

Exploring feedbacks between atmospheric composition and numerical weather forecasting at ECMWF

Johannes Flemming (1), Alessio Bozzo (1), Richard Engelen (1), Antje Inness (1), Mark Parrington (1), Robin Hogan (1), Melanie Ades (1), Beatriz Monge-Sanz (1), Zak Kipling (1), Vincent Huijnen (2), and Samuel Remy (3)

(1) ECMWF, Copernicus Atmosphere Monitoring Service, Reading, United Kingdom (johannes.flemming@ecmwf.int), (2) KNMI, De Bilt, The Netherlands, (3) LMD,CNRS, Paris, France

The European Centre for medium-Range Weather Forecasts (ECMWF) is a leading provider of global meteorological forecast from the medium to the seasonal time scale range. In the last decade, ECWMF included the capacity for operational atmospheric composition forecast and assimilation in its Integrated Forecasting System. Global atmospheric composition forecast and re-analysis are now carried out operationally at ECMWF as part of the Copernicus Atmosphere Monitoring Service (CAMS) funded by the EU.

The coupled forecasting system gives the opportunity to take into account the effect of atmospheric composition on numerical weather prediction (AC-NWP feedbacks). While the importance of composition is well established in climate modelling, the impact of these feedbacks is harder to demonstrate for shorter time scales. This is because the NWP forecasts are initialised with observations and NWPs system have been highly optimised to achieve ever improving forecast scores, despite using simple approaches to account for the AC-NWP feedbacks. Further, our ability to model the AC-NWP feedback is still limited by incomplete knowledge of the relevant processes as well as the uncertainty in the actual spatio-temporal distribution of atmospheric composition fields. The CAMS assimilation system, which includes assimilation of atmospheric composition, has therefore a strong advantage as it improves the realism of the composition fields used in the simulating AC-NWP feedbacks. We present recent results from the CAMS system to include prognostic representations and climatologies of aerosols and ozone in the radiation scheme.