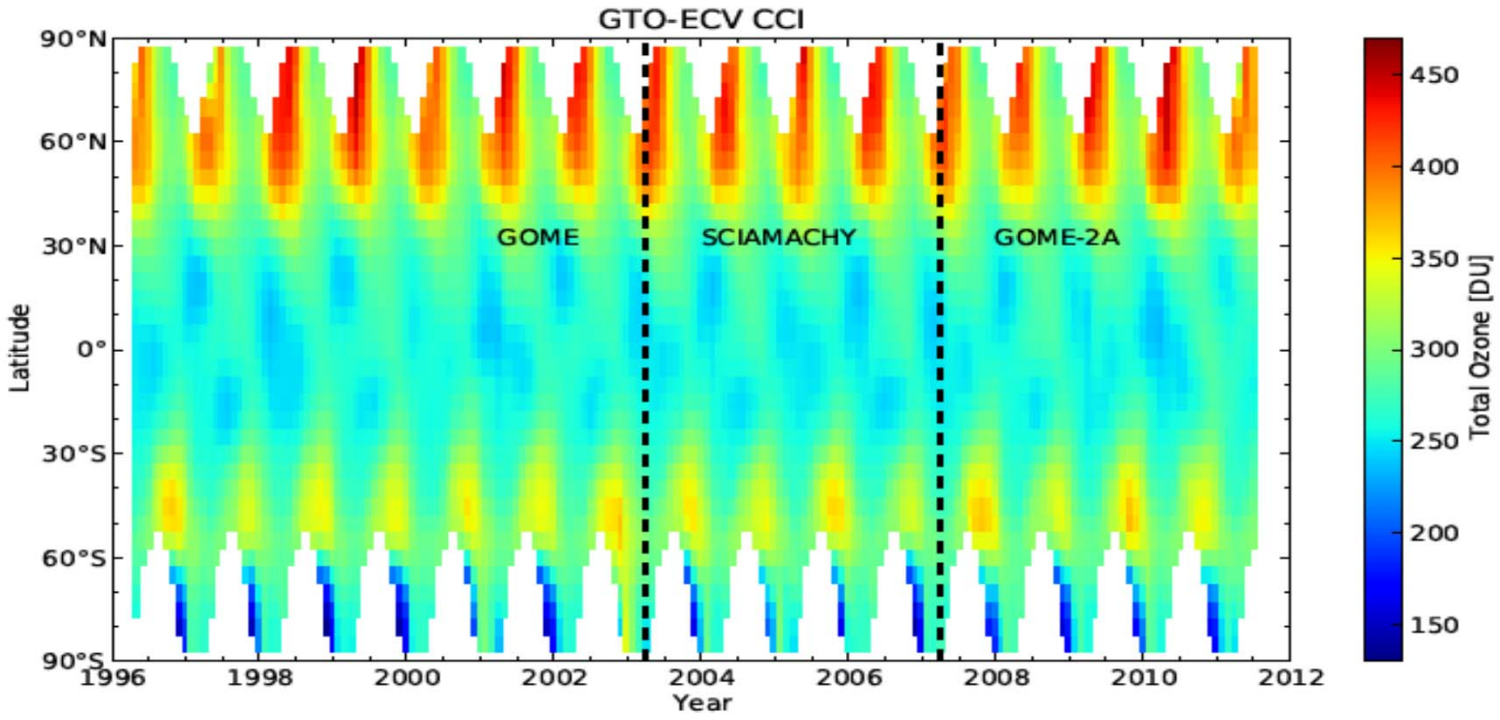
D. Loyola (DLR), M. Coldewey-Egbers (DLR),
G. Labow (NASA), S. Frith (NASA),

Outline

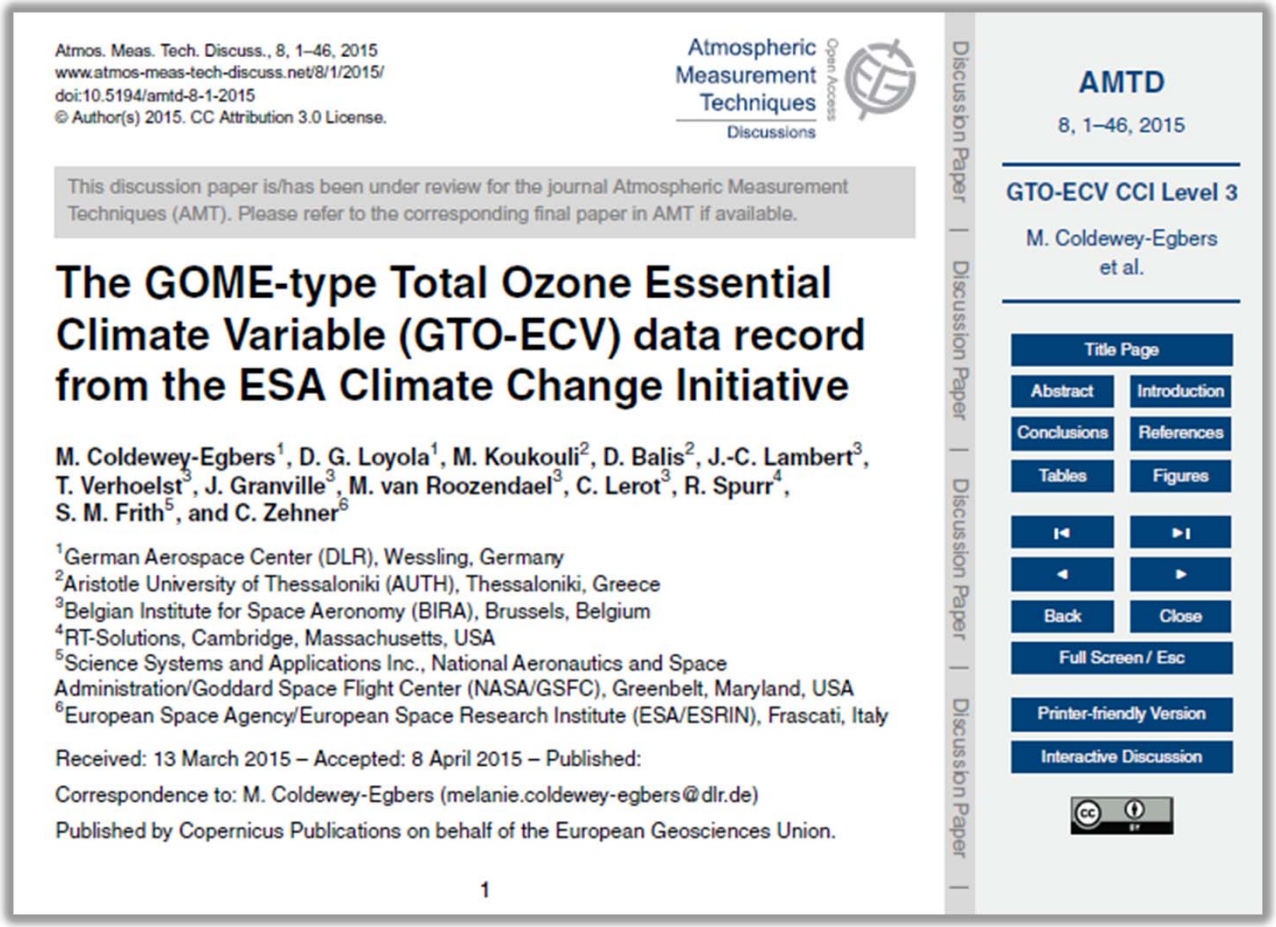
- GTO-ECV
  - Dataset
  - Sampling errors & Validation
  - CCI Phase II extension & Trends
- GTO-ECV and SBUV-MOD comparison
  - Zonal Mean
  - Grid data
- Outlook

GTO-ECV: Homogenized Total Ozone L3 Dataset

- Based on GODFIT L2 version 3.0
- Merge GOME/ERS-2, SCIAMAHCY/ENVISAT, and GOME-2/MetOp-A
- Monthly 1x1°grid data in NetCDF CF 1.5



GTO-ECV: Merging Algorithm in CCI Phase-I



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www.atmos-meas-tech-discuss.net/8/1/2015/
doi:10.5194/amtd-8-1-2015

Atmospheric Measurement Techniques Discussions

The GOME-type Total Ozone Essential Climate Variable (GTO-ECV) data record from the ESA Climate Change Initiative

M. Coldewey-Egbers[1], D. G. Loyola[1], M. Koukouli[2], D. Balis[2], J.-C. Lambert[3], T. Verhoelst[3], J. Granville[3], M. van Roozendael[3], C. Lerot[3], R. Spurr[4], S. M. Frith[5], and C. Zehner[6]

[1]German Aerospace Center (DLR), Wessling, Germany
[2]Aristotle University of Thessaloniki (AUTH), Thessaloniki, Greece
[3]Belgian Institute for Space Aeronomy (BIRA), Brussels, Belgium
[4]RT-Solutions, Cambridge, Massachusetts, USA
[5]Science Systems and Applications Inc., National Aeronautics and Space Administration/Goddard Space Flight Center (NASA/GSFC), Greenbelt, Maryland, USA
[6]European Space Agency/European Space Research Institute (ESA/ESRIN), Frascati, Italy

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Correspondence to: M. Coldewey-Egbers (melanie.coldewey-egbers@dlr.de)

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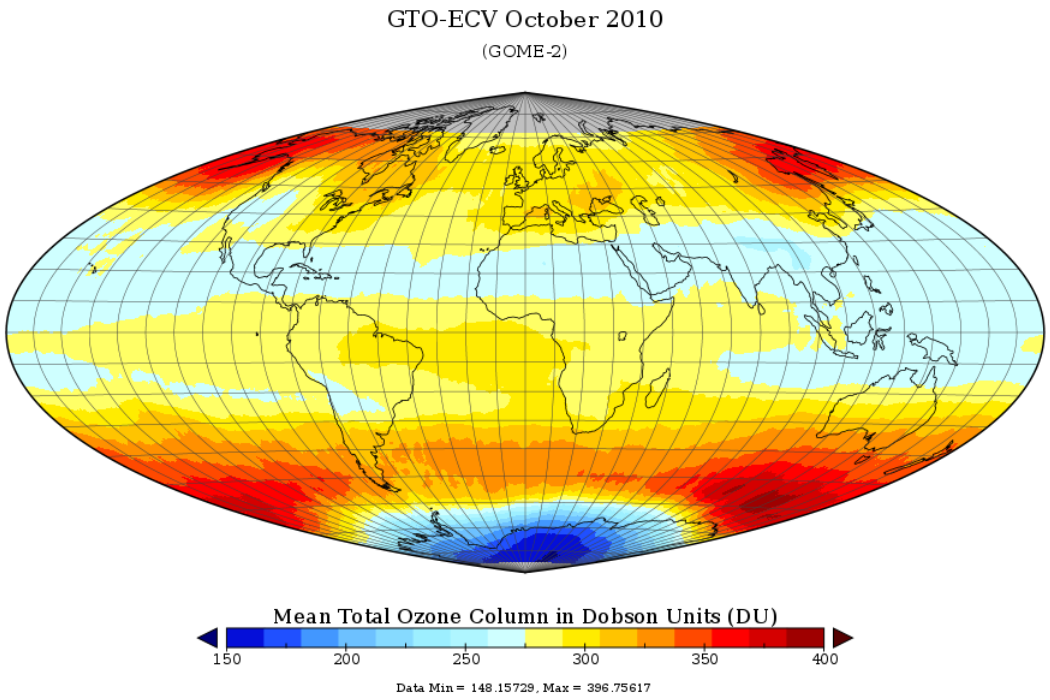
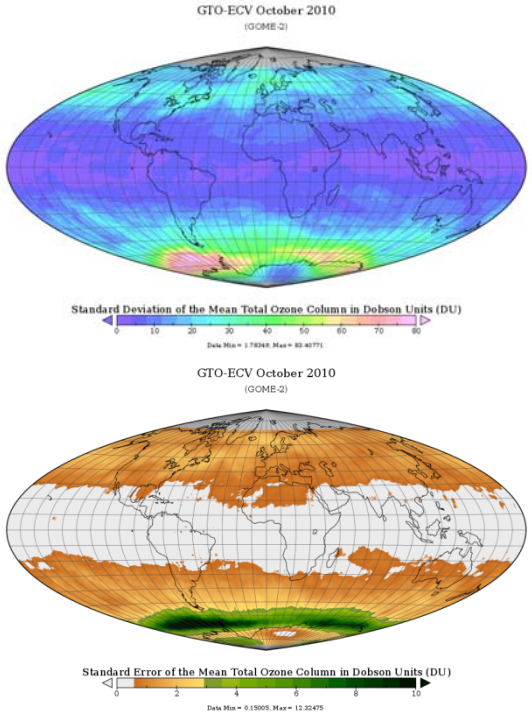
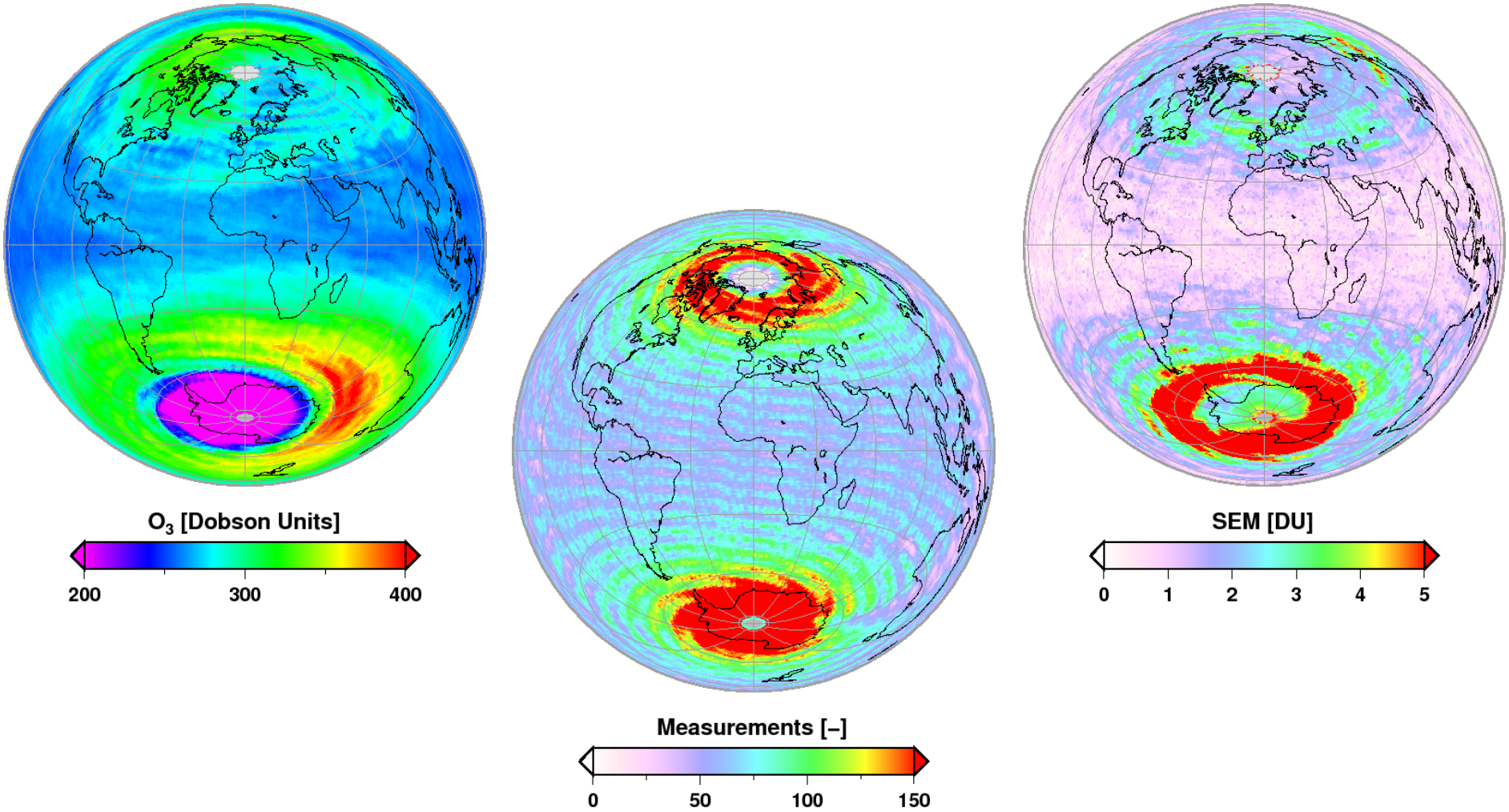
GTO-ECV: Product Content

- Monthly mean total ozone
- Standard deviation
- **Standard error** estimated using an OSSE



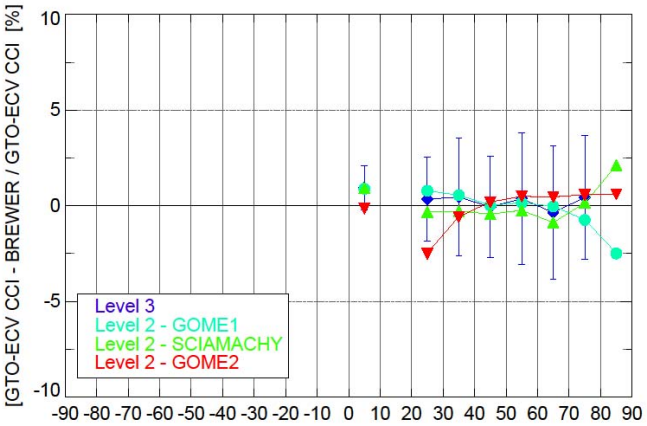


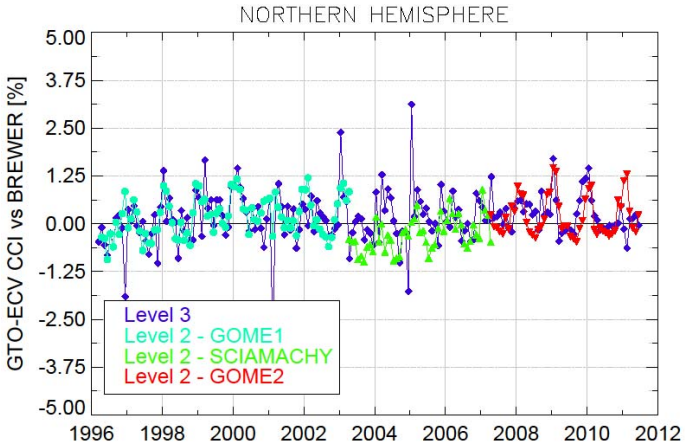
GTO-ECV: Sampling Error Characterization (SCIA)



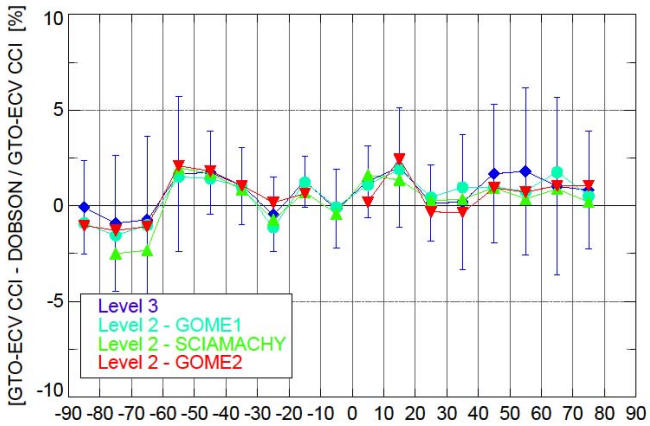
GTO-ECV: Ground-Based Validation

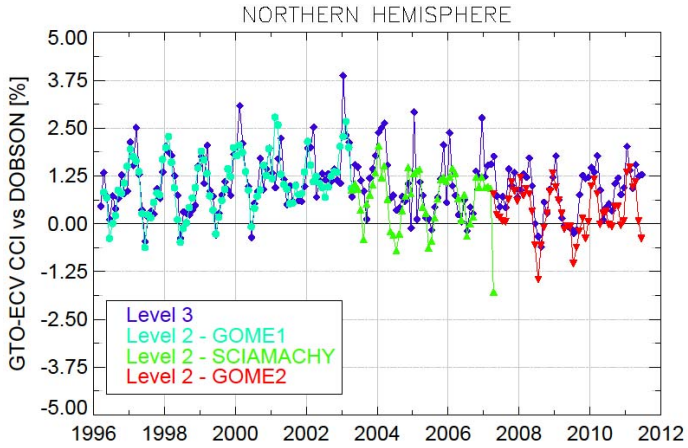
Brewer





Dobson

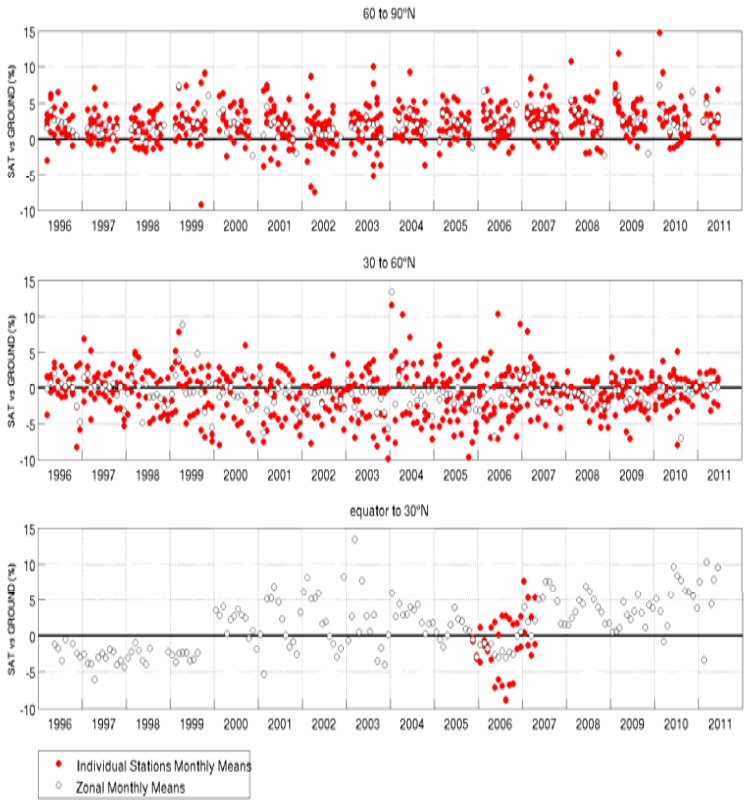




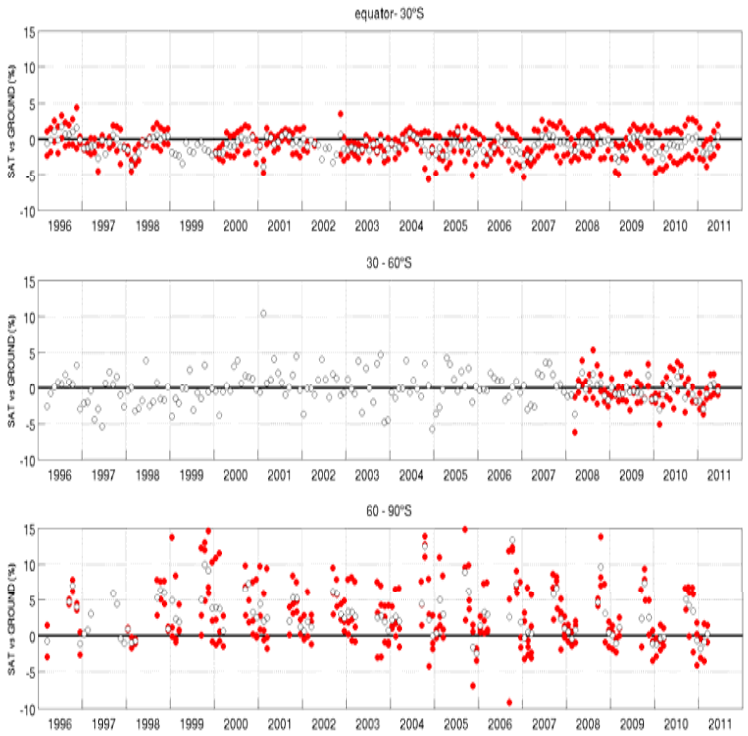
Courtesy of M. Koukouli, AUTH

GTO-ECV: Ground-Based Validation (2)

SAOZ Northern Hemisphere



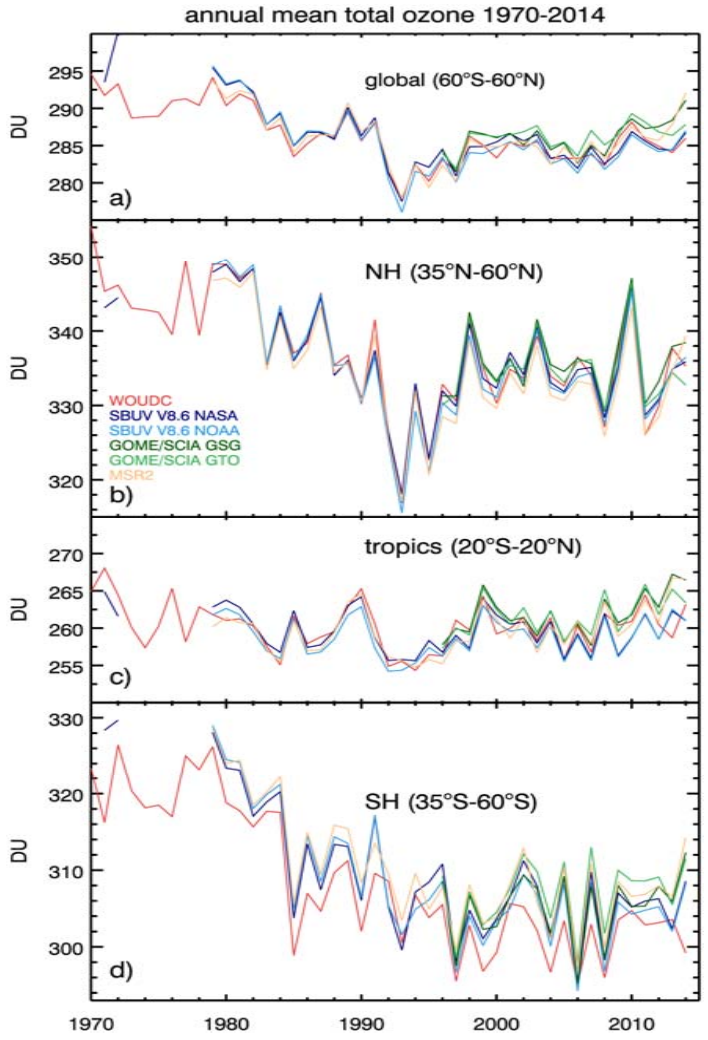
SAOZ Southern Hemisphere



Courtesy of T. Verhoelst + J. Granville, BIRA

Extended GTO-ECV: Ozone_CCI Phase II

- GODFIT L2 from GOME in 1995 and GOME-2A/MetOp-A data from 2012-2014 now available
- GTO-ECV extend from June 1995 to December 2014
- Extended dataset has been included in:
  - „Stratospheric Ozone“ section of „The State of the Climate 2014“ submitted to BAMS; Weber et al., 2015.
  - WMO Assessment of Ozone Depletion: 2014, WMO Report No. 55, 2015.



Courtesy of M. Weber, IUP

Extended GTO-ECV: Ozone Trend Detection

Geophysical Research Letters

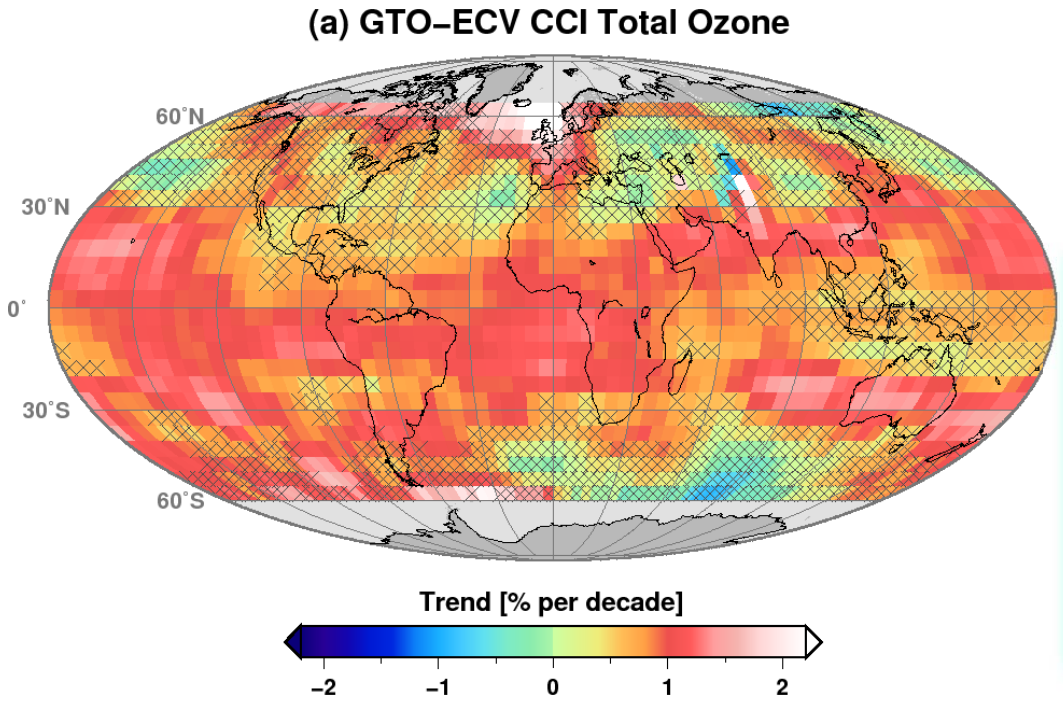
RESEARCH LETTER

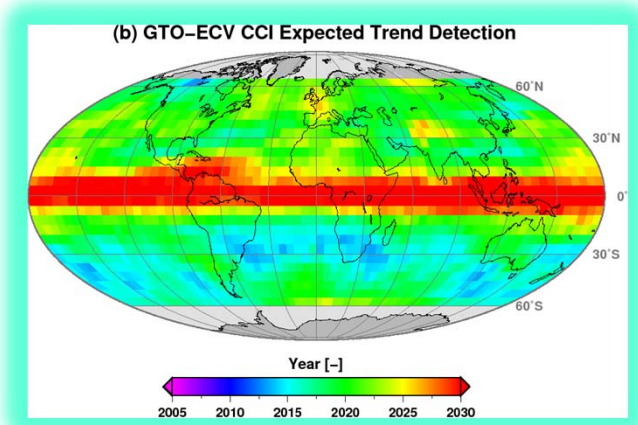
10.1002/2014GL060212

A new health check of the ozone layer at global and regional scales

Key Points:
- Global assessment of ozone trends

Melanie Coldewey-Egbers[1], Diego G. Loyola R.[1], Peter Braesicke[2], Martin Dameris[3], Michel van Roozendael[4], Christophe Lerot[4], and Walter Zimmer[1]



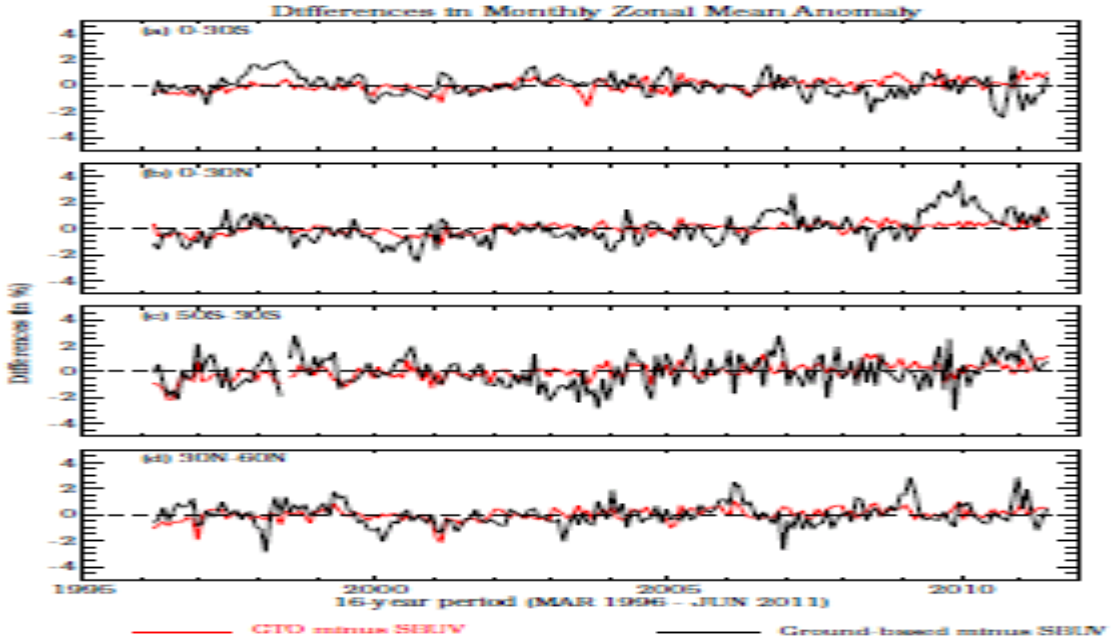


GTO-ECV and SBUV-MOD Comparison

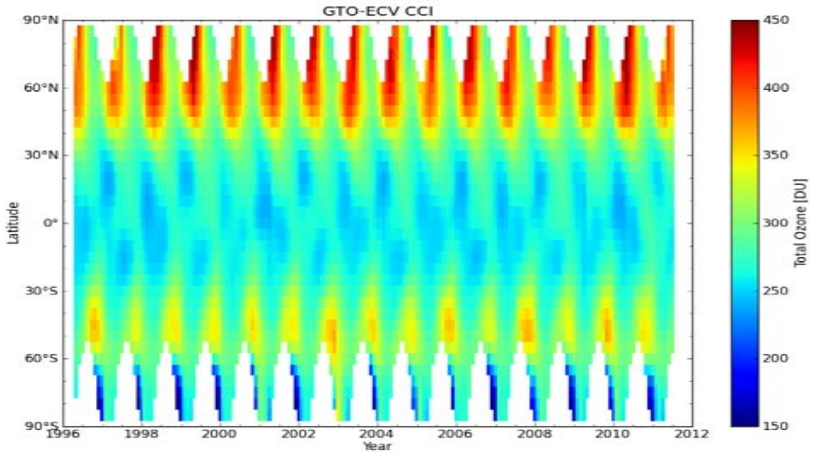
Comparison of profile total ozone from SBUV (v8.6) with GOME-type and ground-based total ozone for a 16-year period (1996 to 2011)

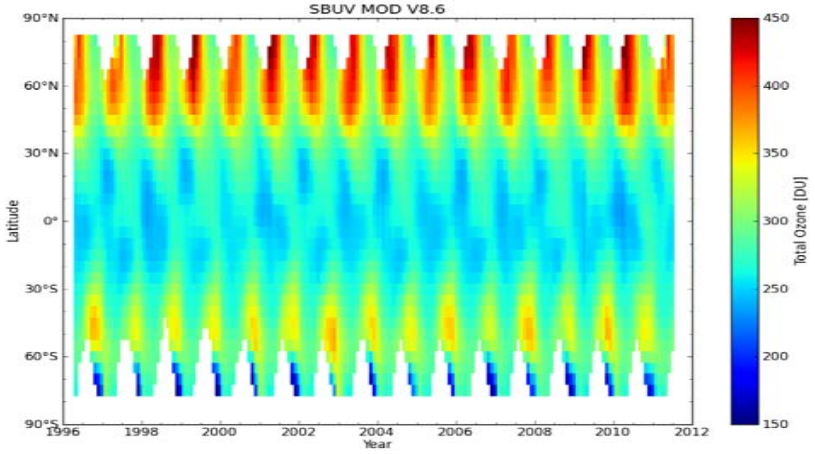
Atmospheric Measurement Techniques Open Access

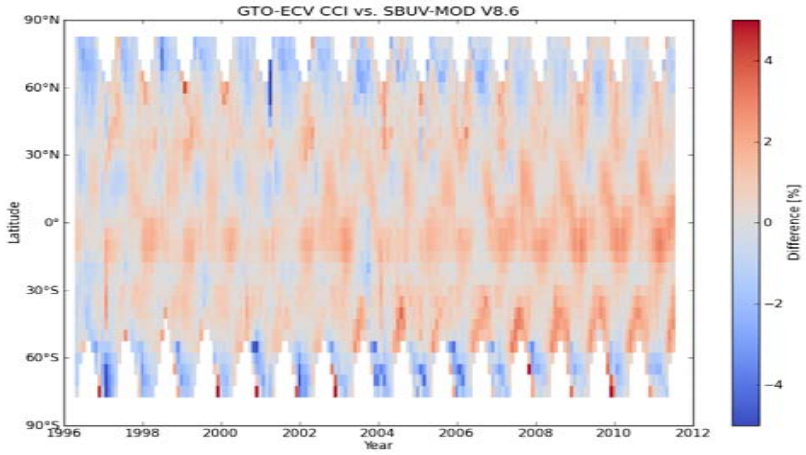
E. W. Chiou[1], P. K. Bhartia[2], R. D. McPeters[2], D. G. Loyola[3], M. Coldewey-Egbers[3], V. E. Fioletov[4], M. Van Roozendael[5], R. Spurr[6], C. Lerot[5], and S. M. Frith[7]



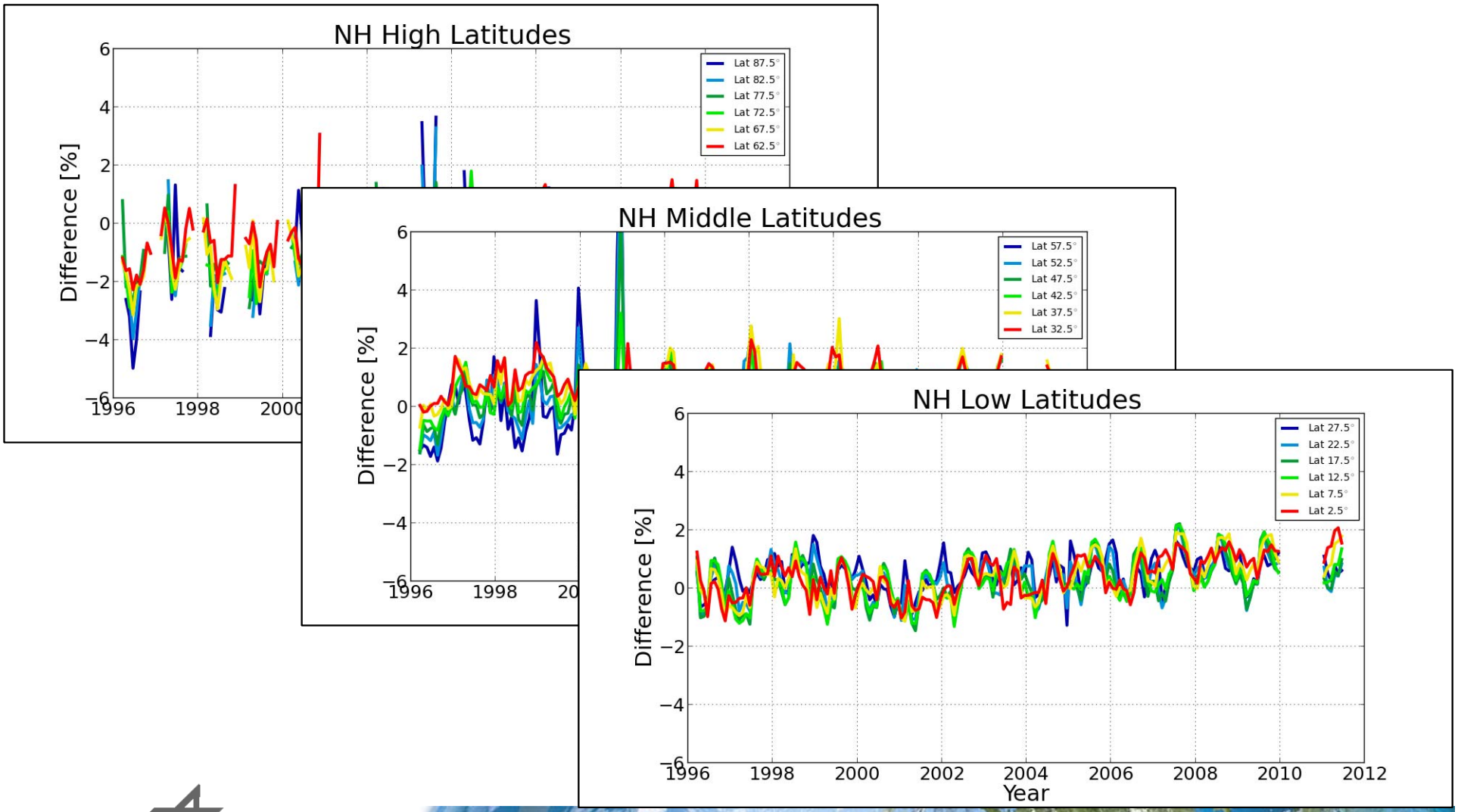
GTO-ECV vs. SBUV-MOD: Total Ozone



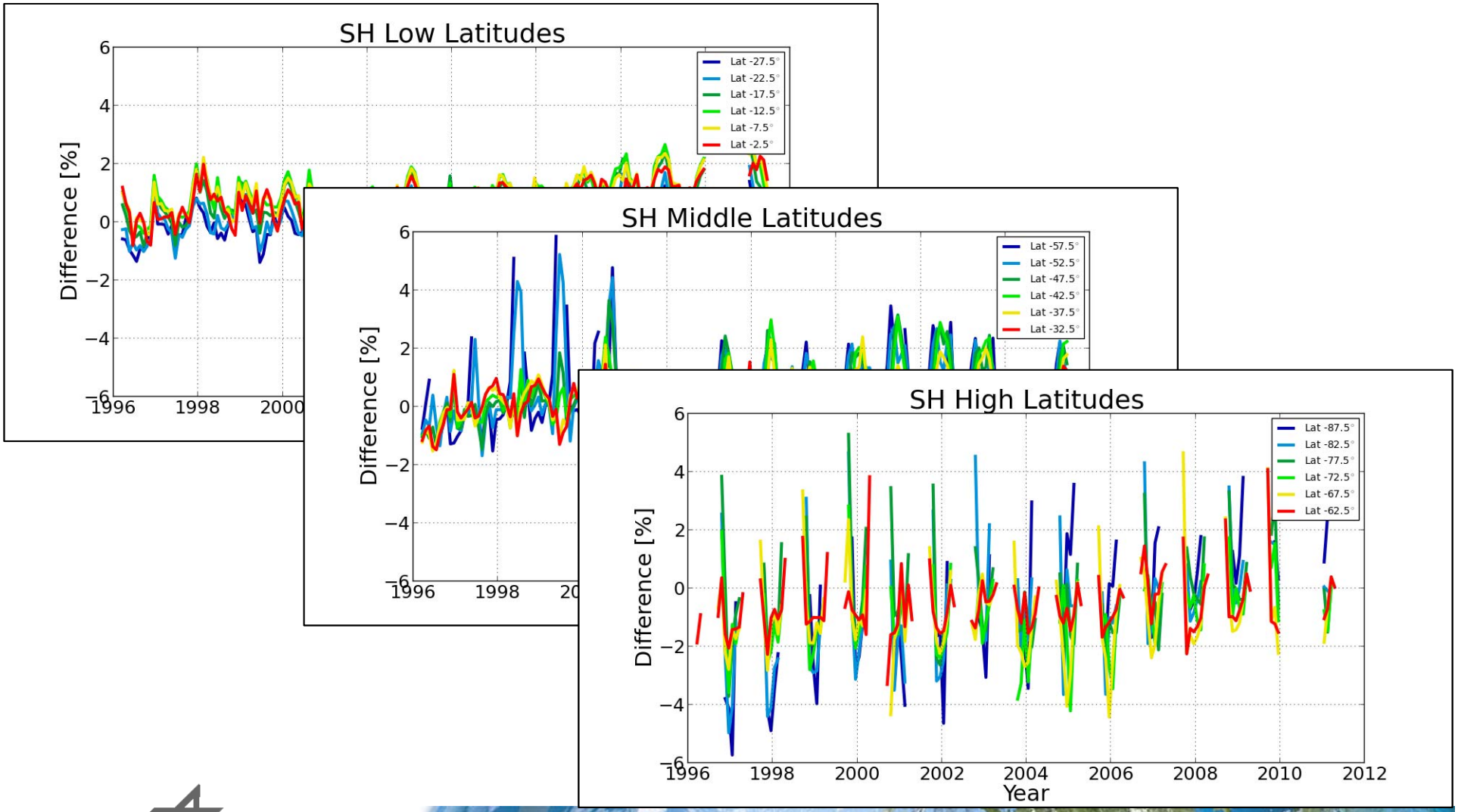




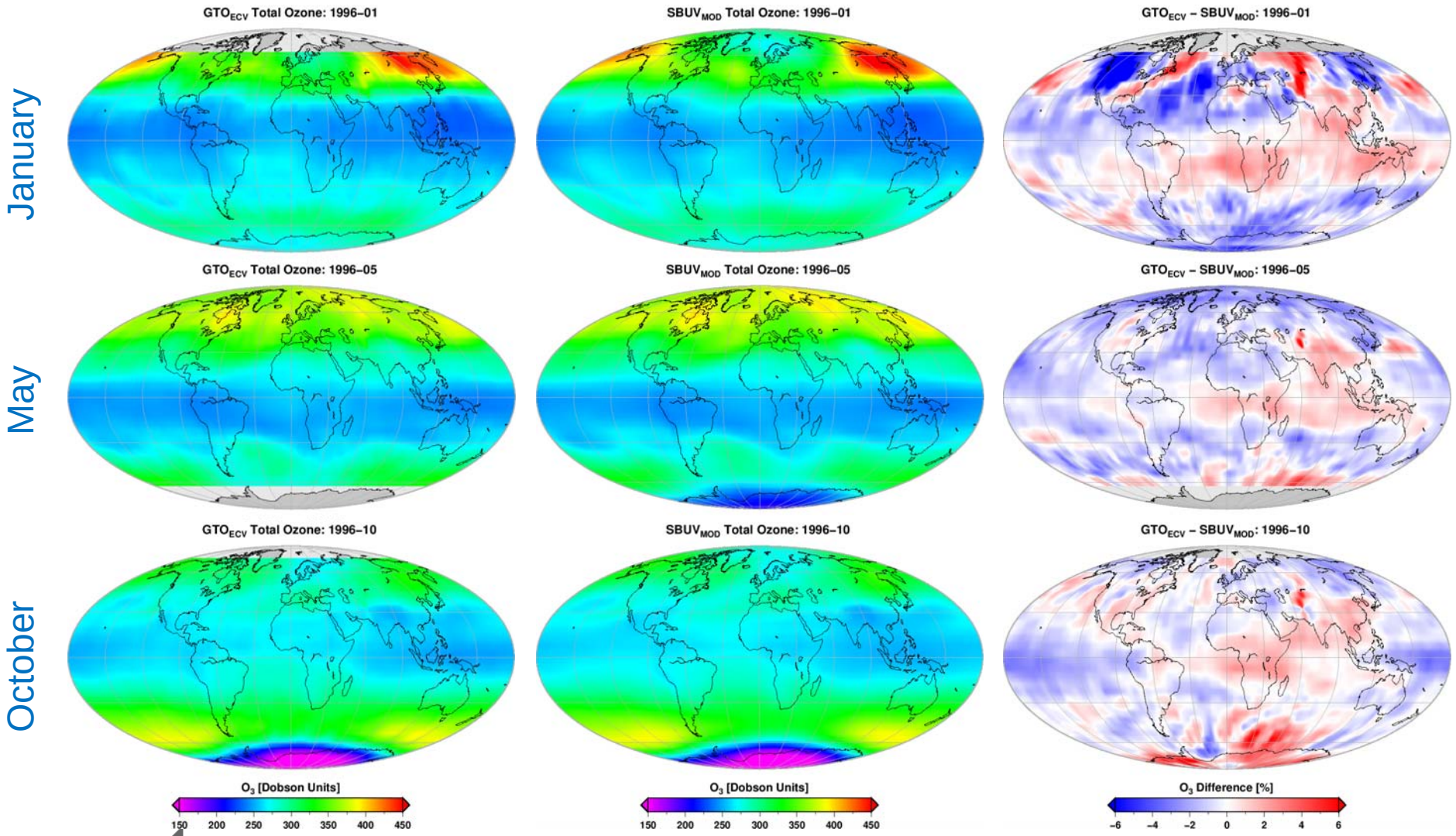
GTO-ECV vs. New SBUV MOD: Zonal Mean NH



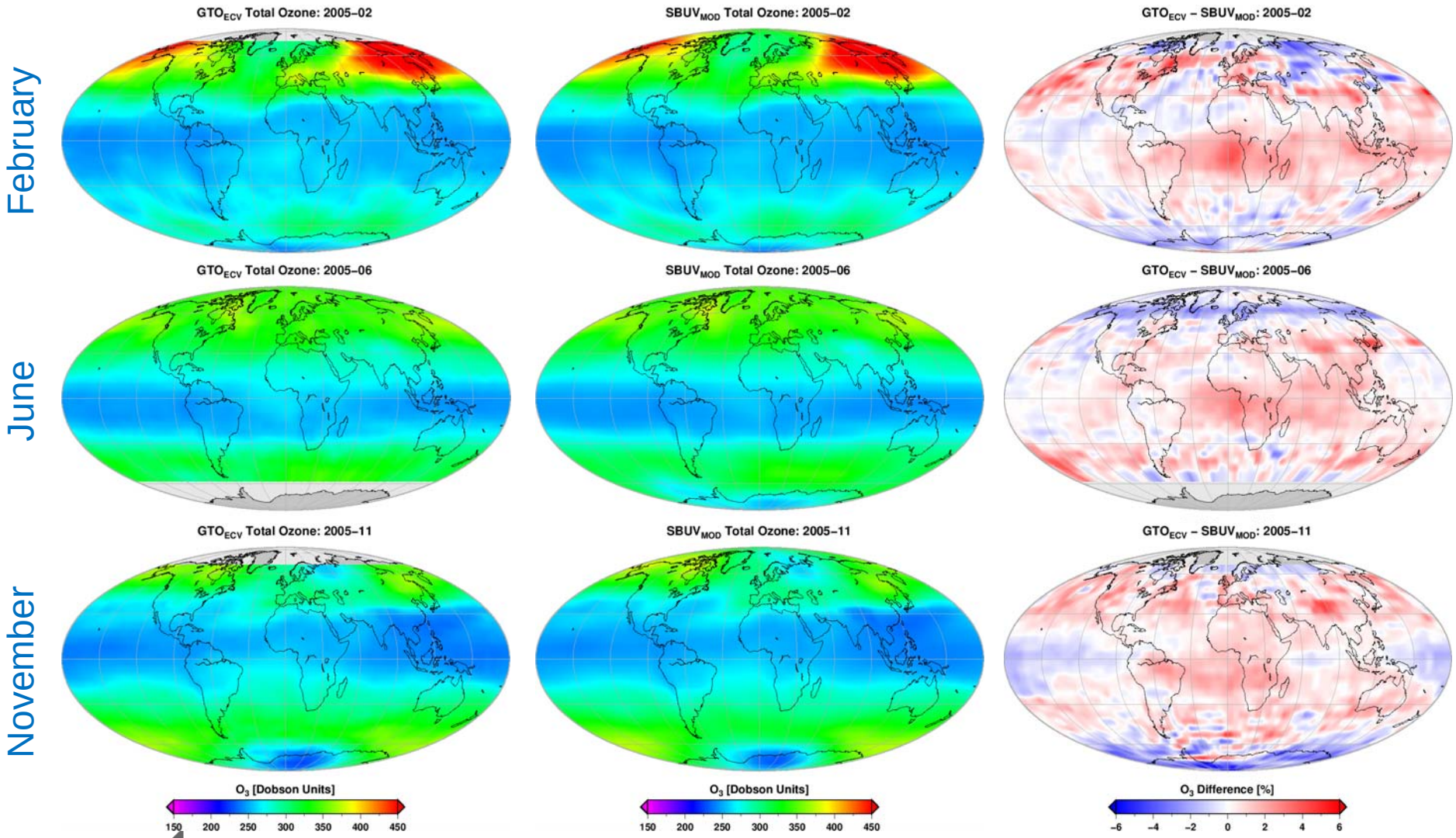
GTO-ECV vs. New SBUV-MOD: Zonal Mean SH



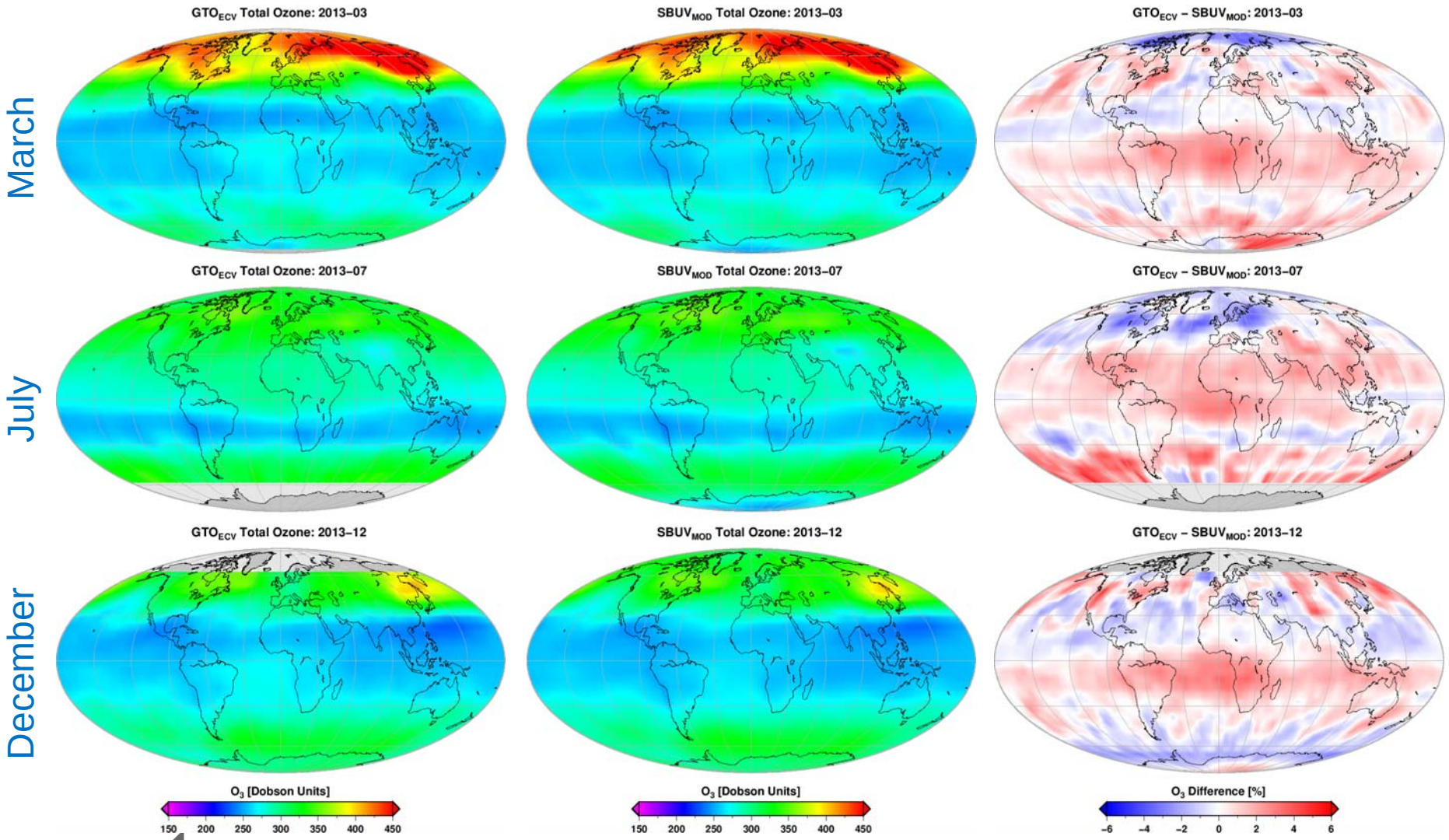
GTO-ECV vs. New SBUV-MOD: GOME (1996)



GTO-ECV vs. New SBUV-MOD: SCIA (2005)



GTO-ECV vs. New SBUV-MOD: GOME-2 (2013)

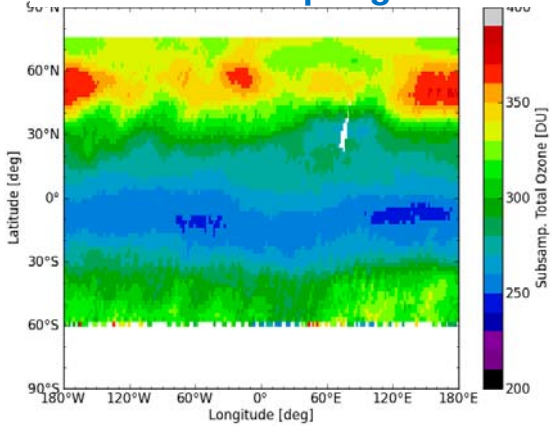


ESA CCI Phase II

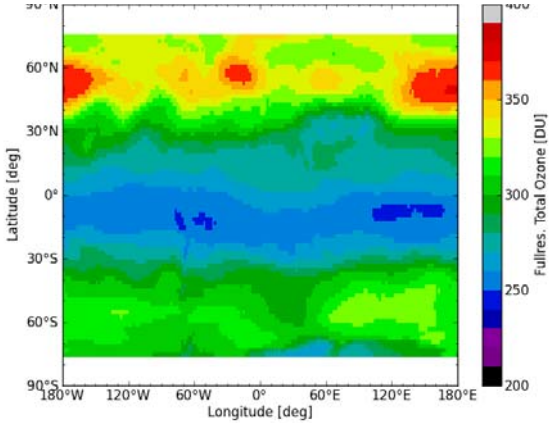
- Extend GTO-ECV with OMI and GOME-2/MetOp-B
- Geo-statistical spatial-temporal interpolation of daily satellite data using:
  - Inverse-Distance-Weighting
  - Kriging
  - Radial Basis Functions
  - Discrete Cosine Transform
  - …
- Compare the new GTO-ECV and SBUV-MOD data in collaboration with the NASA team

IDW Interpolation: Impact on monthly means

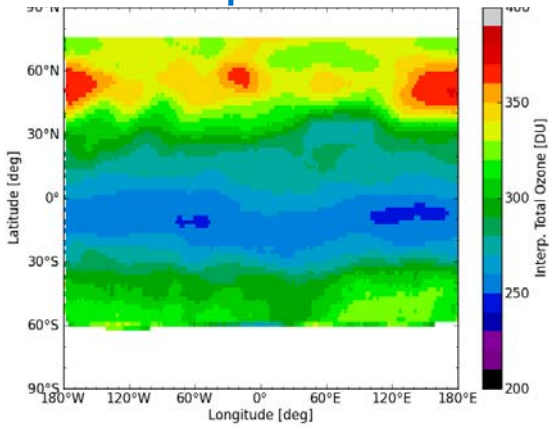
Satellite Sampling



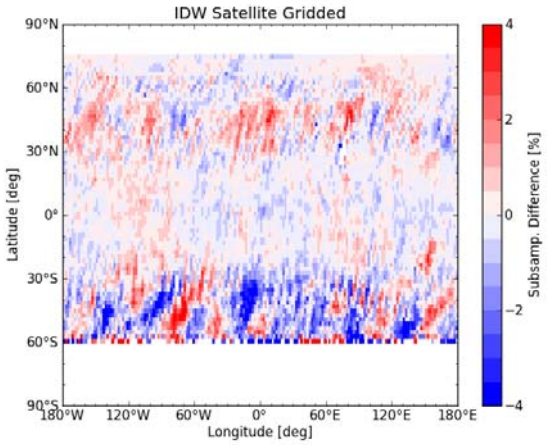
ECMWF Full Resolution



IDW Interpolation



Satellite – Full.Res.



IDW Interp. – Full.Res.