

Polar sea ice on the wane

Satellite measurements reveal that the extent of sea ice has decreased in both the Arctic and Antarctic since 1978, reports a team of scientists from the Nansen Environmental and Remote Sensing Center in Bergen, Norway.

For climate scientists, Earth's polar regions play the role of the canary sent down a coal mine to test the air. As extremely sensitive regions of the planet, the Antarctic and the Arctic are expected to warm more and possibly sooner than other parts of the globe in response to greenhouse gas pollution. A thinning of polar sea ice might therefore provide an early warning of greenhouse warming.

NASA scientists had previously detected evidence of reduced sea ice extent in the Arctic while studying satellite data collected from 1978 to 1987. Antarctic sea ice showed no statistically significant trend during that period.

To continue the sea ice record, Ola M. Johannessen, Martin W. Miles, and Einar Bjørge merged the data from 1978 to 1987 with measurements collected by a different satellite sensor between 1987 and 1994. The two satellite sensors overlapped by 6 weeks, enabling the Norwegian scientists to match the data sets.

In the July 13 *NATURE*, they report that ice reductions in the Arctic accelerated in the later period. The area covered by sea ice, which includes some regions of open water, dropped by 2.5 percent per decade in the earlier period and 4.3 percent per decade in the later one. The area of water actually covered by ice fell 2.8 percent per decade in the earlier record and 4.5 percent per decade later.

When they combined the two data sets, Johannessen and his coworkers found a slight, but statistically significant, drop in Antarctic sea ice extent, amounting to 1.4 percent per decade over the last 16 years. The area actually covered by ice also declined but not by a statistically significant amount, they announced last month at a conference in Florence.

Although the change matches the pattern expected from greenhouse warming, the team says it is too early to pinpoint the cause. With only 16 years of satellite data, the scientists cannot rule out the possibility that natural changes are reducing the ice cover, says Miles.

Taking a yardstick to a killer crater

Hidden beneath the surface of Mexico's Yucatán Peninsula lies the giant Chicxulub crater, carved by a comet or meteorite that smacked Earth silly 65 million years ago. Geologists originally estimated the diameter of the crater as 180 kilometers, but a 1993 study indicated that the structure stretched 300 km across, making it one of the largest craters in the solar system (SN: 4/3/93, p. 212). Not so, report Alan R. Hildebrand of the Geological Survey of Canada and his col-



Gravity data show concentric rings of Chicxulub crater. White dots mark sinkhole lakes outlining crater edge.

leagues in the Aug. 3 *NATURE*. The group asserts that new gravity measurements made over the crater fix its size at 180 km, still one of the largest on Earth. The pattern of sinkhole lakes at the surface, which follows the crater's outer rim, also supports this smaller diameter.

Bering glacier on the run again

Alaska's Bering glacier, the largest and longest in North America, can't seem to make up its mind. It appeared to have

settled down last year following a 17-month-long surge forward. But the halt proved only temporary. The glacier surprised scientists this spring by renewing its rapid movement, according to Bruce F. Molnia of the U.S. Geological Survey in Reston, Va.

During its previous surge, the front end of the glacier advanced about 9 kilometers, covering up much of Vitus Lake, located at the glacier's foot. The current activity, first noticed in April, threatens to fill the lake completely, says Molnia, who recently surveyed the glacier.

If the glacier continues its speedy movement, it could increase the number of large icebergs discharging into the Gulf of Alaska within 100 km of oil tanker routes leading to Prince William Sound.

Two plates are better than one

Forty million years ago, India and Australia rode as fellow passengers on board a great tectonic plate steaming slowly northward. But the two travelers have started moving in different directions in recent geologic time, causing the once united Indo-Australian plate to begin splitting apart, concludes a new study by James Van Orman, James R. Cochran, and Jeffrey K. Weissel of the Lamont-Doherty Earth Observatory in Palisades, N.Y., and Florence Jestin of the Ecole Normale Supérieure in Paris.

Tectonic plates are large sections of Earth's outer shell, or lithosphere, that float on a semisoft layer of rock in the mantle. Geologists at present recognize a dozen major tectonic plates and several smaller ones. The new findings, if confirmed by later studies, would bring the number of major plates to 13.

Researchers have long suspected that the Indo-Australian plate behaved differently from the others. As a rule, tectonic plates deform only along their margins, where they bump and grind into one another. But various scientists over the last 25 years have noted signs that the lithosphere was crumpling south of India—a region far from the recognized boundaries of the Indo-Australian plate.

Van Orman, now at the Massachusetts Institute of Technology, and his colleagues studied the deformation between India and Australia by analyzing measurements of the seafloor collected during oceanographic expeditions in 1991 and 1986. Judging from the faults in the ocean bottom, Van Orman and his coworkers calculated that India and Australia are currently moving in different directions and therefore must sit on separate plates.

The boundary between the putative Indian and Australian plates extends across a zone of deformed lithosphere nearly 900 kilometers across, making it much wider than the borders between other tectonic plates. Cochran explains that the break formed in the last 8 million years—recently by geologic standards—and has yet to develop into a sharp border between the plates.

Striped region represents deformed band separating Indian and Australian plates. The split between India and Australia stems from the ongoing collision of India into Asia, which has shifted stress to the south.

