

some idea of how material will spread, and how that is affected by factors such as the weather.

Data from the New York experiments, principally funded by the Department of Homeland Security (DHS), will be fed into computer models that can be run in an emergency, to predict how a plume of material will disperse over the following hours and to inform emergency services about how to respond.

It is impossible to test every material, in every location and in all conditions. But Tom Keiss, acting programme manager for radio-

logical countermeasures in the DHS Office of Research and Development, says the results from such experiments could lead to models accurate enough for use in an emergency.

"These models could tell us what sort of area first-responders should evacuate, and even the information you would give the public," he says, such as safe routes out of a city. "We consider this to be a sound investment that can save lives."

The gases are being released from an area of two square kilometres south of Central Park

releases in London. It tested its models with data from a tracer experiment to examine air pollution in the city, and is deciding whether to fund a large-scale tracer-release programme in London.

"Experiments in New York are not much use to London or Paris. Our cities are very different physically, and have different climates," says Alan Robins, a specialist in environmental fluid mechanics at the University of Surrey, Guildford, and chair of the London project. ■

Tom Simonite

Japan accelerates global supercomputer war

TOKYO

Japanese groups are competing to reclaim for their country the honour of owning the world's fastest supercomputer.

Japan lost the title last autumn, when IBM's BlueGene/L computer — which has a maximum speed of 140 million million calculations per second (140 teraflops) — overtook the Yokohama-based Earth Simulator (see *Nature* 431, 618; 2004).

Last month, a group that includes Toshiba, the University of Tokyo and the Institute of Physical and Chemical Research announced plans for a computer that would be 73 times faster — capable of 10,000 million million calculations per second (10 petaflops). It said that the project could cost between ¥80 billion (US\$700 million) and ¥100 billion, and would be ready by March 2011.

But experts are already expressing doubts. Tetsuya Sato, director of the Earth

Simulator, says the project will be held back by the limits on semiconductor technology, which is reaching the narrowest dimensions of circuits that can be etched. "I am very sceptical," he says.

Erich Strohmaier, a computer scientist at Lawrence Berkeley National Laboratory, says difficulties with increased heat output and power consumption would also hamper the development of faster processors. But he predicts that technological advances could produce a machine of at least 3 petaflops by 2011, and doesn't rule out the Japanese team reaching their goal. "It's an ambitious project," he says. "With an exceptional system design, 10 petaflops seems within reach."

Meanwhile, Sato has his own plan — hooking the 40-teraflop Earth Simulator to a new 400-teraflop computer. The smaller machine would act as a 'macro-structure', performing large-scale calculations and

directing the more intricate operations of the larger one, he told *Nature*.

Sato thinks that changing the networks' wiring in this way would allow the equivalent of 16 petaflops. "We are close to the technological limit," he says. "But this solution is based on physics, not technology." Strohmaier warns, however, that such hierarchical structures are a risk because they sacrifice a great asset of the Earth Simulator — "a tried and tested technology, which we understand and know how to program," he explains.

This computing power, if achieved, could be used to model climate change, drug metabolism and galaxy formation, for example. But it would be very expensive. It is not clear which of the projects, if either, will make it into the Japanese science ministry's budget requests, due this month. ■

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