

The challenges of heat extreme events to the urbanization over Asia

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Asia, home to more than 4.0 billion people or 60% of all humankind is undergoing rapid urbanization. Meanwhile, over Asia, more than 50% of all new building construction worldwide is taking place. Considering the facts of large population and rapid urbanization, under the context of climate change, more regions and urban areas over Asia are gradually vulnerable. However, compared with Europe and the U.S, Asia has not made progresses in assessing risk and drawing up policies, and has conducted less synthetic researches. The topics related to heat wave events over Asia have been investigated. The evolution of heat extreme events was analyzed followed by investigations on specific sub-regions. The GHCN CAMS gridded land air surface temperature and the MODIS land surface temperature products (including MOD11C3/MYD11C3 and MOD11A2/MYD11A2) were used to evaluate the anomaly of summertime thermal environment over the region of Asian Monsoon and sub-regions, as well as the MODIS Land Cover Type yearly product (MCD12Q1).

Along with the positive warming trend over Asia, more and more areas have been suffered from heat extremes in summertime. Particularly, the increasing trends have become obvious since 1960, both in the affected area and anomaly intensity. It indicates that more areas over Asia are readily influenced by extremely heat events. Compared with other types, the urban and built-up generally presents larger surface temperature at daytime. Thermal contrast between urban and the surroundings, which is defined as urban heat island intensity (UHII) shows both time- and geography-dependent variations. Meanwhile, the UHII over medium and small cities was even more obvious and larger than megapolis areas. Findings suggest that land use/cover change as a consequence of rapid urbanization possibly gives positive feedback to warming anomaly during heat wave event. The exacerbated warming over the built-up environment, not only the megapolis areas but also medium and small cities, deserves our attention in urban management, especially for the area suffering rapid urbanization.

Key words: Asian monsoon, urbanization, megapolis, global warming