International Session (Oral) | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS02_29AM2]Data Assimilation in Earth Sciences

Convener:*Hirohiko Ishikawa(Disaster Prevention Research Institute, Kyoto University), Shigeo Yoden(Division of Earth and Planetary Sciences, Graduate School of Science, Kyoto University), Takeshi Enomoto(Disaster Prevention Research Institute, Kyoto University), Seon-Ki Park(Ewha Women's University), Chun-Chieh Wu(National Taiwan University), SHINICHI MIYAZAKI(Graduate School of Science, Kyoto University), Yoichi Ishikawa(JAPAN Agency for Marine-Earth Science and Technology), Chair:Takeshi Enomoto(Disaster Prevention Research Institute, Kyoto University)

Tue. Apr 29, 2014 11:00 AM - 12:41 PM 314 (3F)

In numerical weather prediction, the observation,prediction and data assimilation techniques have developed dramatically,achieving improvements of forecast skills of high-impact weather eventssuch as bomb cyclones, super typhoons, torrential rain, tornadoes andhot spells. Data assimilation techniques have been applied toatmospheric transport, ocean circulation and earthquakes and a number ofadvanced techniques have been proposed. In this session, with invitedspeaker Prof Emeritus Yoshikazu Sasaki, we review the recent developmentof data assimilation techniques, discuss methodologies and applicationsof their applications and project future directions for further development.

12:35 PM - 12:41 PM

[AAS02-P01_PG]Decadal climate prediction using 4D-VAR data assimilation approach

3-min talk in an oral session

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Keywords:decadal prediction, climate prediction, global warming, data assimilation, 4D-VAR

It is very recently that decadal climate prediction experiments have been carried out with initialization. As a first step in decadal prediction, simple initialization approaches have usually been used so far, particularly focusing on ocean states. An advanced initialization technique is a pressing concern toward further enhancing the decadal predictability by obtaining suitable atmospheric and oceanic initial conditions that are compatible with both the model and observations. Here, by employing a 4D-VAR data assimilation approach to initialize the atmosphere-ocean coupled climate model, we attempt to perform ensembles of decadal hindcast experiments in line with the CMIP5 protocol. We perform full-field initialization rather than anomaly initialization and assimilate the atmospheric states together with the ocean states. We can validate the predictive skills in the atmosphere and ocean temperature hindcasts in some areas and, roughly speaking, the spatial patterns of the hindcast skills are similar to those of the multi-model ensembles of the CMIP5 decadal hindcasts. While our assimilation system has been developed originally for the purpose of seasonal-to-interannual climate simulations and we use 9-month assimilation window in these experiments, the hindcast results suggest that the atmosphere and ocean states associated with low-frequency variations beyond annual timescales can also be effectively initialized through the iterations of the forward and backward runs of the 4D-VAR data assimilation.