

HO_x Measurements at T1

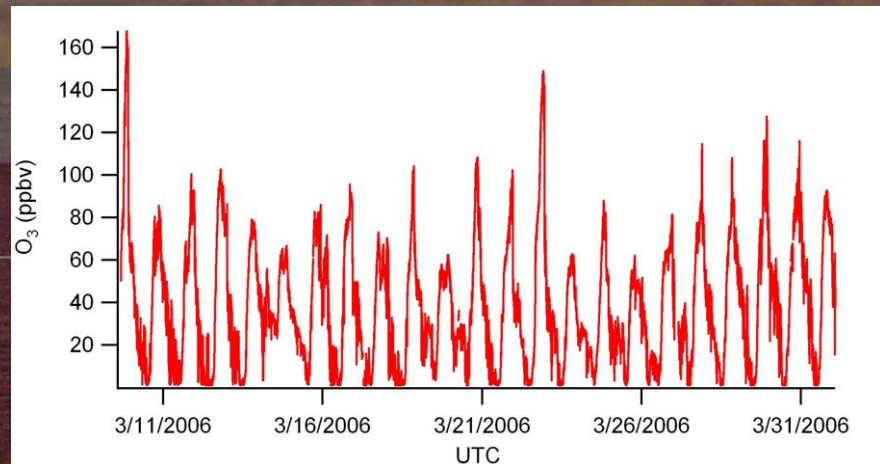
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Georgia Tech

Jennifer Olson and Gao Chen
NASA Langley

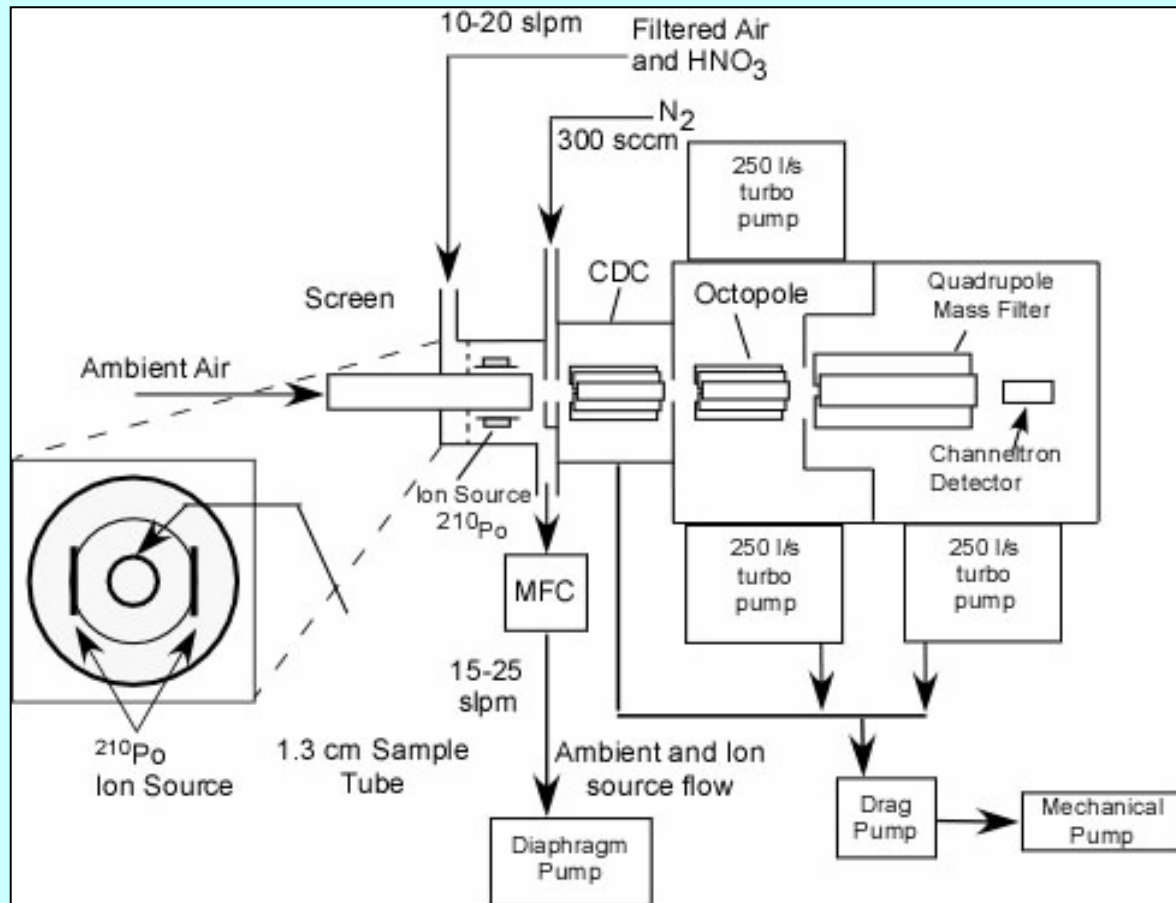
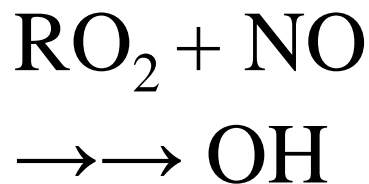
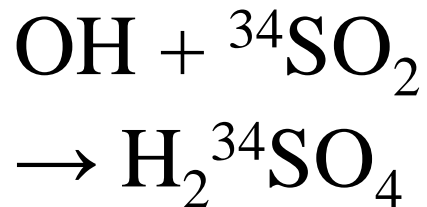
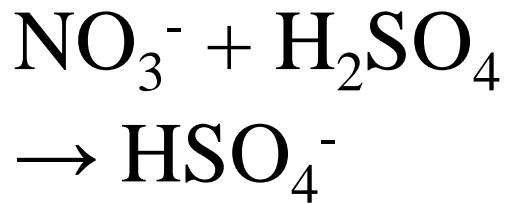
MILAGRO T1 Site

Wide Range of Chemical Species Measured by Ga. Tech, UC Irvine, U. of Houston, NCAR, NOAA, DOE, U. of Minnesota, UC Berkeley, etc.

merge data set including gas, aerosol, radiation, and met data available



HO_x CIMS



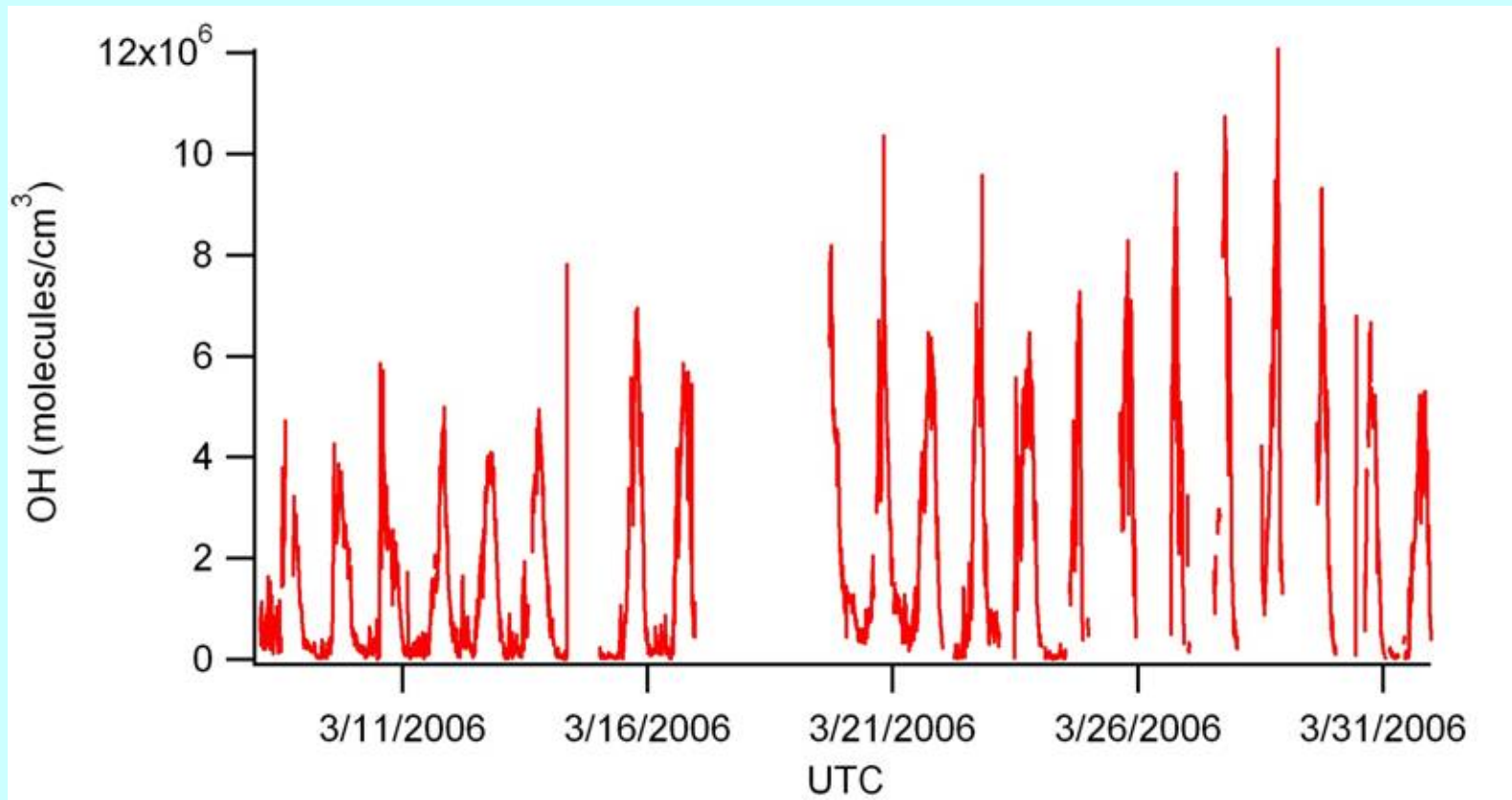
OH – Eisele and coworkers

RO₂ + HO₂ – Cantrell and coworkers

CIMS on top of Ga. Tech Trailer



OH Observations



OH mid-day average =
 5×10^6 molec. cm^{-3}

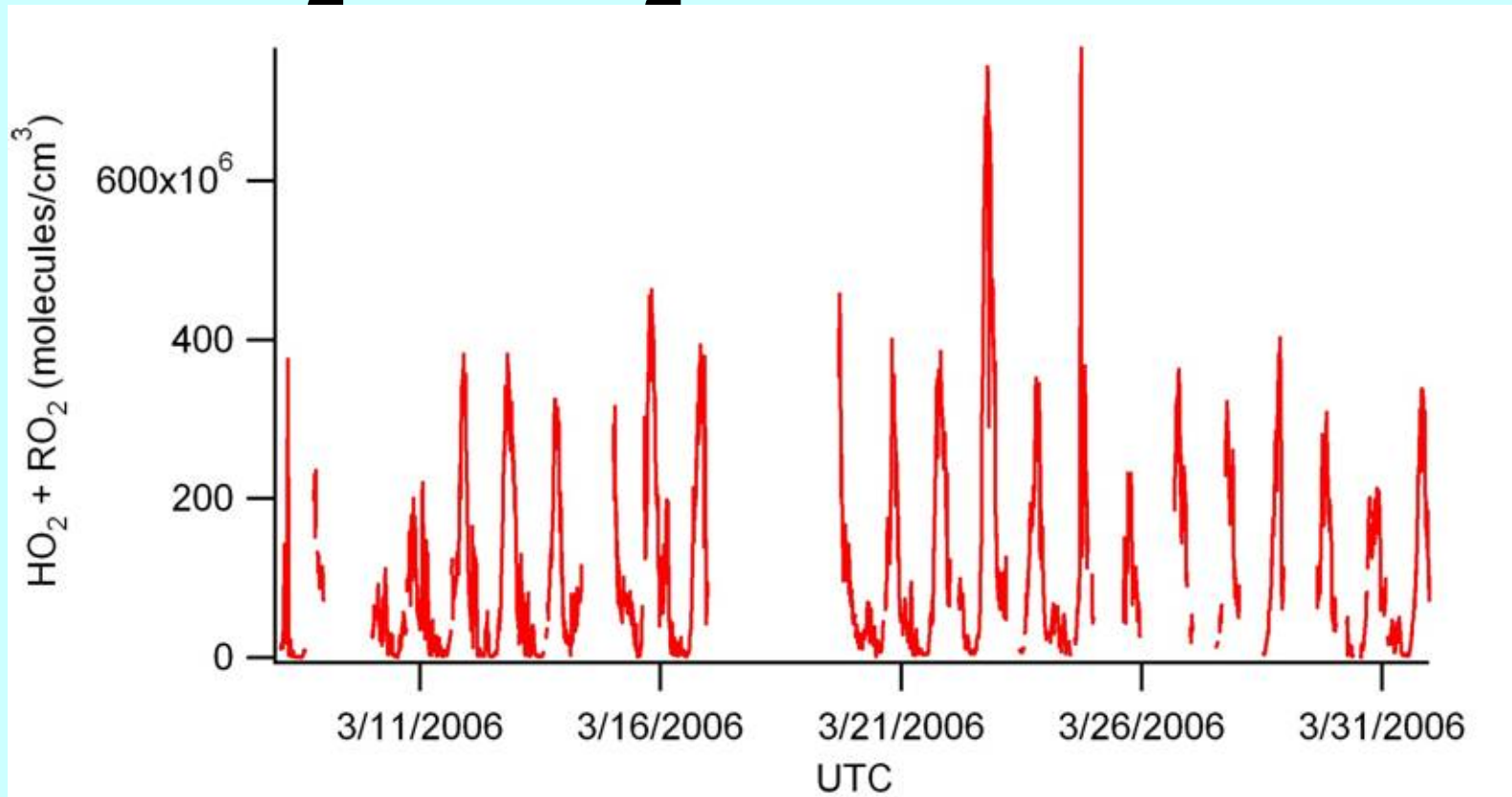
2003 observations by
Penn. State $\sim 7 \times 10^6$

Comparison to NASA Langley Model

$R^2 = 0.6$

Median M/O = 1.2

HO₂ + RO₂ Observations



RO₂ mid-day average =
 2.6×10^8 molec. cm⁻³

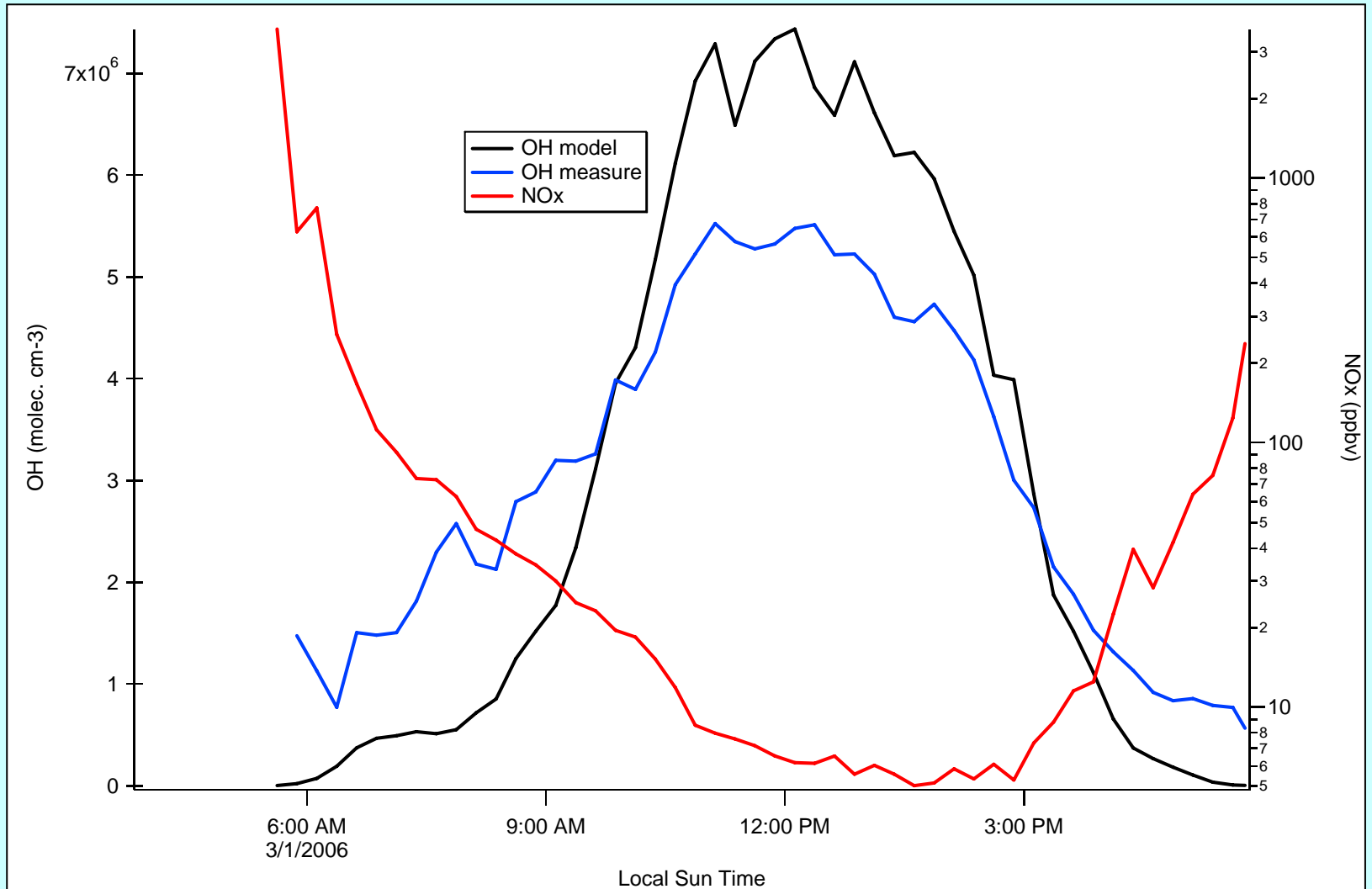
2003 HO₂ observations by
Penn. State $\sim 8 \times 10^8$

Comparison to NASA Langley Model

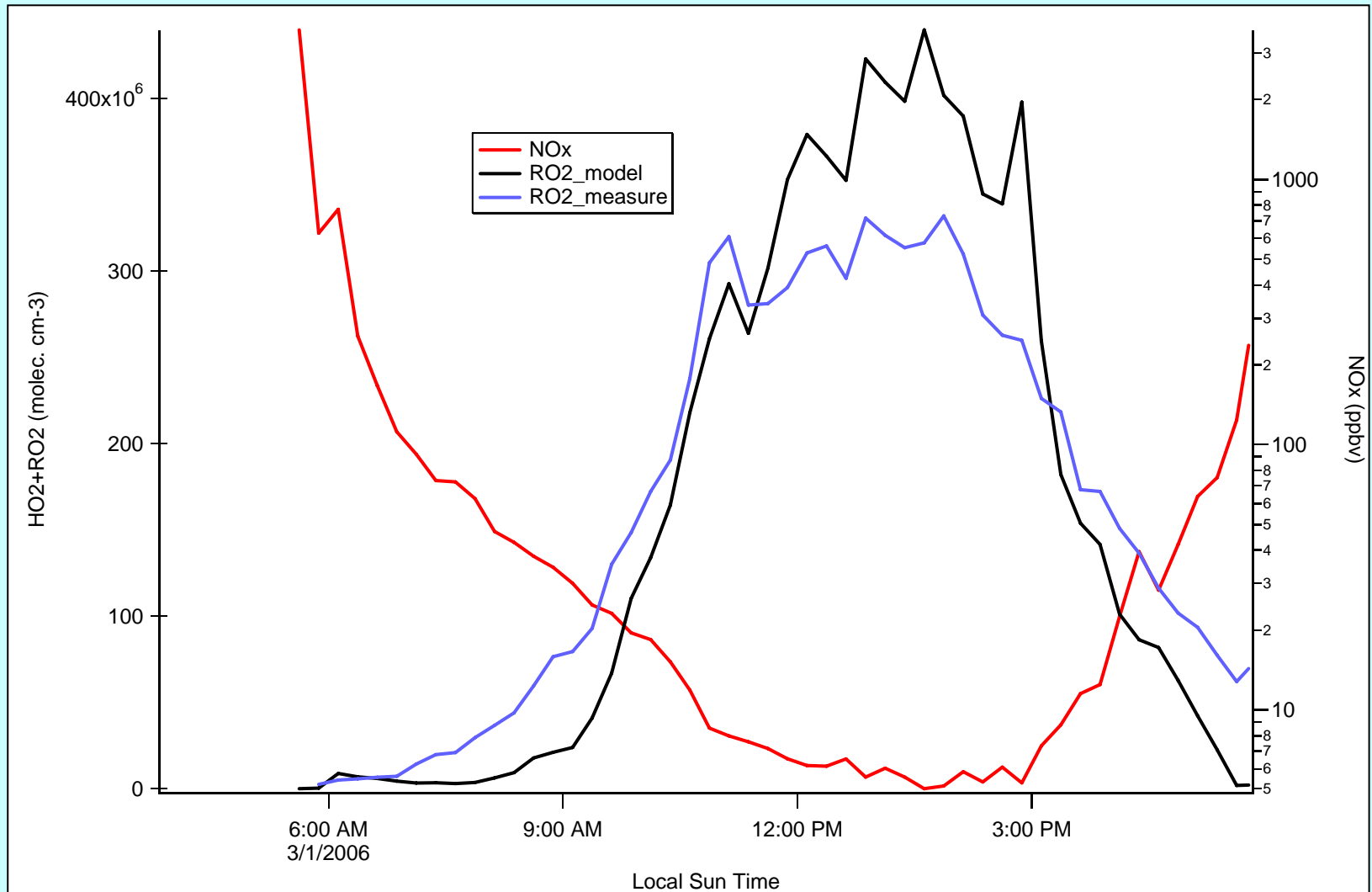
$R^2 = 0.55$

Median M/O = 1.0

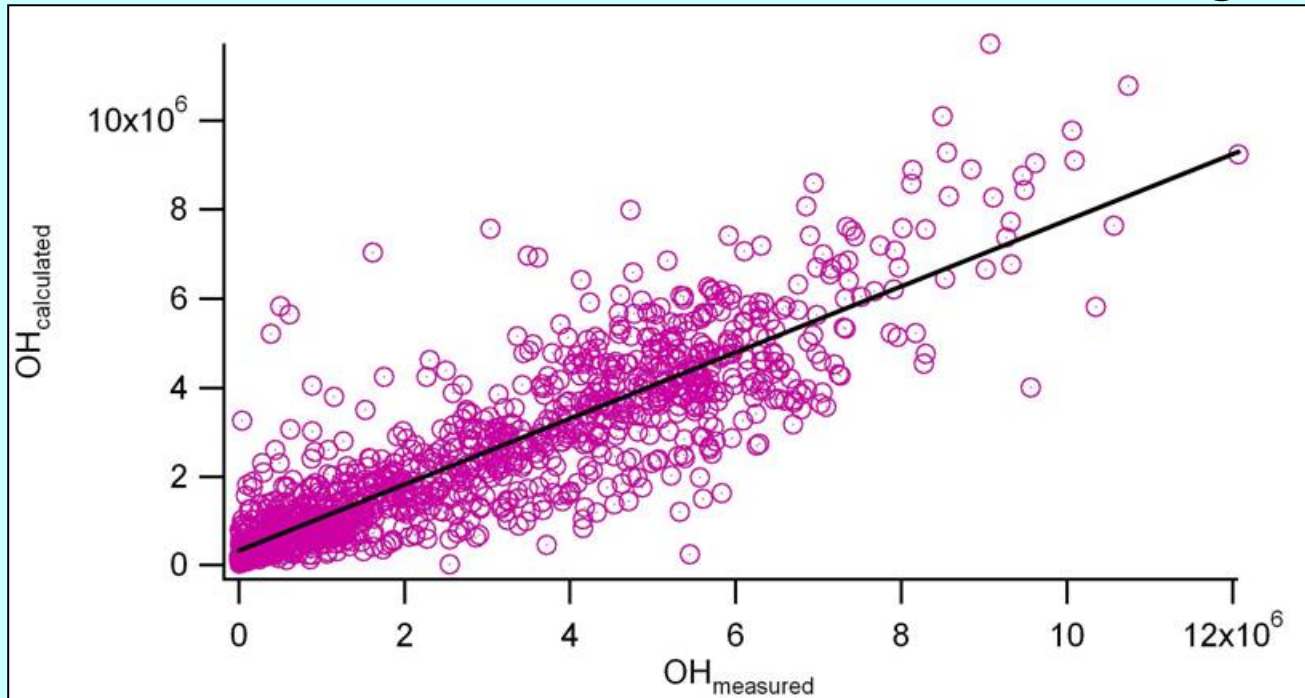
Composite OH Data



Composite RO₂ Data



Is the observed OH consistent with H_2SO_4 , SO_2 and aerosol loading?



$R^2=0.9$

Slope = 0.75

Gas-phase sulfuric acid lifetime is ~ 75 s

$$[\text{OH}] = R / k[\text{SO}_2]$$

where R depends on

v = Mean Molecular Speed

α = mass accommodation coefficient

A = Fuchs' surface area

Preliminary Conclusions

- Reasonable agreement between measurement and model during midday
- Morning radical sources (e.g. HONO) are needed to explain observed rise in OH – consistent with *Volkamer et al., 2007*
- Need to compare NASA model results to CMAQ, etc.
- VOC interpolation needs to be improved

Acknowledgements

VOC Data – Blake (UC Irvine) and NOAA
Groups

J Values – Barry Lefer (U. of Houston)

Aerosol – Peter McMurry (U. of Minn.)

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