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HEADLINE: Drastic Shifts In Climate Are Likely, Experts Warn

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BODY:

The vast reshaping of the environment by modern civilization raises the chances of sudden and drastic upheavals in the climate, a panel of experts warns.

In a report released yesterday in Washington by the National Research Council, the research arm of the National Academy of Sciences, a panel of 11 scientists examined the possibility of abrupt climate change in which small events can bring on rapid and great consequences.

Dr. Richard B. Alley, a professor of geosciences at Pennsylvania State University and chairman of the committee, compared abrupt climate change to a light switch, while gradual climate- what most climatologists study -- is like a light dimmer. Press upward on a dimmer, and the light brightens a little. Press more, and the light brightens more. With a switch, press lightly and nothing happens. Press hard enough, and the light abruptly turns on.

"What the research shows is that there are switches as well as dimmers in Earth's system," Dr. Alley said.

The scientists do not foresee any imminent changes, and the report advises that the public "not be fatalistic about the threats." The panel recommends further research to understand the mechanisms that can cause the sudden changes.

Most of the report focuses on abrupt changes that occurred naturally, long before humans dominated the landscape. One prominent example is a period 12,800 years ago known as the Younger Dryas cold interval. The climate had almost completely recovered from the last ice age, but then average temperatures dropped 10 degrees or more and remained cold for more than 1,000 years. Then the Earth abruptly warmed again, perhaps 15 degrees in a decade. By contrast, the warming of the Earth in the last century was 1 degree.

Although the sudden shifts occur naturally, the changes in the environment, including flooding the atmosphere with carbon dioxide or cutting swaths of rain forests, could act as a final push, the scientists said. "The harder you push, the more likely you are to cross a threshold," Dr. Alley said. "We are likely to be surprised."

Most climate studies like those that look at global warming and its links to carbon dioxide emissions have examined changes that emerge gradually and steadily over decades or centuries.

At the meeting of the American Geophysical Union yesterday in San Francisco, scientists presented computer simulations indicating that a rise in carbon dioxide levels would lengthen the time that a low-pressure weather system hovered over the North Pole and a high-pressure air mass over the Atlantic.

That pattern tends to blow in warm air from the Atlantic into Europe, potentially leading to wetter and warmer winters over the coming decades. But that gradual shift to warmer and wetter winters may also cause an abrupt climate change.

Some climate models predict that the increased rainfall may weaken, or perhaps even stop, the Atlantic currents that carry warm water northward from the tropics and may plunge Europe into a new ice age. Other models predict no effects. The Younger Dryas may have been caused by the turning off of the northward currents and may have ended when the currents suddenly resumed.

"It leaves open the question of could we be pushing the variability one way or another," said Dr. John M Wallace, a professor of atmospheric sciences at the University of Washington and another panel member. "There are a lot of ifs."

The report also reviews research on regional temporary shifts like the 1930's Dust Bowl drought. Although the drought seems to have occurred naturally, soil erosion caused by farming may have prolonged it.

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