1.240 Cloud condensation nuclei (CCN) measurements with the HALO aircraft during EMeRGe in European and Asian airspace.

Early Career Scientist

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Abstract:

During the EMeRGe campaign we employed a cloud condensation nuclei counter (CCNC) on board the high altitude and long range (HALO) research aircraft. The instrument was located in the CCN-Rack, together with a single particle soot photometer (SP2) and an aerosol multi-impactor for microspectroscopic aerosol particle analysis. The aerosol

particles were sampled by using the HALO aerosol submicrometer inlet (HASI).
The scientific goal of EMeRGe has been to investigate the effect of megacities on the transport and transformation of pollutants on the regional and global scales. Therefore, measurements were taken in the European airspace in 2017, probing aerosol properties over cities like London, Paris, Barcelona and Rome. During March 2018, the same set of instruments was probing the outflows of Asian megacities like Taipei, Manila and transported pollution from China Mainland over the ocean. Furthermore, Japanese and South Korean airspace were probed. The measurements took place in altitudes between 0.3 km and 13 km ASL. Our scientific objective is to investigate the effect of different pollution states on cloud properties.
The measurements have been performed with a two column continuous-flow longitudinal thermal-gradient instrument (CCN-200) manufactured by DMT. The CCN-200 measures the CCN number concentration as a function of water vapor supersaturation (S). These measurements are carried out by changing S within one column from 0.10 % up to 1.00 % using 12 different supersaturations and keeping S constant within the second column (S =0.38 ± 0.04 %) to ensure baseline data. The different supersaturations are created by changing the flow while setting a fixed temperature difference.
The CCN properties will be compared with the total aerosol number concentration (CN) measured by a condensation particle counter and the black carbon measurements performed by the SP2. Supplementary, a comparison with ground based CCN and CN data from Cape Fuguei (Taiwan) will be conducted.