

“Ice Cold in Dublin”

Introduction

By
Michael Laurie



“Ice Cold in Dublin”



“Ice Cold in Dublin”
circa 12,000 years ago



Ice Cold Running Order

- Introduction – Michael Laurie
- Underwriting Risks for H&M and P&I– Reidun Eikeland Haahjem of Gard
- Legal – Martyn Haines of Clyde & Co
- Casualties & Survey Warranties – Michael Laurie
- Questions
- Coffee
- Mikhael Belkin of Rosatomflot
- Patrik Mossberg of Marininvest
- Bob Umbdenstock of Resolve Marine
- Questions & Conclusions

Arctic & Antarctic Polar Regions



Introduction

- ❖ Introduction and history of exploration & polar operations
- ❖ New routes
- ❖ Brief history of cruising - Antarctic and Arctic cruises
- ❖ Global warming? Environmental changes in Arctic & Antarctic
- ❖ Charts
- ❖ Human Issues

“Scotia” trapped in ice 1902-04 Scottish National Antarctic Expedition



IMO says...

- Ships operating in the Arctic and Antarctic environments are exposed to a number of unique risks. Poor weather conditions and the relative lack of good charts, communication systems and other navigational aids pose challenges for mariners. The remoteness of the areas makes rescue or clean-up operations difficult and costly. Cold temperatures may reduce the effectiveness of numerous components of the ship, ranging from deck machinery and emergency equipment to sea suction. When ice is present, it can impose additional loads on the hull, propulsion system and appendages.
- Whilst Arctic and Antarctic waters have a number of similarities, there are also significant differences. The Arctic is an ocean surrounded by continents while the Antarctic is a continent surrounded by an ocean. The Antarctic sea ice retreats significantly during the summer season or is dispersed by permanent gyres in the two major seas of the Antarctic: the Weddell and the Ross. Thus there is relatively little multi-year ice in the Antarctic. Conversely, Arctic sea ice survives many summer seasons and there is a significant amount of multi-year ice. Whilst the marine environments of both Polar seas are similarly vulnerable, response to such challenge should duly take into account specific features of the legal and political regimes applicable to their respective marine spaces.

Antarctica Chronology

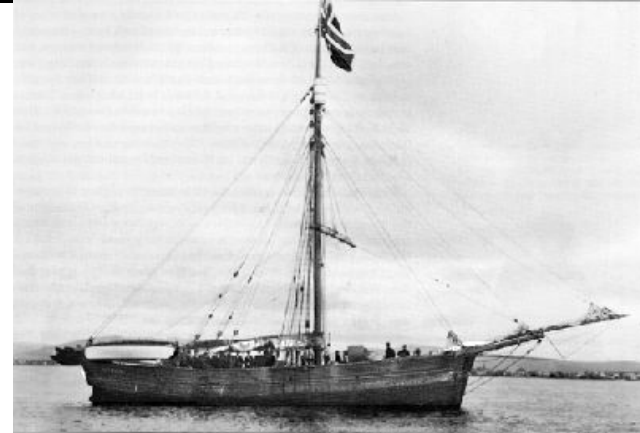
- ❖ Over 2000 years ago Greek writers described a large land mass believed to exist in the south of the world to balance the northern land masses
- ❖ 1773-5 Antarctica circumnavigated by James Cook, but land not sighted although reaching latitude 71°S
- ❖ 1819 First sighting of Antarctic Peninsula by Capt William Smith
- ❖ 1821 First known landing on the continent at Hughes Bay by US Capt John Davis
- ❖ 1823 James Weddell reached 74° 34'S in what is now the Weddell Sea
- ❖ 1903-4 First permanent scientific station established by Scottish National Antarctic Expedition at Laurie Island, South Orkney Islands
- ❖ Dec 1911 Roald Amundsen reached South Pole
- ❖ Jan 1912 Capt Robert Scott reached South Pole but died on the return trip
- ❖ 1956 First permanent base at South Pole
- ❖ 1957-8 International Geophysical Year
- ❖ 1961 Antarctic Treaty ratified by 12 countries

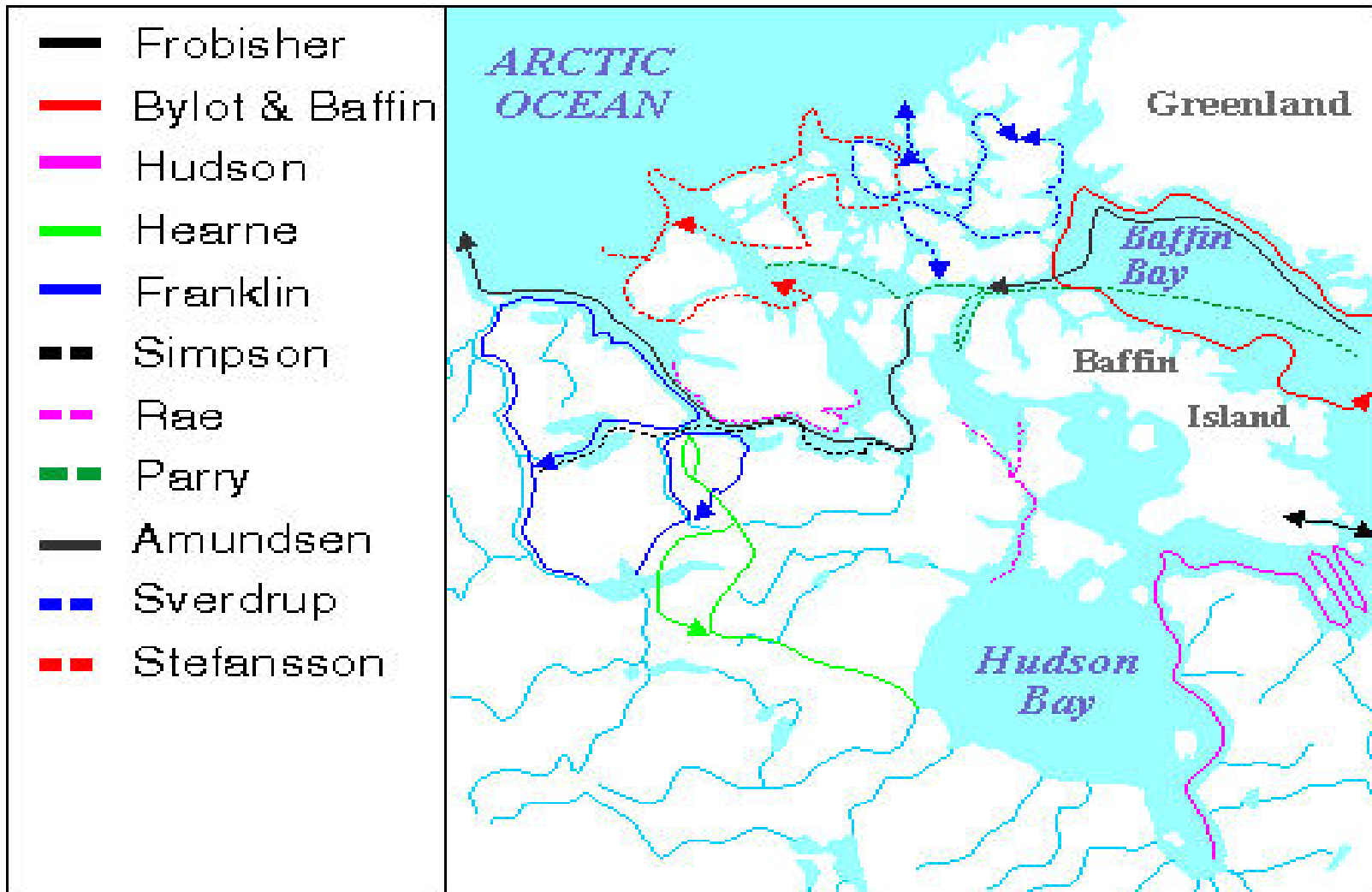
NE Passage Exploration

- 1594 -97 Willem Barents discovers Spitsbergen & Kara Sea
- 1725-42 Russian Great Northern Expeditions – Vitus Bering
- 1878-9 Baron Nordenskiold first successful navigation
- 1908-9 Robert Peary reportedly reached the North Pole
- 1910 -1915 Russian expedition explores and charts NSR
- 1932 Icebreaker “Sibiriakov” sailed from Archangelsk, the propeller shaft broke, and using sails arrived in the Bering Strait in October completing the first successful crossing of the Northern Sea Route during a single navigation without wintering.
- 1935 the first commercial cruises were carried out by two cargo steamers each way between Murmansk and Vladivostok,

NW Passage Exploration

- 330 BC First record of polar ice
- 1576-8 Martin Frobisher
- 1585-7 John Davis
- 1610 Henry Hudson
- 1818 British Admiralty – John Ross, W Parry
- 1845-1850 John Franklin & Robert McClure plus many other expeditions up to 1900
- 1903-6 Amundsen's ship "Gjoa" completed first transit
- 1940's first passages in a single year
- 1969 "Manhattan" first commercial transit with icebreaker assistance





Increasing Polar Activity

- Transportation routes
- Passenger Cruising
- Mining & energy
- Scientific/exploration
- Government interests



New Sea Routes

- North West Passage
- 1906 Norwegian explorer, Roald Amundsen and crew were the first to cross the Northeast Passage entirely by sea. the journey took three years and used waters that were too shallow for commercial shipping.
- 1944 The first single season trip through the passage was by Henry Larsen and crew. Again the route taken was not deep enough for commercial shipping.
- 1957, three United States Coast Guard Cutters, Storis, Bramble and SPAR became the first ships to cross the Northwest Passage along a deep draft route. They covered the 4,500 miles of semi-charted water in 64 days.



- The first ship capable of carrying significant cargo to traverse the North West Passage was the SS Manhattan, a specially reinforced supertanker, in 1969. It was accompanied by the John A Macdonald, a Canadian icebreaker. This trip was taken to test the Northwest Passage as an alternative to building the Alaska Pipeline. At that time it was determined that the Northwest Passage was not economical and the Alaska Pipeline was built.



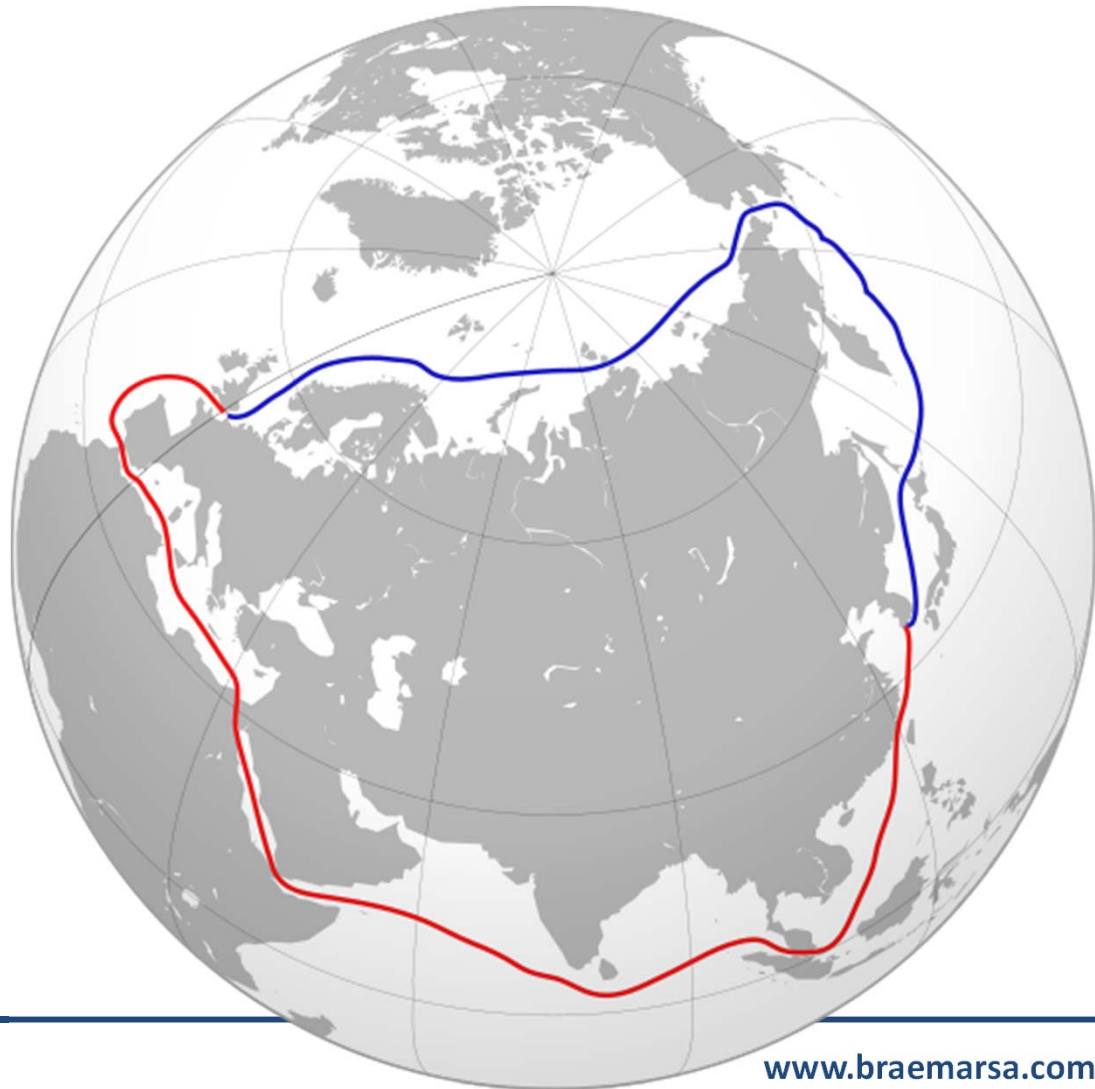
“Arctic” – built 1978 to service mines in
the Canadian Arctic

- Built to carry
both oil & ore
- Ice strengthened



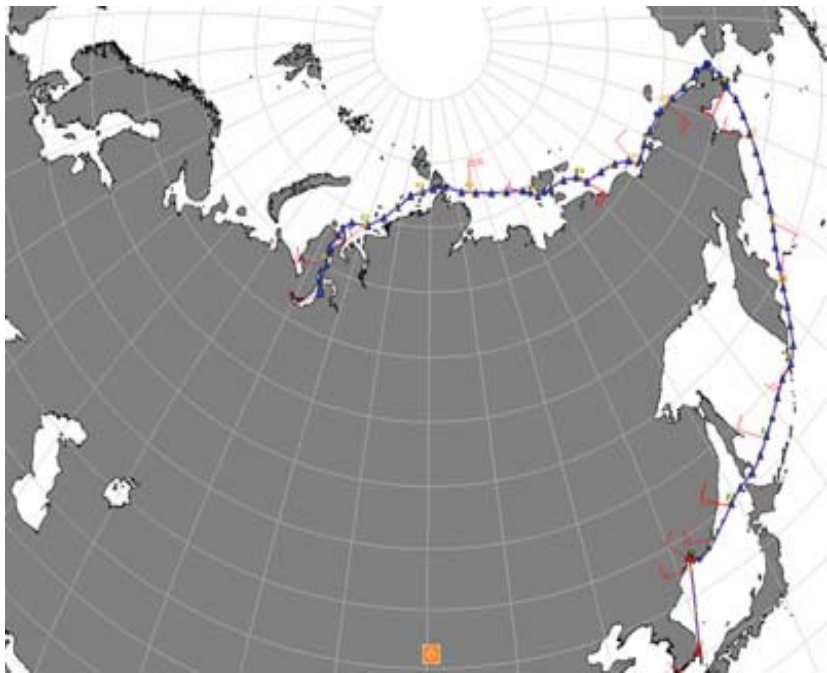
North East passage & Northern Sea Route

- Shows comparison of distance between northern route and conventional route via Suez and Indian Ocean.
- Exploration began as early as 1100's and by 1700 the feasibility had been established, but only in 1878 was the first continuous navigation from west to east completed



July 2009 Beluga Fraternity and Beluga Foresight

- During the passage through the East Siberian Sea, the Sannikov Strait and the Vilkizki Strait, the Beluga vessels followed in a little convoy behind Russian Atomflot-ice breakers 50 Let Pobedy and Rossia. Small icebergs, icefields and iceblocks were safely negotiated. Beluga claimed a saving of 4,000 miles from Ulsan to Rotterdam with costs of Euro 300,000 less



“Nordic Barents” lead by Russian Icebreaker carries iron ore from Norway to China Sept 2010



Brief history of Cruising

- Cruises commenced around 150 years ago with operators including P&O (1844), Thomas Cook, Hamburg America, etc Prior to the 1960's summer cruises were mainly performed by passenger liners, whose main function was intercontinental passenger transportation before air took over
- After 1970 all new ships were designed primarily to provide cruises
- Operators quickly realised that they needed to provide ever more interesting and exciting itineraries to attract customers
- In 1970 P&O sent the liner "Arcadia" to open up cruises to Alaska
- In the mid 1970's cruising was highlighted and popularised by the TV show "The Love Boat" (Pacific Princess)
- 1966 First commercial Antarctic cruise by Lars-Eric Lindblad – 1969 built "Lindblad Explorer" (later renamed "Explorer" sank in 2007)



Arcadia pioneers Alaskan Cruises in 1970



Illustrates 3 different aspects

- Ever more exciting (risky??) cruise itineraries
- Ice retreat
- Charting

- James Cook third expedition 1776-1778
- One of the officers on Cook's final voyage, George Vancouver, would lead later attempts to find the North-West Passage, approaching from the Pacific. On a voyage lasting from 1791–95 Vancouver surveyed many channels and inlets on the west coast of today's Canada. Upon finding no navigable waterways at temperate latitudes (i.e. those not hampered by ice) he was forced to conclude that if any passage did exist it must be much further north, and thereby, by virtue of polar ice, an impractical proposition. The search for the Passage was, to many, effectively over.



- Glacier Bay, Alaska
- Shows receding glacier ice



1890

1860

1780

Arctic Cruises

- Hurtigruten – year round cargo, mail & passenger service along Norwegian coast
- Cruise season from June to September
- Cruises to Svalbard Islands, Greenland, Arctic Canada
- Even a cruise in a massive icebreaker billed to go to the North Pole
- Mainly icebreakers or ice strengthened vessels but some large non ice cruise vessels
- Usually around 100 passengers but some 2000 plus



Antarctic Cruises

- Season from November to March, whilst ice recedes around the Antarctic Peninsula
- Most cruises from Ushuaia, Argentina to South Shetland Islands and the Antarctic Peninsula
- Some also call at Falkland Islands and South Georgia
- Around 30 vessels at peak of season in December & January
- Small vessels with 20 to 500 passengers – some Ice Class
- Small vessels can land passengers – maximum of 100 in any one place at a time
- Occasional large cruise liners Hamburg America, Princess & Celebrity etc with up to 4000 passengers and crew
- Actual itinerary varies depending on weather and other cruise vessels
- Crossing of Drake Passage south from Cape Horn can be very rough
- Long days – some light even at midnight
- Spectacular scenery and wildlife

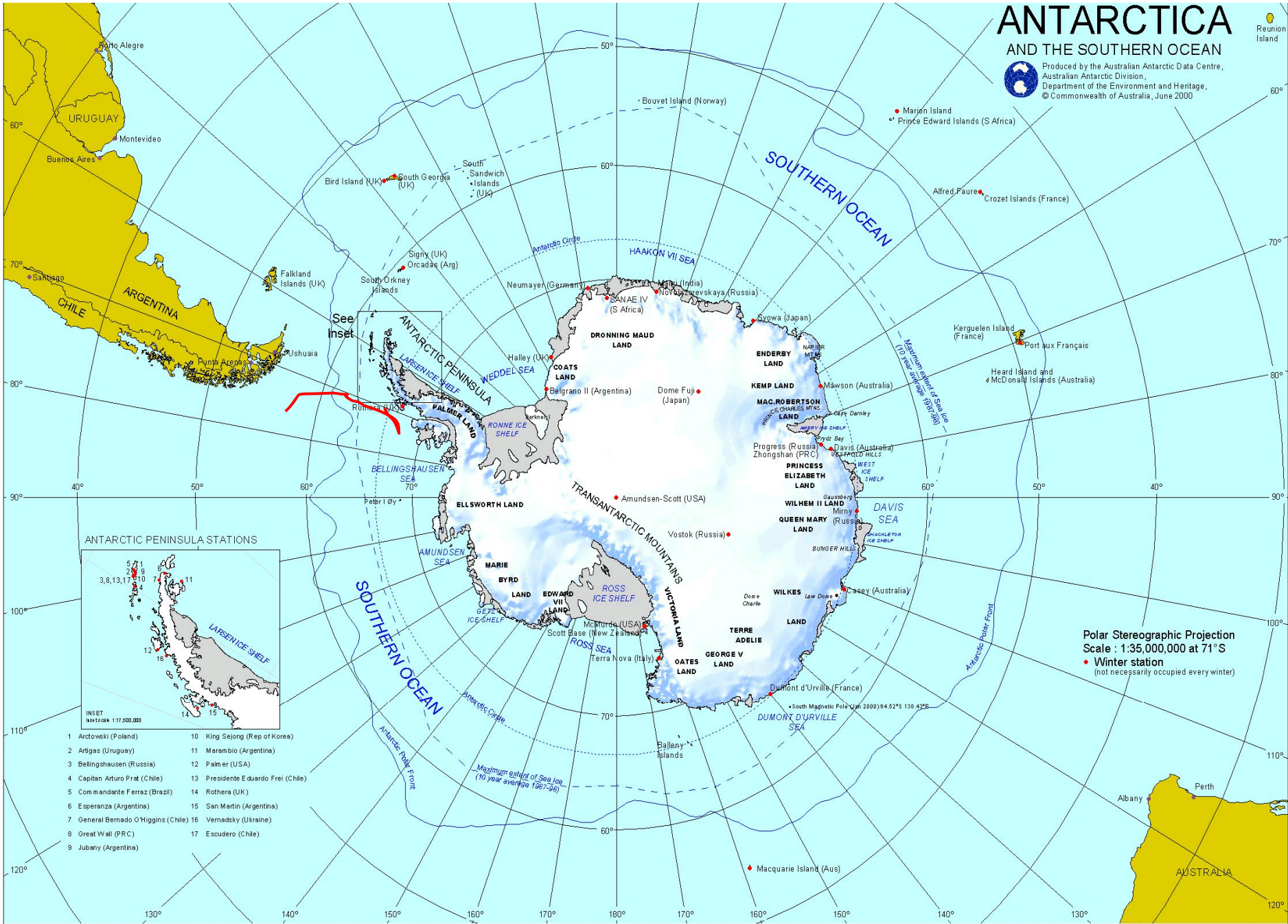
Ouch!! Is this a reasonable risk?



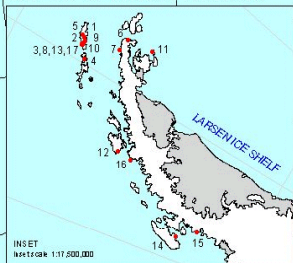
ANTARCTICA

AND THE SOUTHERN OCEAN

Produced by the Australian Antarctic Data Centre,
Australian Antarctic Division,
Department of the Environment and Heritage,
© Commonwealth of Australia, June 2000



ANTARCTIC PENINSULA STATIONS



- | | |
|--------------------------------------|------------------------------------|
| 1 Arctowski (Poland) | 10 King Sejong (Rep of Korea) |
| 2 Artigas (Uruguay) | 11 Marambio (Argentina) |
| 3 Bellingshausen (Russia) | 12 Palmer (USA) |
| 4 Capitan Arturo Prat (Chile) | 13 Presidente Eduardo Frei (Chile) |
| 5 Comandante Ferraz (Brazil) | 14 Rothera (UK) |
| 6 Esperanza (Argentina) | 15 San Martin (Argentina) |
| 7 General Bernardo O'Higgins (Chile) | 16 Vernadsky (Ukraine) |
| 8 Great Wall (PRC) | 17 Escudero (Chile) |
| 9 Jubany (Argentina) | |

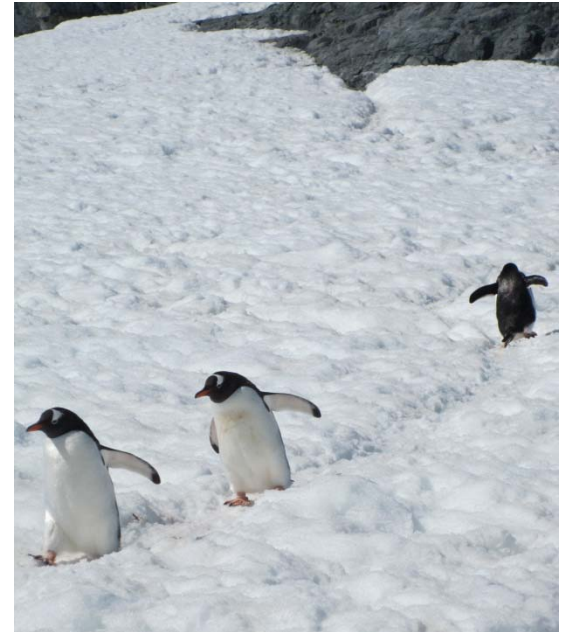
Polar Stereographic Projection
Scale : 1:35 000,000 at 71°S

• Winter station
(not necessarily occupied every winter)





Penguin Highways





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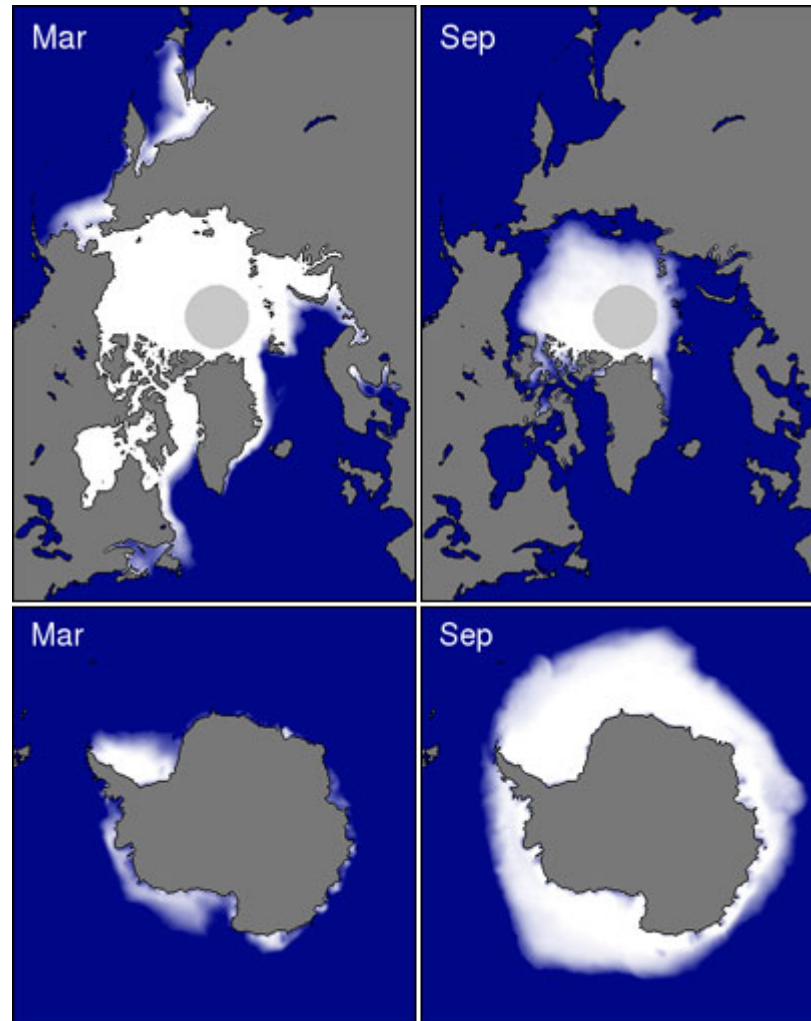


Exciting scenery and narrow ice strewn passages



Arctic & Antarctic seasons

- Sea ice climatologies:
Arctic and Antarctic sea ice concentration climatology from 1979-2000, at the approximate seasonal maximum and minimum levels based on passive microwave satellite data.
- Image provided by National Snow and Ice Data Center, University of Colorado, Boulder



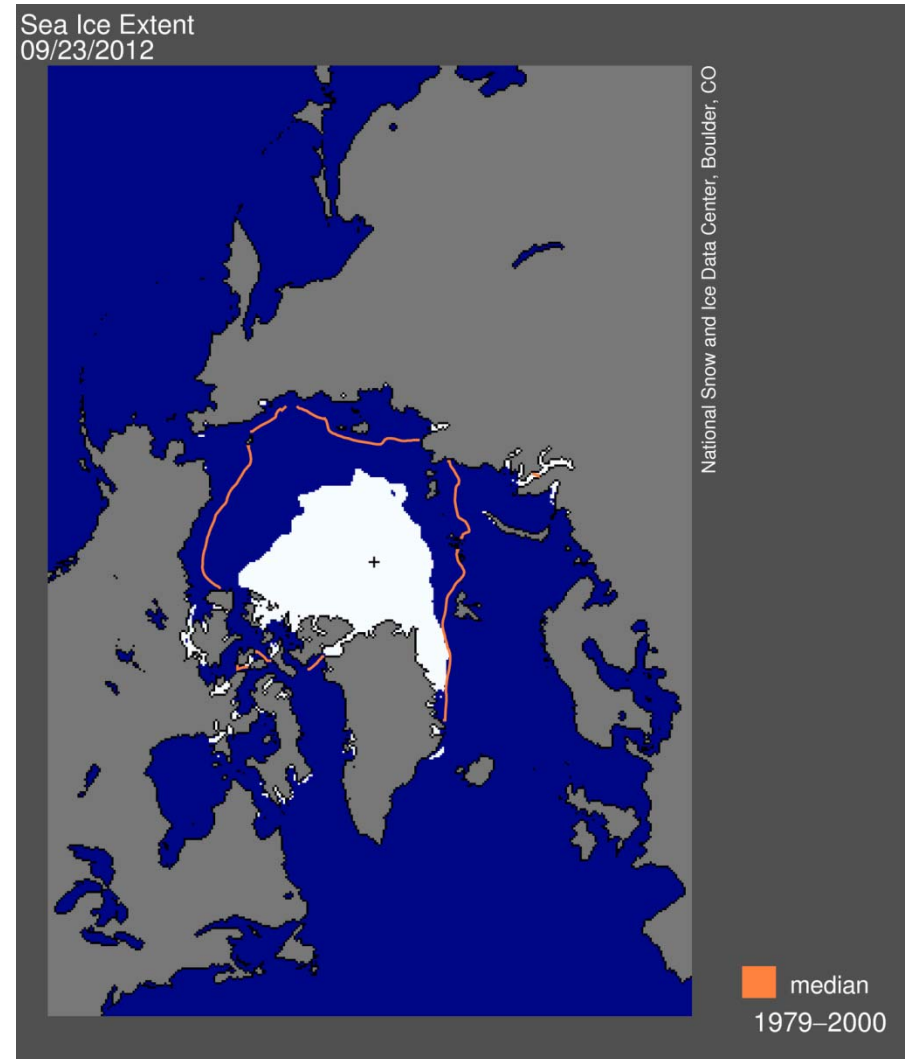
Summary of differences between Arctic and Antarctic sea ice characteristics

	Arctic	Antarctic
Average Maximum Areal Extent	15,000,000 km ² (9,320,568 mi ²)	18,000,000 km ² (11,184,681 mi ²)
Average Minimum Areal Extent	7,000,000 km ² (4,349,598 mi ²)	3,000,000 km ² (1,864,114 mi ²)
Typical Thickness	~ 2 m (6 ft)	~ 1 m (3 ft)
Geographic Distribution	Asymmetric	Symmetric
Snow Thickness	Thinner	Thicker
Trend, 1979-2008	Significant decrease of 4.1% (~500,000 km ² ; 193,000 mi ²) per decade	Small increase of 0.9% (~100,000 km ² ; 42,000 mi ²) per decade

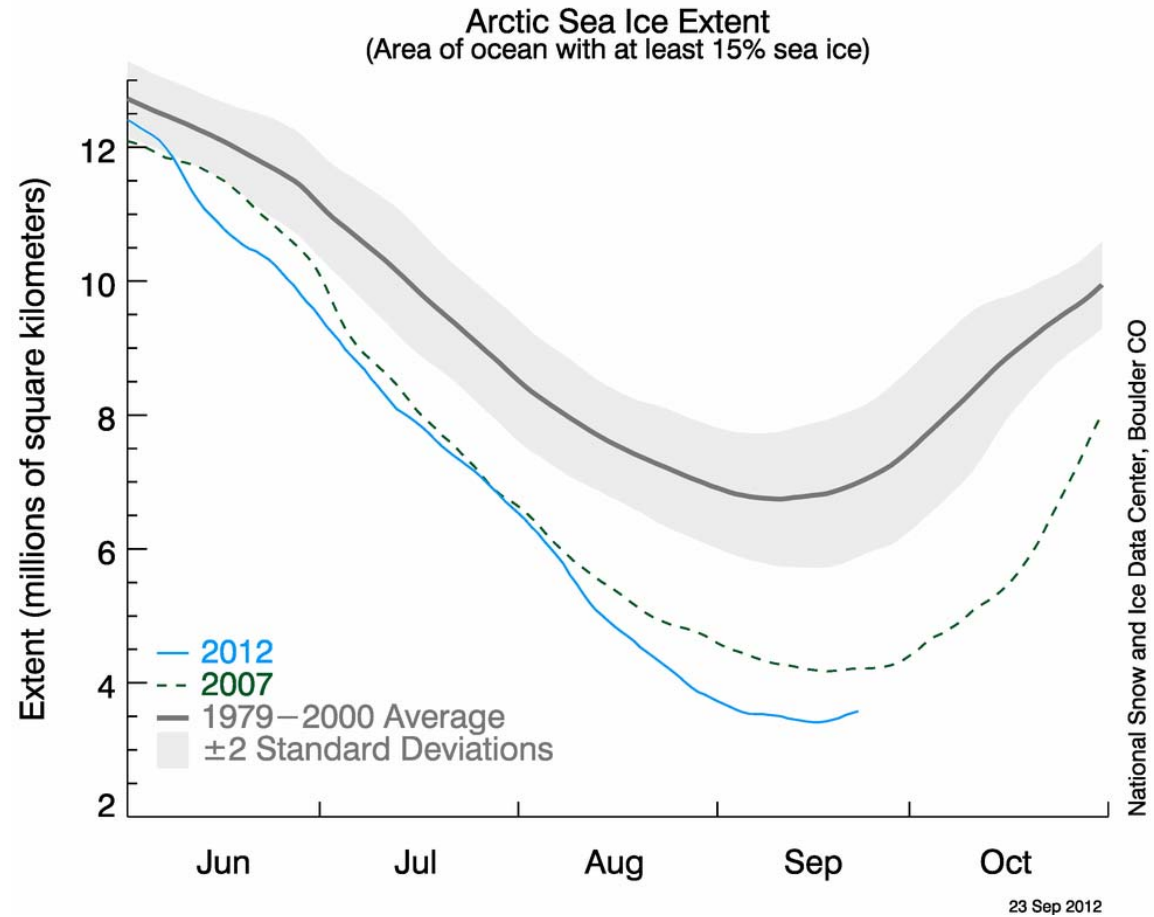
Arctic Sea Ice Extent

On September 16, 2012 sea ice extent dropped to 3.41 million square kilometers (1.32 million square miles). This appears to have been the lowest extent of the year. In response to the setting sun and falling temperatures, ice extent will now climb through autumn and winter. However, a shift in wind patterns or a period of late season melt could still push the ice extent lower. The minimum extent was reached three days later than the 1979 to 2000 average minimum date of September 13.

The magenta line shows the 1979 to 2000 median extent for that month. The black cross indicates the geographic North Pole



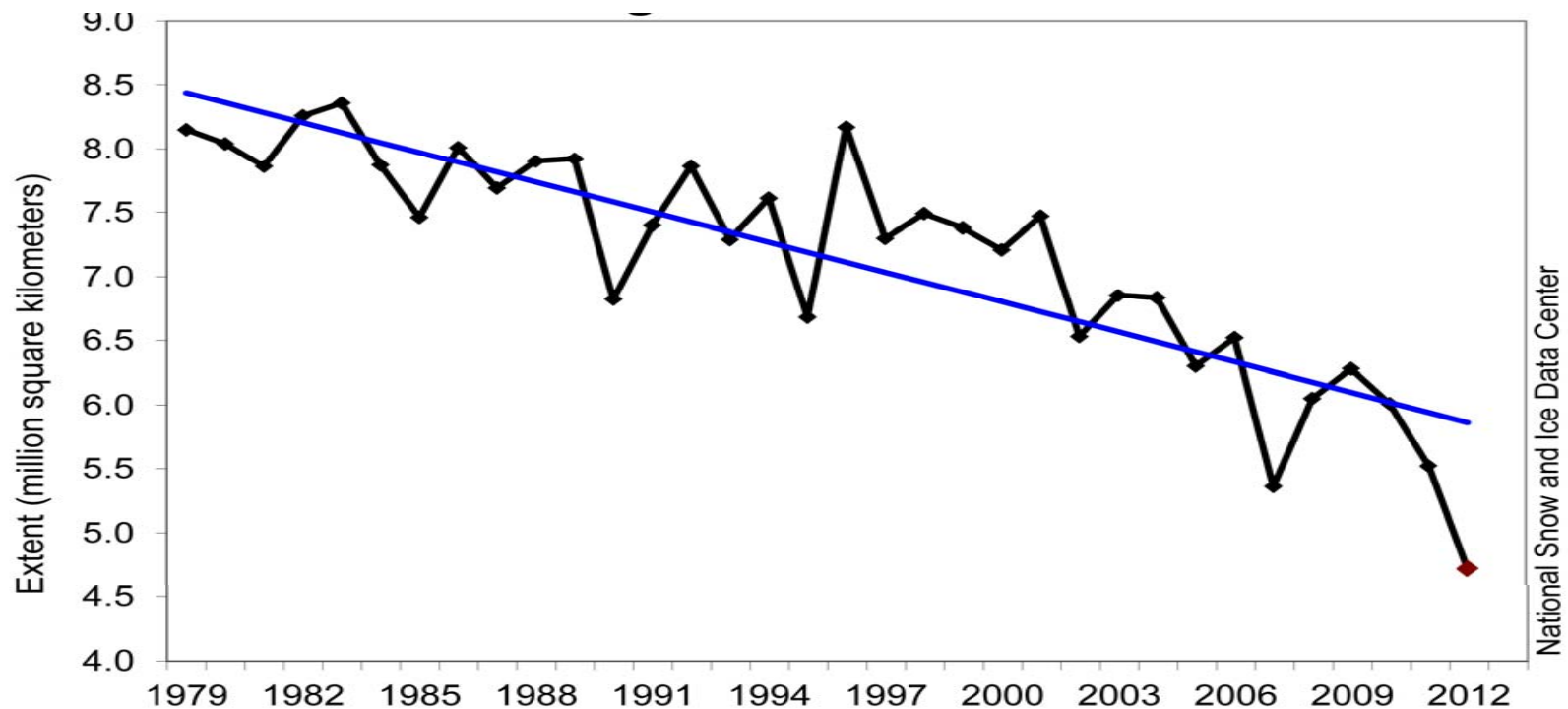
Arctic Sea Ice Extent



Average Monthly Arctic Sea Ice Extent August 1979 to 2012

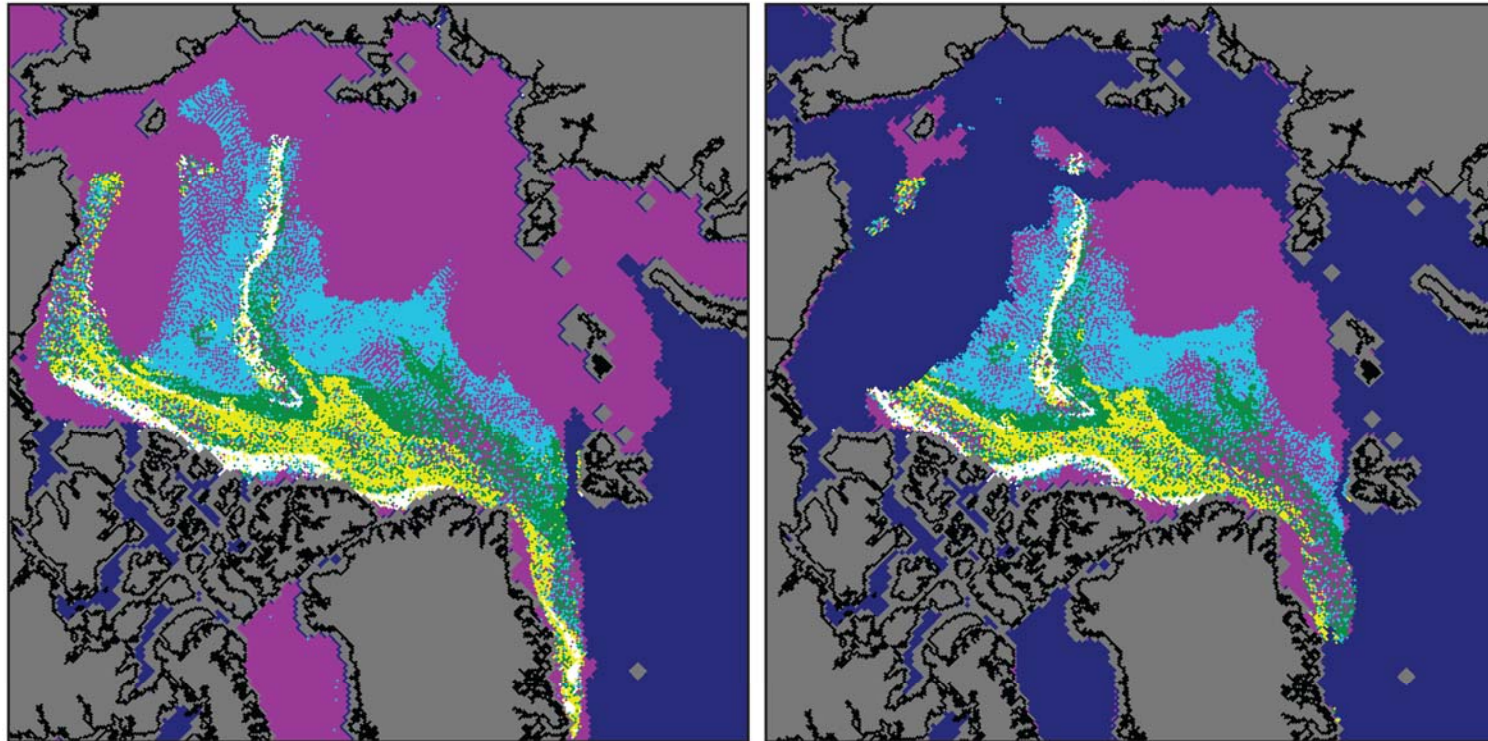
August 2012 compared to past years

The monthly averaged ice extent for August was 4.72 million square kilometers (1.82 square miles). This is 2.94 million square kilometers (1.14 million square miles) below the 1979 to 2000 average extent, and 640,000 square kilometers (247,000 square miles) below the previous record low for August set in 2007. Including 2012, the August trend is -78,100 square kilometers (-30,200 square miles) per year, or -10.2 % per decade relative to the 1979 to 2000 average.



Late March 2012

Late August 2012



First-year ice
(<1 year old)

Second-year ice
(1-2 years old)

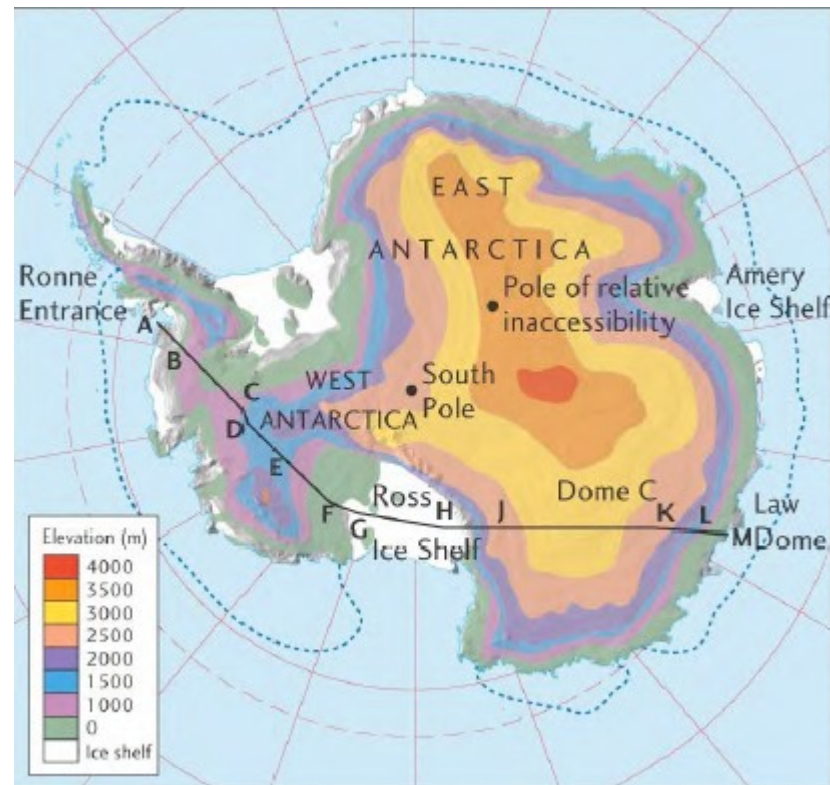
Third-year ice
(2-3 years old)

Fourth-year ice
(3-4 years old)

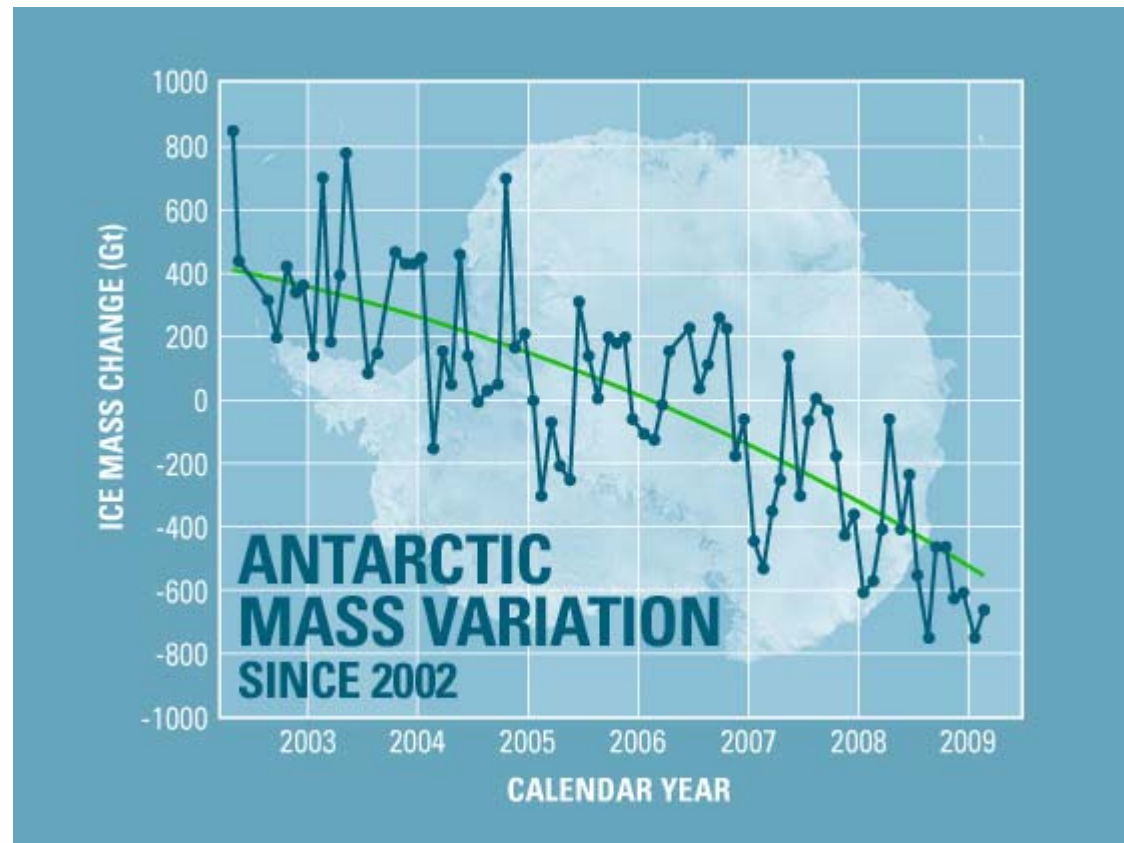
5+-year ice
(5+ years old)

NSIDC courtesy M. Tschudi and J. Maslanik, University of Colorado Boulder

- The Antarctic ice sheet. East Antarctica is much higher in elevation than West Antarctica. Ice sheet is average 2 km thick



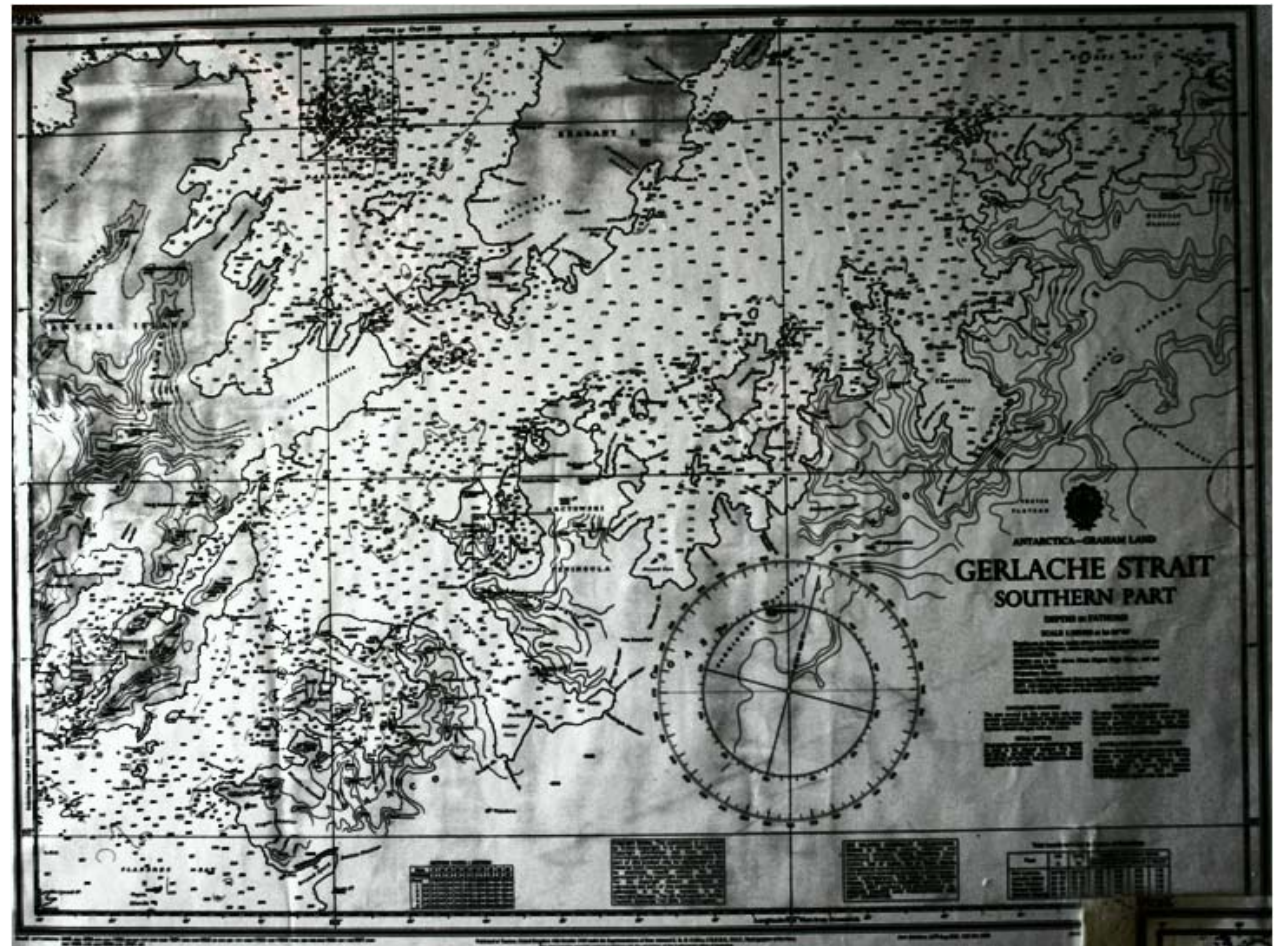
The continent of Antarctica has been losing more than 100 cubic kilometers (24 cubic miles) of ice per year since 2002



Polar Charts

- Vast expanse of ocean
- Often relying on surveys carried out in 1800's
- Inadequate or non-existent modern hydrographic surveys
- Ice retreat opening up new areas not previously charted/surveyed
- Surveys prior to 1960's used lines of depth soundings
- Post 1970 used sidescan sonar for wider area
- Use of aerial surveying
- Lack of tide and height data for chart datum
- Majority are still paper charts

“The area covered by this chart has only been partially surveyed. Uncharted dangers are known to exist, particularly within the 100 fathom line. Mariners should navigate with due caution”



Arctic Nautical Charting Plan
published 2011 by US Office of Coast Survey



- Currently, charting data in much of the Arctic is inadequate or nonexistent
- Most of the shoreline along Alaska's northern and western coasts has not been mapped since 1960, if ever, and confidence in the shoreline depicted on the region's nautical charts is extremely low.
- NOAA's Office of Coast Survey has identified 38,000 square miles as its surveying priority and estimates it will take more than 25 years to complete updated charts for this area.

Canadian Hydrographic Service



- “Canada has the longest coastline in the world and we have three oceans and the Great Lakes,” says Savi Narayanan, the CHS's director general.
- Don't expect charts showing every detail of the Arctic seabed north of 60 degrees latitude — an area of about seven million square kilometres — any time soon.
- Only about 10 per cent of the total Arctic has been charted and surveyed to a modern standard. Twenty-five to 35 per cent of the main Arctic shipping routes are surveyed and charted to that standard.

Canadian

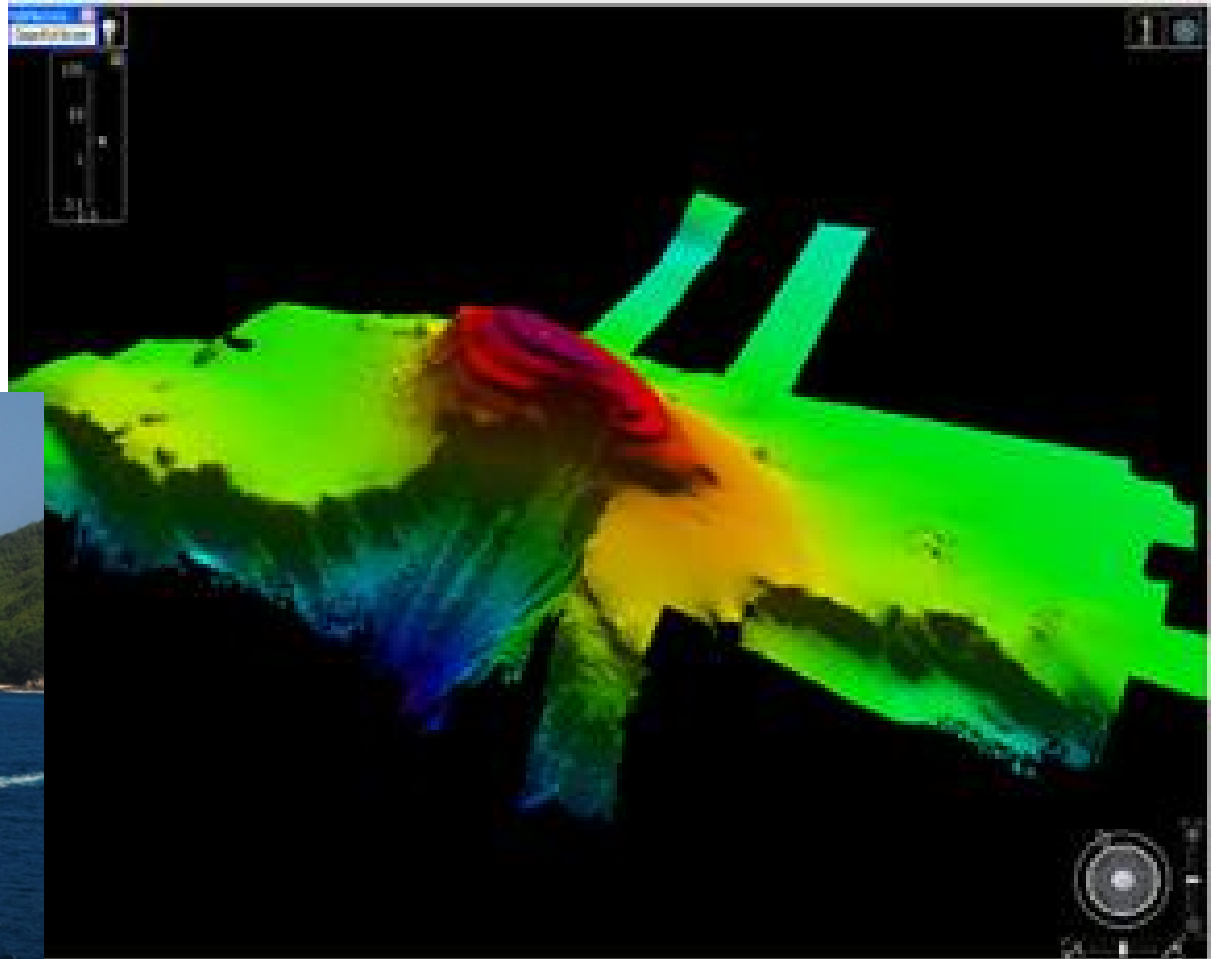
- **THE VALUE OF A CHART DEPENDS TO A GREAT EXTENT ON THE ACCURACY AND DETAIL OF THE SURVEYS ON WHICH IT WAS BASED.**
- *(Navigation Instruction, Canadian Arctic, Vol. 1, 1982, p.8)*
- There are two areas of concern with the use of charts in the Arctic. These are consideration of the uncommon projections used and the accuracy of the surveys.

Northern Sea Route

- ***Russia to commission Northern Sea Route hydrographic surveys to identify safe-water routes for large ships – April 2012***
- "We will increase the hydrographic work in the Arctic to the year 2015-2016 to get a real picture of the depths for safe navigation"
- 'White spots' (areas without depth data) on the charts will not be covered throughout the whole region, but survey work will be concentrated on the Northern Sea Route in the interests of the safe navigation of ship traffic.

HMS Echo discovers uncharted underwater mountain in Red Sea in July 2012

Chart shows depth
of 385m but
survey gives 40m



Warnings on Charts

- Mighty Servant 2 – November 1999 struck a rock pinnacle, capsized and sank resulting in 5 fatalities and the total loss of ship and the cargo of an 8,970 tonne offshore production module.
- The chart of the passage through Indonesian waters showed a warning about uncharted rocks and MS 2 apparently found one of them with catastrophic results. A subsequent specially commissioned hydrographic survey found a single granite pinnacle directly on the ship's course, that was not on existing charts.



People

- Various “human” problems can be encountered:
- Training as an Ice Navigator or Ice Master – no single agreed qualification (NI)
- Experience in the Baltic not similar to polar regions (“Explorer”)
- Problems of working in very cold weather (-40°C), wind chill, frostbite, etc
- Clearance of ice from on deck – exhausting work
- Proper protective clothing & training
- Impairment of decision-making in cold conditions
- Continuous noise and heavy vibration in ice resulting in sleep deprivation
- Crew and Passenger SAR

In 1820 whaling Captain William Scoresby wrote “The Arctic Regions and the Northern Whale Fishery”

- “The navigation of the Polar seas, which is peculiar, requires in a particular manner, an extensive knowledge of the nature, properties and usual motions of the ice, and it can only be performed to the best advantage by those who have long experience with working a ship in icy conditions”
- Another more recent quote: “It takes as long to train an ice master as it does a brain surgeon”

- Safety – fully enclosed survival suits available for all crew and passengers - demonstrated by crew at beginning of voyage.
- But how long would it take 3000 unfamiliar passengers to get kitted up in an emergency?



Search & Rescue Services in Antarctica?



Conclusions

- Polar regions are remote and unforgiving – lack of SAR & other support
- Shortage of experienced ice navigators
- No single agreed qualification (IMO/NI)
- No single agreed ice classification of vessels (IACS)
- Weather and ice conditions can change very rapidly
- Global warming is opening up new routes
- Increasing energy and mineral extraction in northern areas, but not in Antarctica
- Increasing shipping
- Inadequate Charts and navigational aids

Thank you for listening