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Global modelling of the carbon monoxide at a regional scale resolution with the ECWMF's Integrated Forecast System

S. Massart (1), J. Flemming (2), and D. Cariolle (1)
(1) CERFACS, Toulouse, France (massart@cerfacs.fr), (2) ECMWF, Reading, UK

Carbon monoxide (CO) is one of the most important tropospheric trace gases. In particular because of enhanced surface concentrations due to the main sources of CO that are incomplete fossil fuel and biomass burning. And with a lifetime of a few months CO can serve as a tracer for regional and inter-continental transport of polluted air.

The chemistry of CO is usually modelled in the Chemical Transport Models (CTMs). Global CTMs with an horizontal resolution of mostly more than 2° by 2° are useful to study the inter-continental transport but have a too large resolution for regional studies. Such studies are based on regional CTMs that have an horizontal resolution of mostly around 0.2° by 0.2°. But regional CTMs are needless for inter-continental transport. To combine the strengths of the two approaches, we model the CO chemistry over the Globe within the European Centre for Medium Range Weather Forecast's Integrated Forecast System (IFS) at a T799 resolution (about 0.225° by 0.225° at the equator). As we can afford a full chemical scheme at such a resolution, we use the linear CO chemical scheme (LinCO) is an alternative. LinCO derives from the CO continuity equation that is expanded into a Taylor series around the local value of the its mixing ratio and the temperature.

We will present the results of IFS-LinCO obtained after a two years simulation. Results include a tropospheric validation again the measurements from the Mozaic dataset and a stratospheric validation against the measurements from the MLS spatial instrument. The benefit of the global T799 resolution compared to a more classical T159 one will also be assessed.