From the editor: halfway through the IPY—halfway for an Antarctic traverse

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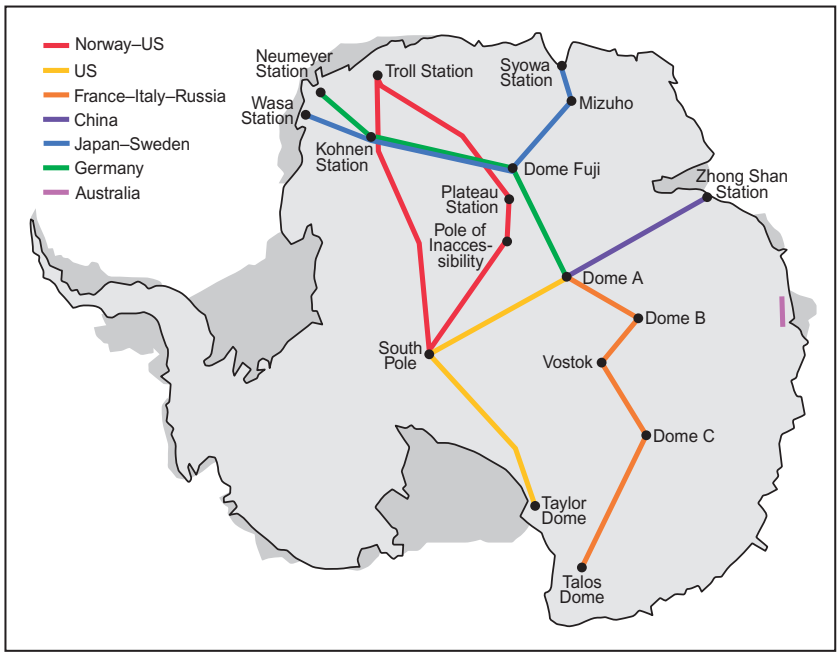
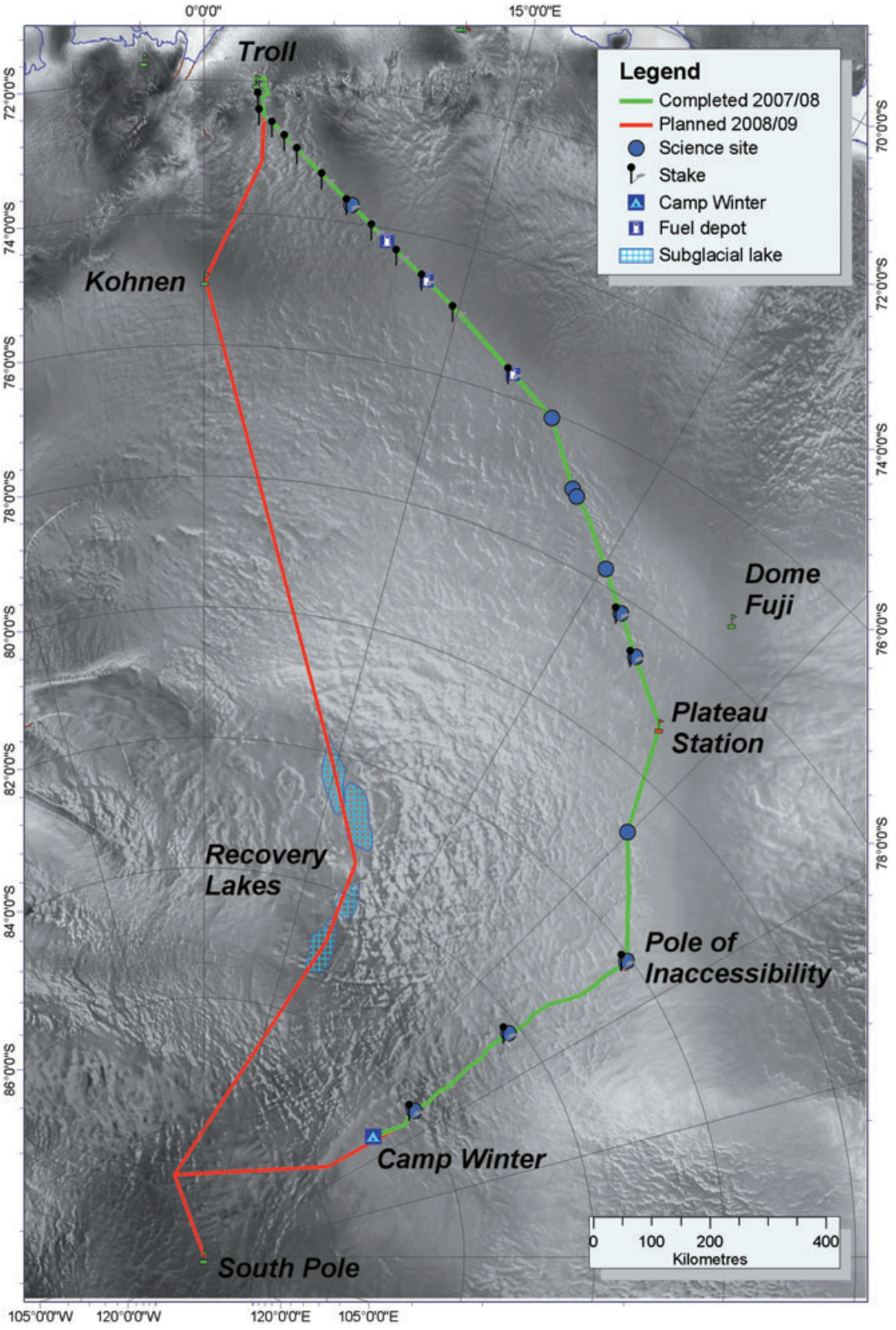
April is here and we have just passed the midpoint of the International Polar Year (IPY), which began on 1 March 2007 and will conclude on 1 March 2009. The "year" stretches over 24 months to accommodate two summer field seasons in both polar regions. The northern summer is fast approaching, and scientists who will undertake a second IPY summer season in the Arctic are making their final preparations. At the opposite end of the planet, summer is over and scientists have wrapped up the first IPY field season. Those whose projects will carry on for a second summer season will have to wait until late this year to resume work in Antarctica.

One IPY project that is making full use of both Antarctic summers is the Norwegian–US Scientific Traverse of East Antarctica (http://traverse.npolar.no/). This joint project is part of the larger Trans-Antarctic Scientific Traverses Expeditions—Ice Divide of East Antarctica (TASTE-IDEA) and the International Partners in Ice Coring Sciences (IPICS). These two international consortia involve a number of coordinated traverses across Antarctica during the IPY. Norway–USA, Sweden–Japan, Germany, France–Italy–Russia, China, Australia and the USA are responsible for the traverses, which criss-cross East Antarctica from starting points that include Taylor Dome, Talos Dome, Wasa Station, Neumeyer Station, Troll Station, Syowa Station and Zhong Shan Station.

The expeditions are travelling through some largely unexplored areas of Antarctica. Along the route, scientists and technicians extract ice cores, make detailed meteorological observations, measure ice depth, investigate ice dynamics, survey under-ice geology and deploy instruments that will continue to furnish data after the IPY is over. It is anticipated that the data amassed during these traverses—as well as those that will continue to come in, post-IPY, from automatic weather stations and snow accumulation stakes, for example—will significantly improve our understanding of past, current and future climate variability, cryosphere–atmosphere interactions and Antarctic ice mass balance. Two-thirds of all the planet's freshwater—including lakes, rivers, groundwater, glaciers and moisture in the atmosphere—exists as ice in Antarctica. The deepest ice measured in Antarctica so far is 4776 m thick; the average Antarctic ice thickness is about 2000 m. Large parts of the continent are inadequately mapped with respect to ice thickness. Measuring ice thickness during the traverses will clarify the picture,



Rough sketch of the International Polar Year (IPY) traverses of Antarctica under the umbrella of the Trans-Antarctic Scientific Traverses Expeditions—Ice Divide of East Antarctica. Actual routes may differ from those shown here. (Illustration based on a diagram at http://www.ipy.org/index.php?ipy/detail/taste_idea/, accessed on 18 January 2008.)



The route of the Norwegian–US Scientific Traverse of East Antarctica. In January 2008, the expedition was forced to conclude about 350-km short of the South Pole. The return leg, which will take place in the coming austral summer, will start from this point, will continue to the South Pole and will then take the expedition on to Troll Station.

Some of the participants of the 2007/08 Norwegian–US traverse posing for a group picture at Troll Station. Left to right: Einar Johansen (Norwegian Polar Institute [NPI]), Atsuhiro Muto (University of Colorado), Stein Tronstad (NPI), Glen Liston (Colorado State University), Stian Solbø (Northern Research Institute Tromsø), John Guldahl (NPI), Jan-Gunnar Winther (NPI), Tom Neumann (University of Vermont), Mary Albert (Dartmouth College), Kjetil Bakkland (NPI), Helgard Anschütz (NPI), Lou Albershardt (University of Wisconsin) and Karsten Müller (University of Oslo). (Photo by Leif Morten Tangen; courtesy of Norwegian Polar Institute Photo Library.)

and will help answer such crucial questions as what is the contribution of Antarctica's ice to sea level change.

Led by Norwegian Polar Institute director Jan-Gunnar Winther, the Norwegian–US Scientific Traverse of East Antarctica is Norway's contribution to TASTE-IDEA. The Norwegian–US traverse is being undertaken in two stages. The first was planned to have taken the expedition from the Norwegian Troll Station to the US Amundsen–Scott South Pole Station in the austral summer of 2007/08. The second stage was intended to start from the South Pole and return to Troll Station, by a different, shorter route, during the following summer. In a region as challenging to work in as Antarctica, it is perhaps no wonder that the first leg of the traveser did not go precisely to plan.

After a delay caused by some days of very high winds—gusts peaking at 185 km h^{-1} capsized 20- and 40-ft containers, and caused other equipment to vanish completely—the team set out from Troll Station on 16 November 2007. The expedition travelled in four tracked vehicles hauling sleds. As expected, heavy loads and the high-altitude thin air made the going slow. The expedition made numerous planned stops to collect fuel and carry out scientific work. Extracting ice cores turned out to be difficult at sites where meagre annual snowfall and annual mean temperatures of around –55°C made the ice fragile, particularly close to the surface. It tended to crumble when disturbed, leaving breaks and gaps in the core, unless handled with great care.

The four tracked vehicles each pulled two sleds loaded with fuel, equipment, and living and working quarters. (Top photo by Atsuhiro Muto. Bottom photo by Stein Tronstad; courtesy of Norwegian Polar Institute Photo Library.)

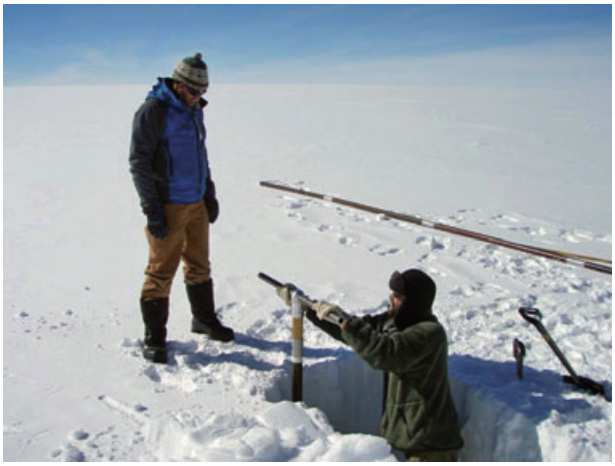
In late November, cameraman Art Howard, who represented PolarPalooza, an IPY outreach programme dedicated to science education, fell ill with a stomach ailment. He was airlifted back to Troll Station; the filming for PolarPalooza podcasts of the expedition was taken over by other expedition members. In December, the medical doctor at Troll flew out to the expedition to treat Lou Albershardt, who had wounded her finger.

The greatest challenge proved to be keeping the vehicles in working order despite the harsh environmental conditions and the very heavy demands placed on them as tonnes of ice cores were added to the load during the progress of the expedition. There were numerous delays as the mechanics grappled—typically in extremely cold temperatures—with difficulties with the tracked vehicles. The differentials and transfer cases were particularly troublesome. These broke down repeatedly and new ones were flown in.

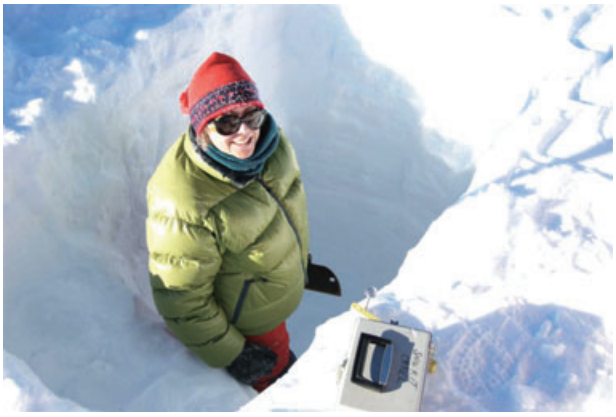
Crevasse-detecting radar developed by the Norwegian Polar Institute. Mounted in a 12-m forward boom in front of the lead vehicle, the device allows the driver to monitor the structure of the ice down to 30 m below the surface, and thereby to avoid crevasses. (Photo by Jan-Gunnar Winther; courtesy of Norwegian Polar Institute Photo Library.)

The expedition stopped at various points along the route to pick up barrels of fuel that had been cached during the preceding Antarctic summer in preparation for the International Polar Year traverse. Here Karsten Müller stands by a partly excavated depot. (Photo by Stian Solbø.)

Ultimately, the mechanical problems proved insurmountable despite the tireless efforts of the mechanics. About 350 km short of the intended finishing point for the first leg of the traverse—the South Pole—the last of the replacement parts available from the manufacturer



Jan-Gunnar Winther (right) and Tom Neumann (left) drill a 12-m ice core with a hand auger at one stop along the way. Ice cores contain valuable information about the climate of the past. (Photo by Atsuhiro Muto.)



Mary Albert taking samples in a snow pit. The samples will be examined for black carbon, which originates in the industrialized regions of the world and is transported by the atmosphere to Antarctica. Black carbon reduces the extent to which snow reflects solar radiation and increases the amount of solar energy snow absorbs, and is therefore an important consideration in climate studies. (Photo by Jan-Gunnar Winther; courtesy of Norwegian Polar Institute Photo Library.)

failed, bringing the expedition to a final standstill in mid-January. The vehicles and hardier equipment and supplies were battoned down for the winter. Personnel, scientific samples and gear unlikely to withstand the Antarctic winter were taken by air to the Amundsen–Scott South Pole Station, and thence back to civilization. Just before departing for the South Pole, the leader of the expedition reflected, "It has been a long journey and it will be good to complete it. However, it is with mixed feelings we are leaving behind the breathtaking wonders of Antarctica. We had a fantastic time on the ice. We leave with good memories, new friends and . . . will be back!"

Lou Albershardt, the expedition's chief driller, extracting an ice core from a 90-m hole. (Photo by Stein Tronstad, courtesy of Norwegian Polar Institute Photo Library.)

The expedition stopped at Plateau Station, last occupied by US scientists in 1969. The tall meteorological tower and some smaller towers are still standing. The clear dome of the aurora tower and the top of a smokestack of the old main station are visible just above snow level. The Norwegian–US team entered through a hatch and found the buried station to be a time capsule of the late 1960s. (Photo by Stein Tronstad; courtesy of Norwegian Polar Institute Photo Library.)

Stian Solbø sets up the expedition's first automatic weather station, which was prepared by the Ice and Climate group at the University of Utrecht. The station will send meteorological data for the next five years via satellite. (Photo by Jan-Gunnar Winther; courtesy of Norwegian Polar Institute Photo Library.)

Though naturally disappointed in not making it all the way to the South Pole with the tracked vehicles, the team was aware that the planned scientific work had been carried out. In this most important respect the expedition was a great success. Working under extreme conditions that often included temperatures well below –40°C and low levels of oxygen, on account of the thin polar atmosphere and the high elevation, they had collected over 700 m—amounting to 5 tonnes—of ice cores, and had collected a range of important measurements and observations in this poorly known part of the world.

The next stage of the Norwegian–US Scientific Traverse of East Antarctica will begin this coming November, setting out from the point at which the first leg was forced to stop. This will take the expedition to the South Pole and back to Troll Station. The route passes over three of four newly discovered subglacial lakes, identified using satellite imagery and ice-surface elevations (Bell et al. 2007; Kohler 2007). More than 150 subglacial lakes are known to lie beneath the vast Antarctic ice sheet. The most recent discoveries are located just at the start of an area of rapid ice flow in the Recovery Glacier ice stream. This suggests that the lakes have something to do with the rapid movement of ice in glaciers such as this one. Data collected during the Norwegian–US traverse of 2008/09 will help elucidate the important role that subglacial lakes may play in ice-sheet mass balance.

The two-stage Norwegian–US Scientific Traverse of East Antarctica is the most ambitious expedition undertaken by Norway since the International Geophysical Year, 50 years ago. The nation has a notable history of

exploration in the Arctic and Antarctic; indeed, the South Pole was first attained by Norwegian Roald Amundsen's five-man team in 1911. Norway has participated strongly in every IPY since the inception of this international scientific endeavour in the late 19th century (Bones 2007; Goldman 2007).

The last page of this issue offers a glimpse of what conditions were like for the Norwegian team overwintering at Norway Station, Antarctica, during the International Geophysical Year, otherwise known as the third IPY. Working and living conditions in Antarctica have certainly improved since then—the newly rebuilt Amundsen–Scott South Pole Station boasts modern medical and dental facilities, a greenhouse, post office, games room, gym and many other features. As life in Antarctica has become safer and more comforatble, the expectations we have of the technicians and scientists who carry out research in Antarctica have risen commensurately. These men and women bear an enormous responsibility. The extent to which the climate is changing and has changed in the past and how current and future climate change will alter other aspects of the global natural system are widely recognized as ranking among the most important questions of our time. (In recognition of how these changes may have profound consequences for human society's welfare and security the 2007 Nobel Peace Prize was awarded to the Intergovernmental Panel on Climate Change and Al Gore.) Climate and related environmental questions can only be answered by concerted international scientific research of the kind being carried out during this IPY at the cold ends of the Earth on an unprecedented scale.

As a final note, I have the pleasure of announcing the establishment of *Polar Research*'s Editorial Advisory Panel. Along with the other members of the Editorial Board, I welcome the participation of our new Editorial Advisers, who are listed inside the front cover of this issue. Providing scientific expertise that complements that of the journal's Subject Editors, and bringing potentially important manuscripts to our attention, the Editorial Advisers serve a vital supporting role for *Polar Research*.

Helle V. Goldman
Chief Editor

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