



A strategy for impact assessment using air quality models: an application in the Iberian Peninsula.

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In the troposphere, ozone is formed as a result of complex photochemical reactions, involving nitrogen oxides (NO_x) and volatile organic compounds (VOC) precursors. The chemical production of O₃ in the atmosphere is highly non-linear, making it difficult to estimate the behavior (both qualitatively and quantitatively) of ozone levels in response to changes in emissions. Under certain conditions, O₃ concentrations increase with increasing NO_x and remain quite insensitive to changes in VOCs, while for other scenarios, the rate of O₃ formation will rise mainly with increasing VOCs.

The complex ozone chemistry, its interactions with the atmosphere and the effects on air quality can be explored with Chemical Transport Models (CTM). Also, CTM are useful tools for Air Quality Authorities trying to evaluate the adequacy of emission control strategies. However, the use of numerical models for air quality studies has to include all the significant factors taking part in the complex and non-linear atmospheric dynamics. In this respect, a very important aspect to be considered is the effect of uncertainties in the input information on the model outputs. When studying the photochemical impact due to new emissions, it has to be taken into account that the emissions inventory could have errors as large as 300%.

The lack of information on some of the critical input data required by the photochemical model, particularly emissions, confers a high degree of uncertainty on the simulated results.

To handle this uncertainty, a methodology based on a matrix of potential emission scenarios is defined. This methodology will serve to analyze the expected ozone impact from a new industry in the area under the different emission scenarios. This kind of study could be used as an effective tool to support environmental managing policies

in the context of the current European Union Directive 2002/3/EC on tropospheric ozone.

This paper presents an application of this methodology for an objective estimation of the impact of new industries, one thermal power plant and one refinery, in Spain. This impact assesment has been carried out using a MM5-CAMx integrated modeling system.