

Thursday, 30 March 2006, 18:39 GMT 19:39 UK

Unexpected warming in Antarctica

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Winter air temperatures over Antarctica have risen by more than 2C in the last 30 years, a new study shows.

Research published in the US journal Science says the warming is seen across the whole of the continent and much of the Southern Ocean.

The study questions the reliability of current climate models that fail to simulate the temperature rise.

In addition, the scientists from the British Antarctic Survey (Bas) say the cause of the warming is not clear.

It could be linked to increases in greenhouse gases in the atmosphere or natural variations in Antarctica's climate system.

Scientists are keen to understand the change in temperatures

over the continent as the region holds enough water in its ice to raise sea levels by 60 metres.

Temperature rise

Temperature rises on parts of the surface of Antarctica have been seen for some time. The western side of the Antarctic Peninsula is known to have the largest annual warming seen anywhere in the world with increases of over 2.5C in the last 50 years.

Until now very little was known about air temperatures above the vast continent.

The new work uses meteorological data collected from weather balloons launched in the Antarctic winters between 1971 and 2003. The scientists collected information from nine international research stations, mostly in the east of the continent.

"It's the largest regional warming on Earth at this level"

Dr John Turner



The researchers were particularly interested in measurements taken in the middle troposphere, the layer of air at a height of about 5km (3 miles) where most heat exchange between the Earth and the atmosphere takes place.

Their analysis shows that temperatures in the layer have risen by between 0.5 and 0.75C for each of the last three decades.

"It's the largest regional warming on Earth at this level," said Dr John Turner of Bas, one of the authors of the paper.

However a question remains over what is causing the change.

"There are arguments for and against this temperature rise being caused by greenhouse gases," Dr Turner told the BBC News website.

"The problem is trying to differentiate between what is happening naturally and what is happening because of man's activities".

Climate models

To try to resolve the conundrum, the Bas team compared the data with twenty simulations of the climate over the last century.

The models simulate rising levels of greenhouse gases and are used by the Intergovernmental Panel on Climate Change (IPCC) to replicate past climates and make predictions for the future.

The team found that in all cases, the models failed to simulate the rise.



Dr Turner believes this could mean the temperature rise is a result of a natural fluctuation in Antarctica's climate or that

current models are inadequate.

Dr Jeff Ridley, a climate scientist at the Hadley Centre for Climate Prediction and Research in the UK, agrees.

He believes it is likely that current climate models are unable to sufficiently recreate conditions on the continent.

"I've looked at all these models and seen that Antarctica is not very well modelled at all," he said. "So we shouldn't put too much confidence in what they tell us is going to happen there".

For example, observations show that in Antarctica winds flow from the South Pole out to the coast in winter. As they move they lose energy, causing heating and mixing the air above.

But in the climate models, simulating these air flows and the mixing it causes is too complex. Instead the model is simplified with a cold layer at the surface that does not mix with the rest of the atmosphere.

One reason for this is the scant data that has been collected across the continent. Another is that the climate models are still not very good at simulating relatively small-scale regional processes.

Dr Ridley is trying to work out how to overcome problems like this in climate models, and believes the new data will help understanding of processes in Antarctica.

But he says we should not lose faith in the ability of current models to predict worldwide climate change.

"On a global scale the processes we have in the models work well. We are confident we are able to predict the past, and globally we can predict climate change".