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Interactive Comment

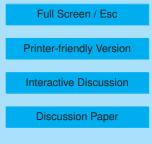
Interactive comment on "Long-term in situ measurements of NO_x and NO_y at Jungfraujoch 1998–2009: time series analysis and evaluation" by S. Pandey Deolal et al.

Anonymous Referee #2

Received and published: 3 October 2011

General Comments:

The authors present the longest running record of NOy measurements recorded in the free troposphere (10 year record at Jungfraujoch). The measurements are complimented by coincident measurement of NOx, CO, and O3 (which have been described elsewhere). The authors conclude that, in contrast to measurements made in more urban settings, closer to sea-level, the concentration of NOy is not decreasing in time, but rather displays a maximum in 2003. Instrument performance is assessed through comparison with a second, separate NOy detector with an externally mounted converter. Agreement between the two detection methods was shown to be within 10%.





Finally, the authors comment an anomalous sampling event, where the inlet of one NOy detector was buried in snow, suggesting that high levels of NOx point toward the possible influence of snow photochemistry. While any 10yr time series is an impressive feat, several unanswered instrumental questions, and qualitative conclusions prevent the paper from being published in its current form.

1. Free Troposphere: It appears that there was no attempt to filter the data to remove the impact of either local pollution events or strong stratospheric influence. Is it possible to use concurrent measurements of O3, CO, and H2O to at the minimum comment on the possible role of stratospheric NOy? Is NOy and CO tightly correlated?

2. Diurnal (or rather diel) profile in NOy: Does NOy display a strong diel profile? In the free troposphere (unperturbed by local emissions of recent convective activity), I would expect NOy to be relatively constant. This could be an indicator of the impact of local emissions.

3. Inlet characterization: It is hard to imagine high transmission of HNO3 through 1m 3/16 ID PFA. Have the authors directly characterized the transmission efficiency of this inlet, through standard additions to the inlet tip? A comparison of NOy between two instruments does not provide us any information on the transmission efficiency of HNO3 or other sticky compounds, as the slope is weighted heavily by the high NOy points that likely have higher NOx/NOy? What does a comparison of NOz look like?

Does the 10C heating refer to 10C over ambient, or is the inlet temperature controlled to a constant 10C. In either case, I would suspect that HO2NO2 or CH3O2NO2 may play an important role in the NOy budget in these airmasses. Due their thermal instability, I suspect that they might be included in NOx?

4. Utility of NOx/NOy measurement: The NOx/NOy measurement is a tremendously useful metric for the age of air in the free troposphere. It would be particularly interesting to investigate this parameter in more detail: i) is there a strong diel profile, ii) can PBL influenced airmasses be removed to investigate seasonal variation in NOx/NOy

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and the role of convection.

5. Snow photochemistry: Unless the section on snow photochemistry is used to discuss potential artifacts on the NOy measurements, it reads as an aside and does not contribute to the paper. It is also unclear how the ETHZ inlet is buried in the snow? Is it submersed, or close to the snow? It is hard to imagine snow in the inlet if it is heated to 25C?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 21835, 2011.

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