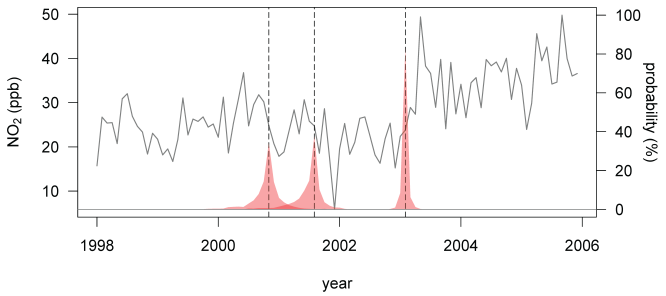
TOWARDS SMARTER AIR-QUALITY ANALYSIS

Thursday 1st October 2009
Institute of Physics, 76 Portland Place, London

OPEN source | NATURAL ENVIRONMENT RESEARCH COUNCIL | AirTrack

Introduction

Ambient air-quality monitoring has grown markedly in the past decade driven by concerns over the adverse impacts of air pollution on health and the environment. The data are mostly used to compute a few routine concentrations statistics for the purpose of checking compliance with standards. Extra information in the data on the performance of particular sources, sectors and policies is generally under-exploited. However, new developments in air-quality management, like exposure reduction and the need to confirm promptly that improvement plans are working, now require this extra information.

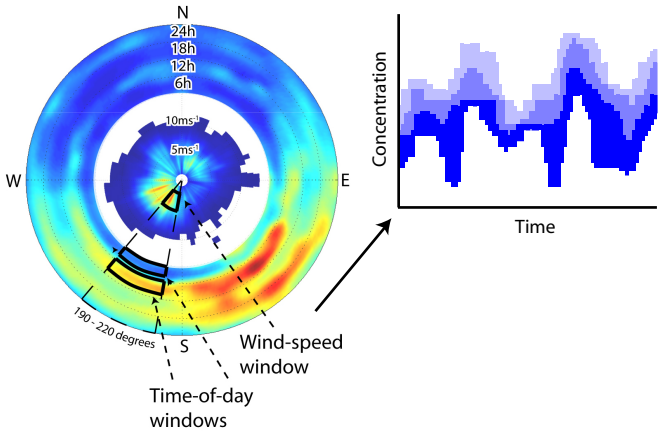


Change-point analysis applied to monthly mean NO_2 concentrations at a roadside site in London. The shaded areas show the probability distributions that a change point has been detected.

Considerable technical knowledge on how to extract extra information exists already in the specialist scientific community. This knowledge needs to be shared with the wider community of air-quality practitioners. Also, the practical knowledge of practitioners needs to be fed back to the scientists in order to guide development of better analysis methods and better interpretation procedures.

The Natural Environment Research Council (NERC) is supporting two Knowledge Exchange projects to connect the scientists and practitioners for innovative air-quality analysis. The ***openair*** project based at the University of Leeds is developing and disseminating open-source tools for the innovative analysis of air-quality data using the statistical software "R". The ***AirTrack*** project based at Lancaster University is using case studies to show how new data-mining methods can be used to track the performance of individual sources, interventions and policies.

"Towards Smarter Air-Quality Analysis" is the first joint *openair* / *AirTrack* workshop. Participants are invited for their knowledge and experience of air-quality data, and for their interest in getting more insights from such data. The workshop will: brief participants on novel analysis methods and examples, explain the work underway in each project, encourage participation in later case studies, and exchange ideas on what new insights are useful and feasible. Guest speakers will consider developments in air-quality analysis from a European perspective, and the implications of emerging technologies for atmospheric monitoring. Posters, networking and a Panel session will also help to link the scientific and practitioner communities, so that together we can get better decisions and value from air-quality data.



The outer plot shows NOx concentrations peak around the morning and evening rush-hours, and the inner-plot shows a high frequency of moderate winds from the south-west, i.e. from the M4 motorway. These features can be used to define conditional windows (boxes) for tracking M4 traffic pollution, near Heathrow.

Programme: Towards Smarter Air-Quality Analysis

09:45 - 10:30 Poster setup and coffee

10:30 SESSION 1

10:30 - 10:45 **Welcome/Introduction** (*Stephen Loader, NERC*)

The air-quality-analysis community is being supported by NERC under their Knowledge Exchange programme. NERC will therefore welcome participants and explain the processess, aims and value of sharing knowledge between the science base and practitioners.

10:45 - 11:30 **Drivers, users and approaches for smarter air-quality analysis** (*Roger Timmis, Environment Agency*)

The reasons for extracting more from monitoring data will be outlined, e.g. for policy, regulatory, operational and planning purposes. An outline will also be given of who will benefit from the extra information, and how. Basic concepts and methods for extracting more information will be introduced.

11:30 - 12:15 ***openair*: Open-source tools for insights into air quality** (*David Carslaw, University of Leeds*)

Innovative techniques and accessible software for mining extra information is essential for widening the uses and users of ambient air-quality data. The "R" software package being developed by the Leeds openair team makes available free, open-source tools to the international air quality community.

12:15 - 13:00 ***AirTrack*: Tracking air-quality performance: applications, implications & challenges** (*Duncan Whyatt, Lancaster University*)

Case studies of varying complexity will be presented. The implications of smarter analysis for the design of monitoring networks will be discussed, as will issues around meteorological data and uncertainty. It will be shown that new analyses are useful for comparisons between models, and between models and observations e.g. to check models "get the right answer for the right reasons".

13:00 - 14:00 LUNCH AND POSTERS

Programme: Towards Smarter Air-Quality Analysis (continued)

14:00 **SESSION 2**

14:00 - 14:45 **Emerging technologies for atmospheric monitoring** (*Ally Lewis, University of York*)

This presentation will highlight some of the capabilities for air quality detection using emergent measurement technologies including sensor detection, microfabricated and miniaturized analytical devices and low cost remote sensing. The opportunity for development of new distributed air quality observation approaches as part of the NERC science strategy will also be discussed.

14:45 - 15:00 COFFEE

15:00 **SESSION 3**

15:00 - 15:15 **Air-quality analysis: reflections on becoming smarter** (*Duncan Laxen, Air Quality Consultants*)

Duncan Laxen will reflect on the opportunities and barriers for making better use of air-quality data, as a preparation for the Panel discussion.

15:15 - 16:00 Panel Discussion

Panel to include representatives from openair, AirTrack, Institute of Air Quality Management, Consultancy, Local Authority and Central Government.

16:00 CLOSE

Who is invited?

Many organisations use air-quality information as evidence for decisions and advice.

Central Government/Agencies:	for policy formulation and regulation
Local Government:	for local air-quality management and compliance
Consultancies:	for assessing impacts and advising clients
Industry & developers:	for permit and planning applications
Environment Groups, NGOs:	for identifying risks to people
Manufacturers & suppliers:	for design of monitors and analysis software
Academic bodies & researchers:	for developing new methods to meet users' needs

Attendees have been invited from all of the above groups to ensure a well-balanced meeting. All will benefit from better exploitation of air-quality data as addressed by the workshop. All will also be interested in getting more "value for money" from monitoring expenditures - a key aim of "smarter" monitoring and analysis. Professional bodies concerned with air-quality and environmental protection will find that the workshop is relevant to their members' skills and interests.

Exchanging Methods & Experience

The Knowledge Exchange process recognises that expertise for better use of air-quality data resides in both the specialist scientific community and in the wider practitioner community. The process is designed to give each community a clearer view of the others' needs.

Those from the specialist scientific community, such as the *openair* and *AirTrack* teams, should learn about what practitioners want from them and about how to make their new analysis methods practical, accessible and "fit for purpose". Those from the wider practitioner community should learn about new concepts and tools available for exploiting air-quality data so that their decisions and/or actions make full use of the evidence available, are more robust and are better prioritised.

This unique Knowledge Exchange opportunity will enable both communities to explore together how "smarter" methods for air-quality analysis can influence the design of monitoring networks, and how they can be transferred to related areas such as model comparison and validation.

Confirming Attendance

In order to confirm your attendance at the workshop on 1st October 2009 please contact Maria Angeles Solera Garcia (Workshop Coordinator) by 31st July 2009.

Email: a.soleragarcia@lancaster.ac.uk

Tel: 01524 594806

Directions

The Institute of Physics is located at 76 Portland Place in London.

The nearest Tube Stations are Great Portland Street (Hammersmith and City, Circle and Metropolitan lines), Oxford Circus (Central, Bakerloo and Victoria lines), and Regent's Park (Bakerloo line).