

Simulating Urban Heat Island Effects by Rapid Urbanization: A Case Study of Shanghai, China

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As one of the most concerned urban climate events, to accurately represent the urban heat island phenomena from the past scenario to the future scenario is my purpose. To achieve this task, a surface-atmospheric coupled model system was established, which included the image classification, urban growth model simulation, calculation of satellite retrieved LST data, calculation of anthropogenic heat flux density and atmospheric model simulation process.

On the other hand, in order to verify the surface-atmospheric coupled model system, as one of the most changing cities in the world, Shanghai was selected to test the coupled model. As one of the main objectives of this study was achieved with the demonstration of the successful coupling of two model systems to simulate the urban heat island phenomena for Shanghai in three selected study periods since the 1990s, when is the start year for Chinese economic reform in Shanghai.

For the results of the model simulation, the urban heat island phenomena in Shanghai can be excellently represented with the coupled model. Furthermore, the coupled model can provide a spatial-temporal continuity solution to represent the urban heat island during 30. Through these analyses, the availability of the methodology was proved. Finally, an attempt is made to utilize the verified coupled model to evaluate and estimate the urban heat island effect of other mega cities or metropolitan areas.

Keywords: coupled model, land surface temperature, LULC, OBIA, urban growth model, urban heat island