# Assimilation of Surface Observations Using an Atmosphere-ocean Coupled EnKF

Hiroshi KOYAMA [a], Masayoshi ISHII [b], Hiroaki TATEBE [a], Teruyuki NISHIMURA [a], and Masahide KIMOTO [c]

[a] *Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology, Yokohama, Japan, hkoyama@jamstec.go.jp,*
[b] *Meteorological Research Institute, Japan Meteorological Agency, Tsukuba, Japan,*
[c] *Atmosphere and Ocean Research Institute, University of Tokyo, Kashiwa, Japan.*

An ensemble data assimilation system has newly been developed, aiming at improving the skill in seasonal-to-decadal climate predictions and at investigating the feasibility of dynamical reconstruction of a global centennial climate data base. The system is based on an Ensemble Kalman Filter (EnKF) applied to a coupled atmosphere-ocean model, MIROC. The system is uniquely configured, with which oceanic and atmospheric observations are assimilated to reproduce long-term climatic variations by taking account of the covariance between atmospheric and oceanic variables. In preliminary experiments with the system, the reproducibility of global atmospheric and oceanic circulations was investigated using only surface pressure (Ps) and sea-surface temperature (SST) observations for the period from 2004 to 2010; these observations are ISPD ver. 2 (International Surface Pressure Databank version 2; NOAA) and COBE-SST (JMA), respectively. The result indicated that the tropospheric circulation and ocean temperature variation associated with El Nino and Southern Oscillation were reproduced as observed. In particular, assimilating the Ps observation was considerably effective in reproducing atmospheric circulations in middle-to-high latitudes because of geostrophic adjustment process seen dominantly there. In low latitudes, Ps and SST data assimilation succeeded in reproducing short-term atmospheric changes and in reducing errors in the mean state of the troposphere. Moreover, it is found that these low-frequency errors were reduced significantly by introducing covariance between atmospheric and oceanic variables. Further progress of this research will be reported in the meeting.