Importance of Terrain Representation in Simulating a Stationary Convective System for the July 2017 Northern Kyushu Heavy Rainfall Case

Tetsuya Takemi (marat.khairoutdinov@stonybrook.edu)
Kyoto University, Disaster Prevention Research Institute

An extreme, damaging rainfall occurred in northern Kyushu in July 2017. Whether such an extreme rainfall is quantitatively captured by numerical models is a challenging issue. We investigate the influences of terrain representation in simulating a stationary convective system and the resulting heavy rainfall for this case by conducting a series of 167-m-resolution numerical experiments. By employing a high-resolution elevation dataset as well as a double-moment cloud microphysics scheme, the control experiment successfully reproduced the stationary, linear-shaped convective system and the associated heavy rainfall. When the model terrain was created by a coarser-resolution elevation dataset, the 167-m-resolution experiment underestimated the accumulated rainfall, because of discretely developing convection and weaker intensities of the rainfall. These impacts of the terrain representation were confirmed to be robust through conducting another experiments with a different microphysics scheme. The representation of model terrains is critically important in simulating stationary convective systems and quantitatively the resulting heavy rainfall.