Assimilation of partial ozone tropospheric columns provided by the IASI instrument to improve assessment of air quality with a chemical transport model at a continental scale

ADRIANA COMAN, GILLES FORET, MAXIM EREMENKO, GAELLE DUFOUR, BENJAMIN GAUBERT, and MATTHIAS BEEKMANN

Laboratoire Inter-universitaire des Systèmes Atmosphériques (LISA), Universities Paris-Est et Paris 7, CNRS, France (adriana.coman@lisa.univ-paris12.fr)

Since 2006, the infrared satellite sensor IASI allows to derive ozone tropospheric profiles and/or columns at twice daily frequencies. Here, the 0-6 km tropospheric partial ozone columns, retrieved using an altitude-dependent regularization method for the morning pass, are used in an assimilation experiment conducted on a chemistry-transport model (CHIMERE) at continental scale. The aim is to evaluate their potential to constrain simulated surface ozone fields.

The method used for assimilation is the Local Ensemble Kalman Filter (LEnKF). This Monte Carlo approach requires the construction of an ensemble of possible realizations of the state vector, ensemble which is used to calculate the covariance matrix error used to propagate the innovations given by the satellite measurements. A local analysis is used in order to avoid the spurious covariances from the remote areas. The averaging kernels derived during the retrieval process are used to construct the observation operator and thus to project the values from the model space to the observation space.

The set up of our assimilation system is presented here as well as the first results for the assimilation of IASI tropospheric partial columns over a month period (July 2007). Results are evaluated using in-situ tropospheric profiles from ozone sondes and commercial aircraft (MOZAIC).