4.165 High Time Resolution Source Apportionment of PM2.5 in Beijing with Multiple Models.

Early Career Scientist

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Abstract:

As the capital of China, Beijing has been suffered from heavy local emissions as well as regional transport, resulting in severe atmospheric fine particles ($PM_{2.5}$) pollution. To better analyze the sources and regional transport of $PM_{2.5}$ in Beijing, high time resolution datasets from online instruments together with multiple models should be applied together for identifying sources, which have seldom been used in previous studies. In this study, high time resolution online measurement of $PM_{2.5}$ was conducted during winter in 2016 in Beijing. Major measured species included 20 metals, 11 water soluble ions, organic carbon, and elemental carbon. This study focuses on online source apportionment of $PM_{2.5}$ in Beijing by positive matrix factorization (PMF) model, combining with other models such as chemical transport model (The Nested Air Quality Prediction Model System, NAQPMS), and the footprint model. The NAQPMS can distinguish local from regional contribution to air pollutants and the footprint model can identify potential source regions. $PM_{2.5}$ source apportionment in Beijing in winter by PMF showed that secondary source was predominant (40~57%) in hazy episodes while traffic source more important in clean episodes (25~32%). The air mass transport by NAQMS agreed well with the temporal variation of $PM_{2.5}$ with polluted southern air mass and stable meteorology resulting in the formation of haze episodes and clean northern air mass and high wind speed causing the rapid decrease of $PM_{2.5}$.The combination of PMF with footprint results indicated significant daily variation of $PM_{2.5}$ sources, with coal and traffic source dominated when footprints located in local area and secondary source contribution increased with southwest footprints.