

Ultra-high resolution numerical weather simulation on the heavy rainfall event over the western Japan 2018

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In this study, we simulated a heavy rainfall event that occurred in western Japan in July 2018 using a high-resolution numerical weather prediction (NWP) model with a large model domain. The objectives of this study are to investigate the impacts of NWP model factors (grid spacing and model domain size) on the heavy rainfall simulation. The Japan Meteorological Agency Non-Hydrostatic Model and the K computer which was the flagship supercomputer in Japan were used for this huge simulation. One of the features of this simulation was that the high-resolution model (500-m grid spacing) was run on a very large model domain (3160*2600 km).

The model resolution showed to play a crucial role. The 500-m grid spacing model showed the best performance. The 2-km grid spacing models showed clearly better performance than 5-km models. One of the interesting findings was that in the long time simulation, the model with a larger domain showed better performance than the model with a smaller domain. Overall, we have demonstrated the benefit of using the high-resolution model (500-m grid spacing) with a large model domain.

Keywords: Numerical wheather prediction model, high-resolution, Western Japan heavy rainfall