


The Challenge of Hydrographic Surveying & Charting the Antarctic

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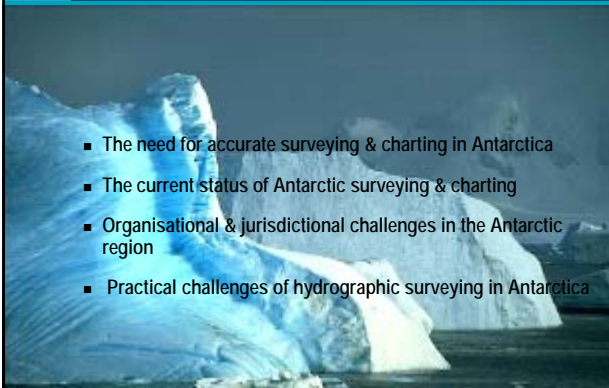



The need for accurate surveying & charting

Vessel size & traffic: environmental protection: safety of navigation



Presentation overview



- The need for accurate surveying & charting in Antarctica
- The current status of Antarctic surveying & charting
- Organisational & jurisdictional challenges in the Antarctic region
- Practical challenges of hydrographic surveying in Antarctica

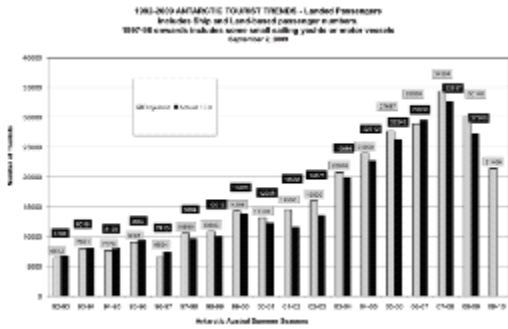
Increase in vessel size



NEW BREED OF CRUISE SHIP
Golden Princess - Star Princess

- 109 000 tonnes
- 3 000 passengers
- 10 metre draft
- zero ice capability
- 65 degrees south

Increase in vessel traffic



Safe & efficient movement of marine traffic



- Accurate survey data & up-to-date charts are essential for the safe & efficient movement of marine traffic;
- Improved charting minimises risk to safe navigation



Environmental protection & scientific research

- Increased global awareness & support for preservation of marine environment
- Tour operators aim for zero impact on Antarctic environment- quality charts required to do this
- Detailed bathymetric data is essential to understanding this complex environment
- Accurate charts enable researchers to work in safety



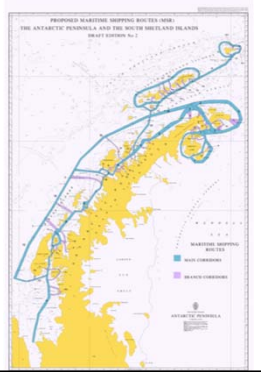
The current status of surveying & charting

Charting responsibilities: area surveyed



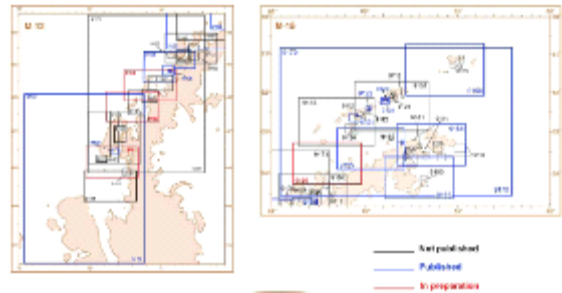
Areas surveyed

- Antarctic Peninsula Channels & approaches- 60% within 200m contour unsurveyed & remainder needs resurvey
- Elsewhere <1% of sea area within 200m contour adequately surveyed
- Surveying done by a number of countries and data-sharing arrangements exist

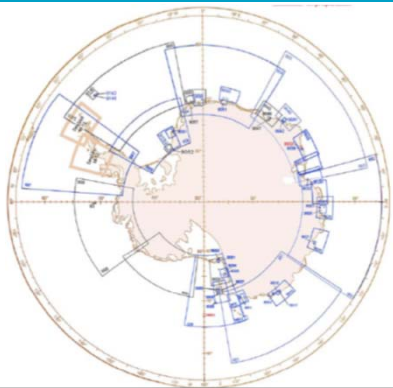


HCA Chart Scheme

Status of INT Chart Production in Antarctica (September 00)

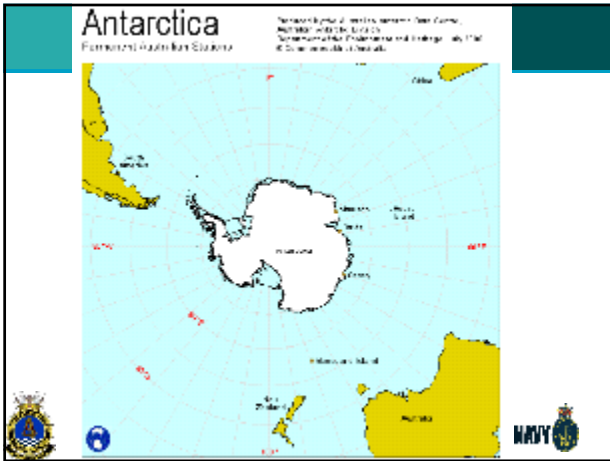


HCA Chart Scheme



Organisational & jurisdictional challenges

Territorial claims; Antarctic Treaty; SOLAS; HCA



Jurisdictional issues

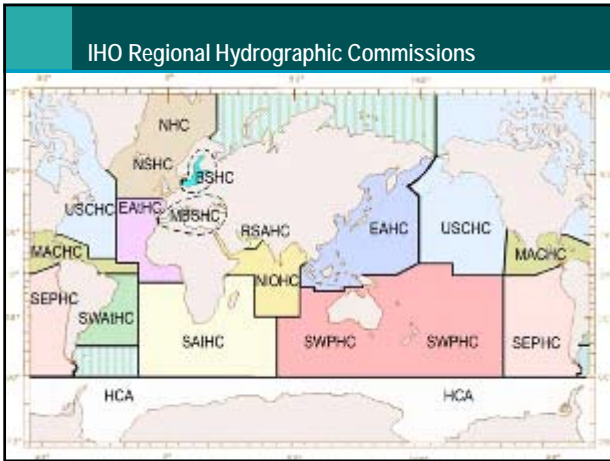
- 7 territorial claims exist, using lines of longitude to define boundaries
- Overlapping claims
- Antarctic claims not universally recognised
- Antarctic Treaty not to be interpreted in any way as support, renunciation or denial of any territorial claim

No Coastal State - SOLAS implications

- SOLAS Chapter 5, Regulation 9 defines coastal State responsibilities & obligations regarding provision of hydrographic services
- Antarctica has no universally recognised sovereign State(s), so SOLAS hydrographic service obligations cannot be applied
- IHO Hydrographic Sub-Committee on Antarctica attempts to overcome this dilemma by multi-party agreement

Antarctic Treaty

- Entered into force 1961
- 12 original signatories- including Australia
- # of parties now at 47
- Antarctica to be used for peaceful purposes only
- Freedom of scientific investigation
- Scientific observations & results to be exchanged & made freely available
- Whilst treaty in force, status quo of Antarctic territorial claims preserved



Coordination of Surveying & Charting

- HCA is responsible for coordinating the international charting scheme for the Antarctic
- Data sharing is an integral part of a coordinated approach
- Problems include:
 - significant resources are required to undertake surveying & charting in Antarctica
 - charting to support national interests may take precedence over charting in Antarctica
 - States occasionally unwilling to share data

Hydrographic Sub-Committee on Antarctica (HCA)

- Membership open to any State who has acceded to the Antarctic Treaty, signed the Statutes of the HCA and contributes to charting & surveying in Antarctica
- 19 Antarctic Treaty Parties currently participate in the HCA
- Aim of HCA is to “promote technical co-operation in the domain of hydrographic surveying, marine cartography and nautical information in the region... to implement the INT chart scheme for the region... to facilitate the exchange of information between Hydrographic Authorities.”

Complicated Negotiation for ENC Scheme

ENC SCHEME FOR MEDIAN SCALES IN ANTARCTICA
(Coastal Navigation: Navigational Purpose 3)

A draft ENC scheme has been prepared by the IHO for Medianscale Purpose 3 (Coastal Navigation), based on the IHO INT chart scheme at scales 1:100,000 to 1:500,000 (not reproduced hereafter).

In preparing these drafts, the following are taken into consideration:

1. IHO Principle 2.4, which reads: “The ENC chart system is a useful basis for other zone schemes for conducting charting (see IHO PRINC 10).”
2. The approaches adopted in IHO ENC and INT charting to develop ENC schemes for Regions ‘Y’ and ‘Z’ under France’s coordination.
3. The recommended assignment of navigational purposes to scale ranges, as contained in IHO ENC ENC/INT, Annex A, § 3.
4. Section 2.2 (Scale) of the ENC Product Specification (Appendix B.1 of IHO INT 3.1), where it is said: “Cells with the same navigational purpose may overlap, although data within the cells shall not overlap. Therefore, in the area of overlap, only one may contain data, or other cells may have a restricted overlap with CAPCOB – 2, covering the overlap area. This rule applies even if several purposes are involved.”
5. Principles to resolve ENC cell overlaps are given below by decreasing order:
 - ENC cell already published;
 - ENC cell with submission planned for the coming year(s);
 - ENC cell based on the larger scale INT chart within navigational purpose 3, in case of overlapping INT charts;
 - INT chart already published (naval edition data determine overlapping areas);
 - INT chart not yet published;
 - INT chart with no assigned producing HO yet.

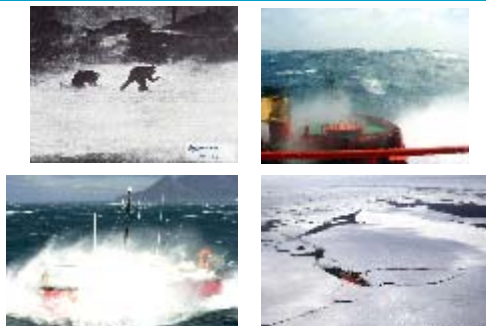




Practical challenges


Limited survey opportunities; hostile environment; remote locality




Hostile environment


Limited survey opportunities





- Collection of survey data dependant on favourable weather & absence of ice
- In some areas, survey window is only one or two months per year
- Survey activities are often reliant upon other groups for transport & support services, which may limit surveying opportunities



Remote locality



- Transit from Australian mainland approximately two weeks
- Distance from re-supply & equipment support facilities
- Distance from search & rescue

Operational Aspects - Surveying in Antarctica

■ Planning Phase

- Selection of Team Members
- Choice of Equipment
 - Redundancy, Rugged, Simple, Spares
- Survey Plan
- Preposition of Equipment
- Meteorological Aspects
- Transport and Support requirements
 - Liaison with AAD
 - Timing - ice dependant



Survey Considerations

■ Ice limitations

- Pack Ice
 - Prevent access
- Flow Ice
 - Damage Equipment
- Ice Bergs
 - Restrict survey area



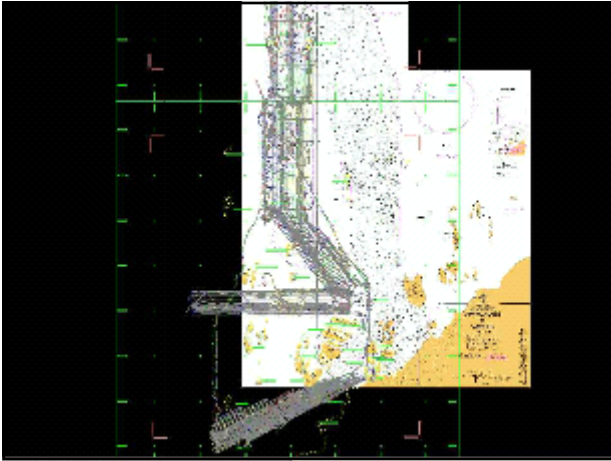
Outer Approach to Mawson



Grounded Ice Berg in Survey Area

Grounded Bergs indicate shallow water but prevent investigation of it





Survey Considerations

- Salinity Effects
- Daily Weather
 - Katabatic winds
 - Rapidly changing conditions
 - SAR Arrangements - Helo Availability
 - Ice formation on survey boats - instability

Massive Ice Island forces re-programming

Katabatic Winds enhanced by Low Pressure System

Pack Ice Breaking Up and Thaw Reduces Surface Salinity



Ice Formation on Boat Gunwhale

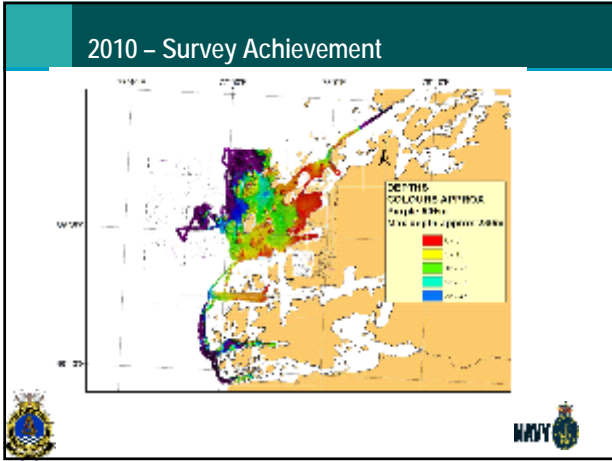


Boat Removed daily for Maintenance and de-icing



Ice Formation on Boat





Concluding remarks

- Remote and Challenging physical environment
- Challenging politics, lack of national obligations
- Enduring challenges- no easy solution
- Preservation & protection of this unique environment as well as safety of navigation in the region are of paramount importance

Concluding remarks

Challenges and future direction

Thank you

Commodore Rod Nairn, RAN