

Interactive comment on “Partitioning of reactive nitrogen (NO_y) and dependence on meteorological conditions in the lower free troposphere” by C. Zellweger et al.

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Response to Referee #1

We would like to thank Referee #1 for his interest in our paper and his comments and suggestions. Both his general and specific comments are addressed below.

Referee #1 mentions that the meteorological filters used in our work could be applied to other European Alpine sites. He also mentions that the definitions of filters strongly depend on orography and location of the sites. We completely agree in this point. If filters are applied to other sites the definitions of these filters have to be developed depending on location and orography of a site. The filters as described in our work can only be used for the characterization of the JFJ station. However, similar filters could be easily developed for other sites. We will point this out more clearly in a revised

manuscript.

Referee #1 also suggests to derive a detailed seasonality and climatology of speciated NO_y from the two-year data record. It can be seen from Figure 2 where monthly means, medians and the first and third quartiles for NO_y and PAN are shown that minimum concentrations are observed in autumn and winter, and highest mixing ratios are found during spring and summer. However, the meteorological processes as described in our paper have often such a strong impact on the concentrations observed at the JFJ that high values can also be observed during winter. A seasonality of the undisturbed FT is also shown in Figures 4a and 4b for NO_x, NO_y and PAN including the effect of meteorological processes on the concentrations. Since further speciation of NO_y is only available during four seasonal measurement campaigns, we feel that a discussion on time series is more appropriate.

We would also like to thank Referee #1 for his constructive specific comments and suggestions for technical corrections. We will consider these suggestions in a revised manuscript, but would like to address one specific comment in more detail.

Page 2271, line 19-21: It is indeed true that pollution levels tend to be higher south of the Alps. This was for example shown in a paper by Prévôt et al. [1997], where ozone and ozone precursors were measured during aircraft campaigns both north and south of the Alps. Observed concentrations were much higher south of the Alps. They concluded that the Milan area with its 4 million inhabitants (distance to the JFJ approximately 150 km) forms a large emission source for ozone precursors. This is in line with NO_x emission inventories made by EMEP (<http://emep.int/>) where the Po valley is also regarded as an area with high NO_x emissions. Finally, ongoing research using satellite data (http://www.isac.cnr.it/%7Etrasfene/POLPO_WEB/HomePage.html) also points to the Po valley area as a hot spot for NO₂.

References

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