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Atmospheric Chemistry and Physics Discussions

Interactive comment on "NLC and the background atmosphere above ALOMAR" *by* J. Fiedler et al.

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GENERAL COMMENTS This paper represents an extension to previous long-term analysis of ALOMAR lidar data addressing NLC behavior (e.g. Fiedler et al. [2005,2009]). In addition to extending the length of the overall NLC data set to 14 years, the lidar data are supplemented in this paper with LIMA model results and co-located radar data to provide further information on mesospheric background conditions during the lidar observations. The ALOMAR measurements are a key source of information for understanding variations in NLC behavior, and the presentation of the variability in local time dependence of NLC parameters is particularly important.

SPECIFIC COMMENTS p. 5649, lines 10-11: It is difficult to understand the nature of the local time variations shown in Figure 2 with so many repetitions of a complex structure compressed into the full season time period. It might be clearer to show just

the daily average of each parameter over the season and the envelope of minimum and maximum values created by the local time variation, since the detailed structure of this function for each parameter is shown more clearly in Figure 4.

p. 5650, lines 2-5: This is a valuable observation for the reader who may question the significance of selected seasonal values based on changes in data volume alone.

p. 5651, lines 13-16: It seems that getting adequate data to characterize 8-hour and 6-hour periods might be more dependent on acquiring long stretches of continuous data, whereas analysis of 12-hour and 24-hour periods should be more robust against small (few hour) data gaps due to poor weather or other issues.

p. 5651, line 18 – p. 5652, line 10: Figure 5 is a very important results for efforts to derive a local time signature of NLC behavior from satellite data sets (e.g. DeLand et al., 2007; Stevens et al., 2009; DeLand et al., 2011). The implication of this figure is that the diurnal signature derived from either a single year of data or a large-scale average of many years may not adequately describe NLC behavior in each individual year.

p. 5653, lines 9-11: The agreement of NLC occurrence with model cold temperature anomalies show in Figure 6 (panels 1 and 3) is also consistent with the local time variation shown in the top panel of Figure 4.

p. 5655, line 26 – p. 5656, line 1: The results shown in Figure 8 support the previous comment.

p. 5658, lines 18-21: The results presented in Section 6.2 are sobering for the analysis of long-term satellite NLC data sets that view multiple local times at high latitudes, and changing local times over the lifetime of a single satellite. - Do the authors have any suggestions for how to evaluate local time effects for time periods prior to the ALOMAR data? At other latitudes? - Can the variations in harmonic fit properties shown in Figure 5 be correlated with LIMA output in a way that would allow extension of these results

(even in an approximate sense) to other latitudes and years?

p. 5659, lines 16-20: The direct solar influence on the ECMWF data used in LIMA (which are cut off at 35 km) is likely to be less significant than the solar influence at mesospheric altitudes.

p. 5660, lines 3-6: The results shown by Robert et al. [2010] suggest that the influence of solar activity on mesospheric temperature is responsible for the approximate 27-day periodic signal in NLC occurrence frequency.

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