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## ***Interactive comment on “Development and application of a new mobile LOPAP instrument for the measurement of HONO altitude profiles in the planetary boundary layer” by R. Häseler et al.***

**Anonymous Referee #1**

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HONO contributes to OH radicals in the atmosphere, yet the source of HONO is not well defined. Measurements of vertical profile of HONO concentration can help to understand the role of HONO in the photochemical reactions at different levels above the ground, and the source of HONO in the atmosphere. This paper reports the development and application of a new mobile LOPAP instrument for the measurement of HONO altitude profiles in the planetary boundary layer. The instrument and the dataset obtained with airship campaign are unique and interesting, and the subject of the paper is appropriate for publication in AMT. Following lists my major concerns about the paper:

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1. In the introduction section, the paper needs to explain why it is important to develop a mobile instruments and why it is important to obtain the vertical profile HONO concentrations.
2. As a paper about the development of a new mobile instrument, the paper did not provide enough results about the evaluation of the instrument and its comparison with the original LOPAP instrument.
3. Since this instrument is designed for measuring vertical profile, the authors need to exam how the change of pressure (and other changes associated with the change of altitude) could influence the measurement results.
4. The paper presents the HONO profile results during the ZEPTER campaigns, there are large variation and spikes of HONO concentrations. The paper needs to discussion if these large and sudden variations were caused by the malfunctions of the LOPAP-Z instrument or the real change in HONO concentration in the boundary layer.

## Technical comments:

1. page 2033, line 20-24, the paper needs to present the evaluation results, such as how the change in water content (relative humidity) influences the results;
2. page 2034, line 10-13, how this disadvantage impacts on the inter-comparison results?
3. page 2037, line 4-5, I don't understand what the authors try to say with the sentence "However, the inlet for the NOx, O3, and CO instruments was at the top 5 platform , approximately 20m above the inlet of the LOPAP-Z.", more elaboration is needed here.
4. page 2038, line 10-14, here it describes the measurement of HONO during daytime and in the early evening. However Figure 10 in the Figure it use "day" and "night". This is misleading, because the HONO concentration in the night can accumulate and may have much higher concentration than in the day time, while in the early evening after sunset, the accumulation of HONO just started. The "night" in figure 10 should be

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changed to “early evening”

5. page 2048, Figure 4, here the comparison of the two instruments shows that the results of LOPAP-Z is slightly higher than that of LOPAP-3. More discussion on the reason for this is needed. The error bars of the two instruments overlap, different color is needed for the error bars.

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