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INTERVIEW: MICHAEL MANN DISCUSSES A STUDY THAT SHOWS THE PATTERN OF GLOBAL WARMING IN THE PREVIOUS CENTURIES MAY ACTUALLY BE PART OF A NATURAL CLIMATE CYCLE, AS EVIDENCED BY TREE RING DATA

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IRA FLATOW, host: We're going to try to finish up the hour talking with--catching up on a story that made news last week about tree rings and climate. A recent study looking at tree growth shows that the pattern of warming in the previous centuries may actually be part of a natural climate cycle. But what does this say about the impact of human activity on global warming? Here to comment on that is **Michael Mann**, professor of environmental science, University of Virginia in Charlottesville, and he joins us today by phone.

Thank you for being with us today, Dr. **Mann**.

Dr. **MICHAEL MANN** (Professor of Environmental Science, University of Virginia in Charlottesville): Thank you. It's a pleasure to be here.

FLATOW: This study is very confusing to a lot of people because they thought, you know, well, most people agree that global warming is occurring and now we see this study of tree rings that says, 'Well, maybe this is a natural occurrence, this warming process.'

Dr. **MANN**: Well, you know, it's confusing to some of us in the scientific community as well because the underlying research that was done by Esper(ph) and his colleagues is good research and they presented some valuable new data into promising new technique for, although a somewhat untested technique, for estimating climate change from tree rings. But there was a--the way that the results of that research were represented was in a somewhat confusing manner, and it created a misconception about what we actually know and what this new particular study actually tells us.

FLATOW: So you're saying it does not contradict the...

Dr. **MANN**: No.

FLATOW: So explain it to us. Where is the confusion here?

Dr. **MANN**: Well, what these scientists did was to look in particular at the extratropical regions of the Northern Hemisphere and the continental regions, because they're using tree ring data, and you can't get tree ring data from the oceans. So you're really looking at the terrestrial regions of the Northern Hemisphere. And they also didn't really look at the late 20th century. They looked at a record which can tell us about climate change through the mid-20th century, and so there are two key caveats in extrapolating the results of this study to, for example, an understanding of truly large-scale, say, full Northern Hemisphere temperature changes over the past thousand years.

My colleagues and I published a study a few years ago, and the conclusions of that study were that, in fact, the late 20th century warming is relatively unprecedented, at least in the context of the last thousand years, potentially even farther back in time, although we don't have quite

as much information going more than a thousand years back in time. And this study in no way contradicts that. What this study shows, that if you concentrate only on the extratropical regions of the Northern Hemisphere and you ignore the tropics, which, in fact, at latitudes below 30 degrees north occupy half of the surface area of the entire Northern Hemisphere, the variability is greater.

We know that the variability is greater in the extratropical regions than it is for the tropical regions, and we also know that there's been substantial warming since the mid-20th century. In fact, a good deal of the 20th century warming has occurred over the past few decades. So the conclusion that the late 20th century warming is unprecedented stands. This study in no way contradicts that conclusion.

FLATOW: Seems to me basically they left out a lot of data that would contradict this tree ring study.

Dr. **MANN**: Well, the strength of the study in essence is that it did highlight some really important questions about the distinction between climate changes, say, in extratropical Northern Hemisphere regions and climate changes over the full globe or the full Northern Hemisphere. It is important, actually, to understand those differences, to understand why climate might be variable in certain regions than it is in other regions, and to help understand the context of periods like the middle Ice Age, when we know there were frozen lakes in Europe that the characters of Hans Christian Andersen's novels were skating on.

We need to try to understand regional climate change in the context of larger-scale climate change. And this study helps us to do that because it helps us zoom in in a particular part of the globe and compare what we see there to what we see at the full Northern Hemisphere scale. But it's really the latter that can best inform us about the relative importance of climate change and natural climate variability in the context of, for example, detecting human influence on a climate.

FLATOW: You seem to be very diplomatic about this.

Dr. **MANN**: Well, the bottom line is that the authors did introduce some useful data and they introduced a useful though, as I said, somewhat untested technique for estimating climate changes from tree ring data. So they've provided a useful contribution to the scientific community, and unfortunately, what's happened was that the results of that study, as is often the case, have been taken out of context and inferred in a way that they can't properly be inferred.

FLATOW: If you would put back the data for the last 30 years in other parts of the Earth that were left out, would they have reached the same conclusion about global warming?

Dr. **MANN**: Yeah. In fact, I'm glad you asked that question, because Ed Cook, who's a co-author on this paper and a scientist for whom I really have great respect, and I have talked about that precise point. And Ed has confirmed that, in fact, they would have come to the same conclusion that the latter 20th century warmth is unprecedented in the context of at least the past thousand years, had they considered the warming that is, indeed, evident in the instrumental record through the end of the 20th century. So, again, it really underscores the fact that there's no fundamental contradiction with the conclusion of our work or the conclusion, for example, of the Intergovernmental Panel on Climate Change report, which came out last year, which also stated that the best available evidence supports the proposition that the late 20th century warming in the Northern Hemisphere is unprecedented in at least a thousand years.

FLATOW: We're talking about global climate change for the rest of the hour on TALK OF THE NATION/SCIENCE FRIDAY from NPR News. I'm Ira Flatow, talking with **Michael Mann**, professor of environmental sciences at the University of Virginia in Charlottesville.

So why after the paper come out? Why do we have to wait for this fighting and the

clarifications to go on after the paper is published? You would have thought somebody might have caught this earlier.

Dr. **MANN**: Well, some of us who do work in this area are a little disappointed at the way that the review process functioned in this particular case. What peer review is supposed to do in the context of the publication of important scientific results is to kind of catch the errors, to take a good study, which fundamentally this is, and catch the small errors and the areas of the study that could easily be taken out of context if they're not clarified and produce a final document that basically is quite a bit better than the original draft. And unfortunately, the peer review process didn't quite function that way.

And moreover, one other unfortunate thing about the way the study came out was that there was an accompanying piece, kind of perspective on the study provided by scientists Keith Briffa and Tim Osborn of the Climatic Research Unit of the University of East Anglia. And they should have clarified some of the issues here with regard to the distinction between mid-20th century warmth and truly late 20th century warmth. And also, this fundamentally important distinction between extratropical climate changes and truly global or full hemisphere climate changes. And their perspective didn't quite serve that purpose, unfortunately, so it actually muddled the issues even a little more.

FLATOW: But you're saying that this study in no way would contradict the widely held belief--just to sum up what we're talking about--that global warming is real and is being caused by human intervention.

Dr. **MANN**: No, absolutely not. What the study shows is that there are potentially some real differences between the way temperatures varied in the centers of the continents of the Northern Hemisphere and the way temperatures varied over a larger scale. And a great example, to help our listeners understand this distinction, is the last Ice Age, the height of the last Ice Age, about 21,000 years ago. Now we know that temperatures in the North Atlantic were probably more than 10 degrees C colder, in some places maybe even closer to 20 degrees C colder, 20 degrees Celsius--that's close to 40 degrees Fahrenheit...

FLATOW: Right.

Dr. **MANN**: ...in certain high-latitude regions. And yet, the best available evidence suggests that tropical temperatures only varied by maybe 2 to 3 degrees C. And since the tropics, or at least the region within 30 degrees of the equator, occupies half of the surface area of the globe, it turns out that the globe was probably only a few degrees colder. So if we were just recording temperatures in the last Ice Age somewhere up near Greenland, we would have a completely inappropriate view of the way global climate changes, and that's kind of what's going on here.

FLATOW: Very interesting. Say if you want to put in where all the land masses are and more of them, you get a whole different reading.

Dr. **MANN**: That's right.

FLATOW: Yeah. All right. Thank you very much for joining us and giving us your view of that paper and your paper. Thank you very much.

Dr. **MANN**: Thank you.

FLATOW: **Michael Mann** is a professor of environmental science at the University of Virginia in Charlottesville. Earlier we spoke to Joseph LeDoux, professor of science at New York University, and astronomer Joe Rao. Oh, I'm sorry, Joe.

(CREDITS)

FLATOW: If you have comments or questions, please write to us at TALK OF THE NATION/SCIENCE FRIDAY, WNYC Radio, 1 Center Street, New York, New York 10007. Or if you missed any of the references or you want to get archival versions of SCIENCE FRIDAY, you're invited to surf over to our Web site at www.sciencefriday.com, where you'll also be able to listen to them on RealAudio and can also take them away with you on one of your favorite players, downloading from the Internet.

Have a great weekend. Have a good holiday season. We'll see you next week. I'm Ira Flatow in New York.

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