

**Review of Paper ACPD 10 (2010), 1483-1516, “Tropospheric ozone variations at the Nepal climate observatory pyramid (Himalayas, 5079 a.s.l.) and influence of stratospheric intrusion events”, by P. Cristofanelli et al.**

**General Remarks**

The paper describes interesting results for a very special station in a region where presumably not much atmospheric sounding had been done before. The analysis is very carefully done. The paper should be published after the following comments are considered by the authors.

**Specific Comments**

The page and line number refer to the “printer friendly version”.

(1) *Abstract*: The abstract is rather long. Although this is frequently found in this field shortening might be considered. For instance, the climate issue is stressed twice.

(2) *P. 1485, line 25*: “Wild, 2007”: You should also consider earlier work such as Roelofs and Lelieveld (*Tellus B* 49 (1997), 38-55) who estimated that as much as 40 % of the tropospheric ozone originates in the stratosphere. From the observational side a hint confirming this may be found in Trickl et al., *Atmos. Chem. Phys.* 10 (2010), 499-524.

(3) *P. 1488, line 9*: “Trickl et al., 2009” should be replaced throughout the paper by the citation already given above.

(4) *P. 1490, line 25*: Fig. 2 must be printed in a full-page layout!

(5) *P. 1492, line 16*: “titration”: is there evidence of sufficient NO? If not, rephrase more cautiously.

(6) *P. 1493*: The findings for the diurnal cycle are very interesting indeed.

(7) *P. 1494, line 10*: “...often leading to strong mixing between stratospheric and tropospheric air”: I doubt that this is explicitly concluded in the publications cited in this context (they show complex cases nevertheless). In particular, Trickl et al. (2010) report on indications that intrusions could be substantially dryer than found in the in-situ RH measurements. I suggest to replace “often leading to strong” by “also including”, and cite some of the relevant literature, such as Shapiro, *J. Atmos. Sci.* 37 (1980), 994-1004, Parrish et al., *J. Geophys. Res.* 105 (2000), 24363-24374.

(8) *P. 1495, lines 7-8*: The justification of a 60-% threshold looks strange. 60 % is by no means a stand-alone criterium for stratospheric air. It could represent the width (“full width at half maximum”) of an intrusion, which cannot be determined by, e.g., RH = 10 %.

(9) *P. 1499, lines 9-10*: Is there observational evidence for the influence of the orographic circulation, is there any publication on this? How far away is the next area with enhanced air pollution? Can the air pollution move along the entire valley within a single day, or does this require a series of diurnal cycles? Is there similarity to related studies elsewhere (e.g., Vergeiner and Dreiseitl, *Meteorol. Atmos. Phys.* 36 (1987), 264-86; VOTALP special issue, *Atmos Environ.* 34, around p. 1400)?

**Language:**

*Title*: “Pyramid” instead of “pyramid”?

*Line 1 of Abstract*: Replace “2-years” by “2 years” or “two years”.

*P. 1487, line 1*: Change to “Signals”.

*P. 1493, line: 22*: Change to “air masses”.

*P. 1495, lines 17-18:* Change complicated final sentence to “This demonstrates that the measurement site was influenced by stratospheric air masses during a non-negligible fraction of time”; however, it would be even better to extend the previous sentence like this: “...investigated period, a non-negligible fraction of time.” since the rest in the final sentence is already mentioned.

*P. 1496, line 25:* Change to “...transported to NCO-P by up-valley flows...”

*P. 1498, line 15:* Change to “... the first 2 years...” or “...the first two years...”.

*P. 1499, line 11:* I would write either “transport” or “transport processes”.

*P. 1499, line 17:* Change to “to identifying”.