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This was no Antarctic pleasure cruise

After his polar vessel became trapped in shifting sea ice, Chris Turney defends the scientific basis of the expedition.

Sitting in the ship's lounge of the Australian icebreaker *Aurora Australis*, safe with friends and colleagues and heading back to civilization, I can say it has been a remarkable journey.

For the past six weeks on board the Russian icebreaker *MV Akademik Shokalskiy*, my colleague Chris Fogwill and I have led a team of scientists, science communicators and volunteers on a voyage from the New Zealand subantarctic islands to the East Antarctic Ice Sheet. The aim was to study various aspects of this vast, remote region to better understand its role in the Earth system, and communicate these results directly to the public. Yet most people only became aware of our work when we got stuck and had to be rescued.

That is the reality of polar science. It is difficult. Almost every season, ships get caught in sea ice, teams lose communications and planes are sometimes tragically lost. Signatories to the Antarctic Treaty understand that one science programme supports another, so national and non-government vessels routinely assist each other.

What went wrong for the *Shokalskiy*? Contrary to some reports, the ship was not frozen in but was pinned by remobilized sea ice that had been blown by fierce winds. Most importantly, the team is safe and we are incredibly grateful to the international effort to help us.

Could this have been avoided? The satellite data leading up to our arrival in Antarctica's Commonwealth Bay indicated open clear water, and the area seemed to have been that way for some time. As the *Shokalskiy* attempted to leave, however, we found ourselves surrounded by a mass breakout of multiyear ice. This was a major event, with the vessel surrounded by blocks of sea ice more than three metres thick, apparently arriving from the other side of the Mertz Glacier. Despite the best efforts of our captain, we could not find a route out. It was deeply frustrating. We had been caught just 2–4 nautical miles (3.7–7.4 kilometres) from the edge of the sea ice. And with pervasive southeasterly winds battering our location, this distance increased to 20 nautical miles within 48 hours.

The extreme nature of the conditions is shown by the fate of the Chinese icebreaker that came to our rescue: as I write this, that vessel is also now trapped, and is awaiting the arrival of the huge US ship *Polar Star* to smash a route to open water.

Since news of our plight raced around the world, I have been surprised by the level of criticism our scientific expedition has received. This was no pleasure cruise. The science case took two years to develop, and was approved by the New Zealand Department of Conservation, the Tasmanian Parks and Wildlife Service and the Australian Antarctic Division.

Major scientific questions remain about the region we sailed into. A southward shift

of westerly winds is influencing the Antarctic Circumpolar Current, increasing transitory upwelling of Circumpolar Deep Water onto the Antarctic continental shelf. At the same time, extensive sea ice has formed in Commonwealth Bay after a huge iceberg called B09B collided with and destroyed the tongue of the Mertz Glacier in 2010. This is adjacent to the Mertz polynya — a stretch of open water surrounded by ice and a major source of Antarctic bottom water formation. We wanted to gather data on the effects of both these events on circulation, ocean properties, biodiversity and stability of the East Antarctic Ice Sheet.

Never before has a science expedition reached out live to so many people from such a remote location. Public engagement was always a core theme. Well before we ran into trouble, we posted daily online reports of our research and aspects of life on the vessel and in the

field. In recent weeks, this extended to reassuring those at home about the well-being of all on board. When the number of television and radio interviews increased, so did our mentions of the science. This encouraged people to follow our work, as seen by the number of hits received on the expedition website. In the past six weeks, www.spiritofmawson.com received 60,000 visits, driving traffic to our social media sites.

Our findings include many firsts for the region: detailed marine and terrestrial ecological studies, glaciological reconstructions and high-resolution palaeoclimate analysis of tree rings, peats and ocean cores from the subantarctic islands. Guided by real-time satellite information, the team undertook an experiment across the Antarctic Convergence — a natural boundary between

cold Antarctic and warmer subantarctic waters. By combining surface drifters with Argo floats (for measuring salinity and temperature), we have gained a unique snapshot of this important frontier.

Reaching Commonwealth Bay, we crossed some 65 kilometres of sea ice to deliver scientists and conservators to the historic base established by scientist and explorer Douglas Mawson a century ago. We surveyed an airstrip for future visits, serviced and collected data from the automatic weather station, and obtained valuable Global Positioning System data for monitoring land-mass uplift as ice sheets retreat.

Our rescue has caused disruption, but fortunately we hear that the next voyage of the *Aurora Australis* is likely to leave Hobart as scheduled. Science will continue in the south: a great relief. In the meantime, the value of our expedition must be judged by the quality of the research it always intended to produce, and the remarkable rekindling of public interest in science and exploration that has come with it. ■

*Chris Turney is a scientist in the Climate Change Research Centre at the University of New South Wales, Australia.
e-mail: c.turney@unsw.edu.au*

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