Global warming 'hiatus' puts climate change scientists on the spot

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It's a climate puzzle that has vexed scientists for more than a decade and added fuel to the arguments of those who insist man-made global warming is a myth. Since just before the start of the 21st century, the Earth's average global surface temperature has failed to rise despite soaring levels of heat-trapping greenhouse gases and years of dire warnings from environmental advocates.

Now, as scientists with the Intergovernmental Panel on Climate Change gather in Sweden this week to approve portions of the IPCC's fifth assessment report, they are finding themselves pressured to explain this glaring discrepancy.

The panel, a United Nations creation that shared the 2007 Nobel Peace Prize with Al Gore, hopes to brief world leaders on the current state of climate science in a clear, unified voice. However, experts inside and outside the process say members probably will engage in heated debate over the causes and significance of the so-called global warming hiatus.

"It's contentious," said IPCC panelist Shang-Ping Xie, a professor of climate science at the Scripps Institution of Oceanography at the University of California, San Diego. "The stakes have been raised by various people, especially the skeptics."

Though scientists don't have any firm answers, they do have multiple theories. Xie has argued that the hiatus is the result of heat absorption by the Pacific Ocean - a little-understood, naturally occurring process that

repeats itself every few decades. Xie and his colleagues presented the idea in a study published last month in the prestigious journal *Nature*.

The theory, which is gaining adherents, remains unproved by actual observation. Surface temperature records date back to the late 1800s, but measurements of deep water temperature began only in the 1960s, so there just isn't enough data to chart the long-term patterns, Xie said.

Scientists have also offered other explanations for the hiatus: lack of sunspot activity, low concentrations of atmospheric water vapor and other marine-related effects. These too remain theories.

For the general public, the existence of the hiatus has been difficult to reconcile with reports of record-breaking summer heat and precedent-setting Arctic ice melts.

At the same time, those who deny the tenets of climate change science - that the burning of fossil fuels adds carbon dioxide and other greenhouse gases to the atmosphere and warms it - have seized on the hiatus, calling it proof that global warming isn't real.

Climate scientists, meanwhile, have had a different response. Although most view the pause as a temporary interruption in a long-term warming trend, some disagree and say it has revealed serious flaws in the deliberative processes of the IPCC.

One of the most prominent of these critics is Judith Curry, a climatologist who heads the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology. She was involved in the third IPCC assessment, which was published in 2001. But now she accuses the organization of intellectual arrogance and bias.

"All other things being equal, adding more greenhouse gases to the

atmosphere will have a warming effect on the planet," Curry said. "However, all things are never equal, and what we are seeing is natural climate variability dominating over human impact."

Curry isn't the only one to suggest flaws in established climate models. IPCC Vice Chair Francis Zwiers, director of the Pacific Climate Impacts Consortium at the University of Victoria in Canada, co-wrote a paper published in this month's *Nature Climate Change* that said climate models had "significantly" overestimated global warming over the last 20 years - and especially for the last 15 years, which coincides with the onset of the hiatus.

The models had predicted that the average global surface temperature would increase by 0.21 of a degree Celsius over this period, but they turned out to be off by a factor of four, Zwiers and his colleagues wrote. In reality, the average temperature has edged up only 0.05 of a degree Celsius over that time - which in a statistical sense is not significantly different from zero.

Of course, people don't actually spend their entire lives subjected to the global average temperature, which is currently about 15 degrees Celsius, or 59 degrees Fahrenheit. Those who fixate on that single measurement lose sight of significant regional trends, particularly in the Northern Hemisphere, climate scientists say.

Xie and Yu Kosaka, an assistant project scientist at Scripps, used computer models to simulate the Pacific decadal oscillation, a phenomenon related to the El Nino and La Nina ocean temperature cycles that lasts for 20 to 30 years. The model suggested that the northern mid-latitudes - an area that includes the United States and most of Europe and China - were "insulated" from the oscillation's cooling effect during the summer months, as was the Arctic region.

"In the summer you've basically removed the Pacific cooling, so we're still baked by greenhouse gases," Xie said.

As a consequence, 2012 marked two climate milestones, he said. The U.S. experienced its hottest year on record, while ice cover in the North Pole shrank to the lowest level ever observed by satellite.

Other climatologists, such as Bill Patzert of NASA's Jet Propulsion Laboratory in La Canada Flintridge, Calif., say sea level rise is "unequivocal proof" that greenhouse gases are continuing to heat the planet, and that much of this added heat is being absorbed by the oceans.

As ocean water warms, it expands and drives sea levels higher, Patzert said. Currently, oceans are rising at an average of more than 3 millimeters, or 0.12 of an inch, per year. This pace is significantly faster than the average rate over the last several thousand years, scientists say.

"There's no doubt that in terms of global temperatures, we've hit a little flat spot in the road here," Patzert said. "But there's been no slowdown whatsoever in sea level rise, so global warming is alive and well."

Whether that message is communicated successfully by the IPCC this week remains to be seen. In the days leading up to the meeting, the organization has found itself on the defensive.

A draft summary that was leaked to the media reported that scientists were "95 percent confident" that human activity was responsible for more than half of the increase in average global surface temperature between 1951 and 2010. But critics openly scoff, considering the IPCC's poor record for predicting short-term temperature increases.

"This unpredicted hiatus just reflects the fact that we don't understand things as well as we thought," said Roger Pielke Jr., a professor of

environmental studies at the University of Colorado in Boulder and vocal critic of the climate change establishment. "Now the IPCC finds itself in a position that a science group never wants to be in. It's in spin management mode."