

## **Trends and periodicities in NLC and related phenomena**

**S. Kirkwood and P. Dalin**

*Institutet för Rymdfysik, Kiruna, Sweden*

Noctilucent clouds (NLC) are the highest clouds in the Earth's atmosphere, observed close to the mesopause at 80-90 km altitudes. Visual NLC observations have been recorded in Europe and in Russia for several decades with varying degrees of detail. During a much shorter period, automatic cameras on the ground have been used to monitor NLCs, and the closely related 'Polar Mesospheric Clouds (PMC), and 'Polar Mesosphere Summer Echoes' (PMSE) have been monitored by satellites and ground-based radars, respectively.

Some 10 years ago there was a widespread belief that the visual NLC observations from NW Europe showed a very large increase from the 1960's to the 1990's but this turned out to be untrue – no significant trend was in fact discernible. At the same time, careful analysis of the longest, sufficiently detailed, ground-based NLC records (Moscow 1962-2005) does not show any significant trend. Small trends in PMC brightness have, however, been reported from satellite observations.

It has been found that periodicities including tidal periods (PMSE), 5-day periods (PMSE, NLC, PMC) and decadal cycles (NLC, PMSE) strongly affect conditions at NLC heights. In addition, combination of the Moscow NLC records with the detailed records from Denmark (1983-2005) shows that the characteristic longitudinal scale of NLC fields is less than 800 km, so that further wave effects must be important.

In our review we will consider how the observed shorter periodicities (5-day or less) and longitudinal variation might affect annual 'mean' statistics and examine whether reported decadal cycles and 'trends' can be physically interpreted.