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# Medium-range forecasts with a non-hydrostatic global atmospheric model on a cubed sphere grid

Young Kwon
KIAPS, Seoul, Korea, Republic Of (yc.kwon@kiaps.org)

Korean Institute of Atmospheric Prediction Systems (KIAPS) was founded at 2011 in order to develop a next generation global model (KIM; Korean Integrated Model) for operational purpose at Korean Meteorological Administration (KMA). As the nine-year KIAPS project is approaching the final year, KIM is in the process of operational transfer to be an official KMA's operational model on January 2020. All the major components of the KIM – data assimilation, dynamic core, physics schemes and model frame - have been developed in-house with unique and cutting-edge features. In this presentation, the summary of developmental efforts of developing the next generation global model will be presented including brief descriptions important elements of the KIM and its performance.

The dynamic core of the KIM consists of horizontal spectral element and vertical finite difference discretization over cubed sphere grid with non-hydrostatic flux-type governing equations. Although the grid projection, spatial and temporal discretization methods are originated from Community Atmospheric Model-Spectral Element (CAM-SE), some key features of the model are revised by KIAPS scientists. Regarding model physics, all nine physics schemes of the KIM are mostly adopted from community models, and all schemes are heavily upgraded at KIAPS based on observations and diagnostics. Especially, scale-aware capability, inter-physics consistency and computation efficiency are high priority of our considerations. Hybrid ensemble-variational data assimilation system (4DEnVAR) has been implemented successfully directly to the cubed sphere grid. All the conventional data are assimilated, while most of major satellite data are also assimilated such as AMSU, MHS, IASI, ATMS, CRIS and so on. Variational bias correction method is recently implemented to MHS and AMSU, and ISAI and ATMS are planned to be used VARBC in the near future. In terms of accuracy, the 500hPa height anomaly correlation of KIM is about 97∼98% of that of the KMA operational model, which is UK Met Office Unified Model.