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Coupled stratospheric ozone-dynamics modeling and assimilation in an operational NWP system

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One of the top priorities of Environment Canada is to develop an integrated prediction and environmental monitoring system. The backbone of this integrated capability is the operational NWP model GEM, and its associated 3D- and 4D-Var assimilation system. The model and assimilation system has been extended to include online chemistry allowing two-way interactions between chemistry and dynamics through the radiation.

We present and compare the results of assimilation of MLS ozone offline vs the NRT product, and present the monitoring over several seasons. The result of the assimilation total column GOME2 using simple prescribed background errors statistics and those obtained from limb sounding instruments are compared and discussed. Finally the assimilation of both GOME2 and MLS observations are presented are compared with individual instrument assimilation.

The inclusion of dynamically evolving stratospheric ozone in a numerical weather prediction model has been is know to improve the temperature forecast skill in the lower stratosphere due to a more realistic radiation forcing. The use of simplified (linearized) chemistry vs comprehensive chemistry is examined as well as the effect of radiation forcing on synoptic-scale developing systems.