The noise never stopped. For three weeks, the pounding, squealing, grinding of the truck-mounted drill accompanied Dr. Catherine Ann Rigsby day and night. The walls of her tent afforded little protection from the roar or from temperatures that dropped below zero every night. Fortunately, the souvenirs made the whole trip worthwhile.

The souvenirs were eight 50-meter cores from the Altiplano, or High Plain, of the Bolivian Andes. The cores will help Rigsby, associate professor of geology, interpret more than 40,000 years of climatic history. This history in turn may help us better understand how the buildup of greenhouse gases is likely to affect future global climate.

The need to improve climate models drives the project. Human activity has resulted in significant increases in the amount of carbon dioxide and other greenhouse gases being released into the atmosphere, and there are short-term indications of resulting global warming. If this continues, sea level could rise as the polar ice caps melt, and severe drought could overtake the U.S. grain belt, just for starters.

On the other hand, higher temperatures and resulting evaporation could set off a cascading effect that shuts down such warm water currents as the Gulf Stream and sends northern latitudes into another ice age.

“Even the best models we have for predicting climate change are not very accurate,” Rigsby said. “Some say the

Clockwise from top:

In the Bolivian Andes, a glacier once filled the curving valley still discernible in the hills behind the drilling rig.

Drilling cores reveal layers of sediment that will help unravel 40,000 years of climate history.

“A lot of sand tells you this was a shoreline,” Catherine Rigsby says about her coring samples.
temperature will be higher, and some say lower. So what the scientific community wants to do is something called hindcasting. We find out all we can about major episodes of climate change in the past, and then we use the known information to test the models and in that way figure out which are most accurate.

So far, most of the evidence has been gathered from ice cores taken from the poles. Rigsby and others now seek to correlate the ice core data with information from equatorial regions. It will be a vital component of any climate change model. The tropics collect most of the Earth’s heat from the sun and, through a combination of heat and water vapor, power the planet’s atmospheric circulation.

In the Western Hemisphere, this search leads to South America. Because erosion has washed evidence of the ancient past from the Amazon River basin, Rigsby is concentrating her research on an area about 12,000 feet up in the Andes Mountains of Bolivia. Here, a stable geologic history has left a thick and continuous record of sedimentation and vegetation. Rigsby hopes to chart how lakes and rivers on the Altiplano grew and shrank through the ages — telltale evidence of fluctuating precipitation.

Four years of preliminary studies paid off in late spring 1999, when the National Science Foundation awarded her a three-year, $300,000 grant for a large-scale research effort. The timing gave her only three weeks to assemble a team and equipment for field work during ECU’s summer break, which coincides with Bolivia’s winter. Despite a limited knowledge of Spanish, a remote location and extreme cold, she pulled together the monthlong expedition, which included three weeks of camping and round-the-clock drilling in the now-dry valley floor. By September, she was back in Greenville analyzing the first set of cores.

In her lab last fall, she pointed to the different colors of sediment. “These cores show the transition between lake and river,” she said. “A lot of sand tells you this was a shoreline. Where there’s an abrupt shift from sand to clay, we know the environment has gotten wetter. The clays were deposited in ancient lakes.”

Colleagues will help her tease out other vital pieces of climate history. Radiocarbon-dating will attach dates to the different layers of sediment. Salt content will tell the rate of evaporation. Plant and animal remains will reveal the temperature range. All together, these cores should contain a 40,000-year record of the climate in a key area of the planet.

Rigsby plans a second drilling expedition for summer 2000. “I know it sounds exotic, but this field work has global implications,” she said. “It’s important for understanding climate change, and for people in places like coastal North Carolina, climate change could have a big impact in terms of rising sea level.”