

City development adaptation towards heat wave event: A scenario study in Hong Kong

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This is a pilot study using the Weather Research and Forecasting (WRF) Model to evaluate and compare the meteorological impact (especially heat wave events in Hong Kong) due to an expansion of urban area and an increasing in building height respectively, with anthropogenic heating taken into account. As Hong Kong has a very high population density, with the addition of shortage of available land and expected further increase in population in the future, local policy-makers may consider developing at the country parks, or constructing taller buildings to support the expected increase of housing demand. Either decisions may bring impacts towards urban climate and consequently affecting quality of life, for instance change in urban heat island pattern and thermal comfort. Therefore, this pilot study will investigate the aforementioned phenomena, and may serve as a reference for policy-makers to make better decision in order to alleviate the potential health/heat risk.

The chosen simulation period is typical summer hot season in Hong Kong. Hong Kong is being influenced by the ridge of high pressure system during this period. In order to take anthropogenic heating and building influences into account, urban-WRF is configured to run with the Building Environment Parameterization and the Building Energy Model (BEP-BEM). There are three simulated scenarios, they are increased building height (30% higher) scenario, urban area expansion (30% more grids categorized as urban in Hong Kong) scenario and a control run for comparison. Comparisons of meteorological parameters, such as temperature, lower surface wind and heat index, will be discussed between the scenario runs and the control.

Keywords: WRF, urban climate, heat wave event, urban heat island, urbanization