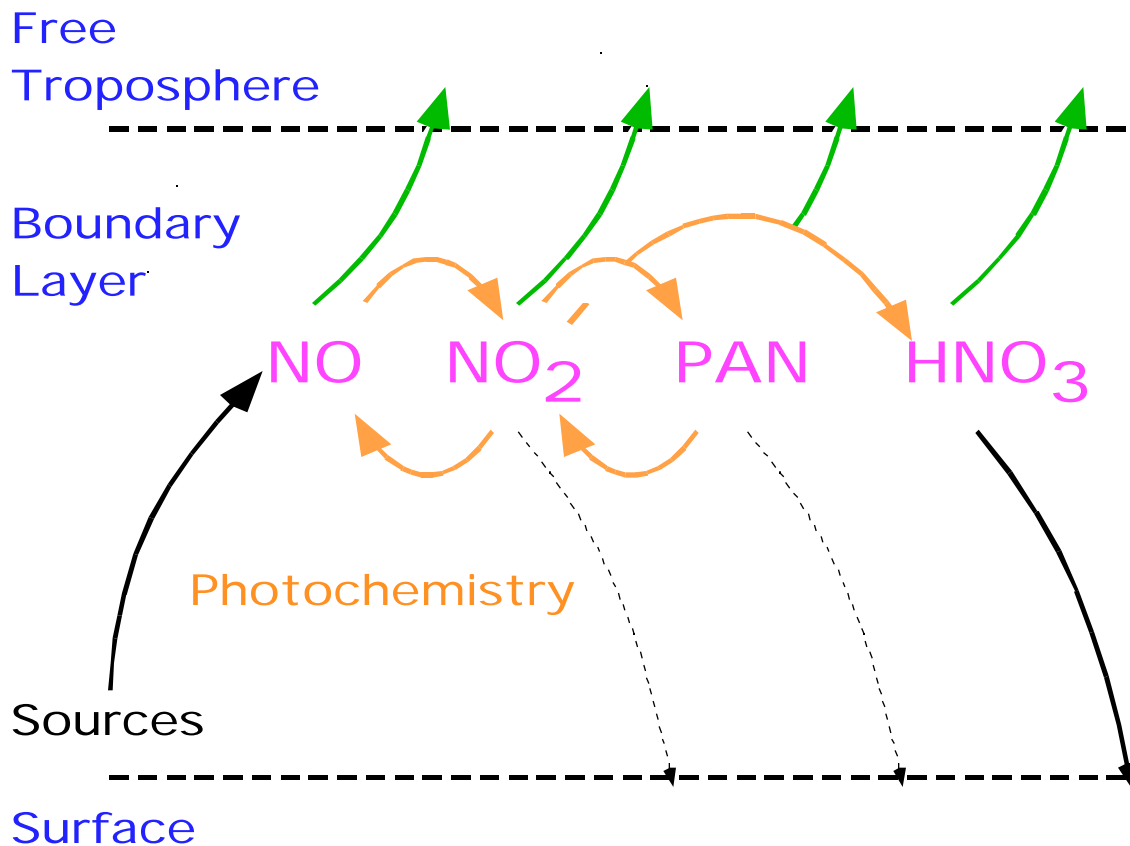


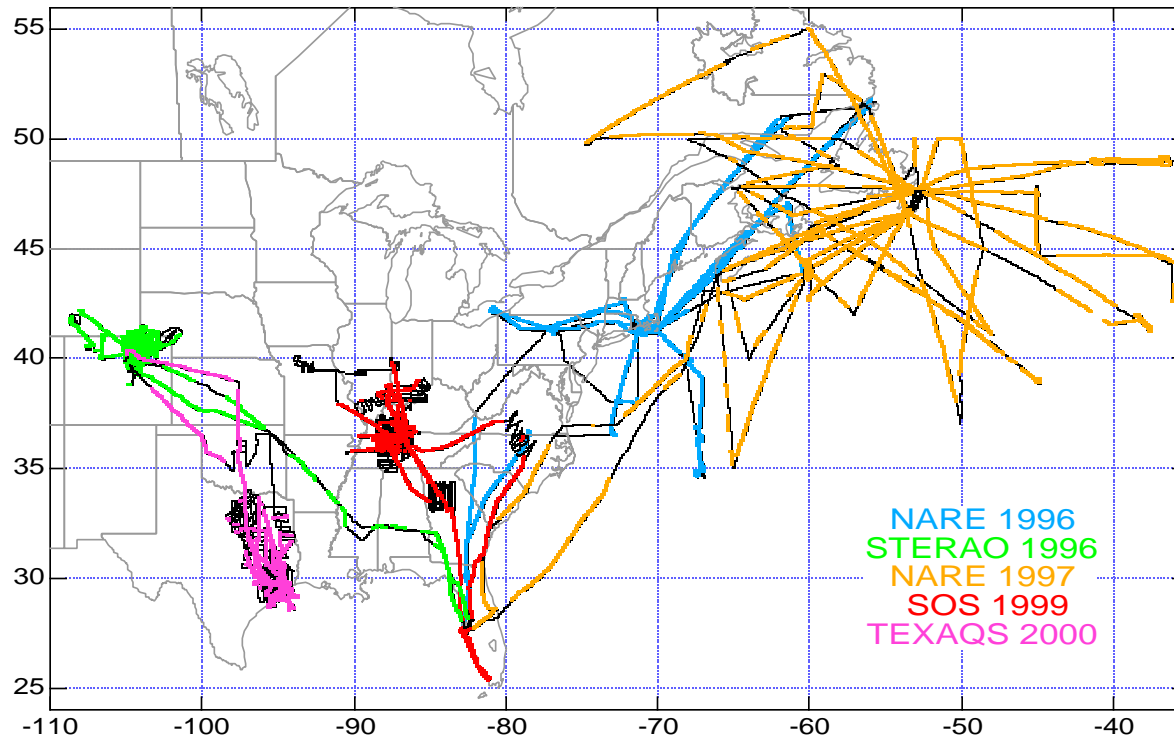
Removal of Oxidized Nitrogen from Polluted Air Masses Transported from the Continental Boundary Layer

D. D. Parrish, J. S. Holloway, T.B. Ryerson, J. A. Neuman,
F. Flocke, A. Weinheimer, J.M. Roberts, G.J. Frost,
G. Hübler, M. Trainer, F.C. Fehsenfeld



- For ozone production in free troposphere, export of NO_y species from continental boundary layer is critical.
- CO provides a tracer for determining fraction of NO_y exported.
- Only a small fraction (<25%) is exported and very little of that is in reactive forms.

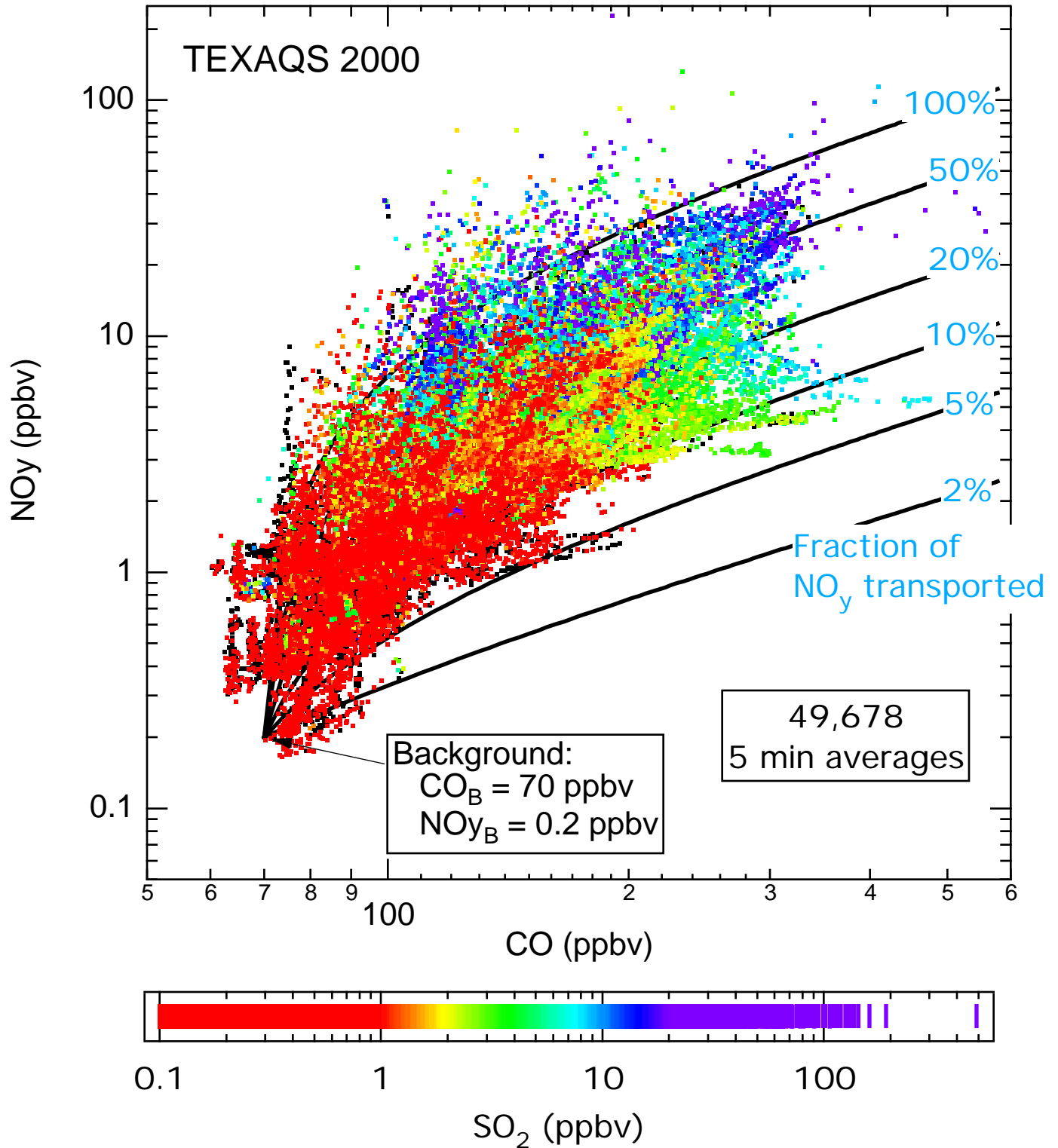
5 Field Studies available for analysis



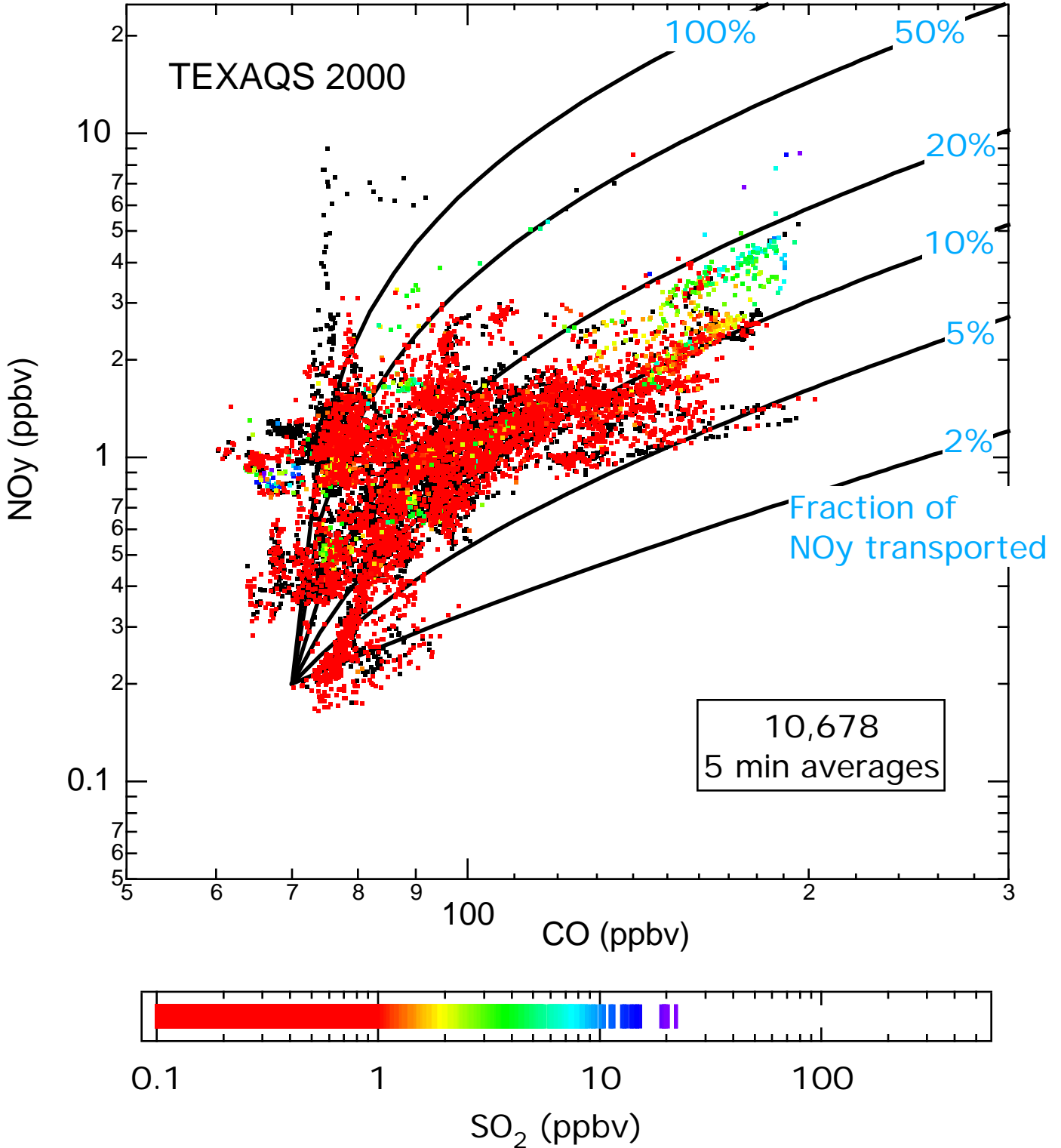
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CO provides an effective tracer for NO_y

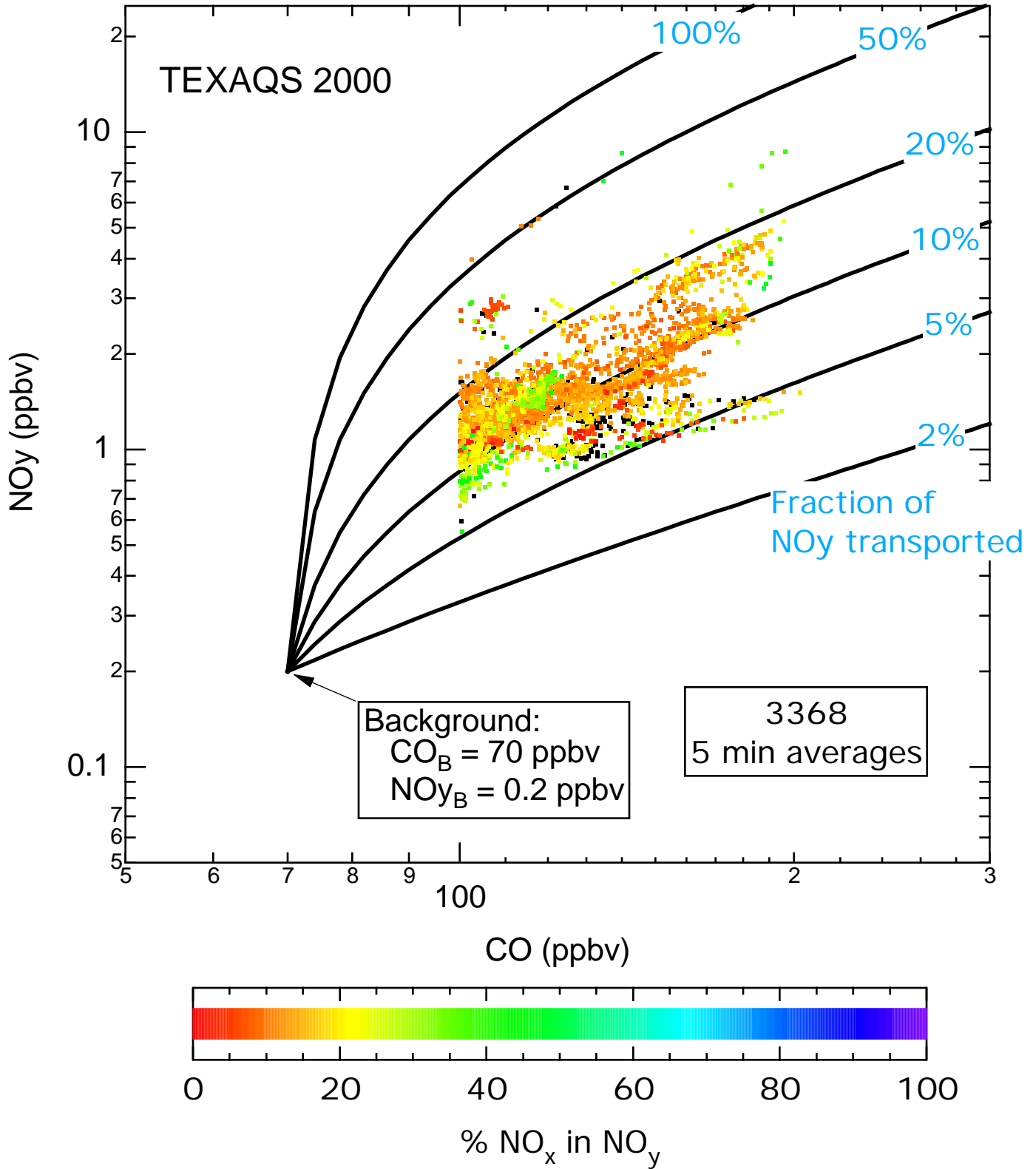
Average U.S. Emissions: $\text{CO}/\text{NO}_y = 4.6$



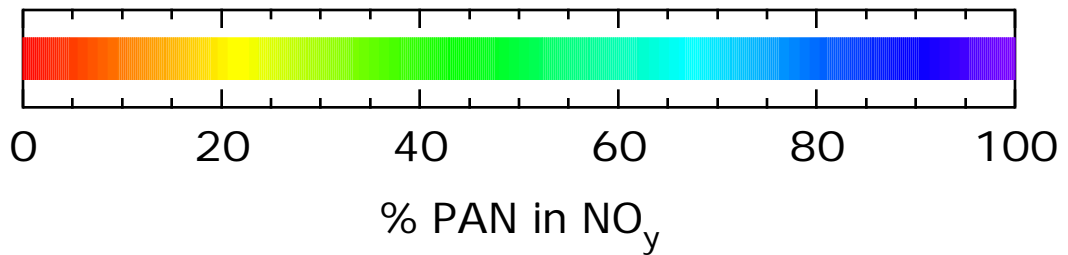
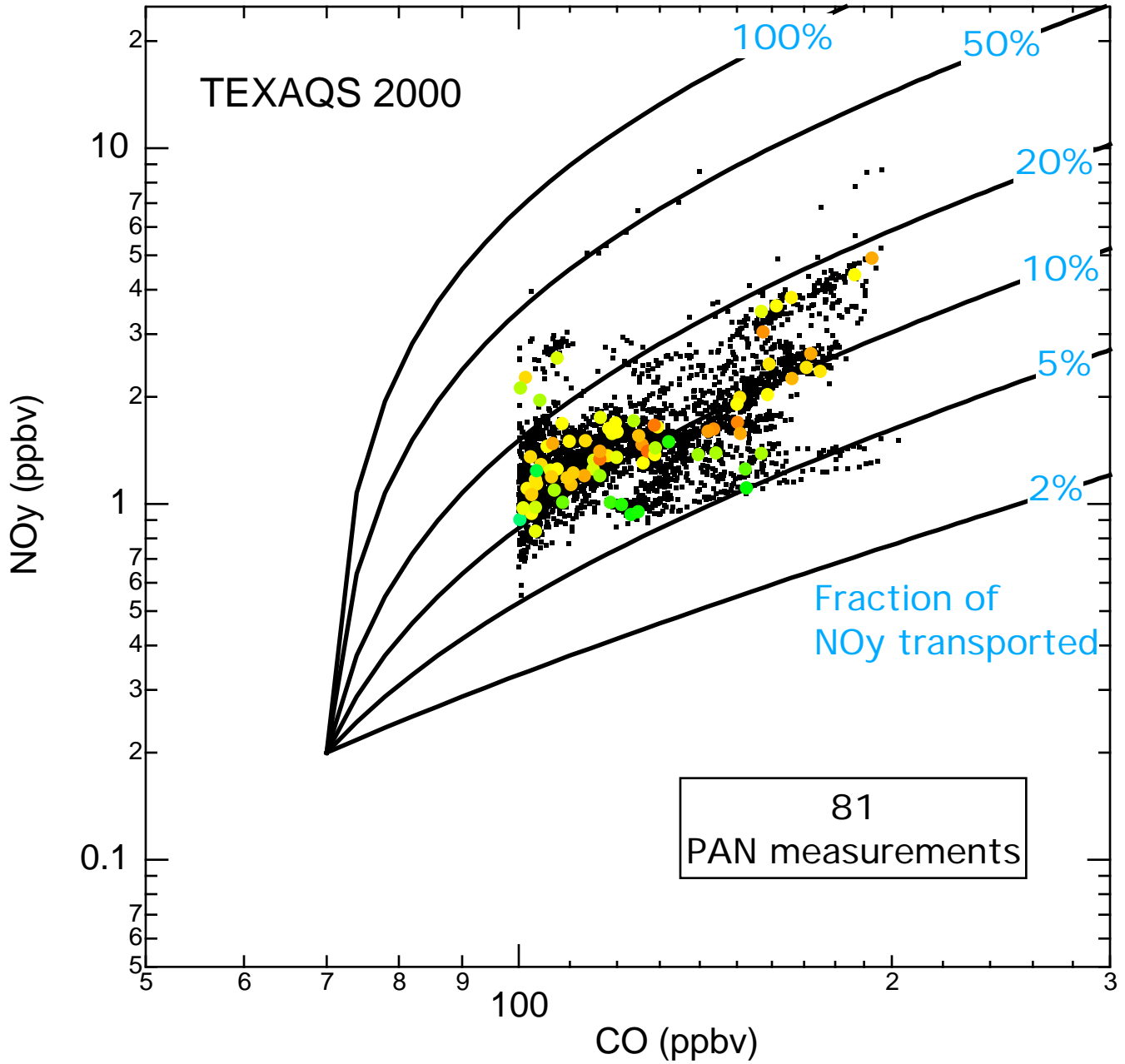
Free troposphere data (altitude > 2.2 km above ground)



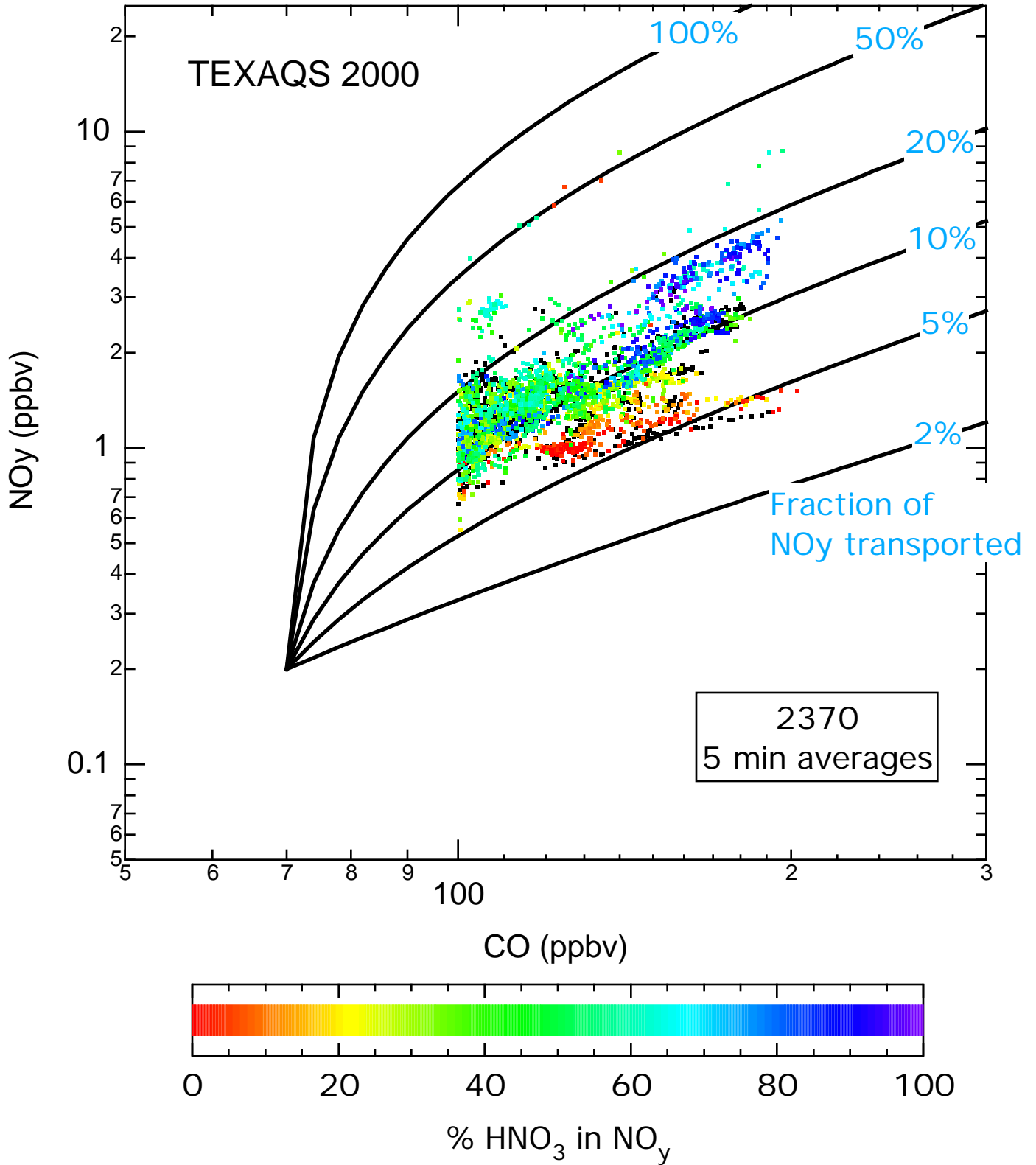
Free troposphere pollution plumes (CO > 100 ppbv)



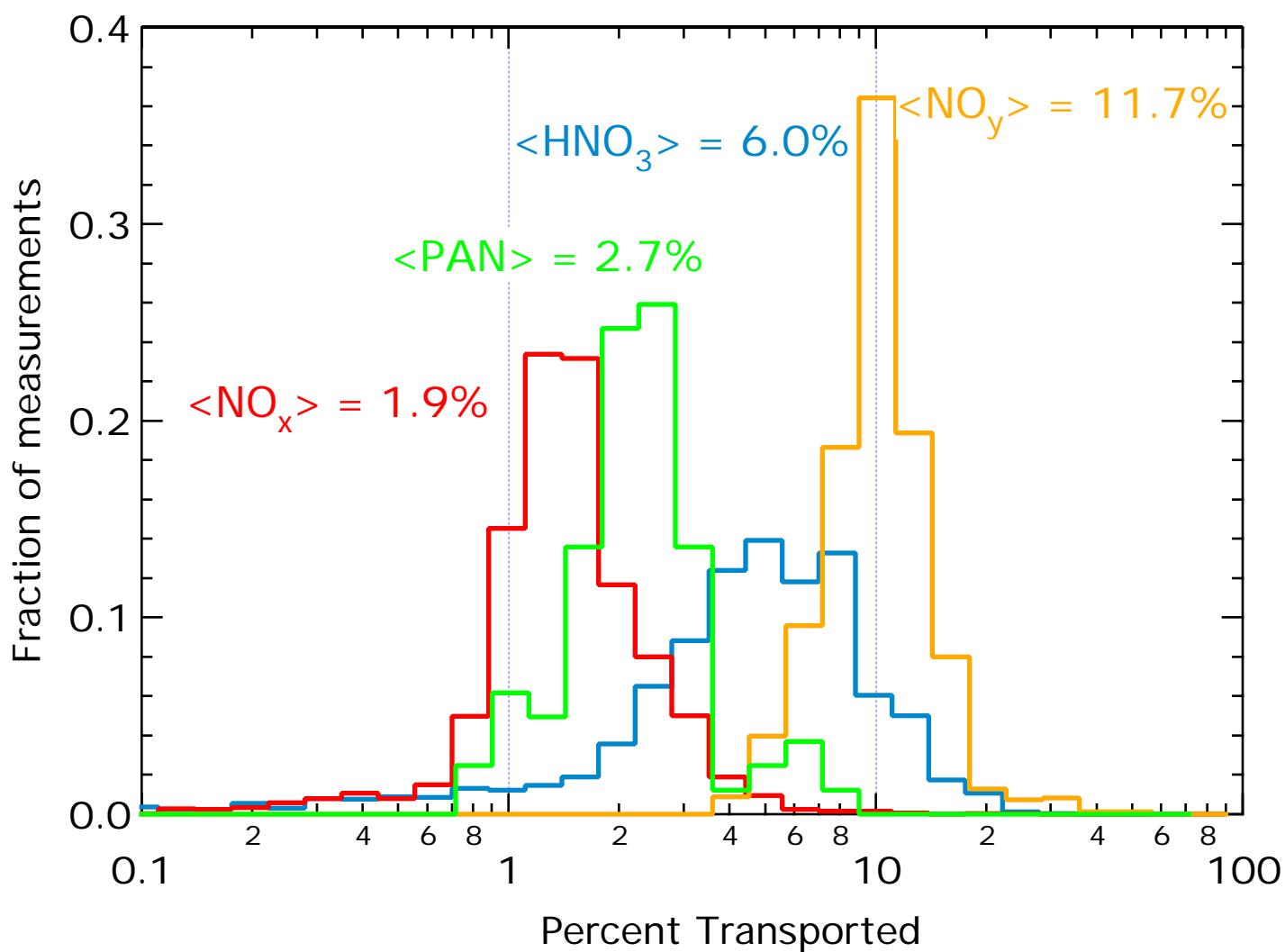
Free troposphere pollution plumes (CO > 100 ppbv)



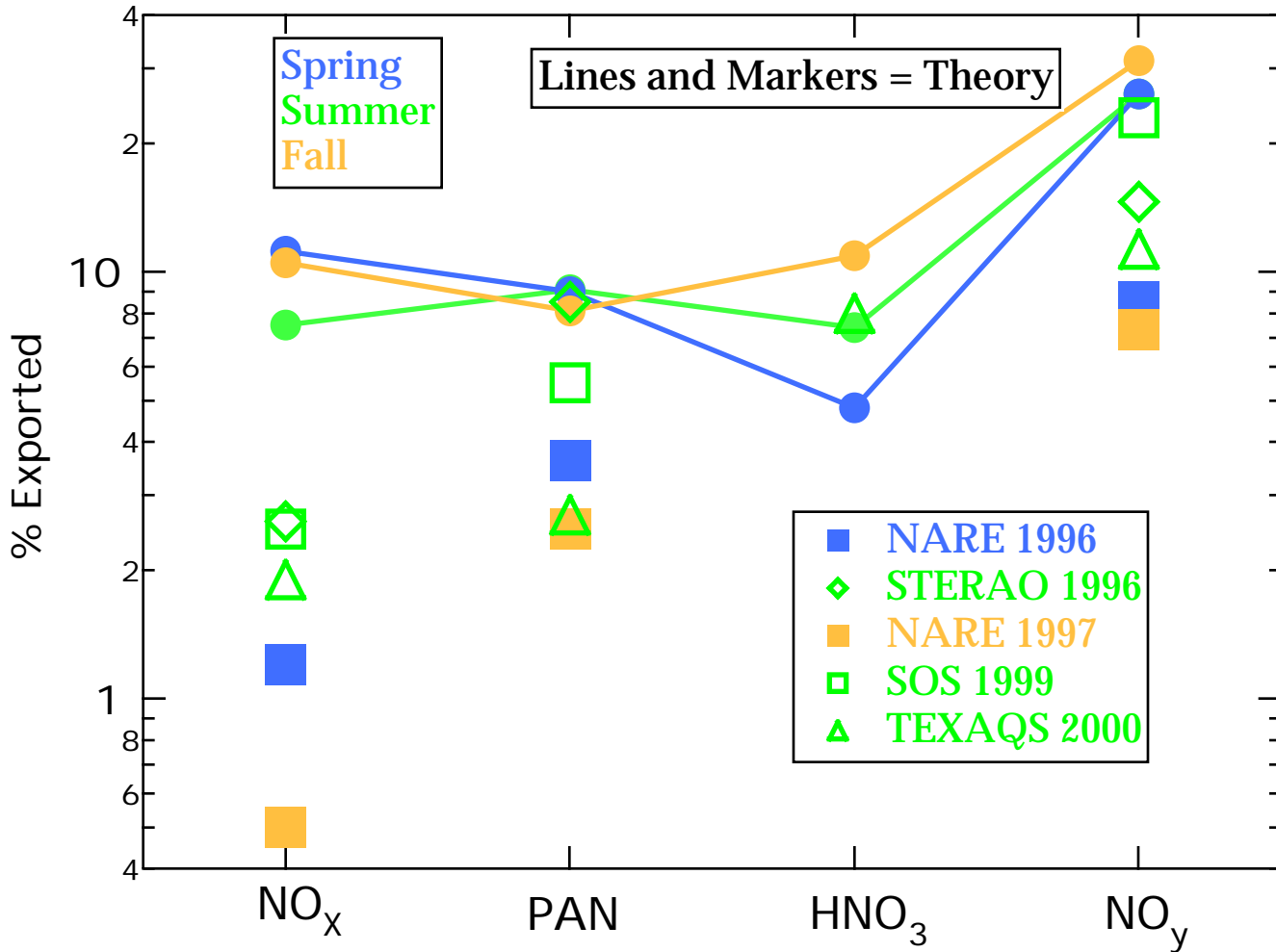
Free troposphere pollution plumes (CO > 100 ppbv)



TEXAQS 2000 Anthropogenic NO_y in the Free Troposphere

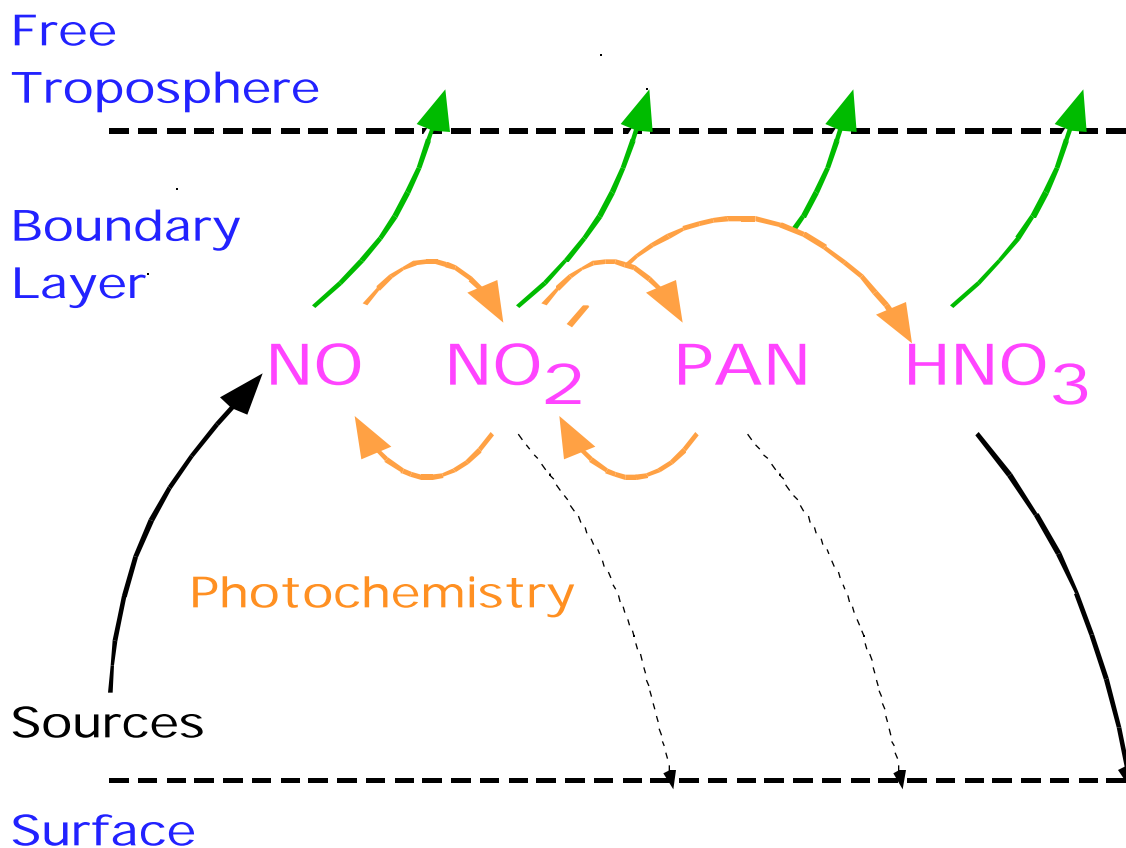


Seasonal Export of NO_y to the Free Troposphere



Literature Model: Liang et al.
J. Geophys. Res., 103, 13,435, 1998

Conclusions



- CO provides a tracer for determining fraction of NO_y exported.
- Only a small fraction (<25%) of originally emitted NO_y is exported.
- In the free troposphere, exported NO_y is predominately nitric acid, with lesser amounts of NO_x and PAN.