Termite insecticide a potent greenhouse gas

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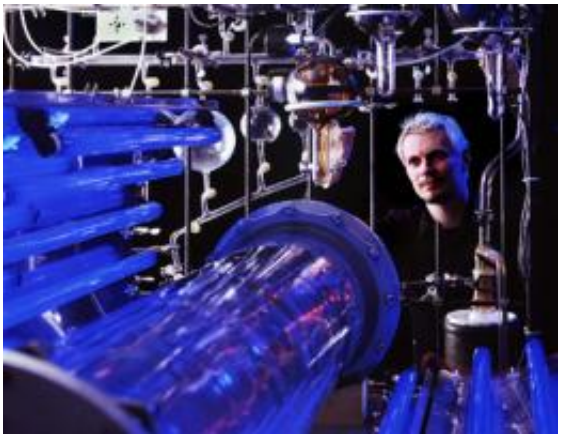

Mads Sulbaek Andersen with Pyrex chamber

(PhysOrg.com) -- An insecticide used to fumigate termite-infested buildings is a strong greenhouse gas that lives in the atmosphere nearly 10 times longer than previously thought, UC Irvine research has found.

Sulfuryl fluoride, UCI chemists discovered, stays in the atmosphere at least 30-40 years and perhaps as long as 100 years. Prior studies estimated its atmospheric lifetime at as low as five years, grossly underestimating the global warming potential.

The fact that sulfuryl fluoride exists for decades - coupled with evidence that levels have nearly doubled in the last six years - concerns study authors Mads Sulbaek Andersen, Donald Blake and Nobel Laureate F. Sherwood Rowland, who discovered that chlorofluorocarbons in aerosol

cans and other products damage the ozone layer. That finding led to a worldwide ban on CFCs.

"Sulfuryl fluoride has a long enough lifetime in the atmosphere that we cannot just close our eyes," said Sulbaek Andersen, a postdoctoral researcher in the Rowland-Blake laboratory and lead author of the study. "The level in the atmosphere is rising fast, and it doesn't seem to disappear very quickly."

This study will appear online Jan. 21 in the journal *Environmental Science and Technology*.

Kilogram for kilogram, sulfuryl fluoride is about 4,000 times more efficient than carbon dioxide at trapping heat, though much less of it exists in the atmosphere.

Its climate impact in California each year equals that of carbon dioxide emitted from about 1 million vehicles. About 60 percent of the world's sulfuryl fluoride use occurs in California.

Sulfuryl fluoride blocks a wavelength of heat that otherwise could easily escape the Earth, the scientists said. Carbon dioxide blocks a different wavelength, trapping heat near the surface.

"The only place where the planet is able to emit heat that escapes the atmosphere is in the region that sulfuryl fluoride blocks," said Blake, chemistry professor. "If we put something with this blocking effect in that area, then we're in trouble - and we are putting something in there."

The chemists worry that emissions will increase as new uses are found for sulfuryl fluoride - especially given the ban of methyl bromide, an ozone-depleting pesticide regulated under the Montreal Protocol. Sulfuryl fluoride emissions are not regulated, though officials do

consider it a toxic contaminant.

The insecticide is pumped into a tent that covers a termite-infested structure. When the tent is removed, the compound escapes into the atmosphere. Sulbaek Andersen, Blake and Rowland believe a suitable replacement should be found, one with less global warming potential.

To measure sulfuryl fluoride's atmospheric lifetime, the chemists put it inside a Pyrex chamber with compounds that are well understood in the atmosphere, such as ethane. They shined lamps on the chamber to simulate sunlight, which caused chemical reactions that eliminated the compounds from the air.

By monitoring sulfuryl fluoride changes compared with changes to the well-known compounds, they were able to estimate its atmospheric lifetime.

"This is a cautionary paper," said Rowland, Donald Bren Research Professor of Chemistry and Earth System Science. "It tells us that we need to be thinking globally - and acting locally."

Source: University of California - Irvine