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AFES-LETKF ensemble reanalysis 2

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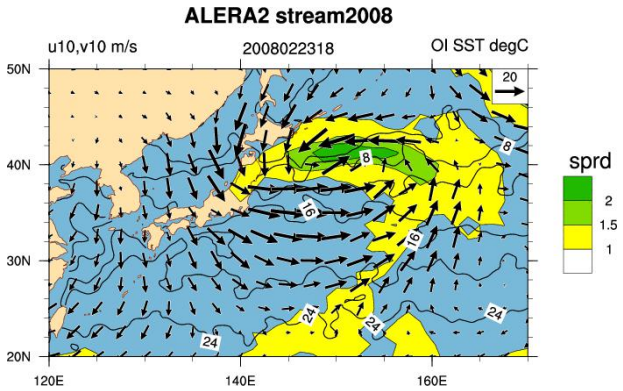
Ensemble reanalysis is multiple estimates of the atmospheric state (analyses). Ensemble forecast is produced from multiple initial conditions. A data assimilation technique is employed to merge ensemble forecast and observations to obtain multiple analyses. Ensemble members approximate the probability density function of the atmosphere. The ensemble mean is the optimal estimate of the atmosphere and the ensemble spread represents the analysis error. Error of the day is unique to ensemble data assimilation, absent in conventional long-term reanalysis datasets.

Using reanalysis data common features of a particular phenomena are extracted by making statistics but features peculiar to a single case has to be omitted. It is sometimes difficult to get enough samples for rare phenomena such as severe weather. Ensemble reanalysis provides the same numbers of sample for each analysis time to enable quantitative discussions on uncertainty without averaging out the peculiar features of each event.

Such attractive features enable a new kind of dynamical process and predictability research (Enomoto et al. 2010), evaluation of observations and optimal observing system design. Using ALERA (AFES-LETKF experimental ensemble reanalysis, Miyoshi and Yamane 2007) as a reference observing system experiments (OSE's) have been conducted (Moteki et al. 2007; Inoue et al. 2009; Moteki et al. 2010, QJRMS in press).

In March 2010 JAMSTEC established Observing system Research and Ensemble Data Assimilation development and research team (OREDA) under the Earth Simulator Center. Using an ensemble data assimilation system composed of updated AFES and LETKF a stream from January 2008 is running on the second generation of the Earth Simulator (ES2) as ALERA2, a successor of ALERA (Fig 1). This stream serves as a reference to OSE's for PALAU 2008, Mirai cruise in the Arctic Ocean 2008 and T-PARC will be conducted. For Mirai cruise in the Arctic Ocean 2010 and VPREX 2010 in Vietnam and Philippines, a stream has been started from August 2010. ALERA2 will be available online from the Earth Simulator Center to encourage studies utilizing unique features of ALERA2.



Keywords: atmospheric general circulation, ensemble Kalman filter, error of the day