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Characteristics of the Chemical Compositions of Aerosols in the North China Plain and their Impact on the Visibility in Beijing and Tianjin

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Highlights

- The low visibility events mainly happened in the North China Plain during the autumn or winter.
- The visibility and PM_{2.1} present non-linear correlations in different relative humidity conditions.
- Organic matter, NH₄NO₃, and (NH₄)₂SO₄ were the main light extinction factors in Beijing.
- 37.1% and 26.5% of the light extinction coefficients came from secondary aerosols on Pollutional Days in Beijing and Tianjin.

Abstract

To better understand the characteristics of the chemical compositions of aerosols comprised of water soluble ions (WSIs) and carbonaceous aerosol (CA) and their impacts on the visibility throughout the North China Plain (NCP), four experimental sampling campaigns were carried out between June 2013 and May 2014. The sampling sites were located in Beijing, Xiangshan, Tianjin, Shijiazhuang, and Qinhuangdao. The air pollution episodes mainly occurred during the autumn and winter in the NCP. With regard to different particle size distributions, the ratio of anions to cations in the fine size (0.64) was greater than that in the coarse size (0.54) in the NCP. Coefficients of divergence indicate that aerosol pollution had similar characteristics in the five cities of the NCP and that the pollutants were characterized by mutual influences and regional transfer processes.

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