Multi-Scale Spatial Difference Analysis Based on Nighttime Lighting Data

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Abstract : The 'Dragon-Elephant Debate' between China and India is an important manifestation of global multipolarity in the 21st century. The two rising powers have carried out economic reforms one after another in the interval of more than ten years, becoming the fastest growing developing country and emerging economy in the world. At the same time, the development differences between China and India have gradually attracted wide attention of scholars. Based on the continuous annual night light data (DMSP-OLS) from 1992 to 2012, this paper systematically compares and analyses the regional development differences between China and India by Gini coefficient, coefficient of variation, comprehensive night light index (CNLI) and hot spot analysis. The results show that: (1) China's overall expansion from 1992 to 2012 is 1.84 times that of India, in which China's change is 2.6 times and India's change is 2 times. The percentage of lights in unlighted areas in China dropped from 92% to 82%, while that in India from 71% to 50%. (2) China's new growth-oriented cities appear in Hohhot, Inner Mongolia, Ordos, and Urumqi in the west, and the declining cities are concentrated in Liaoning Province and Jilin Province in the northeast; India's new growth-oriented cities are concentrated in Chhattisgarh in the north, while the declining areas are distributed in Uttar Pradesh. (3) China's differences on different scales are lower than India's, and regional inequality of development is gradually narrowing. Gini coefficients at the regional and provincial levels have decreased from 0.29, 0.44 to 0.24 and 0.38, respectively, while regional inequality in India has slowly improved and regional differences are gradually widening, with Gini coefficients rising from 0.28 to 0.32. The provincial Gini coefficient decreased slightly from 0.64 to 0.63. (4) The spatial pattern of China's regional development is mainly east-west difference, which shows the difference between coastal and inland areas; while the spatial pattern of India's regional development is mainly north-south difference, but because the southern states are sea-dependent, it also reflects the coastal inland difference to a certain extent. (5) Beijing and Shanghai present a multi-core outward expansion model, with an average annual CNLI higher than 0.01, while New Delhi and Mumbai present the main core enhancement expansion model, with an average annual CNLI lower than 0.01, of which the average annual CNLI in Shanghai is about five times that in Mumbai.

Keywords : spatial pattern, spatial difference, DMSP-OLS, China, India
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