Exploration, Exploitation and Explanation: Some Historical Relations in Antarctica. by James Gardner



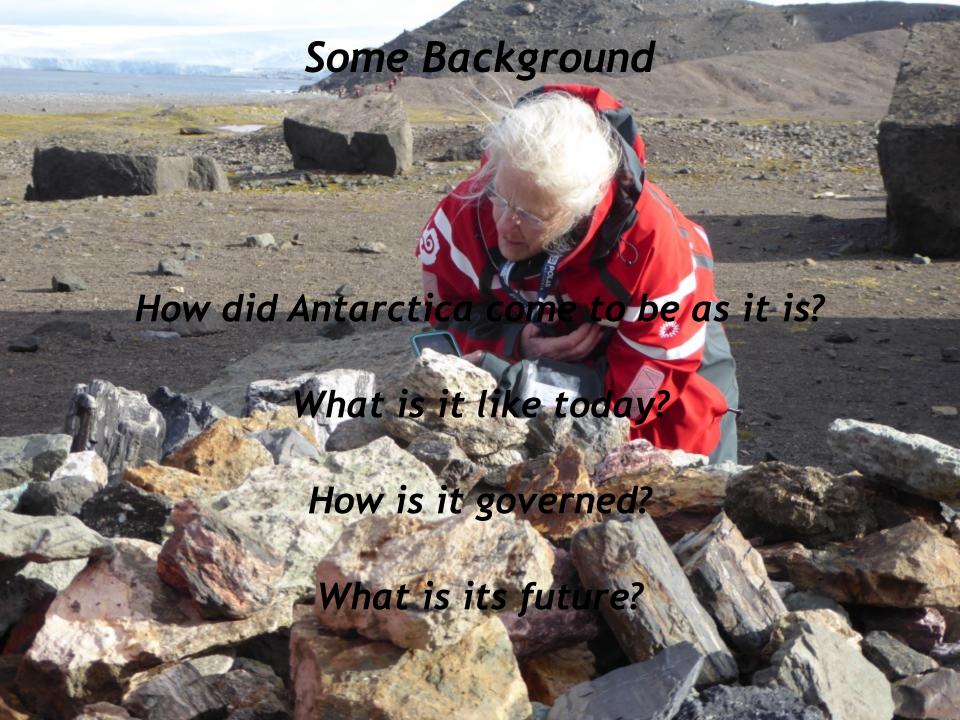
Outline

Proposition: Antarctica has become known to us through interactions within and among Exploration (mapping), Explanation (science) and Exploitation (use and consumption of extant resources).

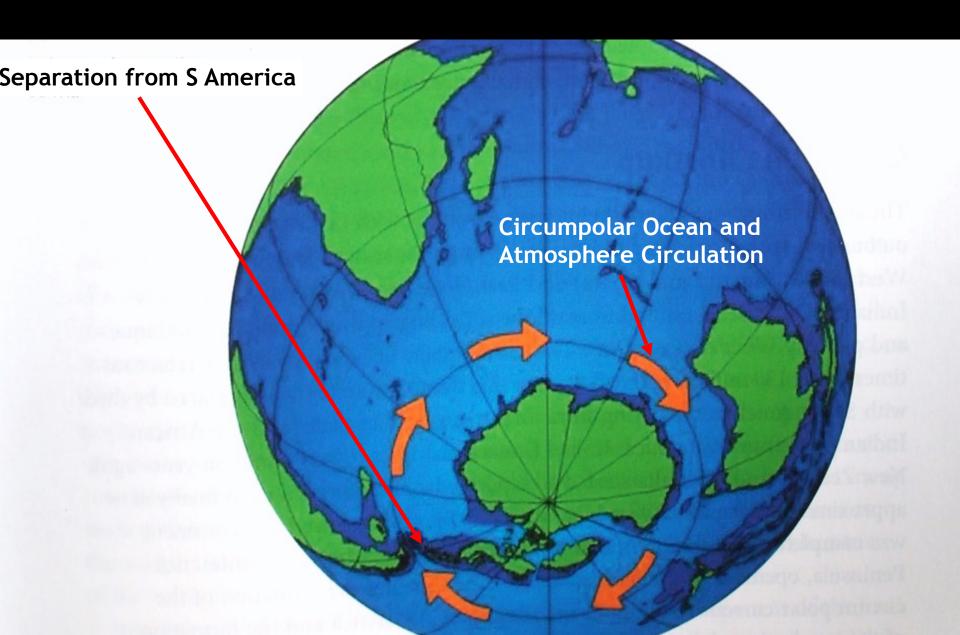
Evidence: Revealed through the historical record of travel to and within the region over the past 250 years, a process that continues today and points to a future.

Focus: Primarily the Antarctic Peninsula and adjacent Southern Ocean and Sub-Antarctic Islands and with some reference to continental Antarctica.

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Geographic Isolation 35m years ago

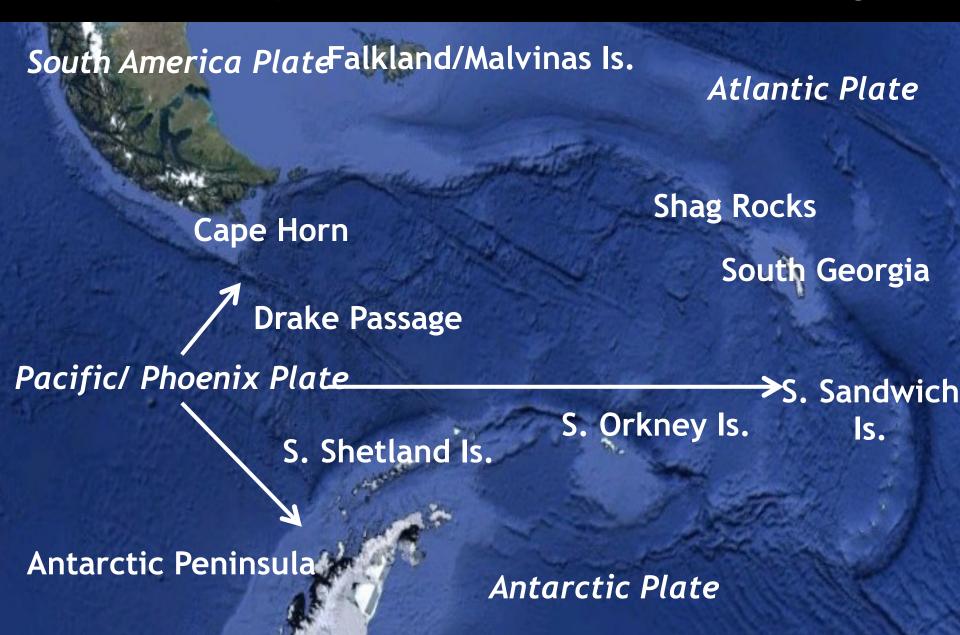


How do we know that Antarctica has changed position and may not have looked like it does now?





Scotia Sea, Scotia Arc and Drake Passage



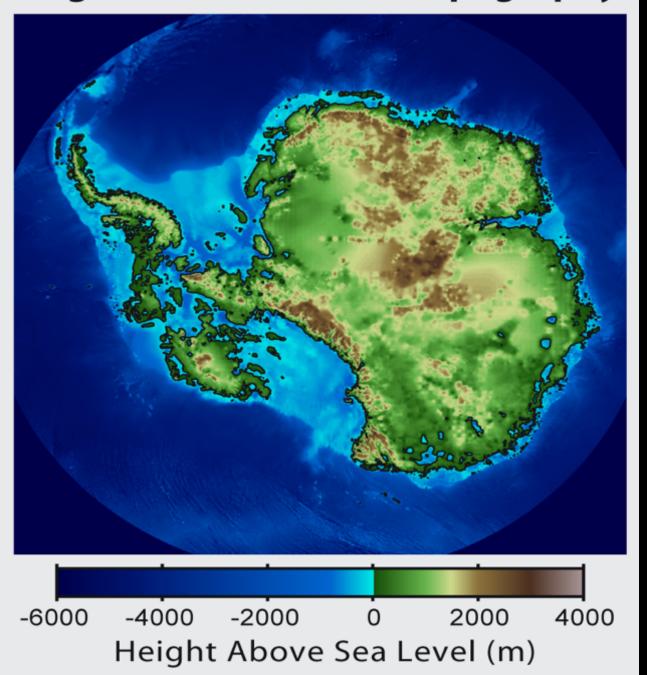
Some Basic Facts Today

- Considered to be the 7th continent on the "bucket list"!
- Covers approx. 14 million km² + winter sea ice more or less doubles the size - but this changing.
- Highest continent with average elevation of 2500m, south pole is at 2835m, Mt. Vinson is highest point at 4892m (also on "bucket list"), lowest point is Bentley Subglacial Trench at -2555m.
- Glacier ice and snow cover 98% of Antarctica, has average thickness 1800m, contains 30 million km³ of ice which constitutes roughly 62% of all the freshwater on Earth.
- Under all this is Antarctica a single landmass or an archipelago?

East Antarctic Icecap

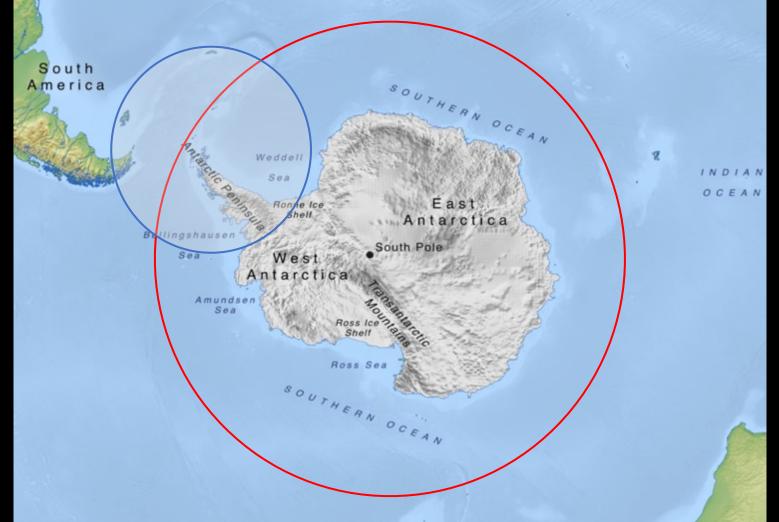
Source: Gov't. of Australia

Deglaciated Antarctic Topography



Africa

Today it is governed through the Antarctic Treaty System

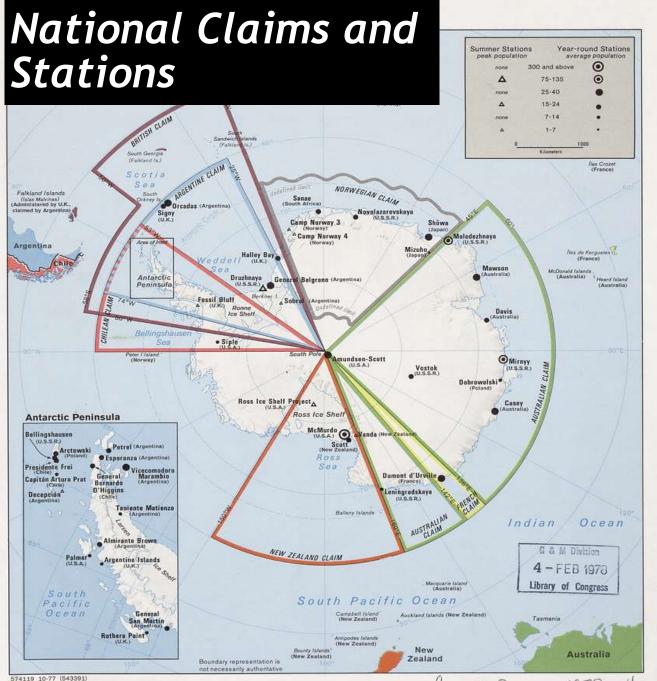


PACIFIC OCEAN

Australia

The Antarctic Treaty System (ATS)

- Composed of the Treaty itself plus numerous protocols, conventions and other attachments for regulation of all activity in the region.
- It sets aside the area south of 60 deg S as a scientific preserve with freedom of investigation within limits and an area devoted to peace.
- The 12 countries most involved in Antarctic research during IGY 1957-58 negotiated the Treaty among themselves and signed it in 1959. It came into force in 1961.
- Today there 54 countries party to the Treaty of which 29 have "consultative" (voting) status.
- The ATS Secretariate presently is in Buenos Aires.
- As part of the agreement, the 7 countries with national claims in the region set those claims aside.



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1977 , US

Some Key Expeditions To 1941

- 1772-75 James Cook British Naval Expedition Resolution
- 1822-24 James Weddell British Sealing Expedition Jane
- 1838-42 Charles Wilkes United States Exploring Expedition Vincennes
- 1839-43 James Clark Ross British Naval Expedition *Erebus* and *Terror*
- 1872-76 C.W. Thompson British Naval Voyage Challenger
- 1892-93 Carl A. Larsen Norwegian Sealing and Whaling Expedition Jason
- 1901-04 Robert F. Scott British National Antarctic Expedition *Discovery*
- 1901-04 Otto Nordenskjöld Swedish South Polar Expedition Antarctica
- 1902-04 William S. Bruce Scottish National Antarctic Expedition Scotia
- 1907-09 Ernest Shackleton British Antarctic Expedition Nimrod
- 1910-13 Robert F. Scott British Antarctic Expedition Terra Nova
- 1914-16 Ernest Shackleton British Imperial Trans-Antarctic Exped. Endurance
- 1928-30 Robert E. Byrd United States Antarctic Expedition City of New York
- 1939-41 Robert E. Byrd United States Services Expedition North Star

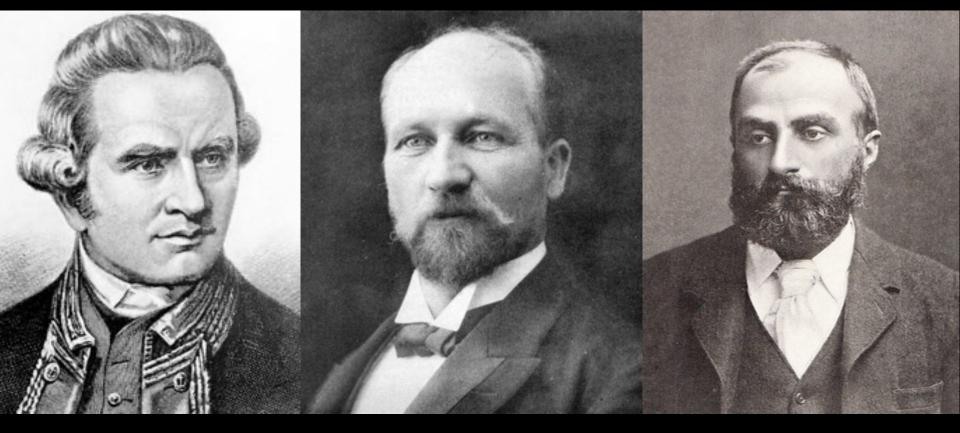
After 1941?

- Operation Tabarin 1944-46.
- Falkland Islands Dependencies Survey 1947-62.
- International Geophysical Year 1957-58.
 - The Antarctic Treaty 1959 + 1961.
- British Antarctic Survey 1962-present plus many other national programs (e.g. USA, USSR/ Russia, Argentina, Chile, Australia, New Zealand, Spain...
 - Ms Lindblad Explorer sails 1969.
 - Montreal Protocol 1987.
 - Antarctic Environmental Protocol 1991.

Shortcuts to Antarctic History (With emphasis on Antarctic Peninsula)

- Boothe, Joan N. 2011. <u>The Storied Ice: Exploration, Discovery and Adventure in Antarctica's Peninsula Region.</u> Berkeley, CA, Regent Press. probably the best complete history covering the Antarctic Peninsula and surroundings.
- Harrison, John. 2012. Forgotten Footprints: Lost Stories in the Discovery of Antarctica this is a first-rate compendium of historical ventures into the Antarctic for exploratory, scientific and commercial purposes with a focus on the South Shetland Islands and Antarctic Peninsula region.
- Walton, David W. (Ed.) 2013. <u>Antarctica: Global Science From a Frozen Continent</u>. London, Cambridge University Press an excellent contemporary and historical source on science in the Antarctic, composed of individual chapters written by experts from the various subject fields.

Exploration, Exploitation and Explanation



Capt. James COOK

Capt. Carl LARSON

Prof. William BRUCE

Exploration, Exploitation, Explanation



Sir Vivian Fuchs

Lars Eric Lindblad

Prof Susan Solomon







Exploration: Capt. Cook arrives in South Georgia 1775



POSSESSION BAY IN THE ISLAND OF SOUTH GEORGIA .

London, Publifield on the Act directs July 16.1776 .

Fortuna Bay and König Glacier Today







The Sealers - 1820s

Focus on maximum harvest of fur and oil.

S. Shetlands, S.Orkneys, S. Georgia.

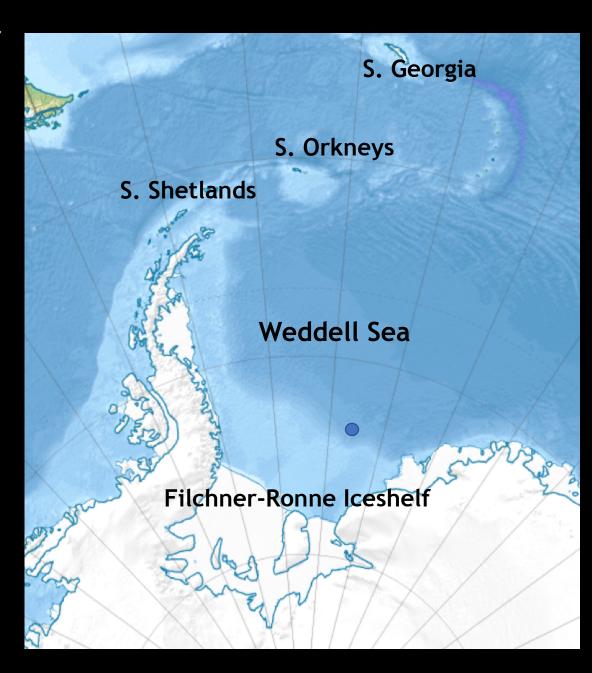
Some exploration for source areas.

Not much sharing of findings.

New knowledge emerged nonetheless.

Weddell navigation of the Weddell Sea 1823.

Area sealed out by 1826 or so.



National Exploring Expeditions - 1820s-40s

Characterized by expansion of national interest, mapping new territory, collecting data and samples, scientific description and attempts at explanation, etc.

- 1. J.S. Dumont d'Urville 1826-29 French Naval Expedition *Astrolabe*.
- 2. Charles Wilkes 1838-42 US Exploring Expedition. *Vincennes*. James Dana, Smithsonian Institution.
- 3. James Clark Ross 1839-43 British Naval Expedition, Erebus and Terror. Joseph D. Hooker.

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Science Piggybacks on Harvesters

William Speirs Bruce, Scottish naturalist and oceanographer, accompanied the Dundee Whaling Expedition to the Southern Ocean in 1892-93. Later, 1902-04, he led the Scottish National Antarctic Expedition that produced our basic knowledge of the Scotia Sea and established what has become the longest standing weather station in Antarctica and Southern Ocean, now Argentina's Occadas Base on Laurie Island, South Orkneys.

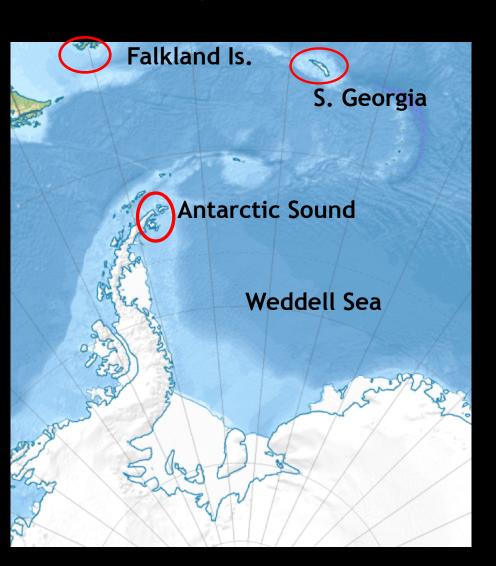
Robert Cushman Murphy, accompanied the Whaling Paris, Daisy to South Georgia in 1912 3 Where he completed the first of it ological inventory in the bay of blue and chronicle has time there in Feedbook for one at the formula Birds of South America that tollowed was a later whaling the classic linthe left







Prospecting and Collecting





José Maria Sobral

The expedition had engaged assistance from Argentina conditional on the inclusion of Sobral, a Navy Sub-Lieutenant. Sobral went on to obtain a PhD in Geology from U. of Uppsala, serve as the father of the **Argentinian Antarctic** Program for decades, and serve as Argentina's **Ambassador to Sweden** for a term. A "supernumerary" makes good!



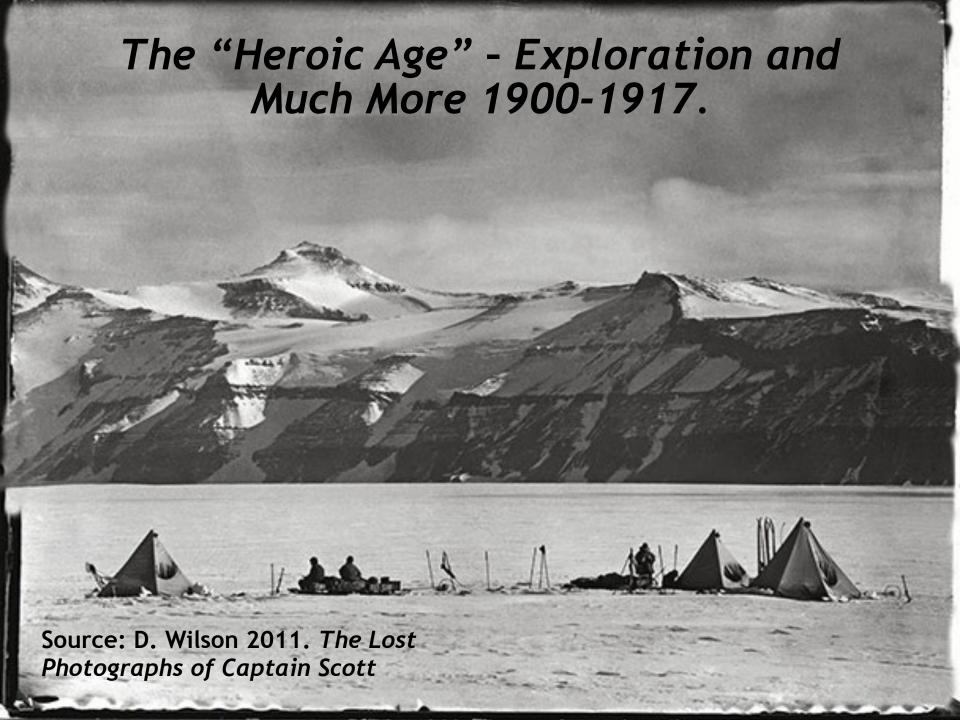




Grave of Sir Ernest Shackleton

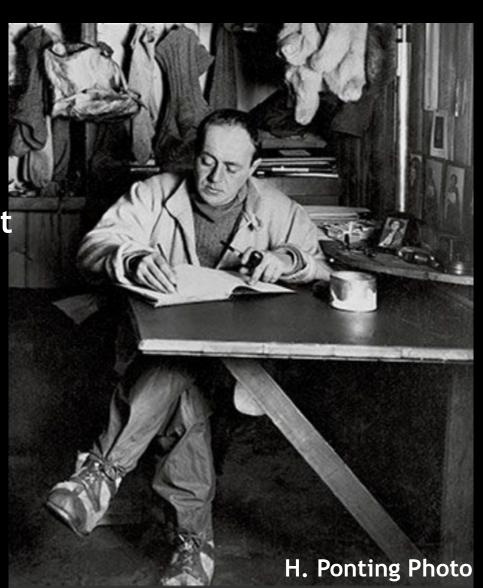
Shackleton passed away at Grytviken in January 1922 due to a heart ailment. This was during his 4th expedition to Antarctica. He was an accomplished leader and explorer. Though not a scientist, he supported scientific work on all his expeditions. He is most remembered for the Endurance expedition of 1914-17. He was one of the leading actors during the "Heroic Age" of Antarctic exploration.





The British Antarctic "Terra Nova" Expedition 1910-13

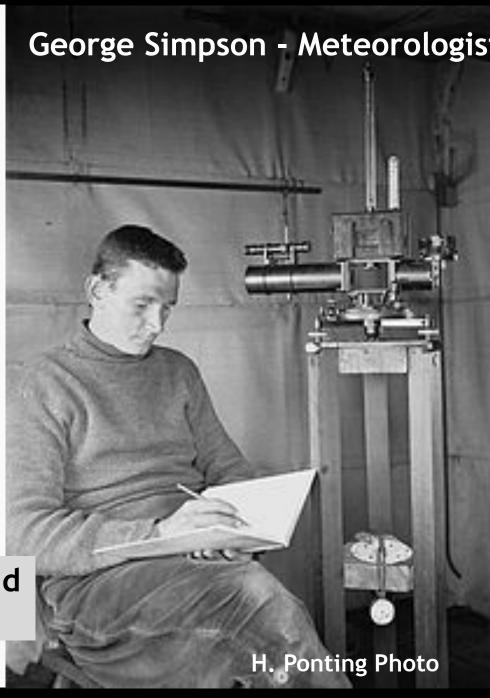
Capt. Robert Falcon Scott





Dr. Edward Wilson - Biologist and Scientific Director

H. Ponting Photo





And Others

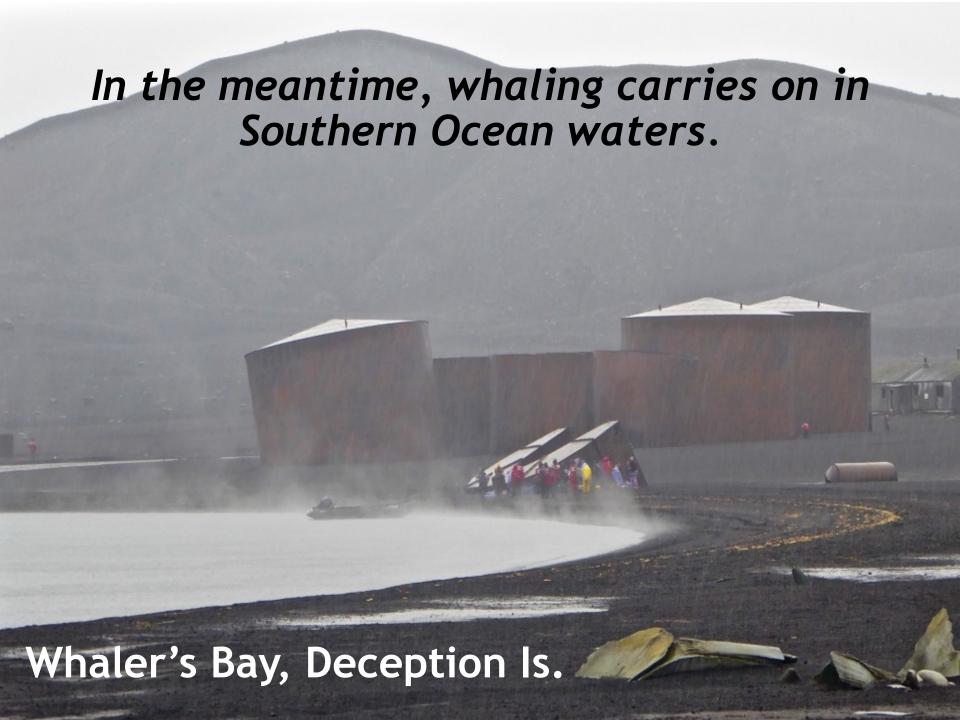
- Griffith Taylor Chief Geologist
- Frank Debenham Geologist
- Raymond Priestly Geologist
- Edward Nelson Biologist
- Dennis Lillie Biologist
- Apsley Cherry-Garrard -Zoological Assistant

Accomplishments

- South Pole January 17, 1912 completing the Beardmore Glacier route, gathering detailed met data, geological samples, glaciological observations, photographic record along the way
- Northern Party meteorological, geological, biological studies and collections in Cape Adare region, Victoria Land, 1911-12.
- Discovery of McMurdo Dry Valleys, geological glaciological, biological data collection and mapping in area west of McMurdo Sound, March 1911, November 1911-March 1912.
- Establishment of Cape Evans Base, McMurdo Sound January 1911-January 1913, most complete meteorological record, including upper air data, of early 20th Century in Antarctica, an important base line in climate change studies.
- Expedition to Cape Crozier June 1911 and collection of Emperor Penguin eggs, "The Worst Journey in the World", testing the Recapitulation Hypothesis (Ontology recapitulates Phylogeny).
- Met work of Simpson, in concert with that of Gilbert Walker in Simla, India illustrated the connectivity of global atmospheric systems.
 - An unmatched legacy in expertise.

Prof Solomon and "The Coldest March"
S. Solomon. 2001. The Coldest March: Scott's Fatal Antarctic
Expedition. New Haven, Yale University Press.





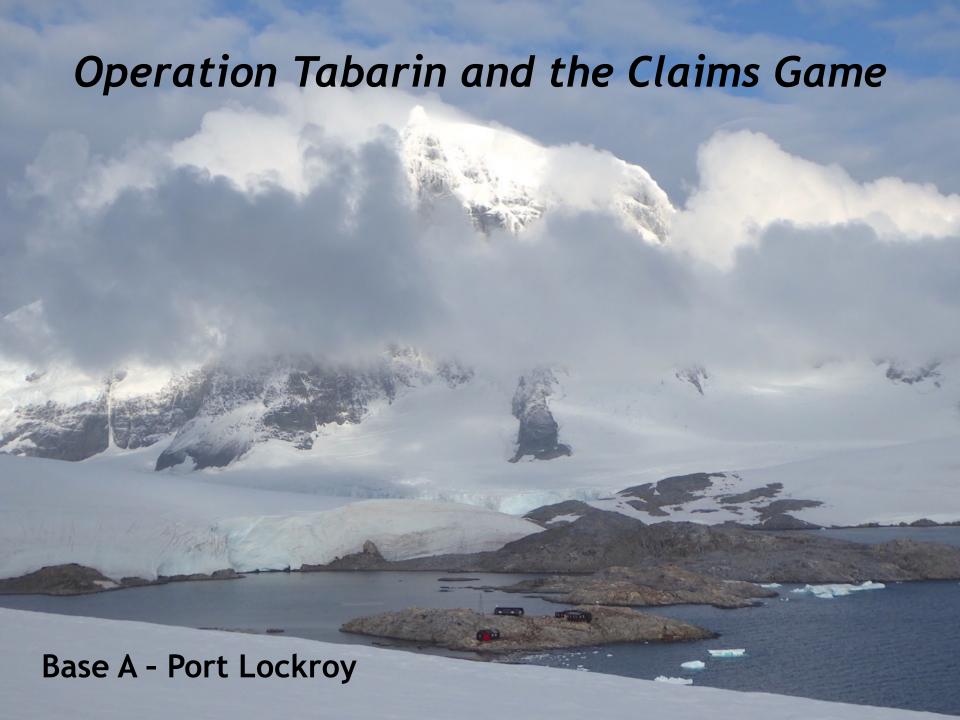


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Minerals and the 1991 Environmental Protocol

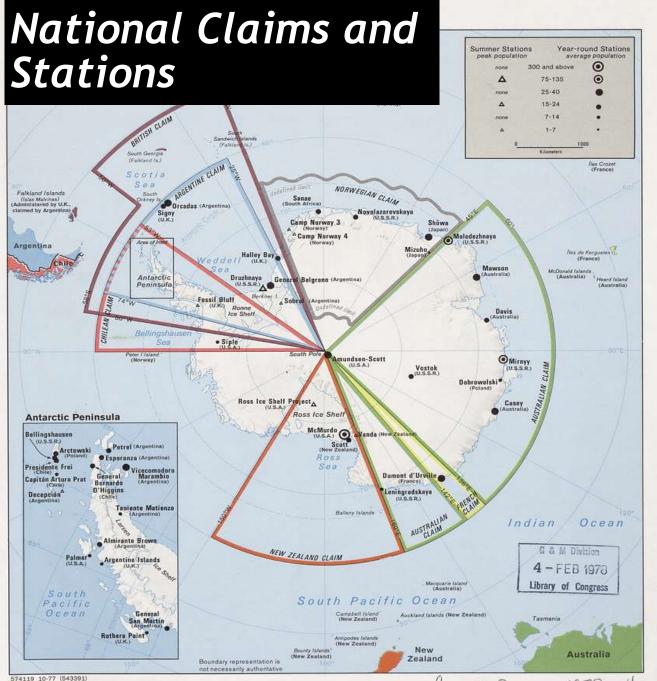




Port Lockroy Today - Bransfield House restored and operated by UK Antarctic Heritage Trust as a museum, post office and souvenir store.



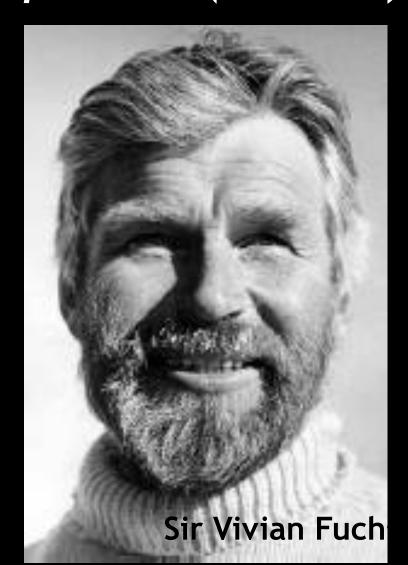




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International Geophysical Year 1957-58 The Commonwealth Trans-Antarctic Expedition (1956-58)



The Antarctic Treaty
Signed 1959 and came into force 1961 and has been strengthened through time with addition of conventions and protocols to create the The Antarctic Treaty System

Lindblad Explorer Sails - 1969 A New Form of Exploitation - Adventure Tourism?







Recorded Seaborne Tourism

Does Not Include S. Georgia and Falkland Is. (2019-20 estimated based on pre-season bookings)

Source: IAATO

Year	Operators	Ships and Yachts	Voyages	Passenger Landings	Cruise Only Passengers
1992-93	10	12	59	6,704	
1997-98	12	13	92	9,473	
2002-03	26	47	136	13,263	2,424
2007-08	48	55	308	32,637	13,015
2012-13	39	45	258	24,892	9,070
2018-19 2019-20*	44 46	56 63	360 432	44,600 59,367	10,889 18,420

Nationality	%	Deep Field	Persons
United States	35	Program	
	15	Emperor Penguin Colony	142
China	15	Camping, skiing,	44
Australia	12	mountaineering, sky diving, cycling, etc	
United Kingdom	8	Deep Field Flights	17
Germany	6	South Pole Fly-in	172
Canada	5	South Pole Ski Expedition	14
France	4	South Pole Motorized Exped.	22
Switzerland	2	Last 1-2 Degree Expedition	43
Other	16	Antarctic Crossing	3
Source: IAATO 2018-19 Season		Vinson Massif	148
		Marathon	110

What is IAATO?

- International Association of Antarctic Tour Operators.
- A member organization founded in 1991 to advocate and promote the practice of safe and environmentally responsible private-sector travel to the Antarctic.
- At present 100 or more operators are members.
- Establishes and manages procedures, guidelines and some regulations for such things as: landing sites, activities, numbers of visitors ashore, staff to visitor ratios, expedition staff qualifications, wildlife watching, biosecurity etc.
- All of which operates within the framework of the Antarctic Treaty System, regulations of the Govt. of South Georgia and South Sandwich Islands, and relevant international marine safety and operational regulations.

Exploration, Exploitation, Explanation in the Context of the Adventure Cruise Industry

- Exploitation: very definitely using a unique biogeophysical region for commercial gain.
- Explanation: heavy reliance on education shipboard and ashore, experiencing and contributing to research (e.g. citizen science arograms whale safari cruises with researchers).
- some segments of the ocean basins are "KNOWN", exploration as known in the 18th, 19th and early 20th centuries is no longer possible. Perhaps the concept has new meaning?







