NOAA User Update

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NOAA/NWS/NCEP

1 - Climate Prediction Center

2 – Environmental Modeling Center

NOAA Users of NPP OMPS Observations

- Operational Assimilation
  - Ozone product assimilation
    - Already assimilating SBUV/2 profile and OMI TO_3
    - Conducting tests using MLS NRT v3 to simulate the OMPS - LP
  - Aerosol product assimilation
    - NEMS GFS Aerosol Component – NGAC
- Climate Monitoring
  - Long term ozone dataset (SBUV/2 + OMPS)
    - Ozone depletion
    - Ozone recovery
    - Impacts due to climate change
  - Ozone “hole” monitoring/attribution
    - Antarctic
    - Arctic

NEMS GFS Aerosol Component (NGAC)
NCEP's global interactive atmosphere-aerosol forecast system

Model Configuration:

- Forecast model: Global Forecast System (GFS) based on NOAA Environmental Modeling System (NEMS), NEMS-GFS
- Aerosol model: NASA Goddard Chemistry Aerosol Radiation and Transport Model, GOCART

Phased Implementation:

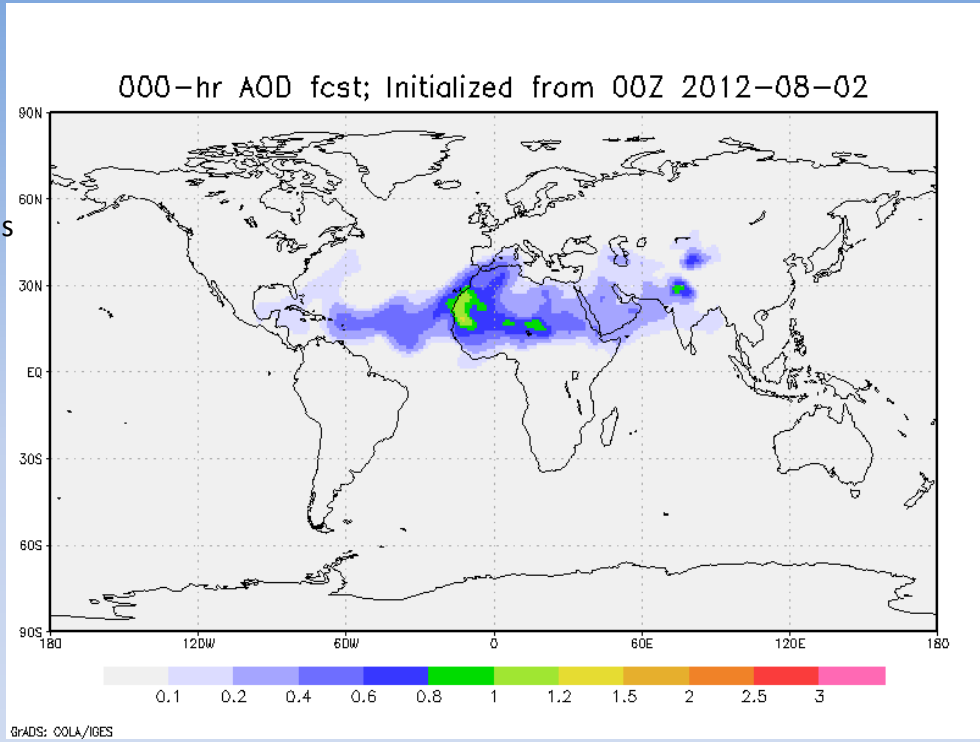
- Dust-only guidance is established in Q4FY12
- Full-package aerosol forecast after real-time global smoke emissions are available and tested (JSCDA project)

NRT Dust Forecasts

- 5-day dust forecast once per day (at 00Z), output every 3 hour, at T126 L64 resolution
- ICs: Aerosols from previous day forecast and meteorology from operational GDAS
- Operational since Sept 2012

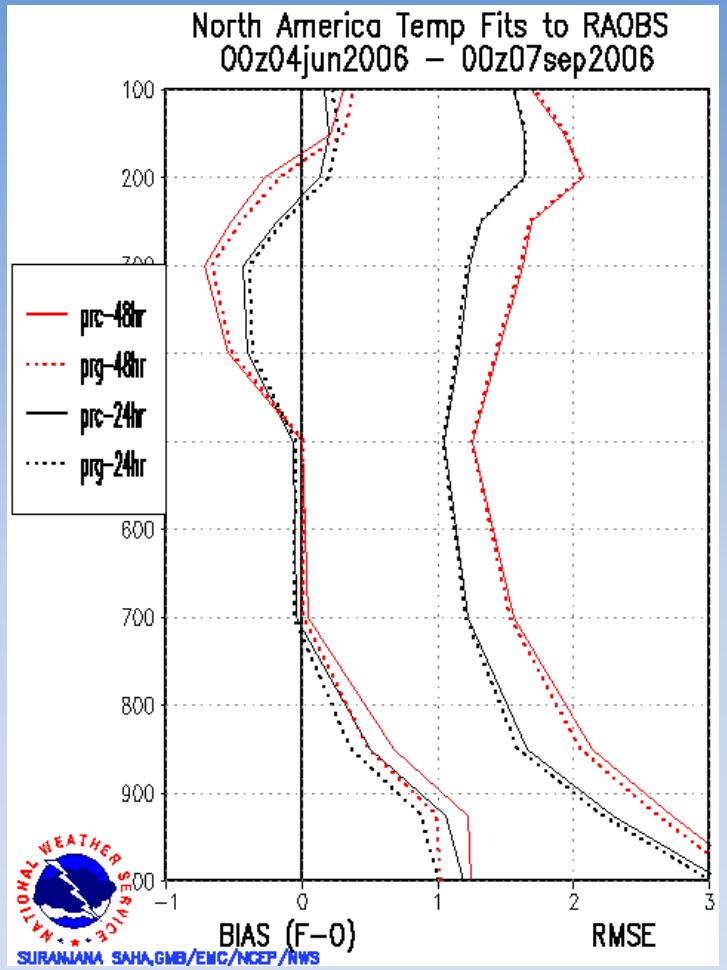
Future operational Benefits

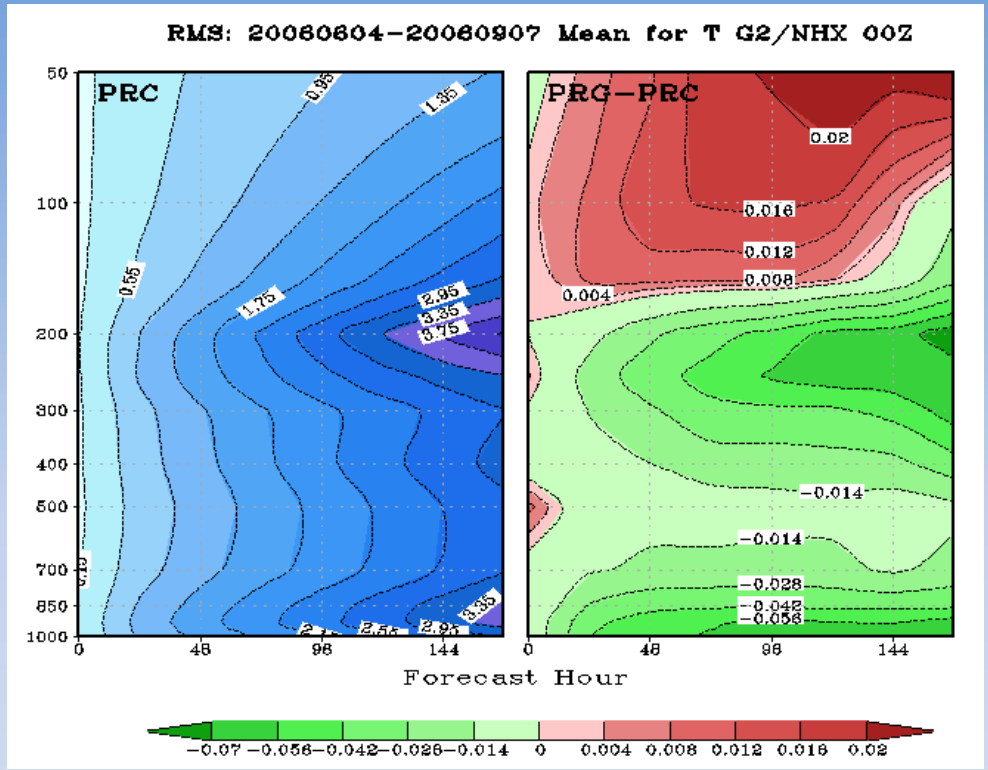
- Enables future operational global short-range (e.g., 5-day) aerosol prediction
- Allows aerosol impacts on medium range weather forecasts (GFS/GSI) to be considered
- Provides global aerosol information required for various applications (e.g., satellite radiance data assimilation, satellite retrievals, SST analysis, UV-index forecasts)
- Provides a first step toward an operational aerosol data assimilation capability at NCEP
- Allows NCEP to explore aerosol-chemistry-climate interaction in the operational Climate Forecast System (CFS)
- Provides lateral aerosol boundary conditions for regional aerosol forecast system



Acknowledge: Development and operational implementation of NGAC represents a successful "research to operations" project sponsored by NASA Applied Science Program, Joint Center for Satellite Data Assimilation and National Weather Services

Aerosol-radiation feedback: Impact of aerosols on weather forecasts





Verification against analyses and observations indicates a neutral-to-positive impact in temperature forecasts due to realistic time-varying treatment of aerosols.

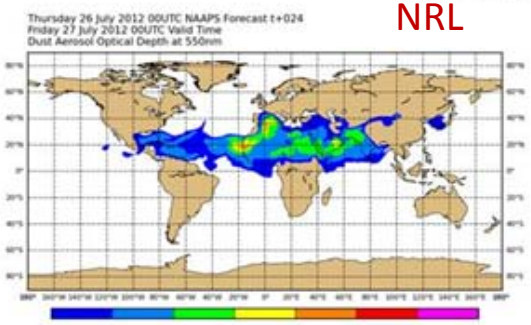
- T126 L64 GFS/GSI experiments for the 2006 summer period
- PRC uses the OPAC climatology (as in the operational applications)
- PRG uses the in-line GEOS4-GOCART dataset (updated every 6 hr)

NGAC Evaluation and Verification: ICAP inter comparison

- NCEP is a member of the **International Cooperative for Aerosol Prediction (ICAP) model intercomparison** –member since June 2011
- Participation in ICAP provides confidence that the quality of NGAC dust products is comparable to that produced by other international and domestic modelling centers

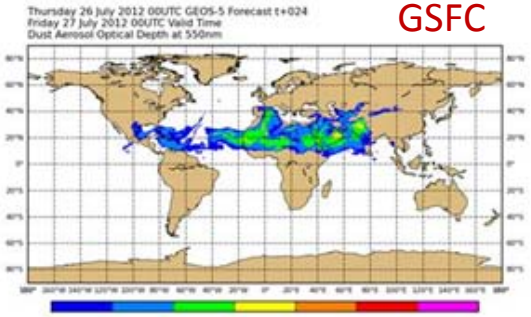
- NRL, ECMWF, GSFC, JMA provide forecasts for dust, sulfate, sea salt, and carbonaceous aerosols
- Future capability of NCEP system

NRL

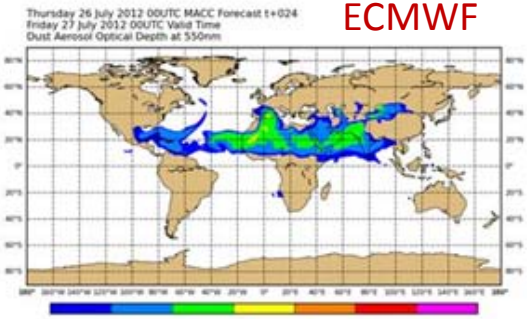


Dust AOD for 24-hr forecast, initialized from 26 Jul 2012 00Z (Image obtained from ICAP website)

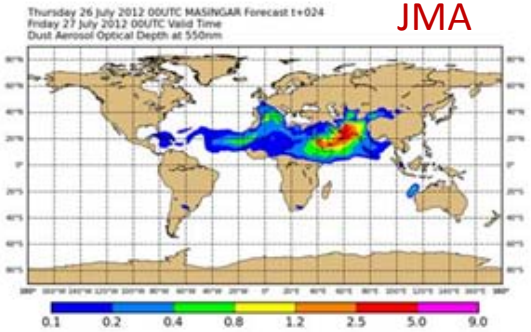
GSFC



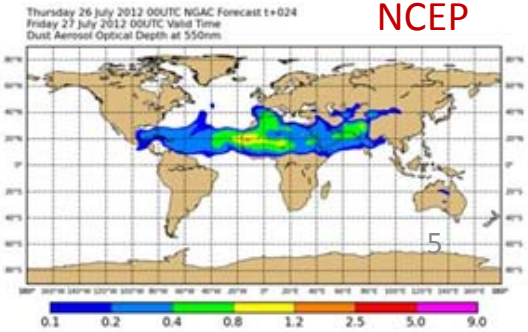
ECMWF



JMA



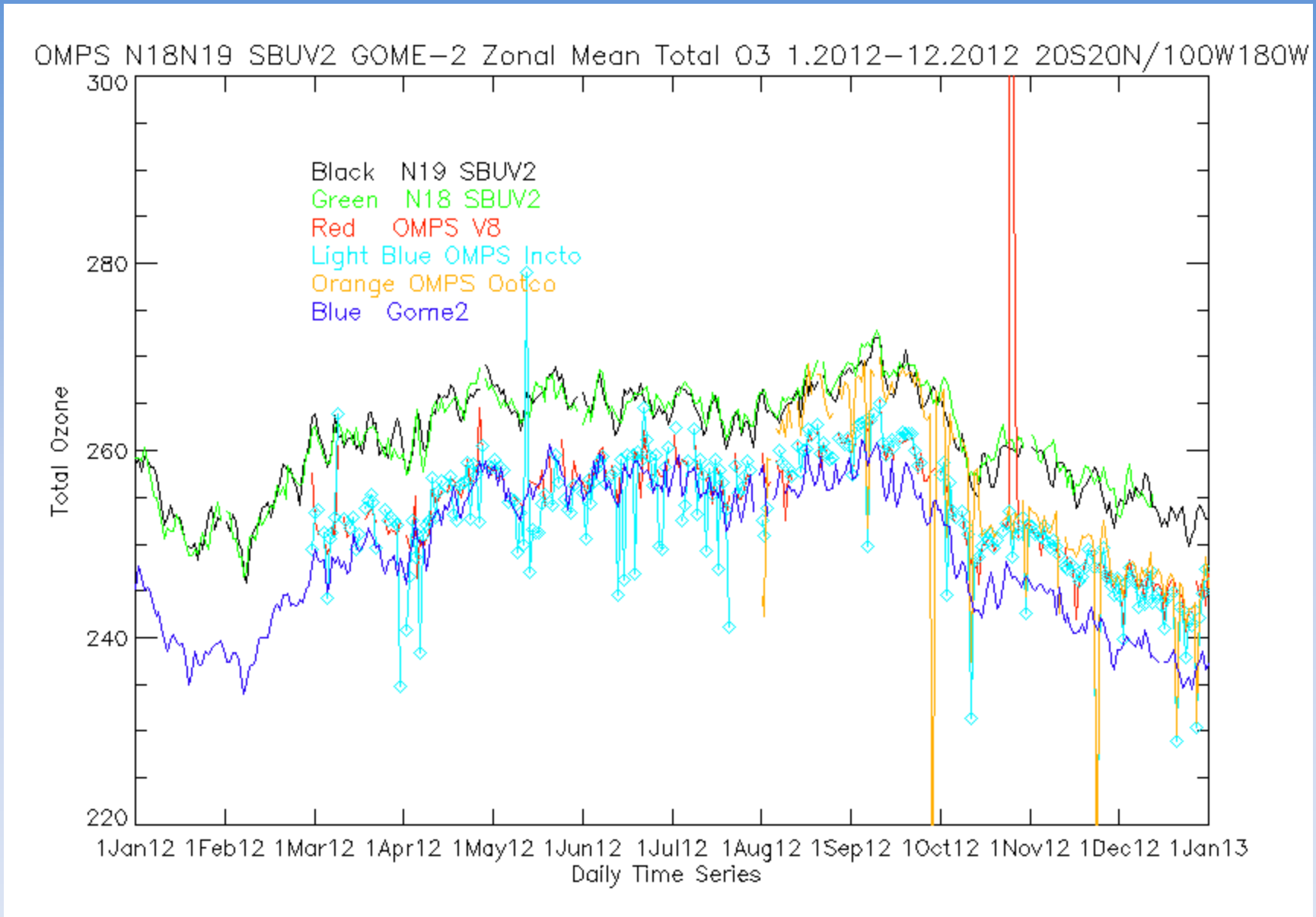
NCEP



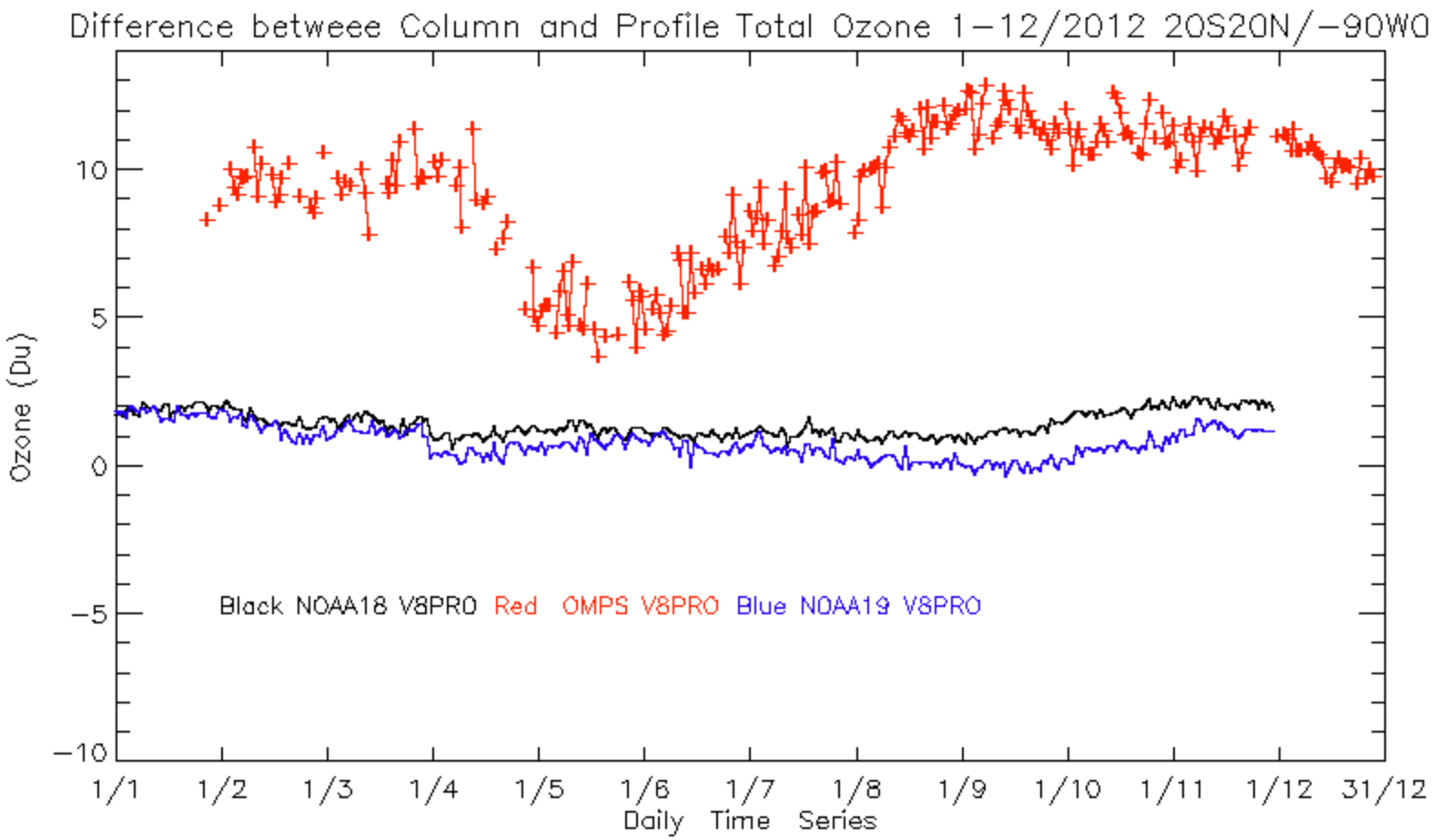
Operational Assimilation of OMPS Ozone Products

- NCEP is currently assimilating:
  - SBUV/2 Profile
    - NOAA-16, NOAA-17, NOAA-18, NOAA-19
  - OMI total column ozone
  - Testing MLS NRT v3
- OMPS NP and NM must meet/exceed SBUV/2 and OMI quality
  - Intersatellite comparisons
    - OMPS NP vs SBUV/2
    - OMPS NM vs OMI
  - Comparisons with ground-based Dobson and Brewer measurements
- Expect OMPS-LP to provide similar vertical information as MLS
  - Greater resolution in vertical
  - Additional quality information below ozone peak down to cloud top

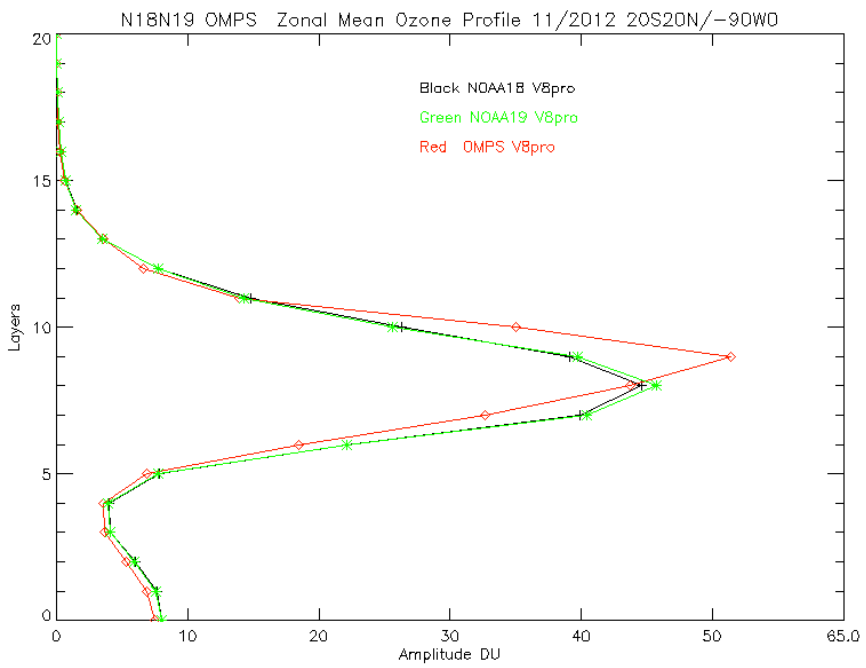
Comparisons of Profile Total Ozone

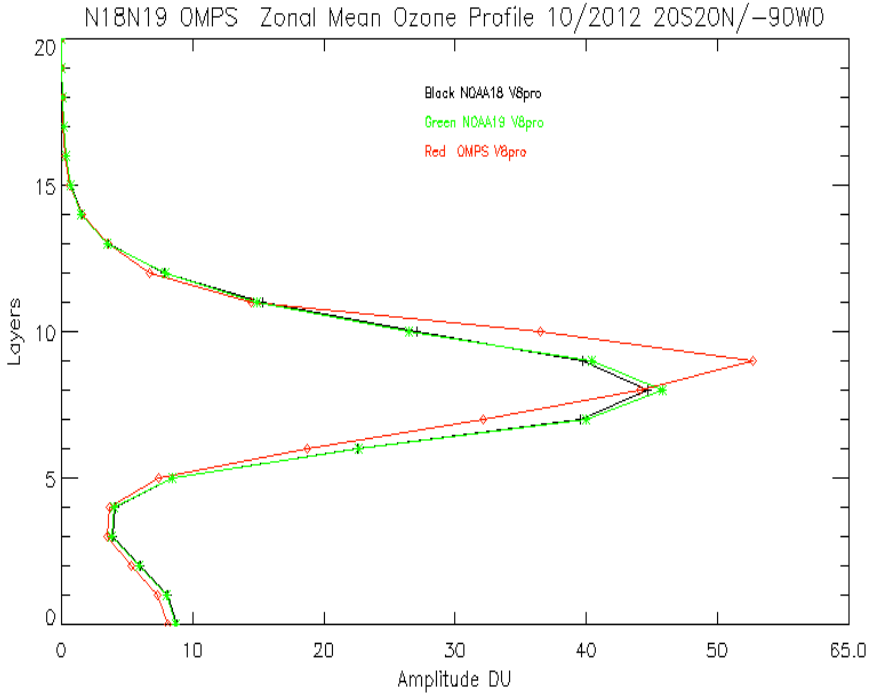


Column and Profile Total Ozone Should be Similar



Profile Ozone Should be Similar to SBUV/2

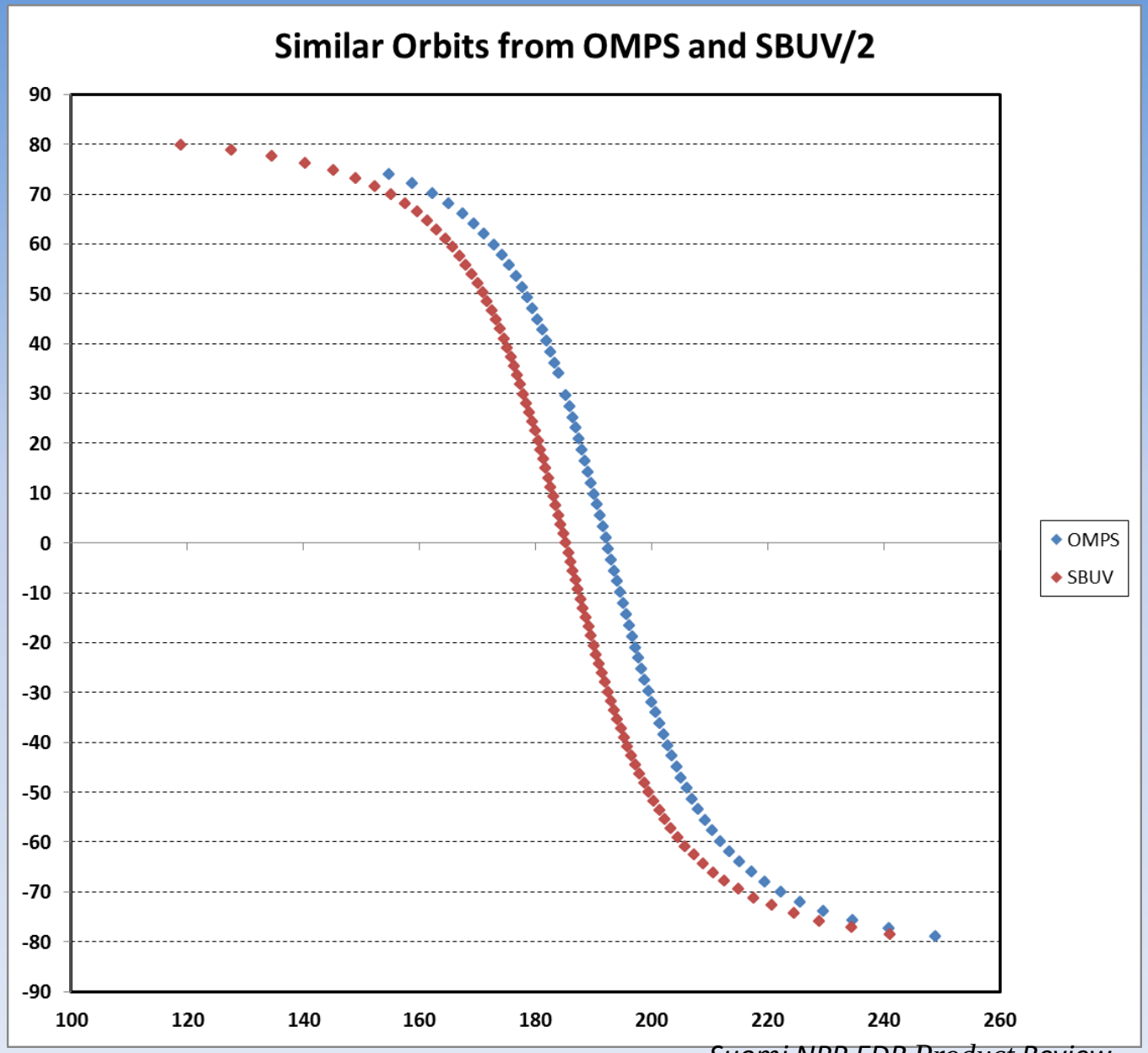




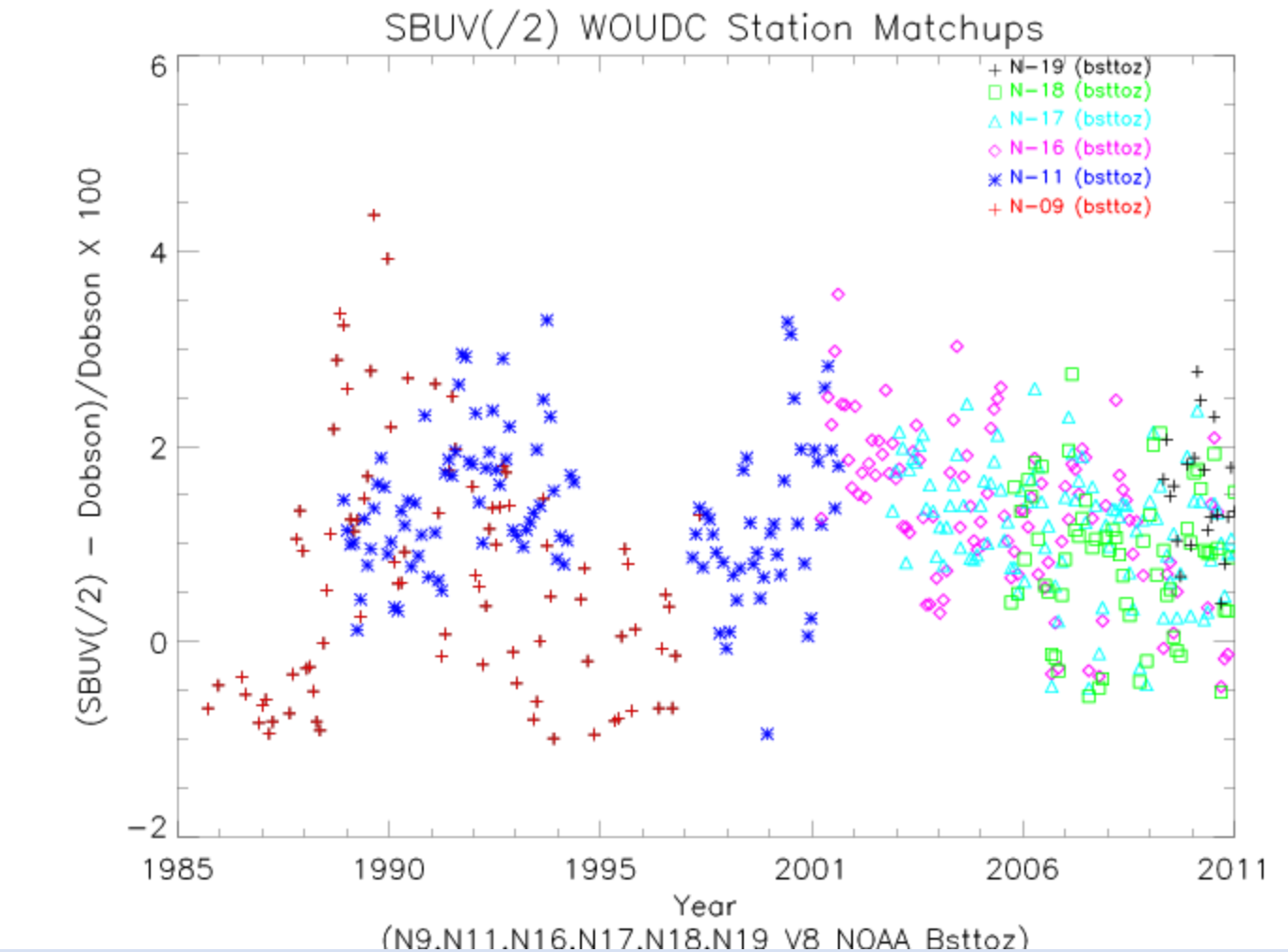
Comparisons for Profiler and Mapper

- Comparison so SBUV/2 and OMPS NP overlapping orbits
  - Total profile ozone
  - Profile O3mr
- Comparison of NM TO_3 and NP TotPro with ground-based Brewer/Dobson
- Comparisons of NM with OMI

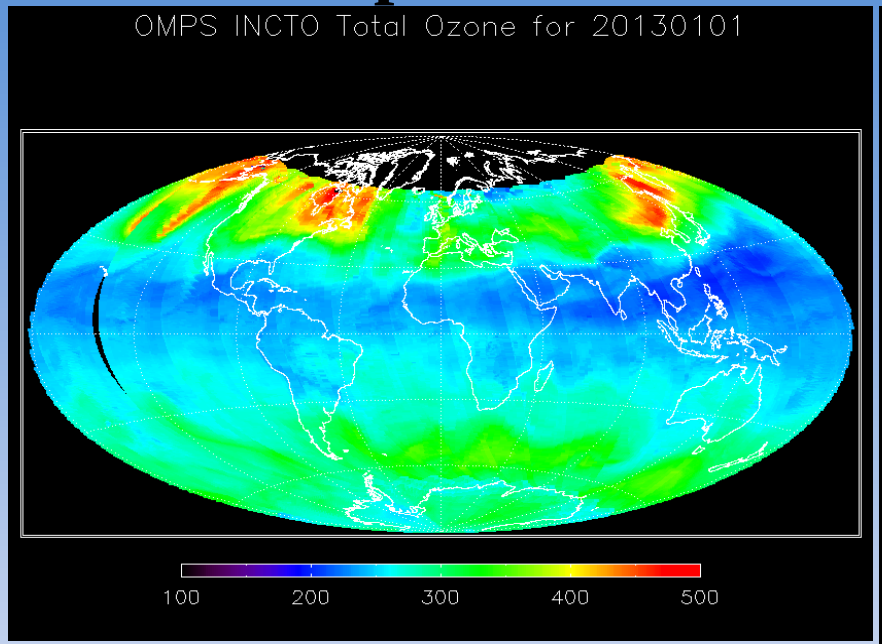
Slight Difference in Num of Obs per Orbit

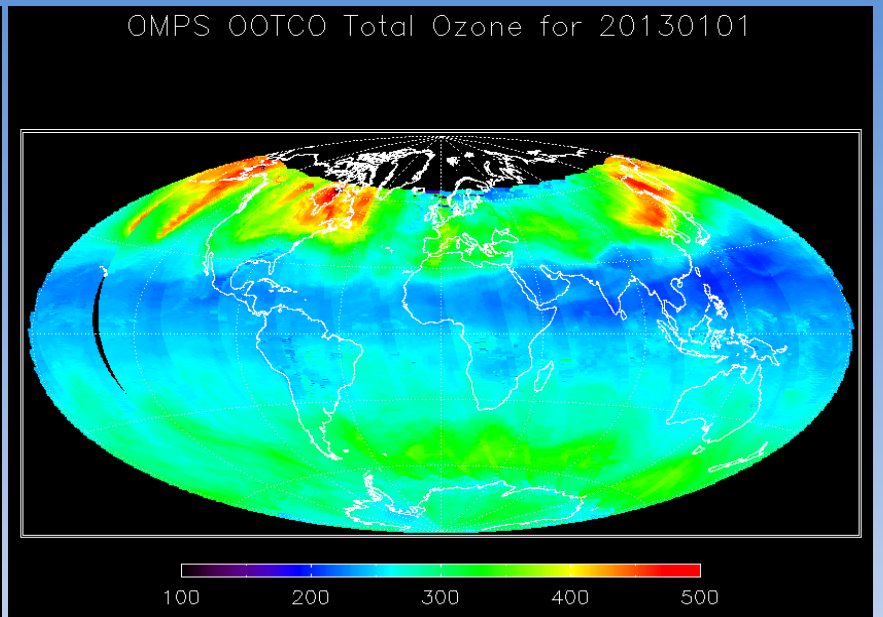


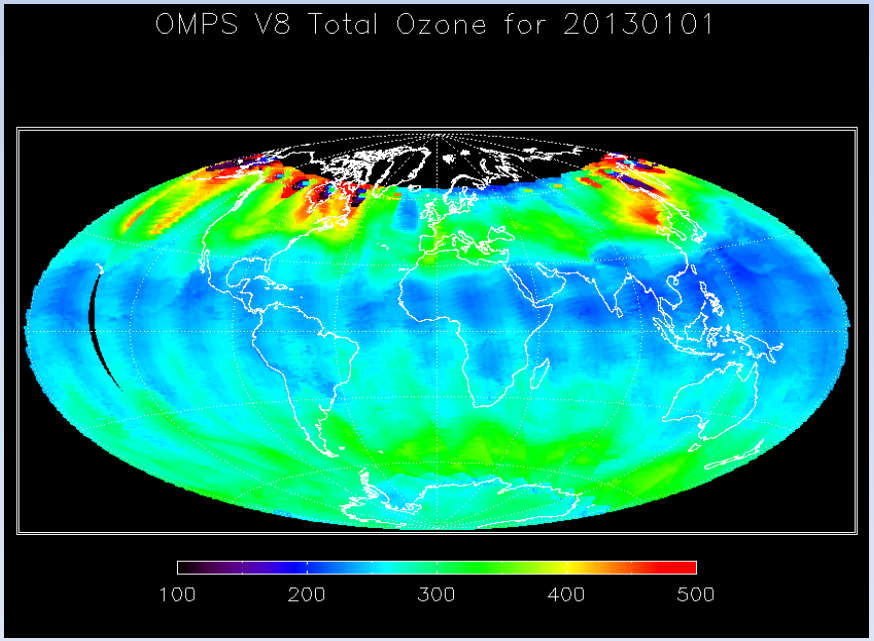
Long Term Comparisons of SBUV/2 TotPro vs Brewer/Dobson

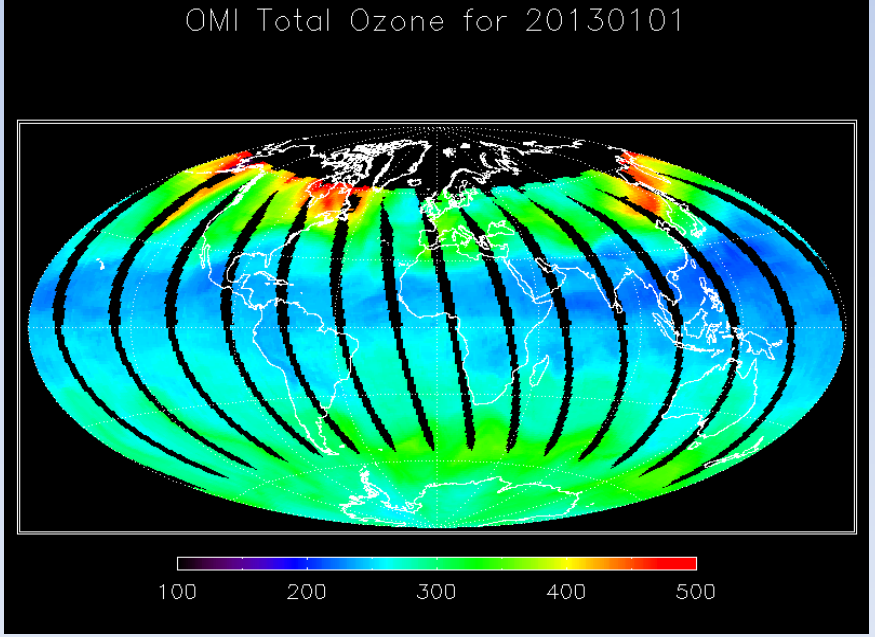


Comparison of NM Total Ozone Protucts

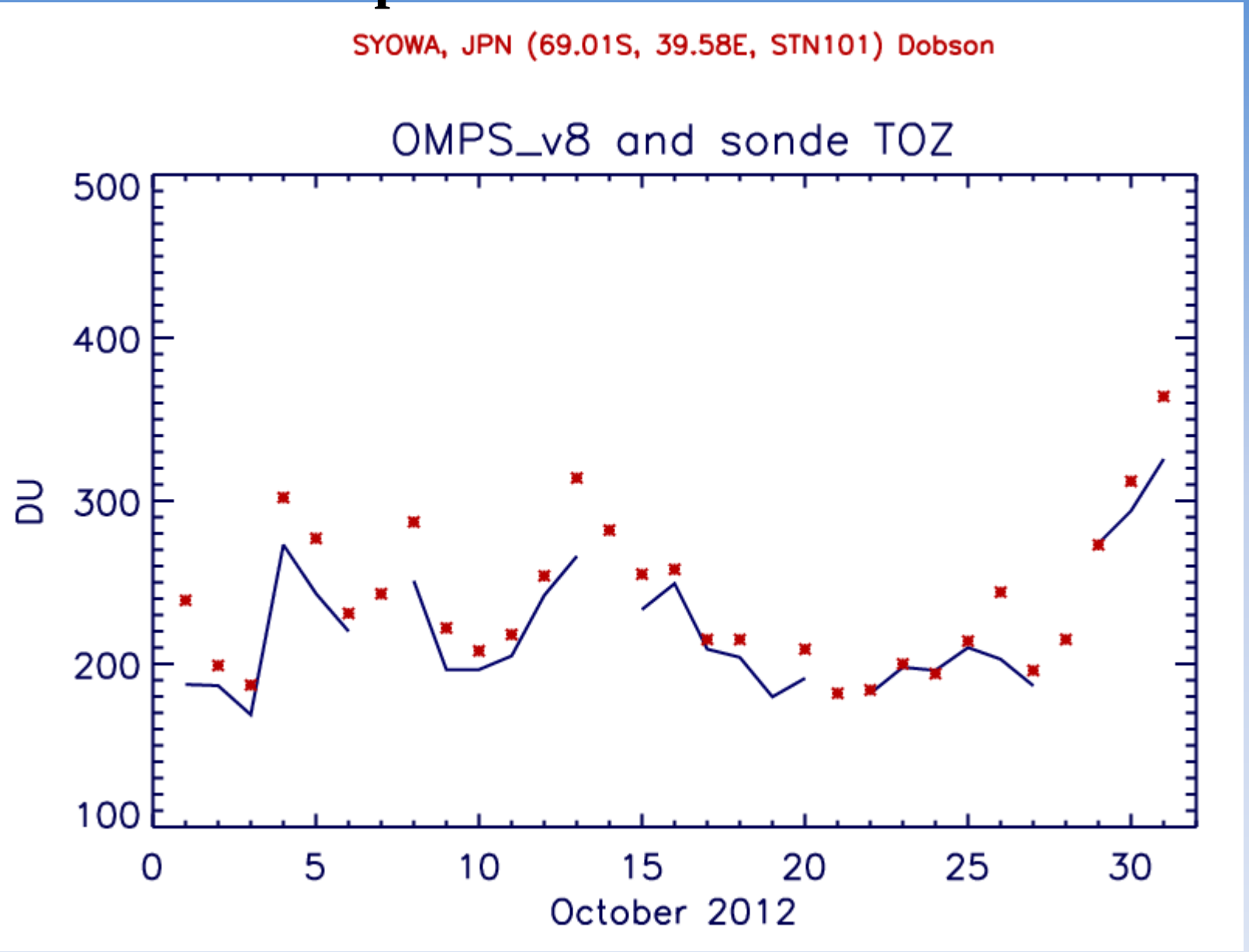








Current Comparisons of OMPS NM vs Dobson



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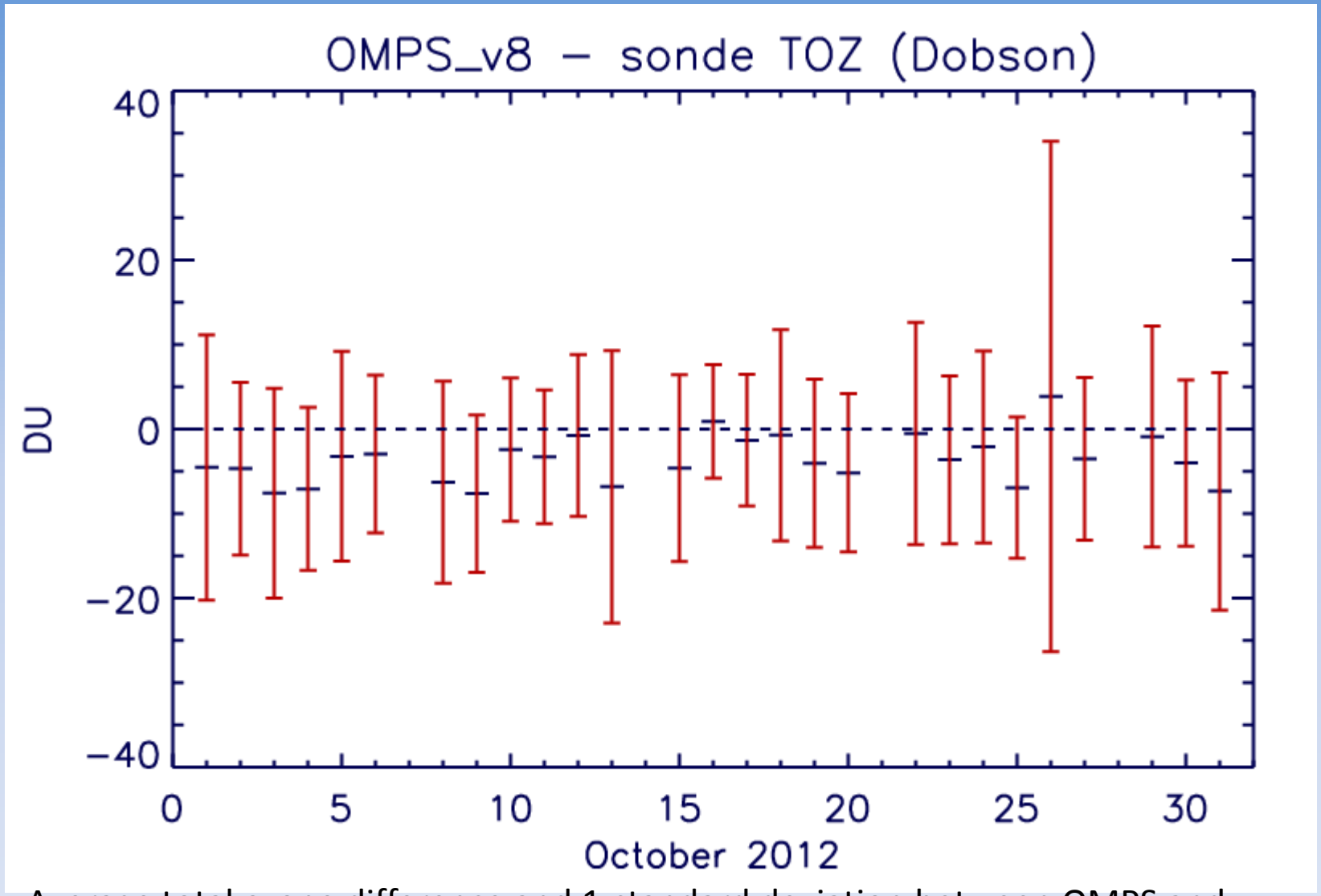
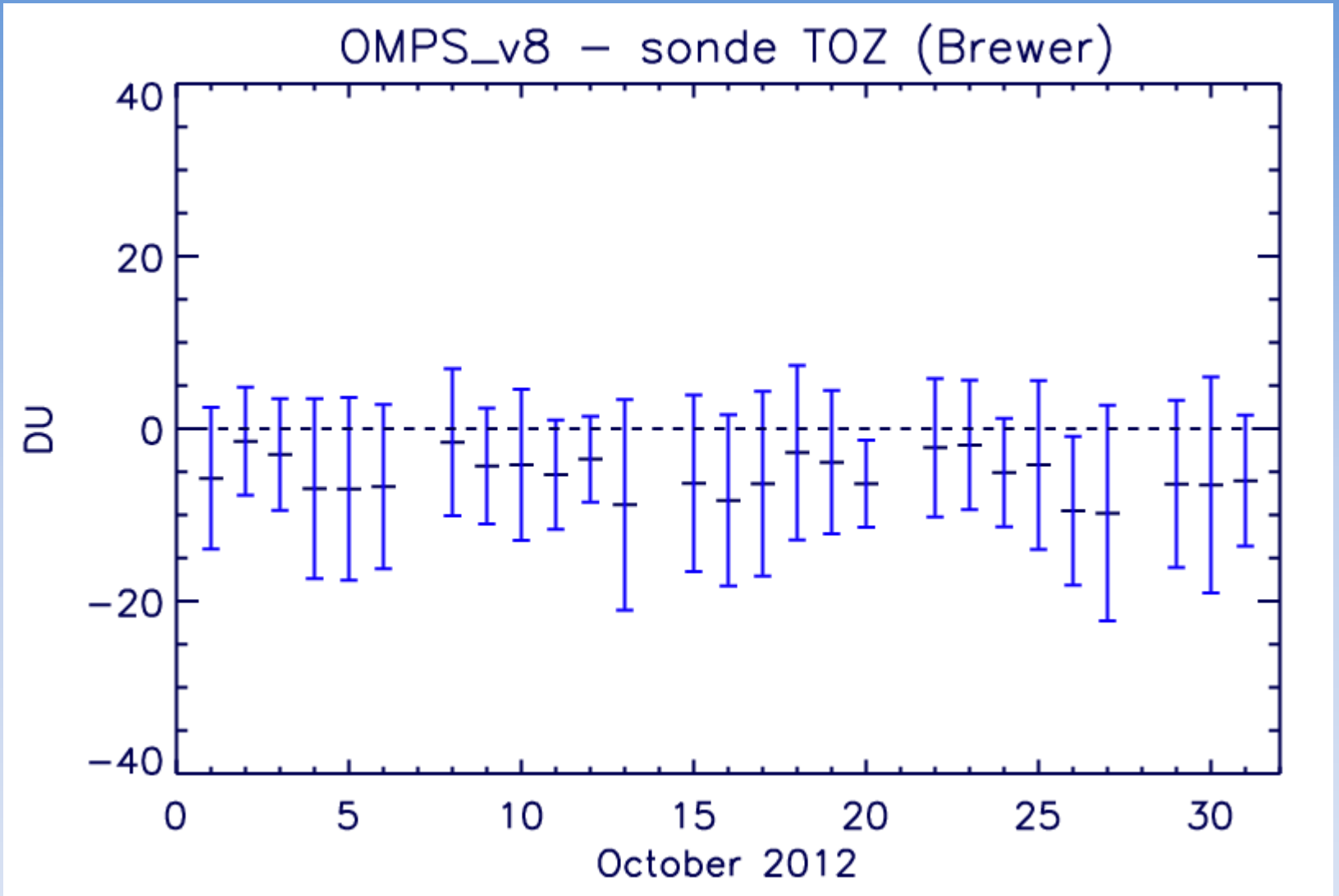


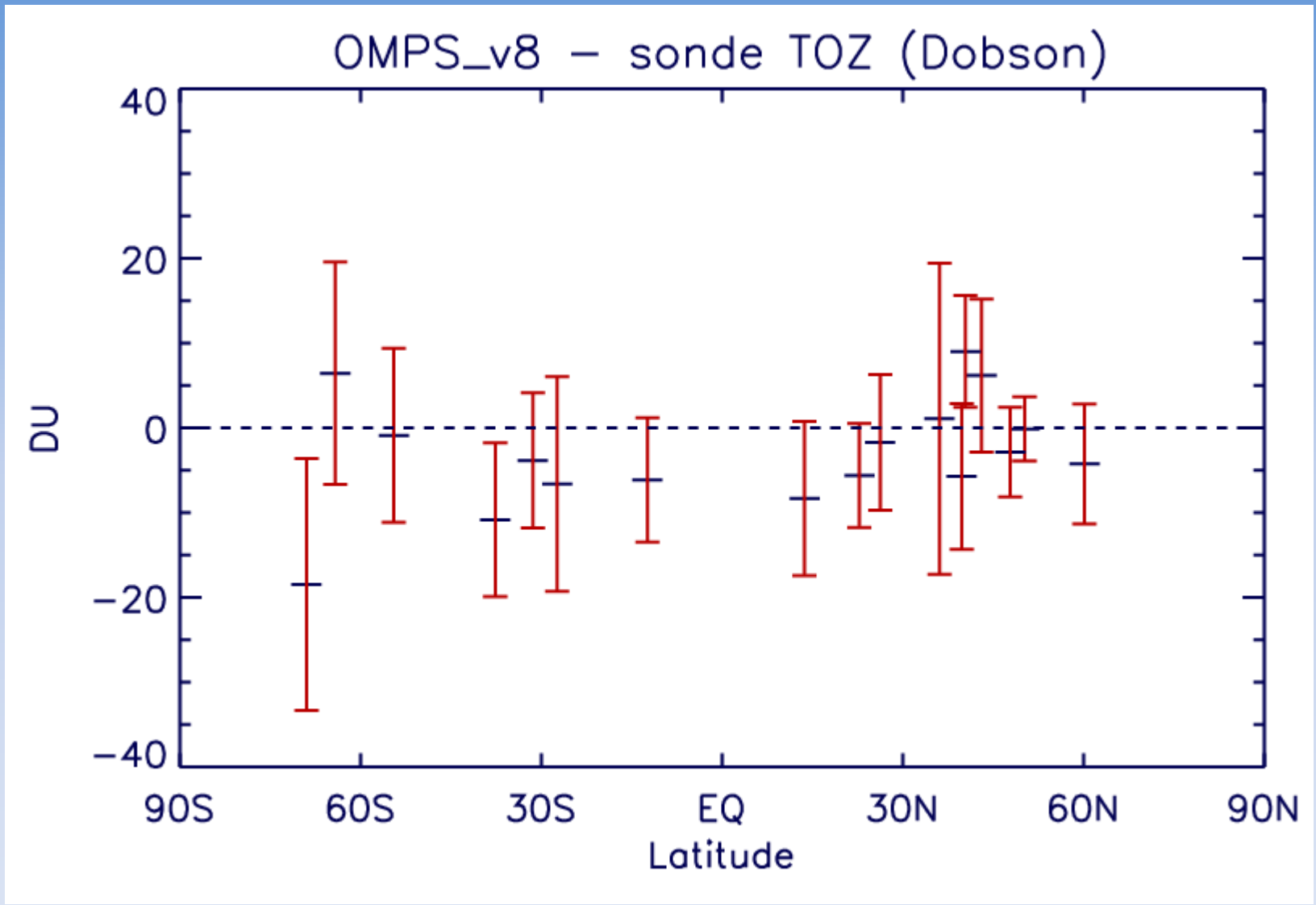
Average total ozone difference and 1-standard deviation between OMPS and Dobson ozonesonde. OMPS data are interpolated to ozonesonde locations.

Current Comparisons of OMPS NM vs Brewer

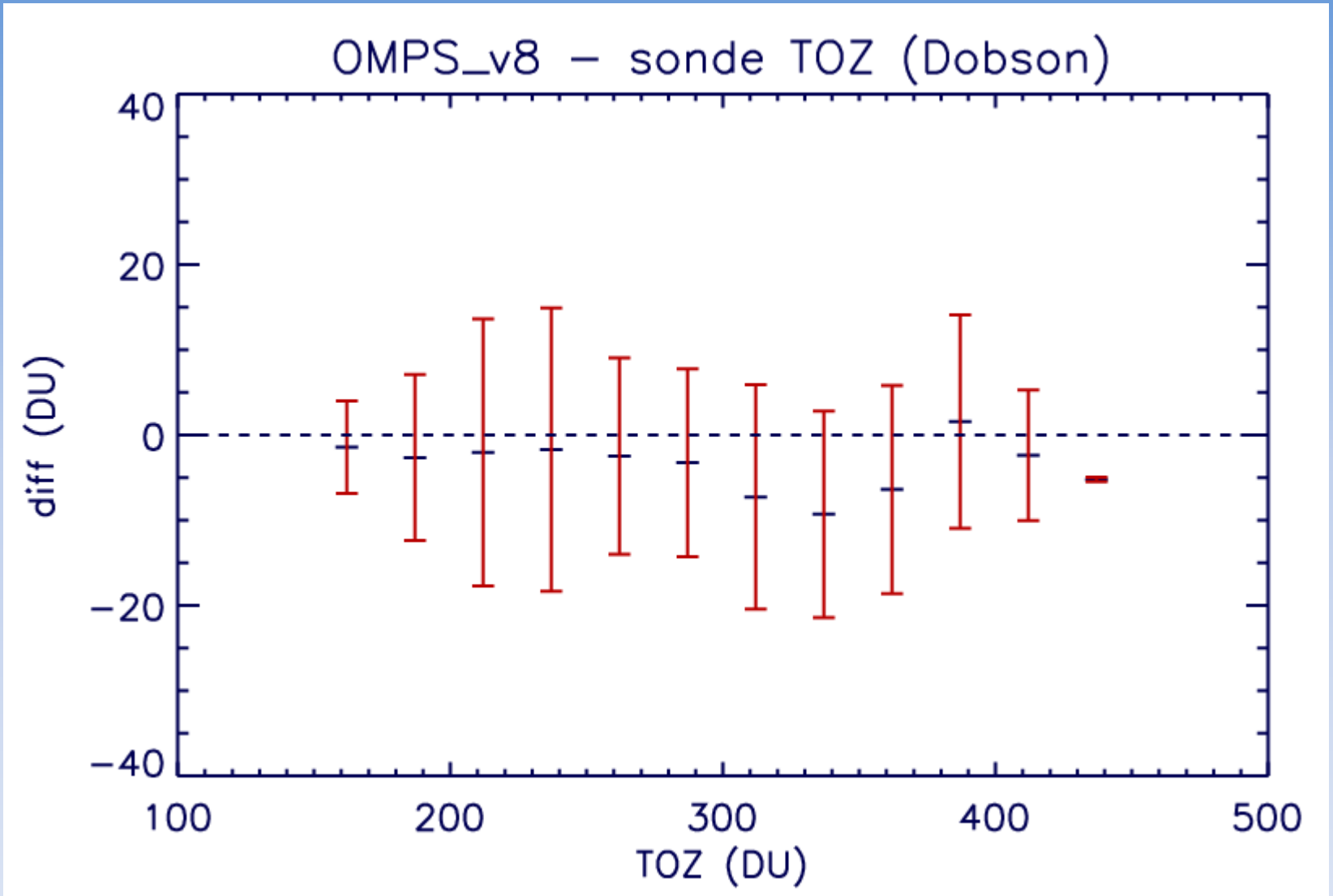


Average total ozone difference and 1-standard deviation between OMPS and Brewer. OMPS data are interpolated to Brewer locations.

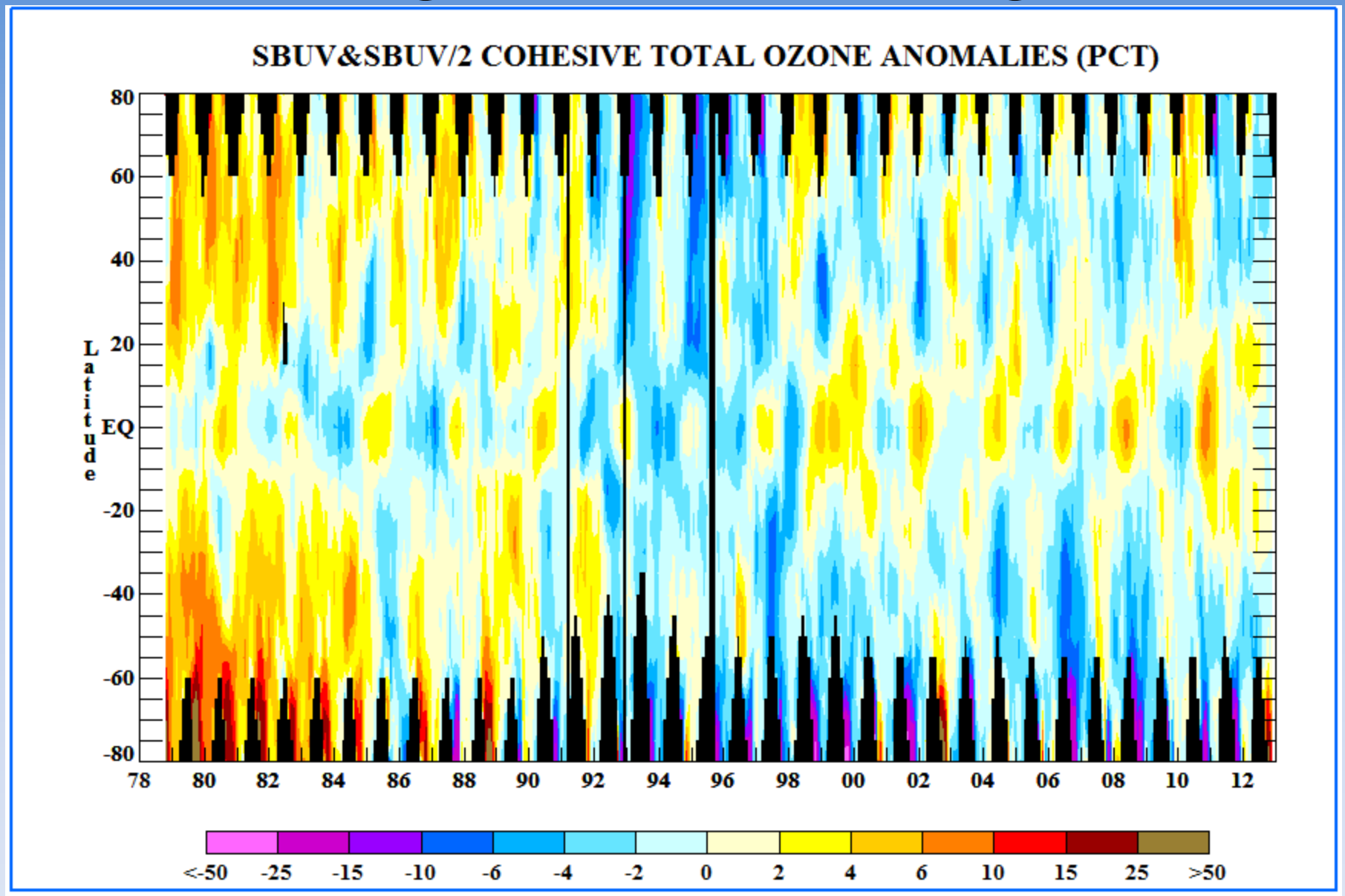
Current Comparisons of OMPS NM vs Dobson



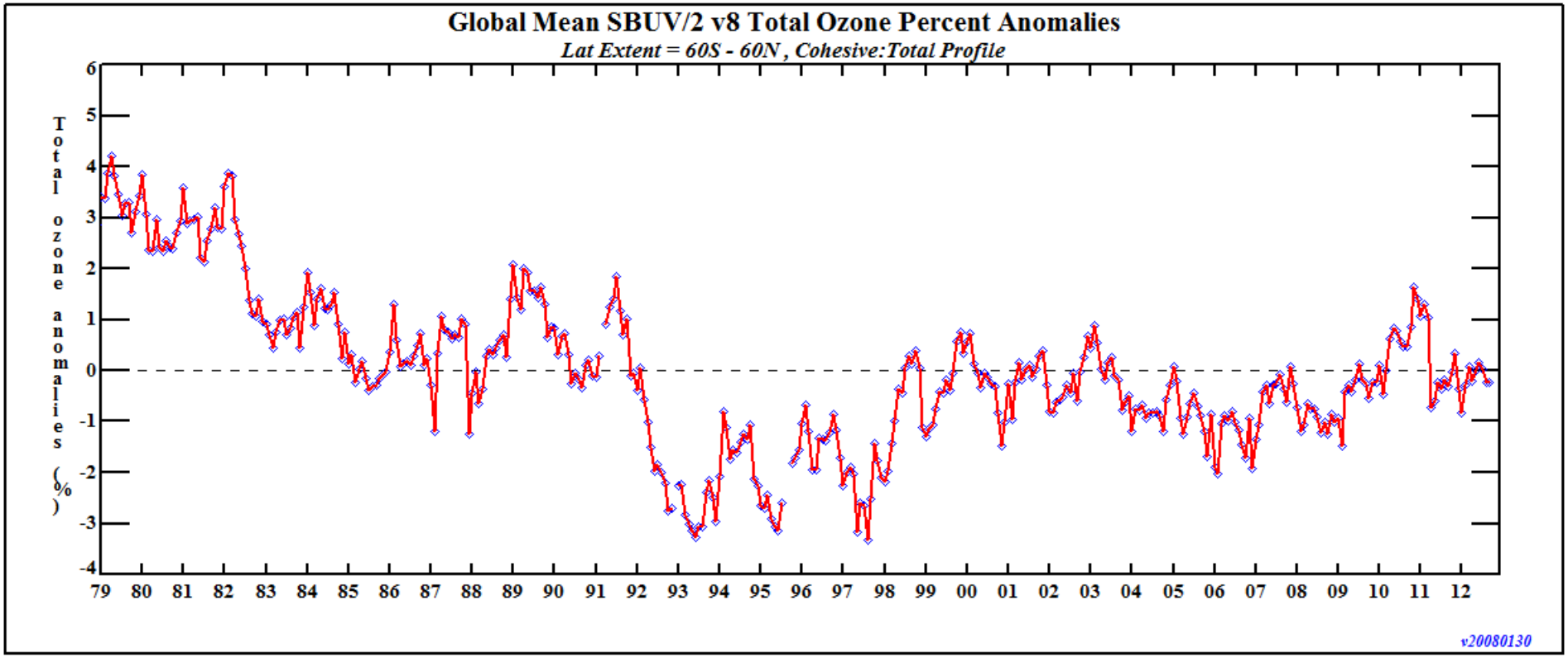
Current Comparisons of OMPS NM vs Dobson



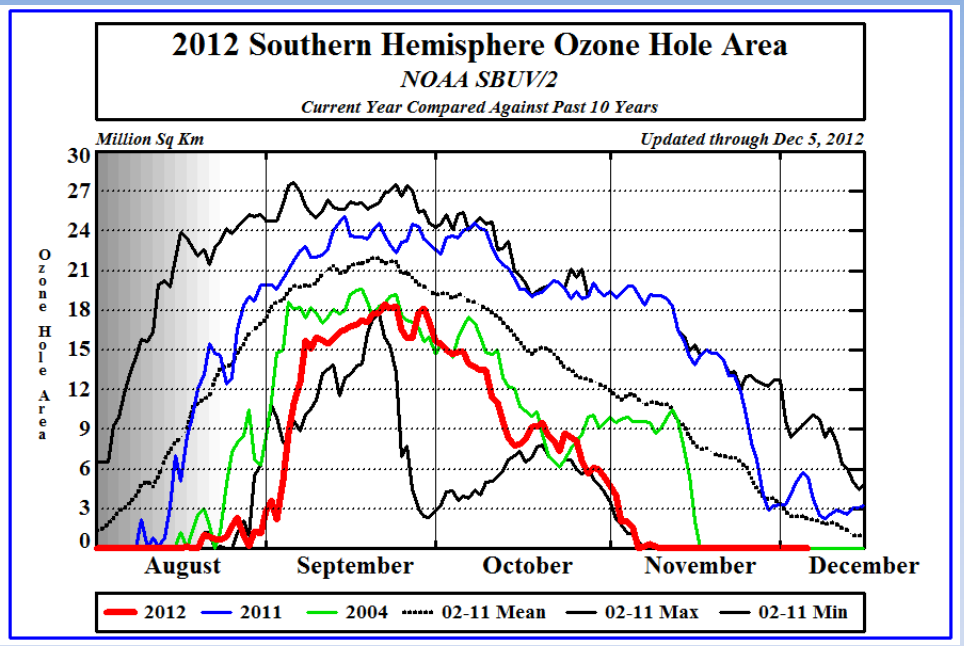
Long Term Ozone Monitoring

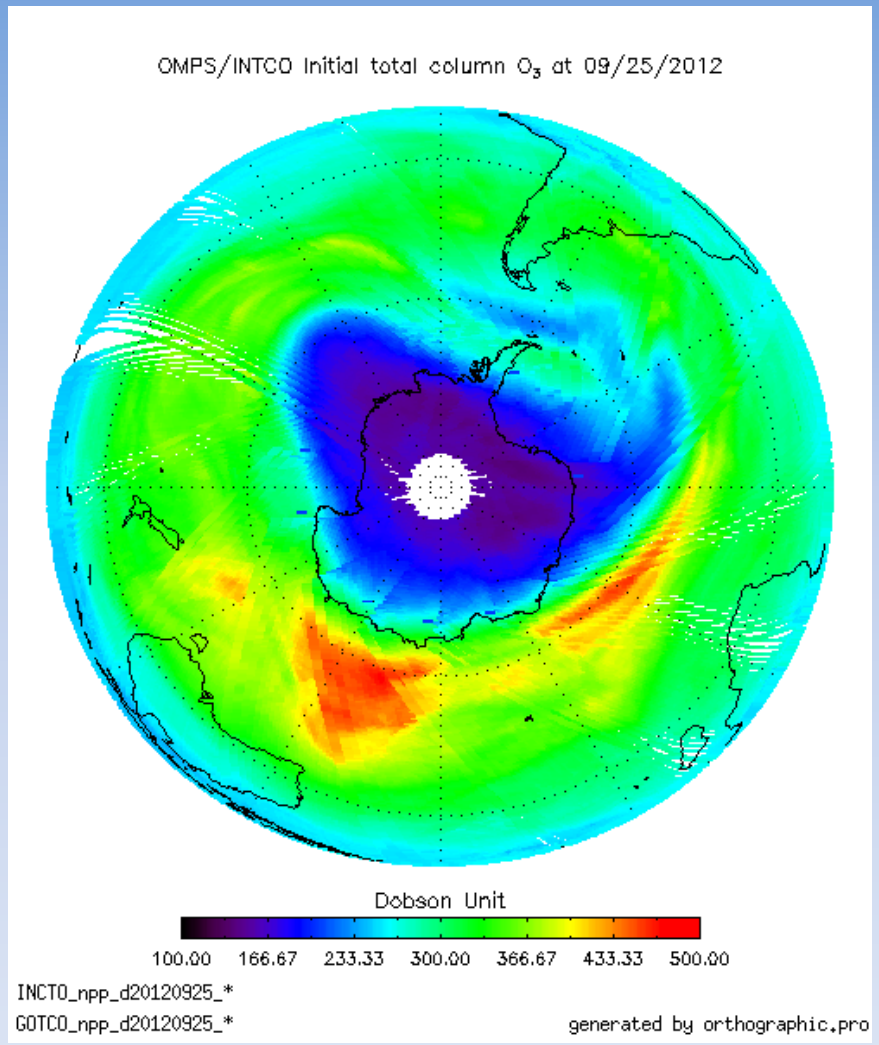


Long Term Ozone Monitoring



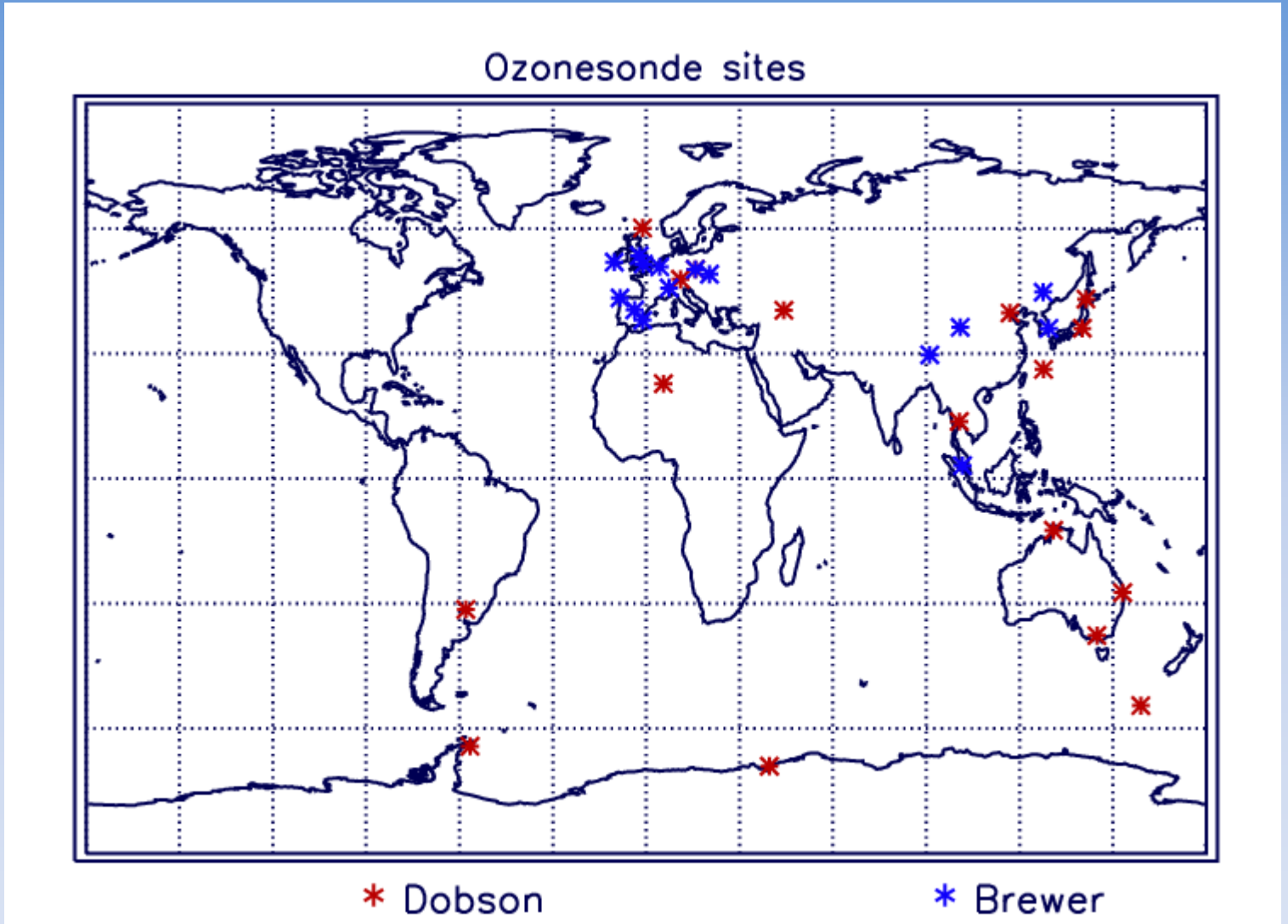
Long Term Ozone Hole Monitoring





To be Continued…

Current Comparisons of OMPS NM vs Brewer/Dobson



There are 32 sites (17 Dobson and 15 Brewer) which have updated total ozone data to October 2012.

platform: sbuv2_n19
region : 70S-90S (180W-180E, 90S-70S)
variable: obs-ges
valid : 00Z15DEC2012 to 00Z14JAN2013