Geophysical Research Abstracts
Vol. 21, EGU2019-4855, 2019
EGU General Assembly 2019

Objective Classification of Surface Wind Fields and Thier relationship to Air Quality in the Pearl River Delta Region,China

Jielan Xie (1) and Shaojia Fan (2)

(1) School of Atmospheric Sciences, Sun Yat-sen University, Guangzhou(xiejlan@mail2.sysu.edu.cn), (2) School of Atmospheric Sciences, Sun Yat-sen University, Guangzhou [U+FF08]eesfsj@mail.sysu.edu.cn[U+FF09]

Air quality in densely populated urban coastal areas is directly related to the coupling of the synoptic- and local-scale flows. Under the influence of different meteorological forcing, the dispersion conditions within the Pearl River Delta (PRD) basin lead to distinct spatio-temporal air pollution patterns. However, the wind-dependent pollution patterns in the region have not been revealed in any previous studies. The study conducts an objective wind field classification for the PRD region based on recent 5-year 23-station hourly wind observations. The results indicated that the wind fields over the PRD region can be grouped into 5 typical types: Type_N, Type_NE, Type_S, Type_SE and Type_Calm. Besides providing the main climatological and dynamic characteristics of the clustered wind fields, this paper also explores the modulation of the clustered wind fields on regional air quality based on simultaneous 55-site pollutant concentrations (including PM2.5, PM10, NO_2 and O_3). The wind type-air quality results revealed the general patterns of regional pollution under the typical wind flow conditions. An anomaly pattern with “downstream higher” and “upstream lower” surface distribution of NO_2, PM2.5 and PM10 were detected in the clustered wind types expect Type_Calm, indicating a strong cross-city transport in this urban-cluster region. In contrast, spatial distribution of O_3 concentration was quite different from that of other pollutants: central cities are commonly lower O_3 concentration than the surrounding cities likely due to the stronger tradition effect. This work will be conducive to the further analysis of the formation process and mechanism of air pollution and further provides important background information for air pollution prediction in the PRD region.