

Ozone-Radiation Interactions in the ECMWF Forecast System

J.-J. Morcrette

*European Centre for Medium-Range Weather Forecasts
Reading, United Kingdom*

ABSTRACT

Interactions between radiative processes and the ozone field forecast by the ECMWF system, operational in January 2002, are studied in 19-month T_L159 L60 simulations with the ozone transported by the dynamics of the model, with and without interactions with the radiation schemes. The sensitivity of the model ozone and temperature to the description of the longwave and shortwave radiative transfer is considered. Both the Rapid Radiation Transfer Model and the new 6-interval shortwave scheme contribute to a warmer stratosphere in better agreement with climatology, and a generally colder lower stratosphere in the tropics, this last feature linked to a deficient vertical transport.

Comparisons are also made of 10-day forecasts with and without ozone-radiation interactions. Compared with ERA-40 analyses, the forecasts including the ozone-radiation interactions show relatively small and generally positive impact on the objective scores of temperature at 100, 50, 30 and 10 hPa. Comparing with ozonesonde observations, the forecasts with ozone-radiation interactions do not differ much from those without such interactions. Temperature profiles are generally well analysed, but forecasted ozone is often in slightly better agreement with the observed ozone profiles than the analyzed ozone.

For further information see:

Morcrette, J.-J.: Ozone-radiation interactions in the ECMWF forecast system. ECMWF Technical Memorandum No. 375, 37 pp, December 2003 (<http://www.ecmwf.int/publications>)