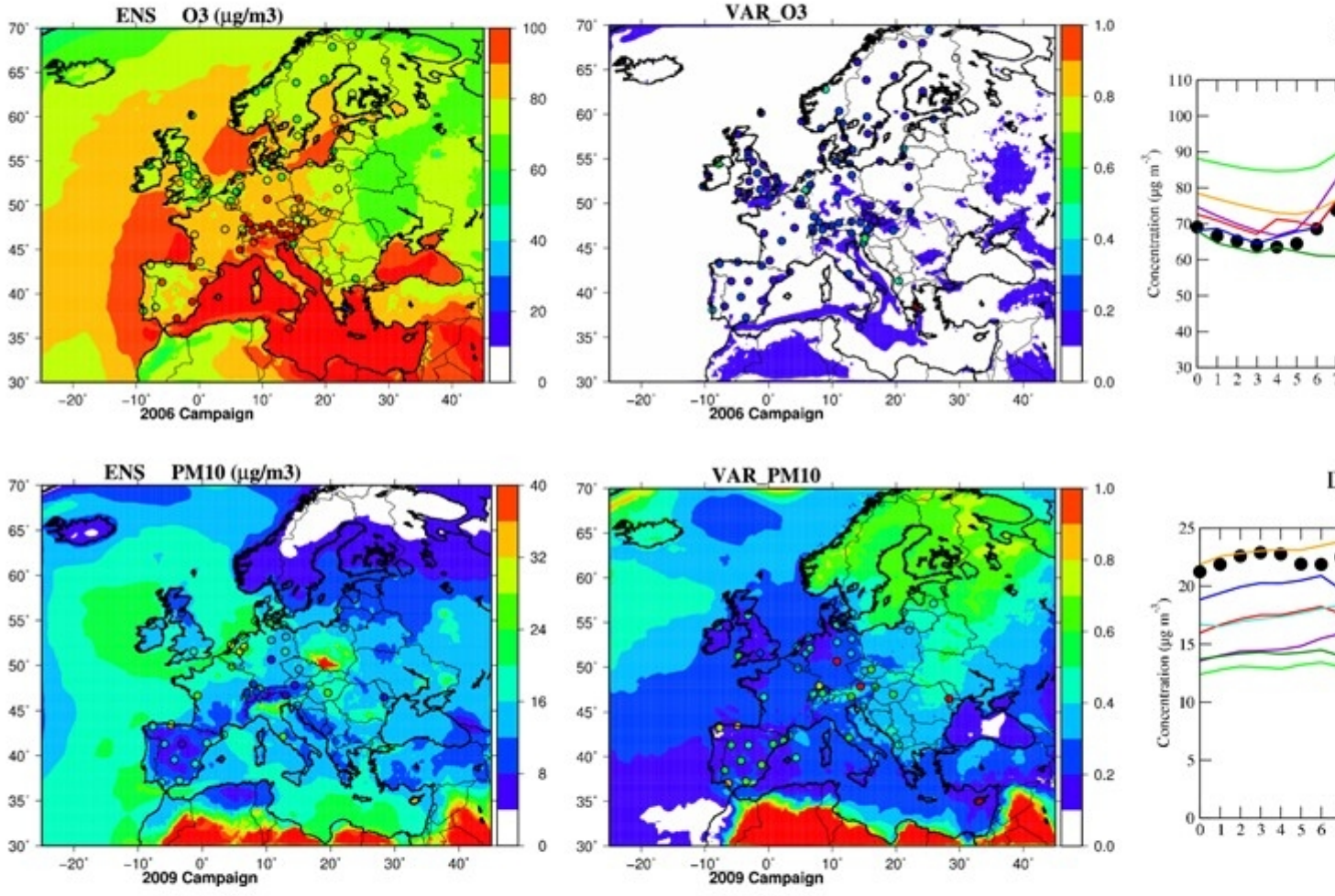
Presentation of the EURODELTA III inter-comparison exercise ? Evaluation of the chemistry transport models performance on criteria pollutants and joint analysis with meteorology



ENS: ensemble of participant models. VAR: variability of the ensemble. O_3: ozone. PM10, particulate matter w
diameter less than 10 um.

The well-known scientific journal Atmospheric Chemistry and Physics (ACP) has recently published the paper titled Presentation of the EURODELTA III inter-comparison exercise – Evaluation of the chemistry transport models performance on criteria pollutants and joint analysis with meteorology as a discussion paper in ACPD, the scientific discussion forum of ACP.

This paper, whose co-author is the BSC researcher Maria Teresa Pay, shows a comprehensive inter-comparison and evaluation of state-of-the-art chemistry transport models performance over Europe that allow to further improve modelling techniques, as well as to quantify and understand the sources of calculation uncertainty. This activity has contributed to the scientific work of the United Nations Economic Commission for Europe (UNECE) Task Force on Measurement and Modelling (TFMM) under the Convention on Long-range Transboundary Air Pollution (CLRTAP).

Abstract: The EURODELTA III exercise allows a very comprehensive inter-comparison and evaluation of chemistry transport models performance. Participating models were applied over four different one month period, within a rather limited number of years (from June 2006 to March 2009) thus allowing evaluating the influence of different meteorological conditions on model performance. The exercise was performed under strict requirements concerning the input data. As a consequence, there were very limited differences in the models set up, representing a sort of sensitivity analysis to several aspects of the modelling chains. The models were evaluated mainly on background stations. Even if the meteorology was prescribed, some variables like the planetary boundary layer (PBL) height, the vertical diffusion coefficient are diagnosed in the model pre-processors and explain the spread of models results. For ozone, this study shows the importance of boundary conditions on model calculations and then on the regime of the gas and particle chemistry. The worst performances are observed for sulphur dioxide concentrations that are poorly captured by the models. The performances of models are rather good very similar for the nitrogen dioxide. On average, the models provide a rather good picture of the particulate matter (PM) concentrations over Europe even if the highest concentrations are underestimated. For the PM, the mean diurnal cycles show a general tendency to overestimate the effect of the PBL height rise while the afternoon chemistry (formation of secondary species) is certainly underestimated, PM observations show very flat diurnal profiles whatever the season. In general the day time PBL height is underestimated by all models, the largest variability of predicted PBL is observed over the ocean and seas. More generally, in most cases model performances are more influenced by the model setup than the season. The temporal evolution of wind speed is most responsible of model skilfulness in reproducing the daily variability of pollutant concentrations (e.g. the development of peak episodes), while the reconstruction of the PBL diurnal cycle seems more influencing in driving the corresponding pollutant diurnal cycle and hence the presence of systematic positive and negative biases detectable on daily basis.

Citation: B. Bessagnet, G. Pirovano, M. Mircea, C. Cuvelier, A. Aulinger, G. Calori, G. Ciarelli, A. Manders, R. Stern, S. Tsyro, M. García Vivanco, P. Thunis, M.-T. Pay, A. Colette, F. Couvidat, F. Meleux, L. Rouïl, A. Ung, S. Aksoyoglu, J. M. Baldasano, J. Bieser, G. Briganti, A. Cappelletti, M. D'Isodoro, S. Finardi, R. Kranenburg, C. Silibello, C. Carnevale, W. Aas, J.-C. Dupont, H. Fagerli, L. Gonzalez, L. Menut, A. S. H. Prévôt, P. Roberts, and L. White
http://www.atmos-chem-phys-discuss.net/acp-2015-736/