

## ***Interactive comment on “Quantification of waves in lidar observations of noctilucent clouds at scales from seconds to minutes” by N. Kaifler et al.***

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The authors present a very good study with excellent figures documenting well performed scientific analyses. The field of research is of actual scientific importance and the study is performed with an unprecedented combination of high-resolution instrumentation, data acquisition and spectral analysis.

The detections of significant signatures in NLC altitude and brightness variations below the Brunt Wäisälä period is of special interest. While only very few other studies and techniques allow observations at MLTI altitudes in this period range (e.g. selected

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airglow and doppler soundings), the quality of the presented data, analyses and results permits noteworthy conclusions on atmospheric dynamics on very small temporal and spatial scales.

The derived slopes between -1.3 and -2 (in comparison with classical -5/3) and the given explanation of mixed influences of horizontal and vertical perturbations are very interesting and could also be applied to other studies with that result.

Concerning the findings of signatures between 1 and 5 minutes (excluding for my point of view the signatures below 1 minute, since a lot of significant random number activity is visible in that period range, figure 8): It is very interesting to observe the significant existence and distribution of periods below the Brunt Wäisälä limit. I agree, following the authors conclusions and reviewers comments, that this might hint at acoustic waves in NLC and requires further analyses in this field (recommended). The period range below 5 minutes in figure 8 might even contain a small peak of increased number of detections around 3.5 minutes in the top and bottom plots; although the limitations of statistics have to be kept in mind, this increased number might hint at acoustic features, since it is documented in literature as a prominent convective, resonant, infrasonic period.

Further investigations e.g. concerning seasonal dependence, addition observation parameters and improving the statistics by more observations are very much encouraged.

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