



Application of OMPS Ozone Products

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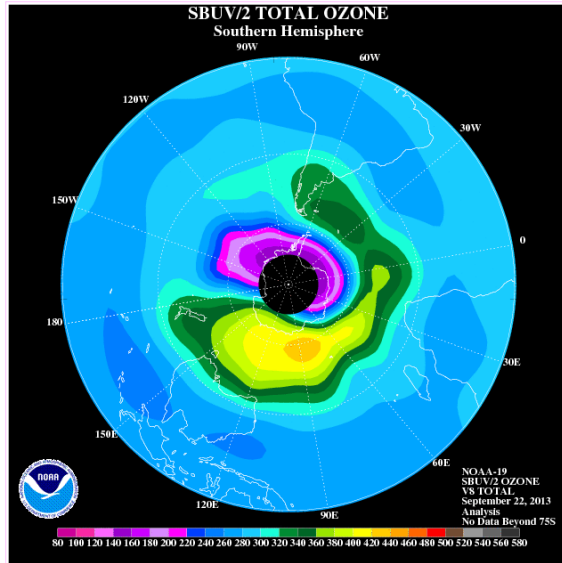
Continuity of Ozone Monitoring

- OMPS NP will allow CPC to continue its ozone monitoring into the future.
 - Replicating everything CPC has done using the SBUV/2
- OMPS TC & LP provide additional tools to work with.
 - TC gives CPC higher horizontal resolution than analysis of NP
 - LP gives CPC higher vertical resolution than NP

Various Time Scales of Ozone Monitoring

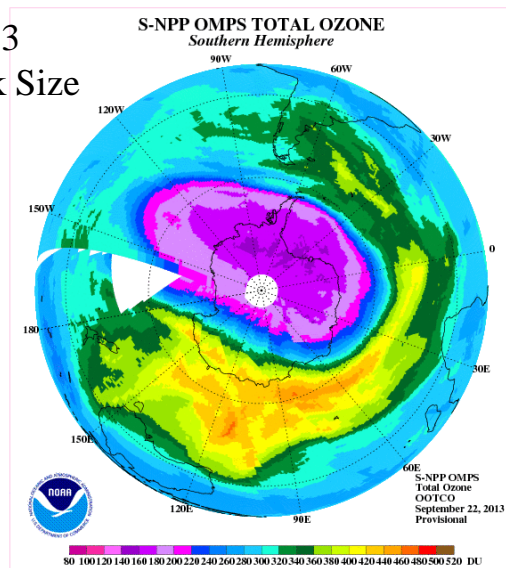
- Short (day to day)
 - Antarctic /Arctic Ozone Hole monitoring
- Seasonal
 - Relationship of profile and TC to phase of QBO
 - QBO dictates the strength of the BD circulation
 - Dictates the anomalous amount of ozone in the winter hemisphere
 - Impacts of winters with Stratospheric Warmings
- Inter-annual to Decadal
 - Creation of cohesive data sets for long term trend detection
 - TC and Profile
 - Hockey Stick regression analysis
 - Depletion trend
 - Recovery trend

Day-to-Day Time Scales

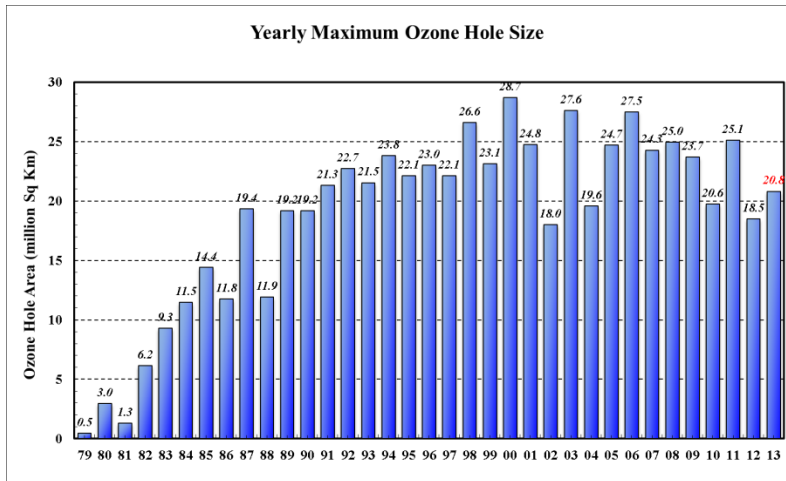
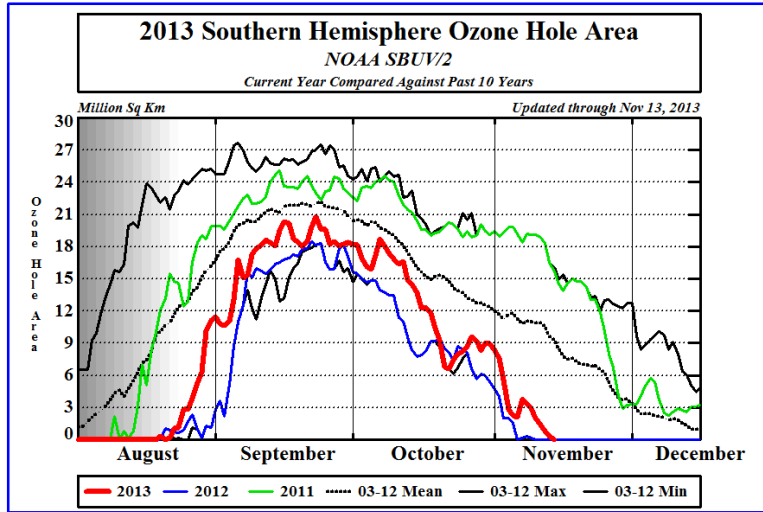


- Using the SBUV/2 nadir observations, CPC uses a Cressman Scheme to make a polar stereographic analysis of the Total Column Ozone. (top)
 - Smooths out or misses fine features
- OMPS TC provides full global coverage.
 - Heritage: TOMS and OMI
 - Currently is providing 35 scan positions
 - Has potential of ~100 scan positions with out compromise to S/N ratio
- www.cpc.ncep.noaa.gov/products/stratosphere/sbu2to/
- www.cpc.ncep.noaa.gov/products/stratosphere/omps/

Sept 22, 2013
Date of Peak Size



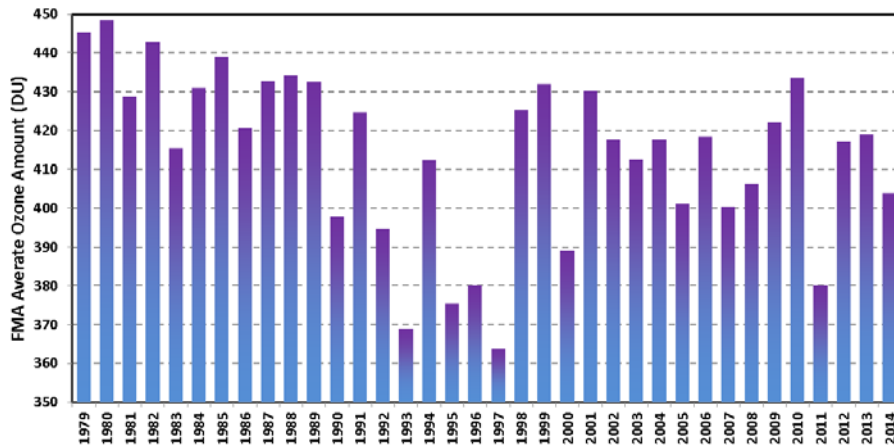
Day-to-Day Time Scales



- Daily Analyses are used to determine the Area of Total Column < 220 DU
- OMPS TC needs to be put into a grid
 - 1/2x1/2 degree
- TC usually has observations closer to pole than NP
 - Will decrease uncertainty of early September ozone hole size estimates
- From daily areas the maximum ozone hole size is determined
 - Usually occurs in latter third of September
- Monitor the life cycle of the ozone hole.

Seasonal Time Scales

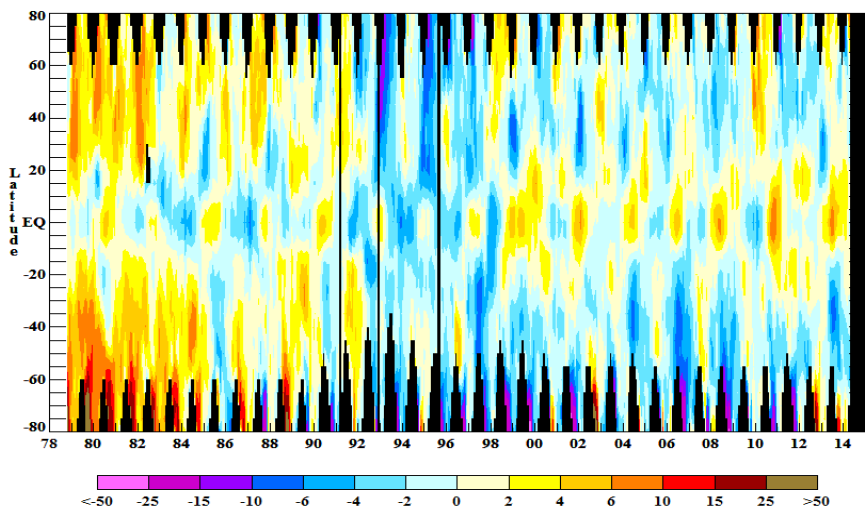
FMA Average Total Ozone 60N-80N



- Comparison of mean ozone amounts during a particular season versus previous years
 - Average of Feb-Mar-Apr
 - Period in NH of maximum ozone amounts
 - Cold winters have low FMA ozone
 - '90, '92, '93, '95, '96, '97, 2000, 2011
 - Warm winters have higher FMA amounts

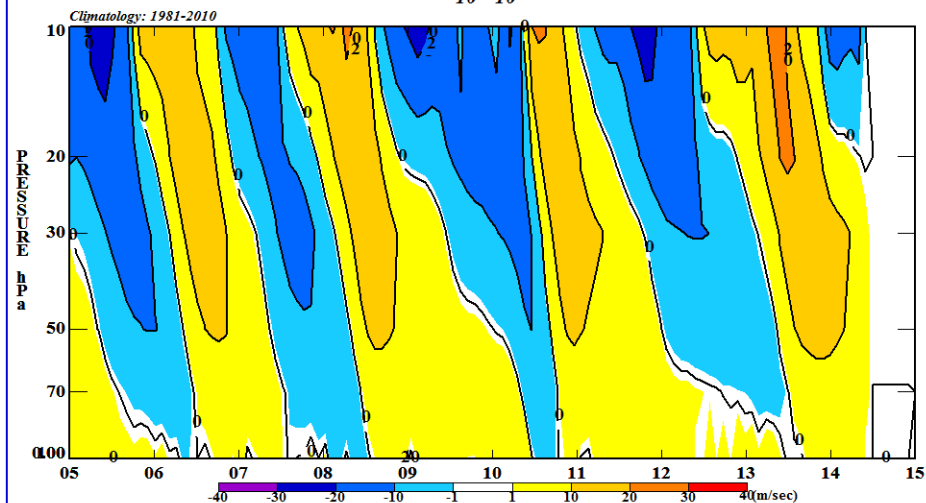
Seasonal Time Scales

SBUV&SBUV/2 COHESIVE TOTAL OZONE ANOMALIES (PCT)



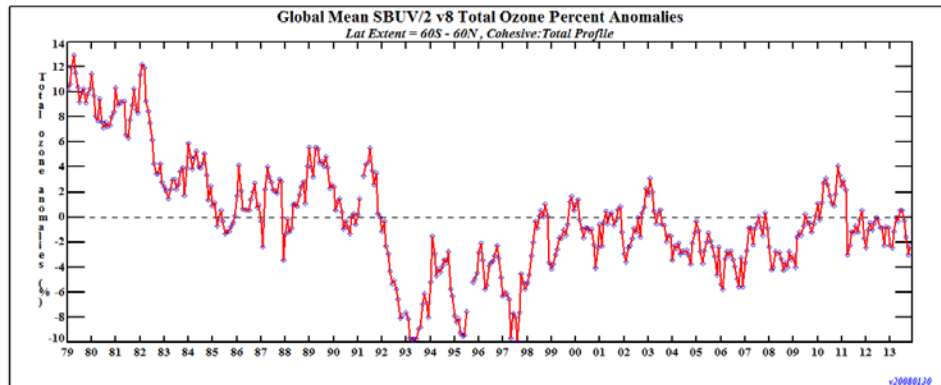
- Zonal mean total ozone anomaly time series illustrates the role the QBO has on the total ozone variability.
- Descending westerlies slows down the BD Circulation
 - Positive anomalies in tropics
 - Negative anomalies in winter polar lat
- 2011:
 - Descending Westerlies
 - no stratospheric warming
 - large negative anomalies in FMA
 - photochemical ozone depletion

Monthly CFSR Zonal Wind Anomalies
-10 - 10



Inter-Annual to Decadal Time Scales

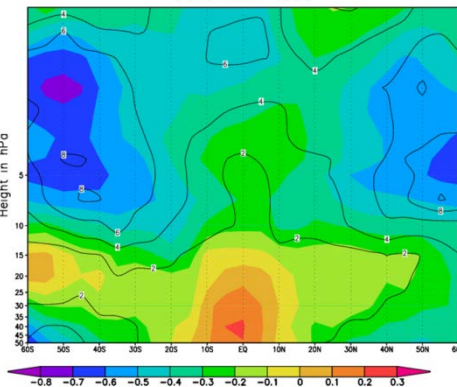
60N-60S Ozone Anomalies (%)



- On multi-annual to decadal time scales trends can be determined.
- Requires creation of a cohesive total and profile ozone data set.
- Start with v8.6
- Apply Wild method to adjust for biases and satellite trends
- Then can apply “hockey stick” regression analysis to determine depletion trend and trend change
- Remove AO, AAO, QBO, and solar cycles

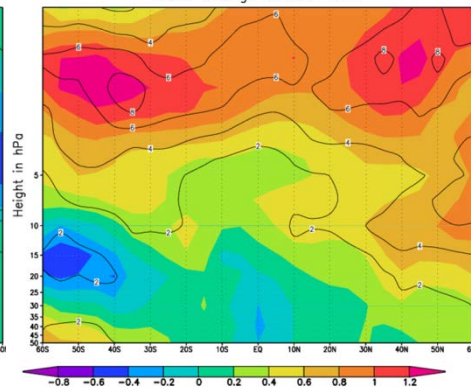
Trend 1

trend 1979-1995



Trend change

trend change at Jan 1996

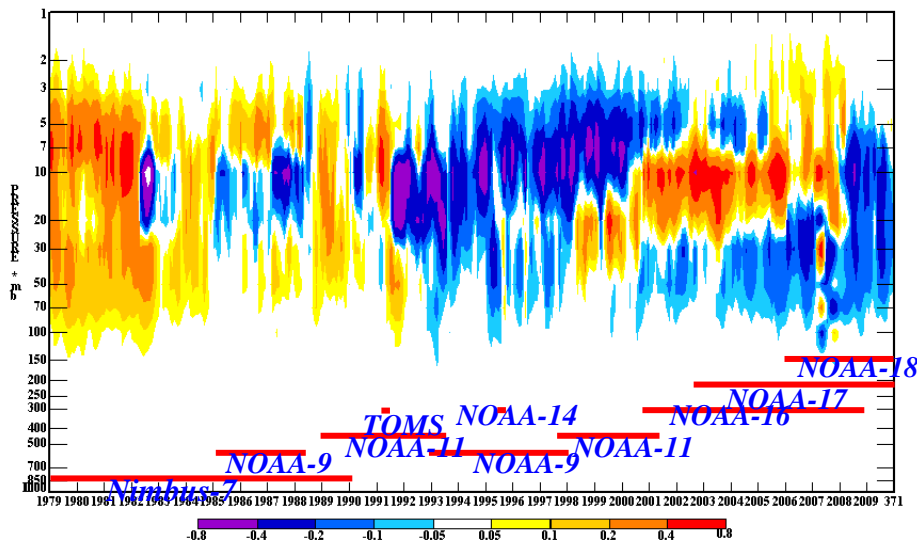


Assimilation into Weather Forecast Models and Climate Reanalyses

- Ozone is important in NWP
 - Radiation scheme relies on it
 - Heating/cooling in stratosphere
 - Needed for IR channels that are ozone sensitive
- NCEP assimilates SBUV/2 profile and OMI total ozone
 - Other centers also assimilate: GOME-2, MLS
 - NCEP needs resources and priority to assimilate OMPS NP and TC
- OMPS v6 profile and total column are made into BUFR
 - WMO requirement for data assimilation
- BUFR table for OMPS-LP?

Assimilation into Weather Forecast Models and Climate Reanalyses

Monthly CFSR O3MR Anomalies (PPM)
GLOBAL (1979 - 2009)



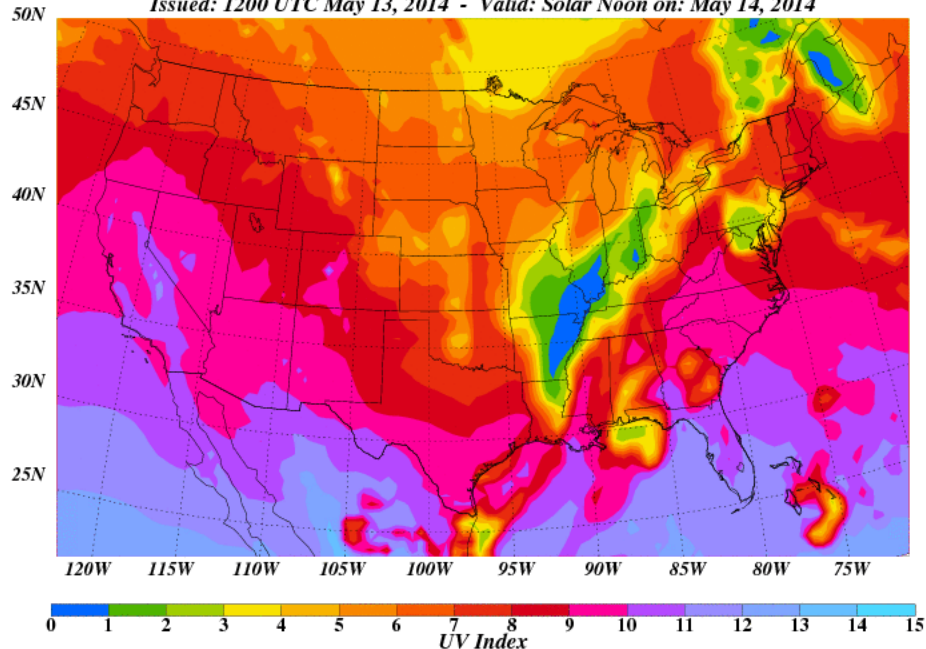
- Next set of reanalyses will use SBUV(/2) v8.6
 - NESDIS/STAR is putting v8.6 into BUFR for international community

- Will OMPS NP be addition to SBUV(/2) data set?

UV Index Forecasts Rely Upon Good Ozone Forecasts

UV INDEX FORECAST

Issued: 1200 UTC May 13, 2014 - Valid: Solar Noon on: May 14, 2014



- Primary step in UV forecasting is relating the total ozone and SZA to surface erythemal UV-B.
- NWP models are increasing in horizontal resolution
- Higher resolution OMPS-TC would be good addition

Summary

- 2 out of 3 isn't bad:
 - Transition / extension of SBUV/2 to OMPS NP have no issues to date
 - TC and LP will enhance CPC's monitoring capabilities
 - Work needs to be done at NCEP/EMC and JCSDA to bring in OMPS NP, TC, and LP obs