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HighResMIP climate simulations with NICAM and beyond on supercomputer Fugaku

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The Non-hydrostatic ICosahedral Atmospheric Model (NICAM), a global model with an icosahedral grid system, has been under development for nearly two decades. Here, we present its recent updates for the Coupled Model Intercomparison Project Phase 6, High Resolution Model Intercomparison Project (HighResMIP) and their impact on the simulated mean states using 56-14km mesh model. Major updates include updates of the cloud microphysics scheme and land surface model, introduction of natural and anthropogenic aerosols and a subgrid-scale orographic gravity wave drag scheme, and improvement of the coupling between the cloud microphysics and the radiation schemes. A short-term sensitivity experiments demonstrate improvements in the ice water content, high cloud amount, surface air temperature over the Arctic region, location and strength of zonal mean subtropical jet, and shortwave radiation over Africa and South Asia. The decadal climate simulations further reveal an improvement in the genesis and structure of the tropical cyclones compared with those with the previous model. Finally, we will address outlook toward the cloud-resolving climate simulation based on a fresh benchmark result on supercomputer Fugaku, a flagship supercomputer in Japan.