1.049 Microphysical and Chemical property of winter fog in highly polluted place in India .

Early Career Scientist

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Abstract:

The fog Experiment was carried out in Delhi to characterize the chemical and microphysical properties of dense fogs occur in the winter season over the northern part of India. This study provides results on aerosol and fog water chemistry, and microphysical properties during dense fog (around 25 events) occurred during 2015 – 2018 winter seasons. Data from the aerosol and fog water chemistry so far indicate a highly polluted environment in which fog developed and dominance of combustion ,vehicular exhaust sources have been noted in aerosol samples. Rapid uptake of gaseous NH_3 in the fog droplets was observed, which was likely due to acidic aerosol solution of HNO_3^- observed during dense fog cases. Secondary inorganic aerosols (SO_4^{2-} and NO_3^-) were dominant ions (38%) in the chemical constituents of the fine particles, higher during all fog events.The chemical partitioning of fog water samples suggested that NH_4^+ (28%) and SO_4^{2-} (26%) dominates chemical composition. The pH of fog water indicates alkaline (6.91). The concentrations of NH_4^+, SO_4^{2-}, Cl^-, Ca_2^+ and NO_3^- were found to be very high, indicating that fog water is highly polluted. Even though the acidic ions SO_4^{2-} and $NO_3^-$are very high, fog water is not acidic because of very high concentration of neutralizing ions NH_4^+ and Ca_2^+ in the samples. Mean particle size distribution was observed by Fog monitor FM-120. There were considerably high aerosol concentrations during the measurement period with an averaged aerosol number concentration of 1,00,000 cm^{-3}. a large amount of fog droplets (>1000 cm^{-3}) with small size (5–6 μm) were observed during the fog period, resulting in extremely low visibility (less than 100 m). Hence it is most likely that the particles grew larger by vapor

deposition/collection processes.LWC excess of 0.4 g/m^3 has been observed, suggesting that very large particles are formed during dense foggy condition.