

Observations of noctilucent clouds with CRL Rayleigh lidar in summer 2002 at Poker Flat

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Communications Research Laboratory (CRL) have deployed nine optical and radio wave instruments at Poker Flat Research Range (PFRR : 65.1N, 147.5W, 394m ASL), Chatanika, Alaska. These instruments support a comprehensive middle atmosphere observation program called the Alaska Project. The Alaska Project is an international collaborative program of both the CRL (Tokyo, Japan) and the Geophysical Institute (the University of Alaska, Fairbanks). The CRL Rayleigh lidar was installed at Poker Flat in November 1997 as one of the nine instruments of the Alaska Project. Height profiles of atmospheric density and temperature in the altitude range of 35 - 80 km can be derived from the CRL Rayleigh lidar data in winter seasons. In late summer seasons, the late July to the beginning of September, we can also observe scattering signal from noctilucent clouds (NLCs) which occur in the upper mesosphere (around 82 - 84 km). NLCs occur only in polar summer when the upper mesospheric temperature reaches lower than 150 K. Occurrence ratio of NLCs have close relationship with temperature structure and abundance of water vapor in the upper mesosphere, and the occurrence ratio increases as temperature decreases and water vapor increases. That fact suggests that NLCs are able to be considered as one of the important indicator for the global change, because strong cooling in the upper mesosphere would balance with warming in the lower atmosphere and the increase of water vapor would be caused from increase of methane in the earth's atmosphere. In this presentation, we show the initial results of NLC data which were taken with CRL Rayleigh lidar in summer 2002 at Poker Flat. Ten-nights data were obtained from July 21/22 to August 27/28, 2002. Scattering signals from NLCs can be found in several data sets. These signals show significant day-to-day variations in occurrence height and intensity. We will derive scattering ratio of NLCs and atmospheric temperature below NLCs and compare these results with the data obtained by the SNOE (student Nitric Oxide Explorer) satellite.