Possible historical impact of urbanization on the surface air temperature in Sofia, Bulgaria

*Lidia Lazarova Vitanova[1,2], Hiroyuki Kusaka[1]

1. Center for Computational Sciences, University of Tsukuba, 2. Nikken Sekkei Research Institute

This study investigates the possible historical impact of the urbanization in Sofia, Bulgaria. This is the first attempt to be numerically investigated the impact on urbanization on the surface temperature between 1878 and 2012. In this study we use the Weather Research and Forecasting (WRF) model with 1-km horizontal resolution for three separated months of July (2011 –2013) in two cases: past land-use (URB1878) and present land-use (URB2012). First, we verify the results of the control simulation (URB2012) against observations. The results show that the WRF model reproduces reasonably the diurnal temperature distributions for both high-urbanized and low-urbanized / rural areas. The mean model biases ranged from −0.6 to 0.6 ˚C. Second, the impacts of the urbanization on the surface air temperatures are evaluated. The results show significant nocturnal temperature increases by 3.1 ˚C in the URB2012 case compared to those in the URB1878 case in Sofia respectively. Third, the surface air temperatures between high and low-urbanized / rural areas are evaluated. The results showed significant nocturnal temperature increases by 3.6 ˚C between Sofia and its suburbs.

Keywords: urbanization, WRF model, surface air temperature

