

Big Data Assimilation: Real-time Workflow for 30-second-update Forecasting and Perspectives toward DA-AI Integration

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The Japan's Big Data Assimilation (BDA) project started in October 2013 and ended its 5.5-year period in March 2019. The direct follow-on project was accepted and started in April 2019 under the Japan Science and Technology Agency (JST) AIP (Advanced Intelligence Project) Acceleration Research, with emphases on the connection with AI technologies, in particular, an integration of DA and AI with high-performance computation (HPC). The BDA project aimed to fully take advantage of "big data" from advanced sensors such as the phased array weather radar (PAWR) and Himawari-8 geostationary satellite, which provide two orders of magnitude more data than the previous sensors. We have achieved successful case studies with newly-developed 30-second-update, 100-m-mesh numerical weather prediction (NWP) system based on the RIKEN's SCALE model and local ensemble transform Kalman filter (LETKF) to assimilate PAWR in Osaka and Kobe. We have been actively developing the workflow for real-time weather forecasting in Tokyo in summer 2020. In addition, we developed two precipitation nowcasting systems with the every-30-second PAWR data: one with an optical-flow-based system, the other with a deep-learning-based system. We chose the convolutional Long Short Term Memory (Conv-LSTM) as a deep learning algorithm, and found it effective for precipitation nowcasting. The use of Conv-LSTM would lead to an integration of DA and AI with HPC. This presentation will include an overview of the BDA project toward a DA-AI-HPC integration under the new AIP Acceleration Research scheme, and recent progress of the project.

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