Smog Spotting Ramps Up Down Under

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SYDNEY, Australia -- Should you go for that run now -- or wait until later? If air pollution levels matter to you, you could check the Web first,- at least if you live in Melbourne.

The Australian Air Quality Forecasting System (AAQFS) provides anticipated air pollution levels as far as 24 hours in advance for the city and surrounding region. The data is shown as a scrolling slide show, with nasty pollutants such as carbon monoxide, nitrogen dioxide and ozone morphing hour by hour as they cast unhealthy splotches over an outline of Australia's second-largest city.

By merging local weather forecasts with detailed industrial and transport emission data, AAQFS forecasts pollution levels for the coming 24 hours in cells as small as one square kilometer. While localized weather and pollution data also are compiled by government agencies in other countries, they're usually available for only a limited number of pollutants, in tabular form and over much larger areas --- making the data less useful for the non-specialist.

"Our aim has been to provide pollution forecasts that the public can use in an easily understandable way," said Dr. Martin Cope of the Atmospheric Research division of the Australian national research organization CSIRO. "We're trying to 'value-add' to data that's already out there by putting it in more graphical form."

But providing pollution forecasts and keeping them constantly updated with real-time graphics requires major numbers-crunching power. To generate the data, AAQFS must use a supercomputer operated jointly by the Bureau of Meteorology and the CSIRO. In the United States, Bruce Hicks, director of the Air Resources Laboratory, U.S. National Oceanographic and Atmospheric Administration, believes AAQFS is the most advanced system of its kind in the world.

He's been in touch with the team that put the Australian system together in hopes of cloning it in the United States.

"The whole world is moving down this path," Hicks said. "But systems being developed are quite different in different locations."

For instance, Australia's coastal cities and largely undeveloped inland makes forecasting somewhat simpler than it is for countries with lots of cities, like the United States.

"In Australia, the polluted areas are on the downwind side of the continent, largely unaffected by anything injected upwind," Hicks said. "In the U.S., we have a more complex chemical situation with pollution from the Ohio Valley, for example, mixing with pollution from Pennsylvania and mingling with pollution from New Jersey before finally affecting New York."

In Melbourne, transport has now largely replaced industry as the largest source of air pollutants. Watching the Web-based graphics scroll by hour by hour makes it easy to spot the daily "rush hour" as growing clouds of carbon monoxide spread over the city. The pollutants then disappear from the city in the overnight hours.

Ultimately, the Victorian EPA hopes AAQFS will be an educational tool to inform people about the impact of such things as car use. Over time, the EPA plans to introduce hypothetical scenarios to the system, such as the ability to show the pollution impact of having 25 percent of the city's normal vehicle traffic taken off the road.

"If you can convince the populace that tomorrow may be a bad day (for air pollutants), you might urge more people to take public transport, or ride their bikes," Cope said. "This could help show people in a graphical form the positive impact of these kinds of personal decisions."

By giving people increasingly detailed forecasts about pollution, Wong believes the system could help in any number of decisions --- from industry planning releases of industrial emissions to assisting consumers in deciding where to buy real estate.

"Studies have shown that if you move as little as 650-1,500 feet away from a major roadway, pollution levels can rapidly fall off to ambient background levels," Wong said. "Maps like this can help identify and isolate emissions hot spots."

And since the Sept. 11 terrorist attack that destroyed New York's World Trade Center, researchers acknowledge the system could show promise as a means of keeping the public up to date in the event of an airborne biochemical terrorist attack.

"Tracing the movement of such things would be just like injecting another ground-level, industrial source of pollution to the model," said Neil Wong, a researcher with the Victoria EPA who helped develop the system. "The system has that sort of capacity."

Last year, developers debugging the system used it to extrapolate the impact of an airborne chemical release at Sydney's 110,000-seat Stadium Australia during the Sept. 15-30 Summer Olympics. While the system wouldn't be much good for warning people inside the stadium what to do, it could alert those elsewhere in Sydney of where, when and how an urban toxic cloud might spread.

Like Wong, Hicks says such a forecasting system could help trace airborne chemicals during terrorist attacks, but he declined to say more.

In coming months, the AAQFS is expected to be extended to Sydney, Brisbane and other Australian cities. But given the complexity of the system, it still has some shortcomings, developers admit. Among other things, the graphics can't be viewed through newer browsers like Netscape and Internet Explorer 6 and above, although older browsers such as Netscape 4.77 and IE 5.0 work fine.