Impact Factor Analysis for Spatially Varying Aerosol Optical Depth in Wuhan Agglomeration

Authors : Wenting Zhang, Shishi Liu, Peihong Fu

Abstract : As an indicator of air quality and directly related to concentration of ground PM2.5, the spatial-temporal variation and impact factor analysis of Aerosol Optical Depth (AOD) have been a hot spot in air pollution. This paper concerns the non-stationarity and the autocorrelation (with Moran's I index of 0.75) of the AOD in Wuhan agglomeration (WHA), in central China, uses the geographically weighted regression (GRW) to identify the spatial relationship of AOD and its impact factors. The 3 km AOD product of Moderate Resolution Imaging Spectrometer (MODIS) is used in this study. Beyond the economic-social factor, land use density factors, vegetable cover, and elevation, the landscape metric is also considered as one factor. The results suggest that the GWR model is capable of dealing with spatial varying relationship, with R square, corrected Akaike Information Criterion (AICc) and standard residual better than that of ordinary least square (OLS) model. The results of GWR suggest that the urban developing, forest, landscape metric, and elevation are the major driving factors of AOD. Generally, the higher AOD trends to located in the place with higher urban developing, less forest, and flat area.

Keywords : aerosol optical depth, geographically weighted regression, land use change, Wuhan agglomeration
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