This research is undertaken in the framework of new legislation for industrial noise with an emphasis on noise from windmills. The results of this research are also applicable to air pollution and dispersion applications since the winds in the boundary layer are amongst the most relevant meteorological parameters influencing the concentration of pollutants.

H13-125
EVALUATING AERSURFACE ROUGHNESS ESTIMATES FOR USE IN EPA’S AERMOD DISPERSION MODEL

Roger Brode

AERMOD has recently become the preferred air dispersion model for near-field regulatory applications in EPA’s "Guideline on Air Quality Models," replacing the ISCST3 air dispersion model. Unlike ISCST3, the AERMOD modeling system requires the input of three surface characteristics, albedo, Bowen ratio, and surface roughness, which are used in processing meteorological data for input to AERMOD. EPA recently completed development of the AERSURFACE tool, which is designed to assist users with determining these surface characteristics based on gridded land cover data. The current version of AERSURFACE was released in January 2008 and supports the use of 1992 National Land Cover Data (NCLD92), available from the U.S. Geological Survey (USGS) at a 30 meter horizontal resolution for the continental U.S. While AERMOD and AERSURFACE provide a more objective technique for determining surface characteristics, the NCLD92 land cover categories are not ideal for purposes of estimating surface roughness at airport locations. The newer 2001 NCLD data provides some advantages over NCLD92 data, but the 2001 land cover categories present additional challenges for estimating roughness at airports. EPA has recently begun evaluating AERSURFACE roughness estimates at airport locations using 1-minute ASOS wind data with a gust factor method based on Wieringa (BAMS, 1980). This presentation will include preliminary results from the evaluation of AERSURFACE roughness estimates, and will describe EPA’s current plans for enhancing the AERSURFACE tool.

H13-142
INFLUENCE OF TRAFFIC EMISSIONS VARIABILITY ON AIR QUALITY PREDICTIONS

Tchepel O., Monteiro A., Ferreira J., Dias D., Miranda A.I., Borrego C.

Application of air pollution models is always confronted with uncertainties and their quantification is crucial, especially when the models are used for regulatory decisions. One of the important sources of uncertainty in the air quality modelling is atmospheric emissions. Besides the errors related with measurements and incompleteness of the data used in the inventories, emission and activity factors are characterised by heterogeneity of values with respect to time and space. This natural variability is critically important in the emission uncertainty analysis. However, current emission inventories contain none or limited information regarding the uncertainties.

The prime objective of the current work is the analysis of uncertainties in the predictions of a chemical-transport model due to the uncertainties in input emission data using a probabilistic approach. The methodology is based on the Monte Carlo technique which consists in multiple selections of random values of emission factors and activity data, within their individual probability density functions, and following calculation of the corresponding emission values. The air pollution modelling system is run repeatedly using these multiple emission inputs. An ensemble of deterministic simulations is used to create probabilistic estimates of air pollution and the probability density function (PDF) for predicted concentrations is analysed. The methodology was applied to the North Region of Portugal. The road traffic emissions were quantified by the Transport Emission Model for Line Sources (TREM) adapted to be used in combination with the Monte Carlo application. Vehicle hourly flows were obtained from automatic counting system considering complex road network as line sources. The MM5-CHIMERE modelling system was applied using the multiple runs and thus providing a random sample of 50 values for concentration predictions at each grid cell. The model outputs are analysed in terms of 95% confidence interval. It is concluded that variability in emission data has important contribution on air quality predictions especially in urban areas where highest uncertainty for the road traffic emissions was obtained.

H13-171
MODELLING ANALYSIS OF PARTICULATE MATTER VERTICAL DISTRIBUTION AND COMPOSITION IN MILAN URBAN AREA


The air quality on the regional and local scale and in particular suspended particles are of great interest for the society, because it affect human health, forest and other ecosystem and moreover, particles act on climate change by affecting the Earth’s radiative balance, directly by altering the scattering properties of the atmosphere, and indirectly by changing clouds properties. In recent years for the study of air quality and in order to have information on aerosol physical features, several particulate matter data was collected in different kind of sites. However, surface measurements are not sufficient to fully understand the pollutants dynamics and chemistry. For better understand how pollutants evolve and to have answers about the processes which causes pollution events, the scientist have been made important efforts to improve three dimensional air quality models which are to day important instruments for monitoring, planning and analysis of atmospheric environment as
provided for the Directive 2008/50/CE. Several European modelling studies show the modelling behaviour on simulating particulate matter, many of them focused their attention on Pianura Padana region, which is the most populated and industrialized area in Italy. All of them analyzed particulate matter horizontal distribution comparing modelling results with groundbased observations. In our study we focused our attention in the validation of modelized vertical profile of the particulate matter (PM), as, its good representation in space and compositions is an important step for public health related studies and besides it could get to be an important useful instrument in the retrieval of the aerosol concentration from the lidar signal. The aim of this study is a first evaluation of an air quality modelling system at 1 km resolution with detailed urban landuse in the simulation of the vertical structure of the aerosol layer in the polluted area of Milan (Bicocca site). In order to achieve our objective we compare model results with Ballon-borne and continuous lidar measurements collected during two intensive campaigns in the frame of the ASI/QUITSAT project.

**H13-197**

**COMPLEX WIND AND TURBULENCE FIELDS MODELLING USING CFD IN COMPARISON TO BOLUND BENCHMARK CASES**

Lobnat AIT HAMOU, Claude SOUPRAYEN, Sharad TRIPATHI

Today, a large number of wind farms are erected in complex terrain with the hope of a large energy production. By placing wind turbines in hilly terrain, along ridges and even in mountainous areas, wind phenomena like flow separation and recirculation can, however, greatly increase the structural loads on the wind turbines. Reliable predictions of such wind features are therefore important for siting of wind turbines in complex terrain and is the subject of the Bolund experiment. The Bolund hill is a 12 m high peninsula located at Roskilde Fjord 1 km north of Risø/U near the city of Roskilde (Denmark). Bolund was selected for a field experiment because of the need for experimental data for validating models of flow in complex terrain. An increasing number of wind farms are being installed in complex terrain, but the tools often used to predict the wind flow have been developed for simple terrain and have not been properly validated against complex terrain experiments at atmospheric scale. The Bolund dataset allows for such a validation. From the accuracy of the flows simulation depends the correct estimation of the flow near obstacles and slopes. Simulations through CFD approach provide the accuracy expected by taking into account all the 3D elements influences. For this comparison, Fluidyn uses the fluidyn-PANACHE numerical tool, a self-contained fully 3-D fluid dynamics, taking into account all topographical and meteorological parameter in a high precision numerical scheme. Parameters considered for the 3D dispersion model are altitude curves, building heights, windrose data (velocity, direction and pasquill class), ambient air temperature. For increasing precision of results, an outer domain and a nested domain were used in the problem with unstructured meshes Intricacy and type of the mesh used, computational scheme and turbulence model were the parameters governing the precision of the results. The results were compared in terms of accuracy and computational complexity.

**H13-204**

**VALIDATION OF ATMOSPHERIC CHEMISTRY/AEROSOL MODEL COUPLED TO REGIONAL CLIMATE MODEL IN HIGH RESOLUTION**

Tomas Halenka, Peter Huszar, Michal Belda

Recent studies show considerable effect of atmospheric chemistry and aerosols on climate on regional and local scale. For the purpose of qualifying and quantifying the magnitude of climate forcing due to atmospheric chemistry/aerosols on regional scale, the coupled regional climate model and chemistry/aerosol model has been used recently on the Department of Meteorology and Environmental Protection, Faculty of Mathematics and Physics, Charles University in Prague, for the EC 6FP Project QUANTIFY and for EC 6FP Project CECILIA, finally for EC FP7 Project MEGAPOLI, where benefits from high resolution are applied in research aiming to study the impact of big cities on climate and vice versa. For this couple, existing regional climate model and chemistry transport model are used. Climate is calculated using model RegCM while chemistry is solved by model CAMx. Meteorological fields generated by RCM drive CAMx transport, chemistry and a dry/wet deposition. A preprocessor utility was developed for transforming RegCM provided fields to CAMx input fields and format. The validation results as well as the discussion of the impact of both-way coupling when interactive modification of radiative transfer due to atmospheric chemistry/aerosols is taken into account are presented. The sensitivity to the inclusion of specific parameterization and emissions of urban areas is studied as well.

**H13-226**

**DEVELOPMENT AND APPLICATION OF A QUANTITATIVE INDEX OF STEADY-STATE CONDITIONS**

Joseph S. Scire

The selection of an appropriate modelling technique is an important consideration in determining the quality and reliability of air quality model predictions. An important consideration is the consistency of model assumptions such as those in steady-state plume models with actual conditions.