Global warming endangers South American water supply, study finds

July 29 2013

Chile and Argentina may face critical water storage issues due to rain-bearing westerly winds over South America's Patagonian Ice-Field to moving south as a result of global warming.

A reconstruction of past changes in the North and Central Patagonian Ice-field, which plays a vital role in the hydrology of the region, has revealed the ice field had suddenly contracted around 15,000 years ago after a southerly migration of westerly winds.

This migration of westerly winds towards the south pole has been observed again in modern times and is expected to continue under a warming climate, likely leading to further ice declines in this area affecting seasonal water storage.

"We found that precipitation brought to this region by Southern Hemisphere westerlies played an important role in the glaciation of the North Patagonian Ice-Fields," said Dr Chris Fogwill from the Climate Change Research Centre at the University of New South Wales.

"Our research has shown this ice-field significantly reduced in size when those winds moved southwards."

The North Patagonian Ice-field is vital to maintain seasonal water storage capacity for Argentina and Chile.

"Worryingly, this study suggests the region may well be on a trajectory

of irreversible change, which will have profound impacts on agriculture and the increasing dependency on hydroelectric power in Chile and Argentina," Dr Fogwill said.

The team revealed the importance of the winds on the ice-sheets and consequent water supply by using rare isotopes to uncover changes in the ice-sheet thickness since the last major glaciation. This revealed the decline in the ice-sheet between 15,000 to 19,000 years ago.

Using a separate collection of ocean cores they were then able to determine that this decline coincided with the movement southwards of the westerlies.

The researchers found that a lack of precipitation caused by this movement, coupled with additional warming caused by rapid ice loss saw a sharp decline in glaciers with no seasonal recovery.

Interestingly, the southern part of the ice-field did not appear to be impacted by the movement of these winds. Instead it appeared that ocean currents and temperatures played a more important role in maintaining the ice in this section.

"The ice-field in the Northern and Central region of the Patagonian ice-field are highly sensitive to precipitation and need this to remain healthy," said Dr Fogwill.

More information: Rapid thinning of the late Pleistocene Patagonian Ice Sheet followed migration of the Southern Westerlies, *Scientific Reports*, DOI: 10.1038/srep02118

Provided by University of New South Wales