

Global warming effect seen in pole-to-pole data-gathering flights

Geoff Mohan, Los Angeles Times, 9-8-11

Scientists who have just completed several years of pole-to-pole flights have uncovered data that confirms some of the deep worries about human-generated global warming that had been predicted by computer-based mathematical models.

The flights offered the most comprehensive look to date at greenhouse gases accumulating in the atmosphere, warming the planet and setting off chains of effects on climate.

The data mined by the National Center for Atmospheric Research team will take years to analyze. Asked about his first overall impression, however, the project's chief investigator, Steven Wofsy, a professor of Atmospheric and Environmental Science at Harvard University, said, "It certainly doesn't make me feel more relaxed" about human-induced climate change.

Unlike satellite or ground-based data, the information gleaned on flights that dipped from as high as 40,000 feet to below 500 feet recorded and demonstrated some of the mechanisms that put additional greenhouse gases into the atmosphere, adding a level of precision that mathematical models and satellite observation often lack.

"It's like looking at an X-ray from the '60s versus a CAT scan today," Wofsy said of the difference in the data.

Scientists were surprised to find strong evidence that ocean surfaces laid bare by melting ice are emitting methane at a "significant" rate likely to have "global impact," Wofsy said.

"It confirms a concern that's been raised about the removal of ice from the arctic," Wofsy said. "It does look to be significant, and that's a new result there."

The process by which the open ocean surface is emitting methane, a more potent greenhouse gas than carbon dioxide, is uncertain, Wofsy said, adding that it likely is not from frozen masses of methane known to be in deep oceans, nor from methane being exhaled from newly thawed tundra.

The discovery of this net addition to the atmosphere confirms a "feedback" mechanism by which one phenomenon has a multiplier effect on the contents of Earth's atmosphere, where greenhouse gases have been accumulating at a rapid rate in modern industrial times.

Here, not only does the white ice stop reflecting the sun's energy into the atmosphere (the albedo effect), but its absence also adds more blanketing gases that trap reflected heat.

"It had not been forecast that we would see evidence of methane coming from the deep ocean regions," Wofsy said. "Maybe we should've known, but that was a surprise."

In the tropics, the flight teams were able to see and measure how nitrogen oxide and nitrogen dioxide accumulate in the upper atmosphere. In addition, the flights more closely observed the interchange of oxygen and carbon dioxide in the ocean, a product of photosynthesis by algae and die-offs of that algae, among other processes.

The flights not only allowed researchers to chronicle the distribution of CO₂ but count the molecules and use the data to test mathematical models' predictions.

The research was conducted jointly by the atmospheric center and the National Science Foundation, which along with the National Oceanic and Atmospheric Administration, provided funding.

Known by its acronym, HIPPO, the effort used an advanced aircraft that would dip down to 500 feet or lower at every two degrees of latitude, collecting data throughout the air column in an effort to determine where and when planet-warming particles enter the atmosphere.

At a time when partisan politicians and climate skeptics have whittled away at uncertainties in models and studies, the data have the potential to be a trove of factual rebuttal. Two peer-reviewed papers already have been produced from the data, and more are expected.