

# AIRS V5 ozone retrievals: *A first look*

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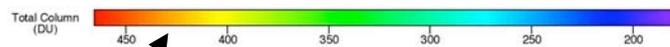
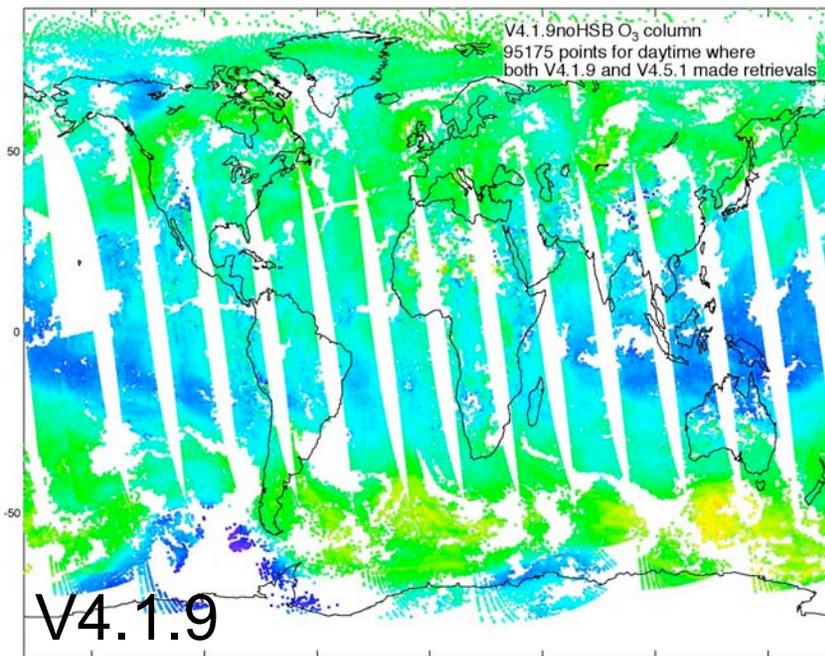
Pusan National University

*With thanks to Bob Oliphant, Sung-Yung Lee , John Blaisdell  
John Worden, Kevin Bowman and Susan Sund Kulawik*

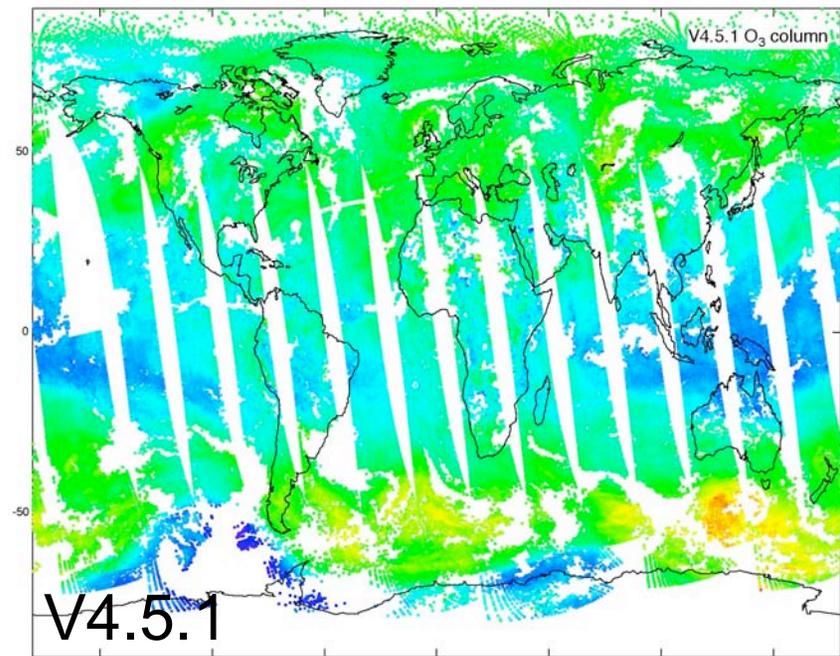


# V4.1.9 (no HSB) vs V4.5.1

Daytime granules / Sept 6, 2002



reverse scale

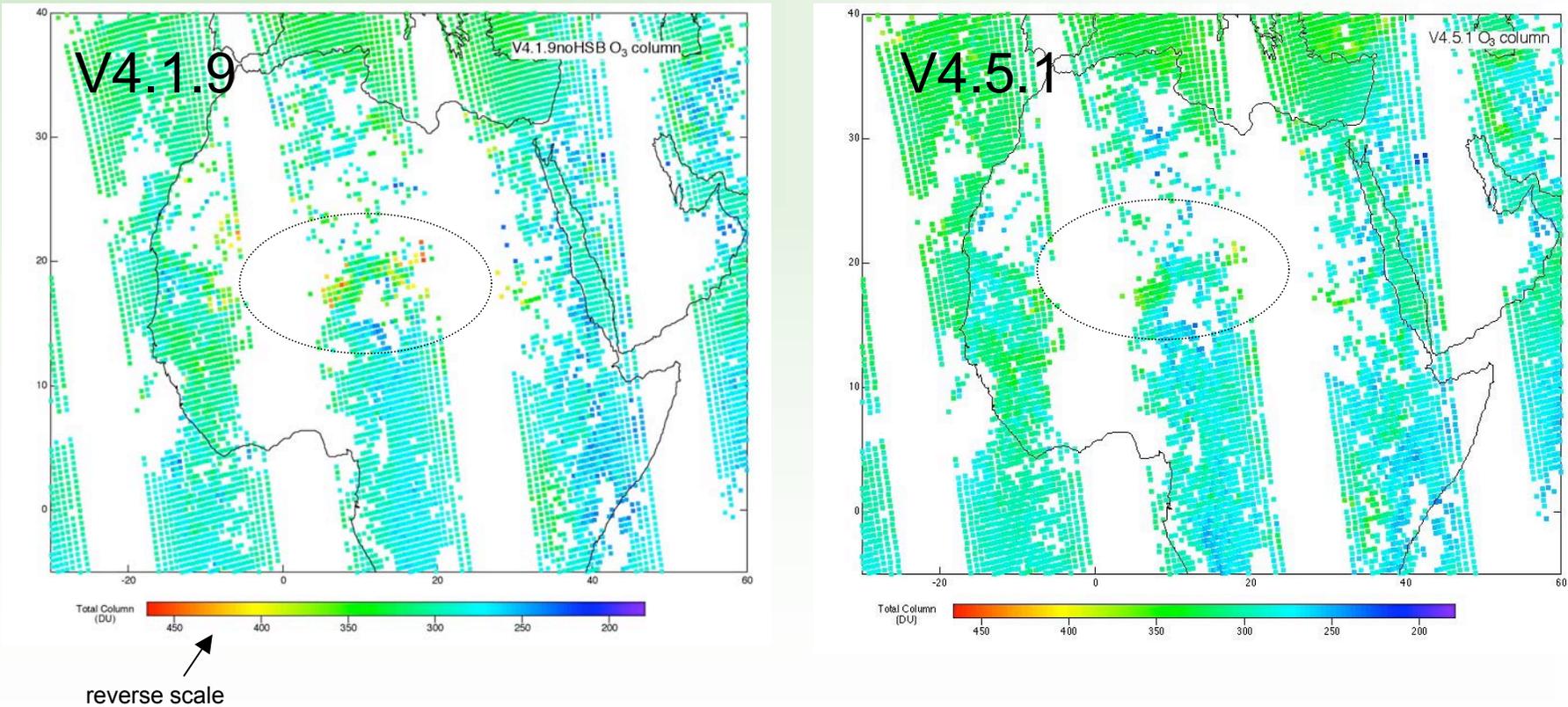


*No major changes in column*

N.B.: V4.5.x or V4.6.x beta versions of V5.

# Northern Africa comparison

Only points where both versions made retrievals shown.

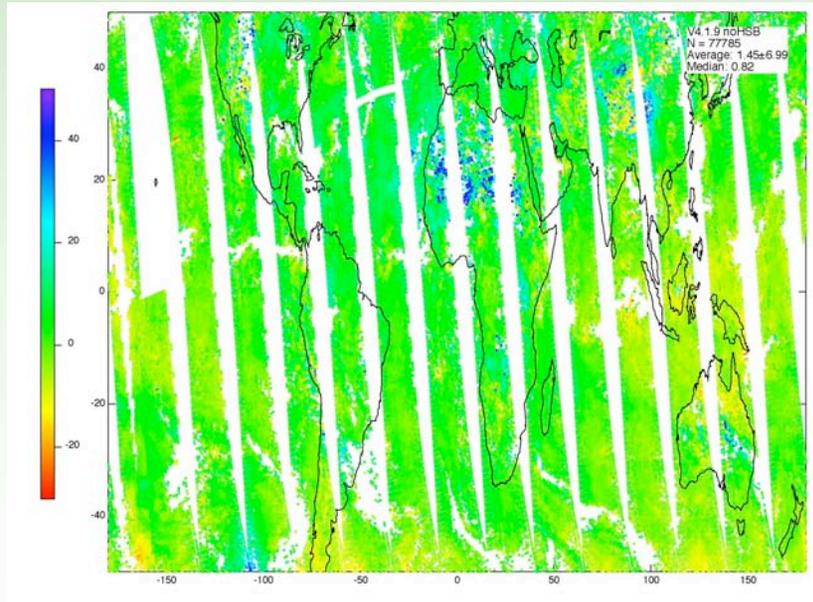


*Unusually high O<sub>3</sub> columns lowered in V4.5.1*

# Comparison with TOMS

(AIRS - TOMS) / TOMS (%)

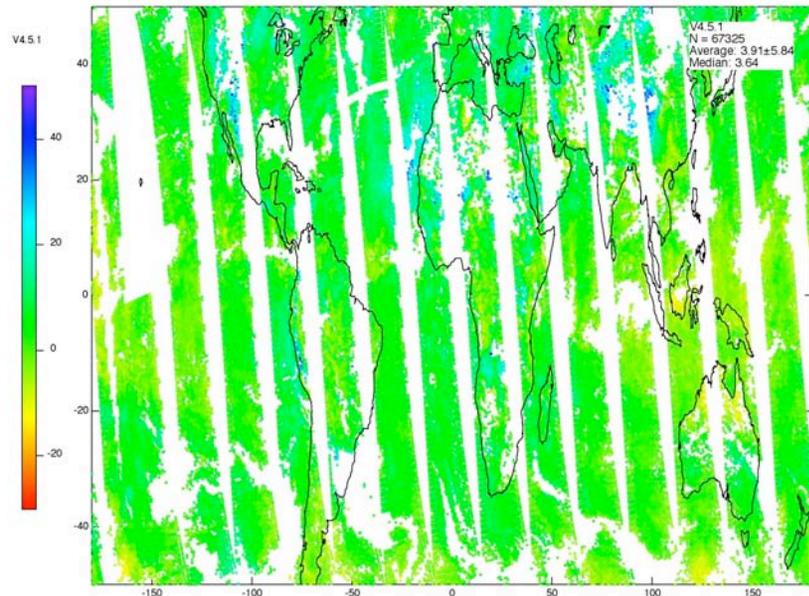
Sept 6, 2002 focus day



V4.1.9 noHSB

N = 77785

Average:  $(1.5 \pm 7.0)\%$  Median: 0.8%

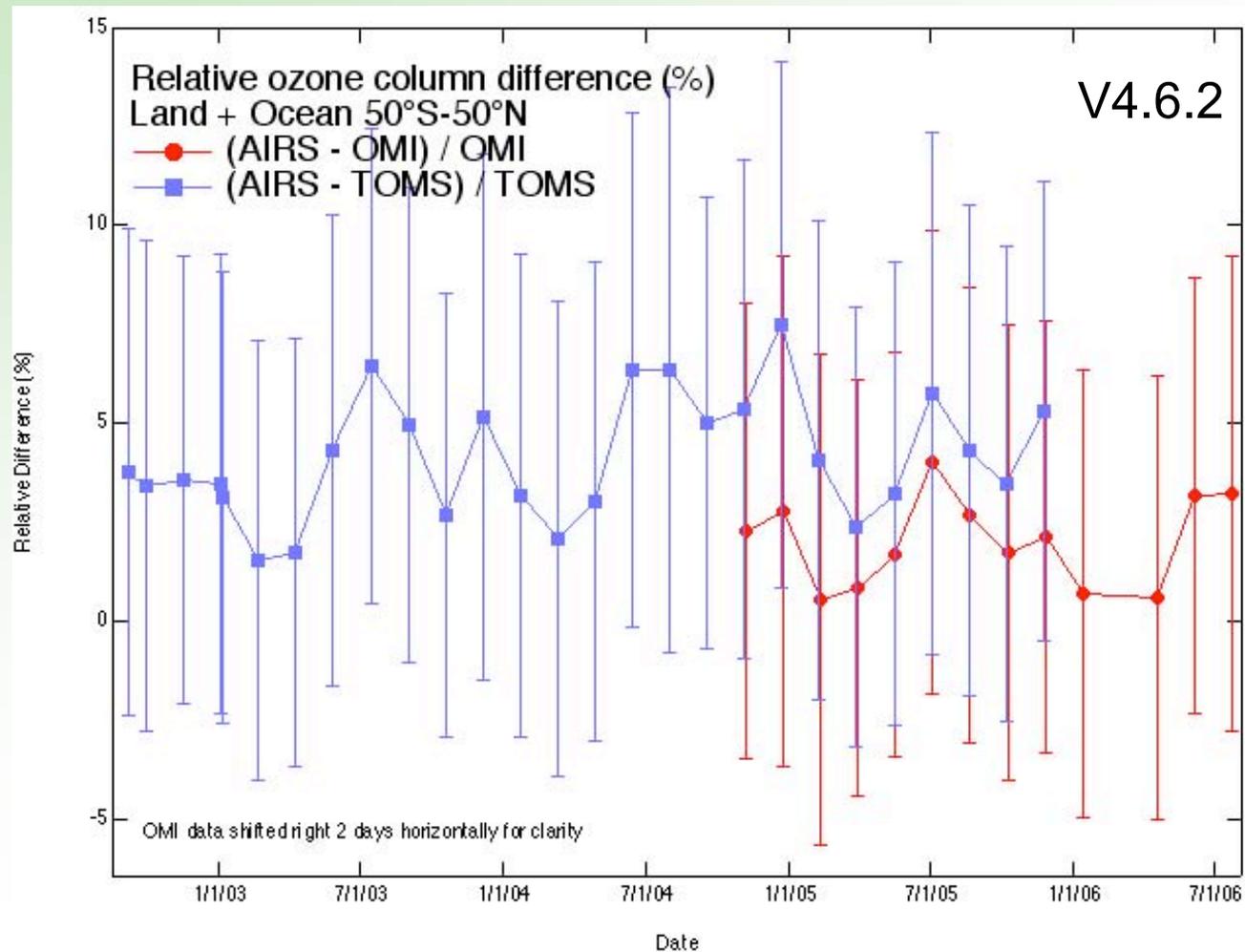


V4.5.1

N = 67325

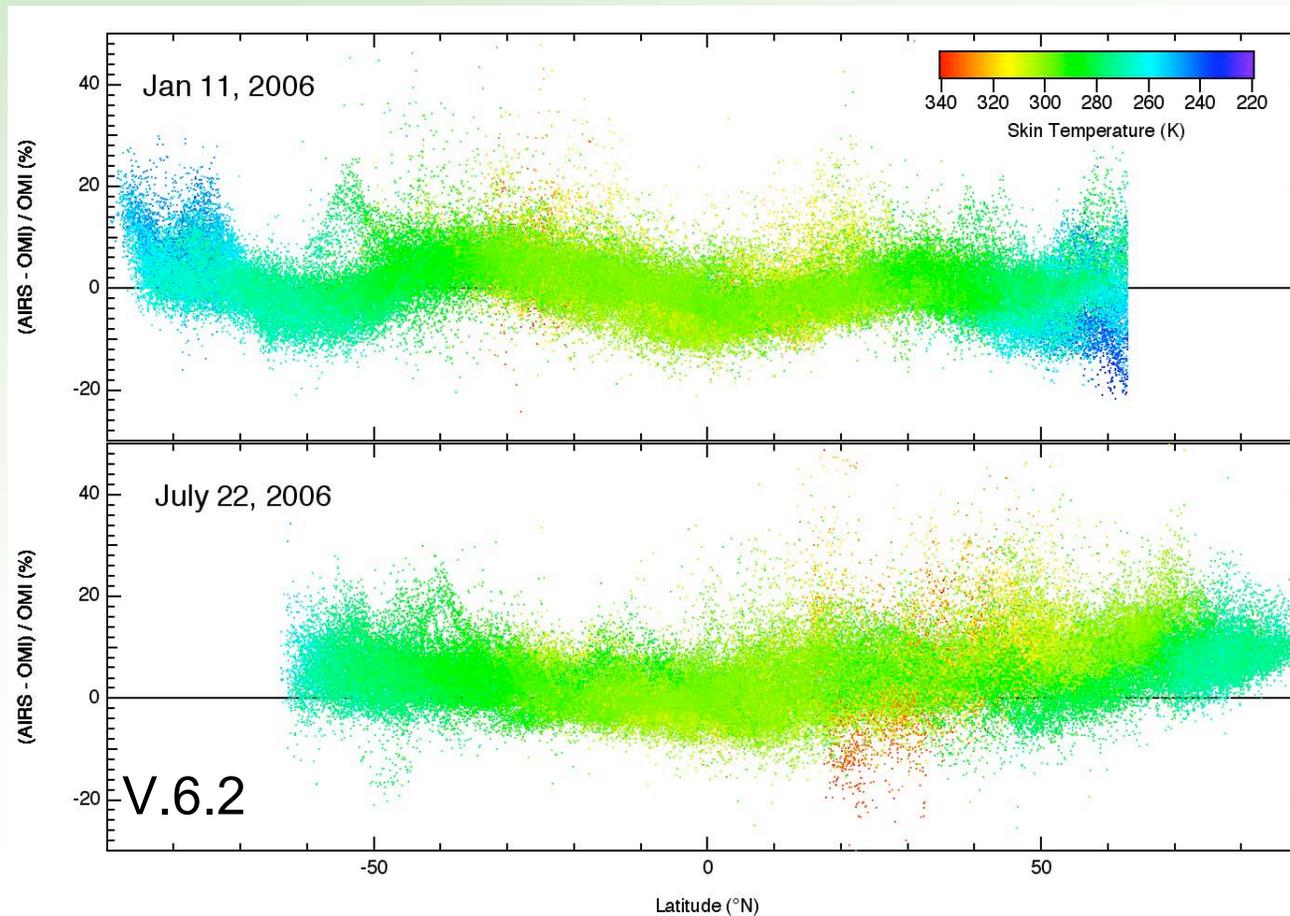
Average:  $(3.9 \pm 5.8)\%$  Median: 3.6%

# Focus day comparisons with TOMS/OMI



# Latitudinal bias against OMI

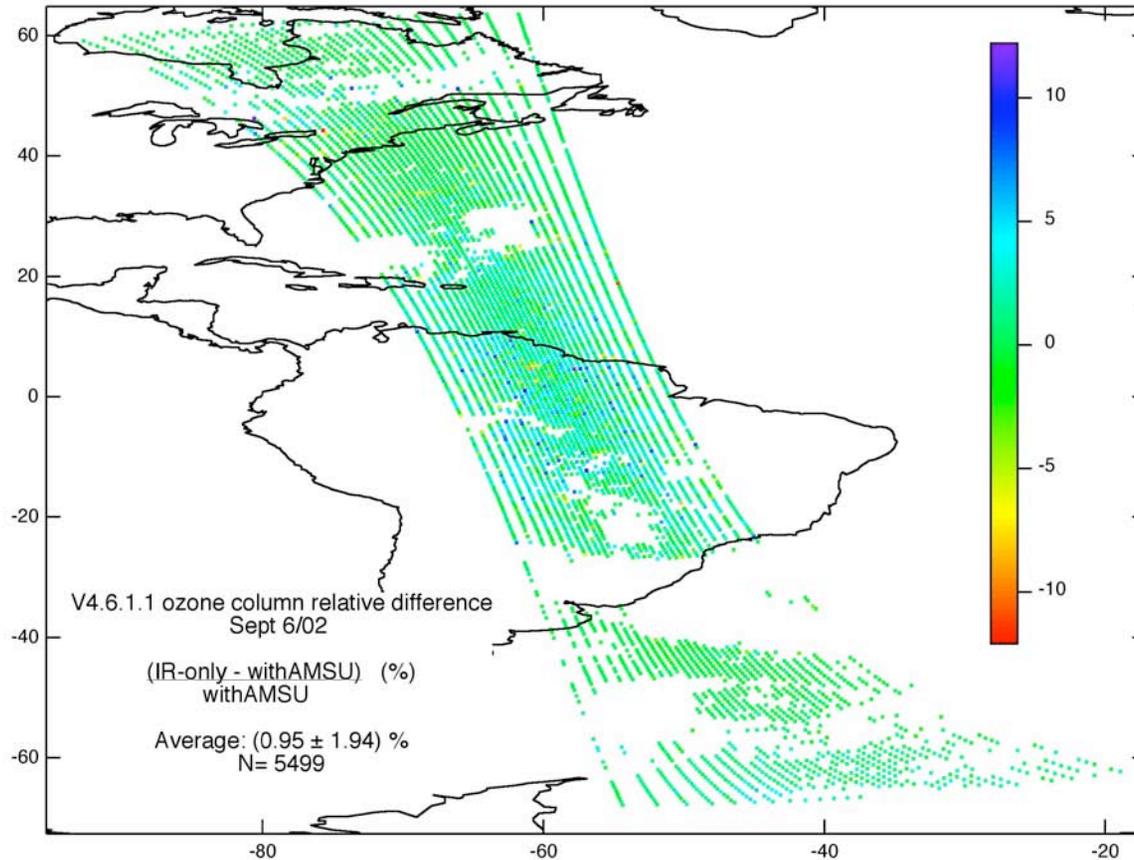
Daytime (AIRS-OMI)/OMI (%)





# AIRS-only vs AIRS+AMSU

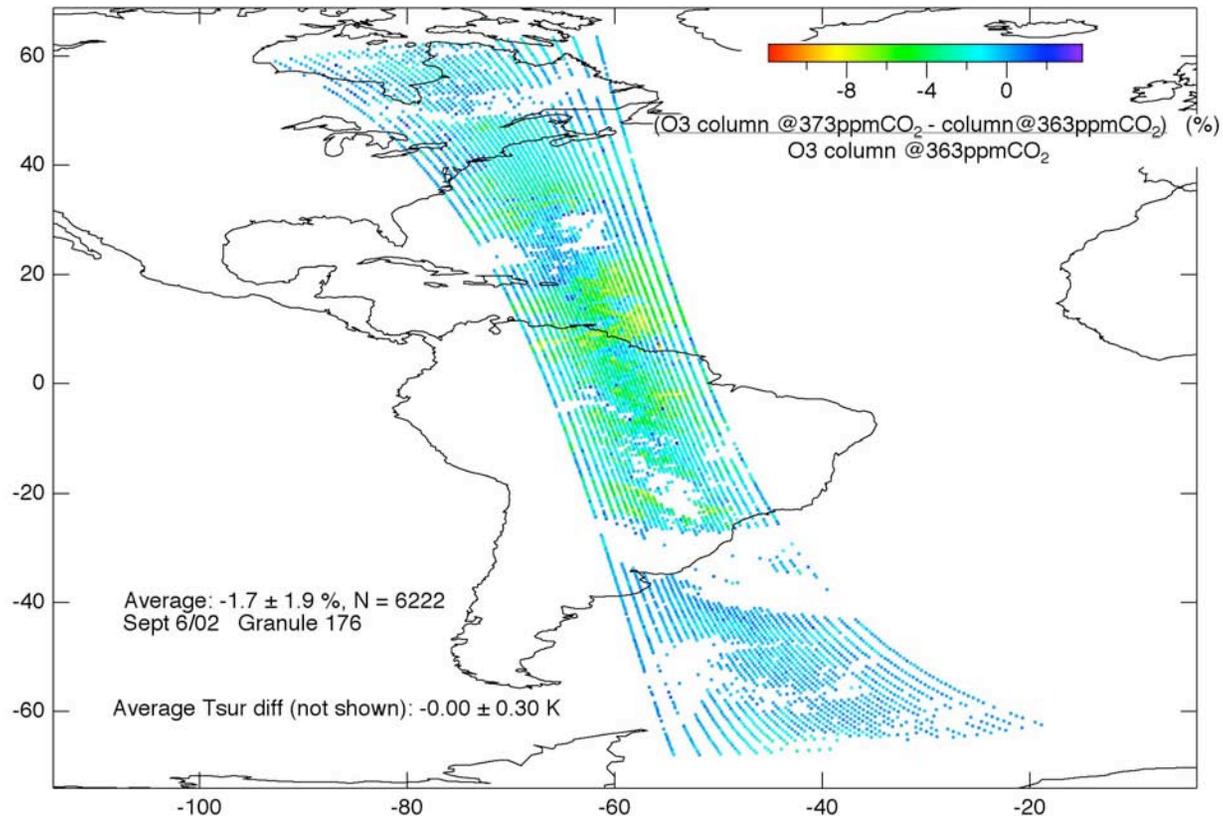
*Removing AMSU increases column by ~1%*



Average Tsur difference (not shown)  
 $(AIRS\text{-only} - AIRS+AMSU) = 0.17 \pm 1.04$  K

# Effect of CO<sub>2</sub> change

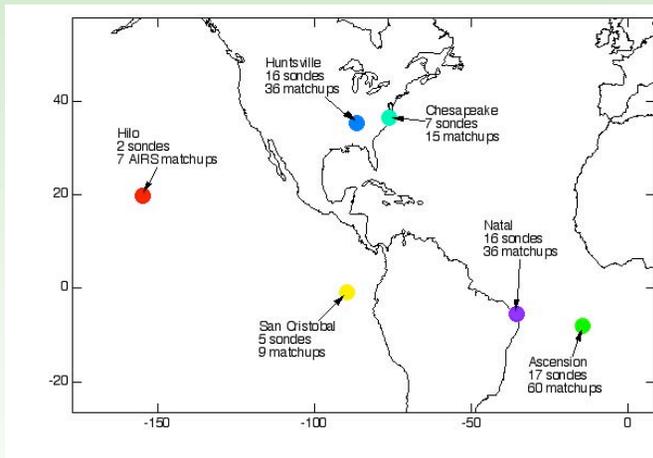
*Increasing CO<sub>2</sub> decreases O<sub>3</sub> column*



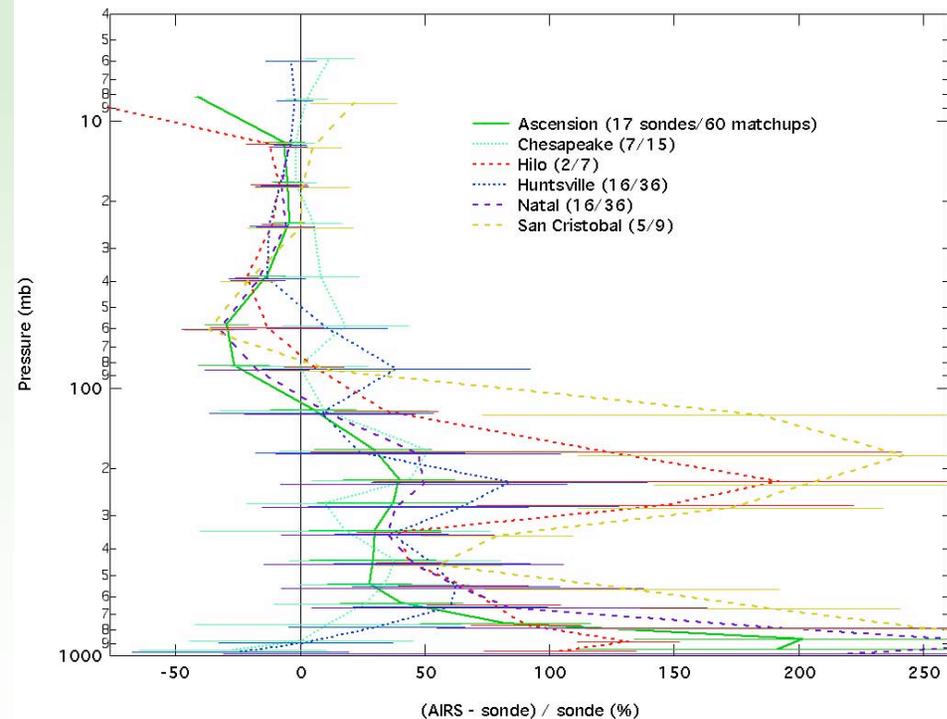
Graphs shows change in column from 363ppmv (former fixed a priori) to 373ppmv CO<sub>2</sub> (amt @ 9/6/2002)

# Comparison to ozonesondes

$$(AIRS - \text{sonde}) / \text{sonde} (\%)$$

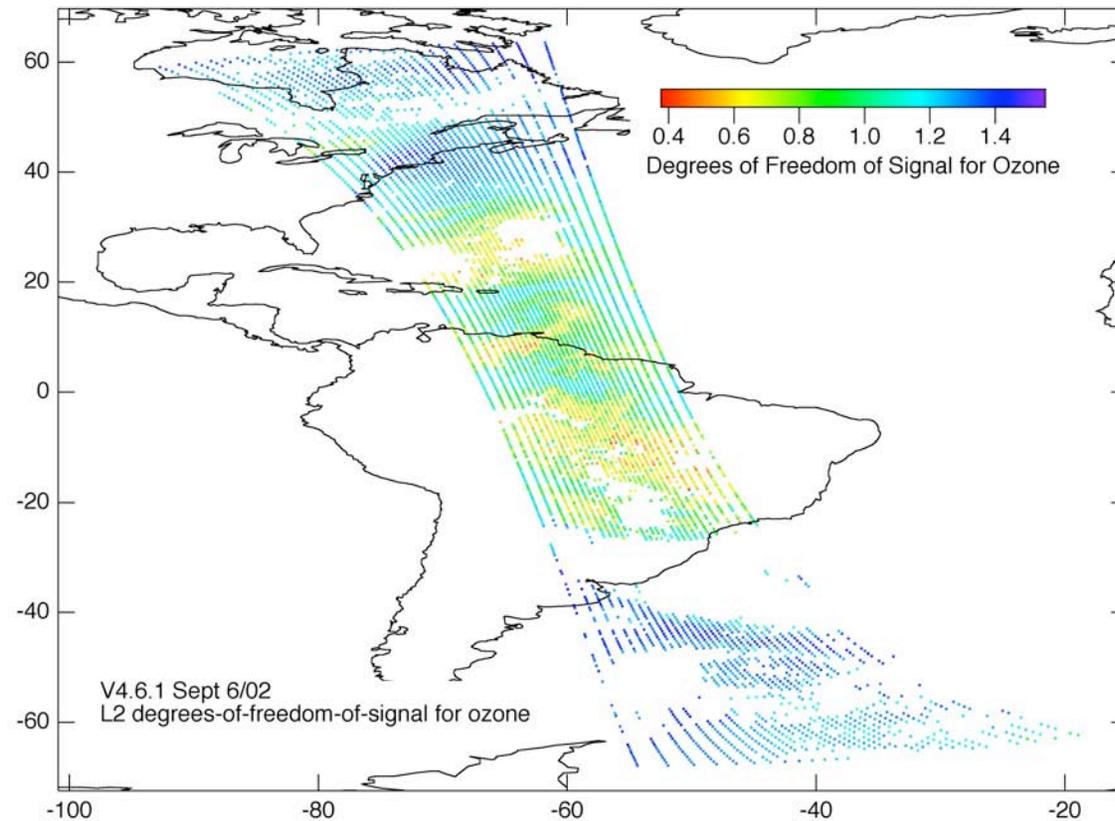


Matchups within 50 km and 3 hrs of sonde launch



*AIRS biased low in stratosphere, high in troposphere.*

# Information Content

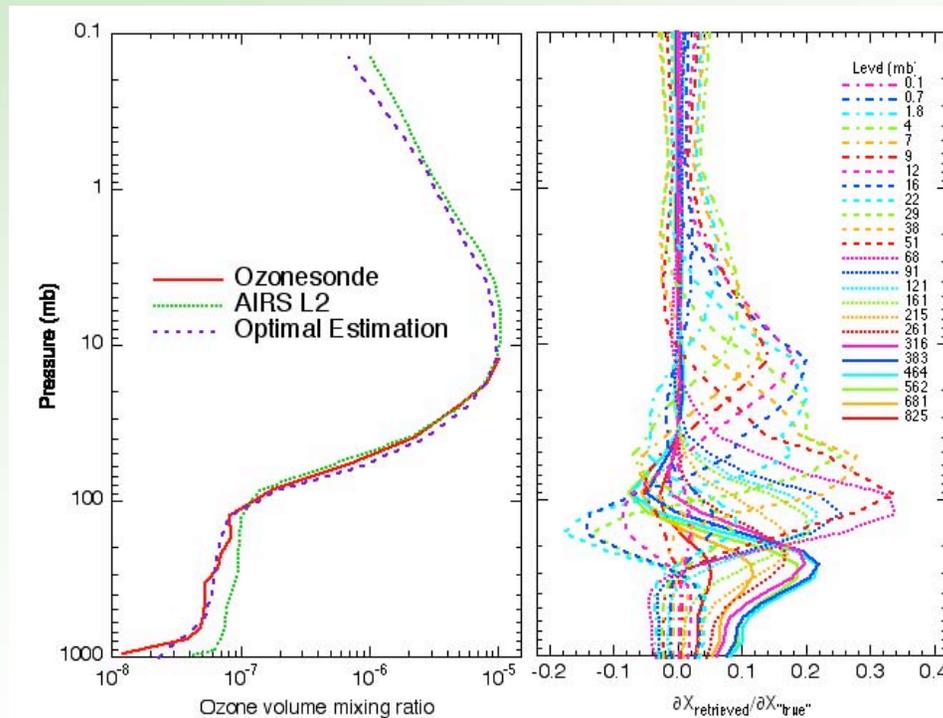


Degrees-of-freedom-of-signal counts information content available to physical retrieval, not to regression 1st guess. Significant information in profile coming from regression.

# A second look at DOFS using optimal estimation (via TES software)

AIRS L2 retrieval on cloud-cleared AMSU (~45 km) footprint

Opt. Est. retrieval on cloud-free AIRS (~15 km) footprint.



DOFS on single clear footprint = 3.4

Significantly better than from cloud-cleared radiances.

*AIRS L2 may be too constrained to fully exploit the spectral information for the physical retrieval.*

# Conclusions

- Comparisons to TOMS/OMI reasonably good. Slightly higher bias in column in V5 compared to V4, but fewer outliers.
- Careful analysis needed to understand constraint issues for profile biases.

