

What can we Learn From Ground-based Photography of Noctilucent Clouds?

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Since the summer 2004, photographs of noctilucent clouds (NLC) are taken from the top floor window of the Arrhenius Laboratory at the University Campus in Stockholm, Sweden (59.37 N, 18.06 E). A digital camera takes every summer night hundreds of images of twilight sky at the rate of 1 to 2 pictures per minute. Time-lapse movies, which magnificently visualise dynamical character of the mesopause region, can be made out of these image series. Wave-like structures of different spatial scales, non-periodic features of different shapes and sizes and front-like structures can usually be observed as they move through the twilight arch. The images have, however, to be re-projected to a horizontal plane in order to correctly represent movements and actual spatial scales. A study of such images provides tools for analyzing the dynamics of this region of the atmosphere. In fact, NLCs work as a tracer of the coherent structures forming or propagating at the mesopause level. Optical studies of similar phenomena have already been conducted using the mesopause region airglow emissions as markers of the waves. Since an NLC layer is significantly thinner than a typical airglow layer (2-3 km compared to 8-9 km) the observed wave signatures should appear much more distinct (or "sharp") in NLCs and thus could be studied in much better detail. Analysis of such still images and time-lapse movies provides information on the region's dominating wind (bulk motion) and characteristics (wavelengths, phase velocities) of periodic features. Examples of such investigation will be presented.

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