The mysterious glaciers that grew when Asia heated up

August 27 2009

Long ago a group of Himalayan glaciers grew by several kilometers even while Central Asia's climate warmed up to six degrees Celsius. BYU professor Summer Rupper's analysis attributes much of the glacial growth to increased cloudiness and wind. Rupper is lending her glacier expertise to a project that will forecast the Indus River system's water supply for the coming decades.

Ice, when heated, is supposed to melt.

That's why a collection of glaciers in the Southeast Himalayas stymies those who know what they did 9,000 years ago. While most other Central Asian glaciers retreated under hotter summer temperatures, this group of glaciers advanced from one to six kilometers.

A new study by BYU geologist Summer Rupper pieces together the chain of events surrounding the unexpected glacial growth.

"Stronger monsoons were thought to be responsible," said Rupper, who reports her findings in the September issue of the journal *Quaternary Research*. "Our research indicates the extra snowfall from monsoonal effects can only take credit for up to 30 percent of the glacial advance."

As Central Asia's summer climate warmed as much as 6 degrees Celsius, shifting weather patterns brought more clouds to the Southeast Himalayas. The additional shade created a pocket of cooler temperatures.

Temperatures also dropped when higher winds spurred more evaporation in this typically humid area, the same process behind household swamp coolers.

The story of these seemingly anomalous glaciers underscores the important distinction between the terms "climate change" and "global warming."

"Even when average temperatures are clearly rising regionally or globally, what happens in any given location depends on the exact dynamics of that place," Rupper said.

The findings come from a framework Rupper developed as an alternative to the notion that glaciers form and melt in direct proportion to temperature. Her method is based on the balance of energy between a glacier and a wide range of climate factors, including wind, humidity, precipitation, evaporation and cloudiness.

Gerard Roe and Alan Gillespie of the University of Washington are co-authors of the new study.

Knowing how glaciers responded in past periods of climate change will help Rupper forecast the region's water supply in the coming decades. She and collaborators are in the process of determining how much of the Indus River comes from the vast network of glaciers far upstream from the agricultural valleys of India and Pakistan.

"Their study can be used to help assess future glaciological and hydrological changes in the most populated part of our planet, which is a region that is now beginning to experience the profound effects of human-induced climate change," said Lewis Owen, a geologist at the University of Cincinnati who was not affiliated with this study.

Source: Brigham Young University (news : web)