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COMPREHENSIVE CHARACTERIZATION OF THE AEROSOL, AND CLOUD CONDENSATION NUCLEI IN THE UAE]

by

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Abstract

Cloud seeding operations considered an alternative freshwater source in which it is used to modify the weather and enhance the conditions to increase the precipitation (rain or snow) in a target area. This technique aims to thicken the clouds and increase the chances of rainfall by inducing nucleation. It requires an operation crew on board a transport aircraft in order to deploy large amounts of seeding particles such as salts or silver iodide and discharged into suitable clouds. These particles act as cloud condensation nuclei (CCN), and, thus, affect indirectly the rainfall rate. In 2018, the increment of the rainfall rate was about 10-15 % as a result of cloud seeding operations as per the National Center of Meteorology and Seismology. The collected data from the Al Dhaid area will identify the optimal seeding strategies in terms of time, location, and amount of seeding via cloud-resolving model simulations using a differential mobility particle sizer (DMPS) and CCN ability with a CCN counter.

The principal conclusions of this study are that the contribution percentage of the coarse particle (diameter 2.5–10 µm) was negligible (0.6%) in number comparing to the fine particles, hence the fine particles (diameter 0.5 µm-2.5µm) dominate the total number concentration during the observation period. it was noticed that the correlation is stronger between the Nucleation mode and different metrological parameters (T^0C, RH%, Rain, mm, and wind speed, m/s) compared to the other aerosol modes as expressed by the correlation coefficients. An increase in CCN number concentration was observed during the period of March-July 2018 which could be linked to the long-range transport of polluted air masses. The highest percentage of the aerosol acted as CCN was found equal to 58% at 1.0% supersaturation, while the lowest percentage equal to 24% at 0.1% supersaturation.