Extension of NCEP/CPC's Ozone Monitoring Using OMPS Ozone Products

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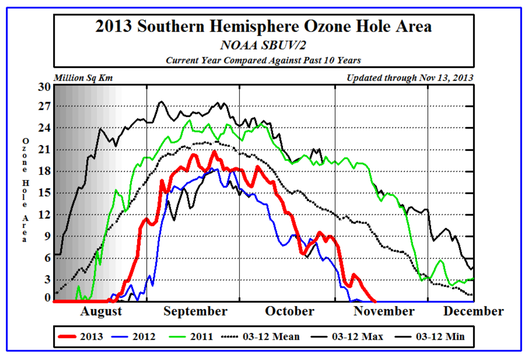
History of Ozone Monitoring at CPC

CPC worked along side NASA in the 1970's to determine the effects of Super Sonic Transport air liners flying on ozone in the stratosphere. CPC began using satellite data to monitor the ozone layer with the BUV instrument on Nimbus-4 and the SBUV on Nimbus-7. NOAA chose to monitor the profile of ozone vs the total column and started using the SBUV/2 on NOAA-9. All together there have been 8 NOAA spacecraft with SBUV/2 instruments on them. CPC has worked hand-in-hand with NESDIS to utilize the best quality ozone data sets for its monitoring of the ozone depletion, the annual ozone hole, the determination of ozone trends, and assisting NCEP/EMC with the assimilation of ozone in NCEP's weather and climate models.

Ozone Monitoring at CPC

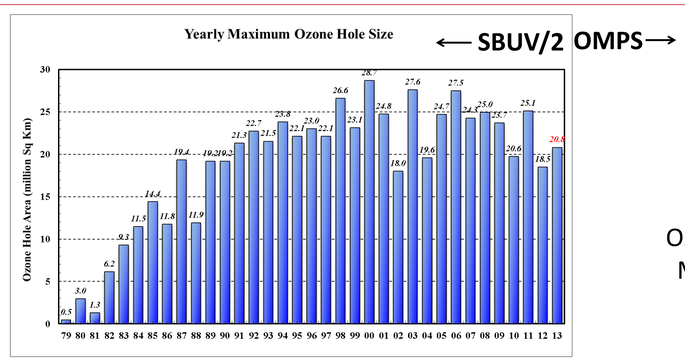
CPC monitors the total column of ozone as well as the ozone profile. CPC monitors ozone on various time scales. Short (day-to-day) time periods for phenomena such as the Antarctic (and occasionally Arctic) ozone hole. Seasonally, CPC monitors the ozone layer's relationship to the thermal and dynamical background. On the longer time scales (annual to decadal), CPC monitors trends in the ozone layer's profile and total column. CPC has used observations from the SBUV/2 instrument to perform this monitoring. The OMPS Nadir Mapper, Nadir Profiler, and Limb Profiler will continue and enhance CPC monitoring capabilities.

OMPS will allow CPC to Continuing to Monitor the Antarctic Ozone Hole



Last year's ozone hole in relation to previous years.

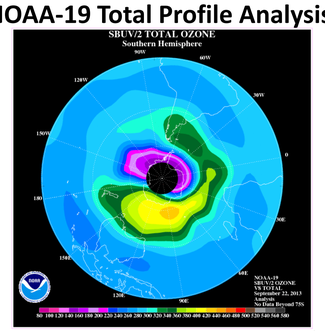
Monitor Inter-Annual Variability of Ozone Hole



Last year's single day maximum ozone hole size Compared to previous years. OMPS observations will continue this monitoring for the next couple decades.

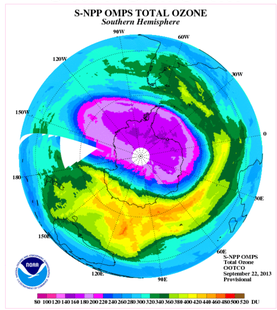
Monitoring Ozone Hole Peak Size

NOAA-19 Total Profile Analysis



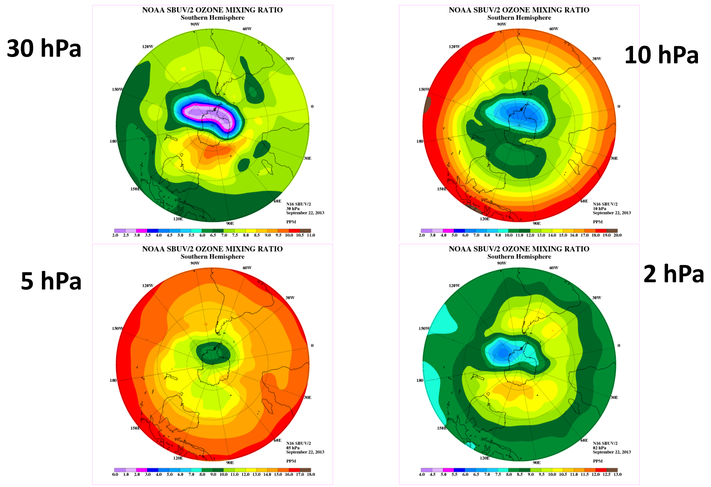
Analysis procedure smooths out features. Reduces Mins and Max values.

S-NPP OMPS NM



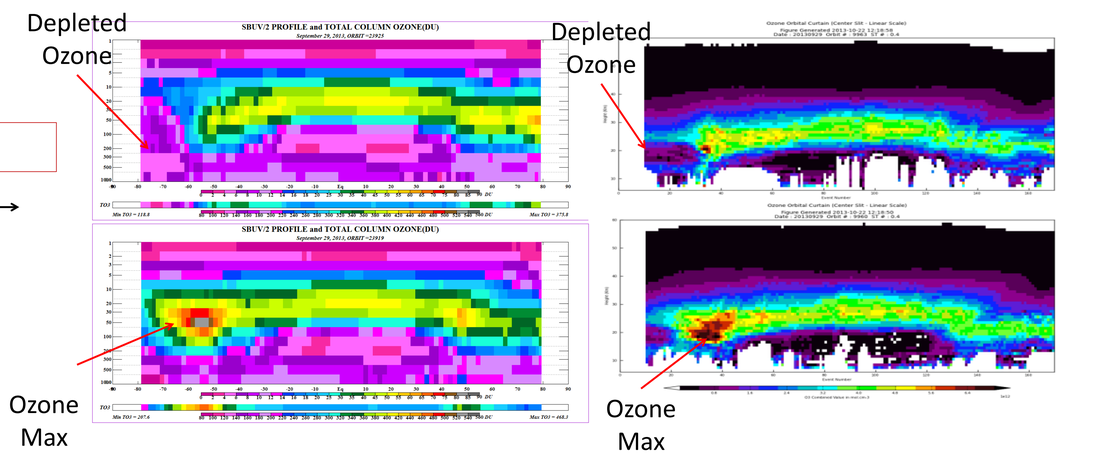
NM provides greater fidelity of features and maintains max and min values.

OMPS NP will continue to provide the structure of ozone in vertical



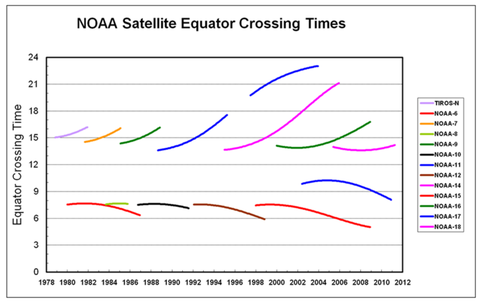
Peak ozone hole size day in 2013 at 30, 10, 5, 2 hPa from N19 SBUV/2

Finer Vertical Resolution of the OMPS Limb Provides Additional Information to the Ozone Profile in the Ozone Hole



Two sets of orbital curtain plots (SBUV/2 on Left and OMPS Limb on Right) of ozone concentration in October 2013. Top orbit shows low ozone values on the edge of the ozone hole on the left side. The bottom orbit passes through the ozone maximum region

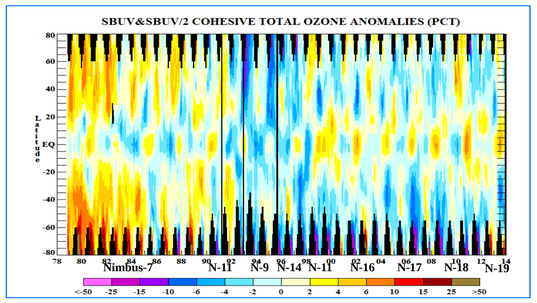
Long Term Monitoring Requires the Creation of a Cohesive Ozone Data Set



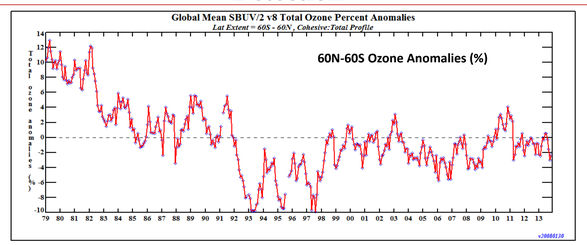
Satellite	Satellite dates
Nimbus 7	10/31/78 – 5/31/89
NOAA-11a	6/1/89 – 12/31/93
NOAA-9	1/1/94 – 2/4/95
NOAA-14	2/5/95 – 12/31/98
NOAA-11d	1/1/99 – 12/31/00
NOAA-16	1/1/01 – 12/31/02
NOAA-17	1/1/03 – 12/31/08
NOAA-18	1/1/09 – 12/31/10
NOAA-19	1/1/11 – 12/31/12

9 SBUV (/2) data sets (one for each satellite) are bias adjusted and trend adjusted to create a long term cohesive total and profile ozone data set to be used for climate and trend detection.

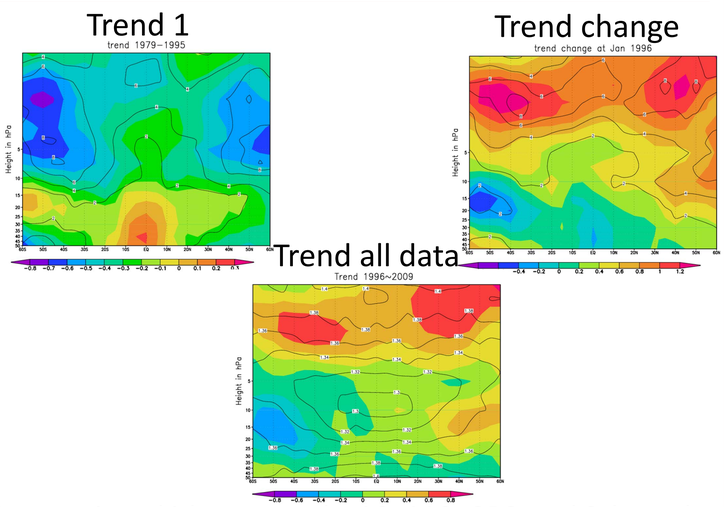
Inter-Annual Variability of Total Column Ozone



Long Term Monitoring of Total Column Ozone for Trend Detection



Using Regression Analysis to Determine Trends



A regression which removes the AO, AAO, QBO, and Solar cycles is used with the "hockey stick" model to determine the trend from 1979-1996, the trend change, and the liniear trend from 1979-2009.