

CLOSURE STUDIES IN MIXED-PHASE AND ICE CLOUDS OVER CYPRUS: IS THERE AGREEMENT BETWEEN ICE NUCLEI AND ICE CRYSTAL NUMBER CONCENTRATION?

Rodanthi-Elisavet Mamouri^{a}, Albert Ansmann^b, Johannes Bühl^b, Ronny Engelmann^b,
and Diofantos Hadjimitsis^a*

^aERASTOSTHENES Research Centre, Faculty of Engineering and Technology, Cyprus University of Technology, Saripolou 2-6, 3036 Achilleos 1A Building, Limassol, Cyprus; Tel: +35725002247; E-mail:

rodanthi.mamouri@cut.ac.cy

^bLeibniz Institute for Tropospheric Research, Permoserstraße 15, 04318 Leipzig, Germany; E-mail:

albert@tropos.de

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ABSTRACT: Combined aerosol and cloud measurements with polarization/Raman lidar and wind Doppler lidar were performed during field campaigns in Cyprus in 2015 and 2017/18. One of the goals was to investigate the relationship between the ice-nucleating particle concentration (INPC) outside mixed-phase and cirrus clouds and the ice crystal number concentration (ICNC) within the observed altocumulus and cirrus layers or just below cloud base (in the virga region). In a cooperation of the Cyprus University of Technology (CUT) and the Leibniz Institute for Tropospheric Research (TROPOS) we developed a new technique to derived height profiles of INPC from polarization lidar measurements. The Doppler lidar, on the other hand, measures the fall velocity of ice crystals from which the effective size of crystals can be estimated and together with the optical properties (from the polarization lidar observations) the ice crystal number concentration can be estimated as well. We present case studies of INPC profiles and ICNC estimates for altocumulus layers (between 5-7 km height) and in cirrus clouds (between 9-10 km height). Good agreement, but also strong deviations between the INPC and ICNC values were found. This will be discussed in the presentation.