NEWS

Glacier estimate is on thin ice

IPCC may modify its Himalayan melting forecasts.

Hundreds of millions of people rely on water from the Himalayas' mighty glaciers, which experts agree are shrinking as a result of rising global temperatures. But a claim that all of the ice could be gone by 2035 — enshrined in the most recent report from the Intergovernmental Panel on Climate Change (IPCC) — has come under fire from, among others, a coordinating lead author of the IPCC chapter that uses the questionable figure.

The dispute highlights the fact that the panel sometimes relies on 'grey' or unrefereed literature. IPCC chairman Rajendra Pachauri says that the panel is investigating whether its report needs to be modified — which, if it were to happen, would be highly unusual.

A hasty retreat

At issue is a statement in the portion of the 2007 IPCC report¹ compiled by its working group on impacts, adaptation and vulnerability. It says that "glaciers in the Himalaya are receding faster than in any other part of the world and, if the present rate continues, the likelihood of them disappearing by the year 2035 and perhaps sooner is very high if the Earth keeps warming at the current rate". The

source cited was a 2005 overview from the conservation group WWF's Nepal Program², which, in turn, refers to non-refereed findings by glaciologist Syed Iqbal Hasnain, a senior fellow at The Energy and Resources Institute in New Delhi.

Hasnain recently told the magazine *New Scientist* that his initial conclusions, contained in a 1999 report by the Working Group on Himalayan Glaciology of the International Commission on Snow and Ice, were "speculative". *Nature* could not reach him for comment.

Satellite observations and *in situ* measurements do suggest that many of the more than 45,000 glaciers in the Himalayan and Tibetan region are losing mass. But given the observed rate of decline so far, many experts doubt that even small glaciers will melt completely before the end of the century.

"The IPCC's statement is wrong and misleading," says Andreas Schild, director-general of the International Centre for Integrated Mountain Development in Kathmandu, Nepal. "It was pretty clear early on that this was an error awaiting correction," adds Michael Zemp, a glaciologist with the World Glacier Monitoring Service in Zurich, Switzerland.

When might the majestic Himalaya glaciers disappear for good?

G. WILTSIE/NATIONAL GEOGRAPHIC

The loudest charges, however, have come from Murari Lal, director of the Climate, Energy and Sustainable Development Analysis Centre in Ghaziabad, who served as coordinating lead author for the Asia chapter in the working group report. He says that his team followed proper IPCC procedures for using non-refereed studies, which require chapter teams to review the quality of such sources

Geologists to evaluate future Haiti risks

US geologists hope to arrive in Haiti next week to pick through the rubble of the earthquake that struck on 12 January, killing tens of thousands of people. The scientists will hunt for survey markers that could help them better understand the geology of what happened — and perhaps determine where future risk lies.

The stainless-steel pins, usually set in concrete bases, are crucial landmarks for measuring earth movements as small as 1 millimetre. To date, the array of 30 devices in Haiti, and 40 in the Dominican Republic — which shares the island

of Hispaniola with Haiti — has yielded the best analysis yet of the local earthquake risk. Finding them could allow researchers to better estimate the likelihood of future fault movements.

Major earthquakes are rare in the region. But in 2008, a team led by Eric Calais, a geophysicist at Purdue University in West Lafayette, Indiana, reported at a Caribbean geology conference that the geodetic markers revealed a dangerous strain build-up along

"These benchmarks are extremely important."

Haiti's Enriquillo fault — enough to produce a magnitude-7.2 quake. Last week's quake, on that fault, was a magnitude 7.0.

Hispaniola sits on the rim of the Caribbean tectonic plate (see map, opposite). To the northeast, the North American plate pushes under the Caribbean Plate, driving it westwards along two parallel faults: the Enriquillo fault on the southern side of the island and the Septentrional fault along the north shore. These faults

periodically lock, build up strain, then release it in earthquakes. Major quakes have not struck the Enriquillo fault area since 1860.

Calais's team passed its warnings on to the Haitian government, but even developed nations would struggle to set up proper earthquake preparedness in the course of just two years. For now, the focus is on helping to assess immediate geological hazards, such as landslides, and gathering data for future studies of seismic risk.

Calais will be going to the island

WHY OIL FROM THE EXXON VALDEZ LINGERS
Rocky beaches lock oil away in airtight pores.
go.nature.com/MJg9fs

CENTER FOR NATURAL RESOURCES DEVELOPMENT AND PROTECTION

the glaciers in the Himalayas," says Pachauri, although they are very unlikely to disappear during the next few decades.

The section also includes other, smaller errors that are drawing less attention. The chapter attributes to the WWF report, for instance, a related but less drastic estimate that the total area of the Himalayan glaciers could shrink from the present 500,000 square kilometres to 100,000 square kilometres by 2035. The WWF publication gives no such number.

Christopher Field, who is overseeing the impacts working group for the next full IPCC assessment report, says that the team will carefully consider the "extremely important" future of the Himalayan glaciers. By 2014, when the next working group report is due, it should be possible to assess Himalayan glacier retreat "in a way that accurately characterizes the risks of water insecurity and glacial lake outburst flooding," says Field, of the Carnegie Institution for Science in Stanford, California.

The IPCC will continue to use a combination of peer-reviewed studies and carefully selected grey literature for its next full report. But Field says the incident shows that the IPCC has an extra responsibility to thoroughly assess the quality of the underlying work.

Meanwhile, lingering uncertainty over glacier retreat has prompted India and other countries to put more emphasis on glaciological research. India's environment minister, Jairam Ramesh, has called the shrinking

Himalayan ice a matter of national security — even though a report he commissioned last year found little evidence of drastic retreat due to climate change³. Pachauri has challenged that finding as "unsubstantiated".

Settling the issue of glacier retreat gained urgency last year with the publication of several papers^{4,5} based on data from the GRACE gravity-sensing satellites, which highlighted the problem of groundwater depletion in India. As they shrink, the glaciers are expected to add melt water to Himalayan rivers. But if the glaciers disappear altogether, run-off to the headwaters of ten major rivers, including the Indus and the Ganges, will drop markedly.

Still, it is unclear whether or when this may happen. Himalayan glaciers, says glaciologist Michael Bishop of the University of Nebraska in Omaha, behave very differently in different places. "Sweeping conclusions," he says, "just don't hold water."

Quirin Schiermeier

1. Cruz, R. V. et al. in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (eds Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J. & Hanson, C. E.) 469–506 (Cambridge Univ. Press, 2007).
2. WWF Nepal Program *An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China* (2005).
3. Raina, V. *Himalayan Glaciers: A State-of-Art Review of Glacial Studies, Glacier Retreat and Climate Change* (2009).
4. Rodell, M., Velicogna, I. & Famiglietti, J. *Nature* **460**, 999–1002 (2009).
5. Tiwari, V. M., Wahr, J. & Swenson, S. *Geophys. Res. Lett.* doi:10.1029/2009GL039401 (2009).

before citing results. The WWF report seemed credible, he says, but he admits that the team should have looked more carefully at the secondary sources to which it refers.

Even so, Lal argues that Hasnain, rather than the IPCC reviewers, is to blame, for coming up with and continuing to talk about a speculative date. "The findings would have been of major significance to the whole region," Lal says.

IPCC representatives say that the bottom line of the Asia chapter remains the same. "There is no scientific doubt on the rapid melting of

with Paul Mann, a geologist at the University of Texas at Austin who has described the Enriquillo fault (P. Mann et al. *Tectonophysics* 246, 1–69; 1995). They will be working with Haitian colleagues in the bureau of mines and energy to take Global Positioning System (GPS) measurements from as many of the geodetic markers as they can, to see how much the fault slipped at different points along its length.

"These benchmarks are extremely important, representing years of data," says Calais. Mann will be looking for surface signs of the fault rupture — called mole tracks because they look like the swell along the surface sometimes produced by the burrowing mammals. Researchers can plug

that information into a model to calculate where strain has now built up along the fault and where future earthquakes might strike.

Seismologists from the universities of Nice and Brest in France will be coming with portable

seismometers. UNAVCO, a non-profit consortium in Boulder, Colorado, has provided ten additional GPS receivers to deploy, and more may be coming from other sources, says Calais. And the US Geological Survey hopes

to send in a rapid-response team, working with the US Agency for International Development.

Meanwhile, other researchers are trying to get insight into the quake from afar. At the University of Miami in Florida, Tim Dixon and Falk Amelung are looking to see whether space-borne radar interferometers, such as that aboard Japan's Advanced Land Observing Satellite, detected deformation of the terrain before the quake. The satellite is expected to pass over Haiti again this week.

Yet all acknowledge that the science will do little immediate good unless countries are able to incorporate the findings into future preparedness plans.

Rex Dalton

SOURCE: USGS