New study increases concerns about climate model reliability

A new study comparing the composite output of 22 leading global climate models with actual climate data finds that the models do an unsatisfactory job of mimicking climate change in key portions of the atmosphere.

This research, published on-line Wednesday in the Royal Meteorological Society's *International Journal of Climatology*, raises new concerns about the reliability of models used to forecast global warming.

"The usual discussion is whether the climate model forecasts of Earth's climate 100 years or so into the future are realistic," said the lead author, Dr. David H. Douglass from the University of Rochester. "Here we have something more fundamental: Can the models accurately explain the climate from the recent past? "It seems that the answer is no."

Scientists from Rochester, the University of Alabama in Huntsville (UAH) and the University of Virginia compared the climate change "forecasts" from the 22 most widely-cited global circulation models with tropical temperature data collected by surface, satellite and balloon sensors. The models predicted that the lower atmosphere should warm significantly more than it actually did.

"Models are very consistent in forecasting a significant difference between climate trends at the surface and in the troposphere, the layer of atmosphere between the surface and the stratosphere," said Dr. John Christy, director of UAH's Earth System Science Center. "The models forecast that the troposphere should be warming more than the surface and that this trend should be especially pronounced in the tropics.

"When we look at actual climate data, however, we do not see accelerated warming in the tropical troposphere. Instead, the lower and middle atmosphere are warming the same or less than the surface. For those layers of the atmosphere, the warming trend we see in the tropics is typically less than half of what the models forecast."

The 22 climate models used in this study are the same models used by the UN Intergovernmental Panel of Climate Change (IPCC), which recently shared a Nobel Peace Prize with former Vice President Al Gore.

The atmospheric temperature data were from two versions of data collected by sensors aboard NOAA satellites since late 1979, plus several sets of temperature data gathered twice a day at dozens of points in the tropics by thermometers carried into the atmosphere by helium balloons. The surface data were from three datasets.

After years of rigorous analysis and testing, the high degree of agreement between the various atmospheric data sets gives an equally high level of confidence in the basic accuracy of the climate data.

"The last 25 years constitute a period of more complete and accurate observations, and more realistic modeling efforts," said Dr. Fred Singer from the University of Virginia. "Nonetheless, the models are seen to disagree with the observations. We suggest, therefore, that projections of future climate based on these models should be viewed with much caution."

The findings of this study contrast strongly with those of a recent study that used 19 of the same climate models and similar climate datasets. That study concluded that any difference between model forecasts and atmospheric climate data is probably due to errors in the data.

"The question was, what would the models 'forecast' for upper air climate change over the past 25 years

and how would that forecast compare to reality?" said Christy. "To answer that we needed climate model results that matched the actual surface temperature changes during that same time. If the models got the surface trend right but the tropospheric trend wrong, then we could pinpoint a potential problem in the models.

"As it turned out, the average of all of the climate models forecasts came out almost like the actual surface trend in the tropics. That meant we could do a very robust test of their reproduction of the lower atmosphere.

"Instead of averaging the model forecasts to get a result whose surface trends match reality, the earlier study looked at the widely scattered range of results from all of the model runs combined. Many of the models had surface trends that were quite different from the actual trend," Christy said. "Nonetheless, that study concluded that since both the surface and upper atmosphere trends were somewhere in that broad range of model results, any disagreement between the climate data and the models was probably due to faulty data.

"We think our experiment is more robust and provides more meaningful results."

Source: Wiley-Blackwell