Coupling relationship between land surface temperature and urban green space in urban heat island studies ——A case study in Changchun City

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An environmental consequence of urbanization is the urban heat island effect, which resulted from the replacement of natural landscapes with impervious surfaces, and it has become more and more serious and prominent, moreover, green space is the only producer in urban ecosystem, so the coupling relationship between land surface temperature and urban green space also becomes one of the hot topics and key problems in urban ecology. A case study in Changchun in Jilin Province of China is carried out by remote sensing and geographical information system. The 6th band (thermal infrared band) of Landsat5 TM images is used as data source, on the basis of atmospheric correction, Mono-Window Algorithm (MV for short) is used to retrieve the land surface temperature (LST). Then the spatial patterns of urban heat field distribution are analyzed. Furthermore, SPOT-5 image and 1:10,000 topographic maps are employed to identify types of green space as well as to quantify urban green spatial patterns. In addition, the landscape indices are calculated， and Euclid shortest-path function is used to analyze the spatial relationship between the center section of urban heat field and green space. The results showed that there were clear differences in the land surface temperature of different kinds of urban green space. There was a significant positive correlativity between shape complexity index of green land patches and the influence of green space on around thermal environment, by contrast, there was not apparent statistically relationship between area, perimeter of green space patches and the influence of green land on around thermal environment; what's more, the thermal capacity of water was much stronger, which resulted in the apparent low temperature effect, that is, water could make that it appeared low temperature region in urban heat field, however, the temperature was gradually decreased because the area of water was generally limited. The results would be of value to simulate spatial distribution of urban heat field and even put forward countermeasures to lessen the urban thermal environment intensity.

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