**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Coincident measurements of PMSE and NLC above ALOMAR (69 N, 16 E) by radar and lidar from 1999–2008" *by* N. Kaifler et al.

Anonymous Referee #1

Received and published: 20 December 2010

Review of Kaifler et al., "Coincident measurements of PMSE and NLC above ALOMAR by radar and lidar from 1999-2008.

General: This paper presents an analysis of summertime data over ten years from a high-latitude site on polar mesospheric summer echoes (PMSE) and noctilucent clouds (NLC). The PMSE data are from the ALWIN VHF radar and the NLC data are from a 532-nm lidar. Detailed descriptions and characteristics for both of these instruments were published previously, and they have been shown to be reliable for these purposes.

The main thrust of the paper is to condition and merge both datasets to study the si-multaneous appearance (or not) of PMSE and NLC, and to characterized observed

coincidences in terms of the altitude ranges involved. As such, it is essentially a statis-tical excercise combined with the development of a classification scheme. There are practically no modeling or physics-based calculations involved; presumably this paper is meant to build a solid foundation for future theoretical analysis. Although the paper could be strengthened by including such work, I believe that there is sufficient content here to warrant publication. In particular, a detailed analysis of such a large volume of data (with nearly 2800 hours of simutaneous radar and lider measurements) repre-sents an important advance in our understanding of how PMSE and NLC are related from a pure observational standpoint.

The paper is generally clear and concise, and the figures and tables are clear. Minor comments and suggestions follow:

1. Abstract: "...were invisible to the radar due to..." is a statement that can be un-derstood but is incorrect because "invisible" refers to something that cannot be seen with visible wavelengths (which says nothing about the 6-m radar). I would strongly recommend "..were not detected by the radar due to..."

2. p 25083, line 9: "number electron density" should be "electron number density"

3. p. 25085, line 9: "...allows to derive..." should be "...allows us to derive..."?

4. p. 25086, line 1: Could use more information on how EPP events were removed from the dataset and how (if) that impacted results. How were these events identified or quantified, and what fraction of the total dataset did this represent?

5. The impact of choice of thresholds for P (radar) and beta (lidar) is examined in Fig 5 which is good. However, there are other, seemingly arbitrary, choices made in section 2.3 which describes the extensive data conditioning and signal analysis done to the data, and many of these choices are not well justified. For example, "..in the neighbourhood of 8 bins..." and "... one bin in the two bins before and after...". It is unclear what happens to the statistics if one would choose 4 bins instead of 8, or three

bins before and after, etc. A little more discussion that would justifiy the choices and show that the results are not sensitive to their exact values would be useful here.

6. p. 25090, line 8: "...as set diagram." should be "...as a set diagram." ?

7. Section 3.1.2: Why is there no relation for P(PMSE| not(NLC)) ?