

## **Development of an ozone analysis system using a local ensemble transform Kalman filter at Japan Meteorological Agency**

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Japan Meteorological Agency (JMA) has been providing surface UV index information using a global chemistry transport model (CTM), which is called MRI-CCM2, developed by the Meteorological Research Institute (MRI). This model was updated in October 2014 to a new version and consists of a dynamics module of Atmospheric General Circulation Model (called MRI-AGCM3) and a chemistry module which includes detailed ozone chemistry throughout the troposphere and the stratosphere.

The present ozone analysis system uses simple nudging technique. In the system, only total column ozone obtained from the satellite measurement of Aura/Ozone Monitoring Instrument (OMI) is used to assimilate ozone and to preserve shapes of the vertical profile of ozone by multiplying a vertically constant coefficient at each altitude. To improve the system, JMA has a plan to introduce a local ensemble transform Kalman filter (LETKF) data assimilation technique to this system in next few years. The LETKF scheme is a kind of the ensemble Kalman filter technique, in which covariance localization is applied to remove sampling errors caused by the limited ensemble size. With this advanced technique, we plan to assimilate three dimensional ozone distribution using not only total column ozone but also ozone vertical profiles provided by Aura/Microwave Limb Sounder (MLS) which are not assimilated in the present system. Our preliminary results show that the new technique improves the performance of ozone analysis compared with the present nudging technique.

The operational numerical weather prediction (NWP) model at JMA uses the three-dimensional monthly-mean ozone climatology (2000-2004) to calculate solar radiation at the surface. However, the ozone climatology is calculated by using the previous version of CTM and nudging technique. We also have a plan to perform an experiment to examine whether the ozone climatology specified by the new ozone analysis system gives better impact on forecast by the JMA's NWP model or not.