

# POLAR VISION

The blue ice of Antarctica seemed improbable terrain for operations by large, wheeled aircraft — until an adventurous British aviator, and a rather troublesome Douglas DC-4, came along

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**MAIN PICTURE:** On lease to Adventure Network International from Kenn Borek Air, DC-4 C-FIQM lands on the blue ice runway adjacent to Antarctica's Patriot Hills, its wheels and the use of reverse pitch on the propellers kicking up a storm of snow and ice particles. Tests after the first landing showed that the use of wheel brakes was, in fact, effective, with sufficient traction to avoid skidding.

**RIGHT:** Giles Kershaw in the cockpit of a Cessna 185 he flew for an Antarctic expedition in 1989. He undertook these trips in down-time or while on leave from commercial flying jobs — for some while he was a Britannia Airways Boeing 737 captain, and at the time of his death in 1990 he was working for Cathay Pacific as a 747 first officer. ➤



**RIGHT:** An ANI Twin Otter-borne survey team scouts the blue ice fields near the Ferris Mountains, Queen Maud Land, for a runway on which to land C-130s.

**BELOW RIGHT:** Powdery snow streams in the wake of the DC-4 as it rolls for take-off from the Patriot Hills strip.

It was in 1974 that Giles Kershaw first laid eyes on the blue ice fields of the Patriot Hills in the Antarctic. Accompanied by glaciologist Charles Swithinbank, he was flying a DHC-6 Twin Otter, radio echo-surveying the ice sheets and glaciers. They were part of the British Antarctic Survey, and as they flew past the pair noticed that the surface seemed smooth enough for a landing by a conventional wheeled aircraft. Twelve years later, Giles and Charles would be back on the same blue ice field, testing, surveying and putting into place procedures that would revolutionise Antarctic aviation forever.

Those were the days when major powers were scrambling to establish their presence on the vast, frozen continent of Antarctica. Permanent stations were being established and scientific expeditions conducted as per the Antarctic Treaty norms. Although technology had facilitated access to the Antarctic, the logistical realities were such that stations clung to the coastline, where they depended on supplies by ship during the summer months. Transport to the interior was by tractor traverse or ski-equipped bush-planes.

During the 1970s and '80s, Giles Kershaw had flown with innumerable Antarctic expeditions. He had established a formidable reputation as a polar bush pilot and, in the words of Swithinbank, was acknowledged as "the most accomplished pilot in Antarctic aviation history". Into this world too had come two Canadian mountaineers, Pat Morrow and Martyn Williams, the hopeful 'Seven Summiteers'. They were intent on climbing Mount Vinson, the tallest mountain in the Antarctic, and so conquer the highest peaks on all seven continents.

Private individuals could hardly hope to access Antarctica, but teaming up with Giles they had flown to Mount Vinson, and successfully scaled the peak in 1985. This opened their eyes to the possibility of using the same strategy to bring in other adventure tourists. So was born Adventure Networks International (ANI), with plans to transport tourists and offer logistics solutions to Antarctic expeditions. This was something no private firm had ever undertaken until then.



They based themselves at Punta Arenas in Chile, on the southern tip of South America, and flew clients from there into the Patriot Hills, the 'launchpad' for most Antarctic expeditions. But as time went by, Giles became acutely conscious of the limited range of the Twin Otter. A flight into the Antarctic entailed numerous refuelling stops and often the carrying of fuel on board the aircraft for its return flight —

hardly a recipe for success for any logistics outfit. Snow-covered Antarctica was suitable for light ski-equipped bush-planes, but these came with a limited range and cargo-carrying capacity. What a firm like ANI needed was a larger aircraft with longer range to move people and cargo in a shorter time and at reduced cost. Kershaw began to work on the possibility of using conventional wheeled aeroplanes to land on the blue ice fields. From this grew the present network of blue ice runways that have radically altered Antarctic aviation.

Blue ice fields are glacial areas that remain snow-free, and are often referred to as 'small net ablation areas'. Turquoise blue in colour, they stand out in sharp contrast to the white of Antarctica, but constitute only one per cent of the land area. They lie scattered across the continent, typically occurring where mountains disturb the flow of winds. Blowing snow is deposited on the upwind side of mountains, while

**“Hypothermia tugging at their elbows, they surveyed the blue ice field”**

the downwind sides see turbulent, snow-free katabatic winds. These descending, hurricane-force winds strip the snow from the ice glaciers, leaving only bare or blue ice. Compressed over centuries, the ice is dense and by its nature reflects the blue in the light that hits it, giving it this distinctive colour. It also has the load-bearing capacity to take heavy wheeled aircraft. The idea of using blue ice runways probably originated in the late 1950s with the first Operation 'Deep Freeze', which began a permanent American presence in Antarctica.



However, it was not carried forward. It was here that Giles Kershaw and ANI stepped in. They picked up the concept and contracted Charles Swithinbank to identify potential runways. They also roped in Chilean Gen Javier Lopetegui who, seeing an opportunity to strengthen Chilean claims over its slice of the Antarctic, offered logistical support to ANI's project.

Meanwhile, Swithinbank pored over hundreds of Landsat photographs of every potential runway, and offered his opinion. So it was that, in late 1986, he and Kershaw took off from Punta Arenas in a Twin Otter and headed for Mount Vinson with a party of mountaineers. Dropping them off, Giles and Charles flew to Wilson Nunataks, where Giles retracted the landing skis and landed the DHC-6 on the blue ice using its wheels. From there they headed south to the Patriot Hills, where they repeated the process. The day was 1 December 1986 and they were on the same blue ice field they had spotted 12 years earlier, while working with BAS.

They stayed for three days on the bleak Patriot Hills, sheltering in dome tents held to the surface by ice screws against the freezing 20kt wind. With hypothermia constantly tugging at their elbows, they surveyed the blue ice field that ran for more than six miles parallel to the mountains, with a width of well over a mile. Here Charles identified a runway some 9,990ft in length as being suitable for landing large aircraft. This had its own set of dynamics. With ice offering little traction, wheel braking was of limited use and potentially dangerous. Reverse thrust was required on the landing roll in order to slow down and stop. This meant blue ice runways needed to be longer than conventional ones. Swithinbank certified the Patriot Hills strip accordingly, and ANI began preparations for landing a large, conventional aircraft on it. Such a demonstration would establish the viability of using blue ice runways for regular cargo and passenger flights to deep within the Antarctic, thus permitting direct intercontinental services.

Kershaw decided to use a Douglas DC-4, primarily on the grounds of

its sturdy undercarriage and slow landing speed. An example was leased from Canadian company Kenn Borek Air — which had provided the Twin Otters for ANI's earlier escapades — and retrofitted for the Antarctic run, installing an additional internal fuel tank to carry adequate fuel for the 3,900-mile round trip from Punta Arenas to Patriot Hills. As Swithinbank wrote, "The distances were such that each take-off from Punta Arenas had to carry not only a useful load but also return fuel to allow for 24 hours in the air". With the aircraft came a six-strong crew, comprising three pilots and three engineers, all well-versed in Arctic flying. The landing was scheduled for the 1987 season.

ANI co-founder Martyn Williams remembers the episode well — the inherent dangers, the ever-changing operating conditions and the constant innovation needed to keep things going. In late 1987, the DC-4, N4218S, began its journey from Canada. First it flew to California to pick up two spare Pratt & Whitney R-2000 Twin Wasp powerplants. However, multiple engine failures were experienced on take-off from Chico Airport. They were

**ABOVE:** Unloading the DC-4 following a successful arrival at Patriot Hills.



**ABOVE:** Adventure tourists help dig the Douglas out of the snow — all part of the adventure they had paid for.

repaired and the machine — built in 1945 as a C-54G Skymaster for the US Army Air Forces — continued south to Santiago in Chile, where yet more engine trouble delayed things further.

In the meantime, other problems were mounting. The aviation authorities had begun to raise objections to the proposed landing attempt. But too much groundwork had already been done, and a great deal was at stake. Kershaw decided to go ahead, in the teeth of opposition from officialdom. The DC-4 finally made it to Punta Arenas in late 1987. Having picked up a nine-member crew and a portable 30-person camp, it headed for the Patriot Hills. There ANI had already set up camp and had two Twin Otters standing by, along with rescue personnel and equipment.

After a seven-hour flight, the DC-4 reached the Patriot Hills on 21 November 1987, making a few flypasts before setting up for an arrival. On his initial landing attempt, the pilot, Capt Jim Smith,

decided to make his approach towards the mountains, across the width of the blue ice field. He touched down safely, thus making history. The Douglas transport had become the first conventional large aircraft to land on a blue ice runway. Well aware of the moment's significance, not least to Antarctic aviation as a whole, ANI set about a series of route-proving missions to establish the practicality of regular operations.



Subsequent thinking showed up the shortcomings of heading for the mountains on landing. The runway was shorter in this direction, and the last third of it sloped down towards the ANI camp and the parked Twin Otters. Had the DC-4 overshot, it would have taken out the camp and rescue equipment. It was decided to use the longer strip, parallel to the mountains, in future.

The DC-4 returned to Punta Arenas for supplies. It then started its second run to the Patriot Hills.

Charles Swithinbank positioned himself at the end of the runway, intending to meet the incoming aircraft and crew. However, this time the DC-4 landed long, and Charles was horrified to see it rush towards him. Only a desperate scramble for safety saved the eminent glaciologist.

Confidence was still high and a third flight was planned. This time it was to carry a load of adventure tourists, each paying \$25,000 for a trip to the Antarctic. This was the business that drove and justified all ANI's high-risk ventures. However, as departure time approached, the DC-4 began to experience engine maladies once again. The spare units were still under repair, but — perhaps given the presence of the tourists — ANI decided to go ahead anyway. Numerous attempts were made to take off, only to be aborted. When the aircraft did eventually get airborne, it returned in minutes.

The Chilean aviation authorities had been observing all this with concern. They felt compelled to pull

the plug on ANI, and its operating licence was withdrawn. ANI was now truly stuck, with a team stranded at the Patriot Hills camp and a furious bunch of clients. The tourists were placated and sent home with assurances that the venture would get going shortly. Naturally, ANI still had a major concern — its team in the Patriot Hills. As seasoned professionals in this environment, they seemed happy enough.

But too much was at stake. The Christmas holidays were coming and all of Chile would be shut down. There remained a usable weather window, so Martyn Williams and Gen Lopetagui set off to meet, lobby and cajole various Chilean aviation authorities. Eventually, as a humanitarian gesture, they permitted ANI to fly again, supplying those stranded in the Antarctic and keeping its operations alive.

Now it was a race against time to make that weather window. On reaching Punta Arenas, ANI staff fanned out in search of the flight crew among the port city's many watering-holes. Williams remembers rounding them up in various stages of intoxication. Having sobered up, they got the DC-4 airborne and set course for the Patriot Hills.

Approaching the runway, little did the crew know they would soon be giving a demonstration of how not to land on blue ice. On touching down the DC-4 went out of control, careening down the strip and beginning to spin. There were no injuries but it ripped off the tyre treads, the tyres themselves staying inflated. The aeroplane left for its return trip, touching down very gently in Punta Arenas with its damaged tyres. They then waited for the arrival of fresh rubber.

By the fourth flight there was plenty of confidence about landing on the bare ice. This time, though the DC-4 touched down short of the runway, into snow a foot deep, and stopped so abruptly a cockpit window broke. The crew found themselves stuck a hundred yards from the strip. Other dangers loomed. They could not let the engines cool to the outside temperature, as the oil would freeze and the aeroplane would be grounded. An hour of desperate

shovelling cleared a pathway for the 2ft-wide wheels, and the aircraft was moved onto the runway.

The DC-4 completed 13 flights that season from Punta Arenas to Antarctica, radically changing the logistics of Antarctic travel. It had clearly demonstrated that men and equipment could be moved deep into the Antarctic directly from other continents, in less time and at a fraction of the cost of earlier journeys. Major research stations could be established and the delivery of heavy equipment became a possibility. Evacuation in case of medical emergencies was now far less complicated. ANI and its successor company Antarctic Logistics & Expeditions (ALE) set up a permanent camp next to the blue ice runway in the Patriot Hills, and would be instrumental in supporting most record-breaking expeditions in the Antarctic over the next 30 years.



## “The DC-4 touched down short of the runway, into snow a foot deep”

Learning from Kershaw, most countries with substantial interests in the Antarctic — the USA, Russia, Australia, Italy and Norway — developed their own blue ice runways there, to accommodate ever-larger aeroplanes. ANI used the same DC-4, now re-registered as C-FIQM, for the 1988-89 season before switching to DC-6s provided by Kenn Borek and Allcair Air Transport and then, from 1993-94, L-382G Hercules of Safair. ALE switched to employing an Ilyushin Il-76TD. The US Air Force would use C-130s and Boeing C-17 Globemaster IIIs, and Air New Zealand flew Boeing 767-300s. Giles had begun flying in an Antarctic

that was the preserve of small ski-equipped bush-planes, but left it capable of handling the largest wheeled aircraft.

Among the other participants, ANI co-founder Pat Morrow continues with mountaineering and photography of little-known worlds. He was made a Member of the Order of Canada. Martyn Williams goes on various expeditions and is a valued inspirational speaker. ANI was run by Giles's wife Anne Kershaw for a while, before she sold it to ALE. Anne was awarded an MBE for her contributions. The flying arm of ANI in time became Antarctic Airways, the continent's first commercial carrier. Charles Swithinbank carried on exploring, teaching and writing about his studies and experiences in the polar regions. He was given an MBE for his work on glaciology, and protocols instituted by him for the protection of the Antarctic environment still hold sway.

Giles Kershaw was awarded the British Polar Medal, and the Sword of Honour of the Guild of Air Pilots and Navigators. He died in a flying accident, while testing an experimental gyrocopter over the Jones Sound in the Antarctic, on 5 March 1990. His team-mate Skip Novak remembers the poignant moments as they gathered Giles's remains in a home-made coffin.

Choosing a promontory at the base of a mountain, they wrestled the coffin over snow and ice to the site. They laid Giles to rest, and raised a cairn of stones over him. The mountain now bears his name, Mount Kershaw, and his burial place is marked by a natural rock formation that soars overhead in the shape of a cross, almost as if by design. In acknowledgement of his contributions to polar exploration and Antarctic aviation, numerous other places have been named in his honour. Besides Mount Kershaw, there are the Kershaw Ice Rumples, a large swathe of glacial faults in the Antarctic, and the Qaqqaq Kershaw Mountains in Greenland.

Having been born in the sunlit hills of Kerala in India, Giles Kershaw now rests in the incomparable peace and quiet of the Antarctic, as though claimed as one of its own. A steel placard marks the location, describing him as the “guardian of the solitude”. What an epitaph.

