



Diurnal variations of noctilucent clouds above ALOMAR as observed by lidar since 1997

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From 1997 to 2003 noctilucent clouds (NLC) were observed by lidar above the ALOMAR observatory in Northern Norway (69° N) during a total of 1880 measurement hours. This data set contains NLC signatures for 640 hours, covering all local times even during highest solar background conditions. After data limitation regarding a threshold value for the volume backscatter coefficient of the NLC particles, a measure for the cloud brightness, local time dependencies of the NLC occurrence frequency, altitude, and brightness were determined. On average over the 7 years NLC occurred during the whole day and preferably in the early morning hours with a maximum occurrence frequency of $\sim 40\%$ between 4 and 7 LT. Splitting the data into weak and strong clouds yields almost identical amplitudes of diurnal and semidiurnal variations for the occurrence of weak clouds, whereas the strong clouds are dominated by the diurnal variation. NLC occurrence, altitude as well as brightness show a remarkable persistence concerning diurnal and semidiurnal variations from 1997 to 2003, which allows to conclude that NLC above ALOMAR are significantly controlled by atmospheric tides. The observed mean anti-phase behavior of cloud altitude and brightness is attributed to a phase shift of the semidiurnal components by ~ 6 hours. Investigation of each individual year regarding the prevailing oscillation periods of the NLC parameters shows also different phase relations and thus the complex nature of the cloud parameters variability.