

URBAN HEAT ISLAND EFFECT IN PRESERVED ZONES OF HISTORY AND CULTURE IN OLD CITY OF BEIJING, CHINA

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ABSTRACT

Many problems were emerged with rapid development of urbanization, especially for some metropolitans. One of them was urban heat island (UHI) effect [1]. UHI refers to the phenomenon of the higher atmospheric temperature in the central urban area than the surrounding rural area, which makes the urban like a warmer island compared with the rural area [2]. UHI is one of the climatic disasters in urban area. It makes the originally warmer urban area hotter and hotter, especially in summer, so that there are more continuous days with high temperatures [3]. Consequently, some natural disasters, urban diseases and epidemics were caused by continuous high temperature [4]. UHI also makes the polluted materials can not be diffused easily, so that the urban environment was polluted heavily [5]. All of that are very bad for the urban ecology and residential environment. So monitoring of UHI and the consequent strategies for controlling the development of UHI is very important for the local government.

Beijing, the capital city of China, is a worldwide famous ancient city with a long history and brilliant culture. For preserving typical areas representing the ancient Chinese culture in old city, Beijing government enclosed 25 preserved zones of history and culture. The old city mainly refers to the areas enclosed by the second ring road. In this paper, the UHI in the 25 preserved zones of history and culture in old city of Beijing were performed using ASTER (Advance Spaceborne Thermal Emission and Reflection Radiometer) data. ASTER is the only high spectral resolution multi-spectral scanning system on the first platform on NASA's Earth Observation System. It has three visible and near infrared bands with 15m spatial resolution and six short infrared bands with 30m spatial resolution and five thermal infrared bands with 90m spatial resolution. The visible bands were used to extract the land use using maximum likelihood method. The thermal infrared bands were used to determine the land surface temperature using split-window algorithm. The thermal infrared bands were resized into 15m using near neighborhood algorithm. The UHI effect was indicated by the UHI intensity which is the temperature difference between the central urban area and the rural area. For calculating the UHI intensity, the temperature in the rural area must be computed. For more representing, a circle area outside fifth ring road was selected and their average land surface temperature

was regarded the comparative rural land surface temperature. The vector data of 25 preserved zones and second ring road were overlain to the land surface temperature image. The averaged land surface temperature in each zone and the old city were acquired using statistical method by ENVI software. The UHI intensity in each zone and the old city is the difference between the averaged land surface temperature and the rural land surface temperature. Our results showed that the averaged urban heat island intensity in the preserved zones of history and culture was lower than that of the old city. But the UHI intensity in some zones such as Liulichang, Dongluguxiang were very big. Because there were high density of buildings in these zone. The smallest UHI intensity is in the Huangcheng zone which might be resulted from the large areas of water body and green land. The UHI statuses in the preserved zones are helpful for the local government to take some measures to decrease the UHI effect in the preserved zones with a higher UHI intensity.

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