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Virtual air pollution embodied in trade and its spatial transfer: a case study of the Yangtze River Delta urban agglomerations

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The trade of goods between cities will not only bring about the economic agglomeration, but also cause the pollution to be transferred due to the regional differences of production and consumption. Such an invisible pollution also becomes the price of the inter-city commodity trade. The Yangtze River Delta (YRD) urban agglomerations (Shanghai, Jiangsu and Zhejiang) are the most concentrated areas for trade in China. Taking the trade of 30 industrial sectors in the urban agglomeration of the YRD as an example, this study explores the spatial pattern of trade implicit air pollution (including SO_2, NO_x, VOC and PM2.5) in the whole YRD urban agglomeration nationwide. And in 2007,2010,2012 three time nodes, explore the YRD region trade implicit pollution center in the spatial migration. The results show that: the air pollution caused by trade exports in the YRD region accounts for more than half of the total air pollution in the region, and the implicit pollution of these trade also shows the distribution of urban agglomerations, such as Beijing-Tianjin-Hebei, and southeastern coastal cities. The center of trade implicit air pollution in the urban agglomeration in the YRD migrated to the northeast, with the longest migration of NO_x and the migration to the northeast by 136.31 km. Our results reveal the spatial pattern of implicit trade in trade and the shift of its center of gravity in the most concentrated urban agglomerations in China, providing a reference for the industrial restructuring of urban agglomerations and the sustainable development of the environment and economy. At the same time for the environmental tax levied on the market means to balance the relationship between the economy and provide the basis for the environment.