Minutes of the Sixth COST 715 Meeting of Working Group 2

Toulouse France, 3 and 4 October 2001

Participants:

Alexander Baklanov
Angela Dandou
Marco Deserti
Joao Ferreira
Sylvain Joffre
Ari Karppinen
Patrice Mestayer
Douglas Middleton
Martin Piringer

1. Status of WG 2: no change. The actual list of Working Group 2 members including full addresses is given in Annex 1.

2. Review of Zuerich decisions:

   Workshop: The joint WG2/WG3 workshop on "Mixing heights and inversions in urban areas" has taken place. It was embedded within a so-called Urban Boundary Layer Week, conducted by PM and hosted by Meteo France. See Annex 2 for a visit report (by DM) of the entire week.

   Study contract proposal on mixing heights (Baklanov/Rasmussen): Intention to use the dame data set as in the proposal by Baumann/Piringer to determine the mixing height, focussing on night-time conditions. SJ points out that the study contract must be interesting for the whole action. WG 2 principally supports the new study contract again pointing out that the final version will undergo the usual reviewing procedures first within the WG and then in the MC.

   A list of COST-Action 715 relevant publications has been compiled and will be further updated.

   Final report: Intended start on final report by chairman not done.

3. Additional activities:

   AB reports on the FUMAPEX proposal submitted within the 6th framework programme including more interdisciplinary aspects and practical items, e.g. population exposure. It consists of 10 work packages.

   DM reports on ongoing activities in Birmingham. Quality-controlled and processed data set will be available soon.

4. Discussion on outcome of workshop:

   Dr. Prager, member of the TC Meteorology, was present throughout a large part of the the discussion and actively took part. The WG agreed that recommendations how to treat the mixing height in urban areas have to be set up. Mr. Prager added that the major cities will certainly need some practical guidance how to manage air pollution problems, and he stressed the necessity to collect more data. The discussion then was between denying the usefulness of a MH for an entire urban area (is it really important to define a specific value of the MH for an urban aera?; theoretically, if the vertical profile of the eddy diffusivity is determined, no MH is needed) and stressing the necessity of having a representative time series of the MH for input to air quality models, for understanding air pollution episodes, and to classify areas which are most sensitive to pollution.

   It was agreed to try to draw up a “flowchart” or “matrix of opposition”, a list of different methods with advantages and dis-advantages, indicating that, in case of x, method y is preferred.

Annex 1: List and addresses of participants

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Annex 2:

Visit Report

COST 715 Action, ESCOMPTE, SATURN and FOSEC

1-5 October 2001

at Meteo France, Toulouse, France

by D R Middleton

10 October 2001

Summary

The meetings were arranged to coincide so that scientists from across Europe could discuss a number of studies and the COST 715 Action, all of which relate to urban meteorology and air pollution. The meetings began with a review of progress in the UBL/CLU-ESCOMPTE experiment, for ESCOMPTE participants. Then there was more general discussion and short presentations open to all at which the first results were outlined. The final meetings were for national delegates to the COST Action.

ESCOMPTE

These are early days for ESCOMPTE analysis. There is a model inter-comparison now being set up by JRC Ispra; http://rtmod.ei.jrc.it/escompte-int. Model results should be submitted before the end of 2001.

Other models could be included as a way of becoming involved with a longer view to collaborating and hence perhaps gaining access to the urban measurements at some later date. The project measured many urban variables by direct and remote sensors in and around and above the city of Marseilles. It represents a very large data base of observations. Several aircraft also participated, and pollutants were measured on a ferry plying between Corsica and Marseilles. Constant density radio sonde balloons also yielded data over the city.

SATURN & FOSEC

The SATURN and FOSEC discussions led by Nicholas Moussiopoulos addressed the requirements on SATURN for reporting, and its response to recent reviews of the work of this project. SATURN began with meetings five years ago, to look at urban source-receptor relations. It has developed high resolution obstacle resolving models, and generated laboratory and field data sets to validate them. The meeting discussed the recent review of SATURN. In particular, a need to address ozone in Europe has identified an important

question. Is ozone a regional problem in all cities, or is it that some cities have a very pronounced local problem. Athens for example is thought to suffer much from locally generated ozone. The focus of these discussions was therefore on FOSEC, the Forecasting of Ozone in Southern European Cities. In such a study, it could be very interesting to include other models in the work, e.g. NAME has the ability to model ozone plumes, and being Lagrangian, can be used for identifying precursor source contributions. More directly relevant to work on pollution climate, is a question now posed by SATURN: which synoptic meteorological conditions are conducive to pollution episodes, especially of ozone, in Southern European Cities. What roles do local versus regional dynamics play, what precursors, and what indicators of photochemical pollution are there? FOSEC web site: http://aix.meng.auth.gr/saturn/forum. SATURN & FOSEC have close links with ESCOMPTE. It was valuable experience to hear about a project as complex as ESCOMPTE, as preparation for involvement in the possible managing of other multi-party projects.

Mixing Heights and Inversions

The COST 715 Action held a series of meetings and workshops. It opened with a series of expert presentations on mixing heights and inversions in urban areas. The following day looked at episodes and mixing heights. These two sessions each concluded with considerable discussion of how are mixing heights best measured (e.g. via accumulated pollutants in the air, or by profiles, or by remote sensing) and what is really meant by them. In the context of NWP, is the mixing height still a valid concept? It seems their practical usefulness in understanding episodes and in running the simpler types of pollution dispersion model renders the concept of mixing height useful, despite the agreed absence of precision in its definition. Some remarkable results were shown, including a collection of the early remote sensing results from Marseilles, and a collection of winter inversions in Helsinki, Finland, when the temperatures were from -22 C to -2 C near the ground. The inversion strength was ≈ 15 C. Such conditions, should they have been in London, would be expected to cause very severe air quality problems. The high latitude of Helsinki is important to consider when evaluating the causes of such strong, cold, surface inversions.

Methods for mixing height were reviewed by Dr Baklanov; in NWP the simple closure models do not work well. Nocturnal stable air in urban areas presents greatest difficulty for modellers. The performance of methods seems more acceptable in daytime than night. Inhomogeneity of surface types and thermal properties in a city should be modelled numerically.

Dr Martens reviewed German regulatory models; a traditional Gaussian plume and the new Lagrangian model. The latter uses turbulence components and Lagrangian time scales to evaluate the dispersion. In discussion the problem of inhomogeneity over an urban surface reappeared.

The review of the Basel experiment BUBBLE showed tower & surface observations, Lidar, Sodar, and tethered balloons. The review of ESCOMPTE (cf above) described also the use of RASS, O3 and particle Lidars. Real profiles showed multiple layering: "it is not really clear what the mixing height is" said the speaker. Another study tested the mixing height schemes within MM5; this being part of a larger PhD project using MM5.

In discussion it was agreed that urban areas are not homogeneous and this is needing to be considered. Equilibrium parametrizations assume long fetch, but this may not be possible. Mixing height may be an artificial concept, but is useful in practise. Urban turbulence may not scale on mixing height.

Using 10 km, 3 km, 1 km nesting Dr Berge has run NWP using MM5 model for Oslo, revealing the necessity of high resolution for resolving topography/density dependent features. Even this resolution tended to overestimate the inversion strength, causing high forecasts for particles. Poor dispersion areas could be identified at this resolution. In view of the London air quality review it would be interesting to repeat these runs shifted to the London area; London has a lower latitude and much flatter topography.

Milan is a city where topography plays a role in winter inversions. Whilst high pressure may build the inversion, local processes determine the local wind field near the ground. In episodes, the topography means the lower circulation is decoupled from the synoptic scale, being driven by local and mesoscale effects.

In discussion it was agreed the role of COST Action 715 is to focus on co-operation, to make recommendations, to recognise local differences, in guiding on meteorology for use in urban air pollution problems. The Working Groups were reminded of this purpose.

COST 715 Action WG and MC7

The remaining meetings were for national delegates. Working groups split to consider their respective topics. Various co-operations are in hand, such as:

WG1 is running 2 studies: urban-rural wind comparisons and a new scaling of urban wind.

WG2 is awaiting an outcome of a Study Contract application, to look at heat fluxes in some existing urban data sets. It is also preparing its report structure.

WG3 is gathering examples of air pollution episodes across Europe, seeking common features or local differences; the WG3 report may be revised.

WG4 is issuing its survey of meteorological measurements; a web questionnaire has been set up for national delegates to use in their respective countries.

http://www.mi.uni-hamburg.de/cost/cost715.html

The Management Committee evaluated the work in hand, including publications in the pipeline and recent workshops and meetings. There will be an increased focus on publications in refereed journals. These will be listed in the final report.

Conclusions

COST 715 represents significant European co-operation in the related fields of urban meteorology, dispersion modelling, and air pollution forecasting. It encourages and facilitates the building of multi-country field experiments and numerical modelling, including high resolution NWP with urban surface processes.