NOVEL FEATURES FOR ATMOSPHERIC DISPERSION MODELS IN RESPONSE TO NEW REGULATORY CHALLENGES

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1. INTRODUCTION

The complexity of processes associated with dispersion of atmospheric pollution undergoing chemical reactions, phase transformation from vapour to particulates and dispersing under complex circulation mechanisms makes the use of three dimensional dispersion models difficult in new regulatory challenges. Taking into consideration recent regulatory efforts of the European Commission for implementing new action plans among which the action (COM-2004-416) for "reducing the disease burden and for identifying and preventing new health threats caused by environmental factors", there are several efforts for incorporating new modules in dispersion models. These are complemented with a new set of monitoring technologies which allow a whole new set of regulatory applications and provide information beyond the classical compliance applications.

2. METHODOLOGY

Research should focus on establishing the correct implementation of dispersion while taking into account the randomness of population activities. For the purposes of this work a collection of suitable simulations are presented and is shown how these are obtained from modules which allow a new set of applications for dispersion simulations.

In this presentation are also examined the new challenges for regulatory purposes in areas where:
• Data are available and impact assessments can be carried out already and where
• Attribution to new environmental sources can be carried out already.

3. RESULTS

The reported examples show the importance of advanced monitoring and address the issue of increasing spatial resolution for:

1. New hazard identification: where are identified the consequences and the level of harmful effects the pollutant monitoring may cause (and characterisation of the nature and strength of the sources that cause these).

2.Dose-response evaluation: where are presented the difficulties in determining the relationship between the amount of exposure to a substance and the extent of a specific biological response (toxic injury or disease) and are shown areas and tools where improvement are possible (expressed as observed incidence, percent response in groups of persons/subject).

3. Exposure assessment: for estimating the magnitude of human exposures, especially for the improving the spatial resolution and accounting for the characteristics of the population exposed.

4.Risk characterisation: especially for estimation of the probability, of occurrence of an adverse effect if a toxic substance is absorbed by a particular organism or population in a specific dose.

4. CONCLUSIONS

Of immediate value is the differentiation of outdoor and indoor effects and the establishment of new vision and roadmap for which regulatory efforts were not possible until now. It is expected, that these will change the perceptions about new vulnerable population groups, the severity of specific locations (hot spots) and the significance of episodes during which specific dispersion modelling is required. The results demonstrate important differences from large area averaging and reporting over the whole year processes which result in doubtful statistics.