

High resolution experiment of JMA-NHM using K computer

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In August 2014, a strong rainband covered Hiroshima city. A heavy rain triggered by the rain band caused debris flows in the north part of Hiroshima city. To prevent and mitigate these water-related hazards, high resolution weather prediction is very important. This study aims to clarify the impact of model resolution on the accuracy of the numerical weather prediction (NWP) model. Feature of this research was to compute a wide region in multiple resolutions.

This study employed a NWP model "JMA-NHM" and the "K computer", which is the 4th fastest super computer in the world. The research targeted the heavy rain event in Hiroshima city in August 19 to 20, 2014. The main experimental conditions were as follows. The experiments periods were 6 and 9 hours simulation till August 20 at 6 a.m.. The horizontal resolutions were 2 km, 500 m and 250 m. Planetary Boundary Layer Schemes were Mellor-Yamada Level 3 and Deardorff. The experiments of 2 km, 500 m, and 250 m used 72, 1600, and 6400 CPUs of the Kei computer, respectively. In this study, we defined the 2 km resolution as low resolution (LR) and the 500 m and 250 m resolutions as high resolutions (HRs).

The results showed that the HRs experiments showed better result than LR experiment. The ground observation results at Miiri indicated that the precipitation were gradually increasing from August 20 at 2 a.m. and peaked at 4 a.m.. The LR experiment showed precipitation was increasing from 2 a.m. to 4 a.m. as same as the observation results. However, strong rainband reproduced northeast of the Hiroshima city. The HRs results showed the rainband reproduced on the Hiroshima city and the damaged area. The precipitation peak was earlier than observation. The peak of precipitation of the 500 m resolution experiment was 2 a.m. and of the 250 m resolution experiment was 3 a.m.. In the presentation, we show results of the multiple resolution experiments impact on the NWP model.

Keywords: High resolution experiment, JMA-NHM, K computer, Numerical weather prediction