Geophysical Research Abstracts
Vol. 13, EGU2011-11033, 2011
EGU General Assembly 2011

Long-term In Situ Measurement of Cloud-Precipitation Microphysical Properties over East Asia

Donghai Wang (1), Jinfang Yin (2), and Guoqing Zhai (2)

(1) State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Sciences, Beijing, 100081, China (wangdh88@163.com), (2) Department of Earth Science, Zhejiang University, Hangzhou, 310027, China

A survey of the existing literature on in situ measurements of cloud-precipitation microphysical properties was undertaken. Then, a database was generated with aerosol, ice nuclei (IN), cloud droplet, fog, ice crystal, snow crystal, and raindrop. From the datasets, the main properties of aerosol, IN and microphysical parameters were obtained, including mean concentration of liquid and ice particles, LWC, and functional fit parameters of particle-size distribution.

A statistical analysis about concentration of microphysical particles and their size distributions were performed. More specifically, microphysical particle range and mean concentration were analyzed, and functional fit equation forms and parameters were discussed.

The results are as follows. The overall average aerosol concentration in diameter greater than 0.3 μm is 166.9 cm^{-3}. Using piecewise functions to fit aerosol particle size distribution can reduce fitting errors greatly. The average maximum values of IN concentration can reach 78.9 L^{-1} at -20ºC, with an overall average of 22.9 L^{-1}. Cumuliform clouds have higher overall average cloud droplet number concentration (N_c) of 907.7 cm^{-3}, compared to stratiform clouds, of 120.9 cm^{-3}. Cumuliform clouds (stratiform clouds) have an average liquid water content (LWC) of 0.875 (0.140) g m^{-3}, with a peak value of 2.000 (0.520) g m^{-3}. The gamma-size distributions are shown to be suitable for most of the observed spectra in stratiform clouds. Both exponential- and gamma-size distributions are applicable to fit raindrops originating from stratiform clouds. Good agreement is obtained when gamma-size distribution is applied to fit raindrops originating from both convective and mixing (stratiform and cumuliform) clouds. The exponential-size distributions are suitable for ice crystals and snow crystals size distributions. All those will provide guidance for our understanding of cloud-precipitation microphysical properties. It is possibly useful for tuning cloud parameterization in the numerical models, evaluating retrival techniques even for weather modification matters.