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Climate now shifting on a continental scale, huge study says

By Doyle Rice, USA TODAY

A landmark climate study released Wednesday reports that global warming is changing the life cycles of thousands of animals and plants — as well as hundreds of physical systems — worldwide.

It documents rapid glacier melts in North America, South America and Europe; trees and plants sprouting leaves much earlier in the spring in Europe, Asia and North America; permafrost melting in Asia; and changes in bird migration patterns across Europe, North America and Australia, all in response to rising global temperatures.

Though previous studies have looked at single phenomena or smaller areas, the latest analysis examines data on a continental scale, says lead author Cynthia Rosenzweig, a scientist at NASA's Goddard Institute for Space Studies in New York.

By analyzing data from each of the Earth's seven continents and the oceans, the study paints a clear picture of a world that's been undergoing rapid transformation in just the past few decades.

"These are things that are happening now, not projections of future changes," she says.

In the study in this week's journal *Nature*, Rosenzweig and her colleagues compiled data on about 28,800 plant and animal systems and 829 physical systems, all of which showed documented changes over the past few decades.

The study found that 95% of the observed physical changes, and 90% of the biological changes, are consistent with warming temperatures.

Some of the physical changes:

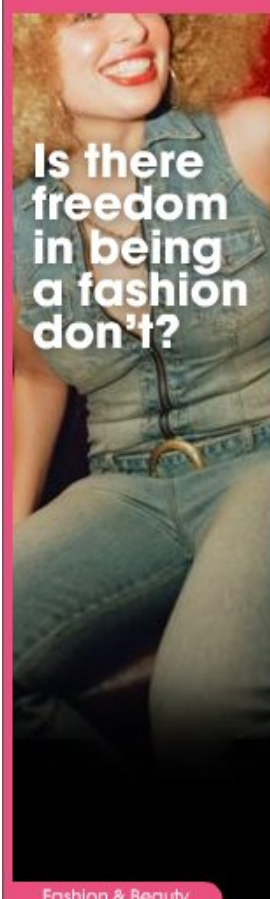
- Melting glaciers on all continents, notably in Alaska, Peru and the Alps.
- Earlier breakup and thinning of river and lake ice in Mongolia.
- Declining mountain snowpack in western North America.

Some of the observed effects on living things include:

- Movements of species to higher latitudes and altitudes throughout the Northern Hemisphere.
- Population of emperor penguins declining 50% on Antarctic Peninsula.
- Advance of spring arrival of long-distance migratory birds in Europe

"It was a real challenge to separate the influence of human-caused temperature increases from natural climate variations or other confounding factors, such as land-use changes or pollution," says study co-author David Karoly, a climate scientist at the University of Melbourne in Victoria, Australia. Scientists reported in the study, however, that "these temperature increases at continental scales cannot be explained by natural climate variations alone."

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But Pat Michaels, a senior fellow in environmental studies at the Cato Institute in Washington, D.C., says the research "is a retrospective study, with very little to say prospectively, given the unevenness of global warming."

Michaels says that there has been no warming since 1997 and that a recent study, also published in *Nature*, found that global warming isn't likely to get started again for at least another 10 years. "I think the problem with this study is not in matching the past with the changes but in projecting the future. "

The data show that changes are most notable in North America, Asia and Europe — mainly because many more studies have been done there, Rosenzweig says.

On the other continents, including South America, Australia and Africa, documentation of changes in physical and biological systems is sparse, although there is strong evidence there of human-influenced warming itself.

The study builds upon the consensus of the IPCC, which in 2007 declared manmade climate warming "likely" to have discernible effects on biological and physical systems.

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