EGU22-10930
https://doi.org/10.5194/egusphere-egu22-10930
EGU General Assembly 2022

Analysis of inundation characteristics under various computational conditions for large-scale flood forecasting

Naoki Koyama and Tadashi Yamada
chuo university, science and engineering, civil and environmental , Japan (knaoki002@g.chuo-u.ac.jp)

In recent years, climate change intensifies heavy rainfall, resulting in annual flood damage. Population is increasing worldwide, and urbanization is expected to continue expanding. Under these circumstances, once an inundation occurs, the damage is expected to be more extensive than ever before. Therefore, in this study, we are analyzing the effects of DEM resolution and land use data, which are the calculation conditions for inundation calculations in flood forecasting, on inundation characteristics such as inundation magnitude and duration during large-scale inundation.

In this paper, the target watershed was the Tone River in Japan, where major floods have occurred in the past, and the analysis was conducted in the plain area. DEM data and land use data are important factors in determining inundation characteristics; The higher the resolution of the DEM data, the better it can represent the microtopography, which in turn affects the inundation flow. Also, land use data determines the roughness coefficient, which affects the velocity of floodwaters, and the infiltration capacity and initial loss into the ground. In this paper, The DEM data were analyzed with resolutions of 5m, 25m, 50, 100m, and 250m. The land use data for the years 1978, 1987, 1997, 2006 and 2016 were used to analyze the inundation characteristics due to increasing urbanization.

The results of inundation analysis with different resolutions of DEM data show that the resolution has no significant effect on the inundation rate. However, as for the inundation area, the larger the mesh size, the larger the inundation area, which is expected to be caused by the homogenization of DEM data. It was also found that as urbanization progresses, the inundation area spreads faster. In addition, the urbanization process affects the diminishing period of inundation rather than the expansion process, because it loses the function of infiltration capacity, and the inundation depth is less likely to decrease.