Atmos. Chem. Phys. Discuss., 11, C13151–C13153, 2011
www.atmos-chem-phys-discuss.net/11/C13151/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Morning NO_x maximum in the forest atmosphere boundary layer" *by* M. Alaghmand et al.

Anonymous Referee #2

Received and published: 13 December 2011

General comments:

This paper describes observations and analyses of a peak in NOx observed in the morning at the PROPHET research site over multiple field seasons. . The authors investigate several possible mechanisms that could explain the morning NOx peak including HONO photolysis, polluted nocturnal residual layer intrusion, upward mixing from surface sources and long-range transport of anthropogenically influenced air masses. The phenomenon the paper is describing is interesting, potentially important and challenging to understand. It is a phenomenon observed commonly in rural areas but the lack of satisfactory explanation has prevented other research teams from

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

publishing on the subject. Before acceptance the paper requires some clarification.

1) Presumably there was a substantial decrease in anthropogenic NOx emissions over the decade that would alter the relative contributions of anthropogenic emissions and soil NOx to the morning peak?

2) I recommend a single section combining the discussion in 3.2 and 3.4. The discussion of CO (section 3.2) and anthropogenic sources (3.4) appear to be addressing the same issue and to be contradictory. CO and toluene should also be correlated. Shouldn't they?

3) The paper leaves this reader thinking that the soil source is the only viable explanationâĂŤbut the discussion of that source is too short to provide adequate context. Comparisons of the unpublished emissions with other soil emission sources should be included to provide context about whether the unpublished measurements are large or small. A better solution of course, would be to publish those measurements here.

4) In light of the soil argument, should be strong correlation with BVOC emissions? Either way some direct discussion of BVOC emissions and their relation to this peak are in order.

5) The conclusions don't seem particularly related to the paper but to be a general discussion of NOx chemistry. The conclusions should be narrowed (perhaps just shortened) to issues that are specifically affected by the morning peak and the mechanisms responsible for that peak.

Figures:

The color scheme in all figures should be changed to be identicalâĂŤat least NOx should always be one color.

There is no reason to show observations of NO.

The CO data seems noisy and would benefit from averaging.

ACPD

11, C13151–C13153, 2011

The figures would be clearer if they only showed times between midnight and 9AM.

Figures 1, 2, 3, 4 and 13 could be omitted without loss of information.

Other comments: 1. P.29256, line 3-5, reference is needed. 2. P.29256, line 7-8, the calibration concentration range needs to be specifies otherwise the 10 sccm information in line 15 is redundant. 3. P.29261, line 12-17, clarify the calculation soil NO emission rate to equivalent NOX mixing ratio. 4. Would medians be better than means for the discussion related to Figure 10.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 29251, 2011.