Global warming greatest in past decade

September 1 2008

Researchers confirm that surface temperatures in the Northern Hemisphere were warmer over the last 10 years than any time during the last 1300 years, and, if the climate scientists include the somewhat controversial data derived from tree-ring records, the warming is anomalous for at least 1700 years.

"Some have argued that tree-ring data is unacceptable for this type of study," says Michael Mann, associate professor of meteorology and geosciences and director of Penn State's Earth System Science Center. "Now we can eliminate tree rings and still have enough data from other so-called 'proxies' to derive a long-term Northern Hemisphere temperature record."

The proxies used by the researchers included information from marine and lake sediment cores, ice cores, coral cores and tree rings.

"We looked at a much expanded database and our methods are more sophisticated than those used previously," says Mann. In today's (Sept. 2) online edition of the *Proceedings of the National Academy of Sciences*, the researchers note, "Conclusions are less definitive for the Southern Hemisphere and globe, which we attribute to larger uncertainties arising from the sparser available proxy data in the Southern Hemisphere."

The research team included Mann; Ray Bradley, university distinguished professor, geosciences and director, Climate System Research Center, University of Massachusetts; Malcolm Hughes, regents' professor, and Fenbiao Ni, research associate, the Laboratory of Tree Ring Research,

University of Arizona; Zhihua Zhang and Sonya Miller, research associates, meteorology, Penn State; and Scott Rutherford, assistant professor, environmental sciences, Roger Williams University.

The National Research Council suggested revisiting surface temperatures in their "Surface Temperature Reconstructions for the Last 2,000 Years," to include newer data and techniques and confirmed results of a 1990s paper by Mann and colleagues.

Results of this study without tree-ring data show that for the Northern Hemisphere, the last 10 years are likely unusually warm for not just the past 1,000 as reported in the 1990s paper and others, but for at least another 300 years going back to about A.D. 700 without using tree-ring data. The same conclusion holds back to A.D. 300 if the researchers include tree-ring data.

One of the reasons that including tree-ring data in these studies raises possible concerns is something called the "segment length curse." This "curse" occurs because trees put on rings every year, but older trees put on narrower rings. When tree ring researchers piece together tree-ring series from two trees, they must account for this factor in how they combine the later rings on one tree with the earlier rings on a younger tree. In the process, some information regarding long-term trends can be lost.

"Ten years ago, we could not simply eliminate all the tree-ring data from our network because we did not have enough other proxy climate records to piece together a reliable global record," says Mann. "With the considerably expanded networks of data now available, we can indeed obtain a reliable long-term record without using tree rings."

The new study shows that, with caveats, tree-ring data can be used, but that even without including that data, it is clear that the anomalous nature

of recent warmth, which most scientists believe to be a result of human impacts on climate, is a reality.

Source: Penn State