Study of the Spatial and Temporal Distribution of Ozone and Its Influence Factors over Sichuan Basin Based on Generalized Additive Model

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In order to study the spatial and temporal distribution characteristics of O_3 and its meteorological cause over Sichuan Basin, the data of national control environment monitoring stations and meteorological stations located in 18 cities in Sichuan Basin from 2015 to 2016 were analyzed. The results showed that the O_3 pollution was becoming serious and the high-value area expanded significantly in Sichuan Basin from 2015 to 2016. The high-value area was mainly located in the western of the basin, including Chengdu, Deyang, Ziyang, Meishan, Neijiang and Guang'an. The concentration of O_3 had obvious seasonal variation characteristics: summer ($110.70\pm41.52\mu$g/m3) > spring ($95.24\pm41.23\mu$g/m3) > autumn ($67.58\pm39.55\mu$g/m3) > winter ($47.17\pm41.15\mu$g/m3). Based on the Generalized Additive Model (GAM), it was found that O_3 has a nonlinear relationship with air pressure, temperature, relative humidity, wind speed, sunshine duration and precipitation. The sunshine duration, relative humidity and temperature had a great influence on O_3 concentration in the Sichuan Basin. While, the effects of wind speed, pressure and precipitation on O_3 concentration are less significant. The GAM model was further used to identify the dominant meteorological factors in 18 cities in Sichuan Basin and to forecast the O_3 concentration in 2017. The results showed that GAM model could predict the trend of O_3 concentration in each city very well.