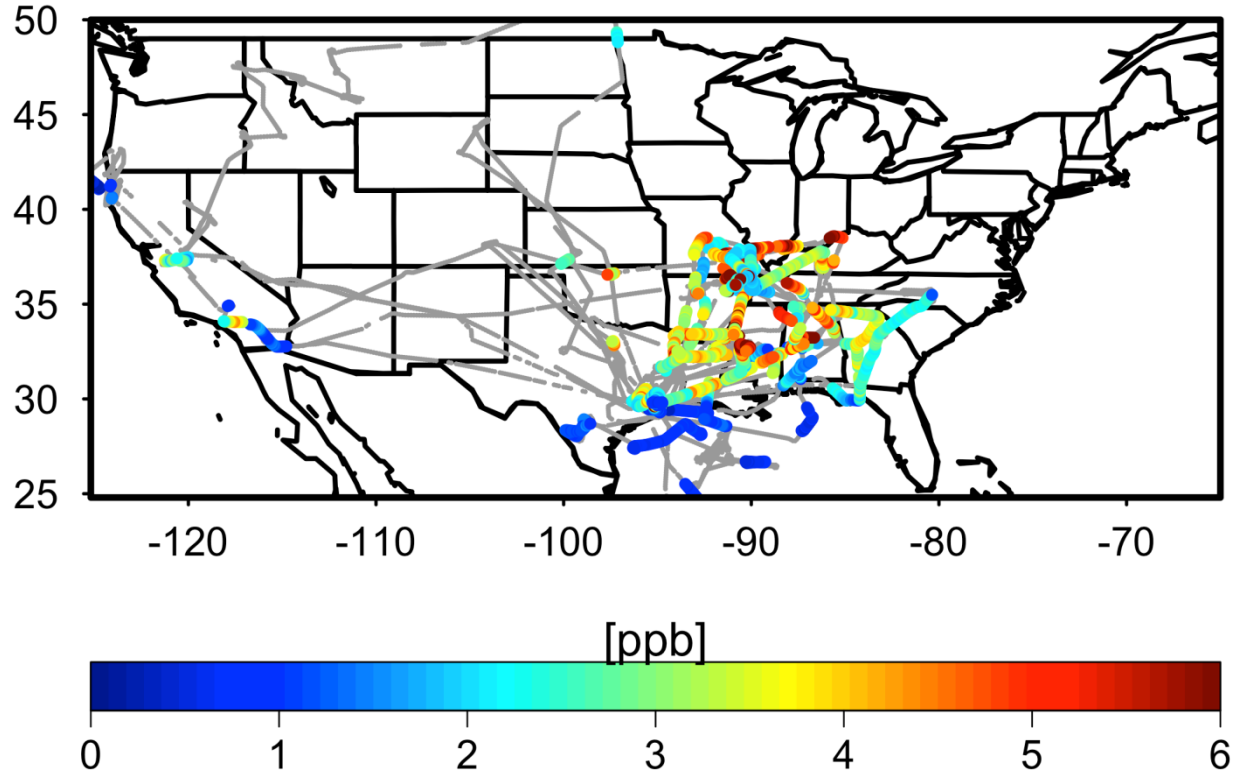
# Aircraft validation of OMI $H_2CO$

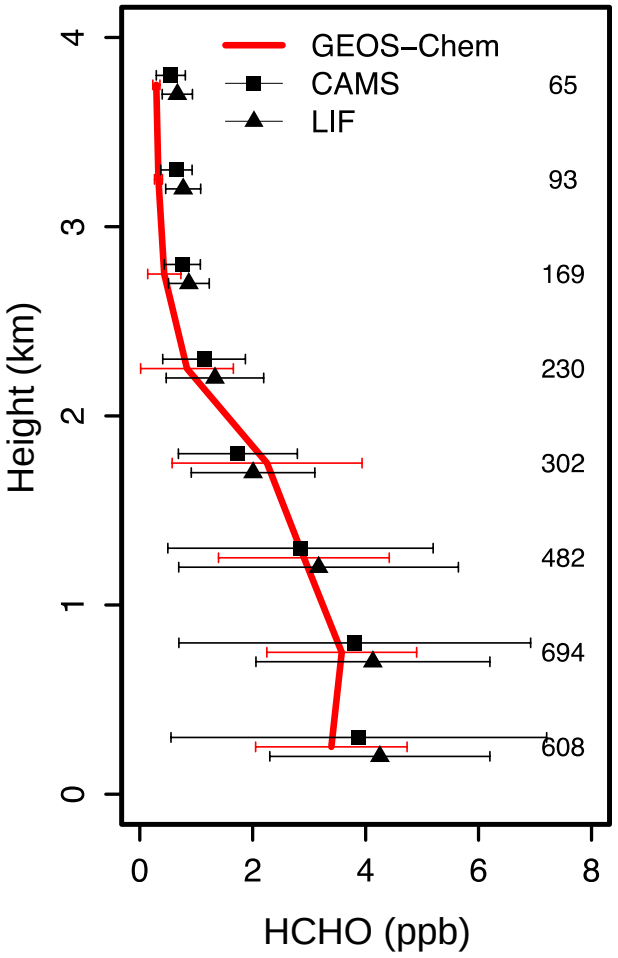

G. Gonzalez Abad, SAO
A. Fried, INSTAAR
L. Zhu, HARVARD

3rd TEMPO Science meeting
May 28, 2015 Huntsville

# SEAC$^4$RS

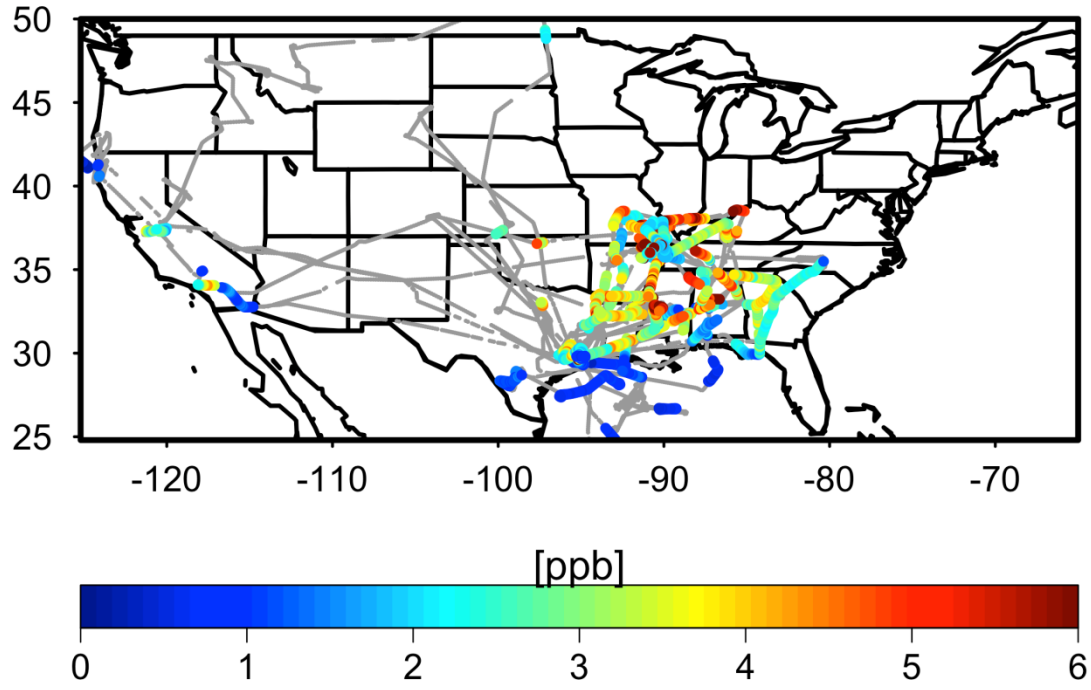
HCHO observations during SEAC$^4$RS (Aug.-Sep., 2013)

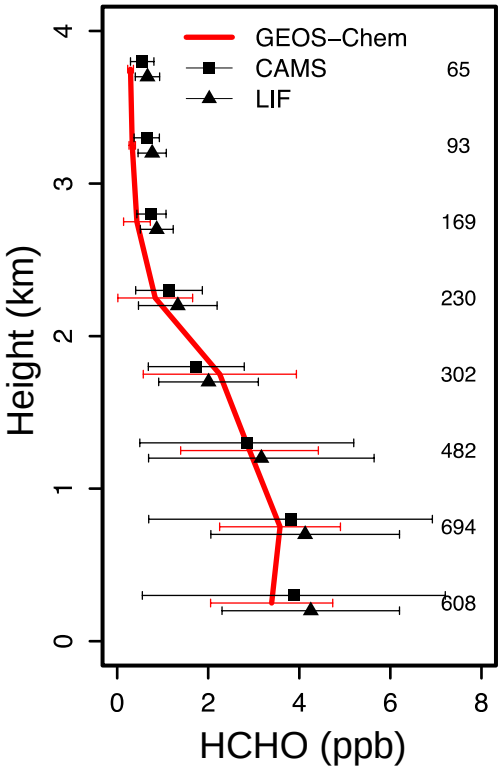


# SEAC$^4$RS

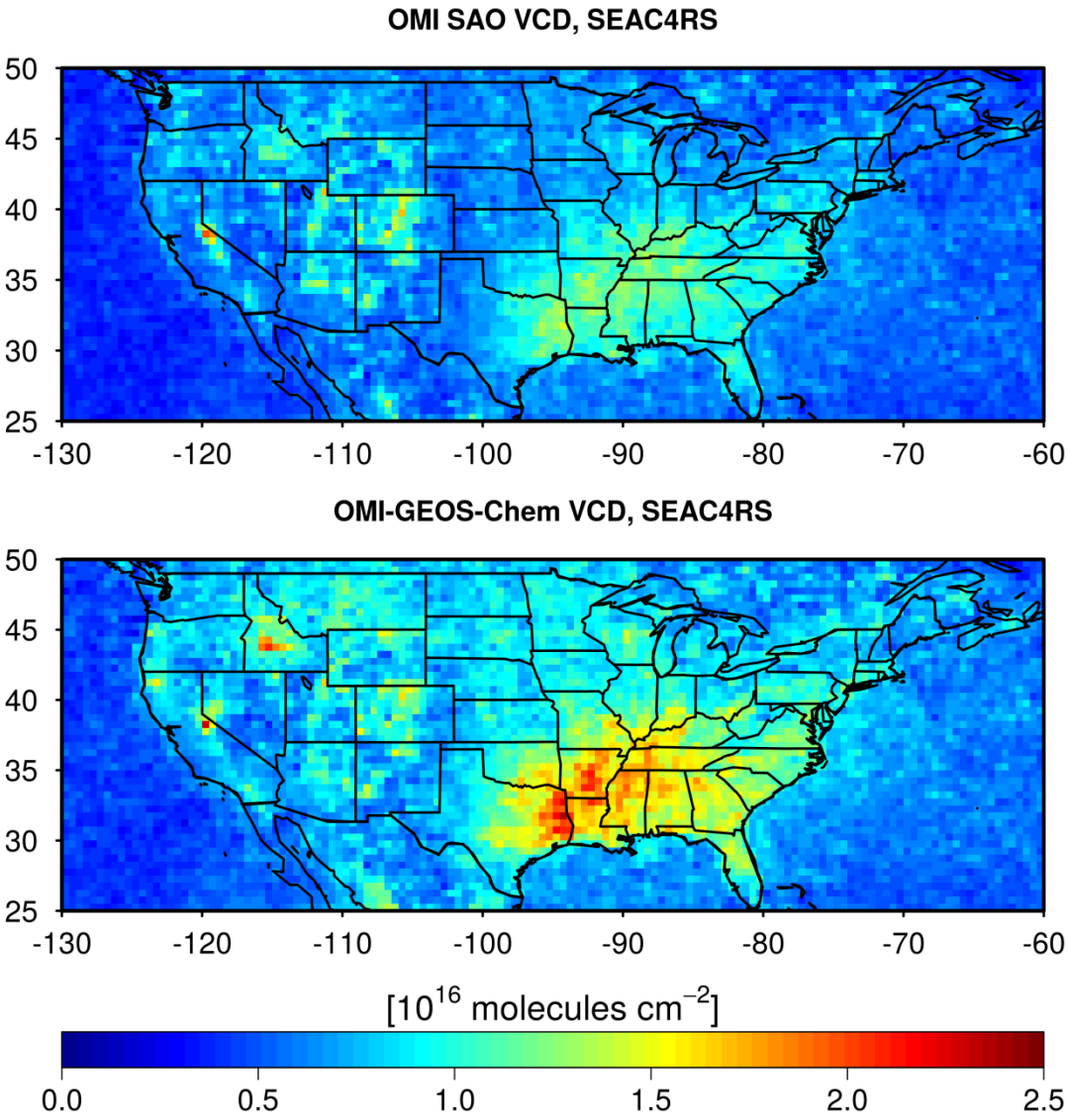
## HCHO observations during SEAC$^4$RS (Aug.-Sep., 2013)




- SEAC$^4$RS provides a great opportunity for validation of HCHO retrievals.
- GEOS-Chem is unbiased in getting HCHO vertical profiles, as confirmed by two independent HCHO measurements.
- Operational SAO OMI HCHO retrieval in the SE US can be improved by 30%-40% using SEAC$^4$RS-informed GEOS-Chem HCHO profiles.
- Indirect validation through SEAC$^4$RS data shows that satellite data have better than 20% accuracy.

# SEAC$^4$RS




- Impact of the shape factor in the VCDs
- Similar shape factors for different products and satellites

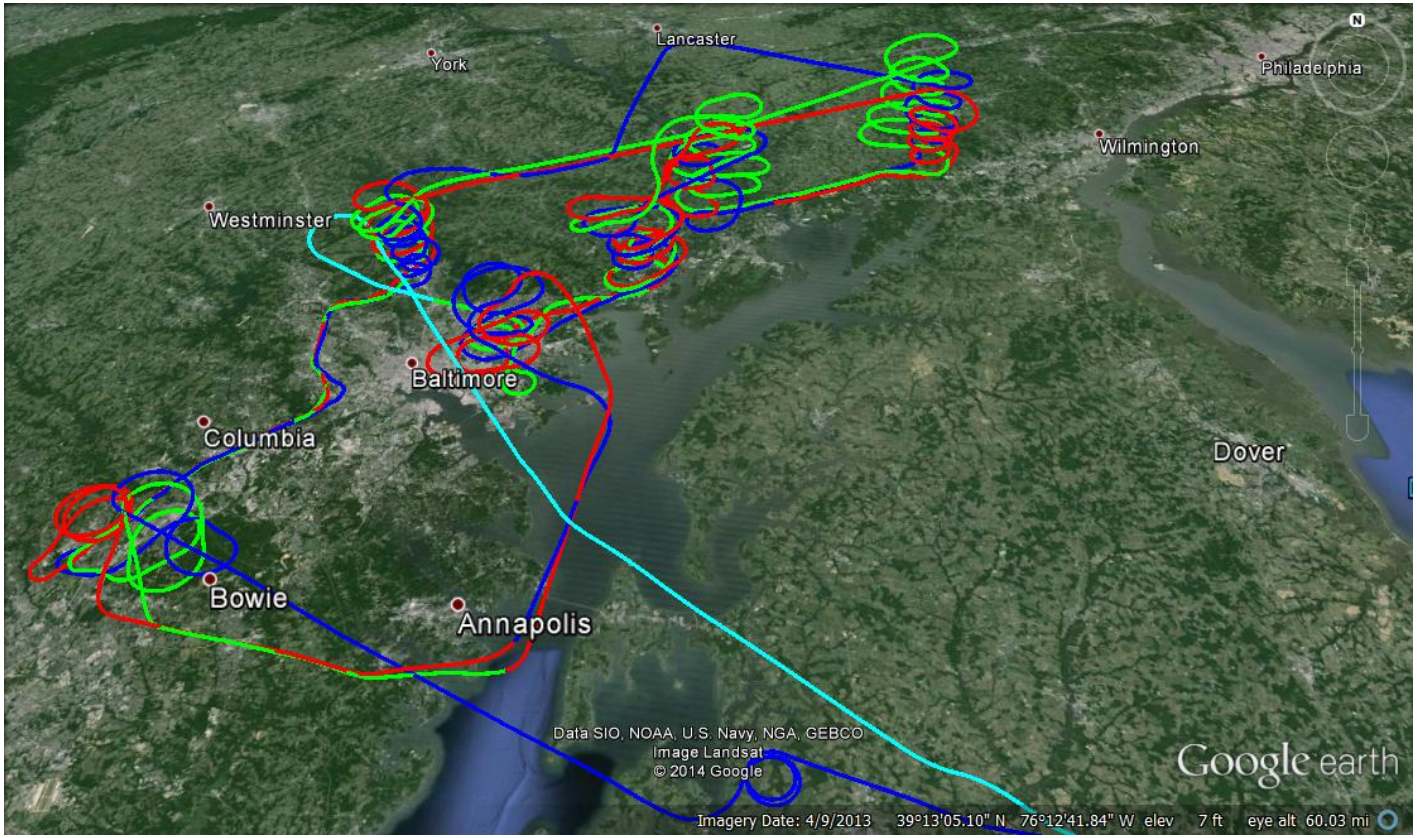
GEOS-Chem compared to the different data

| Data set | RMA slope | *r* | NMB |
|---|---|---|---|
| SEAC$^4$RS | 1.08 (1.05, 1.11) | 0.79 | -1.8% |
| SAO OMI | 0.94 (0.81, 1.1) | 0.88 | -3.7% |
| De Smedt OMI | 1.0 (0.87, 1.2) | 0.79 | -13% |
| SAO OMPS | 1.1 (0.91, 1.3) | 0.85 | -20% |
| GOME2-B | 0.74 (0.65, 0.86) | 0.87 | +16% |

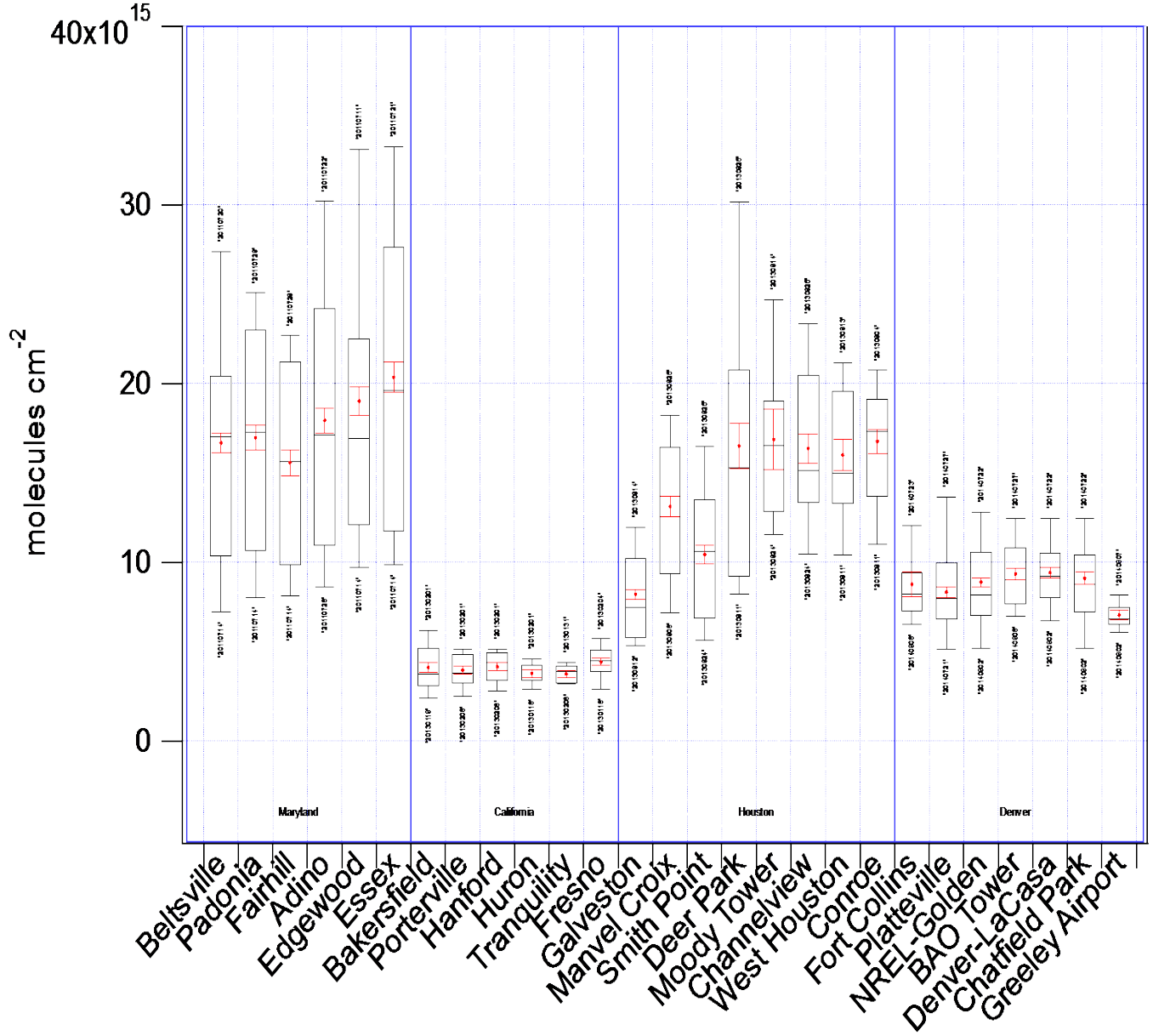
# DISCOVER-AQ

Four campaigns:

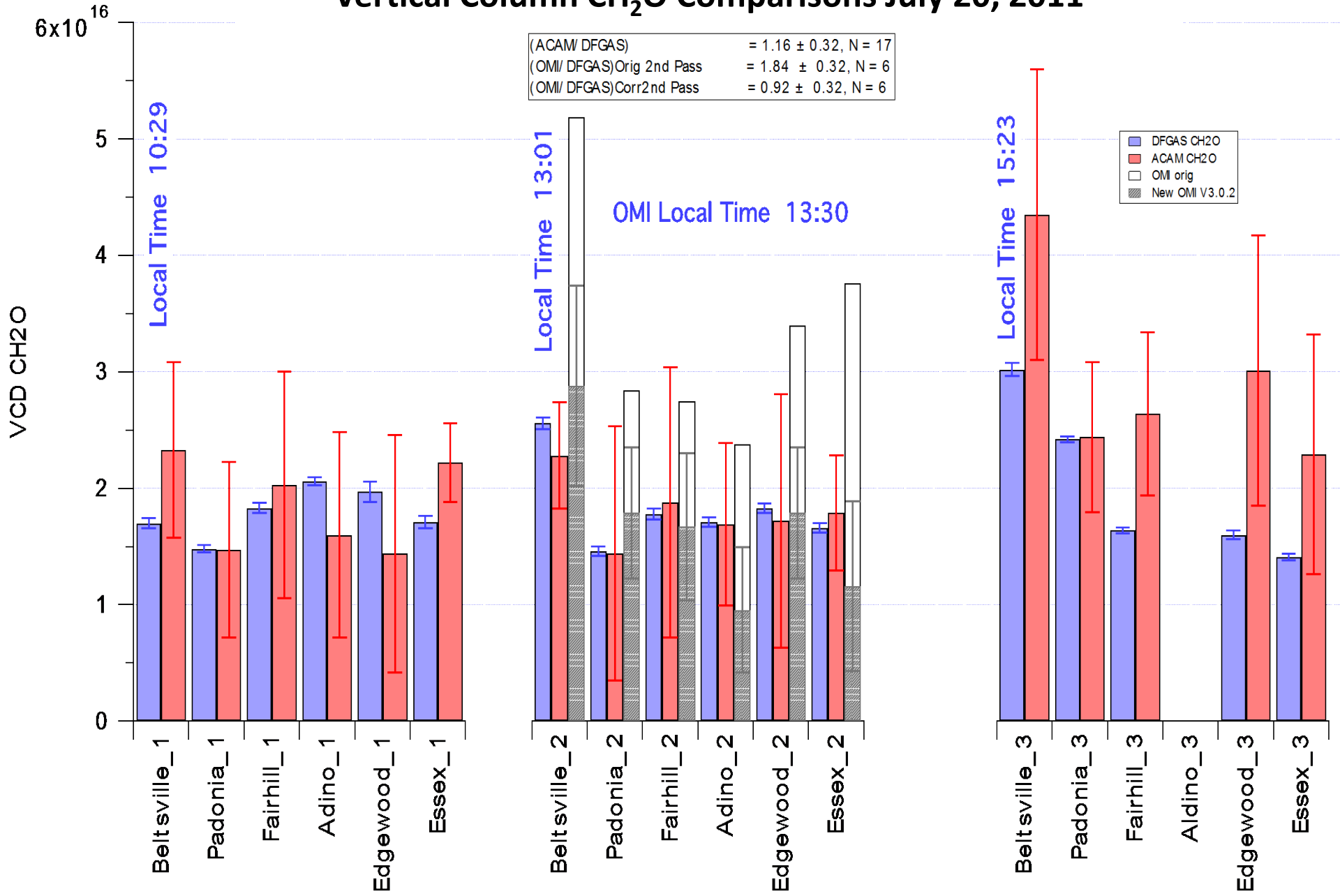
1. Baltimore/Washington DC (July 2011)
2. California (February 2013)
3. Texas (September 2013)
4. Colorado (July/August 2014)



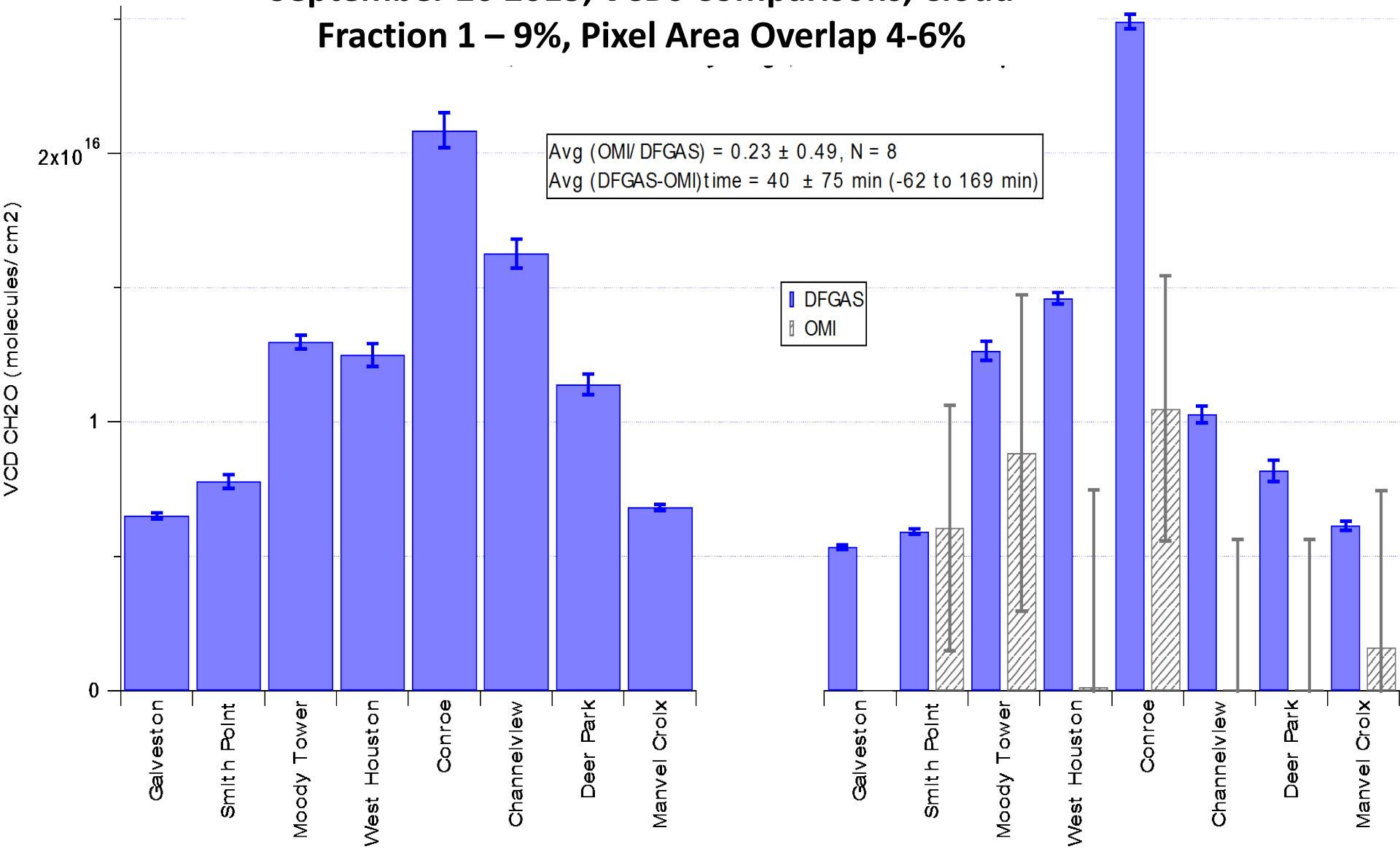
# Overview of Monthly-Averaged Derived P3 VCDs over Four Missions (Filled to Surface)



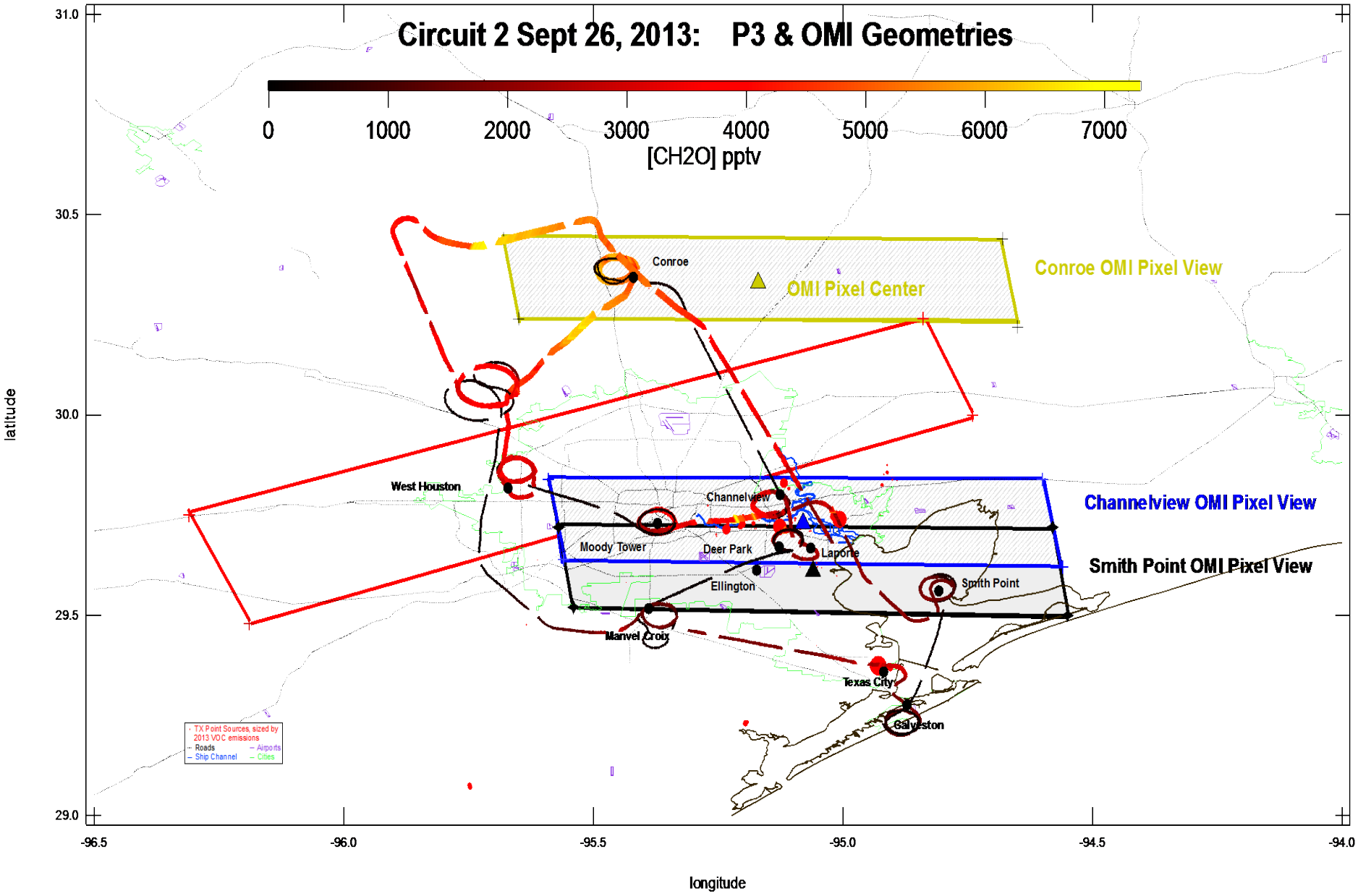
# Vertical Column $CH_2O$ Comparisons July 20, 2011



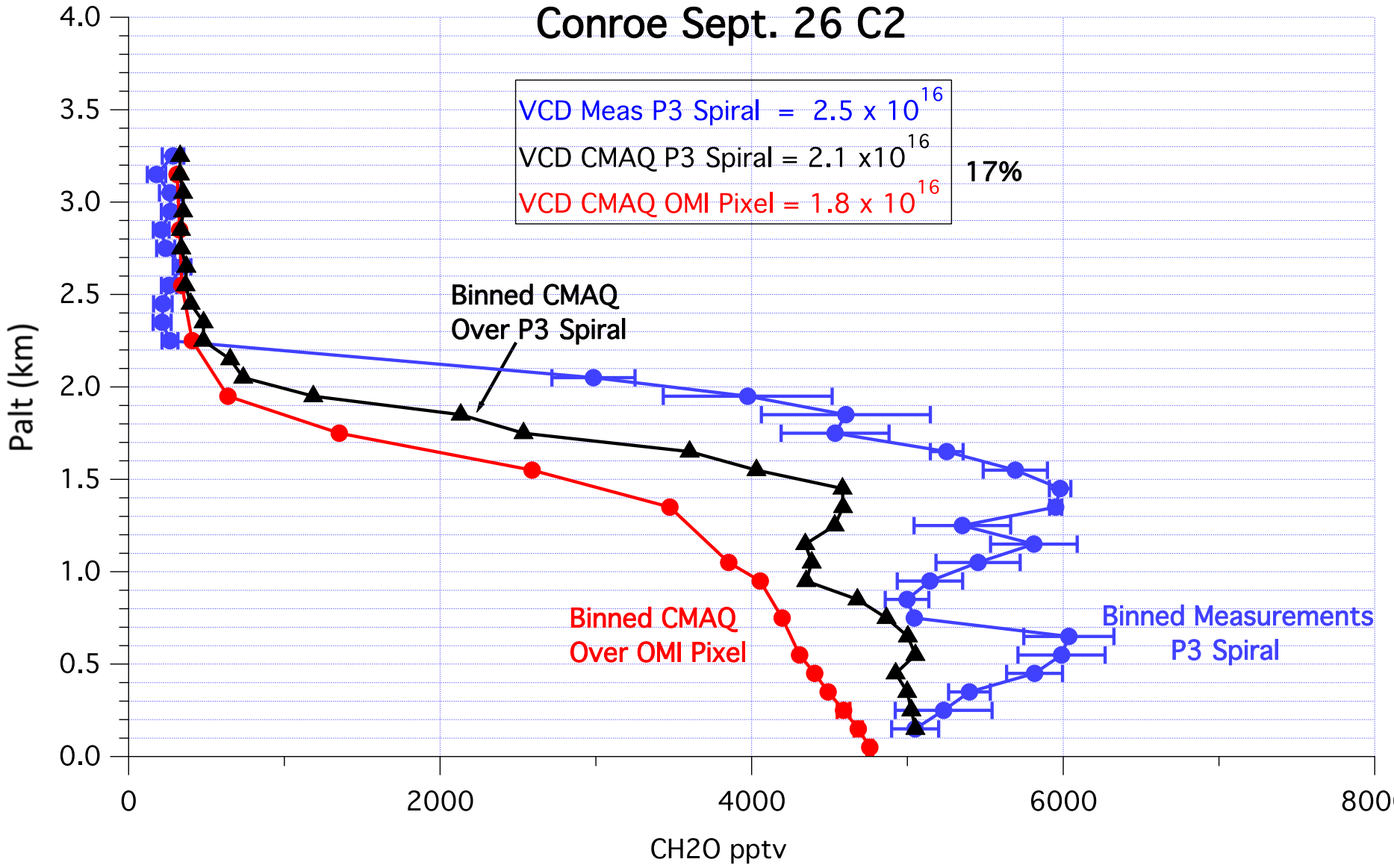
# September 26 2013, VCDs Comparisons, Cloud Fraction 1 – 9%, Pixel Area Overlap 4-6%



# P3-OMI Spatial Overlap of Measurements



# P3-OMI Spatial Overlap of Measurements



# Thanks

# Discussion

- Temporal averaging vs. individual pixels
- Using model as an intermediate:
  - Shape factors
  - Temporal and spatial gridding
- Satellite pixel is inhomogeneous (how to account for that). It should be easier for TEMPO
- Satellite data is noisy which difficults individual pixel comparisons.