

Numerical simulation of a heavy rain event in Hiroshima city on 19-20 August 2014

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In Hiroshima, heavy rainfall caused debris flows on 19-20 August 2014. The heavy rain was a line-shaped rainband caused by “back-building formation” in a relatively narrow region. To predict and mitigate this kind of disaster, an accurate numerical prediction is necessary.

In this study, we investigated important factors in a numerical weather prediction (NWP) model that impact on a performance of heavy rainfall forecast. The investigated factors were grid spacings (5 km to 250 m), planetary boundary layer (PBL) schemes, model domain sizes, lateral boundary conditions in nesting simulations, and terrain representations.

Results indicated that ultra-high-resolution (500-250 m grid spacing) experiments showed better performance than coarser-resolution experiments (5 and 2 km grid spacing) in the rainfall cases. The differences of grid spacings had a larger impact on the position of rainband. These results demonstrate that the ultra-high-resolution NWP model has the possibility to improve predictions of heavy rainfall.

Keywords: Heavy rain, High resolution, Numerical weather prediction