

Minutes of the WG1, WG1/WG2 and MC¹ meetings of COST 715

Greenwich, Dec. 6-8 2000.

Working Group 1 (technical meeting), Dec. 6 2000

[Due to the late arrival of the rapporteur – delayed airplane – the first part of the meeting is reported here only briefly]

Attendants: R. Almbauer [WG 3], E. Batchvarova, R. Berkowicz, J. Brechler, R. Costa Carvalho [no WG], B. Fisher [chairman COST715], Z. Janour, V. Prior, M. Rotach, L. Slørdal [WG 3], C. Soriano, A. Viseu [no WG]

[Note that due to the location and arrangements with the MC meeting, some people of other working groups participated, while some WG1 members also participated in the meetings of other working groups.]

Progress of work:

The state of progress of the five tasks as identified on WG's homepage was presented by the respective responsible WG members (given here in the order of the agenda rather than the order of presentation):

- *Roughness sublayer and canopy:* M. Rotach briefly informed on recent progress that has been made in parameterising Reynolds stress and mean wind speed data from a 'real array' wind tunnel study (Nantes, Rue de Strassbourg). Results from full-scale and wind tunnel observations seem to agree in general characteristics and a 'unified' description will be available soon
- *Urban Boundary Layer:* Z. Janour presented a generalised Rossby number similarity for extremely rough surfaces, which looks very promising. To this end no attempts have been undertaken to compare the predictions of this theory to measurements (due to the lack of data). Some suggestions for possible data sources were made. Clearly, the forthcoming experiments (ESCOMPTE and BUBBLE, see below) will yield the appropriate data.
- *Urban-rural transition:* Several data sets were presented which compare a rural reference wind observation to nearby urban observations: Barcelona (Soriano), Copenhagen (Berkowicz), Lisbon (Prior). Also, E. Batchvarova presented data from a recent study in Athens. In none of the cases an attempt has (so far) been made to apply the procedure as developed in the last WG1 meeting in Roskilde (which can be found on the WG's homepage). This procedure ensures that i) not only the rural observations are comparable (WMO standard), but also the urban observations (new, yet to be defined standard) and ii) that the influence of the roughness sublayer is properly taken into account. Problems with these data sets (in conjunction with the mentioned procedure) and the planned work were discussed and the further work was discussed and will be described under a separate item below (next steps).
- *Spatial inhomogeneity:* no contribution due to the absence of C. Sacré
- *Urban meteorological network:* short overview by V. Prior. The Lisbon urban network will be operational in short time and data will become available soon.

Next steps:

It was recognised that a thorough evaluation of the 'urban rural procedure' is hampered to some extent by the fact that WG1 members do not have resources to actually perform extensive sensitivity studies themselves. Therefore, the following general approach will be adopted:

- Establish a list of suitable data sets. For each of these, a responsible person will guarantee that the data set is available on request (within a short time). The possible costs of rural reference data will also have to be assessed.
- Establish a list of persons, who can direct a diploma or Master thesis in their institution. These people are encouraged to 'advertise' the subject of rural-urban wind speed intercomparison and can obtain the data sets from the people above.
- The results will then be collected by WG1 and general conclusions will be drawn. It is foreseen to publish the results in a joint paper. C. Soriano volunteered to proceed the idea of a first publication covering the already available urban-rural comparisons (i.e., without correcting for roughness effects). Such a publication

¹ Note that the complete minutes of the MC meeting are expected to be available from the COST715 secretariat (Dunkel). Here, I only list the most important issues in short (especially for those in the Swiss community, who are not on the distribution list) with an emphasis on the issues relevant for WG1.

will 'set the stage' for the envisaged later publication including the results from the theses as mentioned above.

Requirements for the data sets:

Availability of

- u(10m) at a nearby rural reference station
- u(any height) and u'w'(any height) at an urban station.
- Some basic information on the urban fabric (in order to estimate the necessary length scales).

Clearly, given practical limitations in fetch at existing sites, certain data sets will only qualify for certain wind directions (due to either the fetch conditions of the rural reference OR the urban station).

Possible data sets (responsible person)²:

- Basel (R.Vogt)
- Birmingham (D. Middleton): SE flow only
- Nantes, full-scale (P. Mestayer)
- Nantes, wind tunnel (P. Kastner-Klein)
- Hamburg (M. Schatzmann)

Other data sets from Copenhagen (Berkowicz) and Zurich (Rotach) may be added if necessary or desirable (and possible).

People who can direct a Masters or Diploma thesis:

- R. Berkowicz
- J. Brechler
- D. Middleton
- M. Rotach
- C. Soriano

Overall goal:

The presently available rural-urban comparisons show certain promising correlation, but it is extremely dependent on the characteristics of the employed data set. It is felt that this is mainly due to the fact that there is NO URBAN REFERENCE position, to which the data can be referenced. It is therefore intended to use the roughness sublayer knowledge in order to find out whether the various data sets become more comparable if related to a suitable urban reference position.

Final report:

A first draft for the final report was presented and discussed. It will be part of the overall report of COST 715.

Working Groups 1 and 2 (joint meeting), Dec. 7 2000

Presentations:

- The BUBBLE (Basel UrBan Boundary Layer Experiment) was presented by M.Rotach. As a COST 715 project within Switzerland it will directly contribute to the data sets sought for in the working groups 1 and 2. Basically, it aims at providing (yearlong) observations in order to test (and develop) parameterisations on the urban wind field and energy balance. It combines detailed surface observations (several towers) with remote sensing techniques (Lidar, Wind Profiler, Sodar, tethered balloon) for the entire urban boundary layer.
- P. Mestayer informed about ESCOMPTE. 7 weeks of observations (tethered balloon, Lidar, Sodar, Airborne) and surface obs. within a mesoscale project in the region of Marseilles. Basic goals are to test parameterisations of the urban energy balance (LUMPS, TEB, SM2-U) and the corresponding mesoscale models (MesoNH, SubMeso, RAMS). Also, the data should be employed to investigate the relation between the observed surface temperature to the radiative temperature.
- M. Pieringer presented results from a study in Vienna on the ventilation of the railway station. R. Berkowicz pointed out that the investigated situation is strongly affected by local geometry.
- D. Middleton gave an overview on activities in the UK with respect to urban meteorology: a) Data set from Birmingham (see above), b) Urban User Group (chair: P.A. Clarke, MetOffice) for applications in NWP and

² Extended after the actual meeting according to personal contacts during the MC meeting.

- pollution modelling, c) Air Pollution research in London (APRIL - chair: H. ApSimon, d) a recent application to NERC which was not funded.
- Roy Coleville (Imperial College – invited 'guest') presented some examples for *applications* of urban meteorological data (mainly of epidemiological nature). He pointed out that data requirements strongly depend on the particular application one has in mind
 - Alison Tomlin (Univ. of Leeds – invited 'guest'): Presented the research initiative LANTERN. Basically, the infrastructure is available but the money to do the actual research has yet to be found. Goal: Instrumentation of street canyons (sonics, instrumented car, chemistry) to study different geometries and categorise profiles. Development of a street canyon model (kinematic approach) and a nesting procedure for the canopy to the UBL. Results could improve parameterisations as employed in UK_ADMS or Airviro.
 - B.Fisher informed on a small study in the city of Paris. Simple concentration measurements should allow for simple relations between emissions and pollution. The approach was criticised to some extent as too simple and too vulnerable to highly local effects.

Definition of joint interests

M. Rotach presented a possible 'frame of reference' as adopted by WG1. This includes a characteristic vertical and spatial (horizontal) structure of the (highly idealised!) urban boundary layer. He suggested that WG2 should come to a similar (analogous) conclusion, in particular since certain important variables (e.g. stability) crucially depend on both, mechanical and thermal turbulence.

A vivid discussion started on the issue, but in the available time no conclusion could be reached. It appears that the basic problem is one of spatial scales and any definition of 'scaling regions' has to take this into account. Jumping back and forth between the scales during the discussion made the discussion somewhat difficult. Patrice Mestayer and M.Rotach will further work on the problem.

[Note added in proof: it appears to me that an idealised (homogeneous) meso-scale picture should be the starting point: what is the over-all characteristic of sensible heat flux, temperature, etc. over a rough but heated surface with complicated heating mechanisms near the ground. This answers the question about the overall heat exchange over an urban surface. Meso-scale models should be able to reproduce this. From this we may then extend the picture to either smaller scales (how does the heat flux profile *deviate from the spatially averaged canopy profile* close to the heated/(non-heated) wall, etc.) or to spatially inhomogeneous situations (internal boundary layers or rather random distribution of heat sources?).]

MC meeting, Dec. 7/8 2000

Detailed minutes from the MC meeting will be available soon (!) from the secretariat. Here, only those issues are summarised which are necessary for either WG1 members or the 'Swiss community'.

Reports from the WG's

- WG1/2: see above
- WG3: the status report on how the different countries treat 'calm conditions' is complete (and awaits (!) publication by Brussels....). Switzerland has not made any contribution due to the lack of a WG3 member AND the lack of any official procedure.
- WG4: A new inventory is planned, this time on available meteorological measurements in urban areas (mostly in conjunction with pollutant monitoring). The national representatives will have to pass a questionnaire to the possible data providers. Also, the report of the Prague workshop awaits publication by Brussels.

International Association for Urban Climate

A recently founded association for those who are interested in urban meteorology. See:

<http://www.geography.ohio-state.edu/UrbanClimate/>

The homepages of W1 13 can be found under 'links' there.

Budget

For next year, 4500'000 € are available for all the meteorological actions. It turns out that even if some initiatives (in 2000) had been 'blocked' by the secretariat due to 'financial problems', these were not real but rather (wrongly) assumed.

Technical Committee

S. Joffre informs on problems with further financing the TC for Meteorology (due to a 'sudden' cut in finances). A possible 'solution' arises for 2002. In the mean time ad hoc solutions have to be sought for.

Workshop/next meeting

It is decided to organise a COST 715

Workshop on Urban Boundary Layer Parameterisations

Zürich, May 24/25 2001

It will be organised by virtually all working groups - but WG1 /2 will take the lead. M. Rotach will take care for local organisation.

In a separate mail a first suggestions for possible speakers will be distributed.

Zürich, December 15 2000

Mathias Rotach