

Science and Human Society

Case study: Antarctic research expedition

1. Outline of Antarctica
2. For the south pole (1911~12)
3. Japanese Antarctic Research Expedition (1956~)

At middle 19th century, Antarctic Continent was viewed by human.

Amundsen reached South pole on December 14, 1911.

Ozone hole was found by the Antarctic Expedition.

Outline Antarctica

- Antarctica continent is around 12,300,000 km² in area.
- Antarctica is divided into East Antarctica and West Antarctica by Trans Antarctic Mountains.

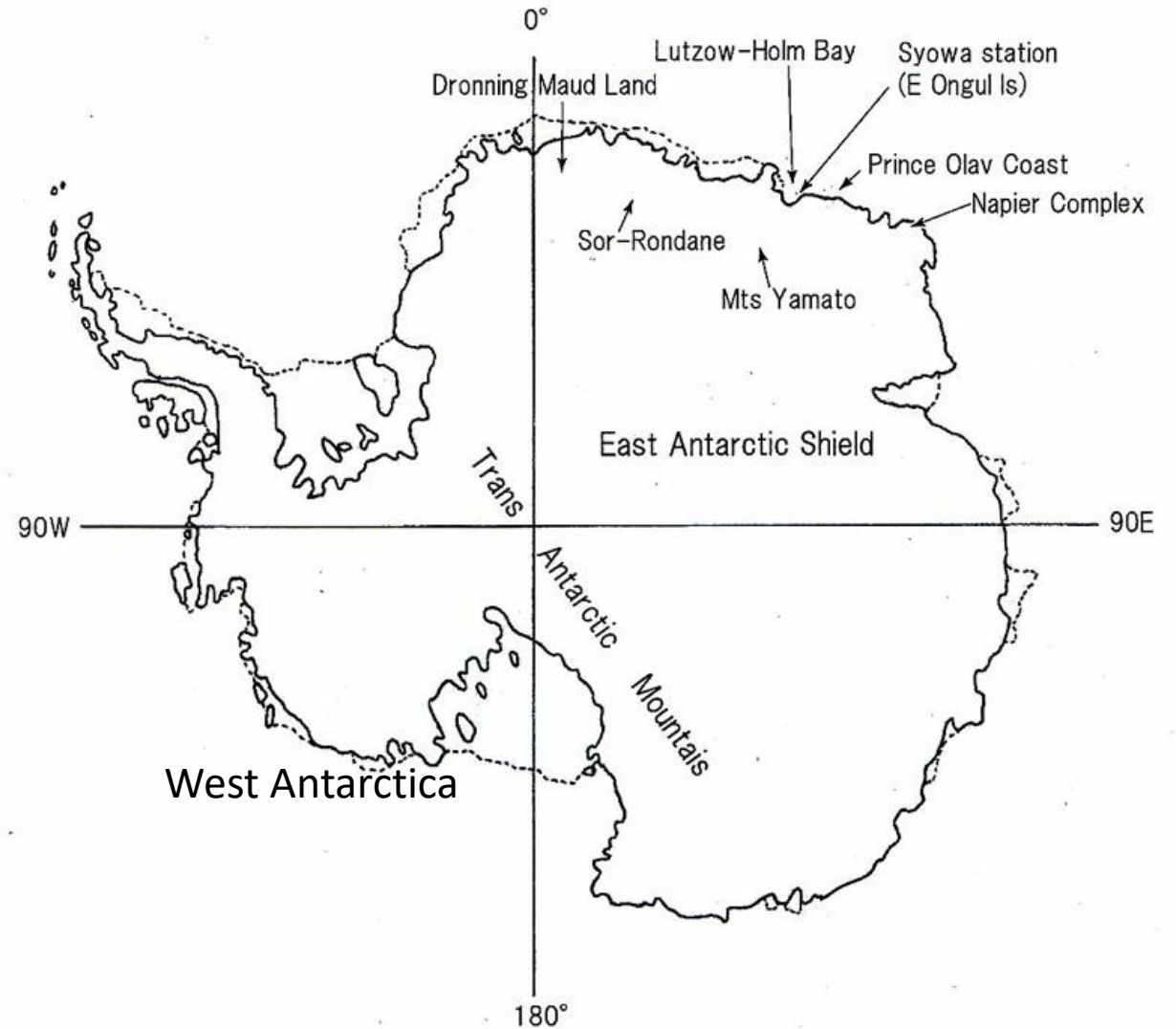


Fig.1-1. Antarctic Continent (Antarctica).

Towards South pole (1911 ~ 12)

Amundsen; He (His party) reached South pole on December 14, 1911, and came back to the base safely.

Scott; He (His party) reached South pole on January 17, 1912, but died due to the cold and starvation on the way to the base.

Shirase; He (His party) reached the location with $80^{\circ} 5' S$ and $156^{\circ} 37' W$ on January 28, 1912, and returned.

Amundsen Party

Food deposit: S82°

How to travel: Dog sledge and Ski

Record: Departure on Oct 19, Dec 14–17 on South pole, Return on Jan 25.



Scott party

Food deposit: North of Amundsen's deposit,

How to travel: Horse sledge, Dog sledge, by foot and Motor sledge

Record: Departure on Nov 1, No horse and dog, only by foot from Dec 11, South pole on Jan 17, On the way all member died.



Comparison of two parties

Deposit: Food deposit of Amundsen party was prepared at more south than it of Scott party.

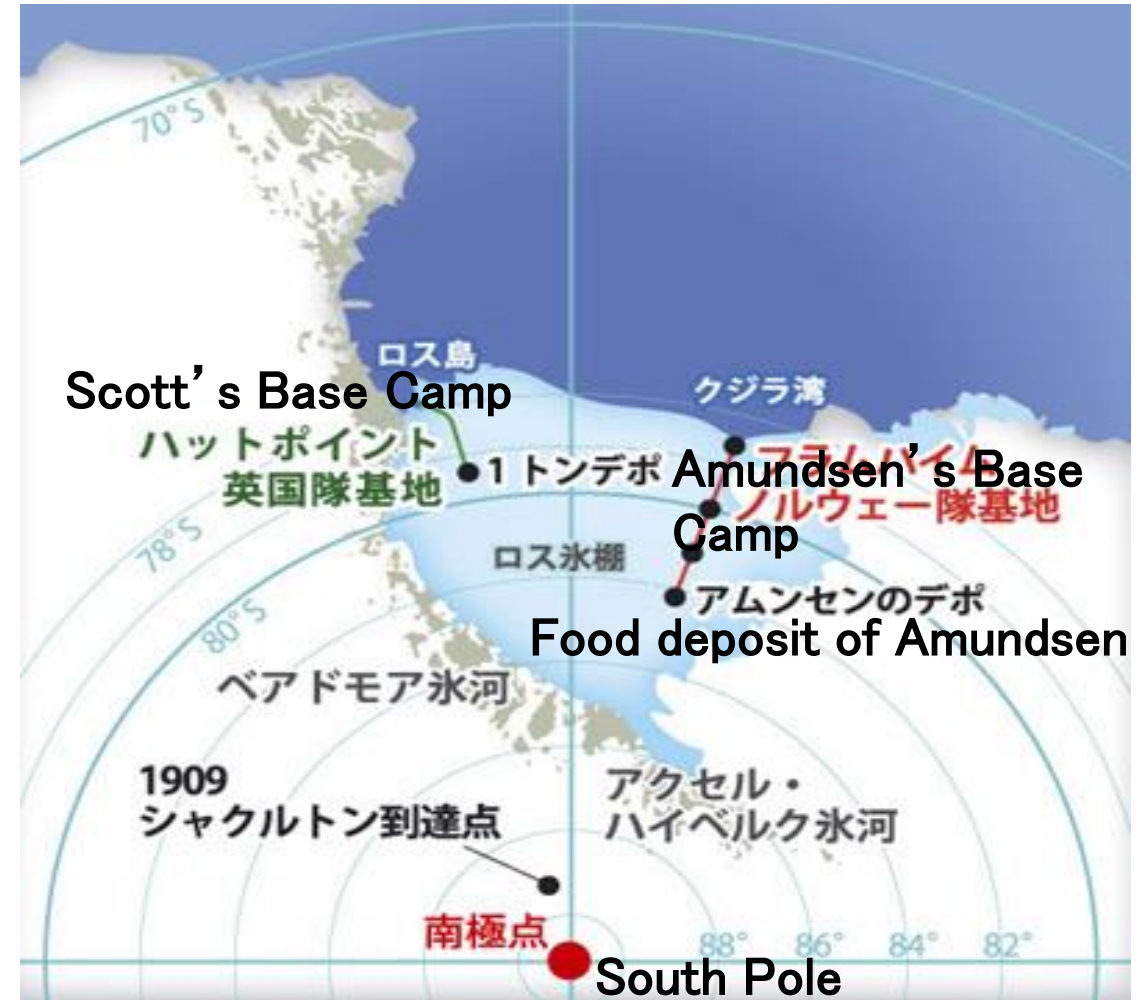
How to move: Dog sledge in Amundsen party, Horse sledge mainly in Scott party.

Party scale: Amundsen party was smaller than Scott party.

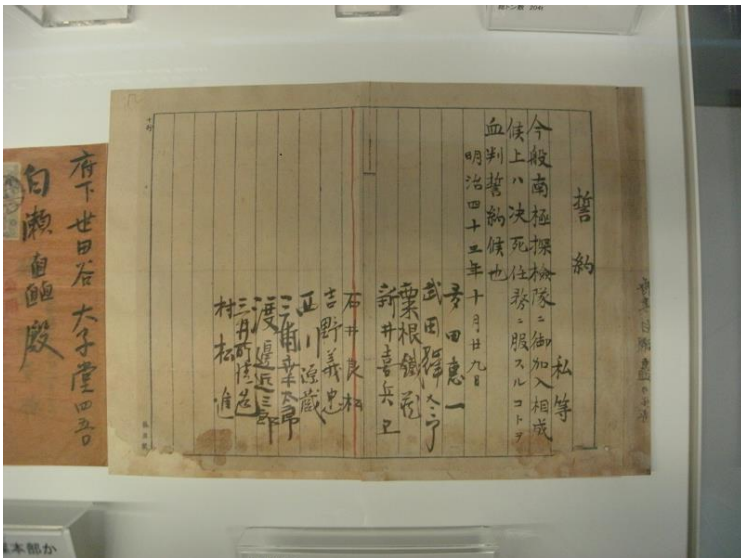
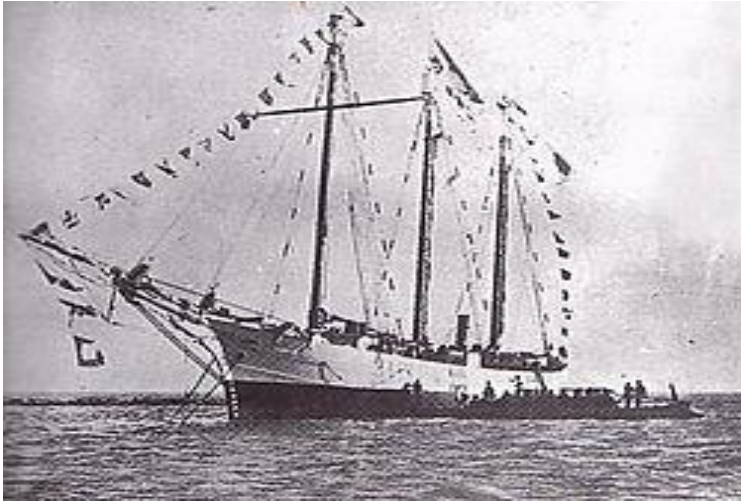
Leadership:

Scott adopted Navy style (Topdown style).

Amundsen regarded team work as important and enhanced members' motivation



Shirase Nobu



1861.7 Born in Akita

1893–1895 Chishima expedition

1904–06 Join the army on War of Japanese–Russia

1910.11 Kainan-maru departed from Japan

1911.3 Returning at Sea of Ross

1911.5 Arrived at Sydney, Australia

1911.11 Departed from Sydney, Australia

1912.1 Arrived at Bay of Whales. Attack party went southwards.

1912.1.28 Arrived at S80° 5'. Party returned.

1912.2 Departed from Bay of Whales.

1912.6 Kainan-maru came back Japan.

1946.9 Died

Japanese Antarctic Research Expedition (since 1956)

- First party: Unknown area, No idea of winter party, Dog sledge
- Ships: Soya, Fuji, Shirase, New Shirase
- Stations: Showa, Mizuho, Asuka, Fuji Dome
- Antarctic Expedition's contribution to Human Society: Prefabricated house, Precooked foods, Finding Ozone hole

Japanese Antarctic research Expedition in Soya Epoch

1956 First expedition departed from Japan by ship "Soya"

1957 Showa Station was established

1958 Staying was abandoned and dogs were left in the station.

1959 Two dogs were survived.

1962 Showa Station was closed.



Antarctic ozone hole



Observation of ozone in Showa Station

Ozone depletion consists of two related events observed since the late 1970s: a steady lowering of about four percent in the total amount of ozone in Earth's atmosphere (the ozone layer), and a much larger springtime decrease in stratospheric ozone around Earth's polar regions. The discovery of the Antarctic "ozone hole" by Japanese Antarctic Expedition (1982) and British Antarctic Survey (1985).

Chlorofluorocarbons (CFCs) are mainly responsible for man-made chemical ozone depletion. CFCs as refrigerants were invented in the 1930s.

They were used in air conditioning and cooling units, as aerosol spray propellants prior to the 1970s, and in the cleaning processes of delicate electronic equipment.

The main public concern regarding the ozone hole has been the effects of increased surface UV radiation on human health. As the ozone hole over Antarctica has in some instances grown so large as to affect parts of Australia, New Zealand, Chile, Argentina, and South Africa, environmentalists have been concerned that the increase in surface UV could be significant.

Movie (youtube) edited by British Antarctic Survey

Extreme Antarctica, 2 min 02 sec

https://www.youtube.com/channel/UCLRaKJeCPee362Z_rLaEnag

Antarctica – Global Britain, 1 min 18 sec

<https://www.youtube.com/watch?v=wwrvt1mzxyg&t=53s>