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# Weather Condition dominates the Regional PM2.5 Pollutions in the Eastern Coastal Provinces of China during winter

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China has been suffering from severe particulate matter (PM) pollution in recent years. Both pollution area and pollution levels are increasing gradually. The PM pollution episodes not only occur in the traditional developed areas like Yangtze River Delta (YRD) and Beijing-Tianjin-Hebei (BTH) region, but also frequently happen in the whole eastern coastal provinces (ECPs) of China. Based on hourly PM2.5 concentrations during December 2013 $\sim$ February 2014 of 55 cities located in the ECPs, we investigated the spatial and temporal variabilities of PM2.5 concentrations and the corresponding meteorological conditions during winter. The results shown that basically the seasonal mean concentrations over the whole ECPs exceeded the China's national standard of 75 $\mu$g/m3, and the most polluted area with mean concentrations greater than 150 $\mu$g/m3 were located in the southwest of Hebei and the west of Shandong provinces. From December to February, there was a decrease trend for the PM2.5 pollution in most areas, especially in the YRD region, while the PM2.5 concentrations over north of Hebei province increased. The spatial distributions and monthly variations are strongly related to the weather conditions. Overall, severe PM pollution was corresponding to a stable weather condition, i.e. small Sea Level Pressure (SLP) gradient, lower Planetary Boundary Layer (PBL) height and weaker wind fields. Statistics shown that the changes of mean PM2.5 concentrations over the ECPs region usually lagged behind the variations of PBL height and wind speeds about 12$\sim$18 hours. The variations of weather conditions could explain about 71% (R2) of the overall changes of PM2.5 concentrations in the ECPs region. This study gives a full insight into the PM2.5 pollution in the area of eastern coastal provinces of China during winter, which would be helpful to predict and control the PM2.5 pollution for this area in the future.