

CHARACTERISTICS OF NOCTILUCENT CLOUDS AND THEIR CONSTITUENTS ABOVE ALOMAR

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Ice particles in the polar summer mesopause region are sometimes visible by eye and are called Noctilucent clouds (NLC). From our current understanding of the physical processes involved we expect that the cloud formation depends (amongst others) on temperature and water vapor, which are highly variable and hard to measure at the altitudes of interest. Models observe a strong dependence of NLC on atmospheric background parameters and the fact that the clouds show variability at different time scales from minutes to several years make NLC an attractive tracer. Using active optical sounding by lidar from ground allows to detect the clouds night and day. The ALOMAR RMR-lidar is located in Northern Norway close to the Andøya Rocket Range and has observed NLC regularly since 1997. Using the most sensitive wavelength of the lidar at 532 nm we have observed NLC signatures covering all local times. From these observations basic cloud parameters like brightness, altitude and occurrence frequency are derived. To deduce properties of the particles forming NLC we use three widely separated wavelengths (355 nm, 532 nm, 1064 nm) and can measure the size and number density of the particles throughout the layer. The combination of basic cloud parameters and microphysical particle properties allows detailed studies of the observed variations and helps to understand the physical processes involved. We investigate and compare variations from yearly to hourly time scales. Combining the lidar observations of the clouds with atmospheric background conditions allows to investigate the origin of the clouds above ALOMAR. With the new Doppler Rayleigh Iodine System we expect to perform detailed studies of the cloud movement by direct detection of the Doppler shift by moving NLC particles.

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