Overview of Laboratory Studies Related to NOx/NOy Chemistry in the UT/LS

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Key Lab Questions on UT/LS NOx/NOy

- Are reaction rates known well enough for the important ozone related reactions involving NOx/NOy?
- Are we overlooking significant gas phase photochemical processes?
- Can atmospheric aerosols act to deactivate NOx and remove NOy?
- Can atmospheric aerosols catalyze reactivation of NOx from NOy?
Lab Progress - 1

- Reducing uncertainty on known photochemical processes
  - $\text{HNO}_4$ and PAN quantum yields
  - Reevaluation of $\text{OH} + \text{NO}_2$
- New gas-phase processes
  - $\text{HNO}_4$ overtone spectroscopy and photodissociation
Lab Progress - 2

• Aerosol Uptake
  – \(\text{HNO}_4\) and PAN accommodation coefficients in sulfuric acid
  – \(\text{HNO}_3\) and \(\text{HNO}_4\) uptake on ice

• Heterogeneous Reactions
  – Conversion of \(\text{HNO}_3\) to \(\text{NO}_x\) on soot
Future Lab Directions

- Further investigation of cirrus-scavenging: HNO$_3$ and HNO$_4$ uptakes at lower partial pressures and/or warmer temperatures
- Identify additional heterogeneous and/or solution phase processes that involve the increased NO$_x$ from aircraft. Especially consider those that could impact surface reactivity and cloud condensation nucleating capability