[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS01]High performance computing for next generation weather, climate, and environmental sciences

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A lot of advanced simulation studies are being conducted by high performance supercomputers such as K computer, Earth Simulator in various fields including meteorology. The high performance supercomputers enables us to conduct numerical simulations and data assimilation of observation big-data (huge high-density and high-frequency data) with an order of magnitude higher resolutions and ensemble numbers than those with previous supercomputers. In addition, the post-K computer will be available as a successor of K, and studies for the post-K computer was started. At the Atmospheric Science session co-organized by the Meteorological Society of Japan, we comprehensively pick up this topic in the Atmospheric and Hydrospheric Sciences Session of this 2018 Union Meeting that enables to comprise the atmospheric, oceanic and land sciences. This session aims to promote recent studies related to the issues on high performance computing in weather, climate, and environmental studies using the K computer and other supercomputers, and to enhance discussions on future directions of numerical simulations in meteorology.

[AAS01-P02]Preliminary results of a high-resolution climate simulation using the Non-hydrostatic Icosahedral Atmospheric Model, NICAM, for CMIP6 HighResMIP

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We introduce a series of climate simulations using the Non-hydrostatic Icosahedral Atmospheric Model, NICAM. Though our typical resolution range is 3.5-14 km for seasonal integration, a relatively coarser mesh size is chosen for multi-decadal integration. In Kodama et al. (2015, J. Meteor. Soc. Japan), we have performed the AMIP-type 30-year simulations with a mesh size of 14 km under the present and future boundary conditions. Although we switch off cumulus parameterization scheme in order to keep physics schemes consistently across resolutions between 3.5 and 14 km, the simulated climatology is fairly good, competitive with other climate models. The advantage of a fine-mesh global climate simulation is that atmospheric multi-scale phenomena ranging from large-scale circulation to meso-scale features associated with convection, front, severe rainfall, atmospheric gravity waves are represented in a seamless manner. For example, we discuss statistics of detailed structure of multi-scale convective systems and extremes such as tropical cyclones; Yamada et al. (2017, J. Climate) analyzed the NICAM AMIP-type simulation dataset and showed widening of the intense wind speed area around the tropical cyclones due to global warming. Now, targeting the CMIP6 HighResMIP, we are performing further longer time integrations for 65 years. The simulations are initialized on 1st January 1950. Because multiple choice of resolution is required, we use mesh sizes of 14, 28, and 56 km. The model used here has been updated and tuned in terms of cloud

microphysics (Roh and Satoh, 2014, J. Atmos. Sci.), aerosol, orographic gravity wave and land model to improve performance of the simulated climatology. Of particular interest here is performance in genesis, development, track and structure of tropical cyclone, and we will show some preliminary results including impact of the horizontal resolution on tropical cyclone statistics.