Based on observing data of atmospheric aerosols measured on the top of Mts. Huang, southeast China, the physical characteristics of aerosol particles, such as number concentration, size distribution and the relationships to meteorological factors were analyzed and compared under different weather conditions. The results show that the mean number concentration reached $3.14 \times 10^3$ cm$^{-3}$ in spring, and $1.80 \times 10^3$ cm$^{-3}$ in summer, and ultra fine particles (<0.1 μm) account for 79% and 68%, respectively. The number concentration distributions in spring and summer all exhibit a single peak, with the peak value appears in 0.04~0.12 μm in diameter. The accumulation mode particles dominate in volume concentration and surface concentration distributions. Fine particles increased during non-foggy periods as compared with foggy periods. It is also indicated that, the meteorological conditions such as wind direction and speed, relative humidity, play a crucial role in formation of fine particles. The CCN concentration has a distinctive diurnal cycle, and can be expressed with formula, $N = CS^k$, while the parameters $C$ and $k$ show the continental characteristic of CCN in spring while maritime characteristics in summer. There is a positive correlation between aerosol number concentration and cloud condensation nuclei. A parameterization scheme for describing aerosol-cloud relationships is proposed.