

OBSERVATIONS ON CROSSING ANTARCTICA

Introduction

There have been several, recent and exaggerated, claims to have traversed, or made crossings, of the Antarctic continent. Many such assertions demonstrate a lack of a historical and geographical basis compared with the explorations that they often purport to emulate. The following observations attempt to clarify the circumstances to allow identification and assessment of various partial or incomplete crossings.

History

All early approaches to Antarctica, and exploration of its interior, were made by expeditions arriving aboard ships. A party of four men from Carsten Borchgrevink's *Southern Cross* expedition reached 78·83°S, in February 1900, from near the Bay of Whales on the edge of the Ross Ice Shelf. Robert Scott, from *Discovery* at Ross Island, led a sledge party to 82·28°S in January 1902, and Ernest Shackleton, from a station established by *Nimrod* on Ross Island, sledged to 88·38°S in January 1909. In 1911 Roald Amundsen led a five-man dog-sledge expedition from 'Framheim', established from *Fram*, to 90°S, the South Pole, on 14 December. Only five weeks later, Scott with four others also reached the South Pole, but all perished during the return journey. These early explorations of the interior of Antarctica did not intend a crossing, but all began from the shores. From the beginning, with very few exceptions, Antarctic stations were coastal, subsequent use of aircraft for exploration was shore based. A few expeditions have re-enacted those of Amundsen and Scott (others going only one-way); but are not considered here as they are not crossing Antarctica.

The earliest proposal to traverse the continent was by William Bruce in 1908 but it did not eventuate. In 1911-12, Wilhelm Filchner, leader of the *Deutschland* South Polar Expedition, planned to cross Antarctica from the Weddell Sea, circumventing the South Pole to reach unexplored territory, then to finish at the Ross Sea. An attempt to build a base on the Filchner Ice Shelf was abandoned when it was found to be on a calving iceberg. *Deutschland* became beset in the Weddell Sea and drifted for nine months before escaping from the ice and returning to Germany. In 1914-16, Sir Ernest Shackleton, leader of the Imperial Trans-Antarctic Expedition aboard *Endurance*, planned to cross Antarctica from the Weddell Sea, via the South Pole to the Ross Sea. The Ross Sea Party of the expedition, aboard *Aurora*, laid depots from McMurdo Sound towards the South Pole for Shackleton's crossing party. Shackleton's ship became beset before reaching the coast, drifted in the Weddell Sea pack ice, was eventually crushed and sank. *Aurora* also became beset and adrift. All twenty-eight men of *Endurance* were rescued in 1916 and the seven survivors of the Ross Sea party in 1917. The Ross Sea and Weddell Sea have the most southern maritime coasts of Antarctica and thus the shortest continental crossing.

Earliest crossing

The first successful continental crossing started in 1955 and was completed in 1958. Dr Vivian Fuchs, leader of the Commonwealth Trans-Antarctic Expedition, crossed from the Shackleton base, Filchner Ice Shelf, on the Weddell Sea, where he landed from *Magga Dan*, via the South Pole, to Scott Base, Ross Island, on the Ross Sea. This crossing, completed in 99 days, was made using Tucker Sno-Cats. After leaving the South Pole, it used depots laid by Sir Edmund Hillary's New Zealand support party from Ross Island. This was transported aboard HMNZS *Endeavour* which took the entire expedition to New Zealand at its conclusion. The expedition achieved what the earlier expeditions of Filchner and Shackleton

had proposed, but failed, to accomplish. During the crossing a comprehensive scientific and surveying programme was conducted.

These expeditions were to cross Antarctica from sea to sea via, or around, the South Pole, regarding the ice front of the Filchner Ice Shelf of the Weddell Sea as the starting point and the terminus of the Ross Ice Shelf, or Ross Island, as the finish. Thus these traverses set the original definition for 'crossing Antarctica'. In essence the start and conclusion were at maritime coasts, that is places with an open ocean, although this may well have some floating pack-ice which a ship can penetrate during summer. These predecessors set the style for successors.

Complete crossings

The few complete, ocean to ocean, traverses include the following. In 1980-81, the Antarctic part of the Trans-Globe Expedition, led by Sir Ranulph Fiennes (Britain) aboard *Benjamin Bowring*, started from a coastal point near the South African SANAE III station on Fimbulisen in Dronning Maud Land and continued, via the South Pole, to Ross Island where they departed aboard the same vessel. This expedition also adhered to the principle of crossing from sea to sea via the South Pole. Similarly the International Trans-Antarctica Expedition (1989–90) led by Will Steger (United States) and Jean-Louis Etienne (France) used dog teams to cross Antarctica. They started from Seal Nunataks, on the Weddell Sea shore of the northern Antarctic Peninsula, arriving there aboard a Twin-Otter aircraft. They sledged south along the Antarctic Peninsula to the South Geographic Pole, turned towards the Pole of Inaccessibility then continued north to the Russian Station at Mirnyy on the shore of the Davis Sea from where they departed aboard *Professor Zubov*. This expedition chose the longest route across Antarctica, via the South Pole, while still adhering to the principle of crossing from sea to sea. The 1990-91 expedition, led by Sjur Mørdre (Norway), used aircraft to reach the northern coast of Berkner Island, a sub-glacial feature, and crossed to Ross Island via the South Pole. In 1996-97 Børge Ousland (Norway) made a solo crossing, also from the coastal part of Berkner Island, to the South Pole and on to McMurdo Sound. In 2005-06 Rune Gjeldnes (Norway) traversed from near Novolazarevskaya to the South Pole then on to Terra Nova Bay on the Ross Sea. In 2016-17 Mike Horn (South Africa) traversed solo from the Fimbulisen coast to the South Pole and on to the Adélie Coast. Several of these expeditions made contributions to research, mainly involving human physiology.

These examples are of the expeditions that can rightly claim to have completed a 'crossing of Antarctica'. Other expeditions, with starting points and finishing points distant from the coastal edges of the frozen continent, might be considered as exceptional feats of human endurance and achievement but fail to qualify as 'crossings of Antarctica' under the original definition of such traverses. Such partial, or incomplete, crossings have become too numerous to record.

Frozen continent

The continent, Antarctica, is permanently covered by the larger of the Earth's ice sheets. Recent survey shows this occupies 99.68% of the surface area. The ice is subject to deformation, as is any solid mineral, with a relatively fast speed of movement (at the South Pole the ice surface moves about 10 m annually). The ice is of terrestrial origin formed by consolidation of snow. It is confluent over the two sub-continent of Antarctica and the ice shelves formed as it flows onto several circumferal seas. The weight of this ice depresses the bedrock beneath it. The greatest ice thickness measured is 4776 m. In many places the base of the ice-sheet is below sea level reaching a maximum depth of 2870 m in Victoria Land. Throughout most of the polar regions permanent ice can only be regarded as a solid mineral – the substrate on ice caps and ice sheets.

The several peripheral ice-shelves, extending from the ice-sheet, form some 46% of the coast. Although from about 300 to 600 m thick where they originate to often 200 m thick

near their termini, they are afloat extending several hundred kilometres over the coastal seas. This glacial ice is in contrast to the pack-ice and other features which are formed by the freezing of saline Southern Ocean water. Ice shelves have ages of many millennia; pack-ice is rarely more than 4 years old. They are in dynamic equilibrium such that the largest appear in approximately the same position on the earliest charts as on modern ones. A variable hinge-zone, generally crevassed, is usually apparent where tidal influences begin. The equilibrium is disrupted by periodic calvings when massive tabular icebergs are detached, the largest of which may be 50 km wide. It may then be many years before the ineluctable flow has advanced the northern position of the ice-cliff to its previous position. Slow variations in the average limit of ice shelves, and entire breakout of some smaller ones, correspond to changes in the Earth's thermodynamics generally.

The grounding, or hydrostatic, line where the terrestrial ice begins to be afloat on sea water is distinct from the 'sea-level' elevation; it extends much farther north. It is determined by geophysical instruments using radar or radio-echo soundings. At its maximum some 1800 m of glacial ice are afloat where the Rutford Ice Stream joins the Ronne Ice Shelf. The proportion of Antarctica where bedrock is depressed below sea level by the weight of ice is 44.7% of its area. The coastal limit of an ice shelf is an ice wall or ice cliff. In historical literature that in the Ross Sea was termed the *Great Ice Barrier*. Indeed, the Antarctic Treaty is unequivocal about the continental limits. Article VI states 'The provisions of the present Treaty shall apply to the area south of 60° South Latitude, including all ice shelves'.

Contentions

A proportion of claimed Antarctic crossings begin, and usually finish, from points far away from the maritime coast, thus greatly reducing their distances. Some of these have decided to regard the hydrostatic line as a boundary. This vastly shortens and simplifies the journey but has no claim to being a historically comparable traverse. Starting and ending points selected by adventurers are various including: Hercules Inlet, base of Leverett Glacier or others in the vicinity, southern (inland) part of Berkner Island or elsewhere on the southern extent of the Filchner-Ronne Ice Shelf or Ross Ice Shelf, Blue 1 runway, Patriot Hills, Union Glacier, and similar interior locations far distant from any maritime coast.

SPOT route

From 2005 the United States Antarctic Program has maintained a graded way between Amundsen-Scott, their South Pole station, and McMurdo station on Ross Island. This South Pole Overland Traverse is 1600 km long and flagged about every 400 m. It provides a very effective way to supply the new Amundsen-Scott station (vastly more fuel-efficient than the previous use of aircraft). Most vehicular traffic is early in the summer but sledge trains follow the path in both directions throughout the season. Several recent traverses have gained assistance from this artificial graded construction as it by far the easiest, and safest, route to or from the South Pole. However few adventurers have used it in entirety to reach McMurdo Sound as most begin or end far inland from any coast and fail to cross the Ross Ice Shelf. A few, quite rudimentary, routes are established elsewhere in Antarctica including the annual Vostok traverse.

Discussion

These contentious assertions substantially curtailing an Antarctic crossing ('moving the goalposts') have caused a degree of controversy and correspondence. These extend beyond geography to dispute: unsupported, unassisted, solo, and similar definitions. Presence of supporting or escorting vehicles, film groups recording traverses, air dropped and landed supplies, rescue and return of adventurers, use of wind power, travel along the graded route, guides and similar assistance, electronic communications, and many similar factors become involved in argument and definition. Assertions of distinctions of nationality, sex, physical condition, age, and similar characteristics are becoming increasingly common.

Commercially operated flights have been practicable in Antarctica from 1987 allowing deployment and collection of personnel and supplies from large areas of the continent. Such charters are, however, necessarily expensive and constrained by time. This has encouraged abbreviated crossings and their consequent proliferation. It is noticeable how rarely the actual locations of the beginnings and ends of many crossings are specified by participants, especially those starting or ending far from any coast. Similarly maps showing actual journeys made are not always available. Exploration is essentially geographical research, these feats and some stunts are better described as adventuring, or varieties of extreme sports. Sports have their principles and standards – but with partial Antarctic crossings these are deteriorating and exaggerated claims are being asserted with increasing frequency. The question about whether an expedition, or its assertions, or both, are fully substantiated is apparently asked too rarely and often uncritically accepted by news and other publicisers of claims. Complication may arise when efforts by adventurers are made to support campaigns, raise funds for charitable or other causes, endorse or advertise commercial products or services, self-promotion, or for various other applications; but this should not compromise the authenticity of their exploits. Contributions to scientific research are rarely forthcoming.

Sources

This note is based on an item written by Damien Gildea for ‘Explorers Web’ *How the Confusion Began and Where Do We Go From Here*, which includes several maps showing full and a selection of abbreviated crossings. Peter Clarkson <pd3@cam.ac.uk> and Robert Headland <rkh10@cam.ac.uk>, with help from several colleagues, added the historical, geographical, and other information.

Information: Gildea, D. 2017 <<https://explorersweb.com/2019/01/09/crossing-antarctica-how-the-confusion-began-and-where-do-we-go-from-here>>. Fuchs, V. E. & Hillary, E. 1958. *The Crossing of Antarctica*. London: Cassel. British Antarctic Survey 2016 *Map the Antarctic* (1 : 10 000 000). British Antarctic Survey Map1 2013 *Bedrock topography of Antarctica*.

Prepared 25 II 2019, Scott Polar Research Institute, Cambridge