

# The Urban Air Quality Archive of the British Atmospheric Data Centre

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## Introduction

The British Atmospheric Data Centre (BADC) is the body appointed by the British Natural Environment Research Council (NERC) to archive, maintain and distribute data issued by atmospheric programmes based in the UK. In 1996, NERC launched a 7-year thematic programme called URGENT. The programme addresses scientific and monitoring issues related to the pollution of urban and suburban water, soil, ecology and air. Air data delivered by the programme will be archived at BADC.

## URban ReGEneration and the EnvironmENT (URGENT)

The 41 research projects funded by URGENT not only tackle a large variety of scientific areas but also conduct a wide range of research activities, from field campaigns to modelling, including lab measurements and development of technical apparatus. The deliverables include field data, images, software as well as urban planning tools and recommendations to city authorities. Most projects are still currently running and only a small number of them have started to supply data to their assigned data centre.

## URGENT overall data management

Four data centres have been designated to host URGENT data belonging to the four covered disciplines (water, soil, ecology, air). A *Data Management and Quality Assurance (DMQA)* Committee has been formed to ensure coordination between the data centres and to deal with issues related to the overall data management. An important task of the DMQA Committee has been to set up *metadata* standards applicable to all URGENT data. The specificity of the URGENT data management and its implementation have been dealt with in Swetnam et al., 2000.

## The URGENT Air projects

Among the 41 URGENT projects, 13 are closely related to the urban and suburban atmospheres. They address issues as diverse as urban meteorology, dispersion of pollutants, homogeneous (gas phase) and heterogeneous chemistry, aerosol particle size distribution and composition, particle toxicity, etc (see Table 1 below). Most projects conduct field experiments or observation, sometimes associated with some technological development, and 8 projects are involved at various degrees in model development. A few are carried out in collaboration with industry or local authorities.

Table 1. URGENT Air Science

Project code	Research subject	In situ observations/experiments	Technology development	Model development	Extra-academic participation
GST/02/1971	A thermal climatology of the West Midlands	✓	✓	✓	✓
GST/02/1974	Study of gaseous pollutant dispersion by means of tracer technology	✓	✓	✓	✓
GST/02/1981	Observation, modelling and management of urban air pollution (PUMA)	✓	✓	✓	✓
GST/02/1983	Characterisation and modelling of organics in airborne particles	✓	✓	✓	✓
GST/02/1996	Prediction of concentration of pollutants from chimney emissions	✓	✓	✓	✓
GST/02/2090	Diode laser detection of peroxy radicals	✓	✓	✓	✓
GST/02/2222	Airborne particle physicochemistry and toxicity	✓	✓	✓	✓
GST/02/2225	Vertical structure of the boundary layer physicochemical components	✓	✓	✓	✓
GST/02/2229	Urban gas phase chemistry	✓	✓	✓	✓
GST/02/2231	Urban meteorology	✓	✓	✓	✓
GST/02/2244	Sources and sinks of urban aerosols	✓	✓	✓	✓
GST/02/2254	Evolution of the particle size distribution of vehicular emissions	✓	✓	✓	✓
GST/02/2602	Dispersion of particles in urban street canyons	✓	✓	✓	✓

## URGENT at BADC

**Services.** One of the missions of BADC is to support scientists in all issues related to data. In order to achieve this goal, an emphasis is currently put on the development of tools intended to assist scientists at various stages of the data collection, analysis, etc. In this context, BADC provides an online air parcel trajectory calculator that has been extensively used during the two campaigns of the PUMA project (Figure 1). Other services include links to coordinate converters, etc.

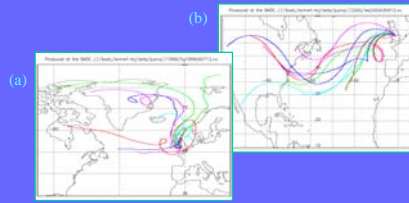


Figure 1. Two examples of 5-day air parcel backward trajectories calculated in the framework of the PUMA campaigns, arriving above (a) Halfpenny Green Airport on 7 June 1999, noon and (b) Witherbrook Equestrian Centre on 3 March 2000, noon. The colours refer to 11 different pressure levels at arrival, from 100 to 1000 mb.

**Format.** In order to ensure consistency between the data sets and to ease data exchange between the participants, the *NASA Ames Standard for Data Exchange* (Gaines and Hipskind, 1998) has been adopted by the URGENT 'Air' community as a common format for numerical fields. Among the many advantages it offers, this standard makes provision of its own metadata format. Online guidelines on how to format/read the data are provided by BADC, as well as facilities to check and upload NASA Ames files *via* the Web.

**Archive.** In order to cope with the variety of the deliverables, the file-based archive has been set up to host reports, software, images as well as proper numerical data, that can be plotted online. Data sets held at BADC are documented as they populate the archive. At the time of writing, two projects (in red in Table 1) have submitted data to BADC. These consist in meteorological, chemical and particulate matter data collected during Summer 1999 and Winter 2000 at a variety of ground sites in and around Birmingham (Figure 2) and in the boundary layer above the city (Figure 3). Further data and software from the remaining

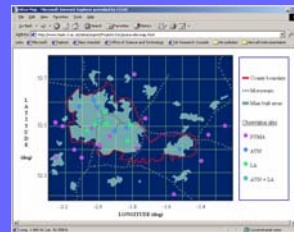


Figure 2. The two PUMA campaigns of Summer 1999 and Winter 2000 took place in and around the West Midlands county (UK), the surface of which is largely occupied by Birmingham city and its suburbs (West) and by Coventry (East). An online map displays the observation sites – each dot is a link to a summary of the data collected at the corresponding site – together with the main built areas and the highway network. AUN refers to the Automatic Urban Network while LA stands for Local Authorities.



Figure 3. During the PUMA campaigns, another URGENT project (GST/02/2225) made measurements aboard a CESSNA aircraft above the West Midlands area. Flights were based at Woodford, Greater Manchester, 78 miles (125 km) North of Birmingham. Flight tracks provided by the project investigators can be viewed on the BADC Web site. The example above displays the flight track of 16 June 1999.

projects are expected to be archived at BADC during 2001 - 2003.

**Search.** The catalogue of all URGENT data sets will eventually become searchable through a metadata search engine. In the meantime, BADC provides several tools to help the user identify the 'air' data he/she requires and to locate the corresponding file(s) in the archive. These include a data inventory listing all measured variables and the 'clickable' site map displayed in Figure 2.

**Access.** URGENT data are subject to a protocol aimed at protecting the investigators' right to exploit and publish their work. For this reason, access to the URGENT archive at BADC is password protected and is restricted to the programme participants and their collaborators until a year after the project completion date. However, all the documentation and data summaries compiled by BADC are publicly accessible.

## References

- Gaines, S.E. and R.S. Hipskind, Format specification for data exchange, Version 1.3, 1998.  
<http://cloud1.arc.nasa.gov/solve/archiv/archive.tutorial.html>
- Swetnam, R., I. Tindall, J. Cook, S. Pepler and R. Shaw, Collation, management and dissemination of environmental research relating to urban areas in the UK: the approach used within the Natural Environment Research Council's URGENT programme, *Proceedings of the XXIInd Urban and Regional Data Management Symposium, Delft, The Netherlands, September 13-15, 2000, 2001.*

