

## INVITED SEMINAR

# Estimation of Surface Fluxes of Carbon and Heat from Atmospheric Data Assimilation

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We succeeded in estimating surface CO<sub>2</sub> fluxes at the model grid-scale resolution by assimilating meteorological variables and CO<sub>2</sub> simultaneously every 6 hours with the Local Ensemble Transform Kalman Filter (LETKF). This was done as an observing system simulation experiment (OSSE) using the SPEEDY AGCM coupled with the LETKF-C. The (unmeasured) surface fluxes are estimated with the state vector augmentation method, as if they were evolving model parameters. The simultaneous ensemble Kalman filter data assimilation allows considering the transport errors on atmospheric CO<sub>2</sub> forecast since it provides the time-evolving error covariance between wind and atmospheric CO<sub>2</sub> fields at every analysis step. Taking a short window (6hr) rather than the very long windows (months) normally used in inversion methods avoids blurring the impact of the surface fluxes on the near surface CO<sub>2</sub> and improves the estimation of both the surface fluxes and the atmospheric CO<sub>2</sub>. The LETKF-C, including several advanced techniques that were developed within this research (Kang et al., JGR 2011, JGR 2012) will be discussed. We also explored the possibility of estimating surface fluxes of heat, moisture and momentum using the same methodology, and OSSE experiments are also encouraging.

오시는 길 

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