London 2012 and Air Quality Forecasting Developments at the UK Met Office

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In the mid 2000s the UK Met Office undertook to develop an entirely new air quality modelling capability. This was to be an online two way coupled regional air quality model consisting of the Met Office Unified Model (MetUM), for weather and climate, and the United Kingdom Chemistry and Aerosol (UKCA) model, previously used extensively for climate composition modelling. In adopting both the UM and UKCA across both weather and climate scales the Met Office aimed to extend its seamless framework for both physical and composition atmospheric modelling. The initial configuration of AQUM consisted of a horizontal grid length of ~12km and 38 vertical levels extending up to a model top of 39 km over a domain comprising the UK and part of Western Europe. The model was non-hydrostatic and the UKCA (with RAQ chemistry mechanism) and CLASSIC sub-models for gas phase and aerosol modelling included 40 transported species, 126 gas phase and 23 photolysis reactions, 6 aerosol types and wet and dry deposition.

AQUM achieved routine running in 2010 and after further extensive testing and evaluation became operational and took over the Met Office air quality forecast shortly ahead of the London 2012 Olympics. The new status of the forecast and the relevance of air quality to the Olympics resulted in it being included in the Met Office Olympics capability showcase. In addition to the existing routine site specific guidance, animations of daily forecast maps were also generated. This information was all presented in terms of the UK daily air quality index which is a health impact index as recommended by the UK Committee on Medical Effects of Air Pollutants. There were only two periods of moderately poor air quality during the Olympics but the showcase still resulted in useful feedback and exposure of the new capability. With the Olympics as a catalyst the Met office then took part in a UK Government organised air quality model inter-comparison in 2013. Significant success in this subsequently lead to the Met Office forecast being adopted by the UK Government as the official national air quality service in 2014. Needles to say extensive challenges and opportunities for improvement remain, with the successful launch of AQUM in 2012 just the start of a complex scientific and modelling task.

This talk will use the Met Office London 2012 air quality showcase to provide an overview of, and insight into, the air quality modelling developments at the Met Office.

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