




Small Group Exercise BES 301 Oct 10, 2005




With your workgroup of approx four people, read the following article from the Seattle Times of Oct 9, 2005. On the back of this page, list the group members here today and then record notes that come from analyzing the article based upon the aspects of the scientific method that we have been discussing. Be prepared to present your thoughts to the class as well.

Monday, October 9, 2005 - Page updated at 12:00 AM

Setting the record straight | "Hockey stick" broken?

The scientific consensus that humans are heating the planet is propped up, in part, by a hockey stick.

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Actually, it's a graph that resembles a hockey stick turned on its side.

Based on analysis of tree rings, ice cores, coral reefs and lake sediments dating back a thousand years, it's one of the most comprehensive reconstructions of ancient climate.

The graph shows a fairly straight line until the start of the industrial age, when it jogs skyward. The work of University of Virginia climatologist Michael Mann, the hockey stick suggests the planet is hotter now than any time in the past millennium.

But two Canadians argue the hockey stick underestimates past climate swings because of a computing flaw that fails to distinguish the effect of temperature from other environmental factors, such as nutrient levels, that influence tree-ring size or coral growth.

The result, say mining consultant Stephen McIntyre and economist Ross McKittrick, is that the analysis is dominated by tree rings from 1,000-year-old bristlecone pines. The trees experienced a mysterious growth spurt in the late 1800s and 1900s, apparently not caused by rising temperatures.

The brouhaha even reached Congress this summer, when Texas Republican Rep. Joe Barton — a global-warming doubter — launched an investigation.

The debate hinges on esoteric math. Researchers who have examined the calculations agree there is a statistical crack in the stick, but most say it doesn't change the conclusions. Six other climate studies also found current warming unprecedented in 1,000 years.

A new study pushed the time window back 2,000 years. Scientists found more ups and downs in the past, but nothing in the historical record matched the recent temperature spike.

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Sunday, October 9, 2005 - Page updated at 12:00 AM


Setting the record straight | Blame the sun?

In the debate over global warming, at least one thing seems constant: the sun.

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But satellite measurements show that our local star dims and brightens slightly in concert with sunspot cycles, which range from nine to 14 years. Could such tiny fluctuations be responsible for changes in climate?

Centuries of scientific study failed to find a link between the cycles, weather and climate.

But in 1991, Danish scientists reported a statistical correlation between the length of sunspot cycles and Northern Hemisphere temperatures over the past 130 years. Coupled with the fact that sunspot activity had climbed steeply between 1900 and 1960, the results led the Exxon-backed George C. Marshall Institute to argue that the sun might be to blame for global warming.

The problem is, no one has been able to figure out how minuscule changes in sunlight could raise temperatures significantly. Of the 1.2-degree increase in average global temperatures over the past century, less than 15 percent can be blamed on changes in the sun, the newest estimates say.

Some scientists have proposed elaborate mechanisms that would amplify weak solar fluctuations, but so far there's little evidence for any of the ideas.

An intriguing possibility was raised in the early 1990s by Harvard astrophysicist Sallie Baliunas, a prominent global-warming skeptic who has received funding from the American Petroleum Institute. She found that stars similar to the sun wax and wane in cycles that last centuries. Perhaps the sun has similar ups and downs?

But later studies found Baliunas' stars didn't really resemble the sun after all, and other researchers couldn't reproduce her results with larger numbers of stars.

All the efforts to blame the sun for global warming founder on one simple observation that most scientists accept as true: For the past three decades — when warming has intensified and accelerated — solar activity hasn't increased.

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Climate models debated

But scientists say the uncertainty lies only in how much warming to expect

Battisti planned to run his grandparents' dairy farm in upstate New York until a persistent professor nudged him toward science. A study on beach formation got him excited about hands-on oceanography, then he switched to atmospheric sciences in graduate school.

He has analyzed some of the more cataclysmic climate-change scenarios, including the sudden shift depicted in the movie "The Day After Tomorrow," and concluded they're highly unlikely.

These days, Battisti ponders the Eocene, a period 35 million to 50 million years ago when alligators lived near the Arctic Circle and palm trees grew in Wyoming.

The world was hot because carbon-dioxide levels were three to five times higher than today — the result of a gradual buildup from volcanic eruptions. But global-climate computer models, which use mathematical formulas to represent complex atmospheric interactions, aren't able to reproduce that warming. When Battisti runs the models under Eocene-like conditions, they come up with much lower temperatures than actually existed — which means something was going on that scientists don't yet understand.

Models have improved greatly in the past 30 years but still can't anticipate all the ways the atmosphere will respond as greenhouse gases climb. The dozen models in use today predict average temperature increases of 3 to 11 degrees by the end of the century.

Though the numbers sound modest, it took only a 10-degree drop to encase much of North America in mile-deep glaciers during the ice age that ended about 12,000 years ago.

Skeptics point to uncertainties in the models and conclude the actual temperature changes will be lower than the predictions. Battisti points to the Eocene and warns that unknown factors could just as easily make things worse.

Could the skeptics be right, and the majority of the world's experts wrong?

The history of science shows consensus doesn't guarantee success. The collective wisdom of the early 1900s declared continental drift bunk. Some Nobel laureates attacked Einstein's theory of relativity.

Those blunders occurred when science was less sophisticated and connected than it is now, said Weart, the historian. With the unprecedented study devoted to climate change, the odds that this consensus is wrong are slim, he added.

"The fact that so many scientists think it's likely a truck is heading for us means that the last thing we want to do is close our eyes and lie down in the road."

Sandi Doughton: 206-464-2491

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Updated at 12:00 AM

Setting the record straight | Satellite puzzle solved

If greenhouse gases are warming the Earth's surface, climate models say the same thing should be going on in the troposphere — the lower layer of atmosphere where weather occurs.

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The fact that weather balloons and satellite measurements from the past 25 years didn't show the predicted warming provided climate-change skeptics with one of their strongest arguments, until recently.

The satellite data have long been controversial and messy. Orbiting high above the poles, the instruments measure temperature indirectly, by analyzing microwave radiation. They peer down through the entire atmosphere, which makes it hard to differentiate between layers. Scientists also must rely on statistical tricks to stitch together data from different satellites launched over the years.

Last month, three studies pointed out errors in those calculations, including failure to factor in the way the satellites drift in orbit, which can lead to confusion between nighttime and daytime temperatures. When corrected, both the satellite and balloon data showed heating.

Those results add to findings published last year by University of Washington climate scientist Qiang Fu. He asked if warming might be masked by rapid cooling in the upper atmosphere, which was predicted as a byproduct of greenhouse warming.

He developed a new way to subtract out the cooling, and found the troposphere was heating up in near-perfect synchrony with the surface below.

Taken together, the new studies show the lower atmosphere is heating up at rates predicted by global climate models.

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Setting the record straight | Urban heat island


Even the most stalwart greenhouse skeptics no longer deny the planet's surface is heating up.

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The last serious cause for suspicion dissipated in 2004 when British scientists debunked the notion that rising temperatures are a false impression, created by the growing sprawl of urbanization.

Which is not to say the urban-heat-island effect isn't real. It's well-known that cities, with their concrete and asphalt, are hotter than rural areas. Many of the stations that gather temperatures are near cities.

American researchers examined the possibility that urban heat was masquerading as global warming in 1997, by comparing data from all over the globe with measurements made only in rural areas. The warming was the same.

Last year, David Parker, of Britain's Hadley Centre for Climate Prediction and Research, settled the question emphatically by comparing measurements taken on calm and windy nights.

If urbanization was making the planet look hotter than it really is, the effect should be more pronounced when there's no wind to dissipate the heat from sweltering cities. But rates of warming were the same whether the wind was blowing or not.

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