

## Climate-Change Articles Note Worldwide Ice Mass Reduction

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Reports on global climate extremes continue unabated, with the Center for Sustainability of semi-Arid Hydrology and Riparian Area's (SAHRA) Global Water News Watch covering nearly 20 articles per month in 2003. An abrupt shift in focus occurred around October, as stories on record summer heat waves, drought, and fire gave way to reports on melting ice. Polar ice caps and ice shelves and glaciers on six continents appear to be melting at unprecedented rates.

Several stories document long-term thinning and shrinkage of the Arctic ice cap. NASA reported 30 years of satellite data show an average loss in sea ice coverage of 360,000 km<sup>2</sup> per decade. An increase in sea surface temperatures across the Arctic over recent decades was also reported. British researchers measured a 40 percent thinning in Arctic ice over the past 50 years and estimate it has decreased from about 13 to nine feet thick in the past three decades; a Chinese expedition reported similar findings. Canadian researchers documented the breakup of the massive 3,000-year-old Ward Hunt Ice Shelf, and a Norwegian researcher warned that the Arctic ice cap could melt completely by the end of this century.

The situation in Antarctica appears more complex. The Larson Ice Shelf in Antarctica may be melting more as a result of warm water beneath it than because of increases in air temperature. NASA reported that although the Antarctic ice mass is less today than in 1973, most losses occurred from 1973 to 1977, and ice mass has gradually increased since then. Increased snowfall and localized cooling on the continent's interior seem to more than offset the breakup of coastal ice.

Beyond the polar regions, reports of melting glaciers and thinning ice have come from nearly every continent:

**South America:** Andean glaciers have decreased nearly 25 percent over the last three decades, and data suggest that they could disappear within 10 years, precipitating a regional water crisis. Glaciers at the southern tip of Argentina are dwindling due to warmer temperatures and decreased precipitation.

**Asia:** Italian researchers report that data from satellites and ground-based lasers show Himalayan glaciers are melting; this observation was confirmed by the World Wildlife Fund. The glaciers feed seven major Asian rivers that supply water to 2 billion people.



The world's largest iceberg, B-15, which broke from the Ross Ice Shelf in 2001, broke up following a recent severe storm. From the National Oceanic and Atmospheric Administration's Operational Significant Event Imagery, Nov. 2, 2003. Visit [www.osei.noaa.gov](http://www.osei.noaa.gov).

**Europe:** The United Nations (UN) Intergovernmental Commission on Climate Change attributed the record rate of retreat of glaciers in the Alps to global warming.

**Africa:** The melting of glaciers on Mt. Kilimanjaro is being accelerated by slash-and-burn agricultural practices in Tanzania, according to CNN. A UN researcher predicted the glaciers could disappear in 20 years.

**North America:** The U.S. Geological Survey reported a 100-year trend of thinning river ice in central Maine correlated with milder and shorter winters. An earlier USGS study also suggested a warming trend and earlier snowmelt across New England.

A few stories noted exceptions to the trend of melting ice. Greenland appears to be cooling 0.2 degrees per year, and snowpacks have increased since 1990. Nearby northeastern Canada had experienced a similar trend, but it appears to have ended or reversed. Some glaciers in Scandinavia seem to be growing as a result of increased snowfall, although most are melting.

Global Water News Watch is at: [www.sahra.arizona.edu/newswatch/](http://www.sahra.arizona.edu/newswatch/); to subscribe to a customized email Water News Tracker, visit [www.sahra.arizona.edu/newswatch/subscribe.html](http://www.sahra.arizona.edu/newswatch/subscribe.html)



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### New Products for Water Science in the Southwest

The U.S. Geological Survey announces the release of a new **SUBSIDENCE AND AQUIFER SYSTEM COMPACTION PACKAGE** for MODFLOW-2000 that allows for the simulation of aquifer-system compaction. The package, bundled in the current release of MODFLOW-2000, is available at:  
<http://water.usgs.gov/nrp/gwsoftware/modflow2000/modflow2000.html>

Documentation of the Subsidence Package is available from the web site. For more information, contact Stan Leake ([sleake@usgs.gov](mailto:sleake@usgs.gov)).

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**USGS CIRCULAR 1260, HEAT AS A TOOL FOR STUDYING THE MOVEMENT OF GROUND WATER NEAR STREAMS** describes the use of temperature measurements to trace surface-water ground-water interactions. The techniques described in the report are particularly useful for investigations of streams in arid and semi-arid environments. Case studies include examples from California, Oregon, Nevada, Arizona, and New Mexico. The report, edited by David A. Stonestrom and Jim Constantz, can be accessed at:  
<http://pubs.water.usgs.gov/circ1260/>

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