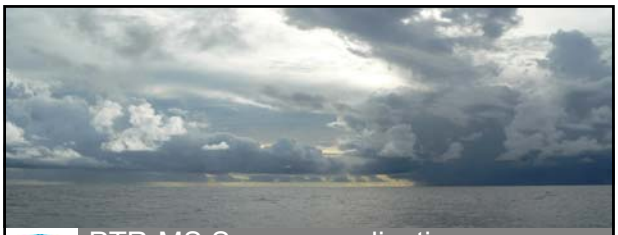


PTR-MS Sensor: applications in air toxics and hazards

Dr Michael Borgas
Healthy Atmosphere Theme

16th August 2006
CSIRO Marine and Atmospheric Research

www.csiro.au

Air toxics from point sources

*National Environment Protection (**Air Toxics**) Measures*

- Benzene
- Formaldehyde
- Benzo(a)pyrene (marker for Polycyclic Aromatic Hydrocarbons)
- Toluene
- Xylenes

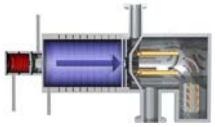
…

U.S. EPA has 188 regulated substances – many volatile organic compounds

Plume methodologies also apply to particles and to odour problems (insect tracking…)

The Proton Transfer Reaction Mass Spectrometer

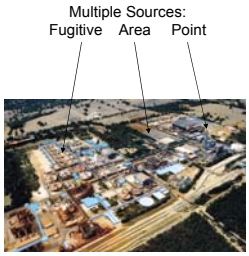
(Ian Galbally, CMAR)



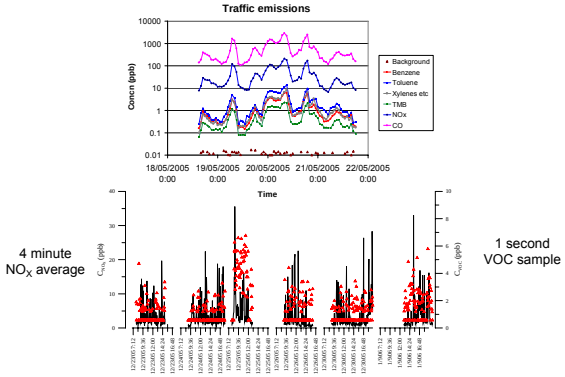
- Quadrupole-Mass-Spectrometer
- Fast inlet → fast response: ca. 100 msec
- Standard-PTR-MS mass range: 0-512 amu
- No reaction with "clean air compounds"
- No loss of primary ions to "clean air compounds"
- Limit Of Detection: 10-20ppt

PTR-MS

Air toxics from point sources: experimental design



Air toxics from point sources: experimental design



4 minute NO_X average

1 second VOC sample

Air toxics from point sources: experimental design

Participants include CMAR (Aspendale and Canberra), State University of Arizona, Dept Env. and Cons. WA, Environ, The Odour Unit, Alcoa and community volunteers.

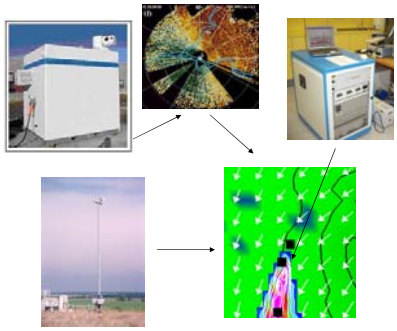
Chemical sampling involves:

- Odour sensing by trained observers;
- Cannister sampling by community observers;
- Two specially equipped trace air quality monitoring stations; and
- Two **PTR-MS** instruments.

The meteorological measurements include:

- Surface flux measurements;
- A network of four surface meteorological monitoring stations;
- Acoustic sounding for winds;
- Celiometer for clouds;
- Radiosondes; and
- An automated doppler lidar for mesoscale winds (8 km radius).

Air toxics from point sources: experimental design



Air toxics from point sources: goals for capability development

- Integration of meteorology, plumes and sensors
- Assimilation of data for prediction (real time) and interpretation (design)
- Signal recognition software
- Calibration of alternative (simpler) electronic noses
- Perimeter monitoring systems
- Adaptation to urban canopies, building emissions, tunnel emissions
- Integration with numerical modelling

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Thank You

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