

An Ultra-high Resolution Ensemble Numerical Weather Prediction: Case Study of the Hiroshima Heavy Rainfall Event in August 2014

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This study aims to examine whether ultra-high resolution ensemble numerical weather predictions are able to produce a more accurate forecast. A case study was a heavy rain event that induced massive debris flow in Hiroshima, August 2014. The Japan Meteorological Agency non-hydrostatic model was run on the “K” computer.

The forecasts with 51 ensemble members were performed on two domains: an inner domain (500 km square) with 500 m grid spacing one way nested inside an outer domain (1600 x 1100 km) with 2 km grid spacing, each with 51 ensemble members. Each member on the inner domain receives boundary conditions from the corresponding member on the outer domain.

The best result of the 2km grid spacing model showed an intense rain band at the similar position to the observed rain band. However, in the worst result of the 2 km grid model, the weak rainband appeared northeast of the observed rainband. In contrast, all of the 51 ensemble member of the 500 m grid spacing model showed the rainband at the similar position to the observation. These results demonstrate that the high-resolution ensemble forecast has the ability to better prediction.

Keywords: heavy rain forecast, high-resolution, K supercomputer