

Summary of subgroup results for Stratospheric Ozone Validation

Ray H.J. Wang

AURA Science Meeting, Boulder, September 11-15, 2006



HIRDLS

- Bruno Nardi

MLS

- Lucien Froidevaux (Strat. (and mes.))
- Yibo Jiang et al. (LS/UT)

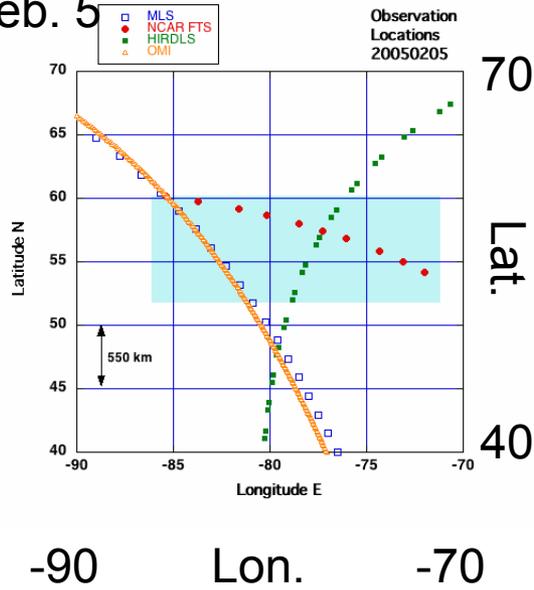
Aura/airborne ozone instruments comparisons

- Irena Petropavlovskikh
- Michael Coffey

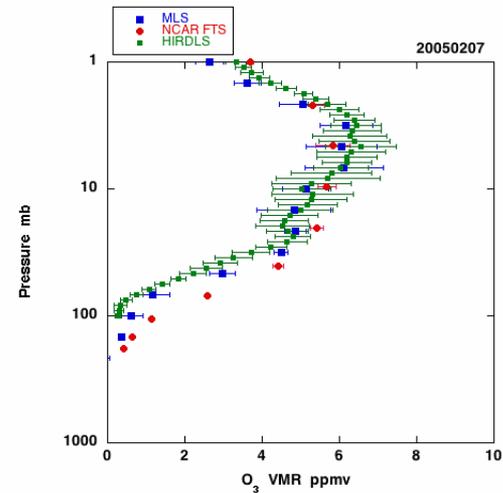
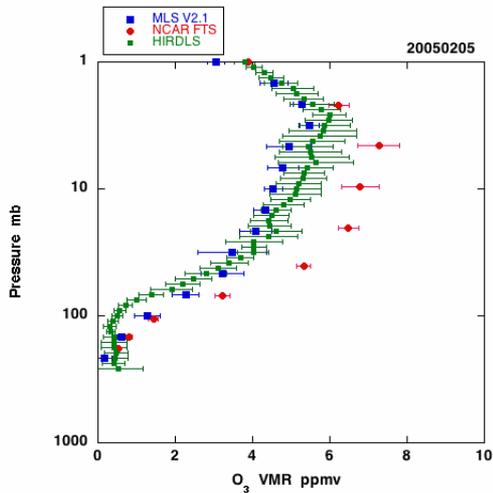
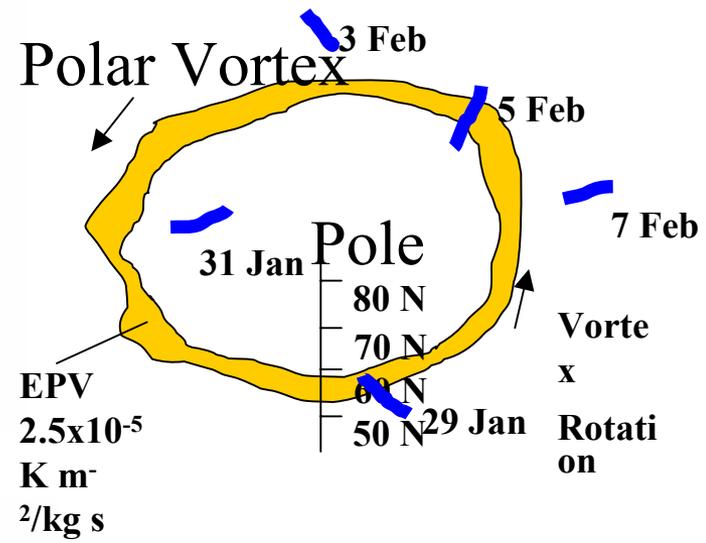
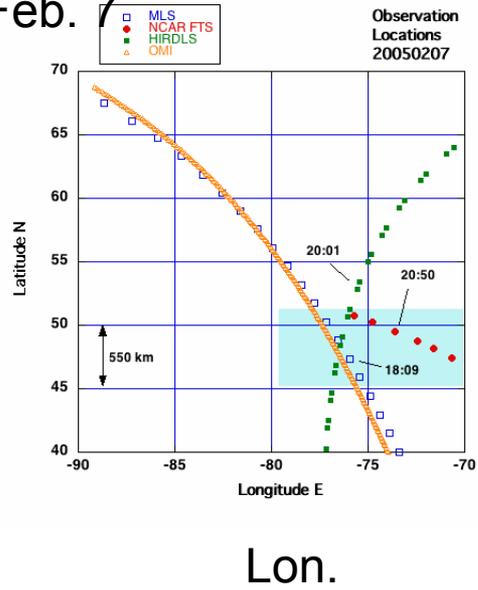
Ozone Observations aboard the DC-8
(during PAVE in Jan.-Feb., 2005)

Observation	Institution	PI	ID
Insitu O ₃	NASA LaRC	Avery	O3
LIDAR	NASA LaRC	Browell	DI
IR abs FTS	NCAR	Coffey	IR
LIDAR	NASA GSFC	McGee	AR
Sub-mm emiss spect.	U. of Bremen	Notholt	AS
Actinic flux spect.	CU/NCAR	Petropavlovskikh	PO

Feb. 5

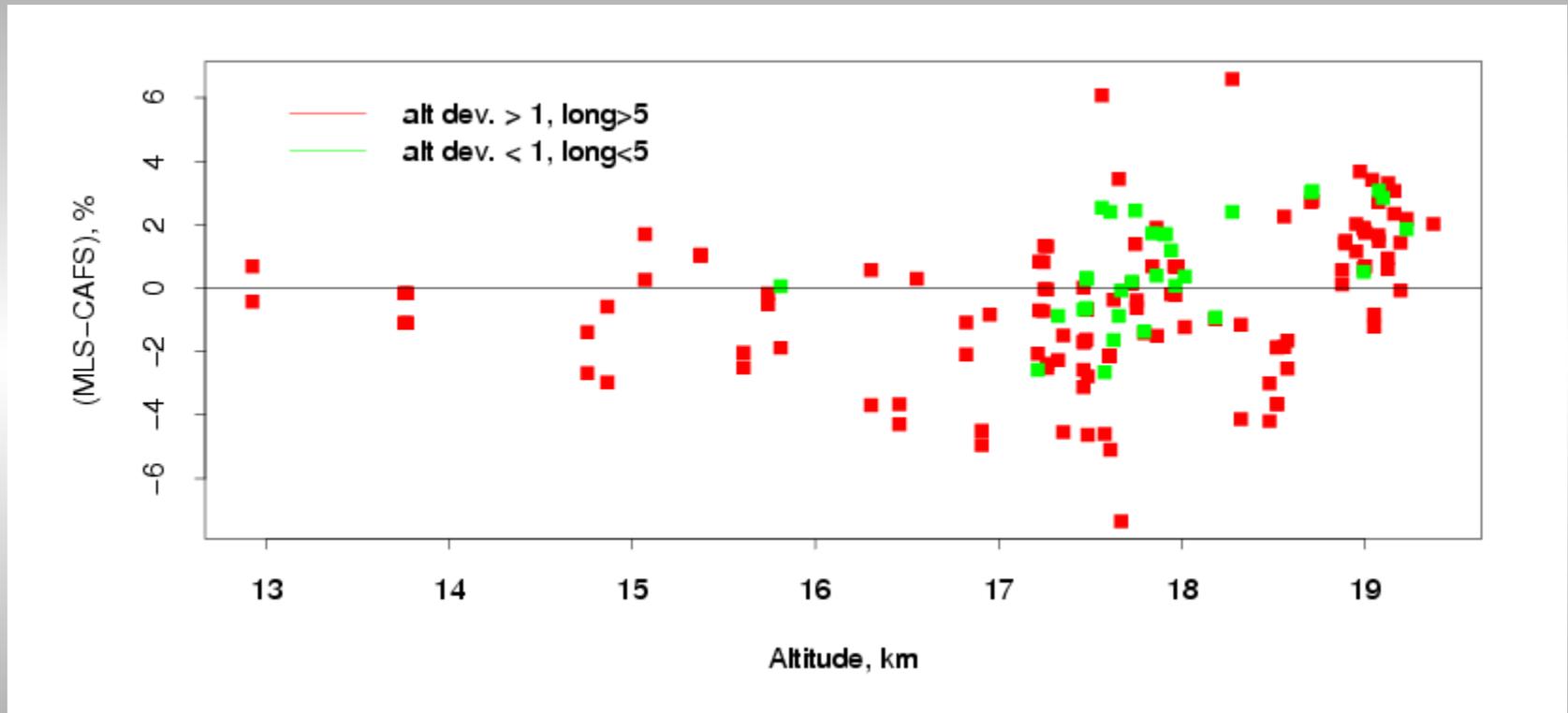


Feb. 7



- OMI
- MLS
- HIRDLS
- NCAR FTS

MLS/CAFS summary, Jan 2006



Stratospheric column ozone comparisons (Petropavlovskikh et al)

Conclusions

- CAFS continues to provide reference for stratospheric ozone column products (MLS, OMI/SBUV) with better than 2 % accuracy.
- Summary of CAFS error is complete and available upon the request.

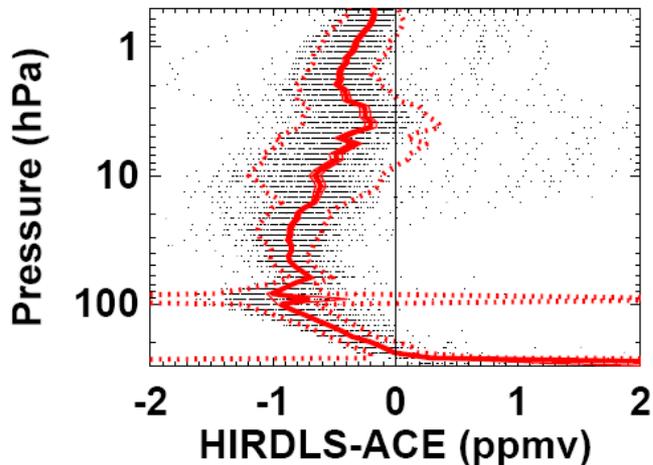
(Petrovavlovskikh et al)

HIRDLS-ACE/FTS Ozone Differences

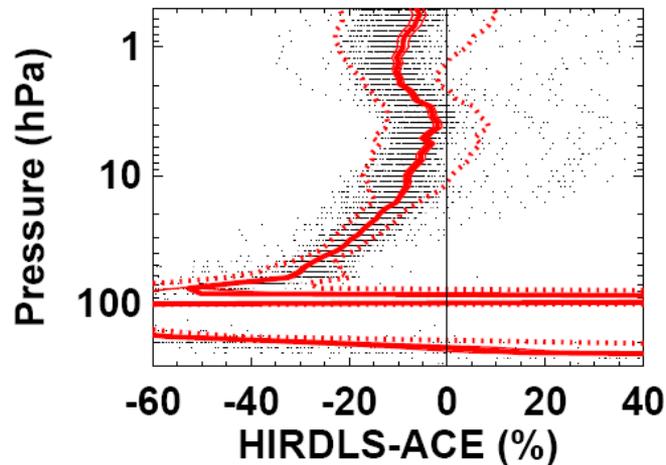
09/2006, v2.02

Data: May 2006

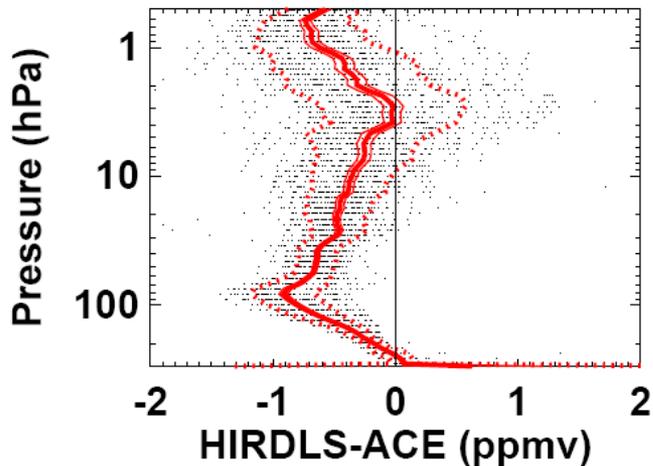
NH O3



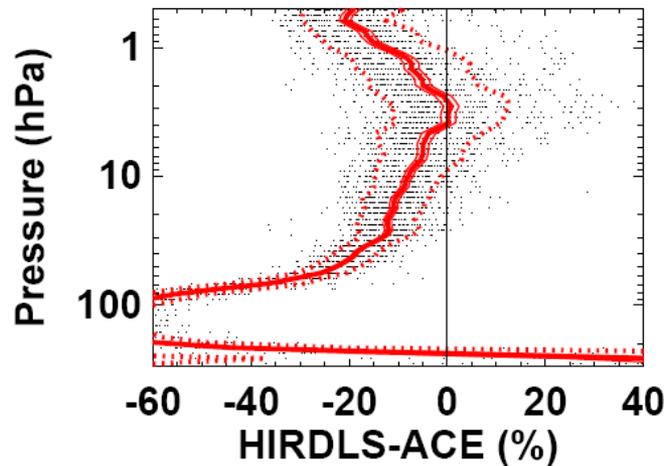
NH O3 (%)



SH O3



SH O3 (%)



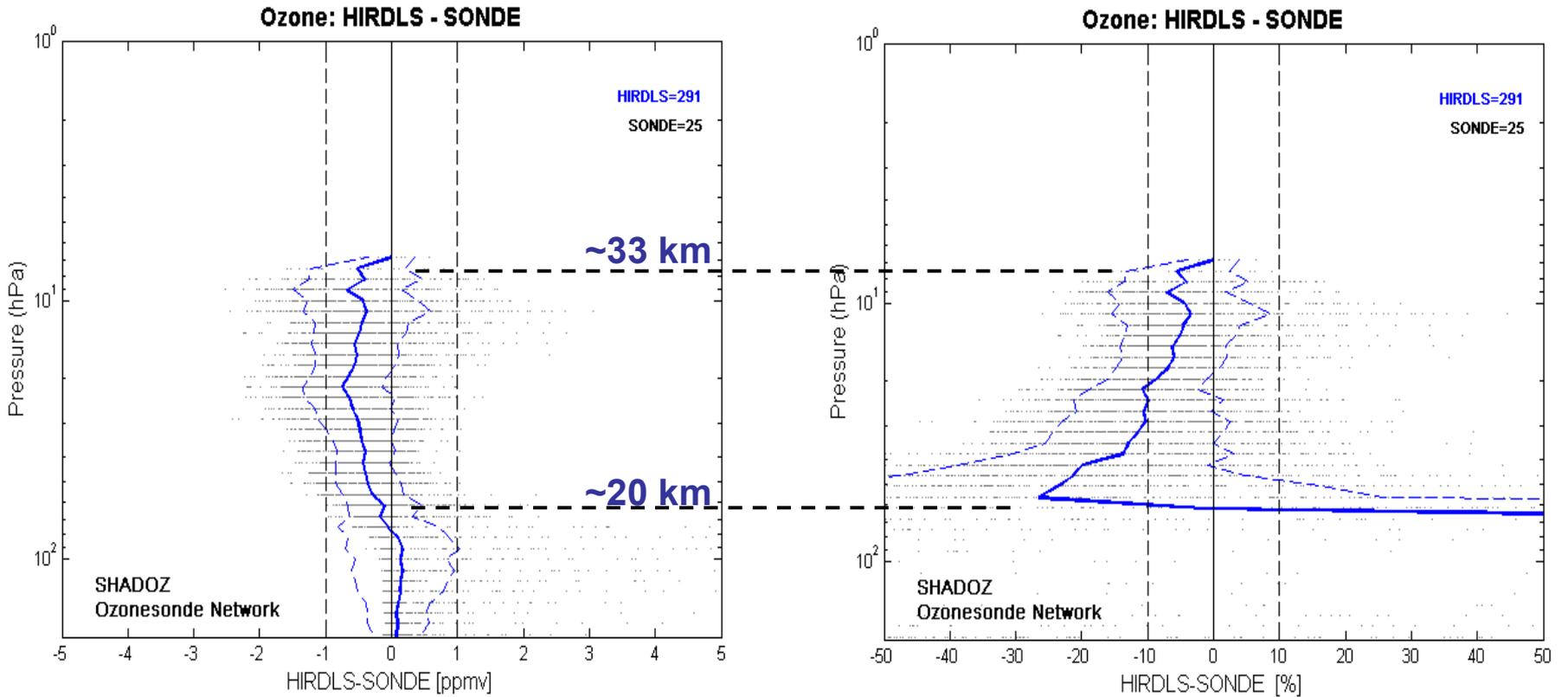
Thick red:
Average

Dotted red:
1- σ distribution

Thin red:
1- σ uncertainty
(often hidden)

Black points:
Individual
differences

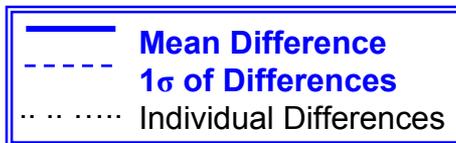
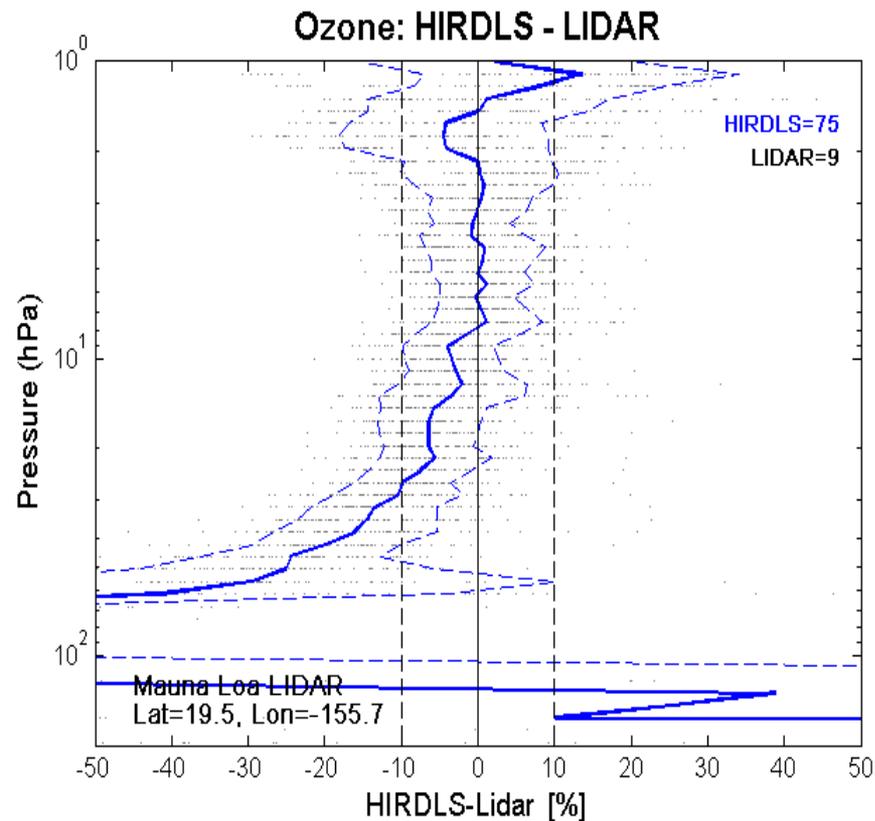
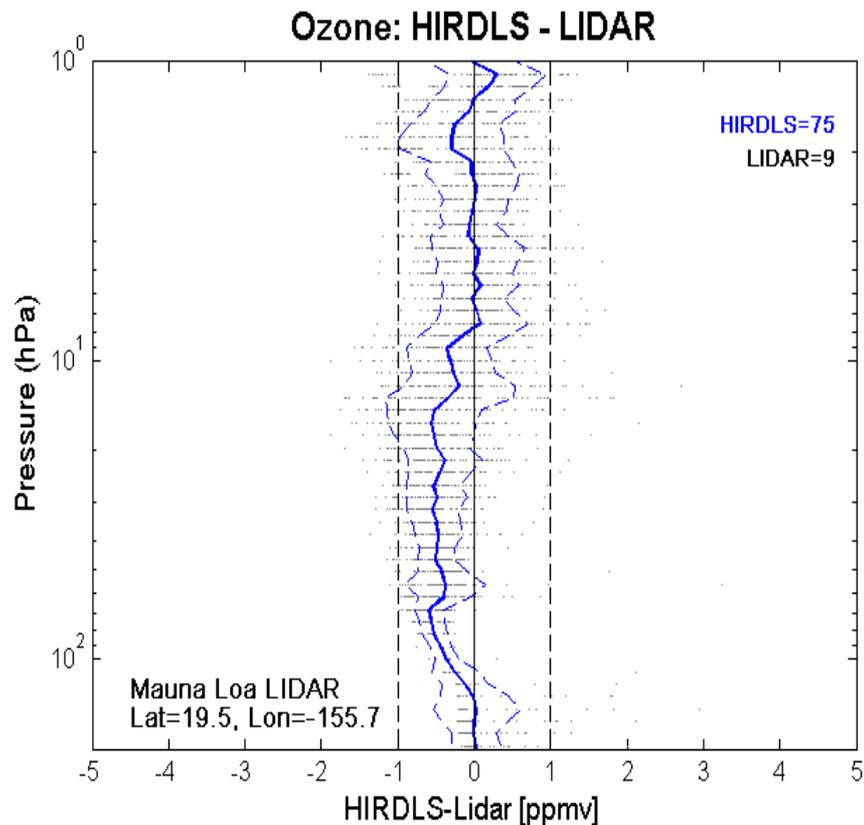
Ozonesonde Comparisons with HIRDLS Statistical Summary: Average Differences



Ozone LIDAR Comparisons with HIRDLS Statistical Summary: Average Differences

09/2006, v2.02

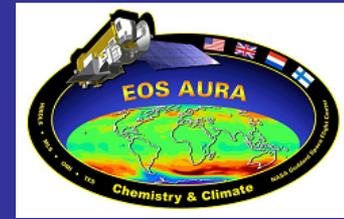
Data: May 2006





Summary

(from Bruno Nardi et al.)



Ozone accuracy at 10-2 mb is several percent

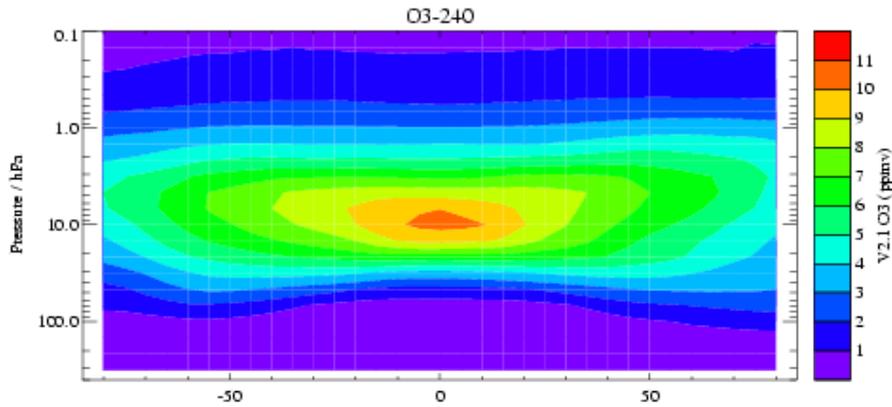
- **Ozone accuracy at 30-10 mb is 10 % or better (biased low)**
- **Current lower limit of valid ozone data is 50 mb (accuracy 20-40%, biased low)**
- **HIRDLS has high vertical resolution capability.**

AVENUES TOWARD IMPROVED OZONE-PRODUCT / COMPARISONS

1. Improved temperature retrieval (biased high) will produce increase in O_3 .
2. Improvement in pointing algorithm
3. Continued improvements Kapton correction
4. Continued improvements open area correction
5. Continued improvements treatment of cloud features

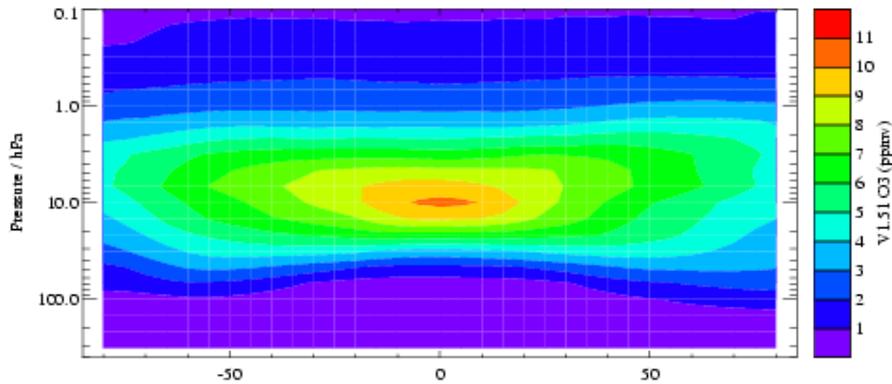
MLS provisional version 2.1 data versus version 1.5 data: O₃

MLS Ozone Zonal Means & Differences (V2.1 vs. V1.51)

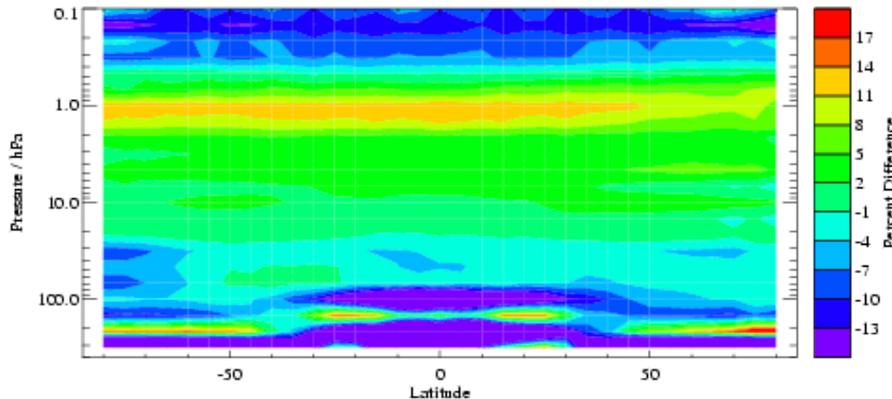


V2.1

The differences (V2.1 – V1.5) are fairly constant (systematic) with latitude.



V1.5

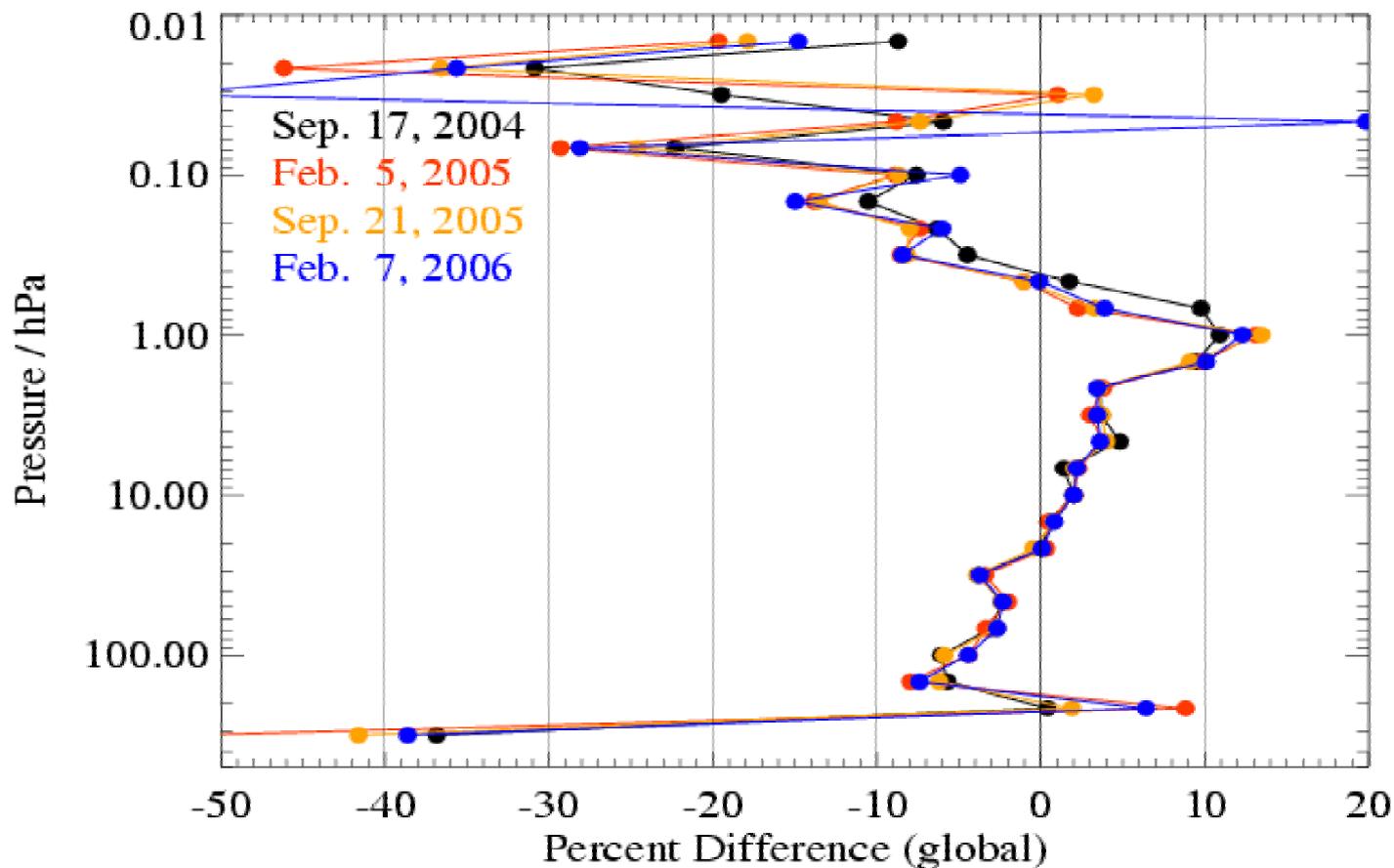


percent differences shown here
- based on 17-day averages, from available v2.1 MLS data

Froidevaux et al

MLS provisional version 2.1 data: O₃

MLS V2.1 versus V1.5: O₃



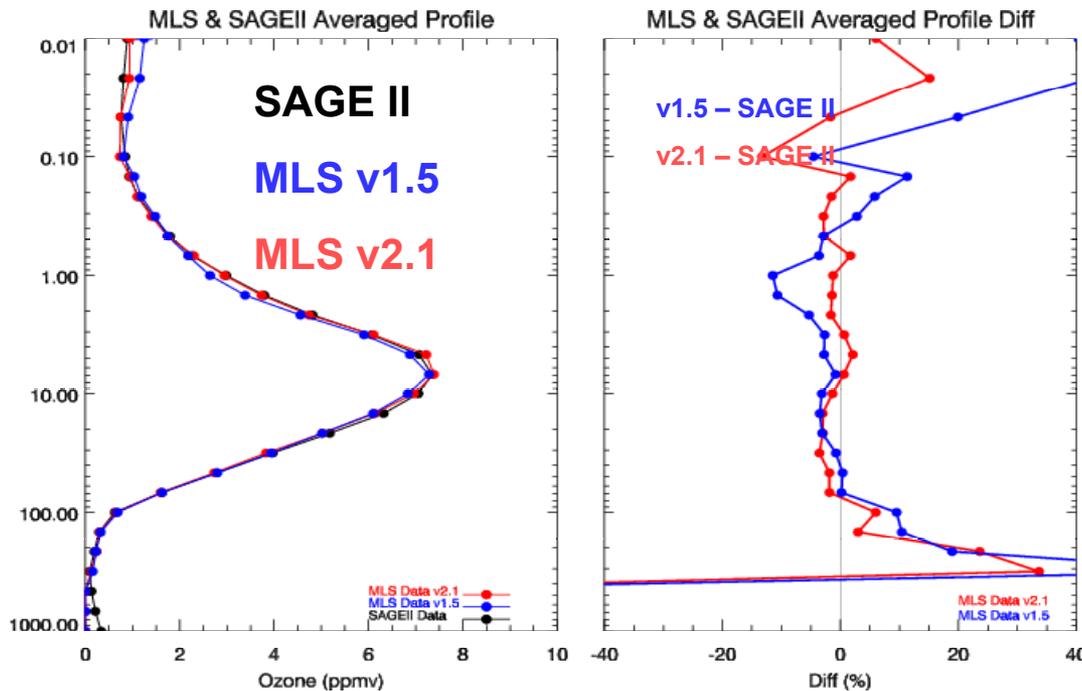
The ozone differences (global averages) from V1.5 to V2.1 are quite reproducible from day to day and over more than 1 year

- based on a few days that have been reprocessed

Changes to MLS ozone in v2.1: impact on comparisons

Satellite Data (some examples)

17 days (~ 200 profiles) of MLS coincidences with SAGE II (72S to 49N, with gaps)



The comparison versus SAGE II is generally improved for v2.1

- stratospheric and mesospheric differences are reduced

- within ~5% from 150 to 0.15 hPa (for these profile averages)

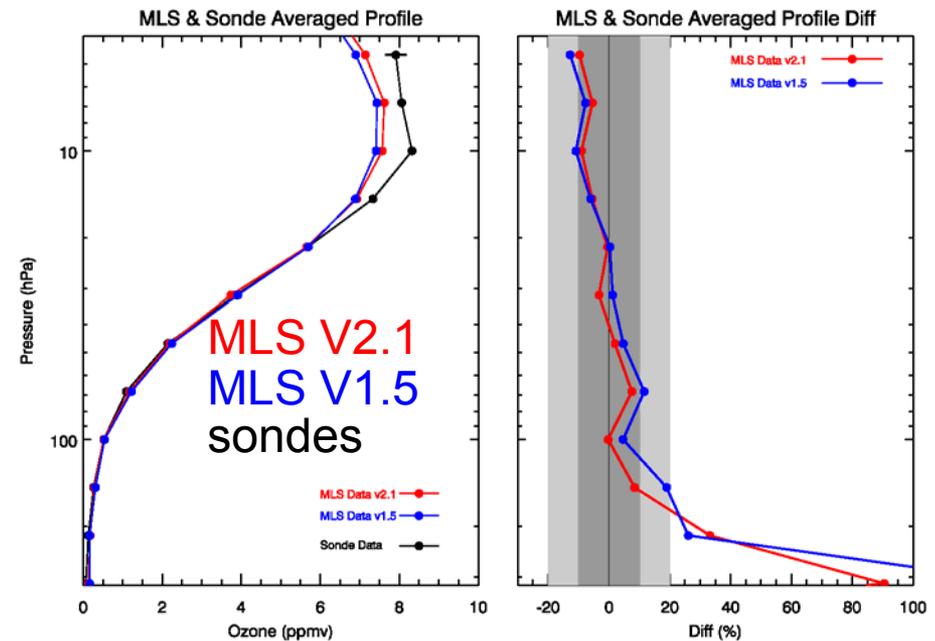
- also seems better at 315 hPa

- will await more (v2.2) data for more analyses vs latitude (and time)

The small positive change in slope versus height is of the right sign and magnitude to reduce the negative slope that was (often) found in ozone comparisons for MLS v1.5 data.

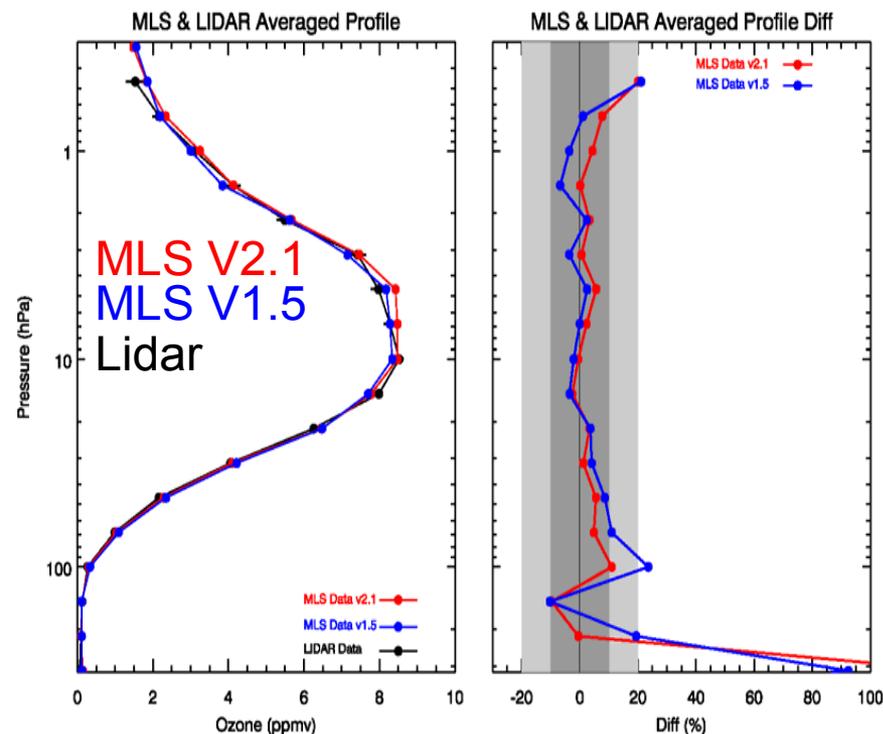
MLS Ozone v2.1, v1.5 & Sondes

- Based on 17 days of MLS v2.1 data
58 coincidence profiles (available on AVDC)
- MLS v2.1 O3 shows better agreement with sonde data than v1.5
 - within 5% from ~ 20 to 100 hPa
 - 10% in US, MLS biased lower
 - still biased high in UT, but improved over v1.5
- Upper stratospheric sonde data quality probably influences poorer comparisons there
- As for comparisons vs satellite data, we see the change in slope for MLS v2.1



MLS Ozone v2.1, v1.5 & LIDAR

- Based on 17 days of MLS v2.1 data
18 coincidence profiles (available on AVDC)
- MLS v2.1 O3 shows better agreement with LIDAR data than v1.5
- v2.1 – lidar within 5-10% for P between 215 and 0.7 hPa
- MLS – sondes differences near 10 hPa is not observed in LIDAR comparison
- MLS is biased high at 315 hPa



MLS provisional V2.1 Ozone data

- profiles have a slight slope change ('lifting' of profiles) versus v1.5 (mainly because of changes to temperature and tangent pressure)
- this reduces the sloping differences versus several other datasets
- V2.1 ozone shows better overall agreement than V1.5 compared to other correlative measurements (e.g. within 5-10% between 150 and 0.15 hPa)