



Thin ice clouds at the tropical tropopause; observations by a mobile lidar system during the STAR-project 2004 in Paramaribo/Suriname

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In the frame of the EU project STAR we have performed measurements of tropical cirrus clouds with a lidar in Paramaribo/Suriname (5.8°N, 55°W). The mobile lidar System MARL was set up at the site of the meteorological institute of Suriname (MDS) and run during the dry season from mid September to mid November 2004. The MARL system measures backscatter and depolarisation at 532 nm and 355 nm using a 30 Hz Nd:YAG laser (Continuum 9030) and a 1.1 m Cassegrain telescope. Ice particles can be distinguished from aerosol by their large depolarisation. The optical depth of cirrus clouds is determined either using the Raman or the Klett method depending on the strength of the backscatter. Our system is able to detect clouds with optical depth below 10^{-3} .

Thin cloud layers are detected frequently in the tropical tropopause layer (TTL). Overall we found in almost 90% of all measurements ice clouds in the TTL. About 40% of these clouds had optical depths of less than 10^{-2} . They usually occur at the cold point of the temperature profile which was measured once daily by a radiosonde. The cloud top temperature is crucial for determining the amount of water vapour that is able to penetrate the stratosphere. We analyse data from the local radiosonde and ECMWF as well as temperature profiles derived from the lidar signals to give a best estimate of the meteorological conditions at which tropical cirrus occur.