

## ***Interactive comment on “Observations of the diurnal and seasonal trends in nitrogen oxides in the western Sierra Nevada” by J. G. Murphy et al.***

### **Anonymous Referee #2**

Received and published: 3 August 2006

#### General Comments

This manuscript presents the results of measurements of reactive nitrogen oxides and ozone obtained at 3 different sites in California, USA and contains a comprehensive analysis of the data with respect to photochemical processing and transport - complicated by spatial and temporal variabilities - with the goal of providing information regarding the regional distribution of reactive nitrogen oxides. It is a highly ambitious undertaking, and represents a significant contribution to the literature. The revisions suggested here are minor in scope but important to the readability of the manuscript.

#### Specific Comments

At the initial reading, it seemed that discussions of the motivation for measurements at

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the Big Hill site and a comparison of the 3 sites were missing. However, a great deal of related introductory and motivating text is contained in the analysis sections, and it would take very little work to expand to include a more detailed discussions of the science questions / hypotheses being addressed with data at these 3 sites. In addition, a concise explanation of the differences in elevation, meteorology, and sources as well as the expectations for spatial and temporal differences in photochemical and dynamical processing of air parcels reaching these sites all in one place as part of the introduction would help greatly. For example, significant portions of the text in the beginning of section 5, the 1st half of section 5.1, the start of section 5.3, and text on pages p 4431 - 4432 would appropriate as introductory text, and it seems that the following sections could be streamlined somewhat once all of this is laid out in the introduction.

The authors should include a discussion of the assumptions inherent in their comparison of data obtained at these 3 sites when the data obtained at Granite Bay was not obtained during 2003. This is especially important for text in section 5.3. The authors may be able to easily motivate comparisons of diurnal cycles observed at the 3 sites. However, it seems that additional evidence must be presented to show that it is reasonable to compare ambient levels at the different sites and draw conclusions regarding the extent of processing that has occurred.

Is the instrument response the same in dry air as it is in ambient air?

What is the fate of the organic nitrate compounds? What fraction are sticky and thus likely to deposit out in transit? Are any water soluble? Is it possible to include a table of suspected PNs and ANs, their fates, information on water solubility and deposition rates and atmospheric lifetimes?

P 4427 lines 6 - 8: why?

Technical Corrections

What does semi-continuous mean for the UC-BFRS site?

4418 line 26 “will be” ? “are”? + similar changes elsewhere in text

In figures and text consistently, designate HNO<sub>3</sub> as gas phase and semi-volatile aerosol nitrate (perhaps “GP+SVAN HNO<sub>3</sub>”??) so that readers do not mistake the HNO<sub>3</sub> data presented.

Section 4 seems somewhat fragmented and could be improved with reorganization (e.g., significant portion of last paragraph seems better as an introductory paragraph).

In section 5.1 it states that data were obtained for the full annual cycle and then a few sentences later it states that electrical power outages prevented measurements during most of May. There is an inconsistency here.

The word “data” is plural - verbs should reflect this.

Check for use of “which” when it should be “that”.

P 4435 line22 “Ë the comparison to” ?

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4415, 2006.

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