



First results of the coupled forecast system of the GEMS subproject on Global Reactive Gases

J. Flemming (1), A. Dethof (1), C. Ordóñez (2), P. Moinat (3), A. Segers (4), O. Stein (5), M. Schultz (6)

(1) ECMWF Reading, (2) CNRS -LA Toulouse (3) Météo-France Toulouse (4) KNMI De Bilt, (5) Max Planck Institute for Meteorology, Hamburg, (6) FZ Juelich

We present the first results of the coupled forecast and assimilation system developed within the GEMS subproject on Global Reactive Gases (GRG). The two-way coupled system consists of ECMWFs integrated forecast system IFS and one of the Chemical Transport Models (CTM) MOZART, TM5 and MOCAGE. In the coupled system, IFS sends meteorological data at high temporal resolution to the CTMs. The CTMs provide concentration tendencies due to emissions and chemical conversion as well as initial tracer conditions to IFS. The application of external tendencies is required in IFS because its 4DVAR data assimilation needs to account for tracer source and sink terms which are not simulated in the IFS model. The operational forecast and assimilation of satellite observations of NO₂, CO, SO₂, O₃ and CHOH with IFS are the main objectives of GRG.

The coupled system has been applied in forecast mode for several months in 2003 in different configurations in terms of vertical transport and coupling synchronisation. Test assimilation runs of CO by MOPITT have been carried out for several weeks. The results have been compared with CO and O₃ profiles of the MOZAIC data set.

This presentation focuses on the coupled forecasts, and will cover the following topics:

- * Impact of external tendencies on IFS tracer simulations.
- * A diagnostic NO_x inter-conversion operator to account for fast chemical reaction which cannot be correctly captured by external tendencies
- * Differences in the vertical transport among the CTMs and in comparison with IFS

* Impact of the 1-hourly meteorological input in comparison to the 6-hourly input in the CTM stand alone runs.

A presentation of technical aspects of the coupled system has been submitted to session CL38 / GI12 Earth System Modelling: Strategies and Software.