Analysis of the Solar Occultation Satellite Data and Temperature, Ozone Validation

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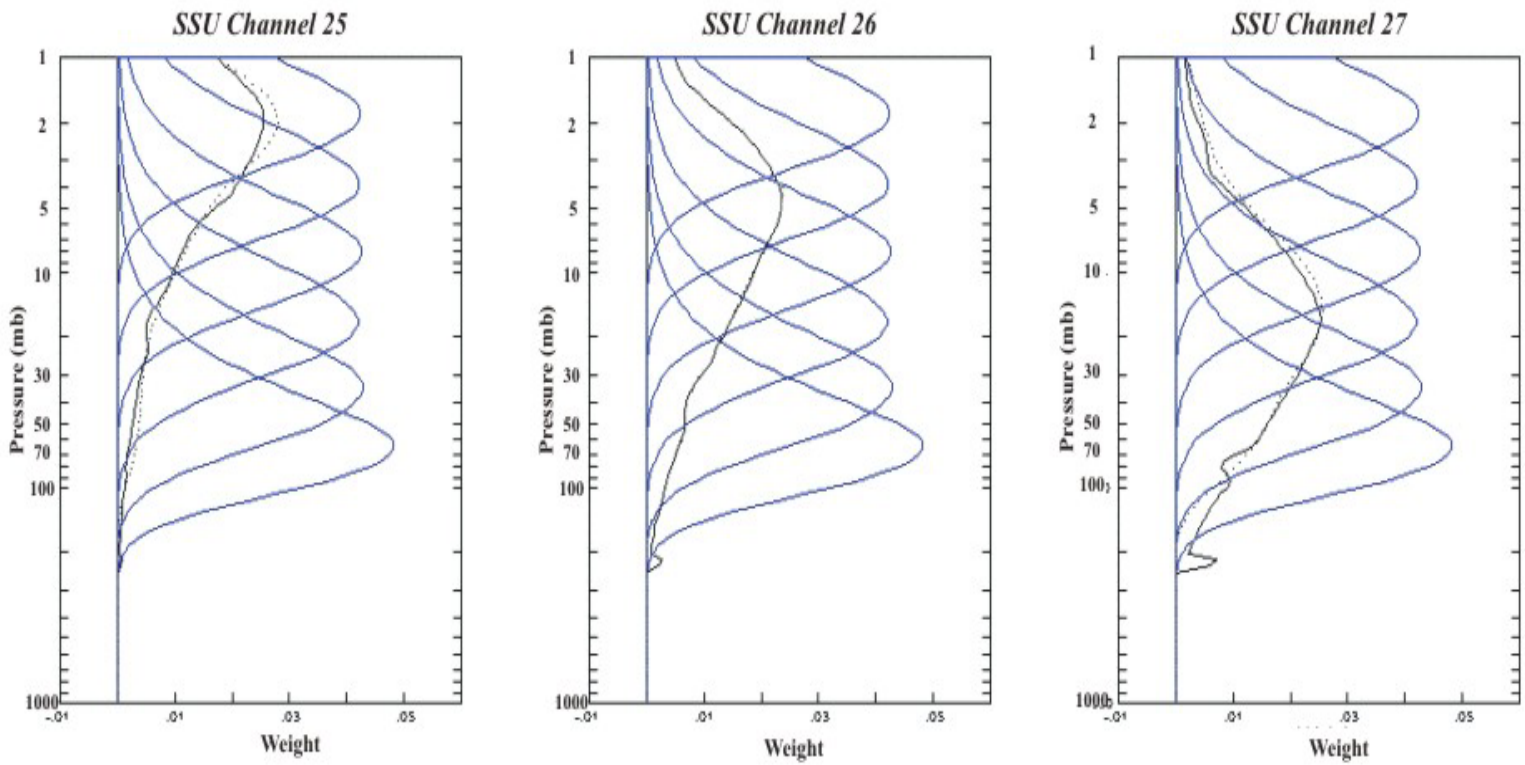
Outline

- **Provide improved temperatures for operations**
- **Help Validate SAGE III Temperature Retrievals**
- **Help Validate SAGE III Ozone Retrievals**
- **Validate SBUV(/2) ozone profile trends**
- **Validate NCEP Global Forecast Model**
- **Examine Arctic and Antarctic Variability Oscillations**

SSU and AMSU Channel Weighting Functions



We propose to help validate the SAGE III temperatures and ozone:

- NOAA Operational Satellites
- EUMETSAT Operational Satellites
- Rawinsondes
- LIDARS
- Microwave instruments
- Satellites of opportunity:

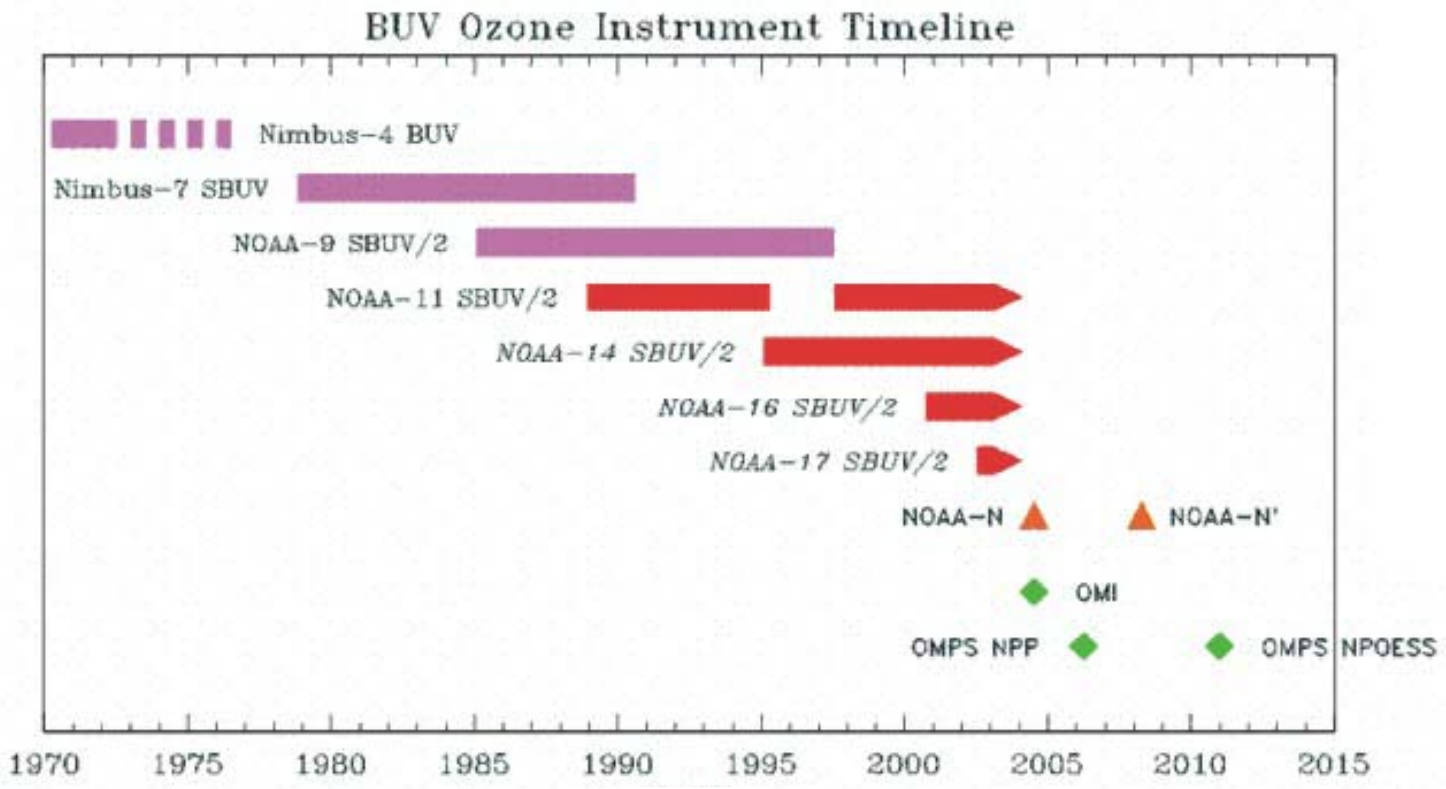
  NASA - HALOE, AIRS, SABER, HIRDLS, MLS

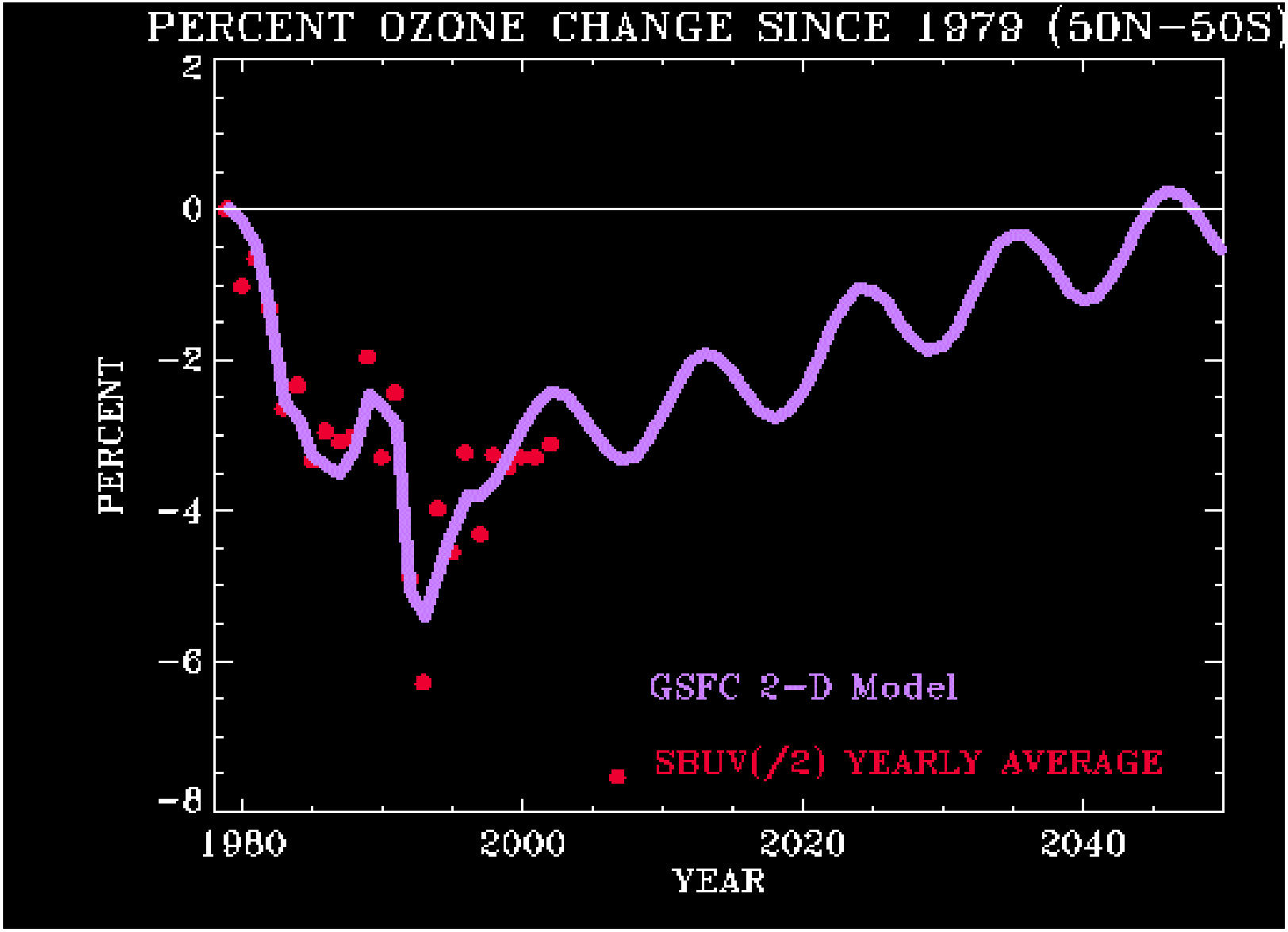
  ESA – GOMOS, MIPAS, SCIAMACHY

  DoD – POAM III

(S)BUV (/2) History

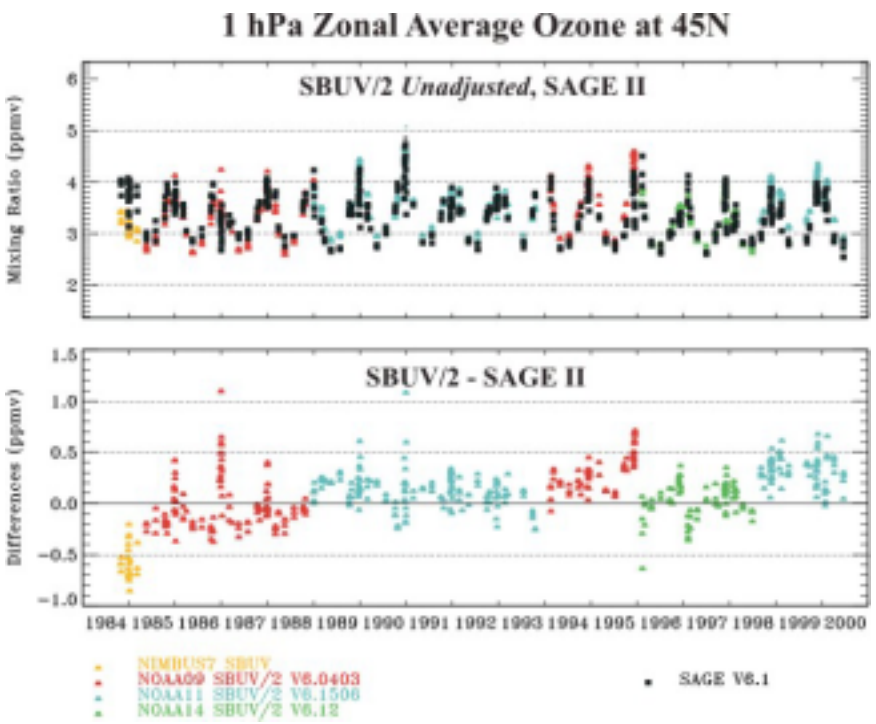
- **NCEP/CPC has been involved with BUV data analysis and validation beginning with NIMBUS-4 in 1970**
  - **Providing daily analyses**
  - **Comparisons against Dobson Network**

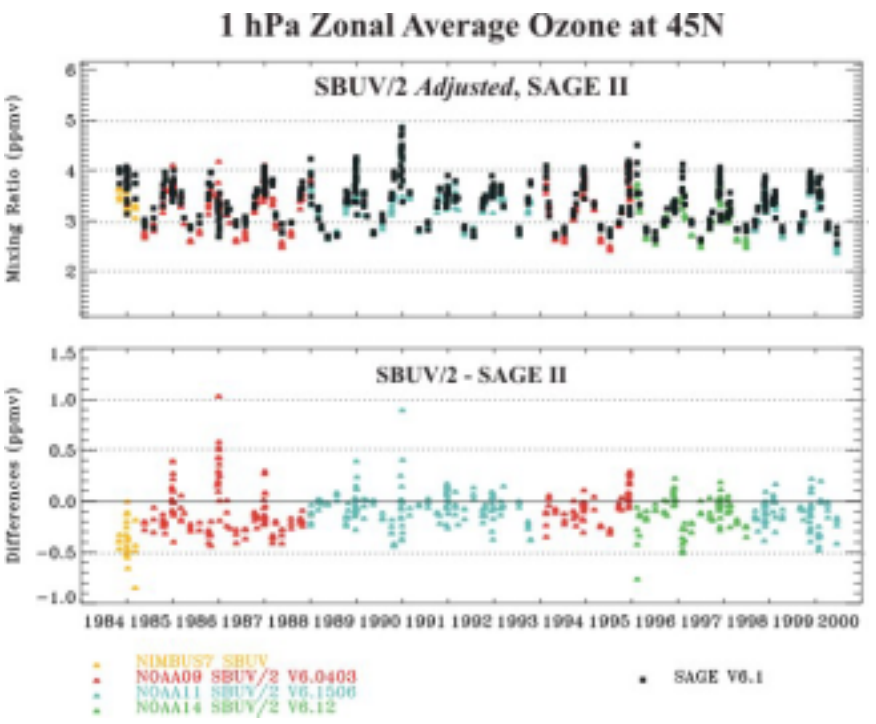



PERCENT OZONE CHANGE SINCE 1979 (50N-50S)
2
0
-2
-4
-6
-8
PERCENT
1980
2000
2020
2040
YEAR
GSFC 2-D Model
SBUV(/2) YEARLY AVERAGE

SBUV(/2) Research

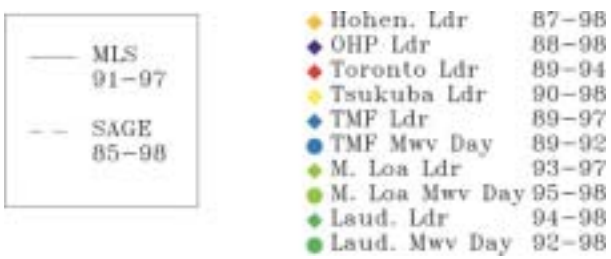
- **Cohesive data set of SBUV(/2) Profile Ozone data**
  - **Adjust Trend of each satellite to SAGE II**
  - **Bias Adjusted to NOAA-9**

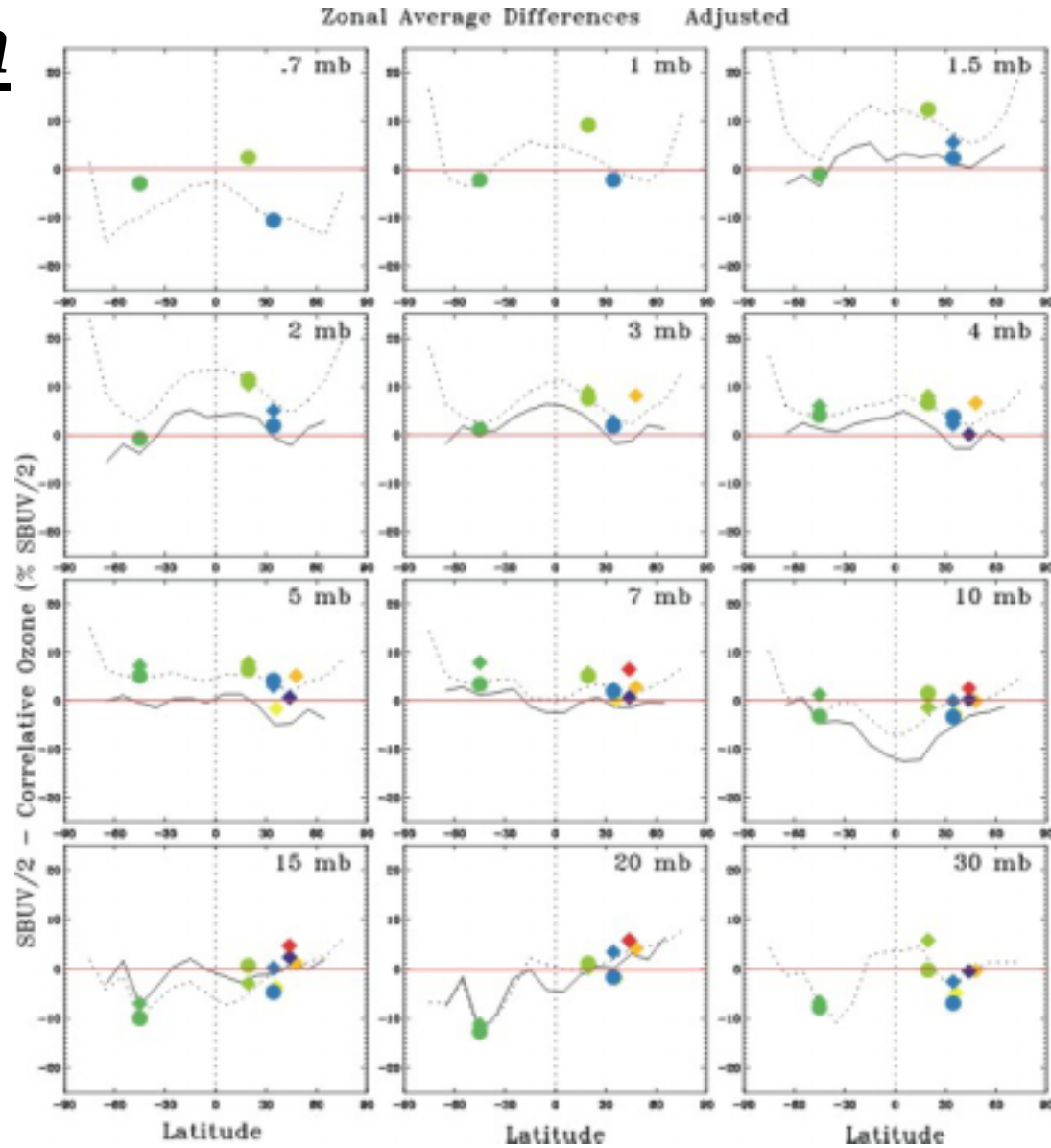


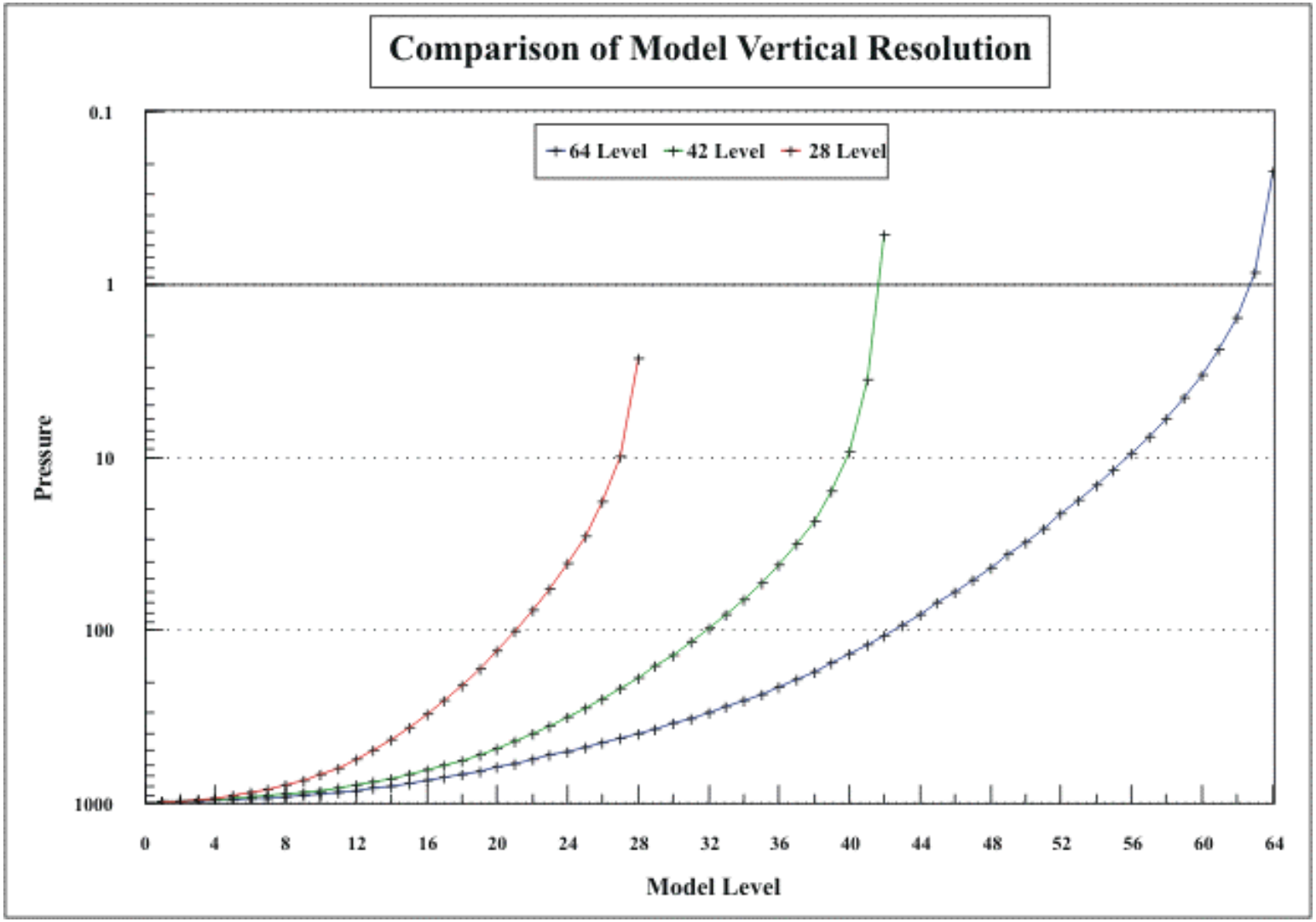


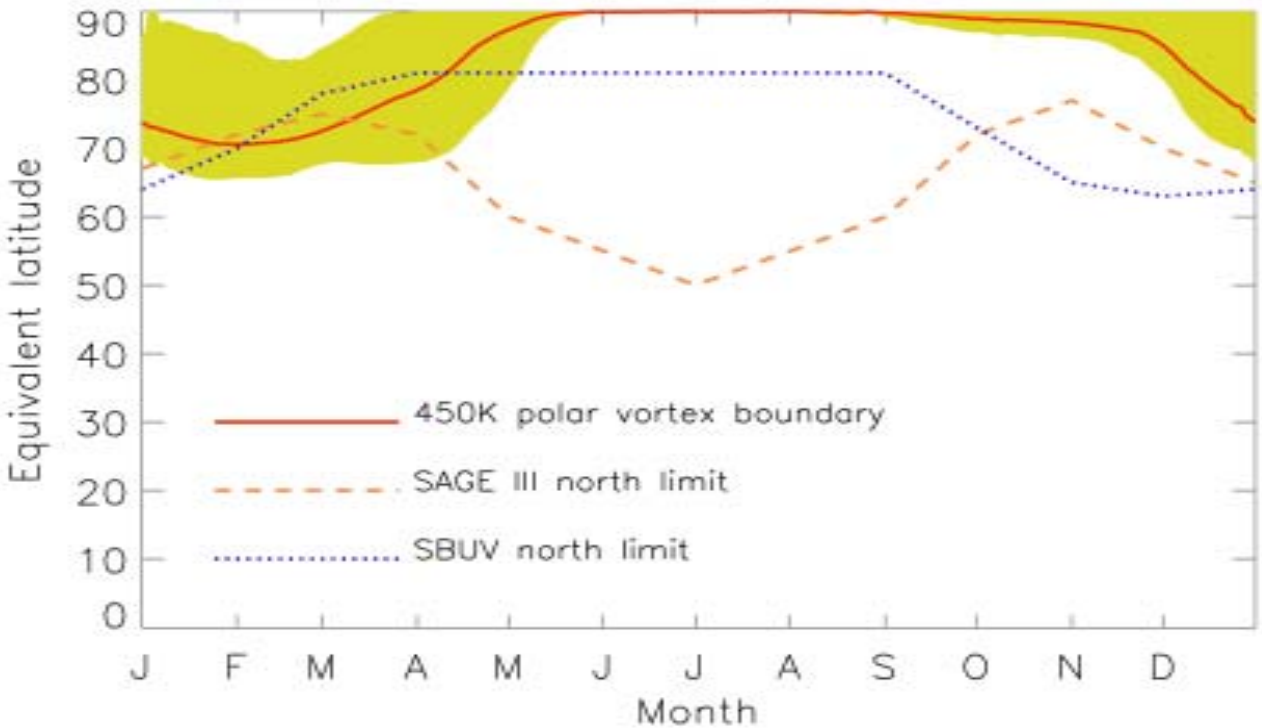
SBUV(/2) Research

- **Validation against:**
  - **SAGE II**
  - **MLS**
  - **Lidar**
  - **Microwave**
    - **Latitudinal variations with each pressure level**






Comparison of Model Vertical Resolution
64 Level
42 Level
28 Level
Pressure
0.1
1
10
100
1000
0
4
8
12
16
20
24
28
32
36
40
44
48
52
56
60
64
Model Level


90
80
70
60
50
40
30
20
10
0
Equivalent latitude
450K polar vortex boundary
SAGE III north limit
SBUV north limit
J
F
M
A
M
J
J
A
S
O
N
D
Month

CPC’s Stratosphere Web Page:

http://www.cpc.ncep.noaa.gov/products/stratosphere/

NCEP Global Forecast Model

- **Operational weather forecast model has current resolution of**
- **T254 (~50 km) w/ 64 levels**
  - **From surface up to 0.1 hPa**
  - **22 levels above 100 hPa**
  - **Forecast fields every 6 hours out to 16 days**
  - **Assimilates ozone data from all 12 Umkehr layers**
  - **Analysis and forecasts of total ozone and profile mixing ratios**
- **Radiation package utilizes ozone for accurate atmospheric heating**
- **Total and profile ozone data improves usage of satellite radiance data.**
- **Provides analyses at synoptic times rather than daily composites.**