环境科学学报
ACTA SCIENTIAE CIRCUMSTANTIAE

研究报告

李茜,宋金平,张建辉,于伟,胡昊.中国城市化对环境空气质量影响的演化规律研究[J].环境科学学报,2013,33(9):2402-2411

中国城市化对环境空气质量影响的演化规律研究

Dynamics in the effect of China’s urbanization on air quality

关键词：城市化 城市空气质量 计量经济

基金项目：国家自然科学基金项目(No.41171444);2010年中央高校基本科研业务费专项资金

作 者 单位

李 茜 1. 北京师范大学地理学与遥感科学学院, 北京 100875;
2. 中国环境监测总站, 北京 100012

宋金平 北京师范大学地理学与遥感科学学院, 北京 100875

张建辉 中国环境监测总站, 北京 100012

于 伟 北京师范大学地理学与遥感科学学院, 北京 100875

胡 昊 环境保护部信息中心, 北京 100029

摘要：运用2001—2010年237个地级以上城市的面板数据,共计2353个样本,应用计量经济学分析方法,研究城市化进程中环境空气主要污染物的演化规律.在对面板数据进行平稳性检验后,运用固定效应模型和随机效应模型,将城市空气主要污染物SO_2、NO_2、PM_{10}的年平均浓度、综合污染指数4个空气质量指标与人均GDP、人口密度、第二产业结构、建成区面积4个反映城市社会经济发展的指标进行回归拟合,得到我国城市经济发展与环境质量变化的关系和演化规律,并提出政策建议.结果表明,2001—2010年,我国城市空气质量与经济发展之间的关系并不完全符合倒U型曲线,不同的污染物类型具有不同的演化规律.10年间,随着城市经济的发展,城市空气中SO_2浓度呈现下降的趋势,并到达拐点,符合倒U型曲线;而对于NO_2、PM_{10}浓度及综合污染指数,10年间与经济发展之间呈U型关系,即现阶段呈现污染继续加重的态势.此外,城市第二产业结构比例、建成区面积与城市空气主要污染物浓度呈显著的正相关关系.

Abstract: This study aims to investigate the relationship between urbanization and air pollution at the city level by analyzing annual panel data of 237 cities and total amount of 2353 samples during the period 2001—2010. Firstly, we took the unit stationary test of panel data, and then used fixed effect model and random effect model to investigate the relationship. The dependent variables included annual average concentrations of SO_2, NO_2, PM_{10} and comprehensive index, and the explanatory variables included per capita GDP, population density, proportion of secondary industry and urban area. The analysis results showed that the characteristics of relationship were dependent on types of pollutants. We found the existence of an invert U-shaped curve for SO_2, which demonstrated that SO_2 pollution of cities had reached the turning point, with the concentration of SO_2 decreased along with the economic development. In comparison, U-shaped curves existed for NO_2, PM_{10} and comprehensive index, which showed that the concentrations of NO_2 and PM_{10} were still in the upward trend at current stage. Moreover, the growth of secondary industries and the expansion of urban area had strong positive relationship with the concentrations of main pollutants.

Key words: urbanization air quality econometric analysis