

# Reactive Nitrogen Measurements at Chebogue Point, NS

**$\text{NO}_2$ ,  $\text{HNO}_3$ ,  $\Sigma\text{PNs}$  and  $\Sigma\text{ANs}$**

(sum peroxy nitrates and sum alkyl nitrates)

by thermal dissociation laser induced fluorescence (TD-LIF)

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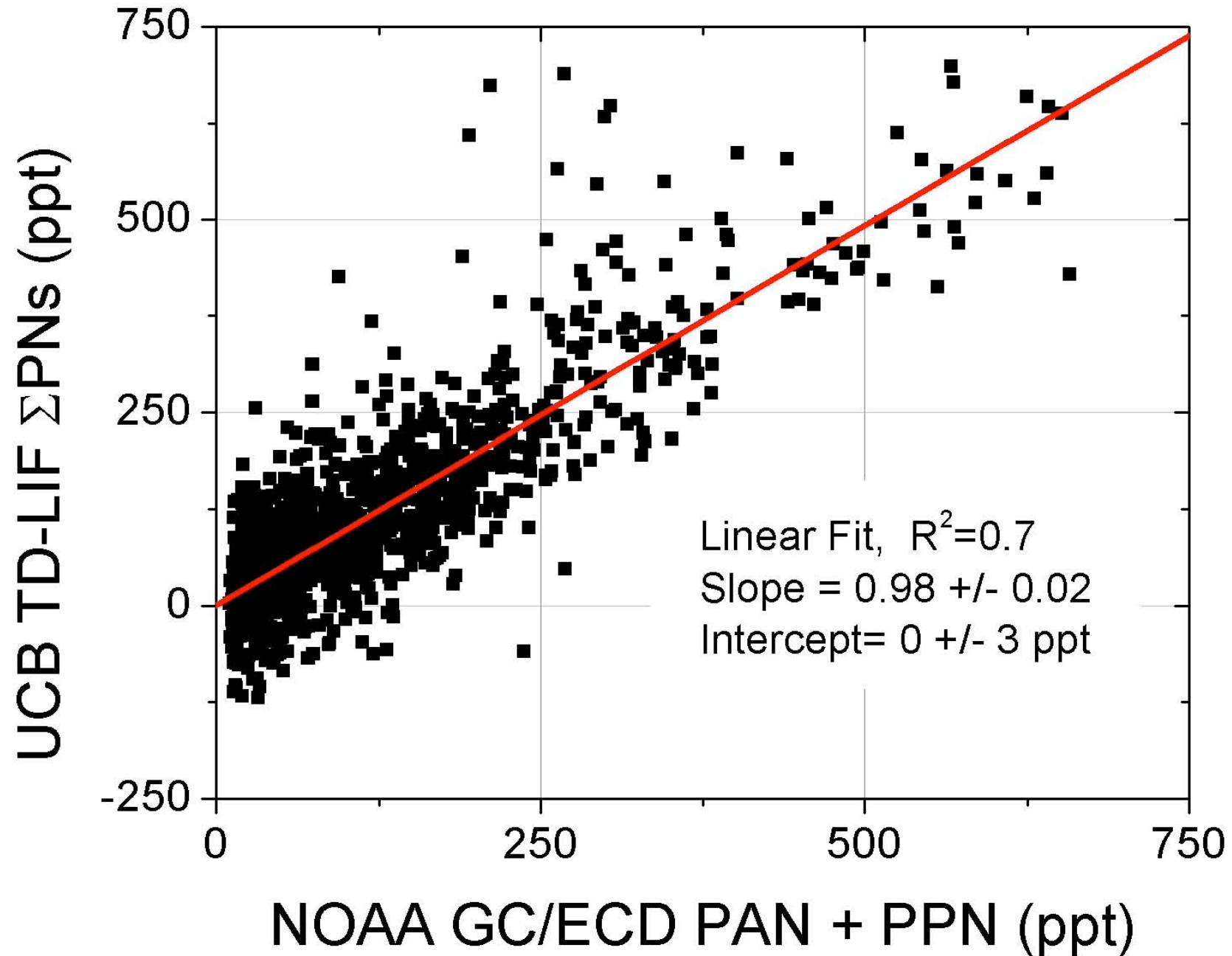
# TD-LIF Technique

- Thermal dissociation of  $\text{NO}_{y_i}$  compounds to  $\text{NO}_2$  in ovens mounted on tower followed by LIF detection system housed in trailer
- First time using tunable diode laser (408 nm) as excitation source
- Laser damaged during transport: signal gain expected from jet cooling and multipass configuration was a factor of 10 lower than expected

⇒ STILL ACQUIRED USEFUL DATA !!!

Day et al. JGR 2002

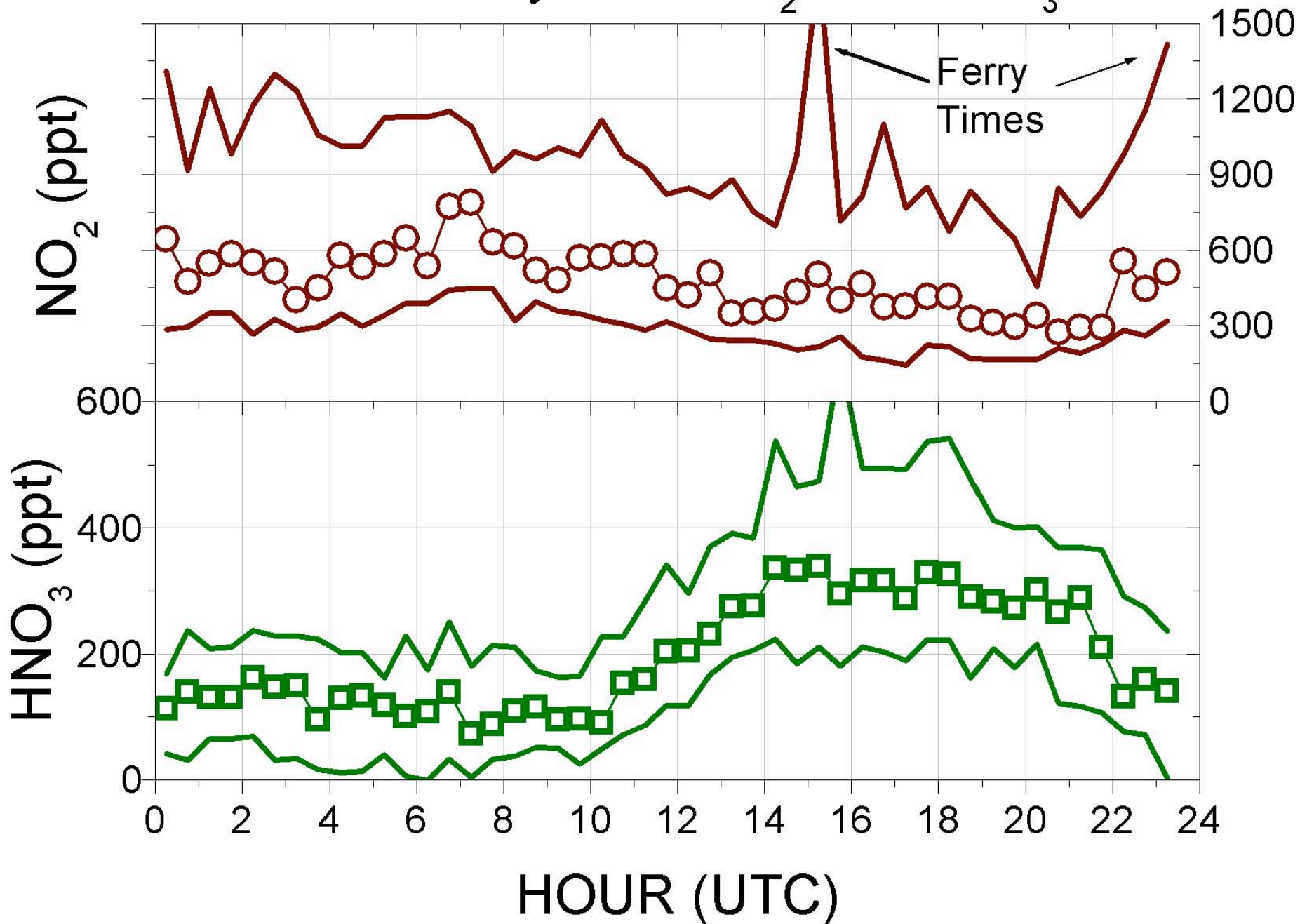
# Peroxynitrate Intercomparison (Half Hour Data)



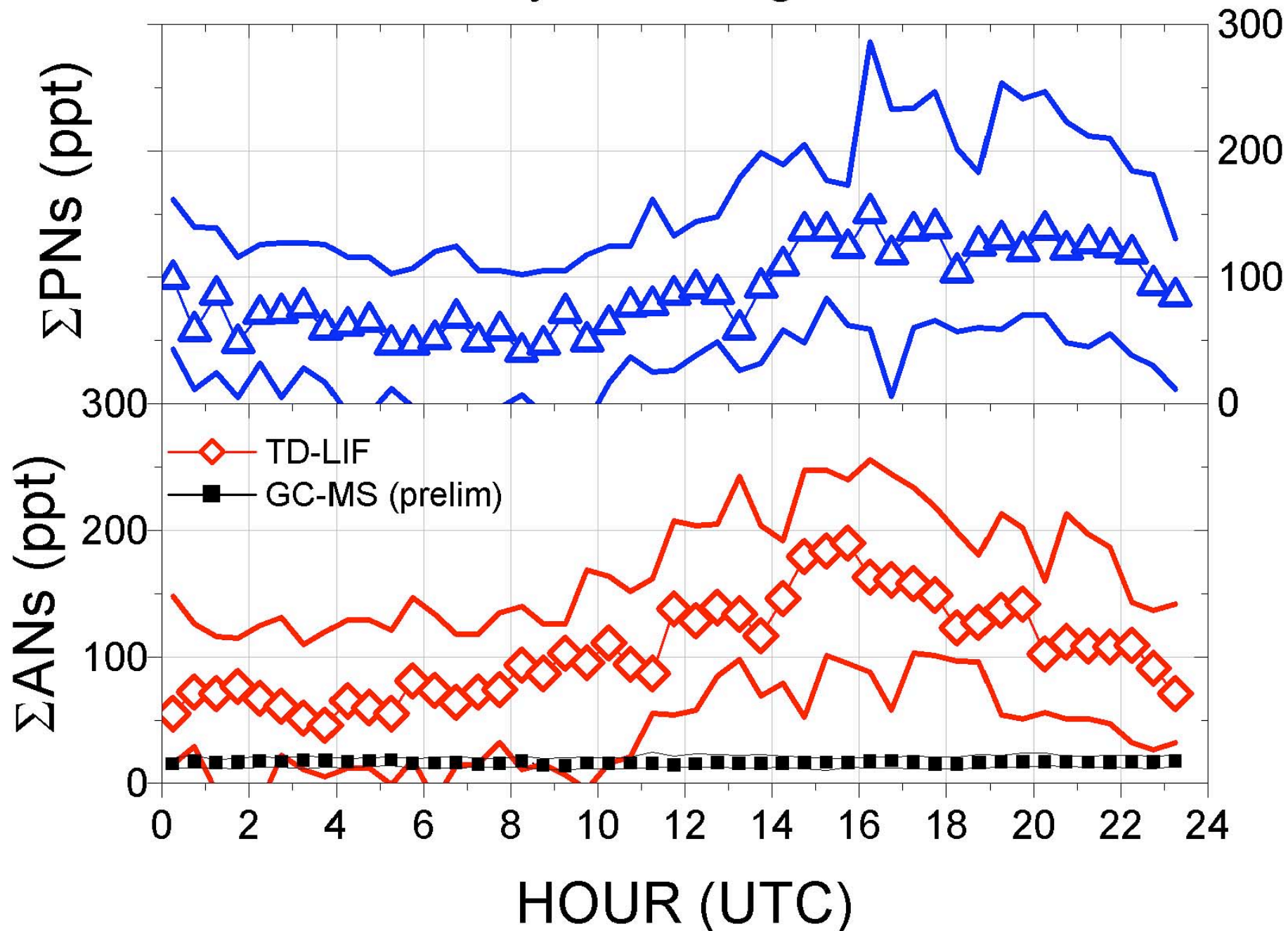
# Three Themes for Discussion

1. Average diurnal profile indicates active local photochemistry (believe it or not)
2. Frequent ferry crossings result in extreme events for  $\text{NO}_x$ , ozone, particles
3. Long range transport events sometimes contain high concentrations of organic nitrates

# Diurnal Cycle in $\text{NO}_2$ and $\text{HNO}_3$



# Diurnal Cycle in Organic Nitrates



# Sampling the Ferry

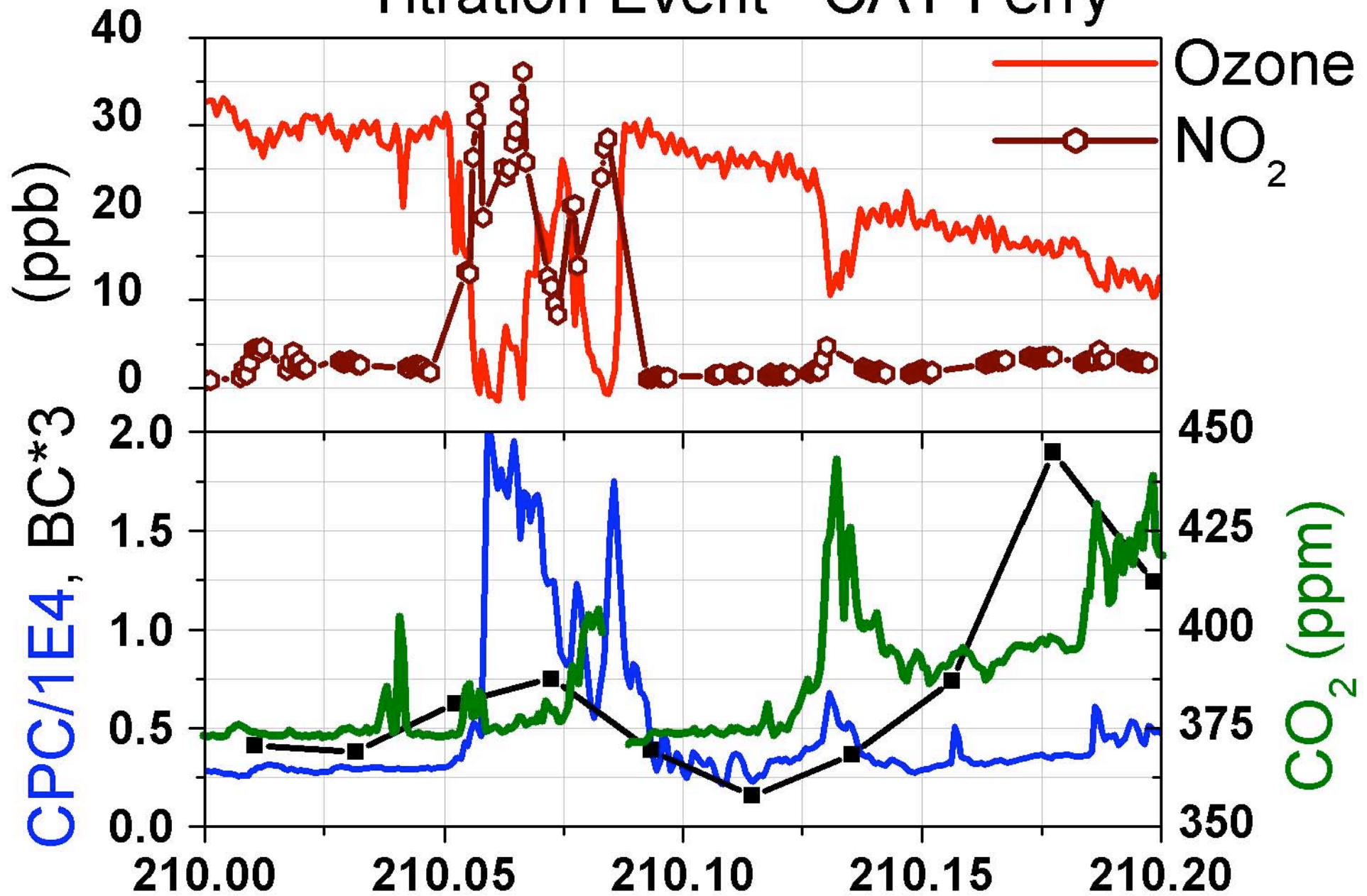
**CAT sailed twice a day: noon arrival, 1 pm departure  
8 pm arrival, 9 pm departure**

**Scotia Prince sailed once a day: 8 am arrival, 9 am departure**

**UTC time periods with likely ferry influence (fractional day):  
0.46 ,0.5, 0.62, 0.67, 0.96, 1**

**Sampling was influenced by ferry emissions on most days  
when the wind direction was from the west**

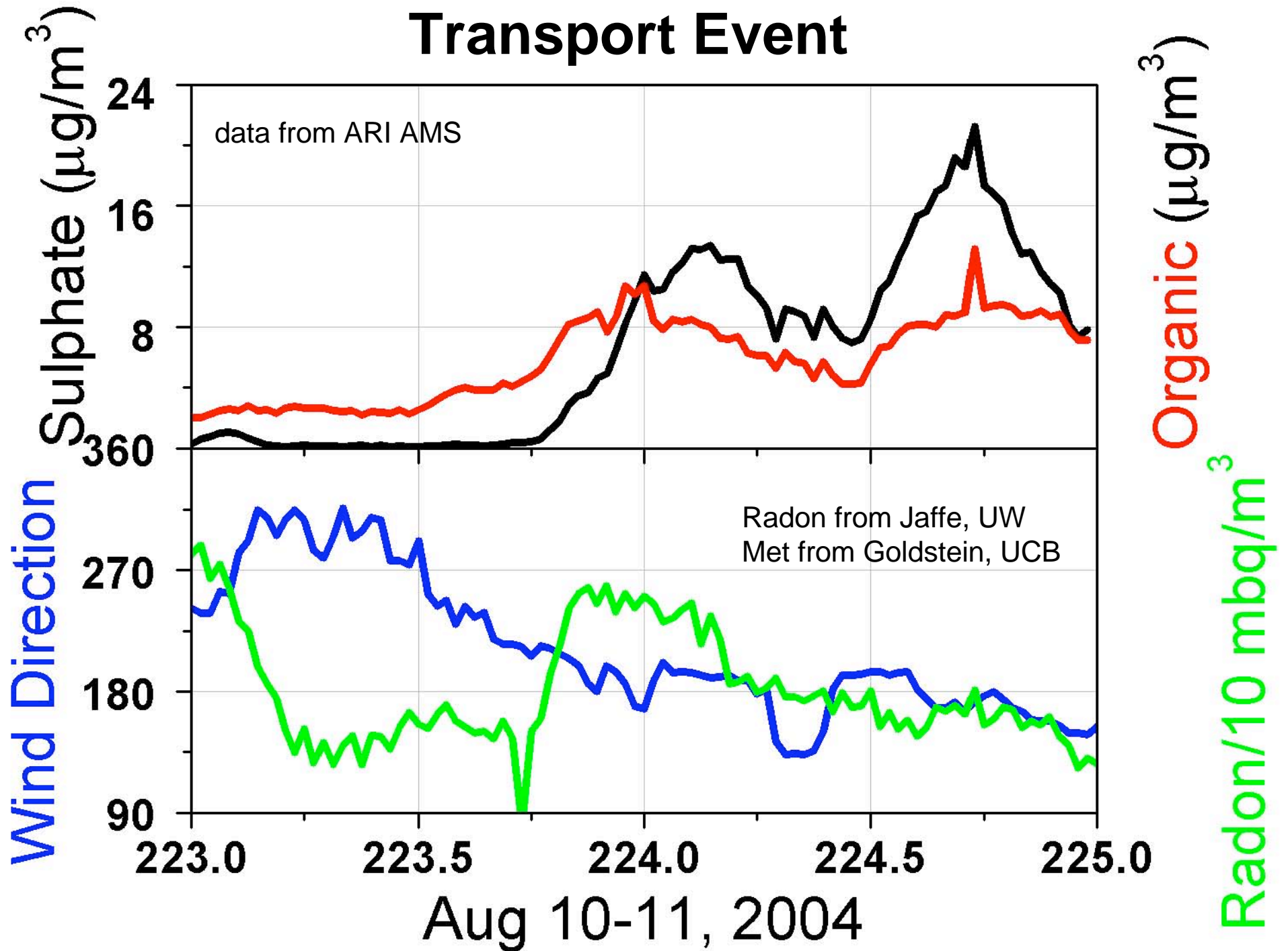
# Titration Event - CAT Ferry



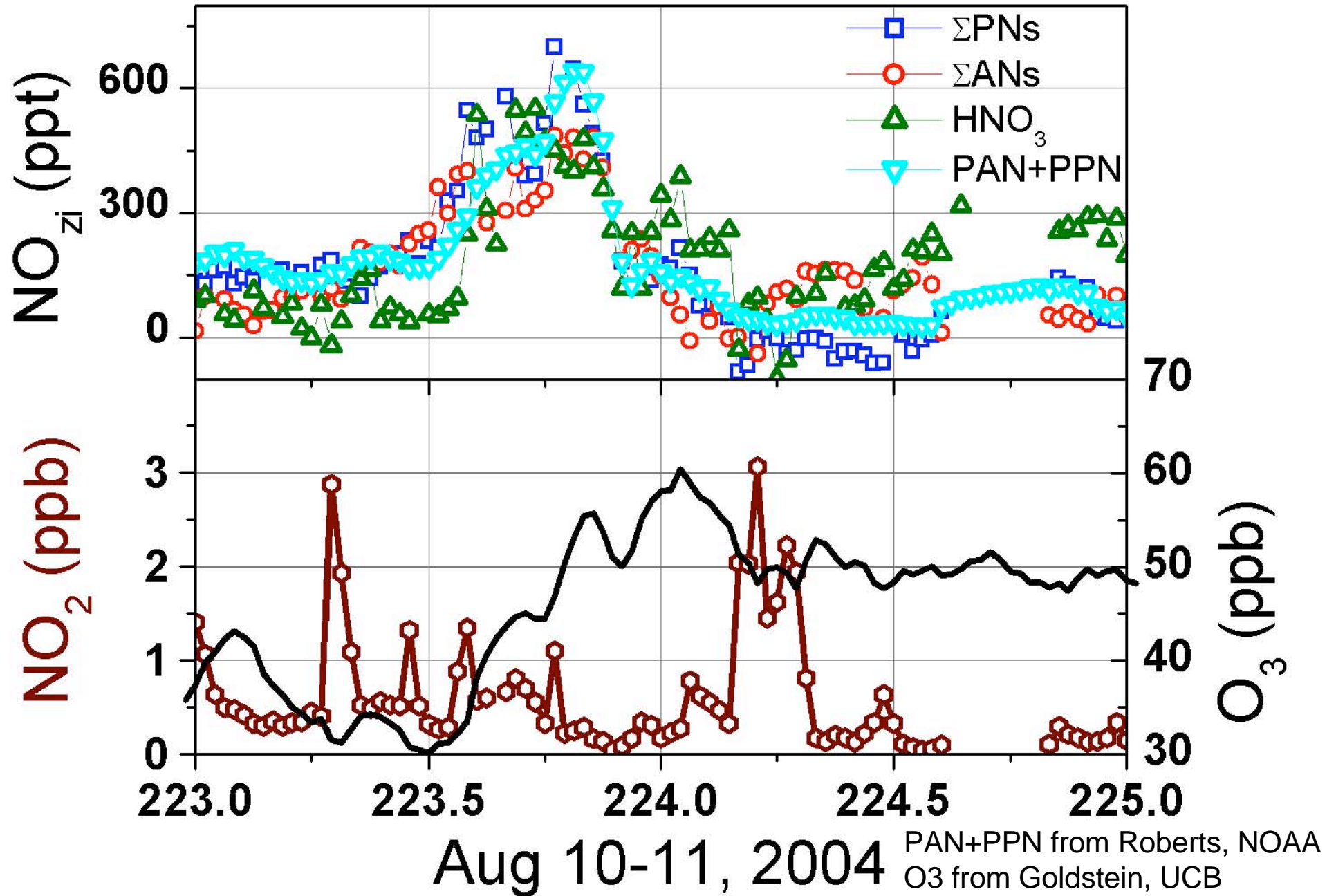
CPC data from Aerosol Dynamics, black carbon from ARI, CO<sub>2</sub> and O<sub>3</sub> from Goldstein, UCB



# Transport Event



# Transport Event



# Differences between Aug 10,11

- Wind vector swings from NW to S
- O<sub>3</sub> higher on Aug 11, but NO<sub>y</sub> is lower
- Organic nitrates disappear as sulphate grows – new airmass or chemistry

\* Loss of organic nitrates does not result in increased NO<sub>2</sub>

# Acknowledgements

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Goldstein group for help with infrastructure, etc

Tim Bertram and Anne Perring for helpful visits

Bavaria Restaurant (currently for sale, asking \$475K)

