

If not in atmosphere, where does carbon go?

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A prominent atmospheric scientist Monday (Oct. 29) called for more research into natural carbon “sinks,” which today absorb almost half of man-made carbon dioxide released into the atmosphere and which will play a large role in determining the extent of future global warming.

Inez Fung, professor of atmospheric sciences and co-director of the University of California, Berkeley, Institute of the Environment, said evidence from recent years has indicated that the absorption rate of two major known reservoirs of carbon in the environment can slow down, allowing the amount of carbon dioxide entering the atmosphere to increase more rapidly than expected and potentially accelerating the rate of climate change.

The world’s oceans are one major potential sink, she said, absorbing carbon dioxide, changing it to other compounds containing carbon and locking it away from the atmosphere. Oceans are layered, she said, with a warmer upper layer separated from a lower colder layer. The lack of mixing between the two layers, she said, limits the amount of carbon dioxide the oceans — which are a potentially enormous carbon sink — can absorb.

Similarly, the amount of carbon absorbed by plants through photosynthesis can be slowed by drought, which reduces plant growth and offsets the carbon-absorbing effects of a longer growing season.

“The rate of climate change has been a surprise for many of us,” Fung said. “It’s an urgent problem.”

Fung spoke Monday at the Science Center in a talk sponsored by the Radcliffe Institute for Advanced Study as part of its “Lectures in the Sciences” series. The talk, “The Changing Carbon Cycle: How Fast Will Atmospheric CO₂ Increase?” was introduced by Radcliffe Interim Dean Barbara Grosz and by Abbott Lawrence Rotch Professor of Atmospheric and Environmental Science Steven Wofsy, who said Fung is a “pioneer” in her field.

Though the broad outlines of the global carbon cycle are understood, the details of how some of its parts work are still fuzzy. There is still debate, Fung said, over whether the vast Southern Ocean is a major reservoir for carbon, something Fung doubts.

Fung described the global landscape of carbon dioxide emissions as being dominated by industrial nations in the Northern Hemisphere, which emit 96 percent of the carbon dioxide. Most of that comes from burning oil, coal, and natural gas, with just 14 percent from all other sources.

Atmospheric carbon dioxide measurements have documented an increase in the levels of the gas in the atmosphere from about 315 parts per million in 1960 to 380 parts per million in recent times. Scientists believe the atmosphere in pre-industrial times had about 280 parts per million of carbon dioxide.

Fung reviewed recent carbon dioxide data, saying the increase has been faster than scientists expected. Instead of the 1.1 percent annual increase in carbon dioxide emissions seen in the 1990s, humans increased their carbon dioxide emissions by 3 percent annually between 2000 and 2004.

Fung said new technology and new experiments, together with integrated observations from the atmosphere, land, and sea, are needed to understand how the biosphere responds to the changing globe. A new

satellite planned for 2008 will measure carbon dioxide in the atmosphere and will help, she said, but field experiments will also be needed.

“The question is whether the warming will accelerate the warming,” Fung said.

Source: Harvard University

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