Geophysical Research Abstracts, Vol. 8, 10428, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10428
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Observing the freezing of upper troposphere stratiform clouds

G. P. Gobbi, F. Barnaba, L. Ammannato, and F. Angelini

Institute of Atmospheric Sciences and Climate (ISAC-CNR), Rome, Italy
(g.gobbi@isac.cnr.it)

The characteristics of upper troposphere stratiform clouds are investigated by lidar depolarization profiles collected at Rome, Italy (42N-13E). Typically, these clouds are detected on 30-40% of the time. Lidar depolarization traces show that an average 50% of these clouds is frozen, the balance presenting large amounts of liquid regions. To investigate the freezing temperature of upper troposphere stratiform clouds we compare lidar depolarization profiles and temperatures from NCEP re-analysis. Nine-hundred observations collected in the years 2001, 2002 and 2003 are considered. Clouds forming in the presence of Saharan dust (256 cases) are addressed separately from the others. The analysis shows no meaningful differences between the freezing point of the two ensembles. These results appear to contradict the common view of mineral dust representing most effective ice nuclei. These and other statistical properties of upper troposphere stratiform clouds are presented and discussed.