Understanding our Islands: How to get the best out of our GIS and data

Turks and Caicos Islands GIS and data Training Workshop
5th February 2015

UK OT marine data – Example: bathymetry

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Why?

Bathymetry data is recognised as being of considerable value, not only to organisations such as Hydrographic Offices, who require the highest possible quality data for producing charts, but increasingly bathymetry data from a variety of sources with varying degrees of quality are being recognised as providing the foundation upon which States can deliver sustainable marine management plans.

The theme for the IHO's World Hydrography Day 2014 was *Hydrography – much more than just nautical charts*

Where the IHO recognise the value of bathymetry data to enable the blue economy

Sources of data:

Hydrographic charting by HO/Navy
Industry surveys e.g. cable and pipeline routing, windfarm, hydrocarbon survey companies
Academia e.g. marine scientific research
etc
etc

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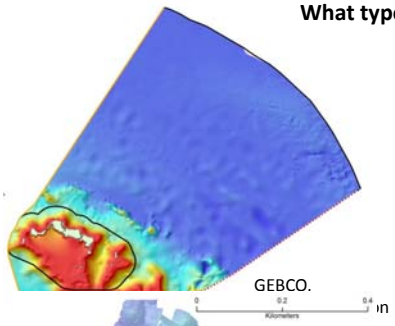
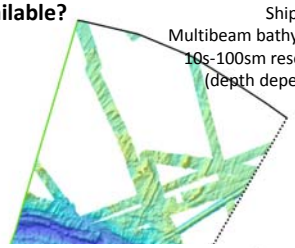
What types of data are available?

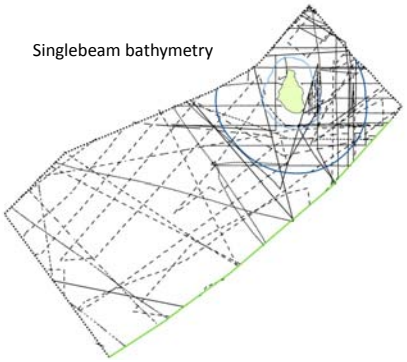


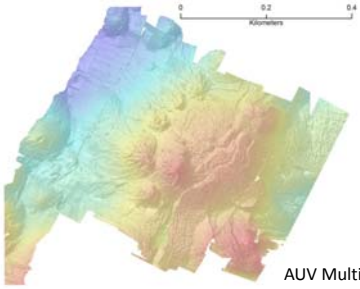
GEBCO.

Shipborne
Multibeam bathymetry,
10s-100sm resolution
(depth dependent)



Singlebeam bathymetry





AUV Multibeam
bathymetry, ~1m res

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What for?

Resource potential	Disaster mitigation	Environmental benefits
Tourism	Tsunami*	Marine biodiversity
Minerals	Volcano	MPAs
Fisheries	Ship grounding	Governance/MSP
Mega-Yacht moorings	Navigation	Habitat mapping
Infrastructure	Environment	
Cable routes (comms)	SOLAS	

* magnitude 2.8 earthquake offshore BVI 15-10-13

"The United Kingdom's Overseas Territories play host to some of our most precious environmental assets, many of which would be irreplaceable if lost.

Richard Benyon Minister for the Natural Environment and Fisheries, Department for Environment, Food and Rural Affairs (2010-2013)

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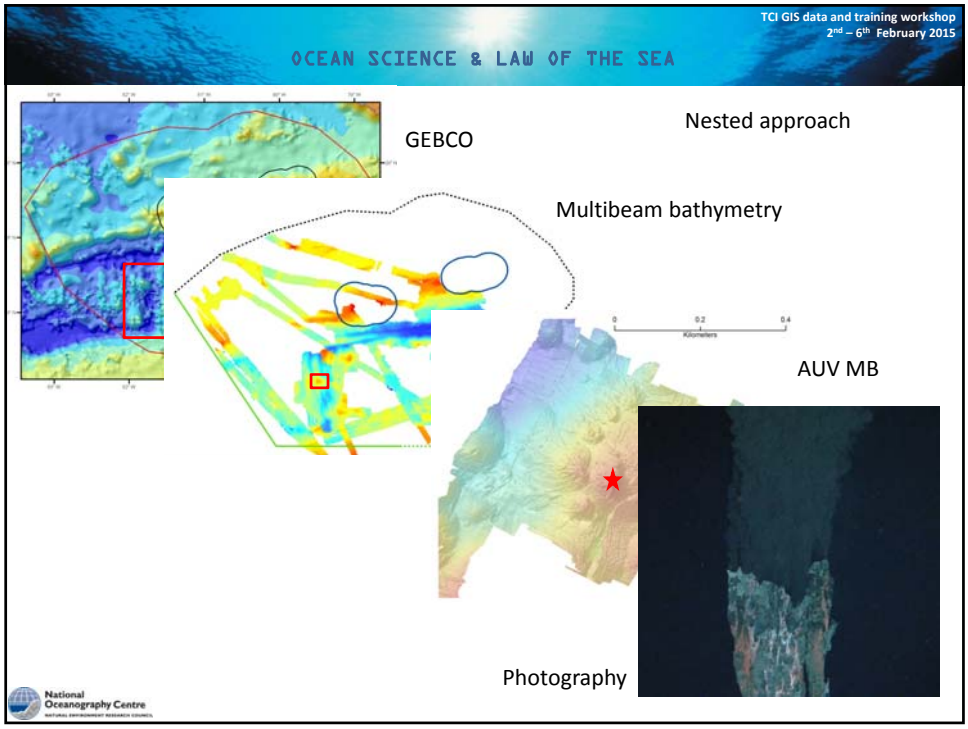
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Nested approach
GEBCO
Multibeam bathymetry
AUV MB
Photography
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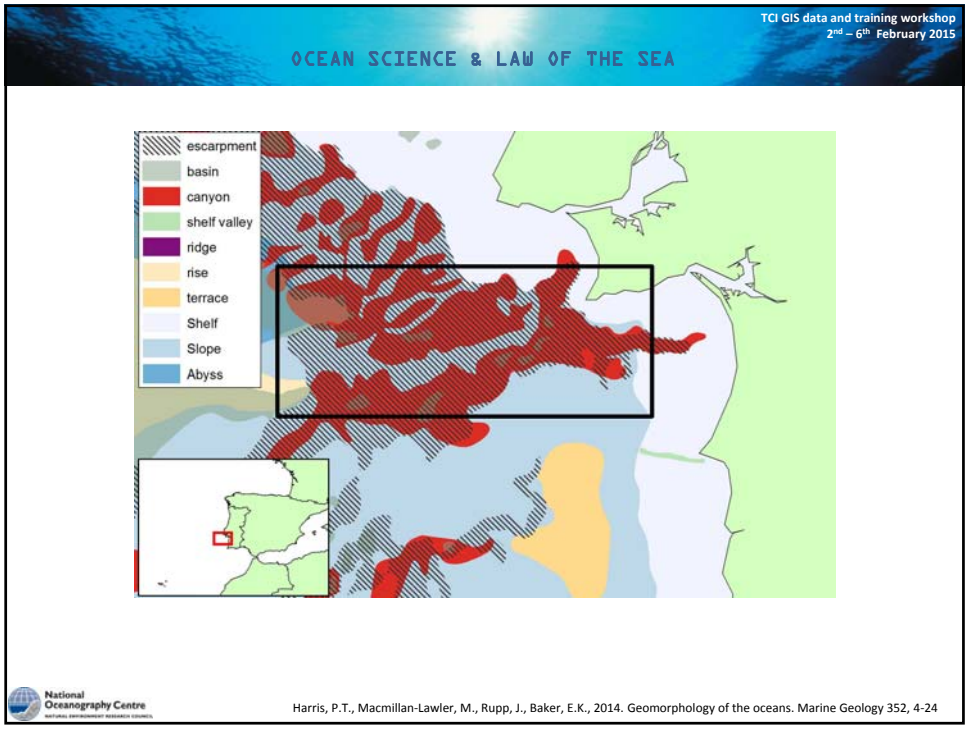
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escarpment
basin
canyon
shelf valley
ridge
rise
terrace
Shelf
Slope
Abyss
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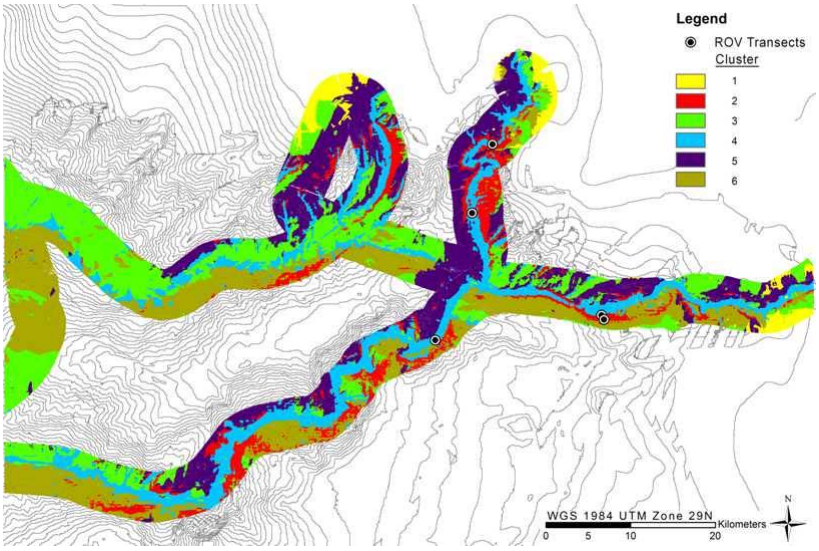
Harris, P.T., Macmillan-Lawler, M., Rupp, J., Baker, E.K., 2014. Geomorphology of the oceans. Marine Geology 352, 4-24



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United Nations Convention on the Law of the Sea (UNCLOS)

Article 79: Submarine cables and pipelines on the continental shelf

Para 3. The delineation of the course for the laying of such pipelines on the continental shelf is subject to the consent of the coastal State.

4. Nothing in this Part affects the right of the coastal State to establish conditions for cables or pipelines entering its territory or territorial sea, or its Jurisdiction […]

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Why now?

UK White Paper on OT recognises importance of OT and encourages collaboration and to provide tech support

UK OT Biodiversity Strategy - Strategic priorities for UK Government action;
v. developing ecosystem-based initiatives for the conservation and sustainable use of the marine environment.

Joint Ministerial Council Communiqué 2014 – Six areas of priorities identified;
Prosperity, Security, Environment, Governance, Communities & international

UN Convention on Biological Diversity (CBD) target of 10% of marine area to be MPA

From Joint Ministerial Council 2013 - Progress on Implementation of Agreed Actions Completed By Montserrat Date: 27th November 2014.

The Fisheries Unit of the Ministry of Agriculture is **seeking adequate technical** and financial assistance from HMG to develop the required legal framework for **improving the long-term sustainable management, governance and development of the marine resource** in Montserrat waters under national jurisdiction.

During a UKOT Biodiversity Strategy Review Meeting, held at KEW, March 2013, OT government participants expressed a **desire for broader based contacts with UK Government experts**, particularly within DEFRA and its family of agencies. **Specific issues in need to be addressed** related to current or anticipated **marine conservation and/or management actions** were identified at this time and through subsequent consultation with OT and Crown Dependencies governments. **Technical assistance, capacity building, resources, and an improved network with UK expertise were identified as critical** components for progress in careful planning and implementation of necessary conservation actions.

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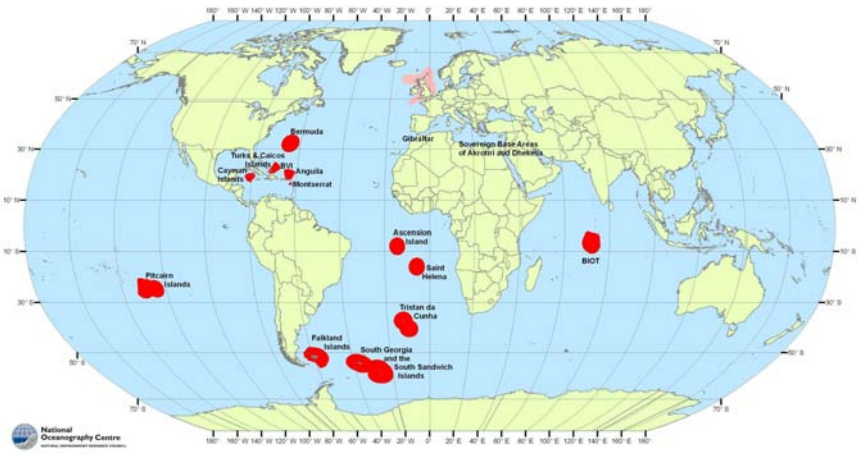
Why?

99.7% of UK OT is marine



Land area 18,400 sq km vs marine area 6,000,000 sq km

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How?

The United Nations Convention on the Law of the Sea (UNCLOS) is the overarching treaty for the marine environment

Within the UNCLOS there are provisions that provide measures by which States;

- define their marine area e.g. maritime boundaries
- recognise their responsibilities and obligations e.g. to protect and preserve
- **outlines the rights they have within their marine area e.g. access to scientific data and promote capacity building**

Example articles:

article 246(2) - Marine scientific research in the exclusive economic zone and on the continental shelf **shall be conducted with the consent of the coastal State**

article 249(1a) - ensure the right of the coastal State [..] **to participate or be represented in the marine scientific research project**, especially on board research vessel [..]

article 249(1c) - [..] **provide access for the coastal State**, at its request, **to all data and samples** derived from the marine scientific research project [..]

http://www.un.org/Depts/los/index.htm

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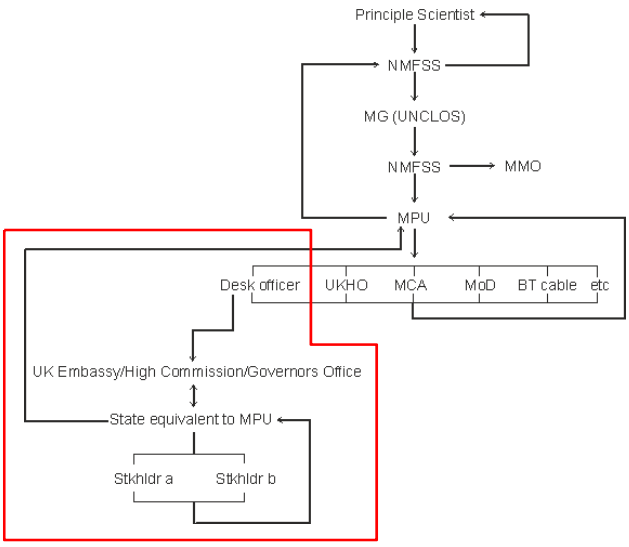
How?

Diplomatic clearance process for NERC(NOC) managed ships



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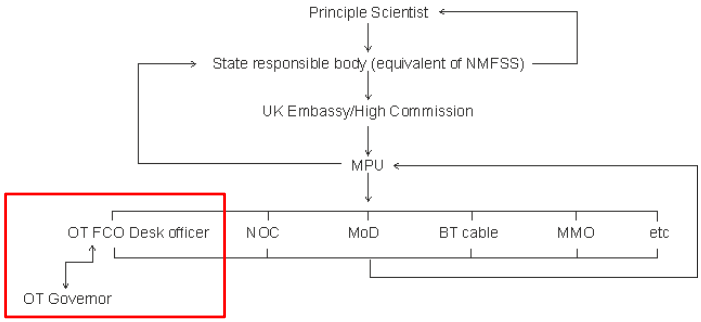
How?

Diplomatic clearance by foreign vessel to work in UK waters



Need to improve diplomatic clearance process to ensure data become available

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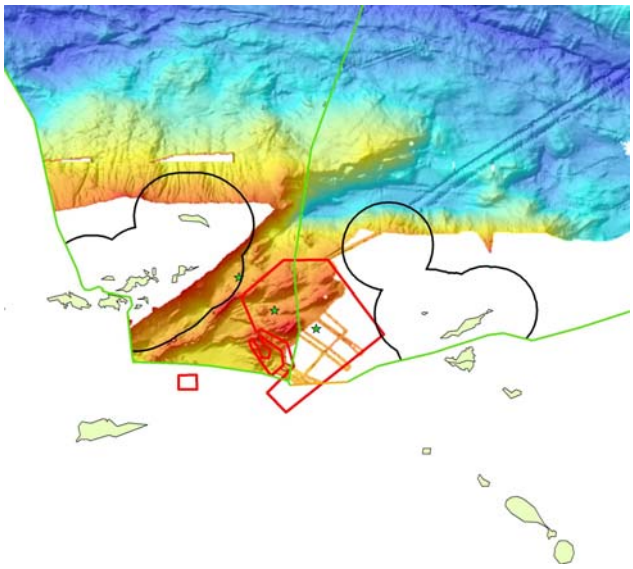
Antilles/Lesser Antilles Transition Zone - F2014-042, Aug-Sep 2014



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Where are the data?

Local database(s)

National database(s) with global coverage

Regional Institutions

International Institutions

Universities

Hydrographic Offices

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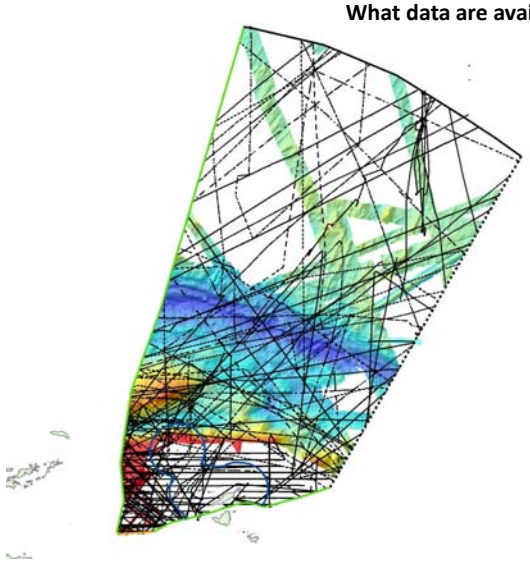
What data are available?



Anguilla

EEZ: 83,500 sq km

SB: 73 surveys

MB: 42,000 sq km ~50% of EEZ

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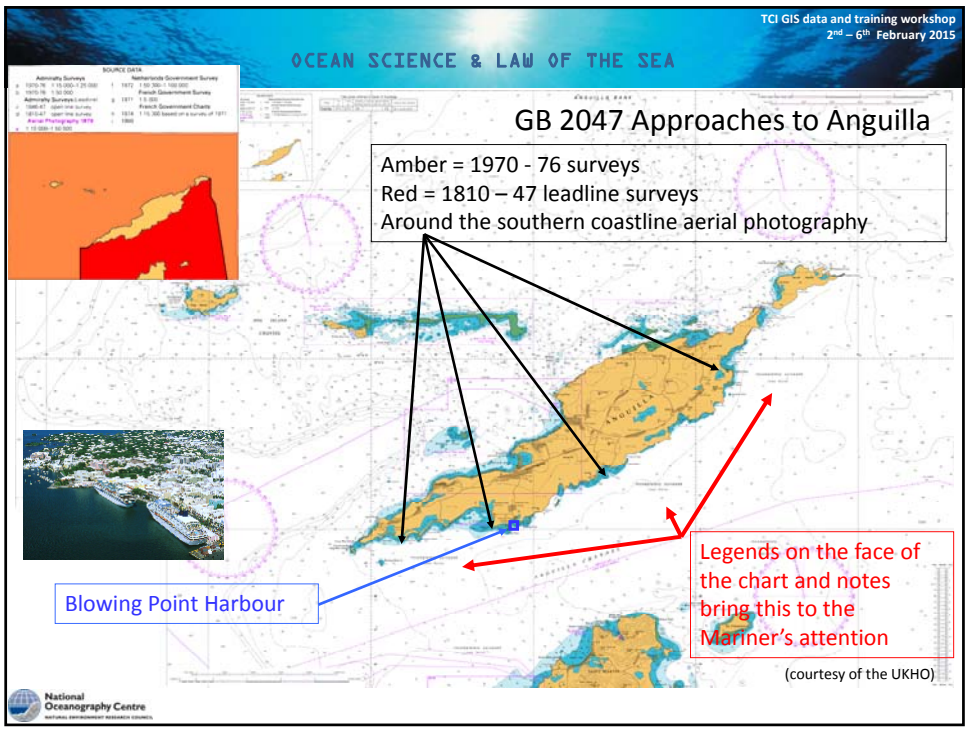
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GB 2047 Approaches to Anguilla
Amber = 1970 - 76 surveys
Red = 1810 – 47 leadline surveys
Around the southern coastline aerial photography
Blowing Point Harbour
Legends on the face of the chart and notes bring this to the Mariner's attention
(courtesy of the UKHO)
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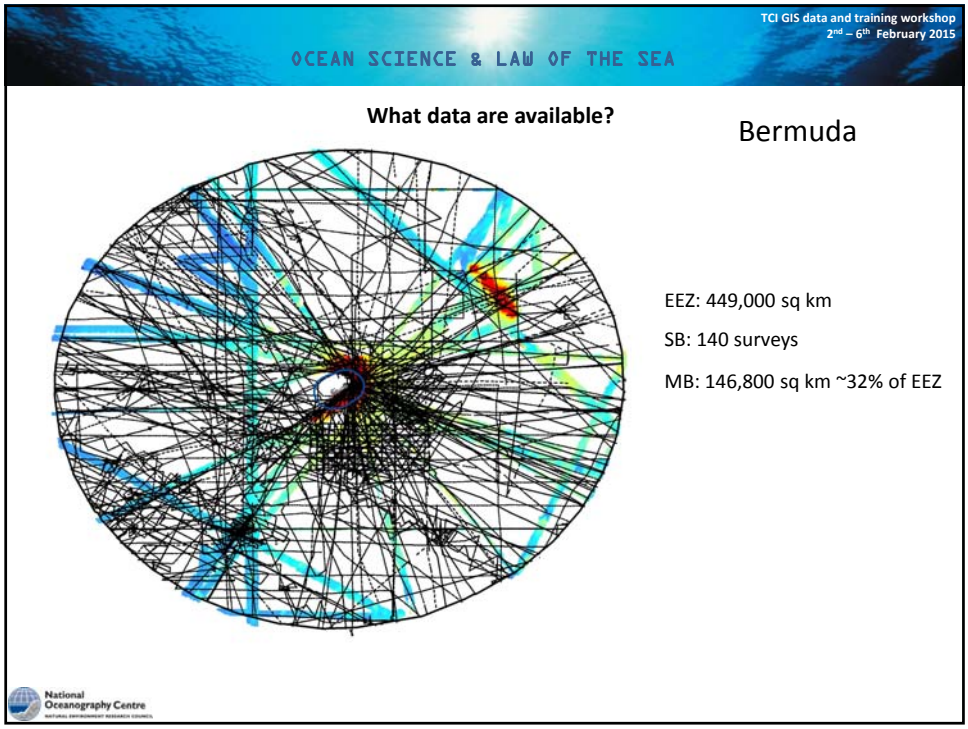
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What data are available?
Bermuda
EEZ: 449,000 sq km
SB: 140 surveys
MB: 146,800 sq km ~32% of EEZ
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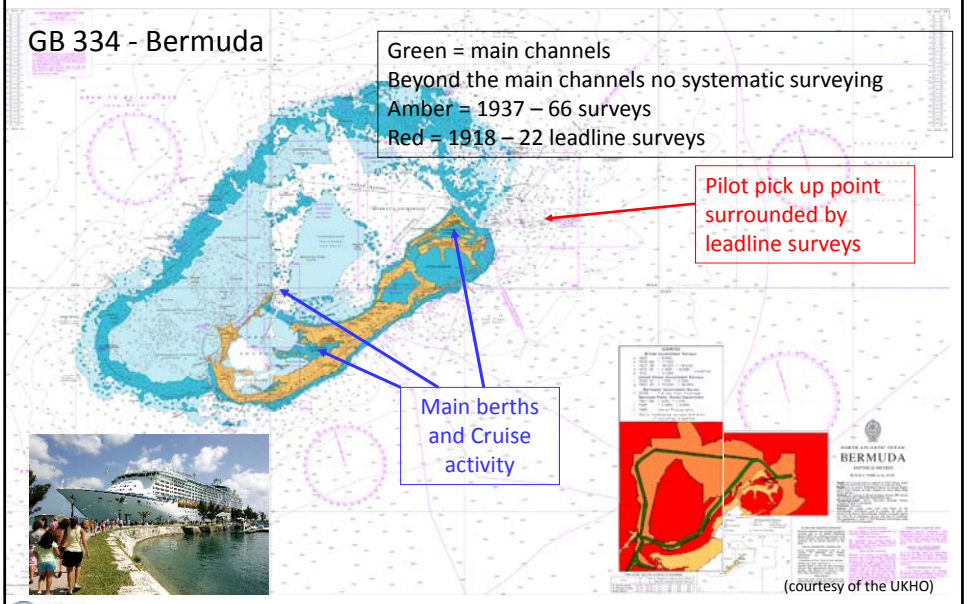
GB 334 - Bermuda

Green = main channels
Beyond the main channels no systematic surveying
Amber = 1937 – 66 surveys
Red = 1918 – 22 leadline surveys



(courtesy of the UKHO)

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Cruise ship on a reef near Hamilton, Bermuda. 2006

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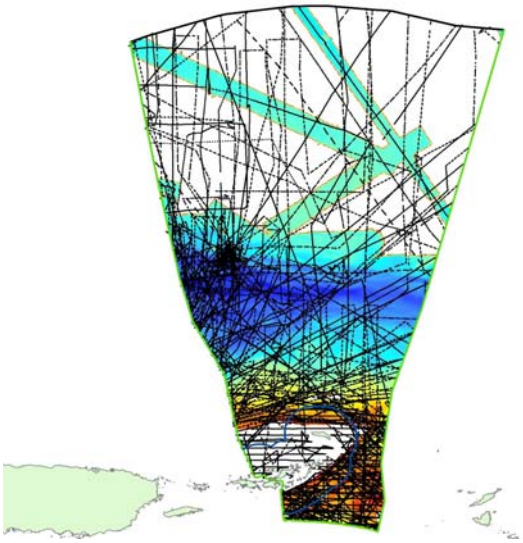
What data are available?

BVI



EEZ: 82,800 sq km
SB: 51 surveys
MB: 43,500 sq km ~53% of EEZ

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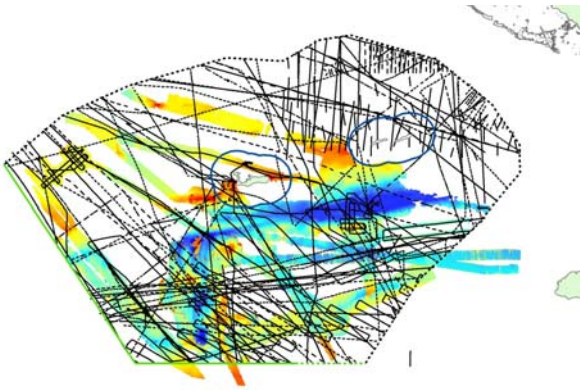
What data are available?

Cayman Islands



EEZ: 116,300 sq km
SB: 41 surveys
MB: 40,000 sq km ~34% of EEZ

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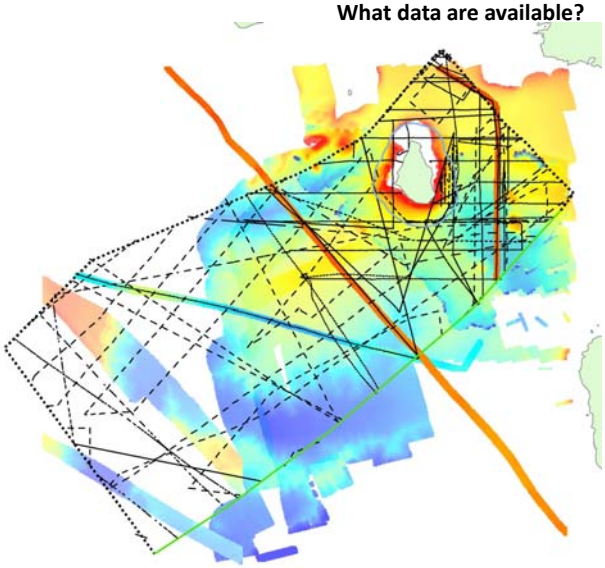
What data are available?



Montserrat

EEZ: 8,000 sq km

SB: 30 surveys

MB: 5,300 sq km ~66% of EEZ

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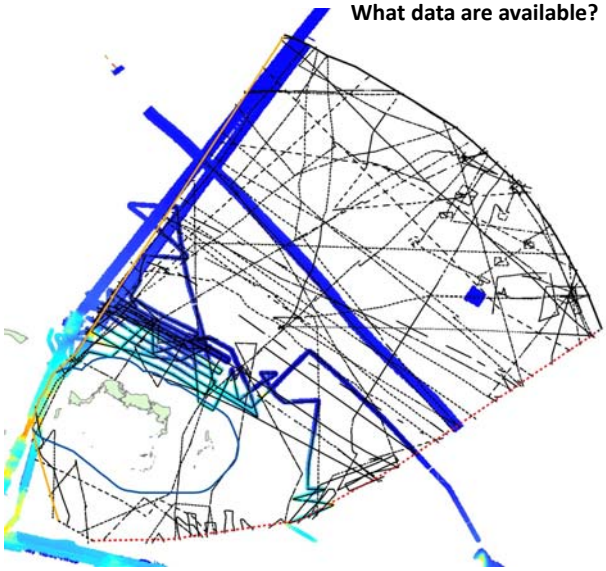
What data are available?



TCI

EEZ: 133,000 sq km

SB: 46 surveys

MB: 23,000 sq km ~17% of EEZ

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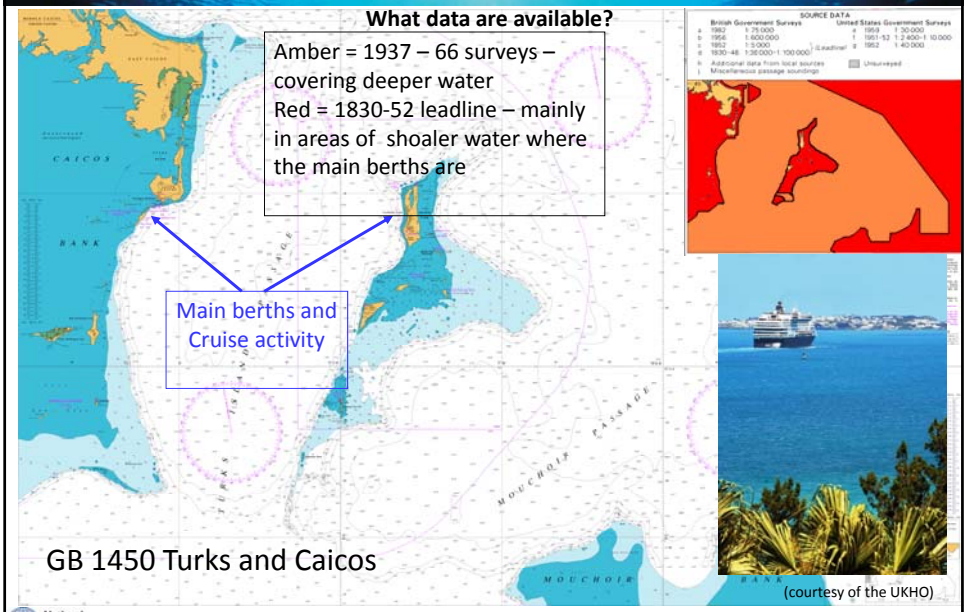
What data are available?

Amber = 1937 – 66 surveys – covering deeper water
Red = 1830-52 leadline – mainly in areas of shoaler water where the main berths are



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Uses in GIS?

Data assembly

Metadata information

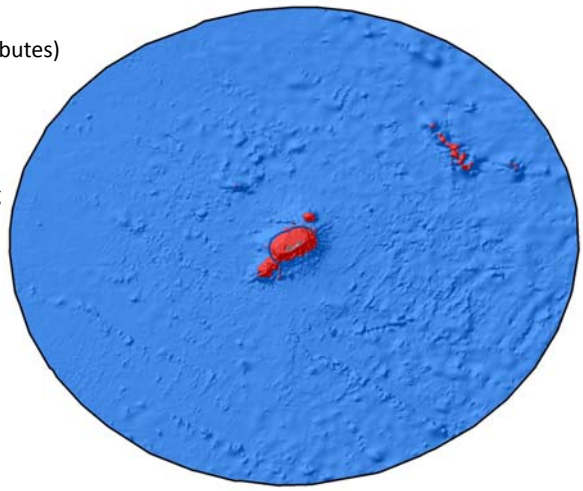
Derivative information (create attributes)

Visualisation of marine space use

Management of marine space use (fisheries areas, dive sites, shipping lanes etc)

Research

Marine Spatial Planning tool
(as part of a broader framework)



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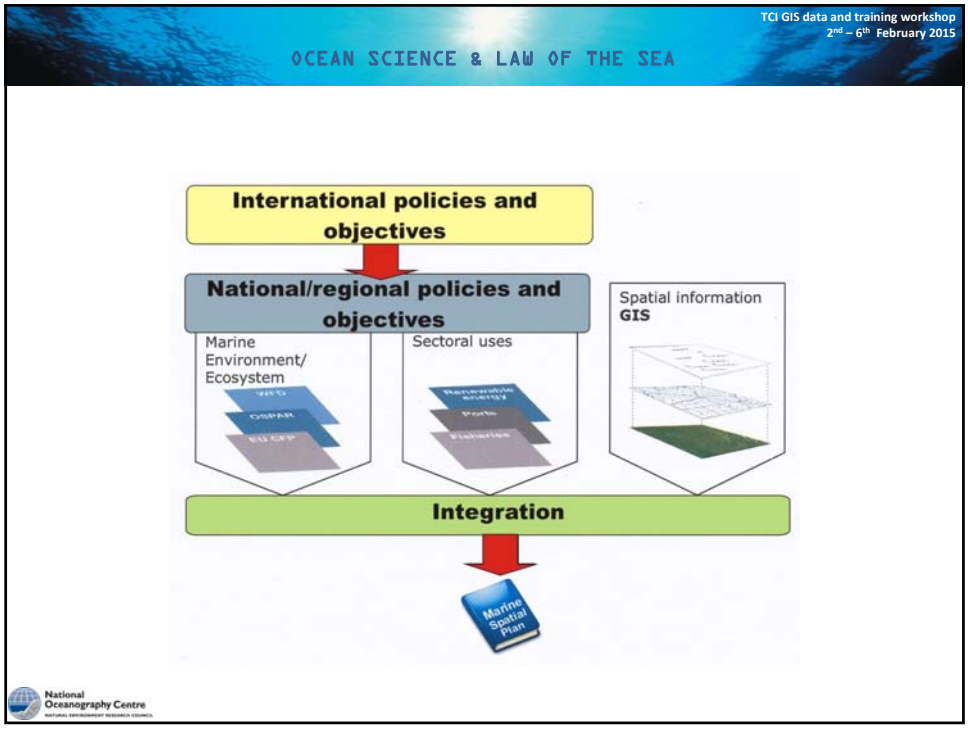
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International policies and objectives
National/regional policies and objectives
Marine Environment/ Ecosystem
Sectoral uses
Spatial information GIS
Integration
Marine Spatial Plan
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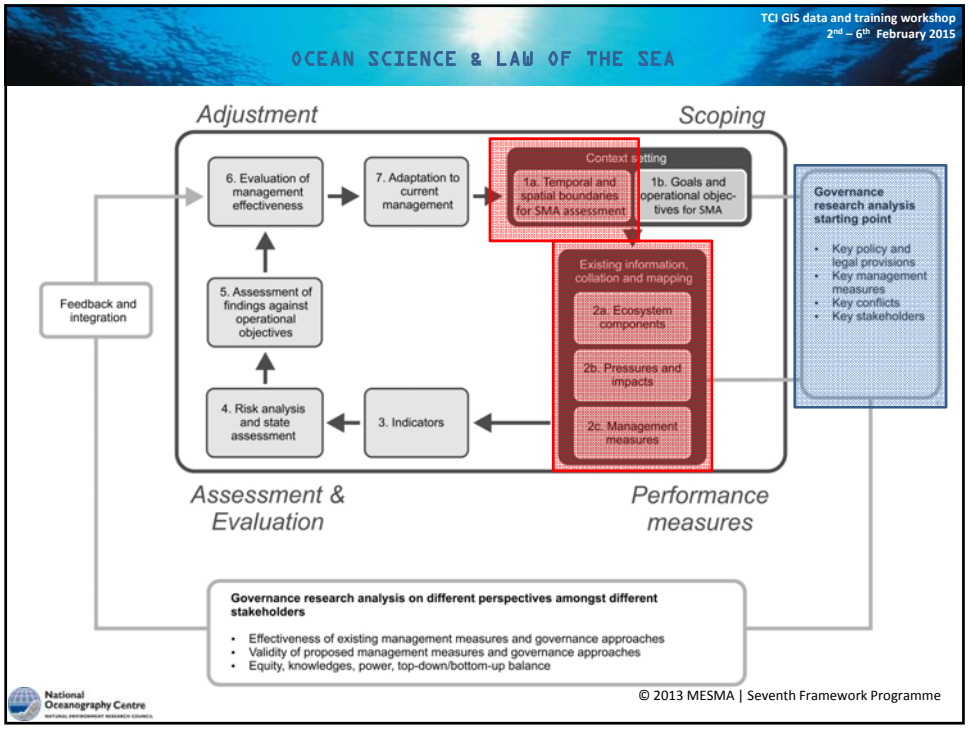
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Adjustment
Scoping
6. Evaluation of management effectiveness
7. Adaptation to current management
Context setting
1a. Temporal and spatial boundaries for SMA assessment
1b. Goals and operational objectives for SMA
Existing information, collation and mapping
2a. Ecosystem components
2b. Pressures and impacts
2c. Management measures
Governance research analysis starting point
Key policy and legal provisions
Key management measures
Key conflicts
Key stakeholders
Feedback and integration
5. Assessment of findings against operational objectives
4. Risk analysis and state assessment
3. Indicators
Assessment & Evaluation
Performance measures
Governance research analysis on different perspectives amongst different stakeholders
Effectiveness of existing management measures and governance approaches
Validity of proposed management measures and governance approaches
Equity, knowledges, power, top-down/bottom-up balance
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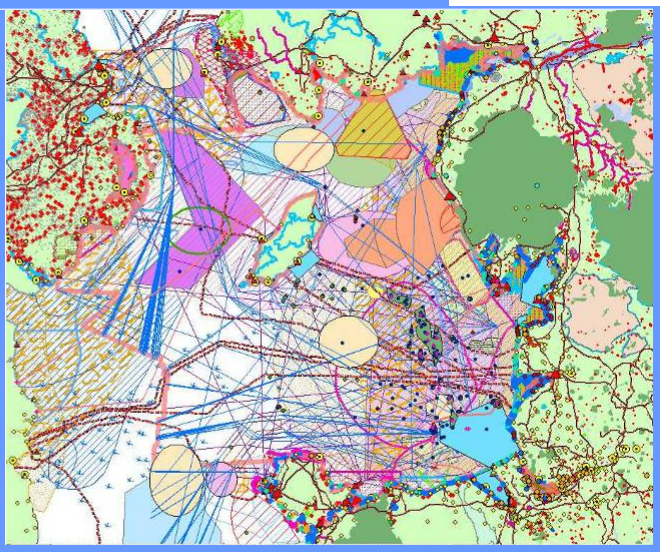
Competing use

defra Department for Environment Food and Rural Affairs

- Landuse
- Tourism
- Oil &Gas
- Mariculture
- Coastal Defence
- Ports & Navigation
- Military Activities
- Culture
- Conservation
- Dredging & Disposal
- Submarine Cables



- Fishing
- Renewable Energy
- Marine Recreation
- Mineral Extraction

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Benefits

- Identify where data exists, no need for re-surveying as such saving significant costs (survey once, use many times)
- Identify gaps in data coverage – targeted approach to addressing shortfall
- access to data for use in scientific research and ocean governance e.g. Resources, Tourism, fisheries, Environment, disaster mitigation
- Cost benefit analysis of mapping programme(s) known to be in the order of 1:>4

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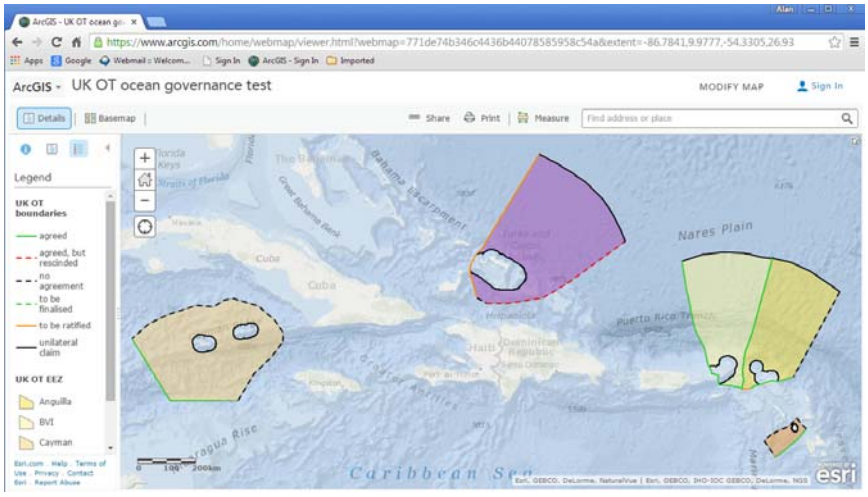
Data dissemination



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