

Transport of Ozone Pollution Over the East China Sea and the Yellow Sea: a Case Study in Coastal Cities in Eastern China

*Yanhua Zheng¹, Fei Jiang¹, Shuzhuang Feng¹, Zhe Cai²

1. Nanjing Univ., 2. Nanjing CLIMBLUE Technology co.LTD

During August 28 and September 5, 2017, a large-scale ozone pollution occurred in the eastern coastal of China. According to the characteristics of the observed ozone, there are three different pollution stages (with slight differences among cities). In the Stage 1, there were significant overall pattern of diurnal high and nocturnal low in O₃ named "single peak pattern". In the Stage 2, the diurnal ozone decreased slightly compared with the Stage 1 while the nighttime ozone increased. The daily minimum O₃ was basically above 20ppb, and the diurnal variation was weakened. In the Stage 3, the nighttime ozone decreased significantly, which restored the "single peak pattern". Using WRF-CMAQ model to simulate the contamination and combining the ozone distribution with weather situation, results are as follows. In the Stage 2, compared with other stages, the eastern coastal regions are controlled by high pressure, lower temperature made the daytime photochemical reaction abate, the bigger northeaster made the air mass above the yellow sea and East China Sea carrying high ozone to coastal regions, so ozone was lower in the day but higher at night. Analyzing the ozone contribution of the main physicochemical processes, it was found that the contribution of horizontal transport in the Stage 2 was significantly higher than that in other stages especially at night. Based on the above analysis, the contribution of transport over the yellow sea and East China Sea to ozone pollution is confirmed. The particle diffusion analysis showed that the air mass had passed over the Beijing-Tianjin-Hebei, the three northeast provinces, Japan-Korea and sea before affecting China's eastern coastal. Using the ISAM source apportionment to further determine the pollutant source, the results showed that pollutant emissions of Japan-Korea and the Beijing-Tianjin-Hebei had obvious contribution to eastern coastal ozone and the contribution of the former than the latter, larger scope and more widely.

Keywords: Ozone pollution, Coastal eastern China, Maritime transport