CCN estimates from CALIOP/CALIPSO observations during the EUFAR-ACEMED campaign

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It is widely accepted that aerosols impact the formation, the optical properties and the life cycle of clouds, aerosol-cloud interactions (ACI) being the largest source of uncertainty in climate change studies. Specifically, for warm clouds, ACI depend on the cloud condensation nuclei (CCN) number concentration. So far, satellite-based studies focusing on ACI utilize observations of aerosol optical depth (AOD) or Aerosol Index (AI: AOD multiplied by the Ångström exponent) considering them as a proxy for the number of aerosols in the atmosphere and not CCN observations per se. Here, we present a first effort to calculate CCN concentration profiles from CALIOP/CALIPSO satellite observations based on recently proposed parameterizations. CCN concentrations along with the corresponding uncertainties are calculated for different tropospheric aerosol types and for different supersaturation levels. Our data are compared against CCN retrievals from the MODIS/Aqua satellite-based product which are available over oceanic areas only. Then, the data are validated against particle number concentrations at different height levels from airborne measurements over the greater Thessaloniki area in northern Greece. The validation data were retrieved from the FAAM (Facility for Airborne Atmospheric Measurements) BAe-146 research aircraft during the ACEMED (evaluation of CALIPSO's Aerosol Classification scheme over Eastern MEDiterranean) campaign that took place in September 2011.