Geophysical Research Abstracts
Vol. 21, EGU2019-7366, 2019
EGU General Assembly 2019

Derivation of PM2.5 based on satellite AOD and Spatiotemporal trends of PM2.5 concentrations in China from 2006 to 2017

Wenhao Xue (1), Jing Zhang (1), Sa Xiao (1), Shuaiming Wang (2), and Yan Qiao (1)

(1) College of Global Change and Earth System Science, Beijing Normal University, Beijing , China(201831490015@mail.bnu.edu.cn), (2) Collaborative Innovation Center of Assessment toward Basic Education QualityBeijing Normal University, Beijing , China

Previous studies showed that fine particulate matter (PM2.5) has adverse impacts on human health and environment. In last decade, several air pollution episodes occurred in the vast area of China. We used two-stage model, multiple linear regression (MLR) model and geographically weighted regression (GWR) model, combined with MODIS Collection 6.1 (C6.1) Level 3 deep blue aerosol product, meteorological data, socio-economic data, land use and NDVI data to predict the PM2.5 concentration among China from 2006 to 2017 at $1^\circ \times 1^\circ$ resolution. Coefficient of determination (R2), mean absolute error (MAE) and root mean square error (RMSE) between the predicted and measured daily PM2.5 concentrations for 2016 were selected to evaluate the model accuracies, and the two-stage model showed the best performance (R2=0.78, MAE =16.31 μg m-3, RMSE=11.91 μg m-3) and was chosen for prediction of historical PM2.5 concentrations. The predicted accuracy (R2) were 0.55, 0.69, 0.76 and 0.77 in 2017 at weekly, monthly, seasonal and yearly levels. The monthly, seasonally and yearly mean PM2.5 concentrations predicted from 2006 to 2017 were used to analyze the spatial and temporal trends in China. The PM2.5 concentration was highest in winter and lowest in summer, and the North China Plain and Xinjiang Uygur Autonomous Region were the most polluted areas in China. We also selected eight city clusters in China to analyze trends of PM2.5 for these 12 years. Except Beijing-Tianjin-Bohai and Yangtze River Delta urban agglomerations where the trends were insignificant, all of the city clusters showed significant decreasing trends ($p<0.05$). The decreasing trends of PM2.5 concentration were slight (slope= -0.04 to -0.06 μg m-3 month-1) in eastern city clusters, while in contrast, it was more obvious in western city clusters (slope= -0.13 μg m-3 month-1).