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Tracking the complex nose of pollution

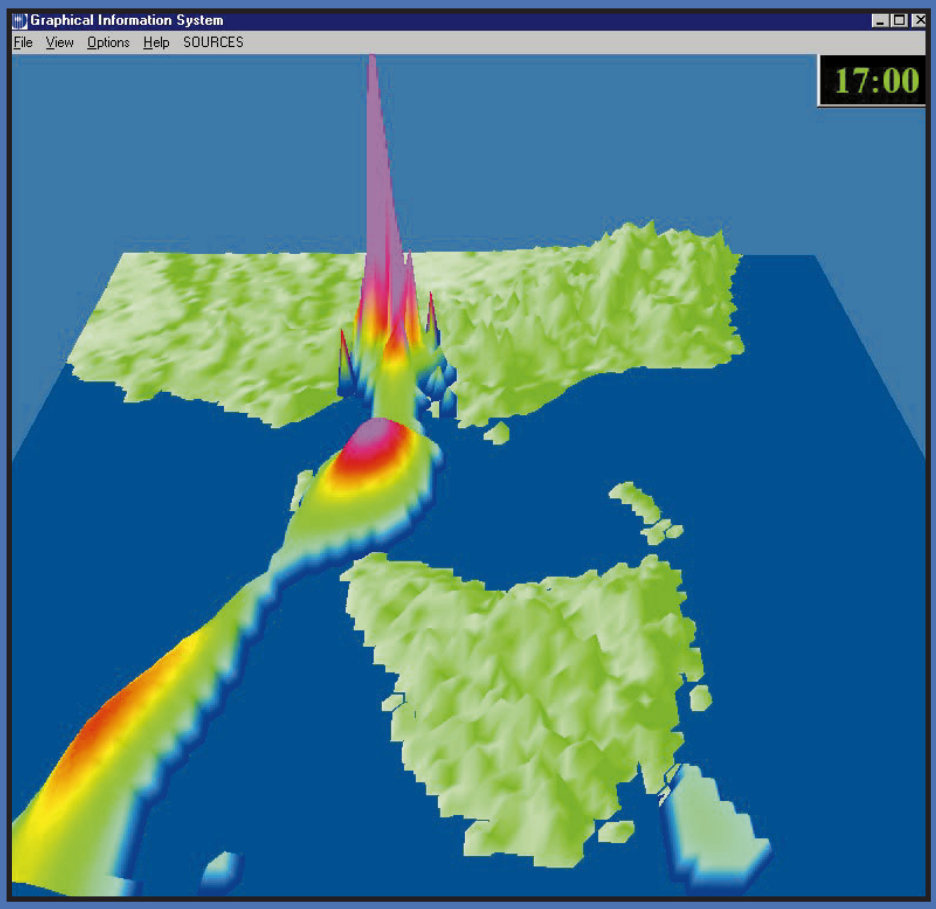
Nobel Prize winning physicist Richard Feynman once spent a week on his hands and knees. He was testing his theory that dogs smell things better than humans because they are closer to the ground, where smells congregate and travel easily. After wearing out the knees of his trousers and forming callouses on the heels of his hands, he decided that dogs just naturally have a better sense of smell.

But now scientists from CSIRO Atmospheric Research have designed a software tool that can 'outsniff' even the most sensitive canine nose. The Air Pollution Model, or TAPM, can trace pollution originating hundreds of kilometres away. For example, Melbourne pollution data collected from air samples taken at Cape Grim in north-west Tasmania, matched TAPM predictions of pollution flow across the 300-km stretch of Bass Strait.

Dr Bill Physick, who leads the air quality modelling team at CSIRO Atmospheric Research, says TAPM's capabilities will allow users in Australia, New Zealand and South-East Asia, to track pollution emissions and identify the most significant sources of pollution in regions of interest.

The model uses geographical and atmospheric data from the Australian Bureau of Meteorology and local data on land formations, soil and vegetation types and weather conditions provided by CSIRO. Users can then obtain pollution predictions for any time period, such as the long-term averages or hourly peak values required by regulatory authorities. TAPM also enables potential atmospheric polluters, such as heavy industry, to model the impact of their emissions on surrounding areas. The model can even track pollution after significant wind changes or 'recirculation', which often occurs around coastal cities.

Physick says an accurate model of atmospheric pollution also allows authorities to develop air-quality management plans. If the model indicates that pollution will be a problem, users can test the consequences of implementing various control policies. Having the power to make theoretical predictions means that more informed and sensible policies can be introduced.



CSIRO Atmospheric Research has designed an air pollution model that traces the distant effects of air pollution. This pathway of atmospheric emissions between Melbourne and Cape Grim in north-west Tasmania – as predicted by the TAPM model – was confirmed by on-site air samples. The model will help environmental authorities and industries to meet air quality standards, both in Australia and overseas.

As well as its regulatory applications, TAPM has been used to assess photochemical smog in cities and haze in countries such as Malaysia. For example, Kuala Lumpur has severe haze problems, but the sources of the haze have been difficult to identify.

Dr Greg Ayers of CSIRO Atmospheric Research has been working on the Malaysian haze problem since the early 1990s.

After the 1997 Indonesian fires, which spread smoke throughout the region, CSIRO, AusAID and the Malaysian Department of the Environment and Meteorological Service, joined forces to tackle the problem directly. Two haze monitoring stations were installed in the Klang Valley and continuous measurements have been made since that time.

Ayers says that as the results from two sites are not enough to determine pollution sources directly, TAPM has been useful in identifying the various sources of the haze, whether they are smoke, traffic emissions or meteorological factors. These measurements will continue until the end of 2000 and the results used to influence Malaysian Government policy to reduce the haze.

Physick says the development of packages such as TAPM will give scientists the tools to track and further understand atmospheric pollution. They may even provide answers to questions that have in the past brought Nobel Prize winning scientists to their knees.

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