



Nitric Acid in Tropical Cirrus Clouds

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Nitric acid uptake in cirrus clouds has extensively been studied during field missions in the last 10 years. However, the tropics remain a severely undersampled region of the atmosphere despite their climatic relevance.

Here we show first measurements of nitric acid in tropical cirrus clouds during the TROCCINOX and the SCOUT campaigns 2005. We evaluate the HNO₃ content of the ice crystals in terms of HNO₃/H₂O molar ratios in ice and determine the fraction of the total HNO₃, that is bound in ice crystals. Both values increase with decreasing temperature. We compare our data to results from previous field campaigns in subtropical, midlatitude and polar regions. Specific for the tropical tropopause region are cold temperatures, and the existing dataset on HNO₃ uptake in ice could be extended down to temperatures of 190K. The observations can be explained by uptake of HNO₃ in ternary aerosol serving as freezing nuclei and subsequent trapping of HNO₃ during ice crystal growth.

Frequent occurrence of cirrus clouds near the tropical tropopause has been detected by lidar observations. The cirrus cloud occurrence frequency between the tropics and midlatitudes is derived from high resolution lidar data and compared to satellite observations.