1.228 Diagnostics of tropospheric oxidants using an ensemble data assimilation system and aircraft observations.

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Abstract:

The oxidative capacity plays a crucial role in the fate of greenhouse gases and air pollutants as well as in the formation of secondary pollutants such as tropospheric ozone. There is a non-linear chemical system that couple long (years for CH_4), intermediate (months for O3 and CO) and very short lifetime (less than a second for OH). To understand the nature of those interactions and improve prediction capability, data assimilation allows to take fully advantage of satellite observations and global coupled model, such as the Community Atmospheric Model with Chemistry (CAM-Chem). In particular, the ensemble Kalman filter approach facilitates statistical estimation of error correlations between chemical states (CO and related species) and parameters (including sources). Within this context, we will investigate the role of initial conditions, emission perturbations and chemistry in the coupled CH_4-O_3-CO-NOx-OH chemical system. We propose a set of tools such as emission tags, diagnostics of chemical regimes and emissions perturbations to estimate a regional budget of primary and secondary pollutants in East Asia and their sensitivity to data assimilation. Posterior fields will be evaluated using a set of non-assimilated measurements. We benefit from a large set of aircraft observations from the Korea-United States Air Quality (KORUS-AQ) campaign that occurred in South Korea in May-June 2016.