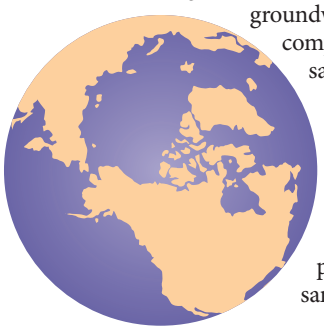
Digging the Arctic

Chien-Lu Ping and his colleagues got their plane stuck in a runway of melting seasonal frost during their survey of North American soil organic carbon pools.

What was the objective of your work?
We wanted to study the quantity and quality of soil organic matter in Arctic tundra soils, with the objective of establishing baseline data for Arctic soils. Our aims fell under two programs, one from the US National Science Foundation and one from the US Department of Agriculture, which overlapped in their goal of characterizing Arctic soil and its organic carbon content.

Why did you choose this particular location for the fieldwork?
The study locations were selected by a multidisciplinary team including biologists, hydrologists, geocryologists and soil scientists. Many of the sites were sampled from 1991 to 2006. We chose two north–south transects across Alaska, and because we wanted to cover the entire north–south bioclimatic gradient, we extended the eastern transect to the east and north into the Canadian Arctic. This allowed us to investigate the biological complexity of ecosystems that are specific to the Arctic region, such as frostboil and patterned ground. In addition, we included fifty sites on an east–west transect from Barrow Alaska to the Canadian border, in conjunction with the Arctic coastal erosion study.

What sorts of data or samples were you after?
Once we had chosen the study sites, we recorded physical environmental data such as landform, microtopography, geology, vegetation, slope and any special surfacial features. We then excavated a soil pit, cleaned a soil profile, took pictures, identified the soil horizons and described the morphological properties. Once this groundwork was complete, we sampled soils from each horizon. In addition to excavating pits we also collected permafrost samples by drilling.



Stuck in the mud. Pilots and scientists working together to dig their airplane out of a sinking runway in Isachsen, Ellef Ringes Island, Nunavut, Canada.

Did you encounter any difficulties?
Soil sampling is more difficult in the Arctic than in most other areas of the world because there is permafrost at all sites. We had to use a jackhammer to excavate ice and frozen soil below the seasonal frost layer.

Did you encounter any dangerous animals?
We often encountered grizzly bears, but mostly at a safe distance. On a helicopter approach to one site in the Arctic National Wildlife Refuge, we counted three grizzly bears at the site and 16 within half a mile of it, so we were forced to choose a different location. However, the most annoying 'wildlife' in the tundra are the mosquitoes.

Any lowpoints, close misses?
The low points were often associated with bad weather. Rain and snow left us either stranded in the tents or in messy working conditions. One close miss occurred along the Beaufort Sea coast in Arctic Alaska when a polar bear passed us 100 yards away. Fortunately the bear didn't charge at us, but went into the ocean instead.

What was the highlight of the expedition?
The first hot meal after setting up the campsite in each remote island.

Did you learn anything new about yourself or your team members?
Yes, I realized how fragile I was on an isolated island. I also learned more about my team members: working together in remote areas brought out mutual courtesy, consideration and the finest qualities in everyone.

Was it straightforward to get the samples back to the lab?
We had to ship the samples back to the lab in bags and coolers using air freight or trucks. For the permafrost samples or the samples that needed to be shipped in a frozen state, we had to either keep putting ice in the cooler or freeze the sample before passing it on to air freight.

Did the trip give you any ideas for future research projects?
We only sampled the tundra soils along a few transects but the spatial variability was more complex than we had anticipated. We are considering incorporating remote sensing to fill the gaps.

This is the Backstory to the work by Chien-Lu Ping and colleagues, published on page 615 of this issue.