Fog Droplet Size Distribution and the Interaction between **Fog Droplets** and **Fine Particles** During Dense Fog in *Tianjin, China*

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From November 2016 to January 2017, there were large-scale dense fog processes *in Tianjin area on the west coast of Bohai Bay, China*, even **strong dense fog with visibility less than 50 m occurred**. Based on the observation data of new fog monitor, visibility sensor, environmental particle monitor and high-density meteorological automatic station, the characteristics of **fog droplet size distribution** and the **interaction between the fog droplets and fine particles** during dense fog events were analyzed. The observed results show following characteristics: *(1)* The average concentration of fog droplets, the average liquid water content and the maximum liquid water content in the strong dense fog process were larger than those in the dense fog. Nucleation condensation was the main way of droplet growth in (strong) dense fog. **The average spectrum of fog droplet size distribution conformed to Junge distribution**, and they were all broad-spectrum fog with a spectrum width of about 45 μm. Due to its specific geographic location and background pollution, **the fog droplet size distribution in Tianjin was similar to that in heavily polluted inland cities and different from those of most coastal areas around the world**. *(2)* The average liquid water content (L_A) was 0.037g/m^3, **the heavy haze weather was the main reason why L_A in Tianjin was lower than that in some coastal areas of the world**. *(3)* **The maximum of fog droplet diameter during the formation stage had a good indication for the eruption of strong dense fog**. *(4)* Under the background of severe haze, **fog process can scavenge fine particles**, and the scavenging efficiency of $PM_{2.5}$ was remarkable. **The increase of the mass concentration of fine particles was conducive to the rapid growth of fog droplets and the sharp drop of visibility within a certain threshold (350 μg/m^3). However, when $C_{PM2.5}$ exceeded the critical value, the increase had a negative feedback effect on the development of the fog process.**

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