CO_2-Climate Models Defended

A National Research Council panel has concluded* that the best estimate of the long-term, global warming due to a doubling of atmospheric carbon dioxide is still 3° ± 1.5°C, despite recent claims that global climate models of the greenhouse effect have exaggerated the warming. The panel enters the fray on the side of the overwhelming majority of specialists in the field, but the dissenters are not likely to withdraw soon.

The center of the controversy is the work of Sherwood Idso, a physicist at the U.S. Water Conservation Laboratory in Phoenix. In 1980, Idso (*1*) calculated the warming due to a doubling of carbon dioxide to be 0.26°C, about one-tenth of that produced by most mathematical models of the climate system. Rather than constructing a mathematical model whose workings would mimic the physical world, Idso based his calculations on measurements of the temperature effects of naturally induced changes in radiation. Carbon dioxide affects temperature by altering radiation fluxes, but no carbon dioxide–induced temperature change is detectable yet. So Idso determined the relation between temperature changes and changes in radiation induced by carbon dioxide surrogates—in two cases dust or water vapor over Phoenix, and in a third case the seasonal changes in incident radiation over the United States.

Idso claims that a given change in radiation at the ground produced the same change in temperature in each case, with the exception of the seasonal changes along the Pacific Coast. This being so, he reasons, the response over Phoenix and the inland United States can be taken as that of all of the continents, and the response of the U.S. Pacific Coast is equivalent to the maximum response of the world ocean. In support of his calculations, Idso cites an equally small carbon dioxide response by tropical ocean temperatures in a model by Reginald Newell of the Massachusetts Institute of Technology and T. G. Dopplick of Scott Air Force Base, Illinois (*2*).

In public at least, climate model specialists have, without exception, criticized these conclusions. Attempting to verify numerical models by comparison with observations is commendable, the panel and other critics emphasize, but observations from a single site, a single country, or one part of the ocean cannot suffice to verify what is a global process. A major failing, they say, is the omission of the ocean from Idso's natural experiments, as he calls them. Those experiments extend over only a few months, while the surface layer of the ocean requires 6 to 8 years to respond significantly to a change in radiation. A part of that response is to send more water vapor into the atmosphere, which traps even more radiant energy, just as carbon dioxide does. Without this and other feedback mechanisms to amplify the carbon dioxide warming, an apparently small response is inevitable, critics say. Researchers make similar complaints about Newell and Dopplick's model, pointing out that the allowed increase in humidity is unrealistically small.

Critics point out that their sophisticated, global climate models can produce a similarly small effect, given unrealistic conditions for a global study. In independent model experiments, Stephen Schneider of the National Center for Atmospheric Research (NCAR) and James Hansen of the Goddard Institute for Space Studies limited their models geographically and temporally in order to duplicate Idso's observations. Their models' responses were comparable to that calculated by Idso. V. Ramanathan of NCAR has in the same manner duplicated the results of Newell and Dopplick for the tropical ocean. Climate researchers believe that their evidence against these challenges is undeniable. The dissenting minority, as small as it is, has yet to concede.—RICHARD A. KERR

References

1. S. B. Idso, *Science* **207**, 1462 (1980); see also *ibid.* **210**, 6 (1980).
2. R. E. Newell and T. G. Dopplick, *J. Appl. Meteorol.* **18**, 822 (1979).

**Carbon Dioxide and Climate: A Second Assesment* (National Academy Press, Washington, D.C., 1982). Available for $7.25 (prepaid) at 2101 Constitution Avenue, NW, Washington, D.C. 20418. Panel members: J. Smagorinsky (chairman), K. Bryan, S. Manabe, L. Armi, F. P. Bretherton, R. D. Cess, W. L. Gates, J. Hansen, and J. E. Kutzbach.

new disease might have arisen, however.

Exposure to sperm from many sources may contribute to the immunodeficiency of homosexual men. Sperm are immunosuppressive if they enter the blood stream. Friedman-Kien, Laubenstein, and Pablo Rubinstein of the New York Blood Center and Bijan Safai's group at Memorial Sloan-Kettering Cancer Center have detected antibodies against sperm in the homosexual patients. These antibodies cross-react with T cells and could thus result in their depletion.

Neither Friedman-Kien nor Safai attributes AIDS solely to immunosuppression by sperm, however. Friedman-Kien says, "I don't think it is just the sperm; it may be a multiplicity of factors." A new virus, possibly carried by sperm, is a good possibility for one of the factors.

How the Haitians acquire AIDS, if they are not homosexuals or drug users, is one of the many puzzles of the disease. Nonetheless, their disease appears to be the same as that in the other groups. According to Spira and Margaret Fischl of Jackson Memorial Hospital in Miami, the Haitians with AIDS have a severe immune deficiency that closely resembles that of the other patients. "The syndrome we see in the Haitian group was strikingly similar to that in the gay community," Fischl explains.

Moreover, AIDS may be occurring in Haiti, too. B. Liautaud, a dermatologist in Port-au-Prince, recently reported 11 cases of Kaposi's sarcoma, a high number for such a small country. Fischl and Spira have begun immunological studies of some of these individuals to see if they have the same immunodeficiency as patients in this country.

Friedman-Kien and Safai point out that Haiti is a favorite vacation spot for many homosexual males. They might have carried the disease to or from that country. At present, no one knows if the syndrome being seen there began before or after AIDS in this country.

Although Kaposi's sarcoma is the most common cancer to be found in AIDS patients, it is not the only malignancy. This was not a surprise. Gottlieb remarks, "I would expect that we are going to see other cancers since these individuals are so profoundly immune deficient."

This expectation is rapidly being fulfilled. Friedman-Kien has now seen nine AIDS patients who have a cancer of the lymph system. In addition, three of the patients with Kaposi's sarcoma have also developed lymphomas.

According to John Ziegler of the Veterans Administration Hospital in San Francisco, Kaposi's sarcoma may be

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