

EGU2020-6382

<https://doi.org/10.5194/egusphere-egu2020-6382>

EGU General Assembly 2020

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Study on spacial-correlation between water pollution and industrial agglomeration in the developed regions of China

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Abstract: Agglomeration of the manufacturing industries is not only a fundamental driving force for urban development. However, a large number of manufacturing industries produce sewage and thus have negative effects on regional environment. This study first estimates the degree of clustering of pollution intensive manufacturing industries in the developed region of China at city level by introducing the Kernel density distribution function, and then evaluates the pollution distribution pattern by dividing the study area into several environmental units according to the naturally integrated characteristics of the primary streams. Furthermore, we quantitatively analyze the mechanism of the response of water environment quality to industrial distribution by utilizing the bi-variate spatial autocorrelation model. Results show that pollution-intensive manufacturing industries form clusters in suburban and non-sensitive areas. Besides, the density of pollution sources gradually decreases from the chief canals to the peripheral areas. Spatial autocorrelation analysis shows that spatial-relationships show differences according to industry categories: the agglomeration of textile, petrochemical and metallurgical industries prominently affects the spatial heterogeneity of water pollution distribution while the effects of the agglomeration of food manufacturing and paper-making industry on water pollution are not significant. Based on the spatial autocorrelation between industrial agglomeration and pollution distribution, we divide the study area into four types: high-agglomeration and high-pollution area, low-agglomeration and low-pollution area, low-agglomeration and high-pollution area, high-agglomeration and low-pollution area. Based on the that, we analyze the formation scheme and provide policy suggestions regarding industrial development. This paper provides a new perspective for the study of the interaction between industrial agglomeration and environment effects, and will be benefit the sustainable development of cities.

Key words: industrial agglomeration; Kernel Density Distribution function; water pollution; manufacturing industry; spatial autocorrelation