[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

convener:Hiromu Seko(Meteorological Research Institute), Chihiro Kodama(Japan Agency for Marine-Earth Science and Technology), Masayuki Takigawa(独立行政法人海洋研究開発機構, 共同), Takemasa Miyoshi(RIKEN Advanced Institute for Computational Science)

Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

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-P04]Analysis of high Radon-222 concentration events using NICAM

★ Invited Papers

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Keywords:NICAM, Radon-222, Event

Low pressure systems and accompanied frontal activity play important roles for transportation of atmospheric components such as air pollutants, greenhouse gases, and aerosols. In East Asian region, when cold front actively develops in the southeast of Japan over the Pacific in winter to spring, atmospheric pollutants, emitted from continental sources, are drawn along the front by the low-pressure system. During the front is passing over a monitoring station, sometimes dense pollutants trapped behind the frontal zone are detected as the high concentration value. In this study, we analyze such high concentration events of atmospheric Radon-222 (^{222}Rn) observed and simulated by a Nonhydrostatic Icosahedral Atmospheric Model (NICAM). Spatiotemporal ^{222}Rn variations in the events are compared between the observations and simulations by NICAM with three different horizontal resolutions of 223, 56, and 14 km (hereafter referred as *d223*, *d56*, *d14*, respectively). To evaluate the impact of synoptic atmospheric variability on ^{222}Rn concentration, monthly-mean emissions are used for the simulations.

Frequency of the occurrence of high ^{222}Rn events at the monitoring stations on remote islands in both hemispheres are comparable between the observations and models. Seasonal changes of the frequency are also well reproduced by models, with the correlation coefficients almost exceeding 0.6. These results

imply that NICAM is capable of simulating synoptic atmospheric fluctuations for ^{222}Rn transport. Temporal changes of ^{222}Rn around the event are reasonably simulated by *d56* and *d14*, but *d223* cannot reproduce the peak sharpness observed, due to the coarse horizontal resolution. Meridional distributions of ^{222}Rn and equivalent potential temperature around the stations for the event time show comparable gradients in *d56* and *d14*, especially indicating tight trapping of ^{222}Rn behind the front at a station in the southeast of Japan. On the other hand, less enhancement of ^{222}Rn, by up to 20 %, accompanied by the milder slopes on the both sides around the station are seen for *d223*. Throughout analyses of high ^{222}Rn events in this study, *d56* and *d14* show comparable performance, also mostly reproducing the observed temporal variability. Although there is no observation data to validate spatial distribution of ^{222}Rn around cold front, it is probably reasonable from our analysis that the horizontal resolution of better than 50-60km is required for simulating atmospheric ^{222}Rn variations.