

# Tropospheric HONO Distribution and Chemistry

## **TROPHONO Team:**

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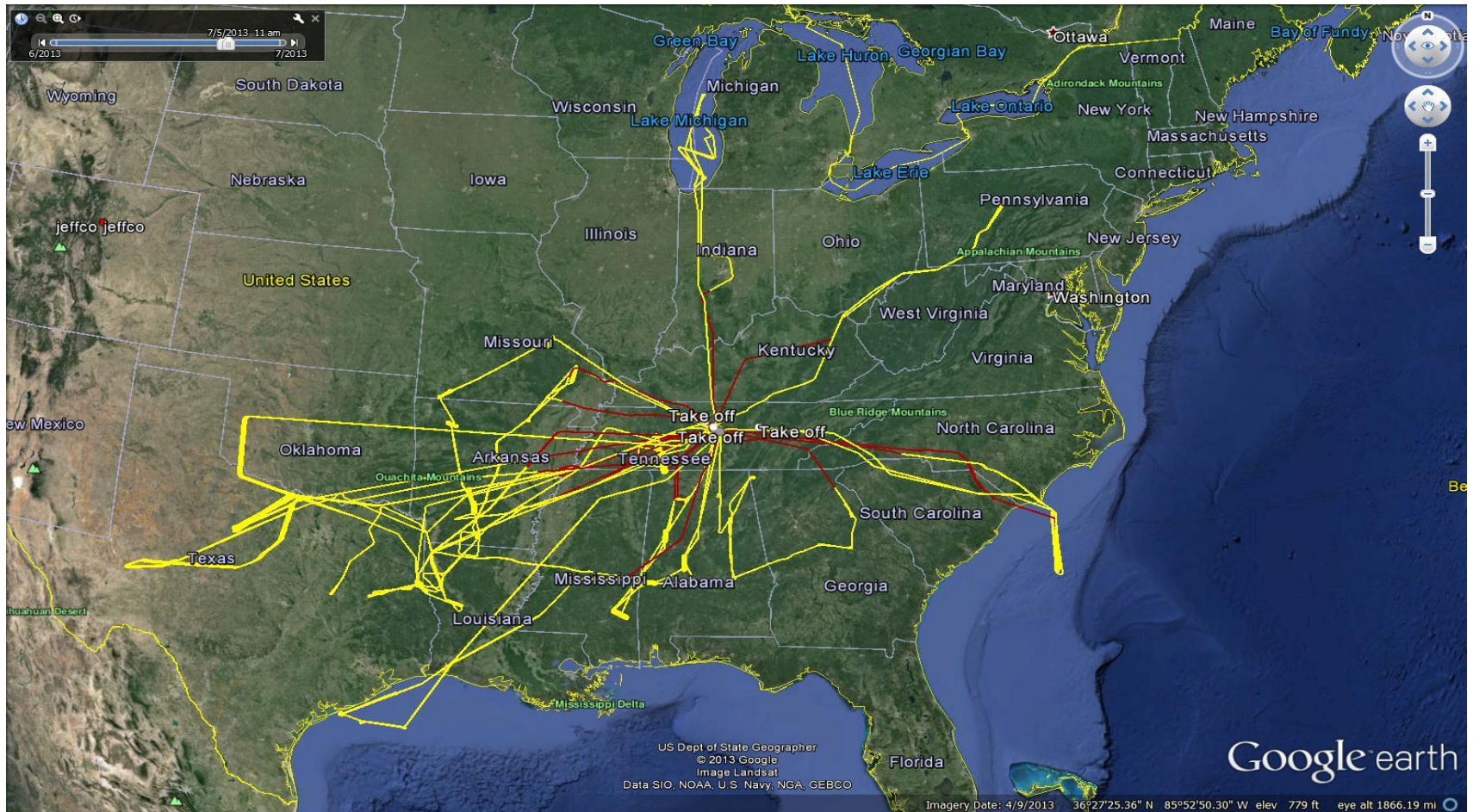
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Jochen Stutz, James Festa, Max Spolaor

Department of Atmospheric and Oceanic Sciences/UCLA

# C-130 Flight Tracks During NOMADSS Field Study, June 1 – July 15, 2013



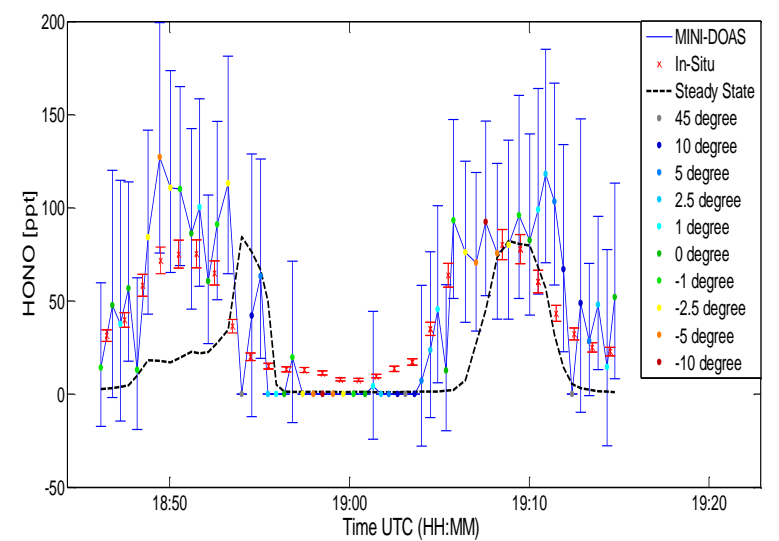
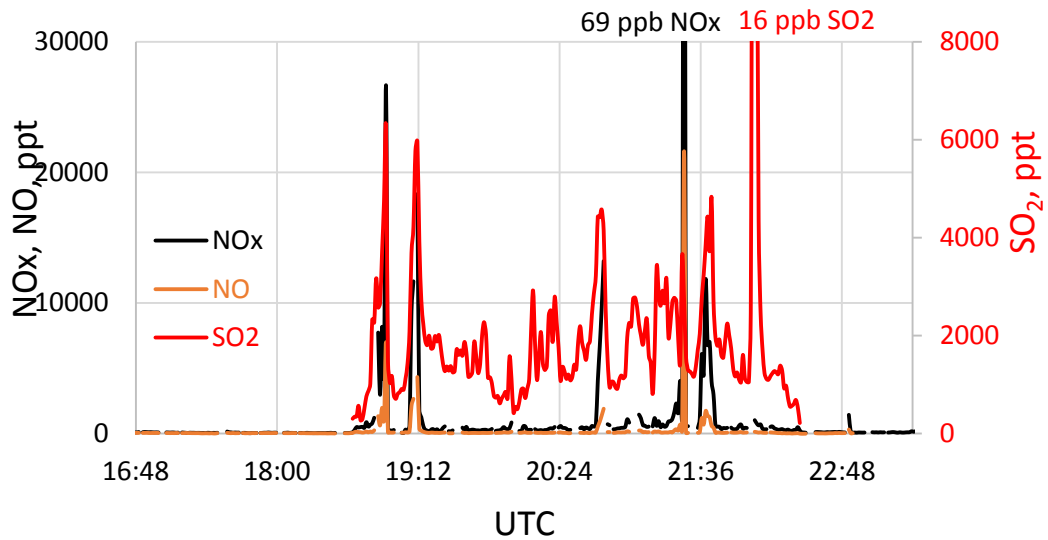
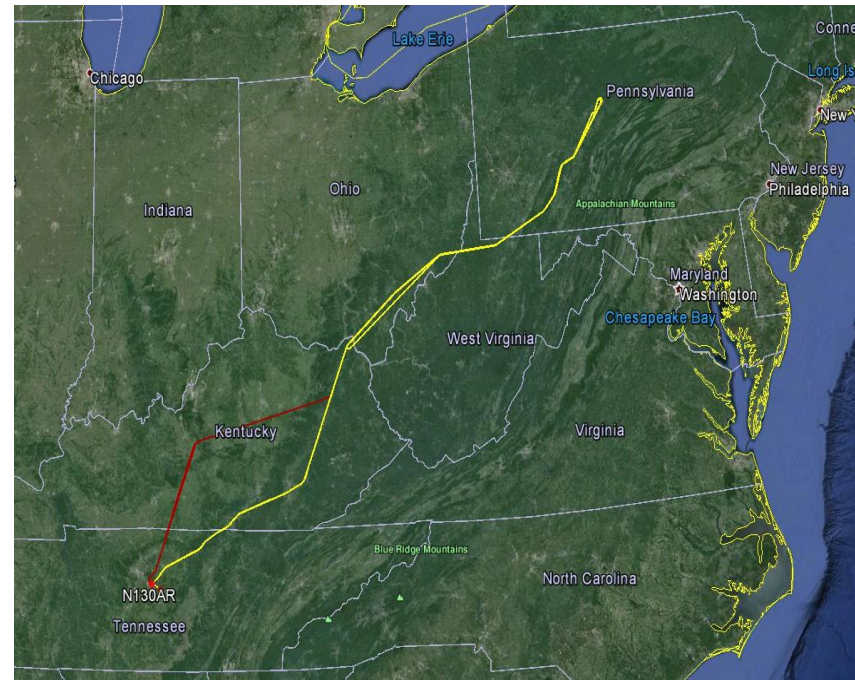
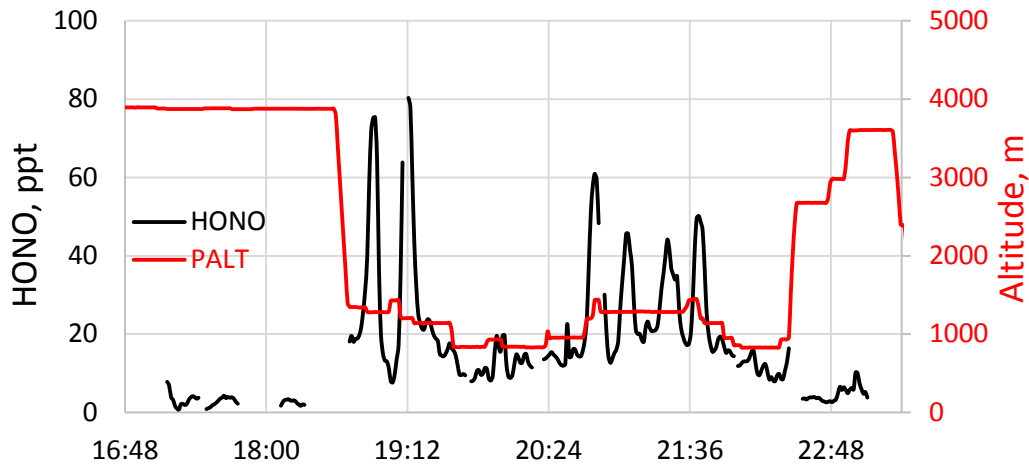
## TROPHONO Measurements:

Five LPAP systems (Long-Path Absorption Photometers) for HONO,  $p\text{NO}_3$ ,  $\text{HNO}_3$ , and  $p\text{Organics}$  UV absorbance.

One Mini-Differential Optical Absorption Spectrometer (Mini-DOAS) for HONO,  $\text{NO}_2$ , HCHO, BrO and glyoxal.

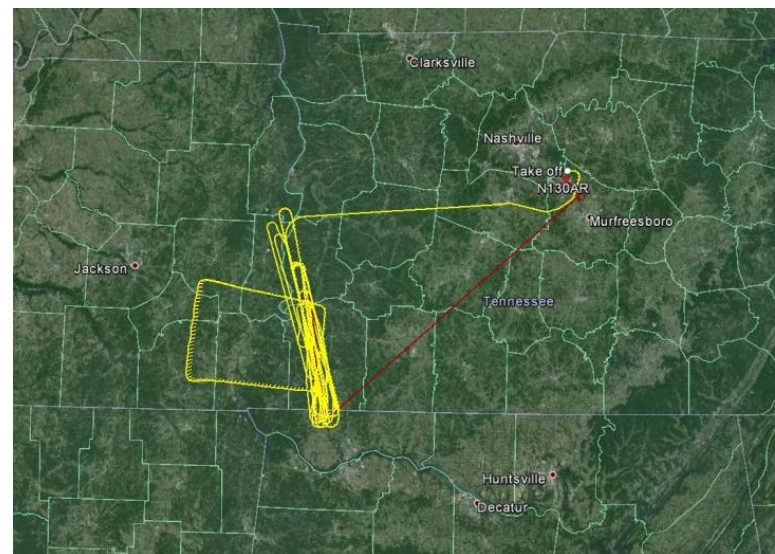
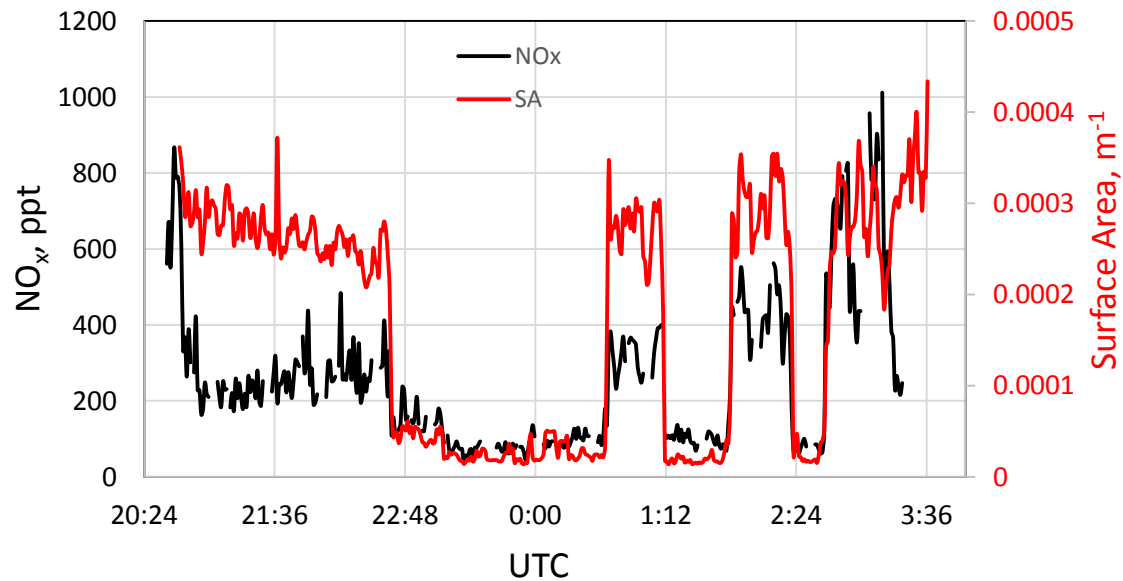
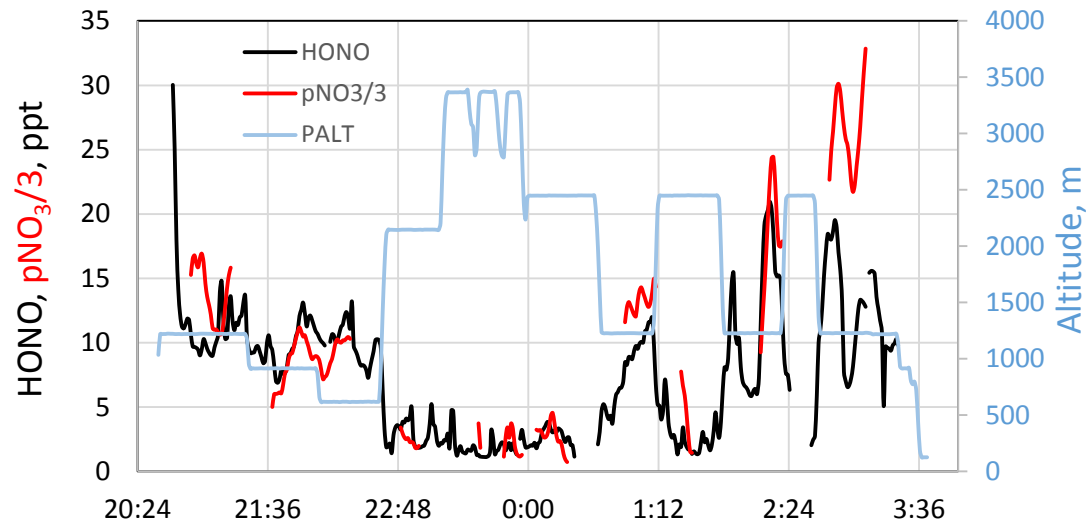
# RF07, 6/20/2013

## Ohio River Valley Power Plant Plumes



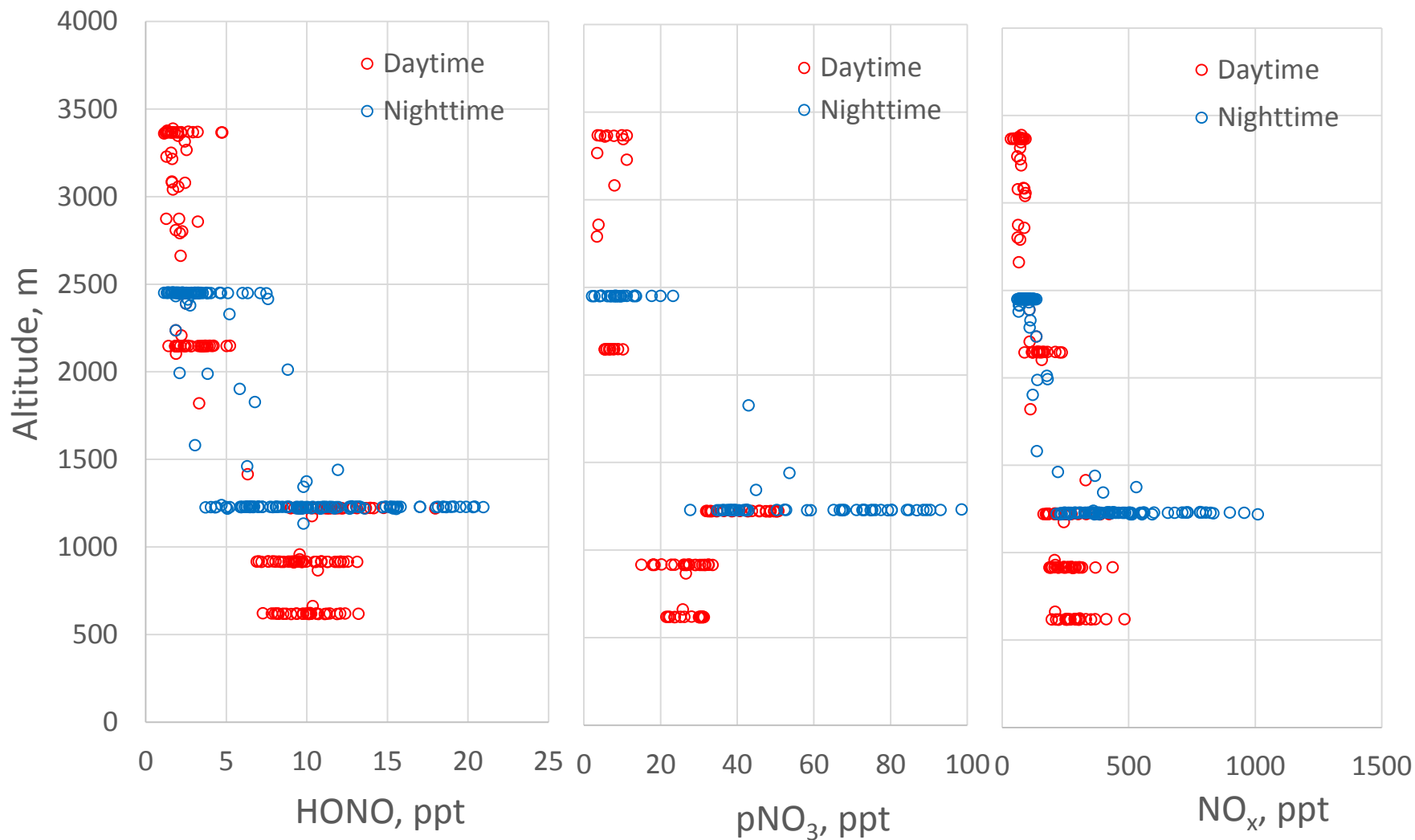


# RF18, 7/12/2013 Daytime Stacked Racetracks and Nighttime Time Series

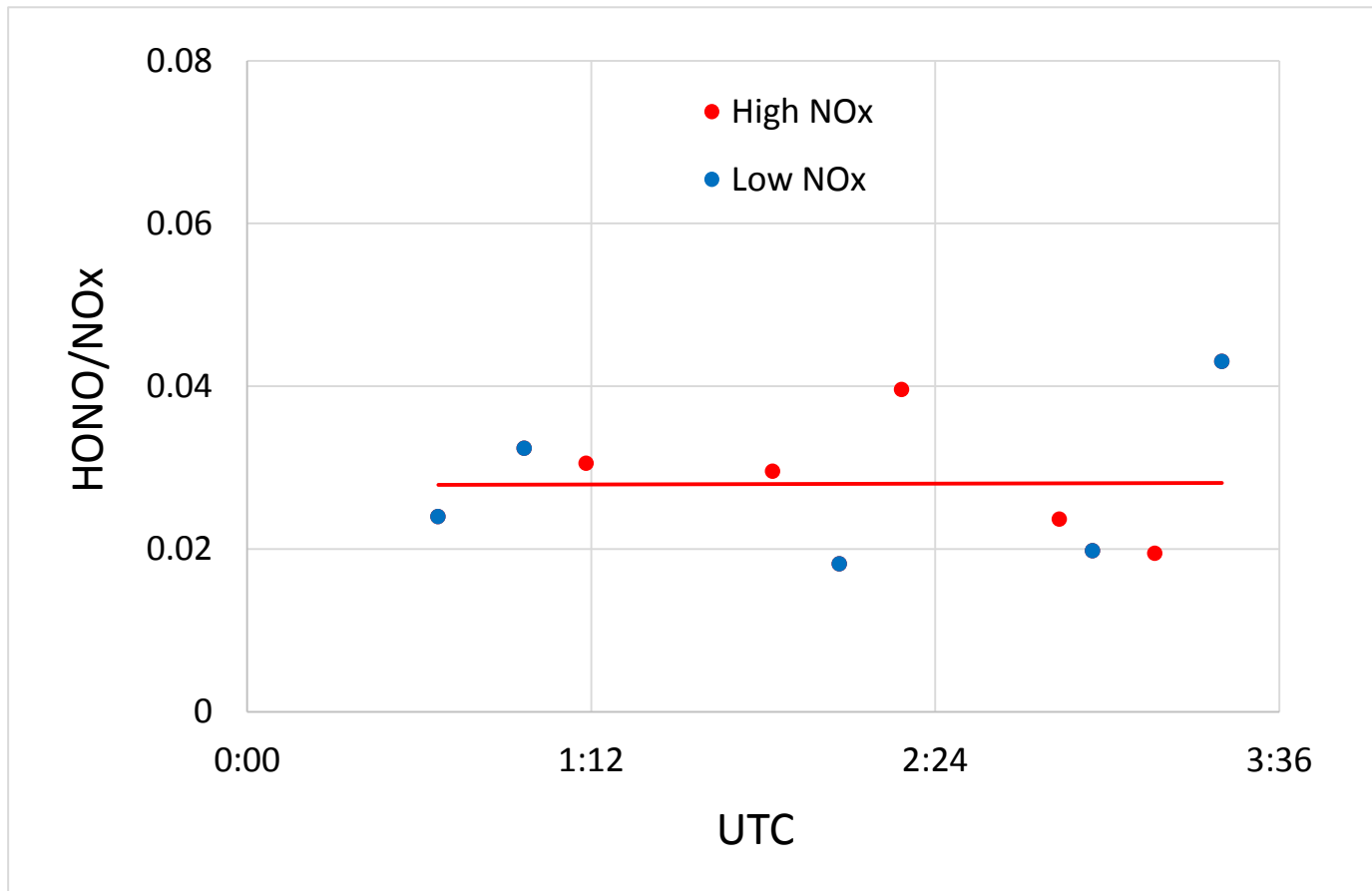


RF18, 7/12/2013

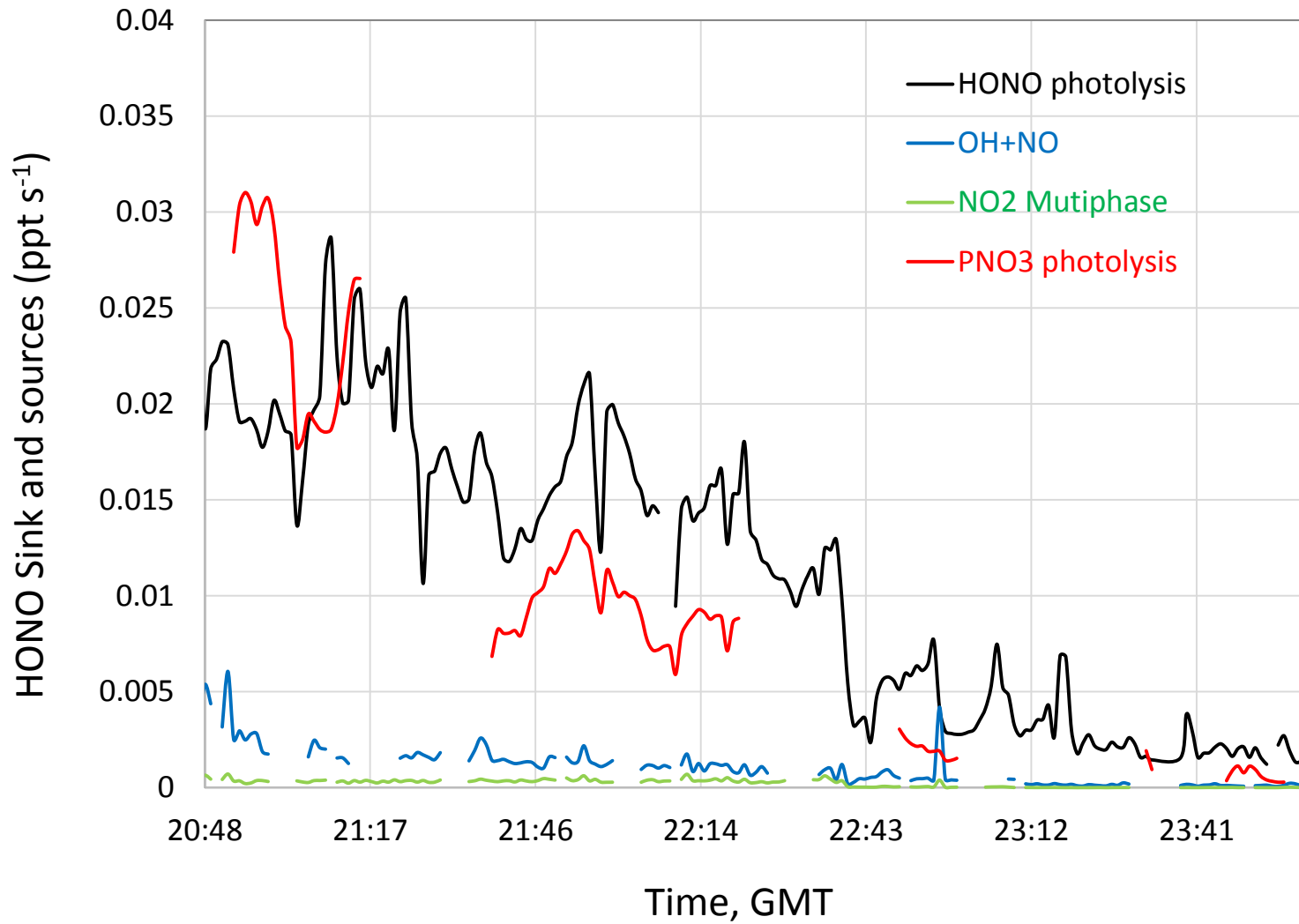
Daytime and nighttime vertical profiles of HONO particulate nitrate ( $pNO_3$ ) and  $NO_x$



# RF18, 7/12/2013, Nighttime HONO Time Series

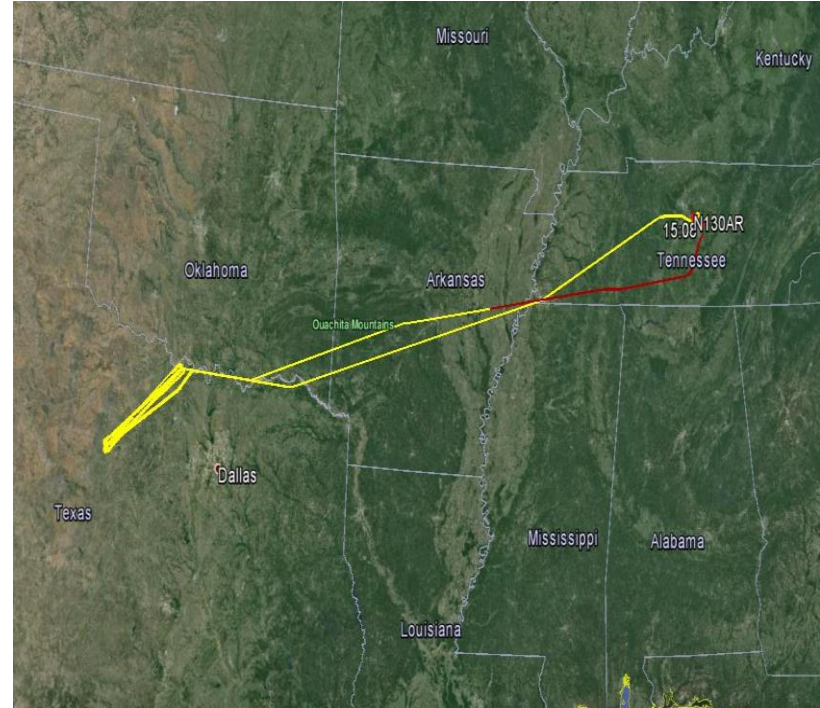
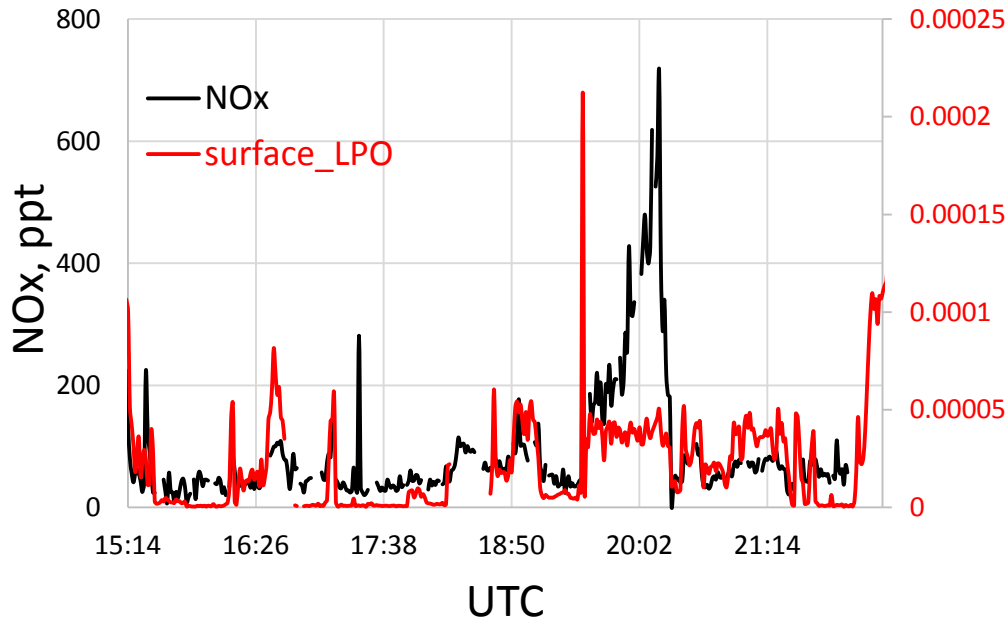
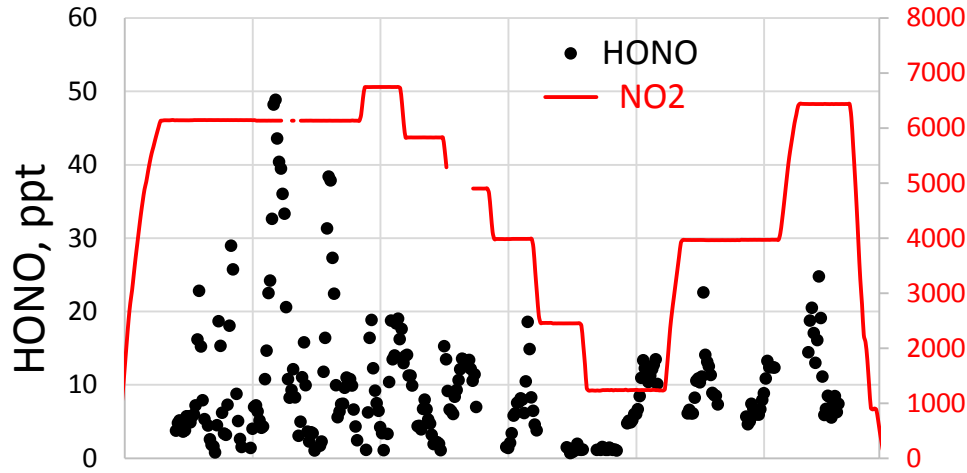


# RF18, 7/12/2013, Daytime HONO Budgets



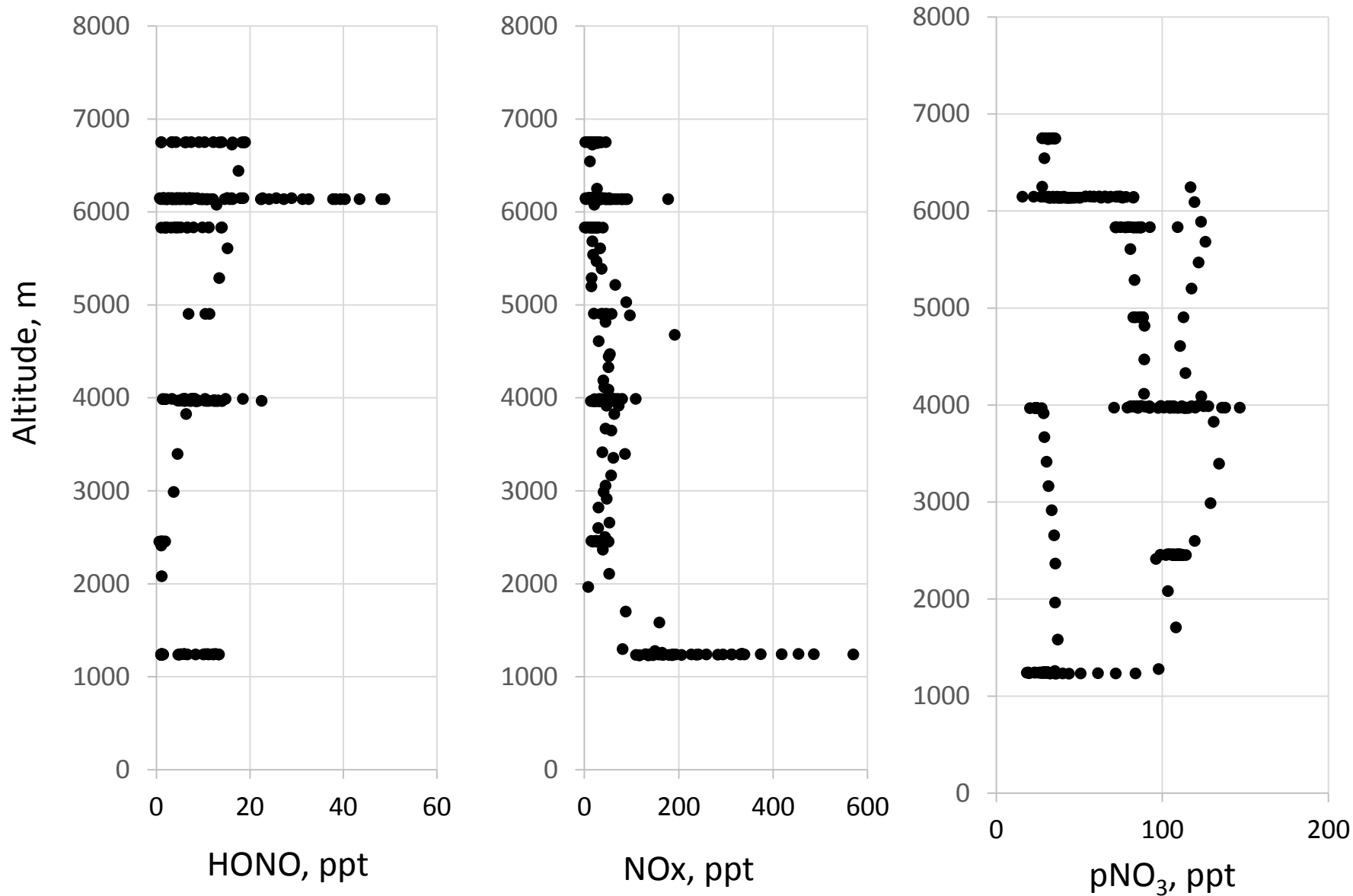
RF09, 6/24/2013

# High Altitude Biomass Burning Plumes

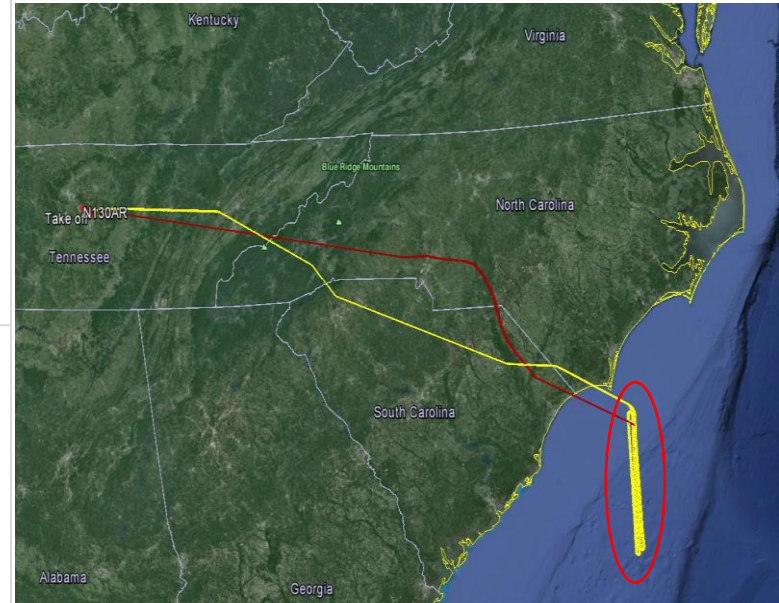
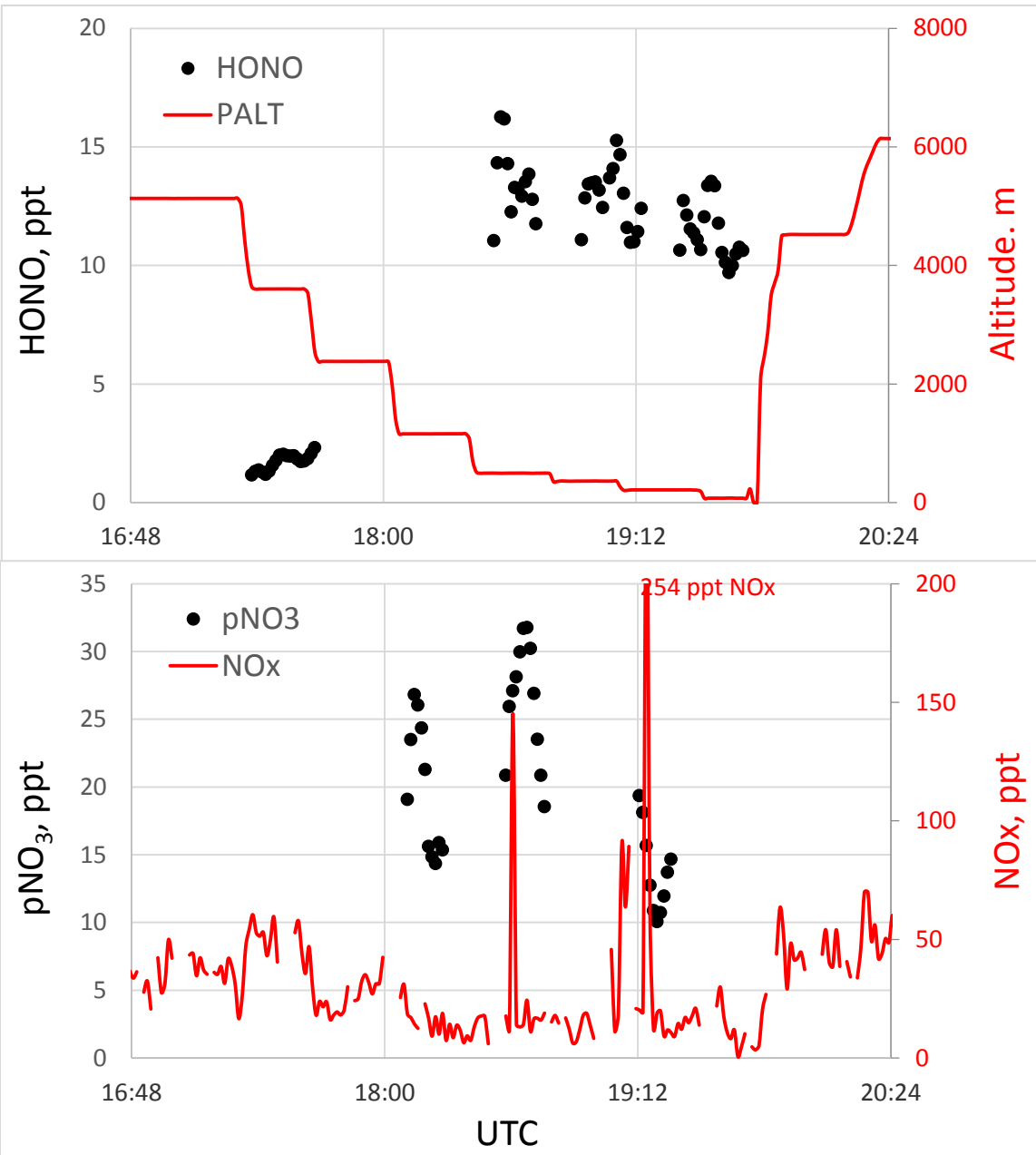




# RF09, 6/24/2013, Vertical Profiles of HONO, NO<sub>x</sub> and pNO<sub>3</sub>

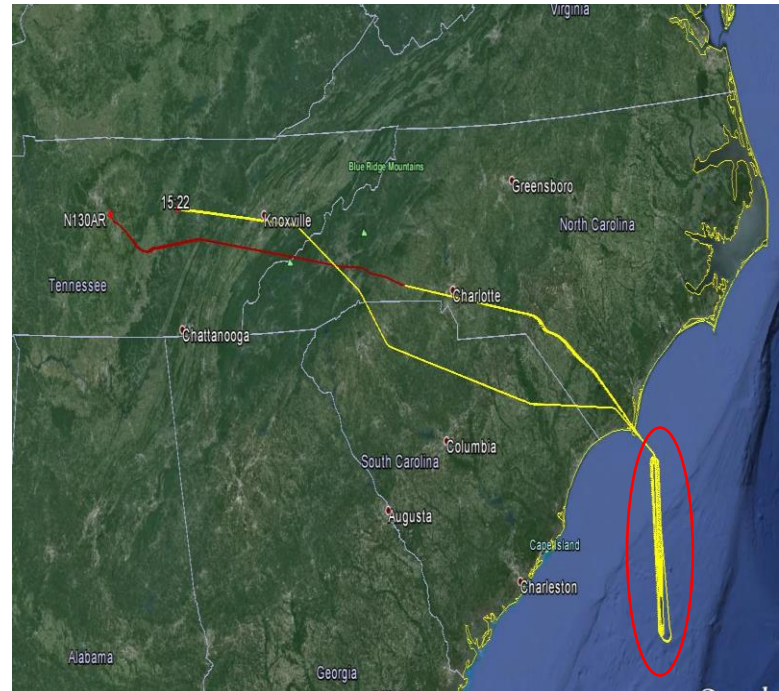
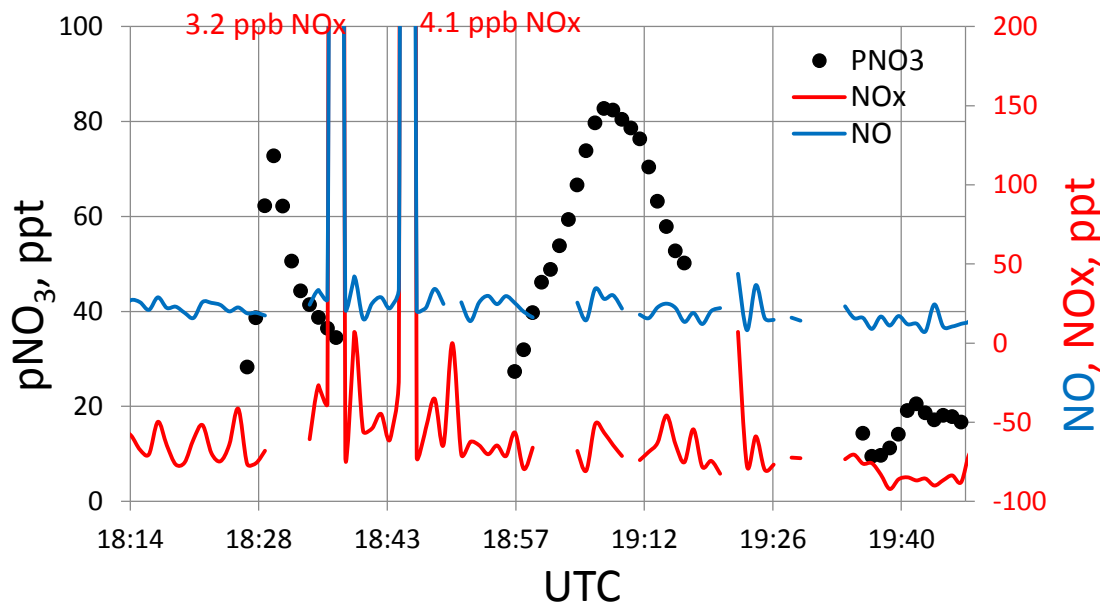
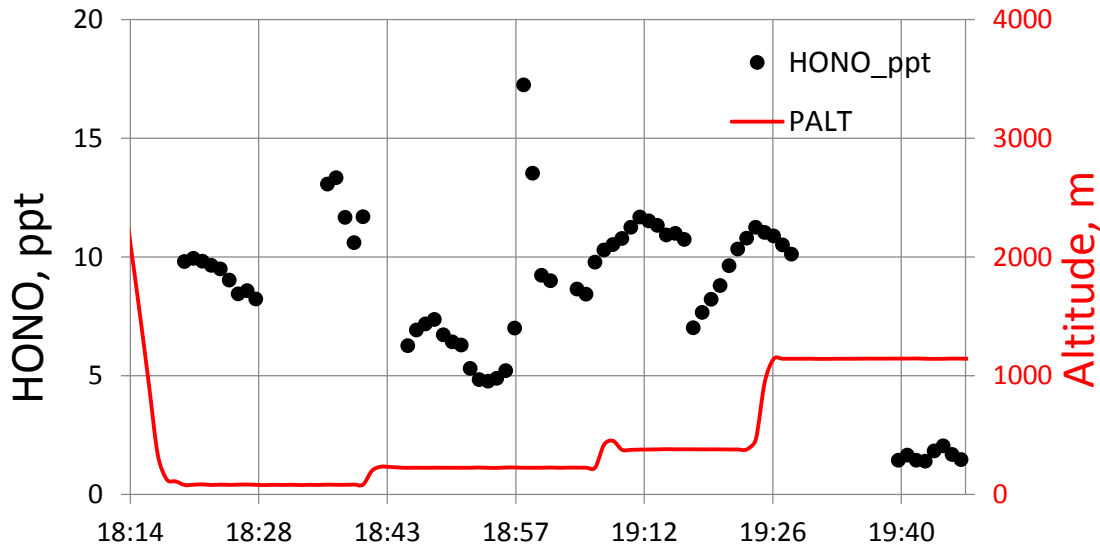


# RF14, 7/5/2013 Clean Marine Boundary Layer



# RF#16, 7/7/2013

## Clean Marine Boundary Layer





# Summary and Conclusions

(1) HONO in the troposphere:

- 2-15 ppt in the background air masses;
- up to 80 ppt in industrial and urban plumes;
- 15-50 ppt in the aged BB plumes at high altitude.

(2) Daytime HONO sources vary in different types of air masses:

- Photolysis of  $\text{pNO}_3$  appears to be the most important HONO source in the background air masses;
- HONO in power plant plumes is mostly from 2<sup>nd</sup> formation source rather than direct emission;
- In biomass burning plumes at high altitudes, precursors ( $\text{pNO}_3$ ?  $\text{NO}_2$ ?) are converted to HONO at very high efficiency.

(3) Away from ground surface, no significant nighttime HONO accumulation exists in the background terrestrial air mass.



# Acknowledgement

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- Colleagues of NOMADSS project
- RAF staffs and crew members of NCAR C130
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