

Organic aerosols: Their composition, origin and dynamics

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Atmospheric particles play an important role in climate forcing directly by absorbing or reflecting solar radiation and indirectly by acting as cloud condensation nuclei (CCN). The cooling effect of aerosols has been estimated regionally large enough to cancel out the global warming by the increasing concentrations of green house gases. As CCN particles, atmospheric aerosols involve in the microphysical process of cloud formation and thus affect on the precipitation processes and global water cycles. Recent rapid industrial developments in Asian countries have caused serious changes in atmospheric environments in East Asia and its outflow regions including the western North Pacific. The fast changes in the aerosol concentrations and compositions may be deeply involved with a recent extreme climate that are characterized by a frequent occurrence of heavy rain-related flood and drought. In particular, organic compounds are enriched in fine particles up to 70 % of aerosol mass and thus the aerosol activity as CCN and capability of cloud formation can be largely influenced by the water-soluble properties of organic aerosols. Water-soluble carboxylic acids such as oxalic acid and other diacids are abundant in fine aerosols and affect on the hygroscopic properties of atmospheric particles.

Here, I will review a recent progress of the studies on source and origin of organic aerosols and report on a hygroscopic property of atmospheric aerosols in relation to the chemical composition. As a result of recent industrialization and urbanization in China, air quality and atmospheric compositions may have significantly changed in East Asia and the western North Pacific. Recent campaigns that have been conducted in China, Korea and Japan will also be presented. In particular I will present the recent changes in the organic aerosol composition at Chichi-jima, Ogasawara Islands, the western North Pacific based on the long-term observation from 2001 to the present. These results will be compared with the observations that were conducted in 1990s at Chichi-jima.