Projection of change in urban heat island intensity of Tokyo metropolitan area during winter

Masayuki HARA,
Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology
Hiroyuki KUSAKA,
Institute of Life and Environmental Sciences, University of Tsukuba
Fujio KIMURA,
Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology
Yasutaka WAKAZUKI,
Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology

Abstract

During the recent 100 years, mean surface air temperature (SAT) increased about 3 C in Tokyo, while mean SAT of the world increased only 0.66 C. The major reason of the difference is urban heat island (UHI). The intensity of UHI is often large during winter. Although a large number of case studies have been carried out, climatological features of UHI are still unknown. We investigates change in UHI intensity of Tokyo metropolitan area associated with the global climate change. First, two high-resolution simulations including a urban canopy sub-model, i.e., a simple hindcast and another hindcast without urban area were performed and validated, before the estimatation of SAT change by the urbanization. Spatial distribution of mean SAT and statistics of 10-minute SAT in hindcast agree well with AMeDAS observation data. The other two simulations, future projection and future projection without urbanization were performed to investigate the impact of the future climate change using Pseudo-Global-Warming method (Sato et al., 2008; Kimura and Kitoh, 2008).