Analysis of cloud formation processes for arctic cyclone in the non-hydrostatic icosahedral grid model

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RIKEN Advanced Institute for Computational Science and University of Tokyo Atmospheric and Ocean Research Institute have co-developed Non-hydrostatic Icosahedral Atmospheric Model (NICAM), whose dynamical core designates the non-hydrostatic equilibrium. This ultra-high resolution model is expected to play an important role for revealing unknown cloud microphysics processes as a cloud resolving simulation model. Numerous studies evaluated the simulation of the cloud convection processes by NICAM in both extratropical and tropical regions, while a small number of researches in the polar region have analyzed these atmospheric phenomena. In one example of previous research related to cloud process in polar region, Aizawa et al. (2014) [1] investigated the three dimensional structure and intensification mechanism of the simulated arctic cyclone (AC) by NICAM with a 7.0 km horizontal mesh resolution, referred as g-level 10. Figure 1 shows an AC at the mature stage which was produced by NICAM in this study. This horizontal structure of AC indicates that it has the quadruple spiral shaped cloud bands without any front. The mature phase of the AC displays anti-clockwise screwing motion as the same stage of cold vortex generally shows. It is meaningful to evaluate the cloud microphysics processes within NICAM in the arctic region through the comparison of model results and observation, and to progress the analysis of the structure of AC by investigating other AC cases.

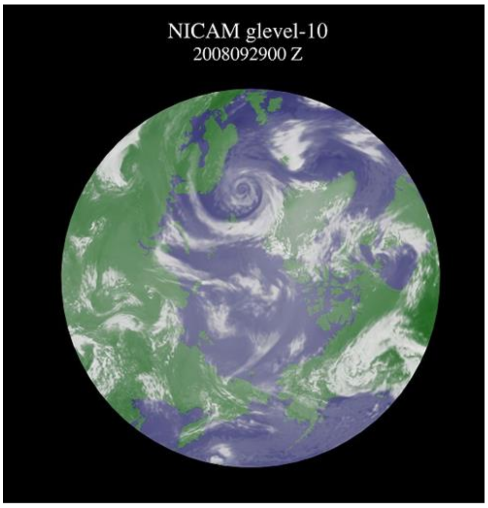

Figure 1. A simulated AC in September 29, 2008 by NICAM g-level 10.

References
[1] T. Aizawa, H.L. Tanaka, and M. Satoh: Rapid development of arctic cyclone in June 2008 simulated by the cloud resolving global model, *Meteorol. Atmos. Phys.,* **126** (2014).