Getting to the core of a killer crater

Mexico's Chicxulub crater taunts geologists in much the same way that candy calls out to children from the shelves of a store. Researchers are eager to study the giant crater in order to probe its role in the death of the dinosaurs and many other forms of life 65 million years ago. Yet the structure lies frustratingly out of reach, buried beneath a kilometer of rock at the north end of the Yucatán Peninsula. Half of it sits on land, and half is underwater.

In October 1996, researchers investigated the submerged section of the crater by setting off explosive blasts that sent sound waves rippling down into the rock. Microphones towed behind the ship recorded the waves after they reflected off buried features.

The seismic survey revealed that Chicxulub has multiple concentric rings—a crater structure seen on the moon and Venus but heretofore not on Earth, they report in the Dec. 4 NATURE. The crater has a raised inner ring about 80 kilometers in diameter, another ring 135 km across, and an outer ring about 195 km in diameter. The researchers, led by Jo Morgan and Mike Warner of Imperial College London, say there are hints of an additional, larger ring.

This seismic survey provides the best evidence to date of the crater's structure, comments H.J. Melosh of the University of Arizona in Tucson. Previous gravity surveys of the crater had proved equivocal, but "the seismic images are clear enough to make the structure unambiguous," says Melosh.

The new data secure Chicxulub's place as one of the largest impact formations on Earth, but at the same time they suggest that the crater is smaller than some researchers had thought. Virgil Sharpton of the Lunar and Planetary Institute in Houston had estimated the diameter of the crater as 300 km or more (SN: 4/3/93, p. 212), a measurement not verified by the seismic study.

Sharpton, a coauthor of the NATURE report, disagrees with its conservative conclusions. "I don't think there's any doubt that the crater is larger than 195 km," says Sharpton, who contends that evidence points to its being 320 km in diameter.

The size of a crater is important because it helps determine the destructive energy of the impact. The new data, says Melosh, teach that "in spite of its smaller size, the impact was still pretty lethal. That size impact is something that gives the whole Earth a bad day and caused a global extinction." —*R.M.*

Winter, Greenland-style

A team of scientists is hunkering down to endure a dark, cold winter atop the Greenland ice sheet. The four-person crew—the first ever to occupy Greenland's highest region in winter—will collect air and snow measurements at a site where climate researchers had previously pulled up a 2-mile-long core of ice.

The ice core records climate information going back more than 100,000 years, near the beginning of the last ice age (SN: 6/3/95, p. 342). As snow falls on top of the high Greenland ice plateau, it gets compacted into layers of ice, trapping air bubbles and dust carried in by winds. By studying the ancient layers of ice, dust, and trapped gas, scientists can reconstruct how climate has changed over the millennia.

The information collected this winter will help in interpreting the ice core, says Jack E. Dibb, who oversees the project from the University of New Hampshire in Durham. Scientists are not sure, for instance, when most of the snow falls on the ice cap. The experiments will also help determine how closely the ice and gas bubbles reflect the composition of the atmosphere.

The sun set for the season on Nov. 14 and will reappear in late January. Temperatures now range from -25°C to -40°C, and the crew is enjoying the aurora borealis, says Dibb. —*R.M.*