Introduction
- Nitric Acid is an important OH-source in polar regions:
  \[ \text{HONO} + h\nu \rightarrow \text{OH} + \text{NO} \] (1)
- Formation mechanism under discussion (Zhou et al., 2001; Stemmler et al., 2006):
  \[ \text{NO}_2 + h\nu \rightarrow \text{NO}_2 + \text{O} (+\text{H}^+) \rightarrow \text{HONO} \] (2)
  \[ \text{NO}_2 + \text{humic acids} + h\nu \rightarrow \text{HONO} + \text{products} \] (3)
- Doubts are raised about the reliability of polar “wet chemical” HONO measurements (Kleffmann and Wiesen, 2008)

Aim of the study
- Measurement of HONO by the LOPAP technique during OASIS/Barrow 2009 campaign

Experimental: The LOPAP®-instrument
- Wet chemical instrument (fast, selective reaction)
- No inlet lines used (external sampling unit, see Fig. 1)
- Two channel system to correct interferences (see Fig. 1)
- Excellent agreement with DOAS also during daytime (smog chamber/atmosphere, Kleffmann et al., 2006)
  - In contrast to most other published intercomparison studies (typically much higher concentrations by the wet chemical instruments \( \leftrightarrow \) interferences!)

Instrument parameters:
- Measurement range: 0.4 pptV - 20 ppb
- Time response: 6-7 min (10-95%)
- Detection limit: 0.4 pptV
- Precision/accuracy: \( \pm 1-7\% \) (+DL)

Results
- [HONO]: 1 - 600 pptV
- High HONO correlates with high NO/CO
  - Emissions (combustion) on many days
- Average [HONO] for all (7) “clean” days 1-10 pptV
  - Excellent agreement with other remote LOPAP measurements at mountains “Zugspitze” (4.6 %; 1.1 %)
    and “Zugspitze” (2.5 %; 1.0 %)
  - Much lower compared to other polar studies in which NO/NOy of 20-100 % was determined
  - Significant interferences of wet chemical instruments are corrected for by the LOPAP instrument (Kleffmann and Wiesen, 2008)

Conclusions
- Low HONO concentrations on clean days
- HONO maximum during daytime
- Low HONO/NOx, HONO/NOy in contrast to other polar “wet chemical” HONO measurements
  - Interferences are corrected for by the LOPAP
- Net daytime HONO/OH-source correlates with J(NO2)
- Photochemical sources proposed
- Correlation with other parameters ([HA], nitrate, etc.) may hint to potential sources (ongoing...)

References: