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Long-term Measurement of Ice Nuclei Characteristics in North China

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A survey of the existing literature on in situ measurement of ice nuclei (IN) properties was undertaken during 1960-2006 and a data list was generated, in which IN concentrations at temperatures -15, -20, -25, -30° were presented. There are 28 filed programs were launched with a Bigg-mixing cloud chamber and a filter technique. Out of the 28 field programs, only 5 sampled with a filter technique. In this work, data sampled by Bigg-mixing chamber are taken as a calibration standard, and translate data sampled by a filter technique into a same level in according with previous study.

We used IN concentration at temperature -20° to delineate its varying with time during the period of 1960-2003, and discuss number concentration of active IN changing with air temperature. In addition, mean concentration of IN and functional fit parameters of IN-temperature spectra were described and compared to those over other regions around the world.

The results indicate that the total average IN concentration is 20.7L^{-1} (range of 3.6 to 78.9 L^{-1}) at temperature -20°. IN concentrations show an increasing tendency from 1960 to 2000, especially with a significant increasing during the period 1990-2000, but return to low values after 2000. The dependence of IN concentration on temperature is consistent, always increasing with decreasing temperature, which can be expressed exponential function as $N(T) = N_0$exp(-*bT*). Compared to those in North America and Australia, there is a higher background IN concentration over north China, but number concentration of active IN have a less sensitivity to temperature. All these may help to research into the cloud physics, climate change, as well as weather and weather modification.