



NLA International–Seabed 2030 Online Survey Report

Quantitative analysis and prioritisation of global
seabed mapping survey responses

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EXECUTIVE SUMMARY

The Nippon Foundation-GEBCO Seabed 2030 Project's vision to map the world's oceans by 2030 is insightful and ambitious setting a challenging timeline to address the 80% of the oceans that have yet to be charted to the required depth-variable resolution grid¹.

The "Wind in the Sails" proposal supports the Seabed 2030 Project by providing empirical evidence to enable the development of a prioritised, targeted survey strategy.

An online survey aimed to understand the global need for bathymetric data. The survey questions were broad and generic in nature to ensure applicability to all. Overall, 796 individuals responded to the survey, drawn from 90 countries, providing a unique, comprehensive and very timely global perspective on stakeholder requirements for mapping the world's oceans.

There was good cross-sectoral representation, with respondents identifying themselves as coming from government (28%); industry (27%); academia (22%); the not-for-profit sector (7%); Defence (3%) and 'other' (12%). The main benefit of mapping the world's oceans was overwhelmingly considered to be 'To advance scientific understanding of seabed characteristics' (40%), followed by 'To monitor environmental changes over time' (13%) and 'To understand and protect national economic interests' (12%).

154 respondents answered 'Yes' to the question: "Do you have any existing or forthcoming data that you could contribute to the Seabed 2030 mission?" Seabed 2030 team members have already been in touch with these respondents, in some cases already collecting data sets that had not previously been identified.

A more detailed level of analysis was subsequently undertaken in order to break down responses into manageable and potentially actionable groups of findings by geography. Results were presented in 12 ocean regions (Arctic Ocean, Atlantic North, Atlantic South, Baltic Sea, Black Sea, Indian Ocean, Mediterranean Sea, Pacific North, Pacific South, South China Sea, Southern Ocean and "Multiple" (Multi). The multiple category incorporates those results whereby respondents had preferences across multiple ocean regions and did not state a preference to either inshore or offshore as a priority for seabed mapping.

For each ocean region, data on the work sector, industries, seabed mapping need and interest, types of data and density required, area of interest and priority were tabulated and discussed.

The key findings from the quantitative analysis were as follows:

- **Arctic:** The largest sector response was from government organisations, the greatest need for seabed mapping came from science and research organisations and the (limited response) industrial requirements came from cables/communications and renewable sectors.
- **Atlantic North:** The largest sector response was industry and within this by far the leading industrial requirements came from the renewable energy companies. The leading need for seabed mapping came from the science and research communities.

¹ 2018 geosciences concept paper-The Nippon Foundation-GEBCO Seabed 2030 Project: The quest to see the world's oceans completely mapped by 2030 pages 8-9 Table 2.

- **Atlantic South**: The largest sector response was academia with the oil & gas companies showing the leading industrial requirement for seabed mapping. Like many ocean regions the greatest need for seabed mapping was for the science and research bodies.
- **Baltic Sea**: With a limited number of respondents (6) the largest sector need was government and the leading industrial requirements were to support defence. Again, the predominant need was to support science and research.
- **Black Sea**: With the smallest number of responses (4) the leading sector response was government, and the seabed mapping needs were equal for both economical and safety perspectives.
- **Indian Ocean**: The government was the leading sector response, and the majority industrial needs came from the fishing, aquaculture and oil & gas sectors. Once again, the primary need to map the seabed was science and research.
- **Mediterranean Sea**: Government was the leading response sector with industrial needs being the most significant call consultancy, research, science, fishing and tourism.
- **Pacific North**: The largest sector response was from academia, with industry needs equally reflected by consultancy, research, science, fishing, aquaculture and tourism. Of note, the fishing, aquaculture and tourism calls for seabed mapping were the largest across all 12 ocean regions.
- **Pacific South**: This region saw the highest number of responses of the whole survey (127) and government was the leading sector. The leading requirement for seabed mapping needs came from science and research bodies.
- **South China Sea**: Industry was the leading response sector and the largest across all 12 ocean regions. The most significant industrial call was for hydrography, mapping and surveying and the priority need was from a safety perspective. Note the South China Sea region was the only region to show that the greatest interest for seabed mapping was to understand and protect national economic interests.
- **Southern Ocean**: The results showed similar trends to the Arctic region. The leading response sector was academia while industrial calls were largely from consultancy, research and science. The overwhelming need for seabed mapping was from an environmental perspective and this was the most significant call across all 12 ocean regions.
- **Multiple Ocean Regions**: For those respondents who expressed interests and preferences for multiple ocean regions, the leading sector was government, with leading industry requirements laying within consultancy / research / science and the greatest need was from an environmental perspective.

While there was variation across the 12 ocean regions, the analysis showed that there was a strong and consistent requirement for the following aspects:

- From an “*interest*” in mapping the seabed the global requirement was **to advance scientific understanding of seabed characteristics**.
- For “*data type*” (environmental, object detection, other, combination or all) the unanimous call encompassed **all data types**.
- For “*data density*” requirements (depths, features, oceanographic, full insonification and others) the consistent call was for **full insonification** of the seabed.

- In 7 of the 12 ocean regions, the offshore waters are considered the top priority. Two prioritise inshore waters, whereas three prioritise both inshore and offshore waters.

Overall, the results of this quantitative analysis provide an insight of user seabed mapping needs in specific ocean regions thus forming the initial foundations of a global prioritisation requirement.

The resultant initial prioritisation list will be shared with national Hydrographic Offices (HOs), the International Hydrographic Organisation (IHO), Inter-governmental Oceanographic Commission (IOC) and other bodies or agencies that lead or have interests in waters beyond national jurisdiction (outside EEZs).

This process will be guided by a bespoke questionnaire to garner the views of these national and international bodies for further refinement and validation of the initial survey prioritisation list so that it evolves into a de facto, accepted international global seabed mapping prioritisation list.

SECTION ONE: INTRODUCTION

CONTEXT

The Nippon Foundation-GEBCO Seabed 2030 Project's vision to map the world's oceans by 2030 is insightful and ambitious setting a challenging timeline to address the 80% of the oceans that have yet to be charted to the required gridded resolution. The "Wind in the Sails" proposal supports the Seabed 2030 Project by providing empirical evidence to enable the development of a prioritised, targeted survey strategy. The aim of this three-phase project is to unite the global hydrographic community and operators within the marine and maritime domains around an agreed global seabed mapping priority list, underpinned by a robust evidence base that articulates the true need and value of mapping the seabed in its entirety to a defined gridded depth variable resolution.

THE 'WIND IN THE SAILS' SURVEY

An online survey was therefore published to understand the global need for bathymetric data. The survey questions were broad and generic in nature to ensure applicability to all. It was imperative that no marine, maritime or blue economy stakeholder was excluded so that as wide an evidence set as possible could be collected to accurately reflect global maritime needs for mapping the seabed.

Overall, 796 individuals responded to the Seabed 2030 online survey. These responses were drawn from 90 countries, providing a unique, comprehensive and very timely global perspective on stakeholder requirements for mapping the world's oceans. Overarching headline findings from the survey are presented in Section Two.

DETAILED TABULATED ANALYSIS BY OCEAN REGION

Beyond the cross-cutting findings that provide a high-level understanding of need and general priorities, the richness of the survey results demanded a much greater level of analysis, which was subsequently undertaken in order to break down responses into manageable and potentially actionable groups of findings.

The most logical way to do this was by geography. Accordingly, this paper outlines the results of a quantitative tabulated analysis of all the Seabed 2030 online survey results. The results are presented in 12 ocean regions as follows: Arctic Ocean, Atlantic North, Atlantic South, Baltic Sea, Black Sea, Indian Ocean, Mediterranean Sea, Pacific North, Pacific South, South China Sea, Southern Ocean and "Multiple" (Multi). The multiple category incorporates those results whereby respondents had preferences across multiple ocean regions and did not state a preference to either inshore or offshore as a priority for seabed mapping.

For each ocean region, data on the work sector, industries, seabed mapping need and interest, types of data and density required, area of interest and priority are tabulated and discussed. The results of this quantitative analysis provide an insight of user seabed mapping needs in specific ocean regions thus forming the initial foundations of a global prioritisation requirement.

USING THE RESULTS

While these findings obviously cannot be considered fully comprehensive of all stakeholder opinions, this is the largest survey to date canvassing the hydrographic community's views on seabed mapping priority areas; these findings thus provide the perfect platform from which to have further and more detailed conversations about where the global community's efforts should be focused in order to achieve the greatest impact.

The resultant initial ocean region prioritisation list will be shared with national Hydrographic Offices (HOs), the International Hydrographic Organisation (IHO), Inter-governmental Oceanographic Commission (IOC) and other bodies or agencies that lead or have interests in waters beyond national jurisdiction (outside EEZs). This process will be guided by a bespoke questionnaire to garner the views of these national and international bodies for further refinement and validation of the initial survey prioritisation list so that it evolves into a de facto, accepted international global seabed mapping prioritisation list.

If stakeholders wish to challenge certain findings, this report can be seen to have been a useful catalyst to elicit those opinions – driving greater and more detailed articulations of which areas *are* important to map. Conversely, if these findings by and large ring true, they provide the groundwork for a global action plan that will bring new focus and vitality to the Seabed 2030 mission.

SECTION TWO: CROSS-CUTTING FINDINGS

INTRODUCTION

In a complex and multi-faceted maritime/marine domain there will be no one answer to the question of priority but there will be layers of information based on requirements for seabed information across differing sectors with users having own needs and priorities.

The initial aim of the seabed 2030 online survey was to answer the following questions regarding seabed mapping:

- Who needs data?
- What is their interest?
- Where do they need it?

The survey results – gathered from 796 respondents in 90 countries – provided some very useful findings to help position next steps.

HEADLINE FINDINGS

There was good cross-sectoral representation, with respondents identifying themselves as coming from government (28%); industry (27%); academia (22%); the not-for-profit sector (7%); Defence (3%) and 'other' (12%).

The main benefit of mapping the world's oceans was overwhelmingly considered to be 'To advance scientific understanding of seabed characteristics' (40%), followed by 'To monitor environmental changes over time' (13%) and 'To understand and protect national economic interests' (12%).

70% of respondents had not yet estimated the environmental, social and economic value of mapping the seabed of greatest interest to them.

40% of respondents were actively involved in trying to map certain areas of the seabed, with 98% of that subset having previously applied for funding to do so.

Respondents were encouraged to identify all types of data they were interested in gathering, and bathymetry / depth / grid resolution selected by 83%; environmental data by 67%; classification of seabed features by 66%; and oceanographic data by 62%.

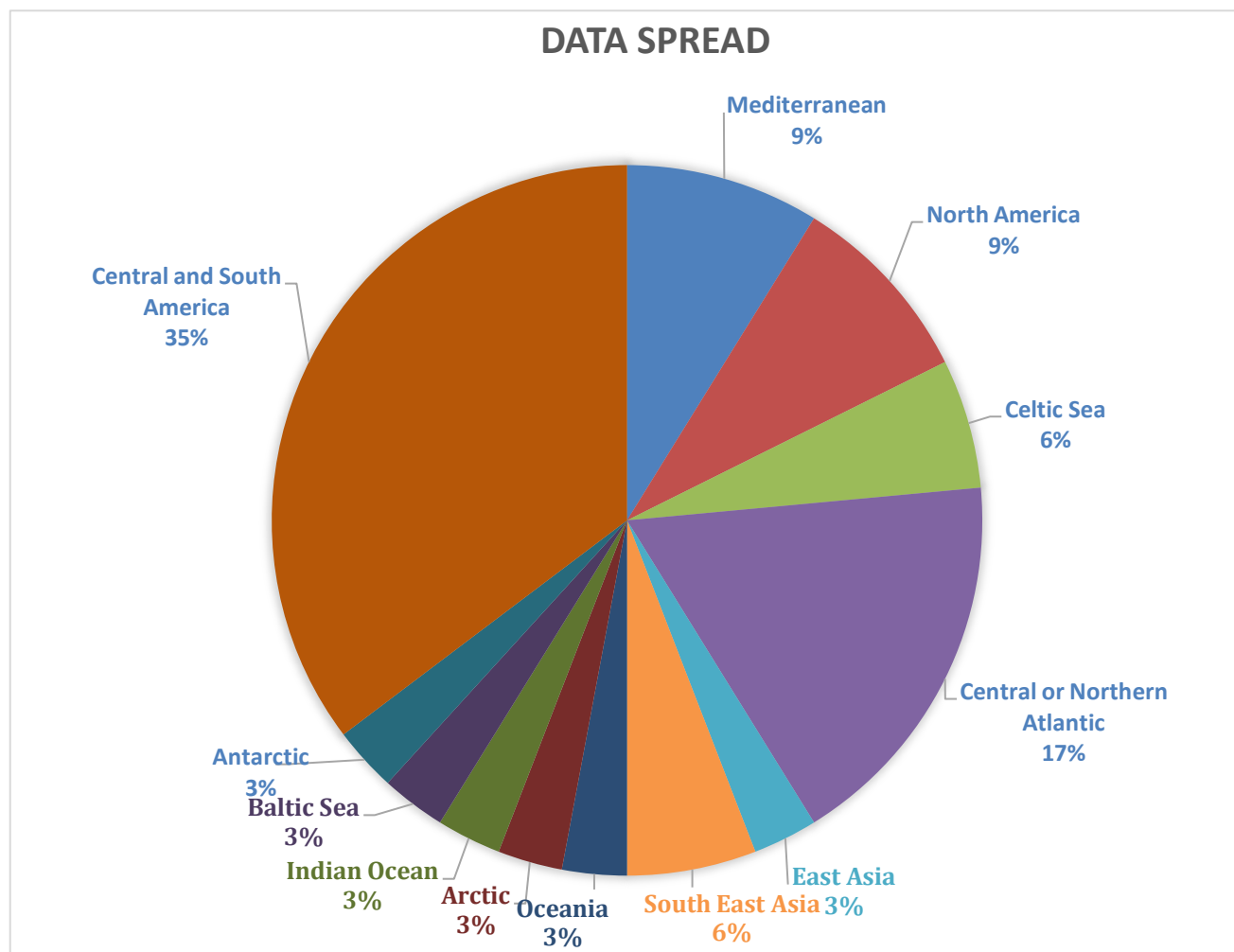
Marine geospatial data was most popularly required to a depth of 200m (36% of respondents), with the deepest ocean depths were preferred by 27%.

On detail and density, 47% of respondents said that they required full insonification and complete coverage of the seabed; the identification and classification of seabed features was the second most popular choice, favoured by 30% of respondents.

60% of respondents expressed a desire to access and download collected seabed data through an online marine data portal. This was followed by a more specific demand for the ability to create tailored, fused products to match specific needs.

New data sets

154 respondents answered 'Yes' to the question: "Do you have any existing or forthcoming data that you could contribute to the Seabed 2030 mission?" The seabed data that they had or are planning to collect broke down geographically (where it was specified) as follows:



Seabed 2030 team members have already been in touch with these respondents, in some cases already collecting data sets that had not previously been identified.

SECTION THREE: OCEAN REGION PRIORITIES ‘SNAPSHOTS’

INTRODUCTION

This section presents accessible ‘snapshots’ of the survey responses as they relate to each of the identified 12 ocean areas (the final “multiple” areas reflect the views of respondents who cited interests in more than one region). These therefore encompass named seas (Baltic, Black and South China Seas) as well as oceans.

Survey respondents were asked the following questions, the headlines of which are presented here:

- Which industry do you represent?
- Which industry has the greatest need to map this areas of the seabed?
- What are the main needs / benefits of mapping that area of the seabed?
- For what reason are you particularly interested in mapping that area of the seabed?
- What types of data do you require in that region (e.g. environmental, seabed objection detection)?
- What level of data detail do you require (e.g. full insonification, oceanographic data)?
- Are there any particular / specific areas of that region’s seabed that you are trying to get mapped?

The answers to these questions provided – provided on a regional basis – present a powerful new data set to drive further analysis and action.

In addition, to further refine seabed mapping needs, each ocean region has been sub-divided into inshore and offshore regions. The inshore regions incorporate those waters from the shoreline to the Territorial Waters (TWs) limit (12 nautical miles) whilst offshore refers to those waters beyond TWs.

In the online survey all responses to each question reflected the views of the collective respondents across 90 countries. By further segmenting the responses of the survey respondents to a particular region, the quantitative analysis was able to identify and extract refined needs for seabed mapping which were otherwise masked in the collective results.

The headline analysis of each of the above questions are presented overleaf – one page per ocean region, with offshore, inshore and combined responses presented side by side.

ARCTIC OCEAN REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES - ARCTIC		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (47%)	Academia (55%)	Government (100%)
LEADING INDUSTRY NEED - ARCTIC		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Others (46%)	Non-specified (27%)	Hydrography / Mapping / Survey (50%)
SEABED MAPPING NEED - ARCTIC		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Science / Research (44%)	Science / Research (55%)	Environmental (50%); Safety (50%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - ARCTIC		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (56%)	To advance scientific understanding of seabed characteristics (64%)	To advance scientific understanding of seabed characteristics (50%); To ensure Safety of Life at Sea (50%)
CHOSEN DATA TYPES - ARCTIC		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (69%)	All (73%)	All (50%); Combination (50%)
REQUIRED DATA DENSITY - ARCTIC		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (53%)	Full (60%)	Full (50%); Oceanographic (50%)
AREAS OF INTEREST TRYING TO GET MAPPED - ARCTIC		
<ul style="list-style-type: none"> Arctic Ocean 		

ATLANTIC NORTH REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – ATLANTIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Industry (43%)	Industry (27%)	Industry (58%)
LEADING INDUSTRY NEED - ATLANTIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Renewable Energy (32%)	Non-specified (32%)	Renewable Energy (40%)
SEABED MAPPING NEED - ATLANTIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Science / Research (39%)	Science / Research (53%)	Economy (33%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - ATLANTIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (36%)	To advance scientific understanding of seabed characteristics (46%)	To advance scientific understanding of seabed characteristics (27%)
CHOSEN DATA TYPES - ATLANTIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (85%)	All (94%)	All (76%)
REQUIRED DATA DENSITY - ATLANTIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (49%)	Full (49%)	Full (51%)
AREAS OF INTEREST TRYING TO GET MAPPED - ATLANTIC NORTH		
<ul style="list-style-type: none"> UK waters (EEZ) 		

ATLANTIC SOUTH REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – ATLANTIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Academia (49%)	Academia (38%)	Academia (48%)
LEADING INDUSTRY NEED - ATLANTIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Non-specified (39%)	Non-specified (56%)	Non-specified (39%)
SEABED MAPPING NEED - ATLANTIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Science / Research (45%)	Science / Research (44%)	Science / Research (55%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - ATLANTIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (49%)	To advance scientific understanding of seabed characteristics (50%)	To advance scientific understanding of seabed characteristics (52%)
CHOSEN DATA TYPES - ATLANTIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (98%)	All (100%)	All (95%)
REQUIRED DATA DENSITY - ATLANTIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (52%)	Full (43%)	Full (50%)
AREAS OF INTEREST TRYING TO GET MAPPED - ATLANTIC SOUTH		
Argentine seabed Azores and Madeira Islands EEZ Bransfield Basin, Antarctica Brazilian continental margin Brazilian continental margin - slope Brazilian river's mouths Ceará State offshore Coastal of Rio Grande do Norte Continental Shelf adj to Doce River mouth - Brazil Continental Shelf of East and Southeast of Brazil	Deep-sea realm Geophysics Gulf Of Guinea Inland maritime water Nav Area V Offshore areas of south America at Atlantic Sea The coastal areas of our EEZ where the greatest maritime traffic occurs. 'Safe Waters' and 'North' Corridors, along Uruguayan coast	Santos Basin Semi-Arid Brazilian Margin South Atlantic Southwest Iberia The area is the inner continental shelf of northern Rio Grande do Norte-Brazil The continental shelf adjacent to Espírito Santo State in Brazil The continental shelf of Ceará, Brazil to identify areas of geological and environmental interest

BALTIC SEA REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – BALTIC SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (50%)	Government (100%)	Government (50%)
LEADING INDUSTRY NEED - BALTIC SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Authorities / Defence (50%)	Authorities / Defence (100%)	Other (50%)
SEABED MAPPING NEED - BALTIC SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Science / Research (67%)	Science / Research (100%)	Science / Research (50%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - BALTIC SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (60%)	To advance scientific understanding of seabed characteristics (100%)	To advance scientific understanding of seabed characteristics (50%)
CHOSEN DATA TYPES - BALTIC SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (60%)	Object Detection (100%)	All (75%)
REQUIRED DATA DENSITY - BALTIC SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (83%)	Full (100%)	Full (75%)
AREAS OF INTEREST TRYING TO GET MAPPED - BALTIC SEA		
<ul style="list-style-type: none"> • Shallow waters, near coast • Seafloor sediments, Baltic Sea • Baltic Sea 		

BLACK SEA REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – BLACK SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (50%)	Academia (33.33%), Government (33.33%), Not-for-profit sector (33.33%)	N/A
LEADING INDUSTRY NEED - BLACK SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Others (50%)	Fishing/Aquaculture (33.33%), Hydrography / Mapping / Survey (33.33%), Other (33.33%)	N/A
SEABED MAPPING NEED - BLACK SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Economy (50%) Safety (50%)	Economy (67%)	N/A
KEY INTEREST FOR OCEAN FLOOR MAPPING - BLACK SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (67%)	To advance scientific understanding of seabed characteristics (67%)	N/A
CHOSEN DATA TYPES - BLACK SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (100%)	All (100%)	N/A
REQUIRED DATA DENSITY - BLACK SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (100%)	Full (100%)	N/A
AREAS OF INTEREST TRYING TO GET MAPPED - BLACK SEA		
<ul style="list-style-type: none"> Kumano Ridge - Nankai Trough Black Sea Aquacultures Biodiversity Conservation 		

INDIAN OCEAN REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – INDIAN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (38%)	Industry (32%)	Government (44%)
LEADING INDUSTRY NEED - INDIAN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Fishing / Aquaculture (24%)	Fishing / Aquaculture (26%)	Other (25%), Fishing / Aquaculture (13%), Oil Gas Exploration (13%), Authorities / Defence (13%)
SEABED MAPPING NEED - INDIAN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Science / Research (46%)	Science / Research (47%)	Science / Research (44%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - INDIAN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (44%)	To advance scientific understanding of seabed characteristics (53%)	To advance scientific understanding of seabed characteristics (40%)
CHOSEN DATA TYPES - INDIAN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (75%)	All (65%)	All (87%)
REQUIRED DATA DENSITY - INDIAN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (50%)	Full (50%)	Full (50%)
AREAS OF INTEREST TRYING TO GET MAPPED - INDIAN OCEAN		
<ul style="list-style-type: none"> Kenyan EEZ 		

MEDITERRANEAN SEA REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – MEDITERRANEAN SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (38%)	Academia (56%)	Government (44%)
LEADING INDUSTRY NEED - MEDITERRANEAN SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Consultancy / Research / Science (29%)	Non-specified (38%)	Consultancy / Research / Science (25%)
SEABED MAPPING NEED - MEDITERRANEAN SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Environmental (40%)	Environmental (44%)	Environmental (44%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - MEDITERRANEAN SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (43%)	To advance scientific understanding of seabed characteristics (78%)	Other (33%) To advance scientific understanding of seabed characteristics (22%) To better protect coastal habitats (22%)
CHOSEN DATA TYPES - MEDITERRANEAN SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (56%)	All (44%), Combination (44%)	All (67%)
REQUIRED DATA DENSITY - MEDITERRANEAN SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (65%)	Full (63%)	Full (75%)
AREAS OF INTEREST TRYING TO GET MAPPED - MEDITERRANEAN SEA		
Central Mediterranean Sea The whole Mediterranean basin (0-30 m) Seepage, shelf and slope bedforms, slope channels, continental shelf Seabed types and Geophysical properties	Mediterranean Sea and especially Balearic Island Italy's shelf areas Ionian Sea Hotspot of Biodiversity in the Mediterranean Sea (cold water coral sites), and coastal areas affected by human impact and marine litter accumulation	Underwater banks off the north of Tunisia Cretan Basin at the Aegean Sea Area of Interest is the coastal zone of the island of Crete Azores Triple Junction and Ionian Sea (Greece)

PACIFIC NORTH REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – PACIFIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Academia (36%)	Academia (33%), Government (33%)	Academia (50%), Industry (50%)
LEADING INDUSTRY NEED - PACIFIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Consultancy / Research / Science (30%), Fishing/Aquaculture (30%)	Fishing/Aquaculture (33%)	Consultancy / Research / Science (50%), Tourism (50%)
SEABED MAPPING NEED - PACIFIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Environmental (45%)	Environmental (33%), Science / Research (33%)	Environmental (100%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - PACIFIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (36%)	To advance scientific understanding of seabed characteristics (33%)	To advance scientific understanding of seabed characteristics (50%), Other (50%)
CHOSEN DATA TYPES - PACIFIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (44%)	All (43%)	All (50%), Combination (50%)
REQUIRED DATA DENSITY - PACIFIC NORTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (63%)	Full (67%)	Full (50%), Features (50%)
AREAS OF INTEREST TRYING TO GET MAPPED - PACIFIC NORTH		
West Pacific Tonkin and Thai gulf Pacific Marine Protected Areas	Mesoamerica next reefs & Pacific islands Ma'alaea Bay, Hawaii, USA - Coral Reef Eco System Restoration Gulf of Alaska, Eastern Bering Sea	EEZ and sea-lanes Cocos Island Areas of W coast of N America EEZ not yet mapped

PACIFIC SOUTH REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – PACIFIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (30%)	Government (24%), Academia (24%)	Government (42%)
LEADING INDUSTRY NEED - PACIFIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Others (48%)	Non-specified (41%)	Non-specified (43%)
SEABED MAPPING NEED - PACIFIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Science / Research (46%)	Science / Research (58%)	Environmental (32%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - PACIFIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (45%)	To advance scientific understanding of seabed characteristics (54%)	To advance scientific understanding of seabed characteristics (32%)
CHOSEN DATA TYPES - PACIFIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (85%)	All (93%)	All (71%)
REQUIRED DATA DENSITY - PACIFIC SOUTH		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (46%)	Full (42%)	Full (47%)
AREAS OF INTEREST TRYING TO GET MAPPED - PACIFIC SOUTH		
<ul style="list-style-type: none"> • Carnegie Ridge • Cocos Ridge • Galapagos Island's EEZ 		

SOUTH CHINA SEA REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – SOUTH CHINA SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Industry (46%)	Government (50%)	Industry (50%)
LEADING INDUSTRY NEED - SOUTH CHINA SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Hydrography / Mapping / Survey (45%)	Hydrography / Mapping / Survey (50%)	Hydrography / Mapping / Survey (33%)
SEABED MAPPING NEED - SOUTH CHINA SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Safety (38%)	Safety (50%)	Economy (50%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - SOUTH CHINA SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (31%), To understand and protect national economic interests (31%)	To advance scientific understanding of seabed characteristics (33%), To monitor environmental changes over time (33%)	To understand and protect national economic interests (50%)
CHOSEN DATA TYPES - SOUTH CHINA SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (67%)	All (40%), Other (40%)	All (83%)
REQUIRED DATA DENSITY - SOUTH CHINA SEA		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (50%)	Full (40%), Features (40%)	Full (50%)
AREAS OF INTEREST TRYING TO GET MAPPED - SOUTH CHINA SEA		
Western part of Banda Sea, Indonesia Waters near Mui Ke Ga in Vietnam Pocket zones between countries in the Indo-West	North Natuna Sea (a part of South China Sea) Large marine ecosystem Indonesia Sea Eastern Indonesia	Areas with unreliable sounding data Areas with high traffics and contain many obstruction/hazards to navigation

SOUTHERN OCEAN REGION PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – SOUTHERN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Academia (53%)	Academia (60%)	Academia (50%)
LEADING INDUSTRY NEED - SOUTHERN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Consultancy / Research / Science (40%)	Non-specified (50%)	Non-specified (67%)
SEABED MAPPING NEED - SOUTHERN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Environmental (53%)	Environmental (70%)	Science / Research (50%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - SOUTHERN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (50%)	To advance scientific understanding of seabed characteristics (67%)	To advance scientific understanding of seabed characteristics (25%), To monitor environmental changes over time (25%), To better protect coastal habitats (25%), To ensure Safety of Life at Sea (25%)
CHOSEN DATA TYPES - SOUTHERN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (64%)	All (57%)	All (75%)
REQUIRED DATA DENSITY - SOUTHERN OCEAN		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (54%)	Full (50%)	Full (67%)
AREAS OF INTEREST TRYING TO GET MAPPED - SOUTHERN OCEAN		
Southern Ocean Antarctic ZEE	Southern Ocean and Antarctica Southern hemisphere - largely unknown. And high-resolution mapping (AUVs)	Lucky Strike vent field East Antarctica

MULTIPLE AREAS OF INTEREST PRIORITIES SNAPSHOT

MARITIME SECTOR WITH MOST RESPONSES – MULTIPLE AREAS OF INTEREST		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Government (40%)	Government (40%)	Government (40%)
LEADING INDUSTRY NEED - MULTIPLE AREAS OF INTEREST		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Consultancy / Research / Science (26%)	Hydrography / Mapping / Survey (26%)	Consultancy / Research / Science (24%)
SEABED MAPPING NEED - MULTIPLE AREAS OF INTEREST		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Environmental (42%)	Environmental (36%)	Environmental (48%)
KEY INTEREST FOR OCEAN FLOOR MAPPING - MULTIPLE AREAS OF INTEREST		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
To advance scientific understanding of seabed characteristics (28%)	To advance scientific understanding of seabed characteristics (32%), Other (32%)	To advance scientific understanding of seabed characteristics (28%)
CHOSEN DATA TYPES - MULTIPLE AREAS OF INTEREST		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
All (60%)	All (57%)	All (64%)
REQUIRED DATA DENSITY - MULTIPLE AREAS OF INTEREST		
TOTAL RESPONSES	OFFSHORE RESPONSES ONLY	INSHORE RESPONSES ONLY
Full (62%)	Full (57%)	Full (65%)
AREAS OF INTEREST TRYING TO GET MAPPED - MULTIPLE AREAS OF INTEREST		
US EEZ Great Lakes		

SECTION FOUR: FULL DATA ANALYSIS OF EACH OCEAN REGION

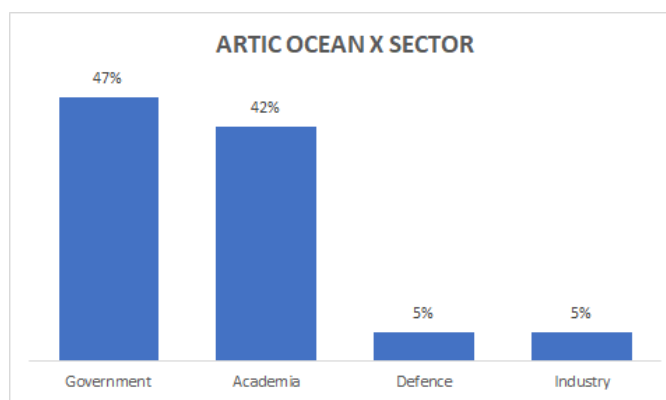
INTRODUCTION

This section presents the full data available aligned to each ocean region, so the reader can focus in on the ocean region(s) of greatest interest to them.

REGION 1: ARCTIC OCEAN

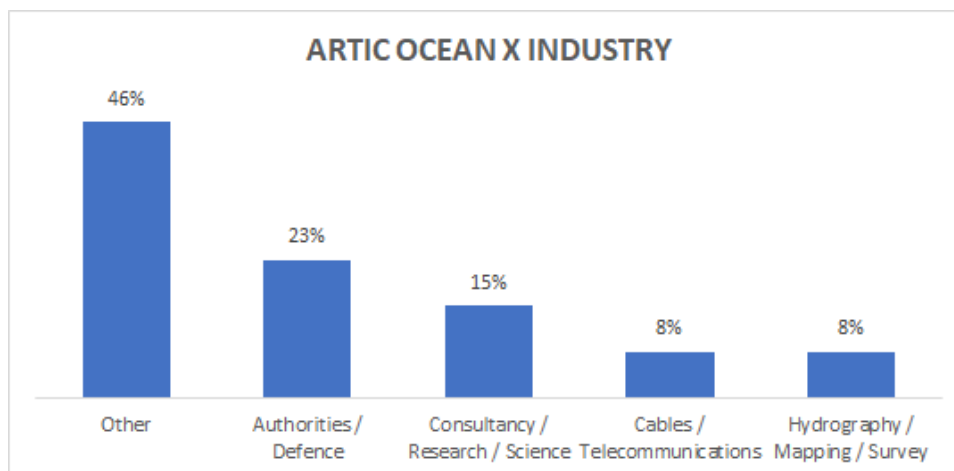
Government and academia formed the top 2 sectors of respondents prioritising the Arctic Ocean region. Although, the 4 main industries represented were authorities/defence, consultancy/research/science, cables/telecommunications, and hydrography/mapping/survey, it is to be noted that a considerable portion of the respondents represent other industries. In terms of the need for seabed mapping, the respondents mostly need it for science/research and environmental purposes. This makes sense since more than half of them are interested in mapping the ocean floor to further understand seabed characteristics. The next most chosen reason is for marine renewable energy purposes. Most of the respondents prefer a full insonification of data density and most chose all data types in terms of needed information. A majority (85%) of the respondents require offshore waters whilst only a small percentage chose inshore.

Maritime Sector



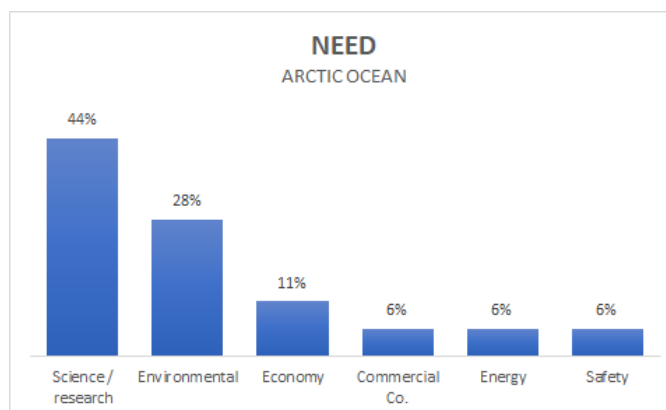
Of the Arctic Ocean survey respondents, 47% represent government (science and environmental make up the majority) with 42% coming from the academia and the final 10% was split between defence and industry. It is not surprising to see the industry interests within the Arctic region predominantly lie within the renewable fields.

Industries Represented



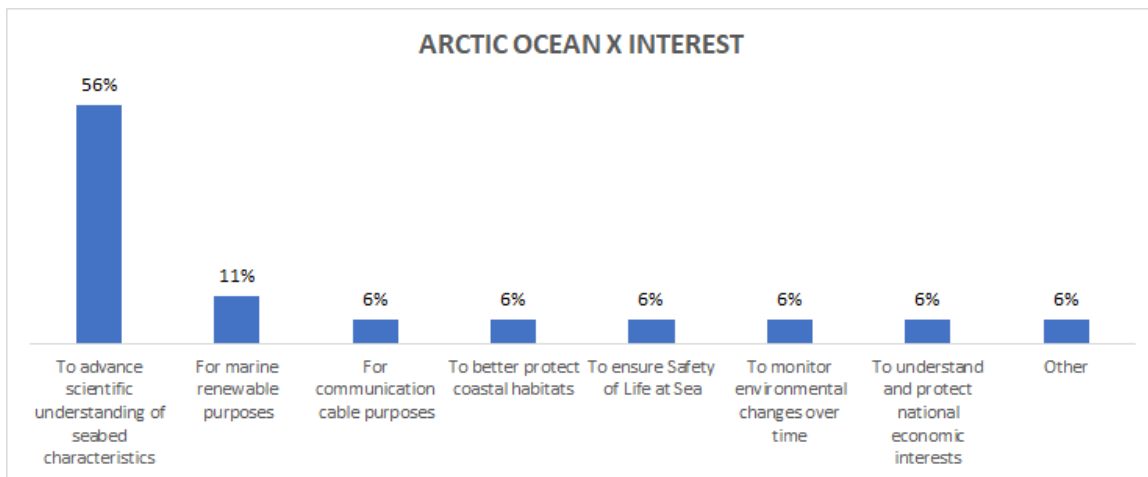
With 13 responses to this question, 46% of the respondents for the Arctic Ocean region come from other areas outside of those specified in the questionnaire. By and large these are representatives who work within science and research fields. The second largest area of 23% represent national authorities and defence fields. The results are the expected norm for the Arctic region.

Seabed Mapping Need



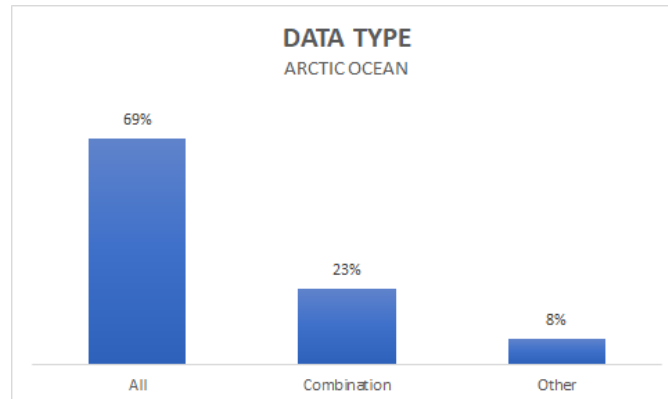
The most significant mapping need for the Arctic Ocean is science/research (44%), followed by environmental (28%) and a combined 72% makes this the preponderance requirement to map the seabed. The 11% economic need to map the seabed align with the renewable industries and cables industries.

Interest for Ocean Floor Mapping



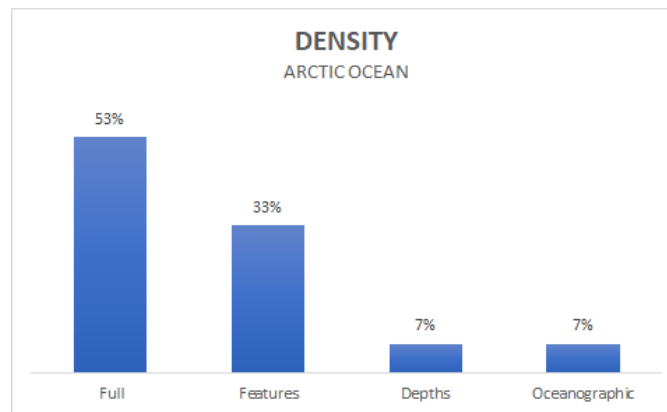
More than half of the 18 respondents (56%) are interested in mapping the ocean floor to advance scientific understanding of seabed characteristics. If you then combine the other environmental interests of better protect coastal habitats (6%) & to monitor environmental changes over time (6%) the total percentage level of respondents who specified environmental interests in the Arctic region totals 68%. Interestingly the second highest interest factor in the Arctic at 11% is particularly concerned with mapping for marine renewable purposes. These results align well with previous questions and analysis.

Chosen Data Types



Given the current paucity of oceanographic and seabed data within the region it is not surprising that most respondents prefer "all" types of data (bathymetry, object detection and environmental) for the Arctic Ocean (69%). Interestingly, 23% of the respondents prefer a combination data type whether it be oceanographic or hydrographic.

Required Data Density

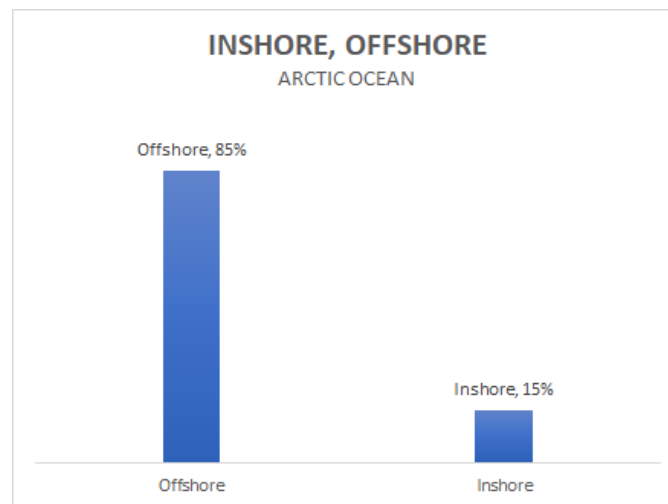


Interestingly, 53% of the respondents require full insonification data for the Arctic Ocean and again with the dearth of data in the region this does not come as a surprise. The results also shown that a significant number of respondents (33%) require features only, whilst only 7% are interested in the depths and oceanographic data.

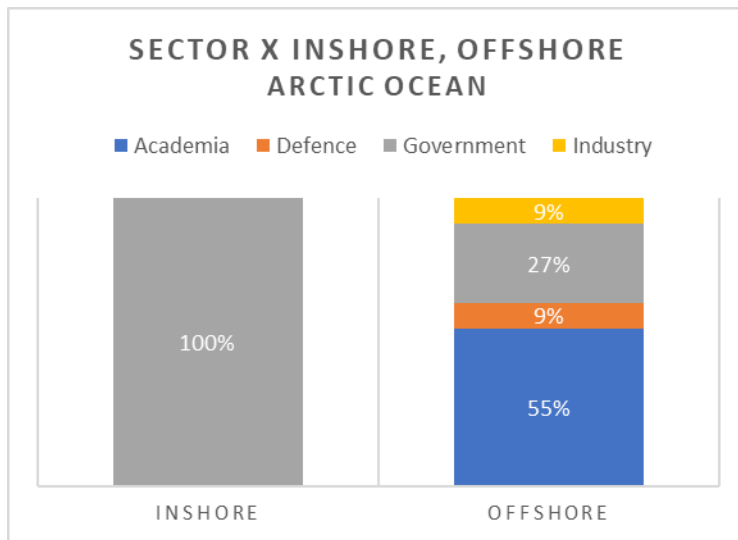
Priority Area for the Region

An overwhelming requirement is to map the deeper offshore waters over those shallower inshore waters. This factor aligns well with many respondents sitting within environmental, science and research fields. The highest priority for seabed mapping in the region of the respondents say that the specific area that is trying to get mapped is the Arctic as a whole.

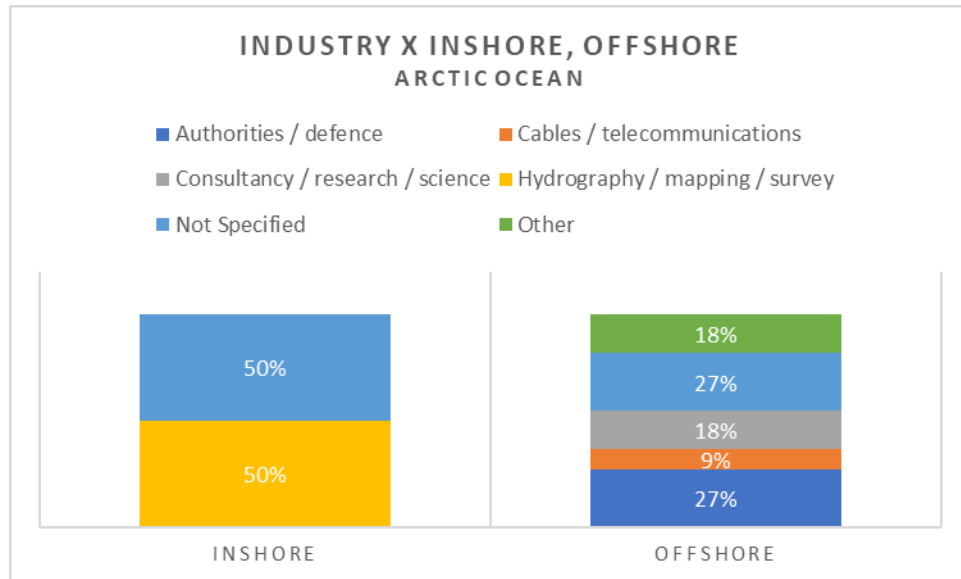
Inshore versus Offshore Priorities



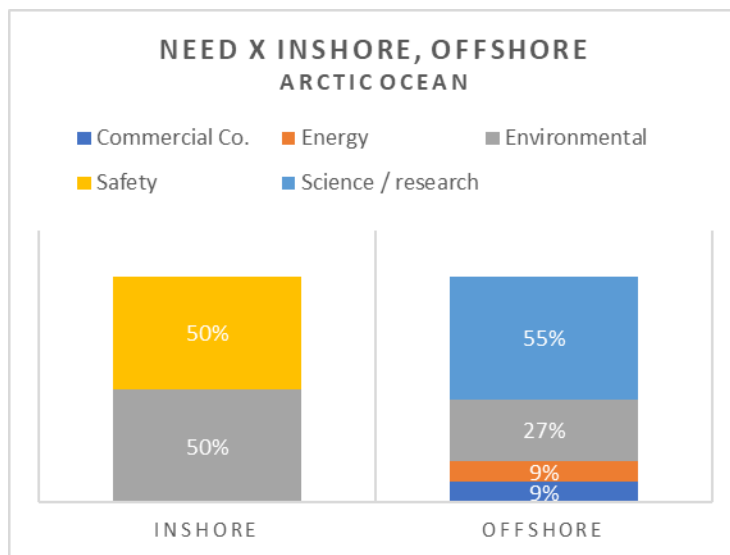
It is not surprising given that the greatest requirements called for in the Arctic region were those factors relating to environmental and scientific understanding that 85% of respondents prioritised offshore mapping and with only 15% requiring inshore waters mapped.



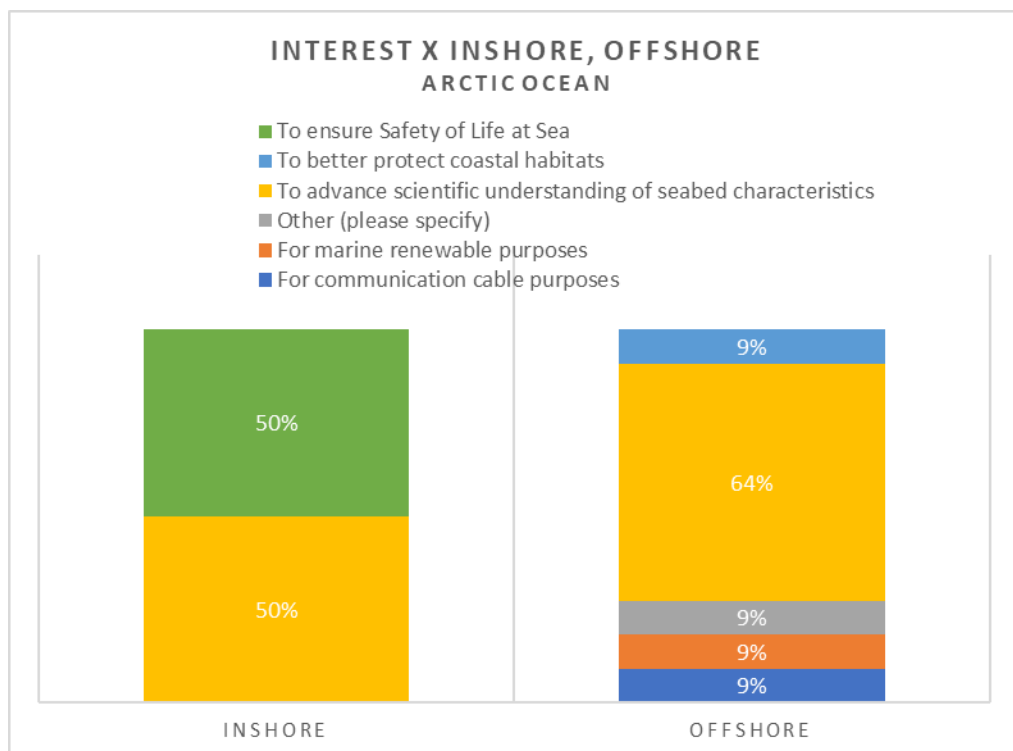
The respondents who chose inshore waters are all from the government sector. Offshore mapping is represented by academia 55%, government 27% and 9% each from the defence and industry sectors.



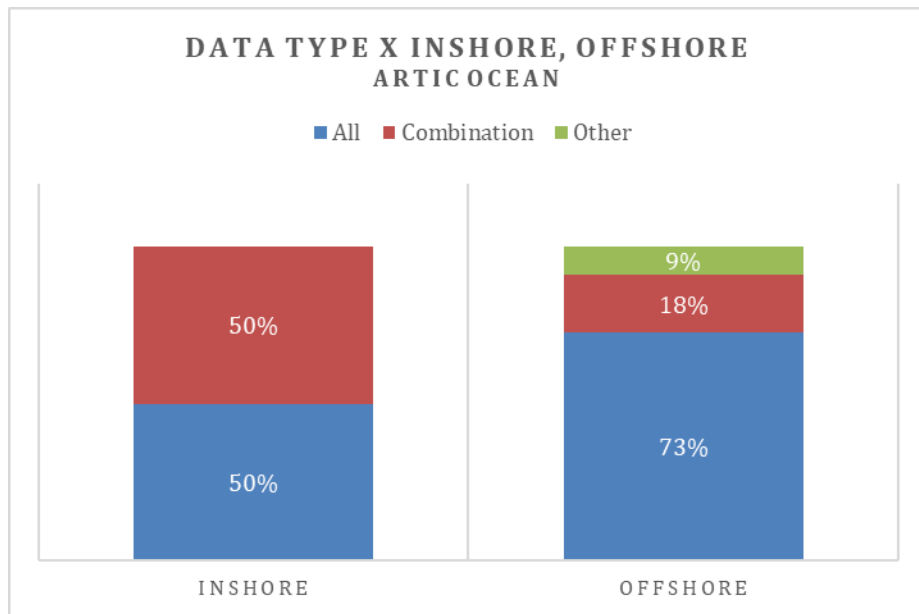
The offshore respondents come from various industries, with authorities/defence (27%), consultancy/research/science (18%) with 27% not specified in the maritime sector and 18% represented by other industries. The industries that the inshore respondents represent are split equally between hydrography/mapping/survey and those that are not specified in the maritime sector.



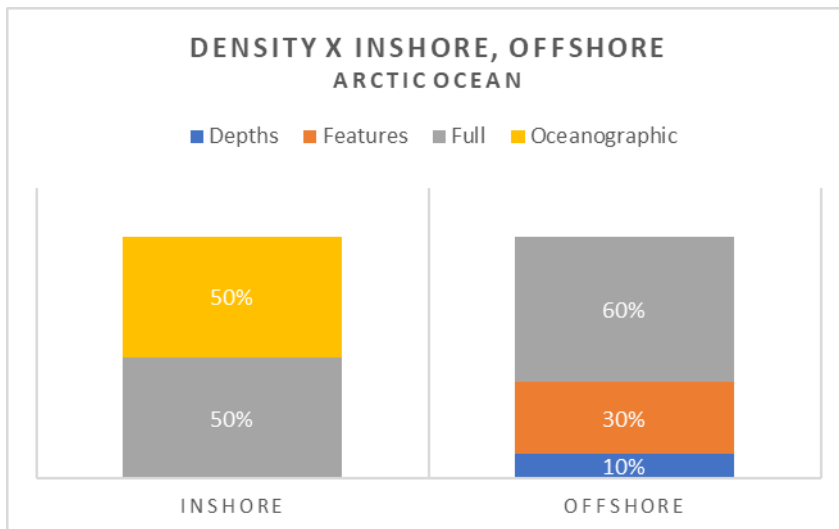
Science/research remains the top priority for the Arctic Ocean comprising of (55%) offshore requirements (55%) and this was followed by 27% who prioritized the environment. Inshore needs to map the seabed were split evenly by both safety and environmental requirements.



Most offshore respondents were interested in advancing scientific understanding of seabed characteristics (64%). Inshore respondents are equally split between advancing scientific understanding and ensuring the safety of life at sea.



As indicated by a previous question the requirement for “all” data types were preferred by 73% of the offshore results and this corroborates with previous results. Whereas inshore results were equally split between all and combined data types, however little weight should be taken from this as there were only 2 responses for the inshore waters on this question.

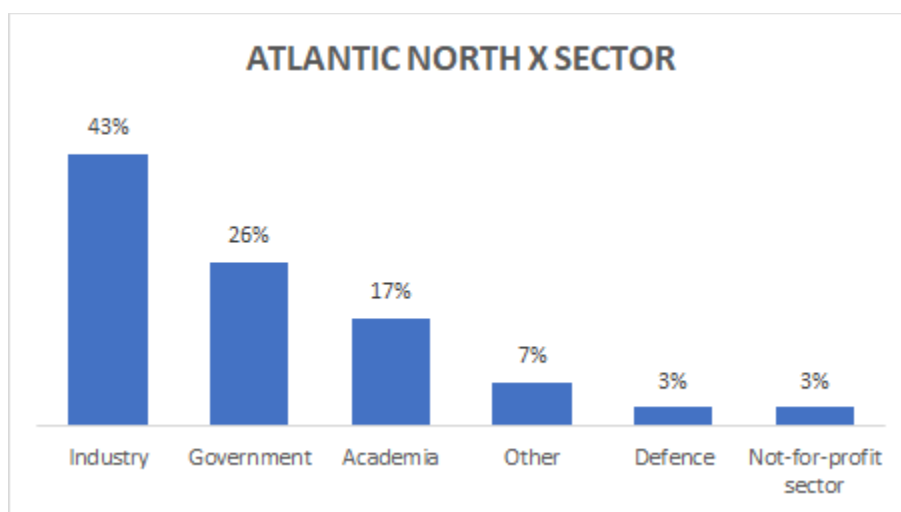


Of 10 responses 60% of respondents who require offshore research prefer a full density of data, with 30% needing features and 10% depths. Inshore data again was equally split between full and oceanographic requirements, but as previously stated with only 2 responses such a small dataset carries little weight.

REGION 2: ATLANTIC NORTH

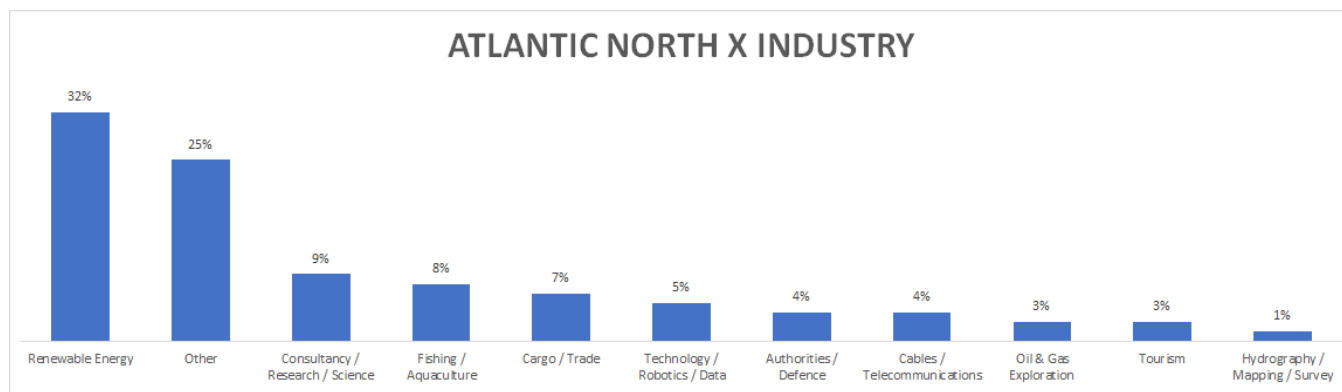
Most Atlantic North respondents work in the industry, government and academia sectors. Across the 12 ocean regions Atlantic North had the second highest call for seabed mapping from an industry need and perspective. Eleven industries are represented with renewable energy and 'other wider industries' making up most responses. There was a significant call to map the inshore waters of the North Atlantic and the waters around the UK were specifically highlighted. There are several factors why this is called for, first the high volume of shipping routes that transit the coastal waters of Northern Europe. Secondly, the rapid growth in the renewable sectors across UK and Northern European waters and the expectation that this sector will proliferate over the coming decade. The most populated reasons for needing seabed mapping are for science/research, economy, and environmental purposes. To add to that, respondents were interested because they want to advance their understanding of seabed characteristics with some interested in marine renewable purposes. All data types are primarily required. With regards to data density, full insonification and features are preferred.

Maritime Sector



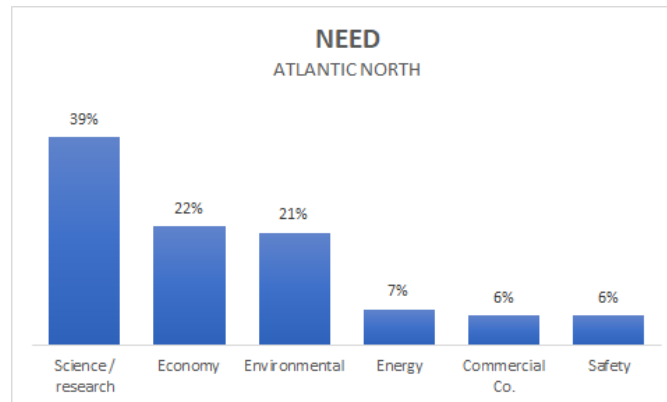
Of the 12 ocean regions the Atlantic North received the second highest number of responses (99) of these 43% represented the industry sector. Other significant sectors within this region were as follows; 26% coming from the government and 17% from academia.

Industries Represented



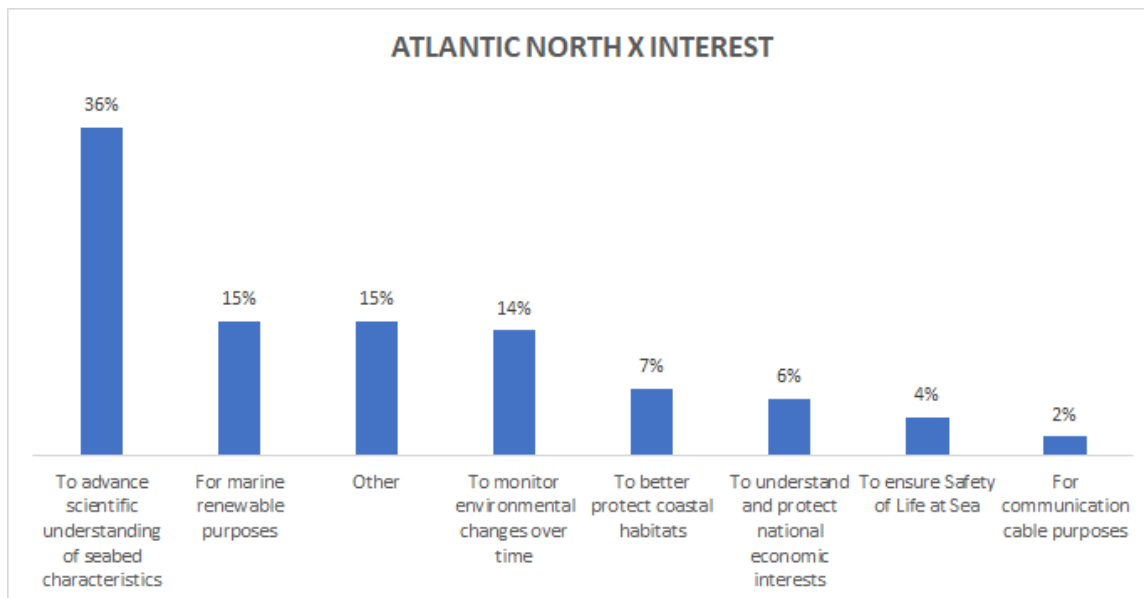
The Atlantic North region received the highest number of responses to this question across the 12 ocean regions. Renewable energy represented the primary area of industry with 32% of the Atlantic North respondents. This aligns well with the recent growth in renewable industries where environmental weather factors are ideal for the generation of renewable energy. Outside of this 25% come from other industries, socio-economic is clearly the largest factor in the North Atlantic region whilst only 9% are in consultancy/research/science.

Seabed Mapping Need



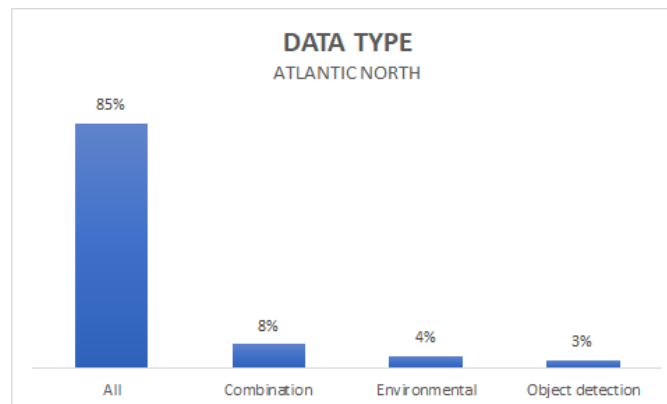
Again, the North Atlantic region saw the second highest number of responses to this question. Interestingly whilst we have seen that industries and socio-economic development is the most significant factor the primary need for seabed mapping of the Atlantic North is for science/research purposes (39%), followed by the economy (22%) and the environment (21%).

Interest for Ocean Floor Mapping



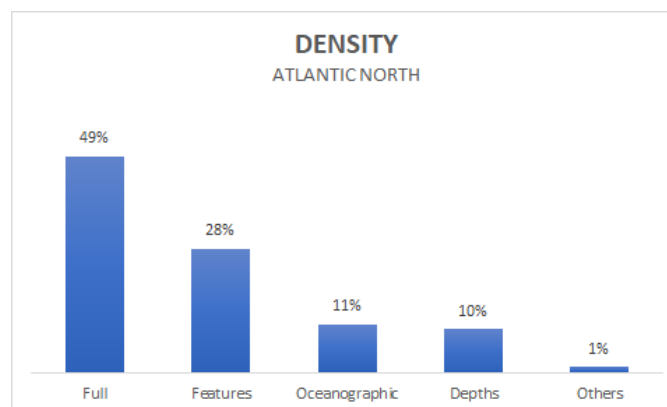
The top reason respondents want to map the ocean floor is to advance scientific understanding of seabed characteristics (36%). Interestingly, the number one interest across all 12 ocean regions stated the main interest for mapping the seabed was for the scientific understanding of seabed characteristics. This is followed by marine renewables (15%) and monitoring environmental change (14%).

Chosen Data Types



Almost all respondents (85%) who are interested in the Atlantic North require all data types. Again, this was a common trend seen across all 12 ocean regions.

Required Data Density

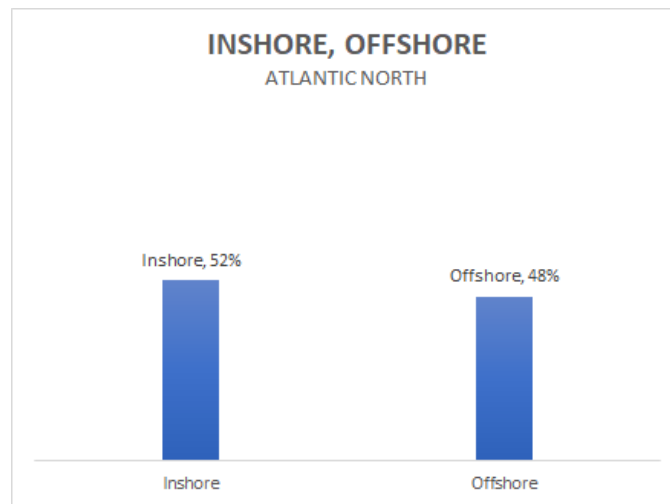


Across 81 respondents the data density requirements for the Atlantic North were predominantly for full data density at 49% and 28% requiring features.

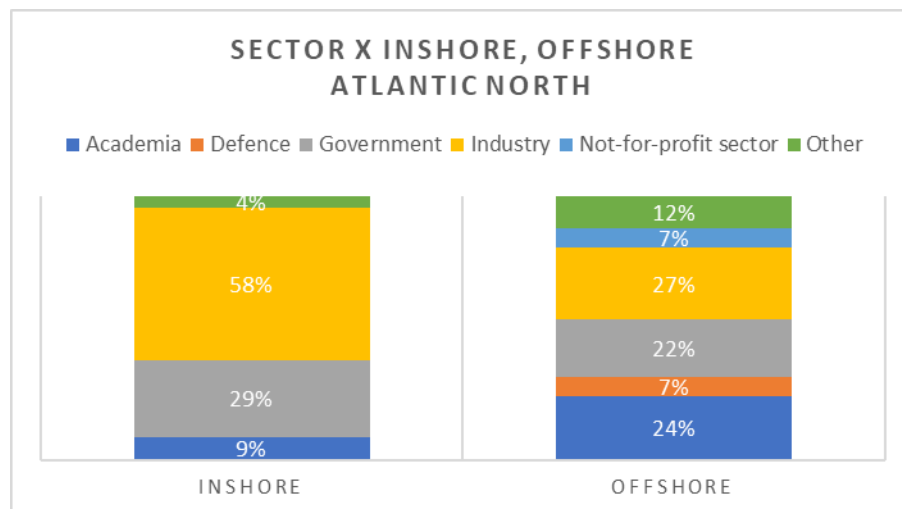
Priority Area for the Region

In the Atlantic North respondents specifically specified that UK waters (EEZ) is the priority area to be mapped.

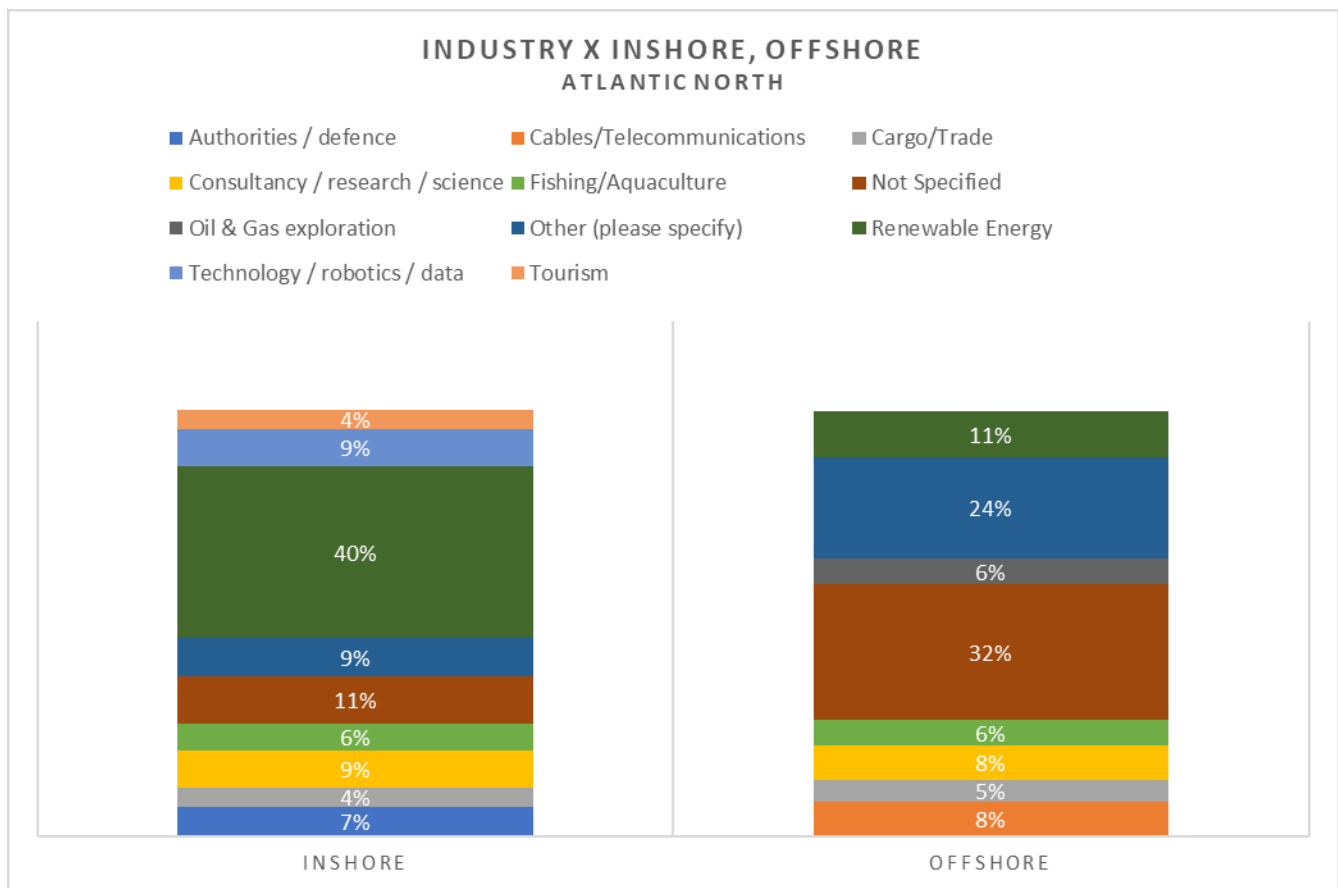
Inshore versus Offshore Priorities



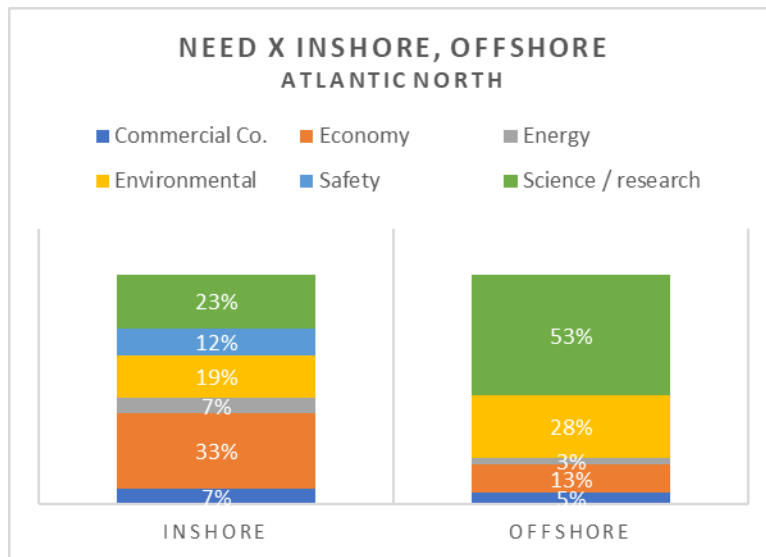
With a significant number of trade routes crossing the North Atlantic and passing through the shallower coastal waters for ports across northern Europe it was not surprising to see an equal prioritisation to map both inshore and offshore waters.



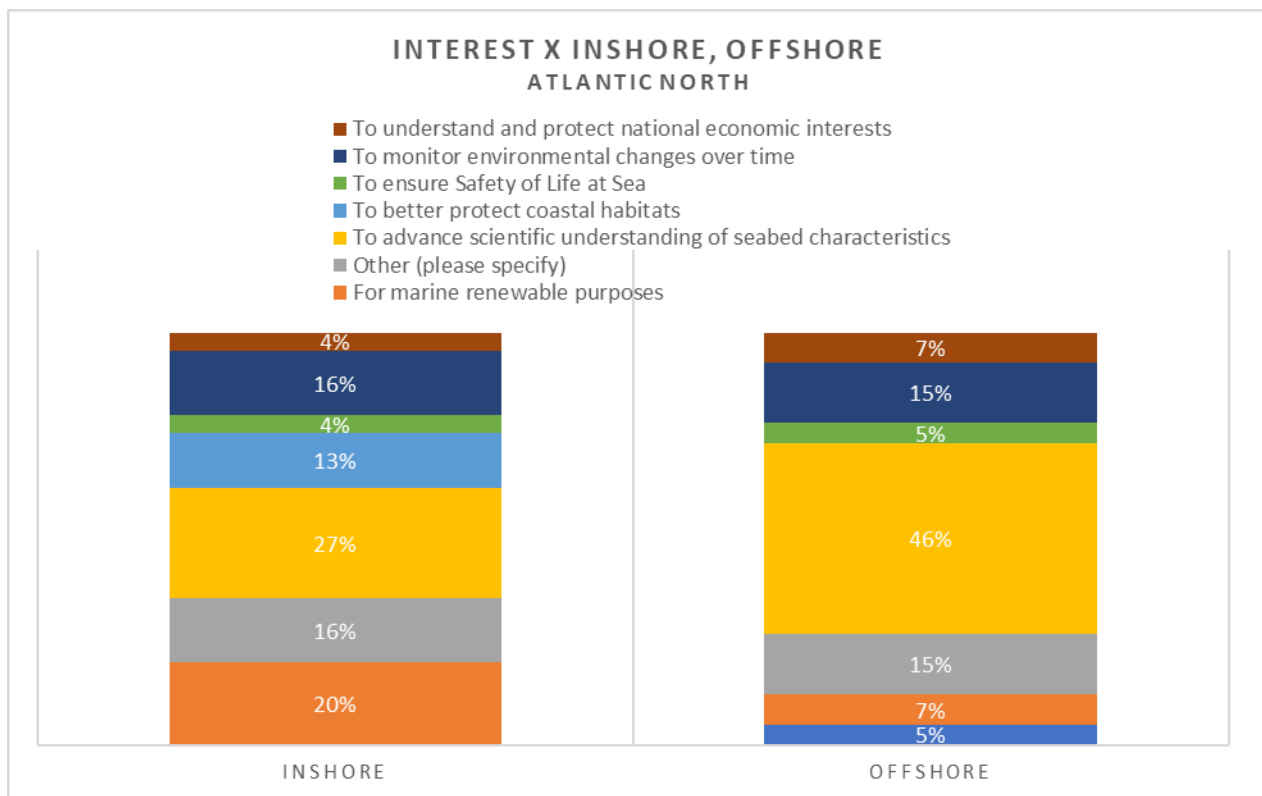
Of the offshore respondents the top sectors were 27% industry, 24% academia and 22% government. More than half (58%) of the inshore respondents are from industry, and 29% come from the government. The significantly higher level of inshore industry respondents reflects trade/cargo, tourism, renewables, and the fishing industries in northern Europe.



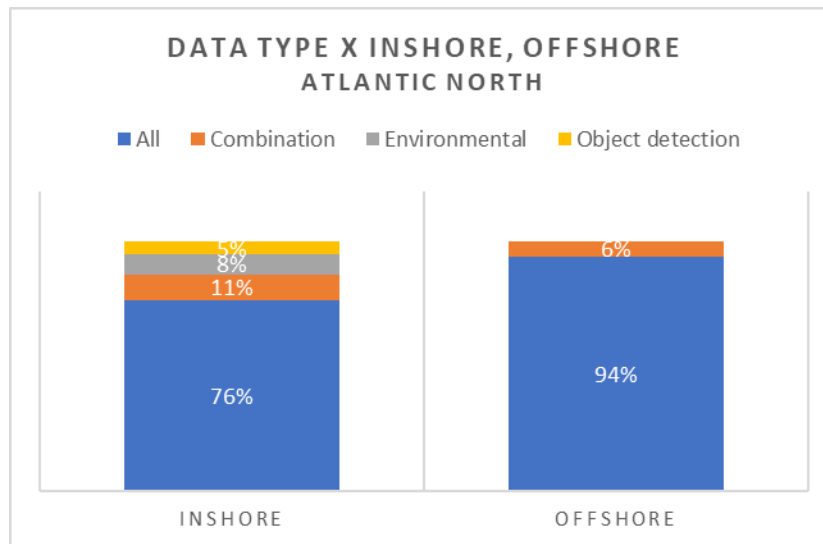
A considerable portion of the inshore respondents are interested in renewable energy (40%), environmental conditions in the North Atlantic perfectly suit the renewable sector and in recent years there has been a vast growth in the renewable sector in the coastal waters of the North Atlantic. The renewable sector and market in this region are forecast to proliferate over the next decade. The growth in the renewable sector will see a marked demand for environmental surveys and seabed mapping. Outside of renewables in the inshore waters 9% of respondents come from consultancy/research/science, tourism, and other sectors respectively, with 11% not specified in the maritime sector. In terms of offshore, 32% of the respondents do not operate in the maritime sector, and 24% are in other wider industry sectors. This is followed by renewable energy (11%), consultancy/research/science (8%), and cables/telecommunications (8%).



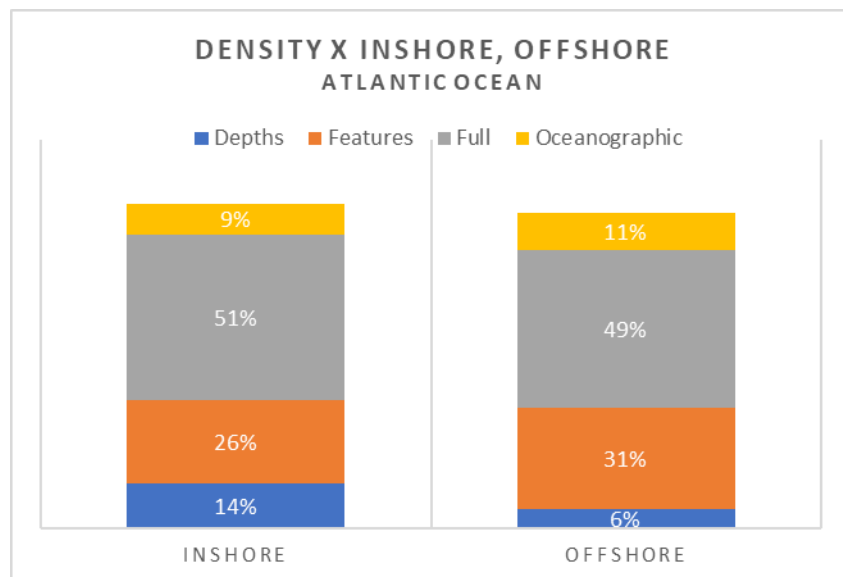
Science/research represented the majority of respondents (53%) requiring mapping of offshore waters, with 28% having an environmental interest. Inshore waters saw the majority interest coming from the economic need (33%) and 23% from a science/ research perspective.



Many offshore respondents were interested in advancing scientific understanding of seabed characteristics (46%), to monitor environmental changes over time (15%) and other reasons (15%). Inshore respondents saw 27% interest in advancing scientific understanding of seabed characteristics, 20% marine renewables with 32% shared between monitoring environmental change and other reasons.



A large majority of the respondents, 94% of offshore and 76% of inshore require all data types.

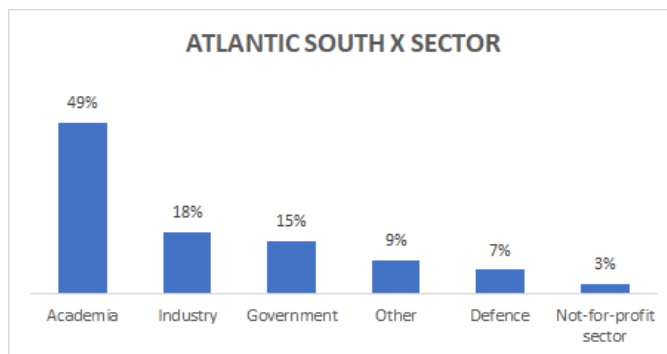


51% & 49% of offshore and inshore respondents want a full data density. This was followed by 26% and 31% of inshore and offshore respondents wanting a features data set only.

REGION 3: ATLANTIC SOUTH

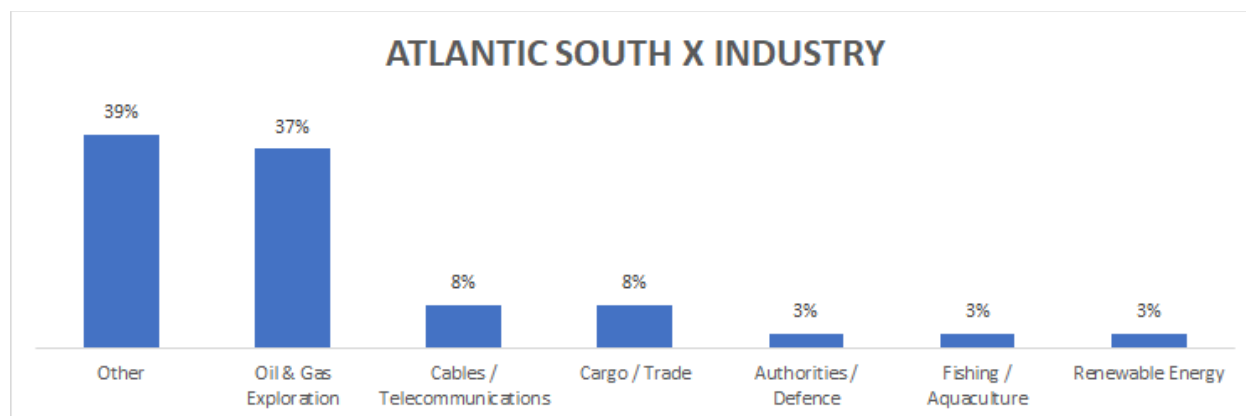
Almost half of the respondents work in the academic sector. The industries of oil & gas exploration and other industries are the most represented by the respondents. Those who operate the Atlantic South Ocean region are primarily interested in science/research purposes. The environment and the economy are also one of the reasons why seabed mapping is needed. Moreover, almost half of the respondents are particularly interested in advancing the understanding of seabed characteristics. A staggering 98% of respondents stated seek all data types (bathymetry, object detection and environmental).

Maritime Sector



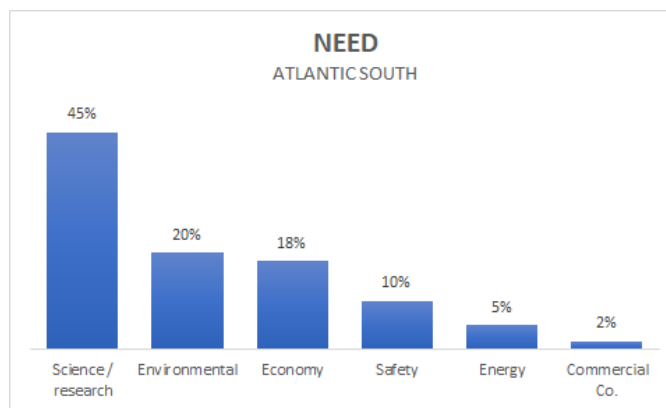
We saw the third highest number of responses (74) to this question across the ocean regions. Of the Atlantic South survey respondents, 49% represent academia with 15% coming from government (science making up the majority). The second highest sector is industry, and the oil and gas market are the leading industry within this. Of the remaining responses 9% came from other sectors and the final 7% defence and 3% not-for-profit sector.

Industries Represented



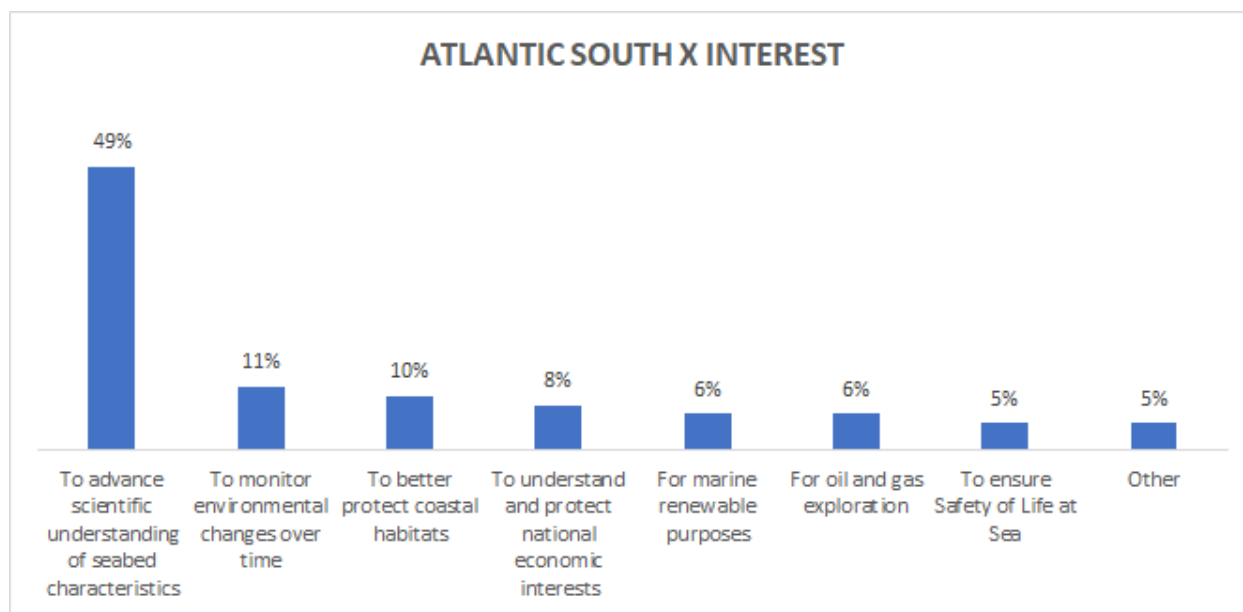
39% of the survey respondents interested were from other wider industries (a large proportion relate to science and research) 37% from the oil & gas exploration industry, 8% cover cables/telecommunications (8%), cargo/trade, authorities/defence (3%), fishing/aquaculture (3%), and renewable energy (3%).

Seabed Mapping Need



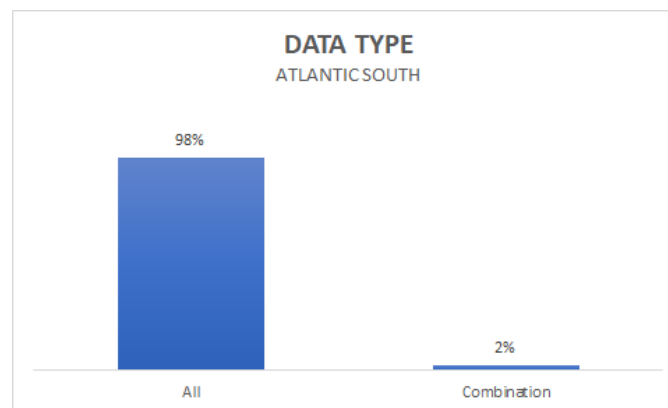
Of the 60 respondents to this question 45% were from scientific research community and this was followed by 20% who had environmental needs. This was closely followed with 18% with an economic need and as previously stated in the South Atlantic region the majority of these came from the Oil & Gas field.

Interest for Ocean Floor Mapping



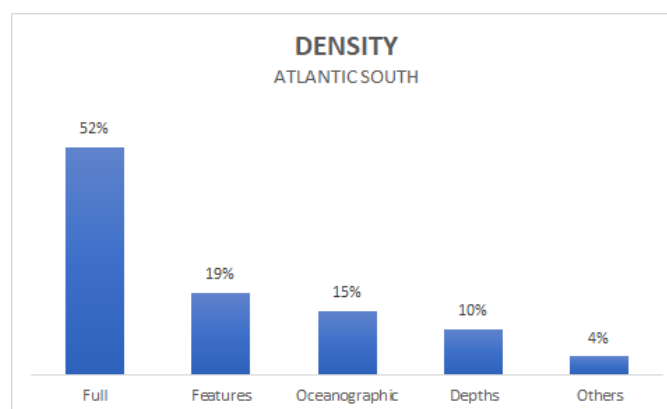
Almost half of the 63 respondents (49%) to this question want to map the ocean floor to advance scientific understanding of seabed characteristics. If you take into account the other scientific and environmental related factors (monitoring the environment and protection of coastal habitats) then this accounted for 70% of the total responses.

Chosen Data Types



Of all the ocean regions (except the Baltic where there were only 3 responses to this question) the South Atlantic with 43 responses to this question had by far the highest call (98%) for all data types (environmental, object detection and bathymetry).

Required Data Density



The third highest response across all ocean regions saw the respondents to the Atlantic South call for a full insonification of the seabed (52%), with features (19%), oceanographic (15%), and depths (10%) accordingly.

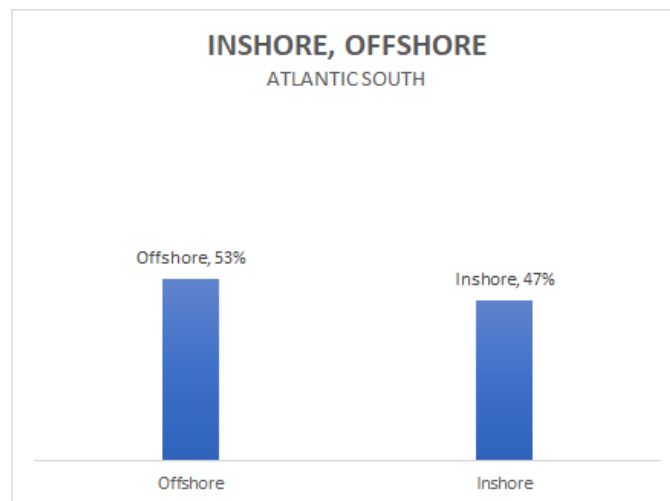
Priority Area for the Region

The following list those specific and specified areas that respondents are trying to get mapped in the Atlantic South:

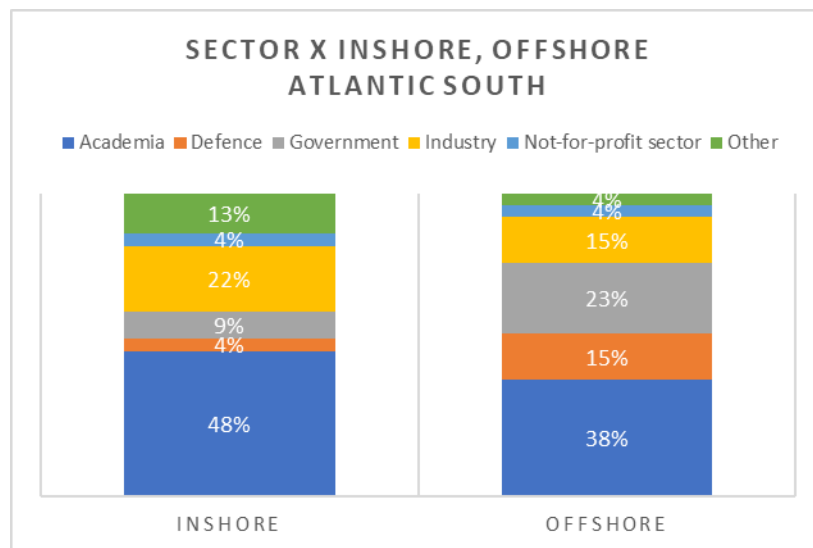
- Argentine seabed
- Azores and Madeira Islands EEZ
- Bransfield Basin, Antarctica
- Brazilian continental margin
- Brazilian continental margin - slope
- Brazilian river's mouths
- Ceará State offshore
- Coastal of Rio Grande do Norte
- Coastal zones
- Continental Shelf adjacent to Doce River mouth - Brazil

- Continental Shelf of East and Southeast of Brazil
- Deep-sea realm
- Geophysics
- Gulf Of Guinea
- Nav Area V
- Offshore areas of south America at Atlantic Sea
- Our Main Area of Interest covers the coastal areas of our Exclusive Economic Zone where the greatest maritime traffic occurs.
- Reefs
- Região dos Lagos (Araruama, Saquarema, Arraial do Cabo, Búzios, Cabo Frio - RJ)
- 'Safe Waters' and 'North' Corridors, along Uruguayan coast
- Santos Basin
- Semi-Arid Brazilian Margin
- South Atlantic
- Southwest Iberia
- The inner continental shelf of northern Rio Grande do Norte-Brazil
- The continental shelf adjacent to Espírito Santo State in Brazil
- The continental shelf of Ceará, Brazil to identify areas of geological and environmental interest

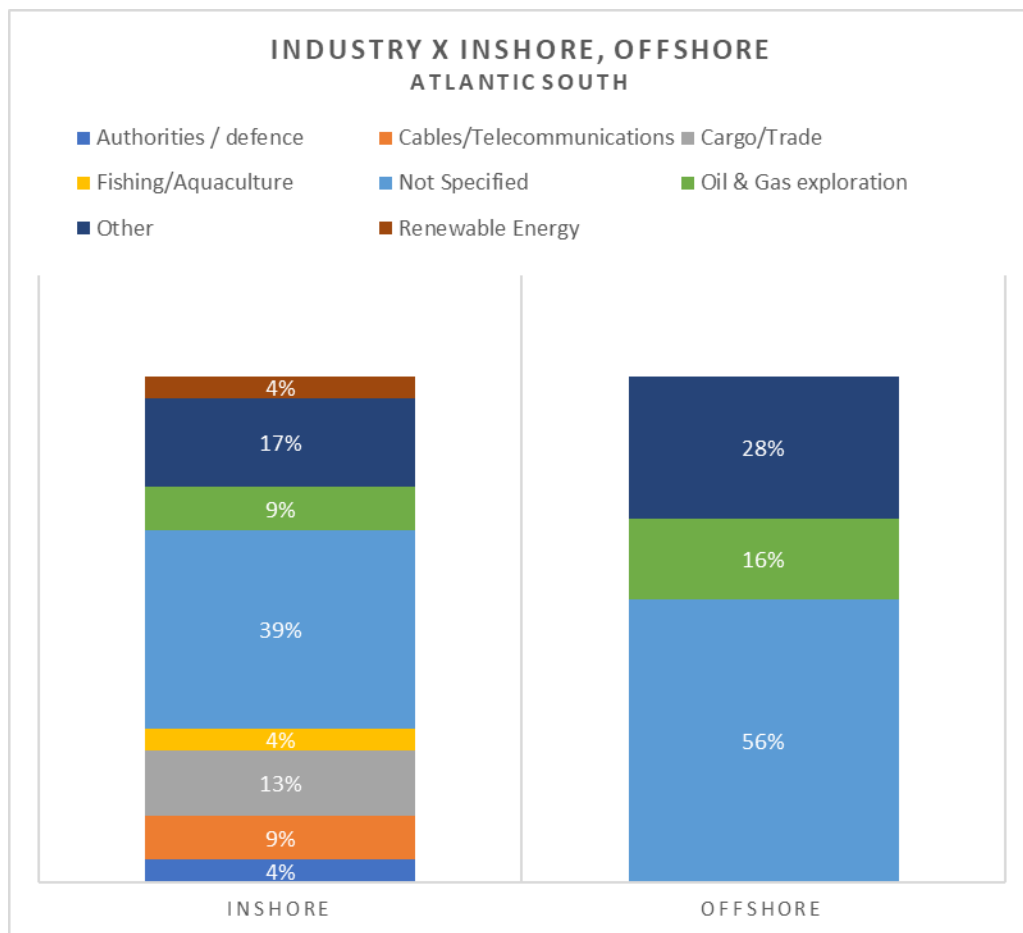
Inshore versus Offshore Priorities



53% of the respondents with an interest in Atlantic South want offshore waters mapping with the remaining 47% requiring inshore waters mapped. There is little to conclude from this other than there an equal need and call to map both inshore and offshore waters in this ocean region.

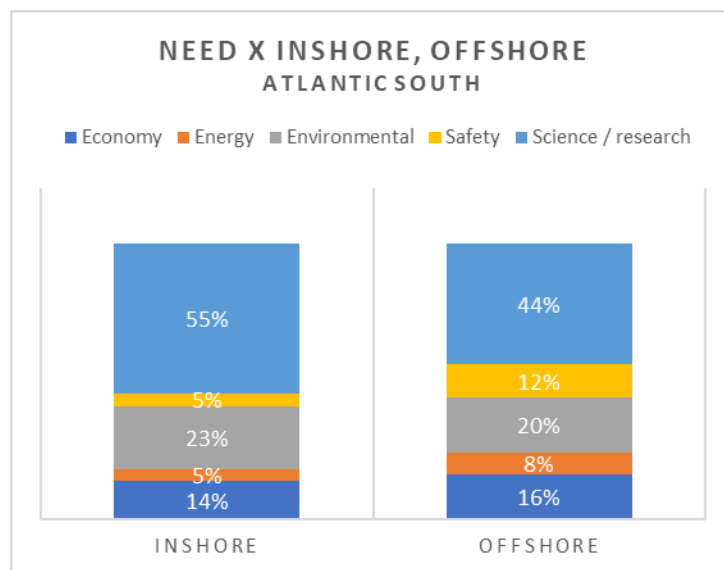


In the Atlantic South the majority of the respondents with a preference of offshore come from academia (38%) and this was followed by Government with 23%. The leading sector for the inshore waters was again academia with 48%, however the second highest sector in this area was industry with 22%.

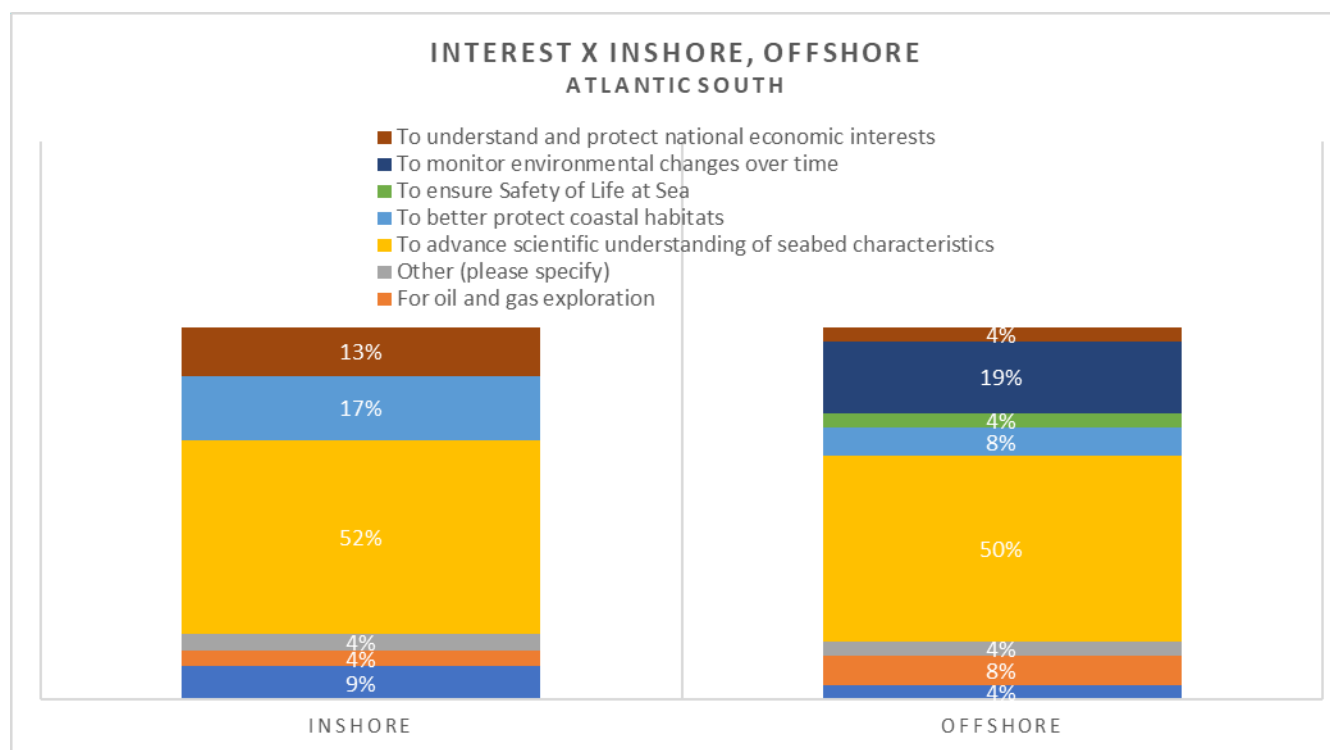


More than half (56%) of the offshore respondents have not specified where they sit within the maritime sector (scientific research are the majority). The remaining 28% and 16% represent other industries and oil and gas exploration respectively. For inshore waters, again 39% of the respondents have not specified where they sit

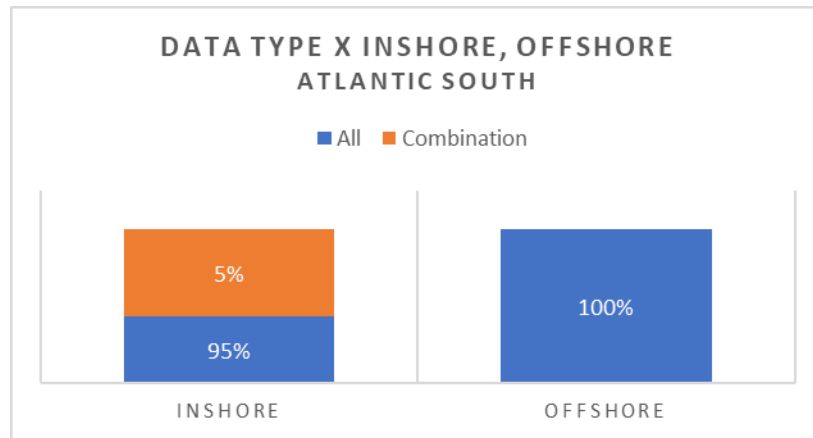
within wider maritime industries, and this was followed by Others at 17%. We did see a cross section of responses across the listed maritime industries; cargo/trade (13%), oil and gas exploration (9%), and cables/telecommunications (9%) industries.



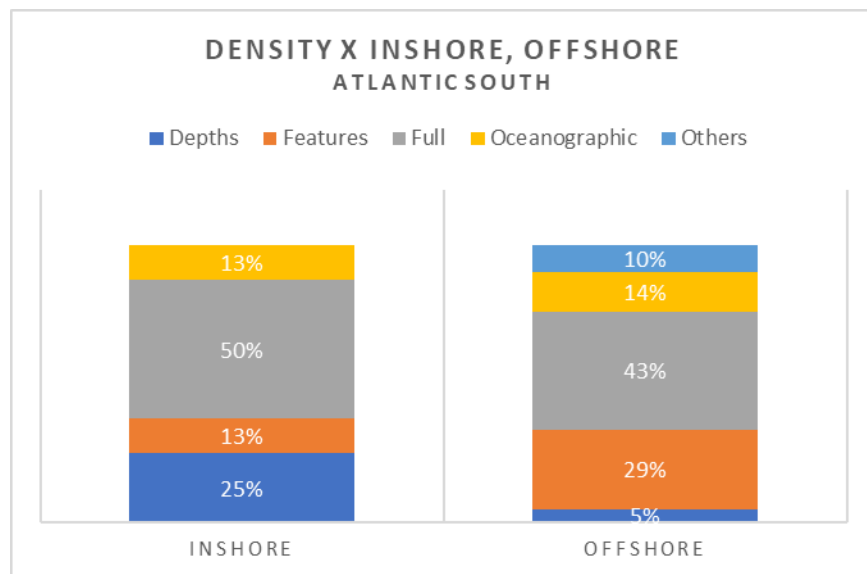
The results for both in and offshore were similar with the majority requirement for science/research 55% and 44% respectively, then environmental with 23% and 20%.



For both inshore and offshore the most popular reason for seabed mapping was to advance scientific understanding of seabed characteristics. However, offshore respondents (19%) are interested in monitoring environmental changes over time while none of the inshore respondents stated this reason.



All offshore respondents require all data types, along with 95% of inshore respondents.

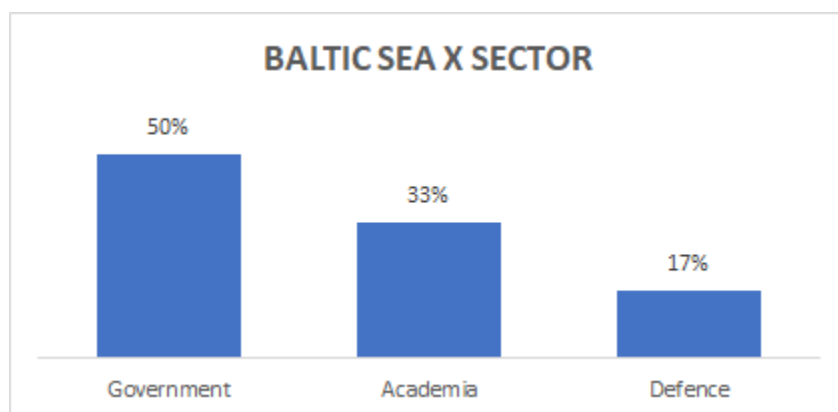


The most required data densities of the offshore respondents are full (43%), features (29%), and oceanographic (14%) densities. Half of the inshore respondents require a full data density, and 25% require depths.

REGION 4: BALTIC SEA

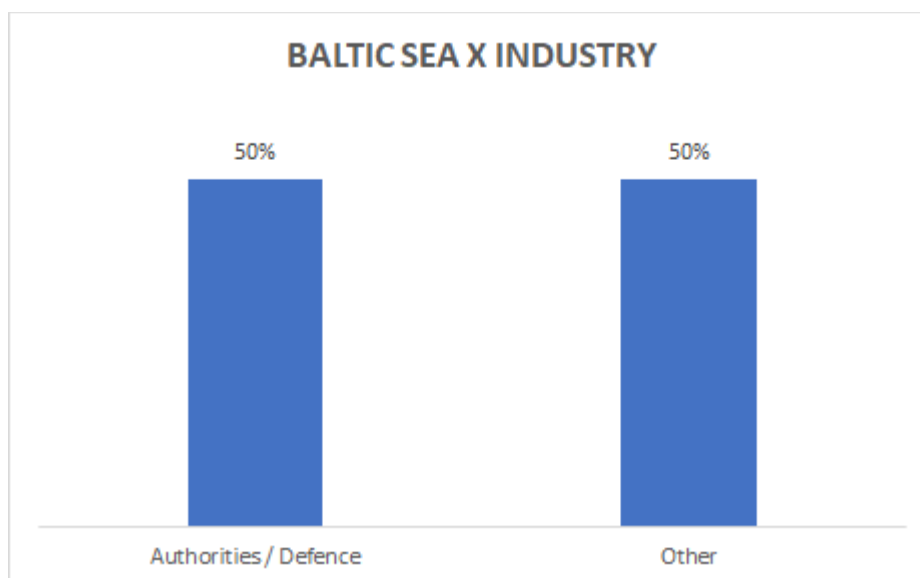
It should be emphasized that for the Baltic Sea only 6 responses were received across the whole survey and to that end with such a small sample set due consideration should be taken when judging the results. The government, academia, and defence sectors are where the Baltic Sea respondents work. Interestingly across all 11 ocean regions the Baltic had the largest call for seabed mapping from a defence perspective (17%). Half of them represent the authorities/defence industry while the other half come from various industries. Science/research is the primary reason for seabed mapping, followed by safety and environmental needs. There are three reasons why respondents are interested to map the Baltic Sea, and these are understanding the seabed characteristics, better coastal habitat protection, and ensuring the safety of life at sea. 60% of them are interested in all data options, while 40% prefer a combination. A small percentage (17%) require depths for data density, but the rest require a complete dense data for all data types. Inshore waters are the primary requirement of 80% of the respondents.

Maritime Sector



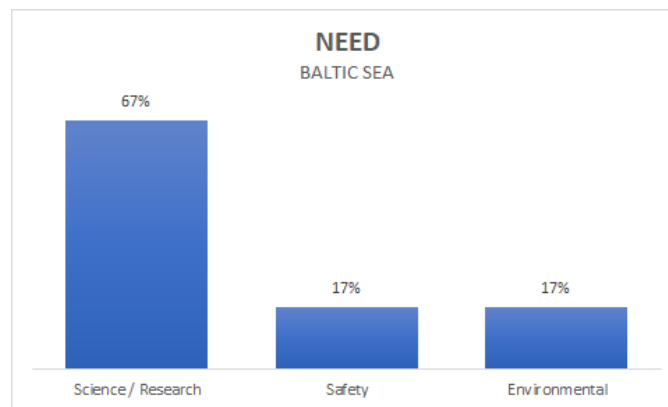
The Baltic Sea produced 50% results from the government sector, followed by 33% academia and defence 17%.

Industries Represented



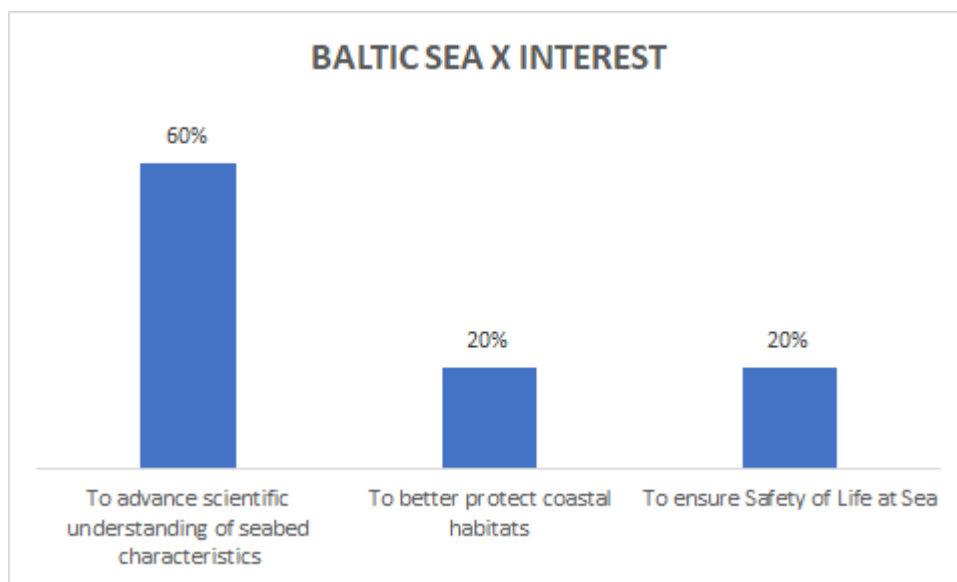
The Baltic Sea respondents were split between the authorities/defence and consisted of other wider industries.

Seabed Mapping Need



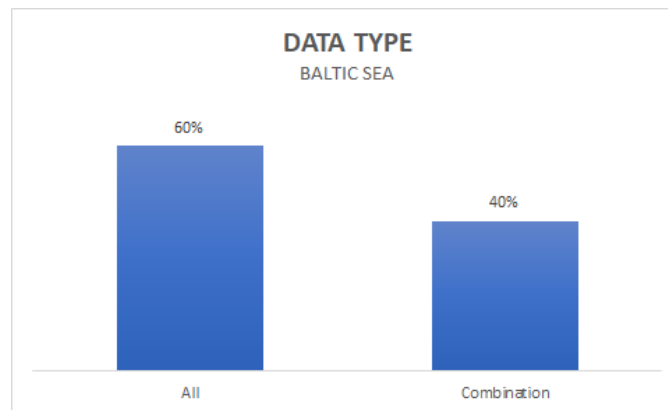
The most desired need for the Baltic Sea is for science/research (67%). Next to that is safety and environmental needs, which both polling 17%.

Interest for Ocean Floor Mapping



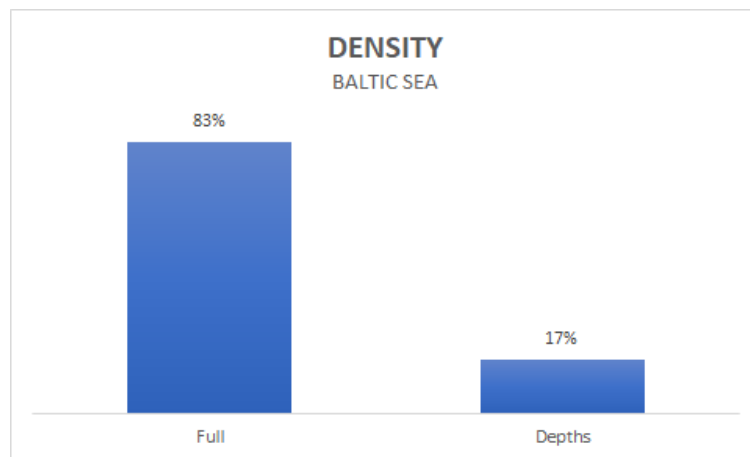
The top reason respondents want to map the ocean floor is to advance scientific understanding of seabed characteristics (60%). Other reasons are to better protect coastal habitats (20%) and to ensure safety of life at sea (20%).

Chosen Data Types



60% of the respondents chose all data types, and 40% chose a combination for the Baltic Sea.

Required Data Density



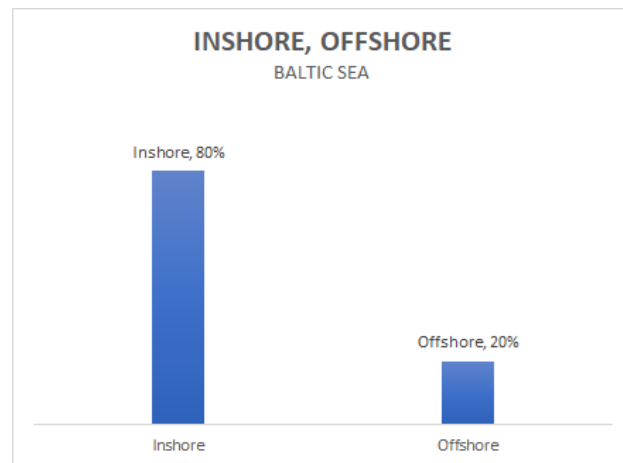
A majority (83%) of the respondents required a full density of data, with 17% requiring only depths.

Priority Area for the Region

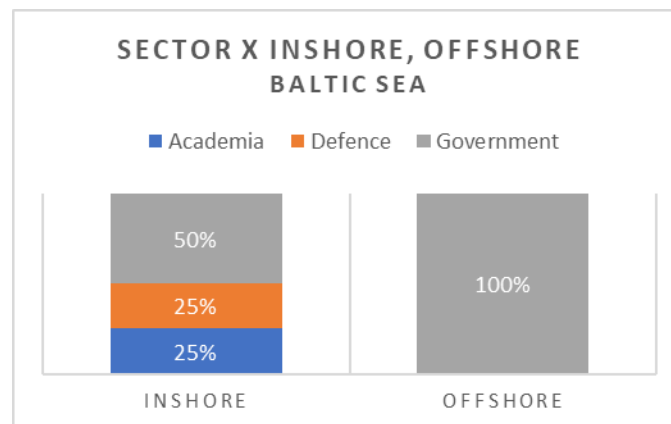
Following are the specific areas in the Baltic Sea that respondents identified that were a priority to be surveyed.

- Shallow waters, near coast
- Seafloor sediments, Baltic Sea
- Baltic Sea

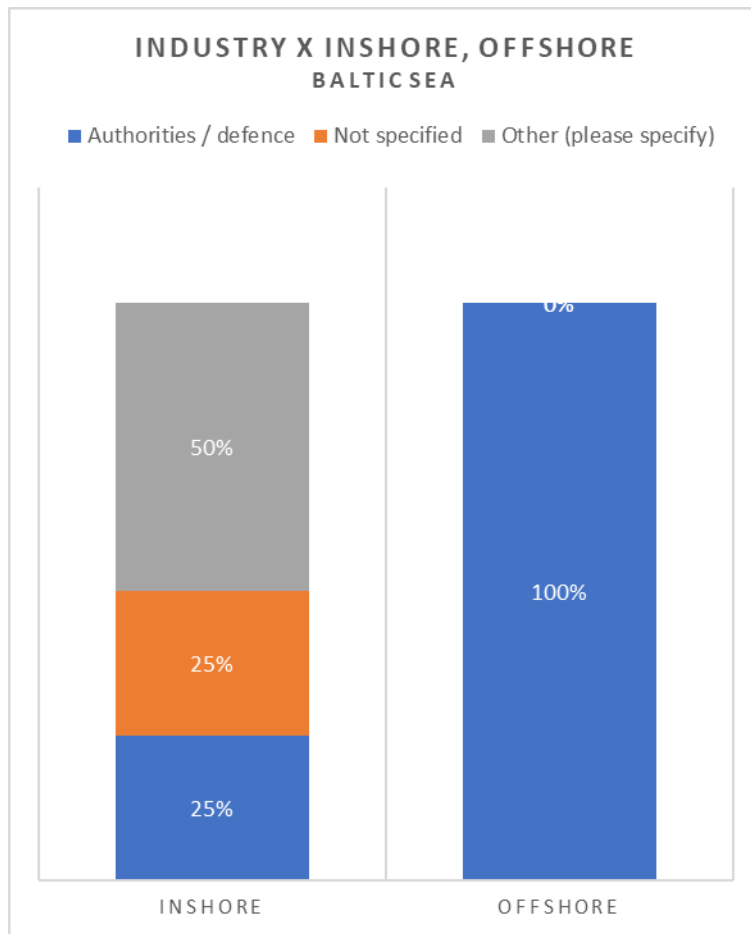
Inshore versus Offshore Priorities



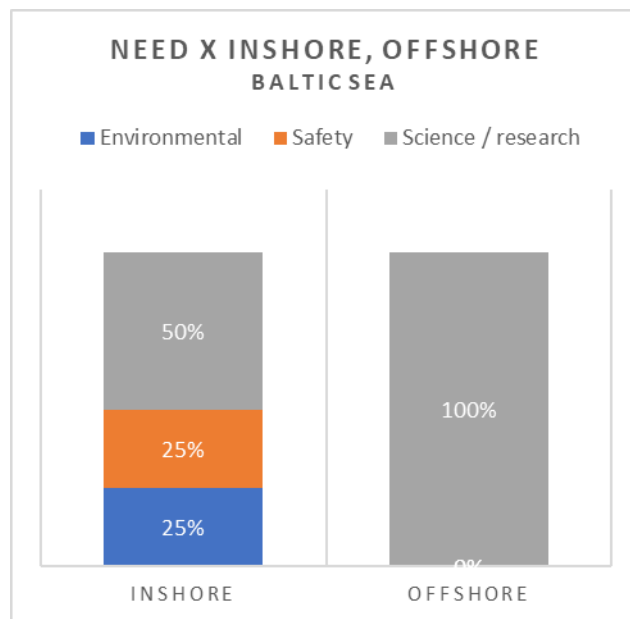
For the Baltic Sea, most of the respondents require inshore waters (80%), with just 20% are interested in offshore.



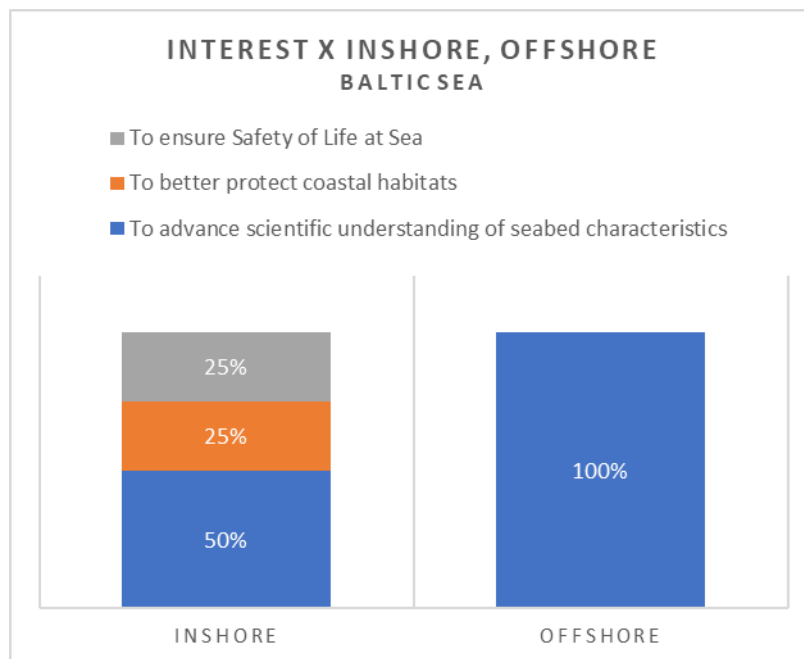
All offshore respondents work in the government sector, as well as half of the inshore respondents. The remaining respondents that chose inshore an even split of those that operate in the academic and defence sectors.



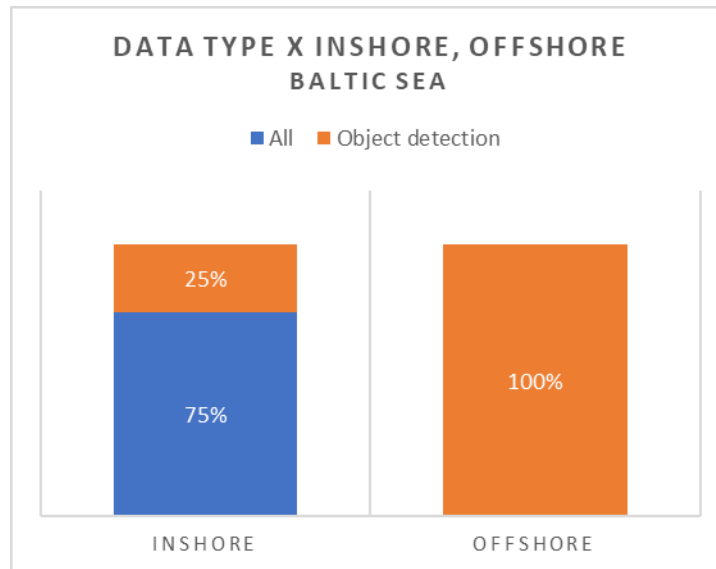
All offshore respondents operate in the authority/defence industries. The inshore respondents mostly come from other industries (50%) and 25% come from authorities/defence. Additionally, 25% of them have not specified what part of the maritime sector they sit within.



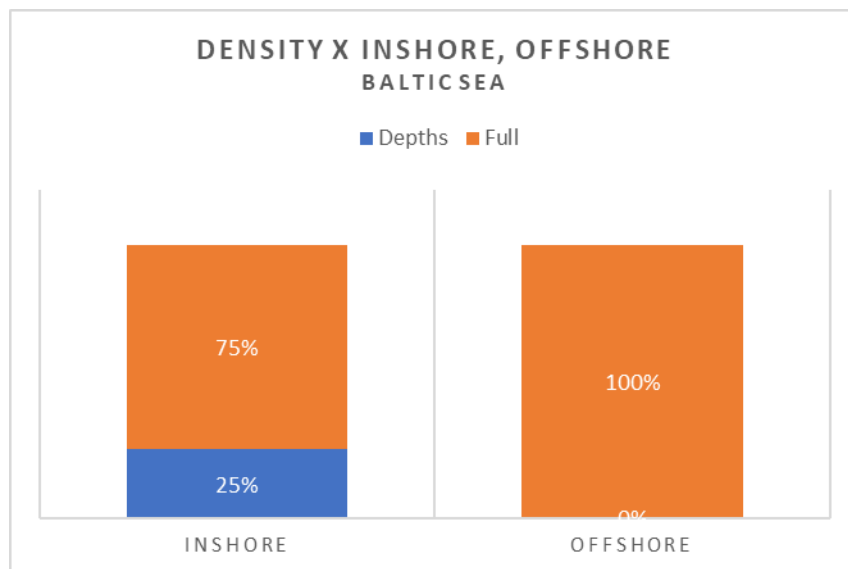
All offshore respondents stated that they had a scientific/research requirement. 50% of the inshore had the same need, while 25% require safety and the remaining 25% require the environment.



All offshore respondents and half of inshore respondents are interested in advancing scientific understanding of seabed characteristics. Protecting coastal habitats and ensuring safety of life at sea were evenly split between the remaining respondents.



75% of the inshore respondents stated that they require all data types. The remaining 25% prefer object detection. All offshore respondents prefer object detection.

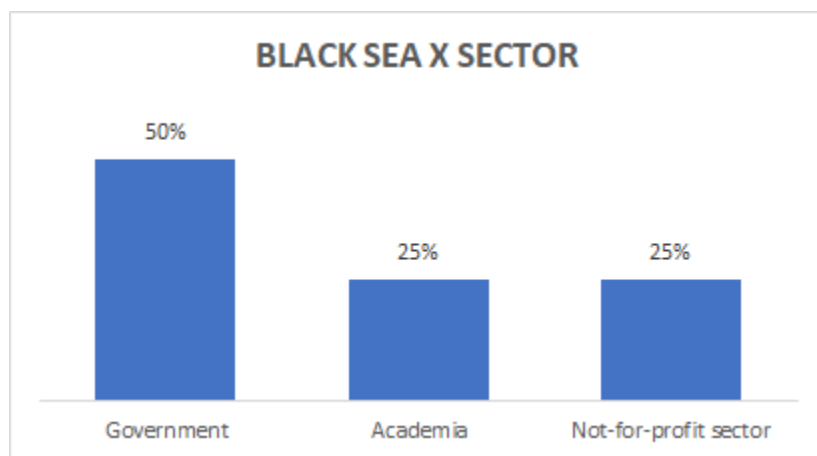


All the respondents for the offshore region seek full data density of the seabed. Whilst 75% of the inshore respondents also stated a requirement for full density it was interesting to see that 25% sought depth data alone.

REGION 5: BLACK SEA

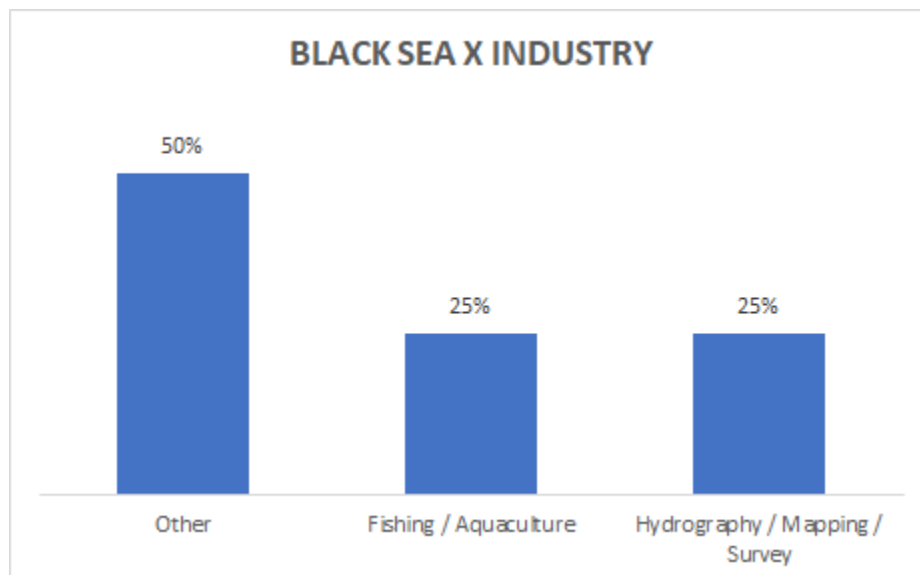
As for the Baltic Sea the Black see responses totaled only 3 across the whole survey and for the same reasons the results from the Black Sea provide a snapshot of views. Black Sea respondents are only interested in offshore research. Half of them work under the government, and the remaining half is split equally between the academia and not-for-profit sector. About half of them come from other industries, but the remaining half are part of the fishing/aquaculture and hydrography/mapping/survey industry. Responses are divided between the scientific understanding of seabed characteristics and ensuring the safety of life at sea when it comes to their interest in mapping the ocean floor. Unlike the previous ocean regions, the Black Sea respondents need seabed mapping mainly for economy and safety. All respondents require all data types and a complete dense data.

Maritime Sector of Work



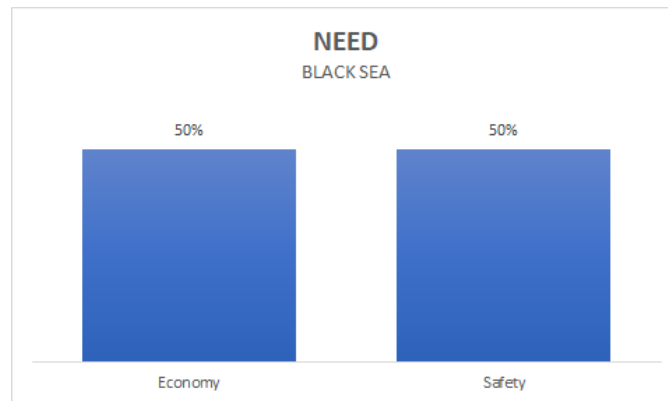
Of the Black Sea survey respondents, 50% represent the government with 25% coming from academia and 25% from the not-for-profit sector.

Industries Represented



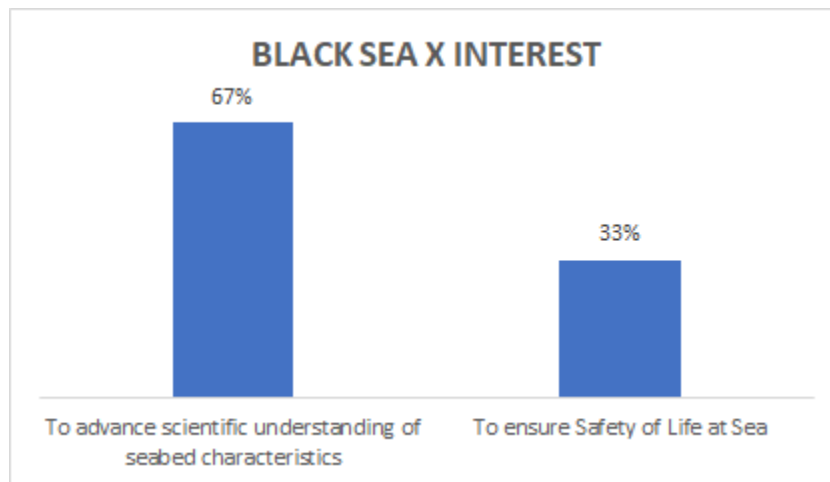
Of the industry respondents 50% with an interest in the Black Sea come from other wider industries, with fishing/aquaculture and hydrography/mapping/survey industries are split equally with 25% each.

Seabed Mapping Need



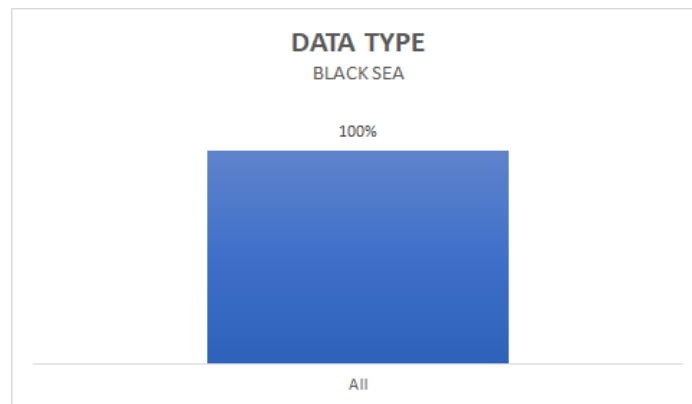
For the Black Sea, the respondents were equally split between economy and safety as the stated need.

Interest for Ocean Floor Mapping



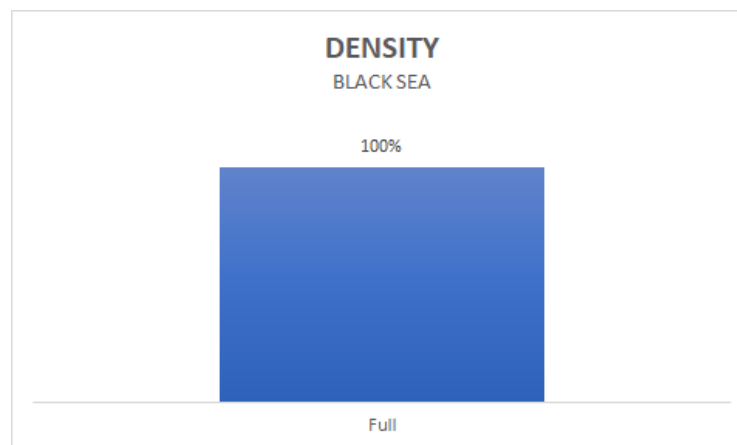
The need to advance the understanding of the seabed characteristics (67%), followed by 33% stating an interest in ensuring safety of life at sea.

Chosen Data Types



100% of the Black Sea respondents require all data types.

Required Data Density



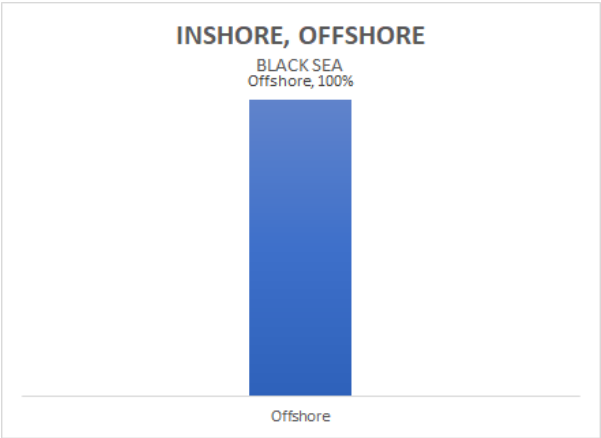
Of these respondents all prefer full density data for the Black Sea.

Priority Area for the Region

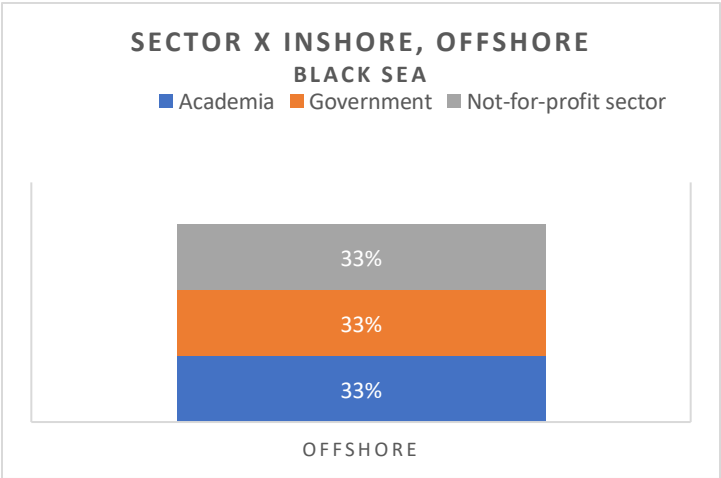
The following three areas were stated by respondents as areas to be prioritised and mapped;

- the Kumano Ridge - Nankai Trough
- Black Sea
- Aquacultures, Biodiversity and Conservation

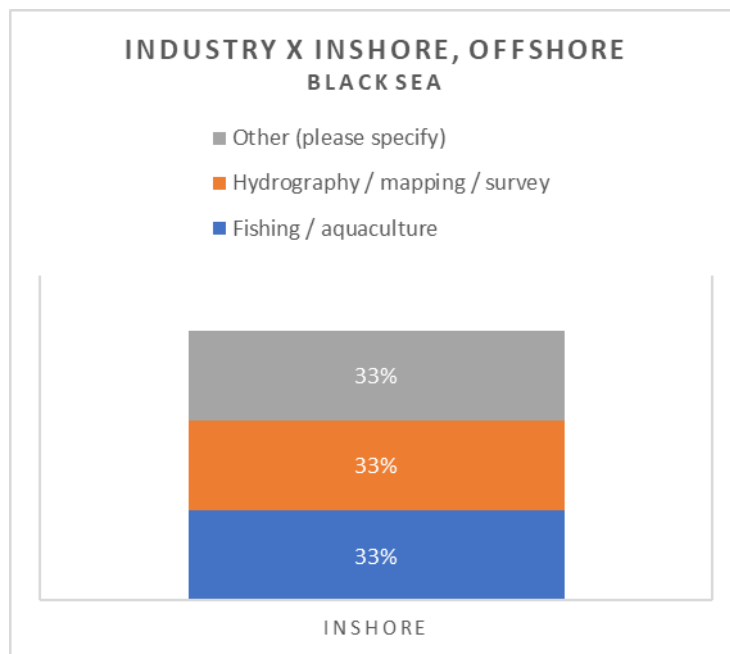
Inshore versus Offshore Priorities



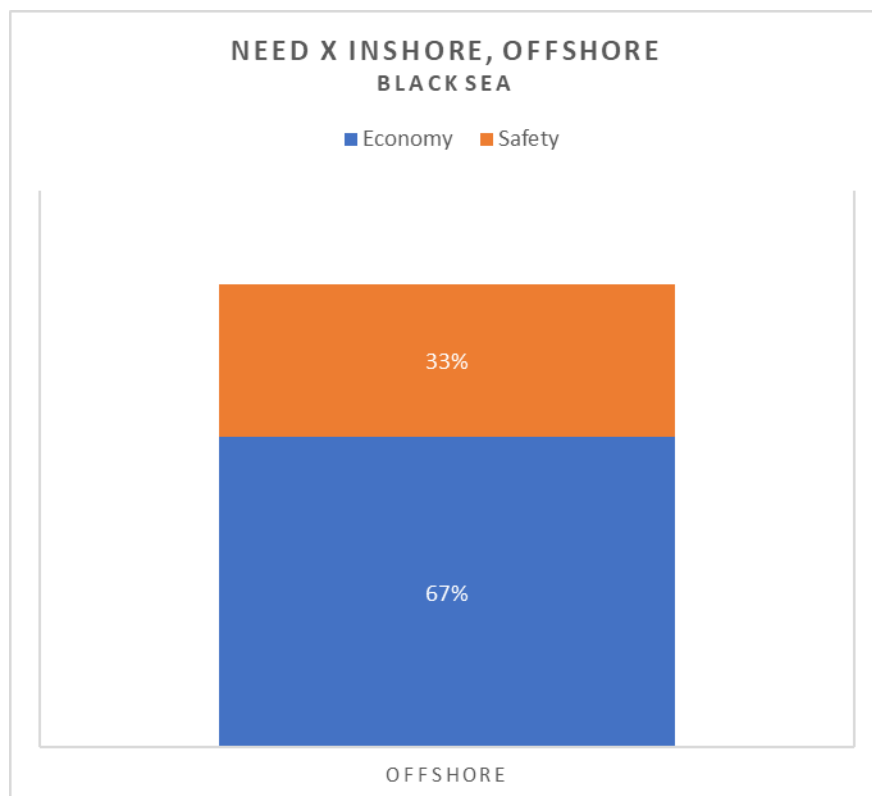
All the Black Sea respondents require offshore waters mapped.



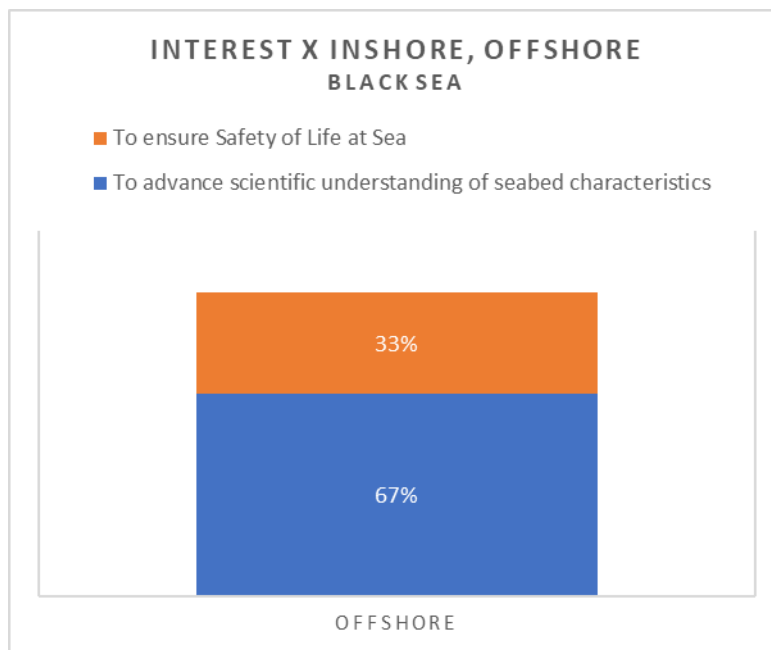
The sectors represented are split evenly between academia, government, and not-for-profit sectors.



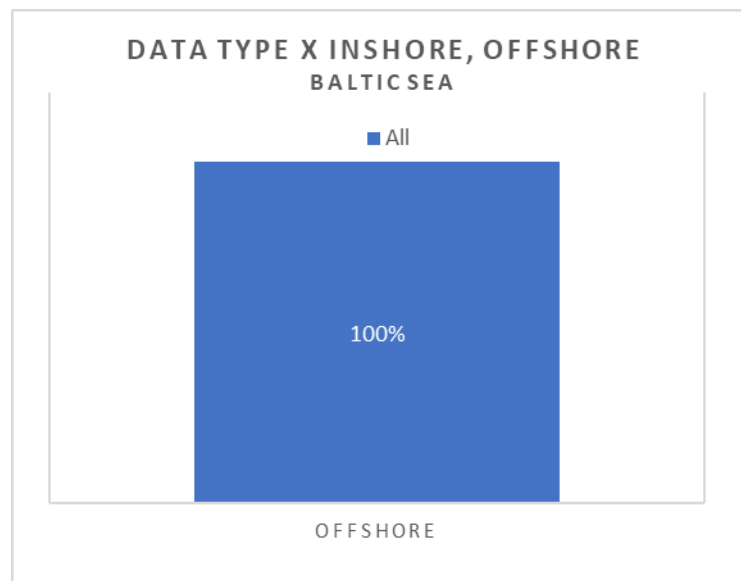
There are only three industries represented by the respondents: fishing/aquaculture, hydrography/mapping/survey, and other wider industries.



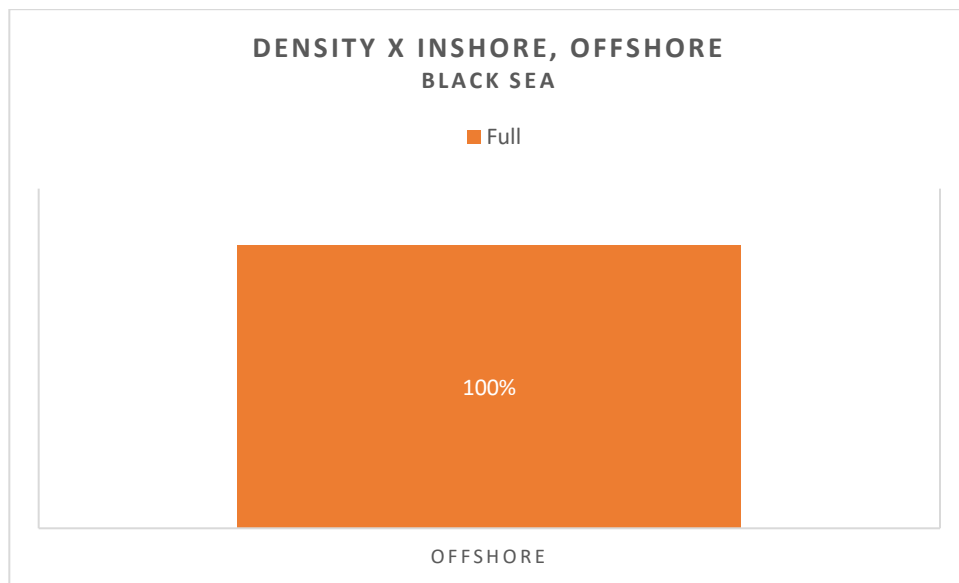
67% of the respondents' most desired requirement is economy while 33% selected safety.



67% of the respondents are interested in advancing scientific understanding of seabed characteristics and the remaining are interested in ensuring the safety of life at sea.



All respondents required all data types.

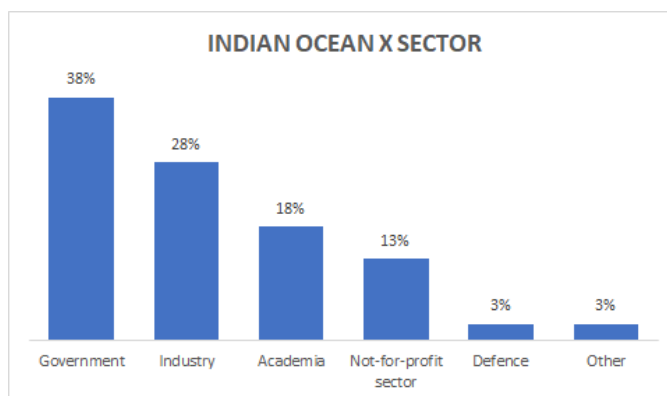


Full density data is required for offshore research in the Black Sea.

REGION 6: INDIAN OCEAN

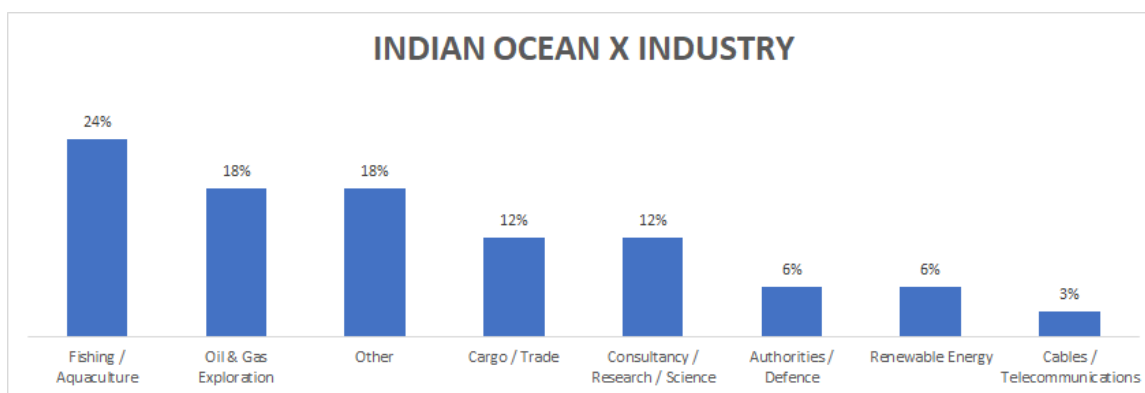
The respondents interested in the Indian Ocean region mostly come from the government (the highest percentage level at 38%), industry, academia, and not-for-profit sectors. They represent various industries, the most common being fishing/aquaculture. This is followed by people in other industries and those in oil & gas exploration. They mainly need ocean mapping for these top three reasons: science/research, environment, and economy. Understanding the seabed characteristics is the primary motive for this need. Still, there are other reasons for their interest, such as environmental change monitoring and understanding, and protecting national economic interests. The respondents chose inshore and offshore waters, accompanied by all data types and a full data density, according to most. Features are preferred by a number of the respondents, as well.

Maritime Sector



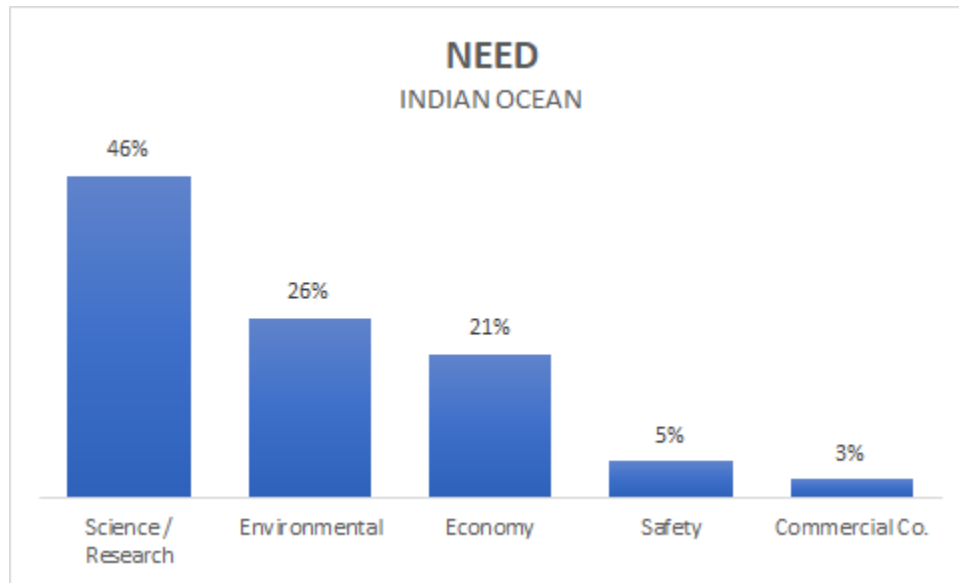
For the Indian Ocean some 38% of respondents are from the government sector, interestingly of the 12 ocean regions only 4 had the Government sector as the largest sector calling for seabed mapping (others were Arctic, Mediterranean and Pacific South). This was followed by the industry sector 28% and academia (18%).

Industries Represented



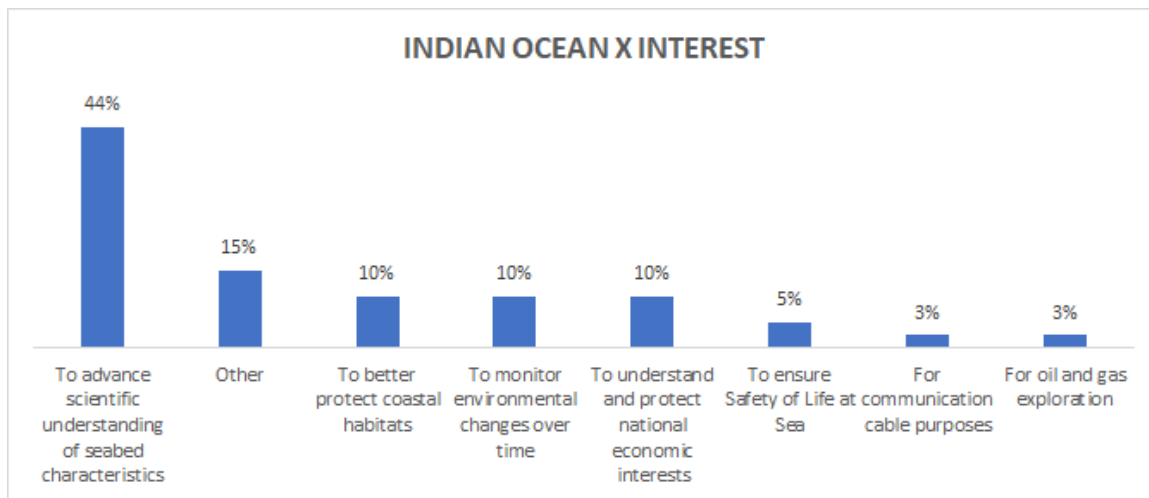
24% of the survey respondents concerned with the Indian Ocean are fishing/aquaculture, of the 12 ocean regions the Indian Ocean was the only one who had fishing/aquaculture as the highest industry sector. Outside of this, oil & gas exploration (18%) was second and across the 12 ocean regions this was the joint second highest call for seabed mapping in support of oil & gas. The majority of "other" respondents came from environmental and academic fields. The remaining significant industry respondents came from cargo/trade (12%) and consultancy/research/science (12%).

Seabed Mapping Need



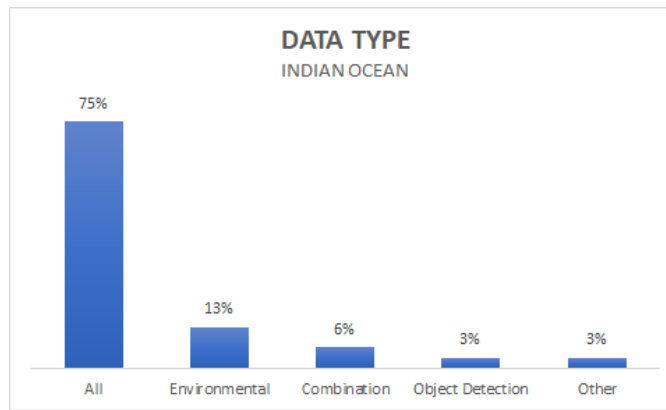
Like the 12 ocean regions reviewed the most selected need for the Indian Ocean is science/research (46%). Followed by environmental needs (26%) and the economy (21%). This was a similar trend across most of the 12 ocean regions.

Interest for Ocean Floor Mapping



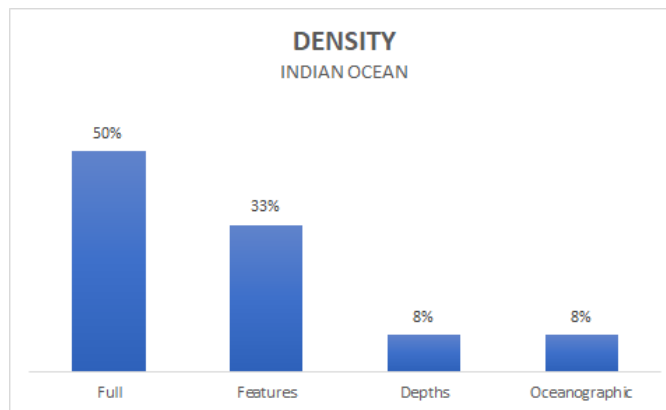
44% of the respondents saw advancing the scientific understanding of seabed characteristics as the reason they are interested in mapping the ocean floor. Outside of the Black Sea (caveated with only 4 responses overall) this aligned with the other ocean regions as the greatest benefit to mapping the world's seabed.

Chosen Data Types



Again, like all the 12 ocean regions 75% of the Indian Ocean respondents require all data types, this overwhelming call was clear and consistent for all ocean regions.

Required Data Density



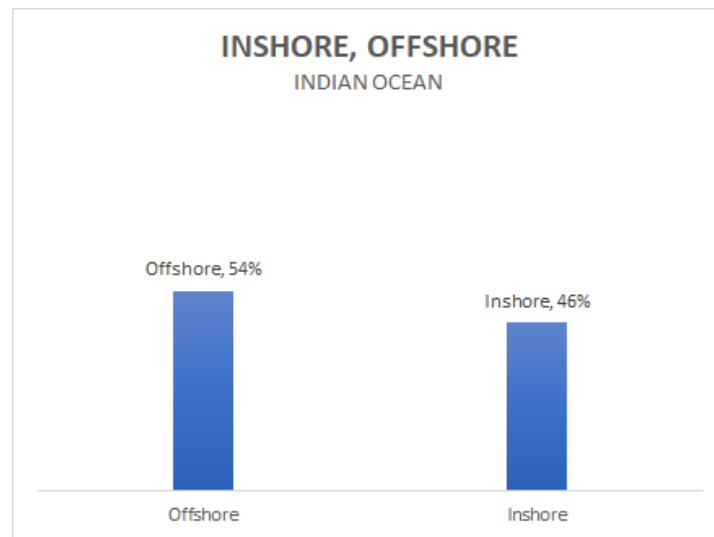
In terms of the density levels the 36 respondents to this question, 50% of the want a full density of the data, whereas 33% prefer features. Again, this was a consistent trend across all ocean regions, calling for full insonification and followed by a call for detected features.

Priority Area for the region

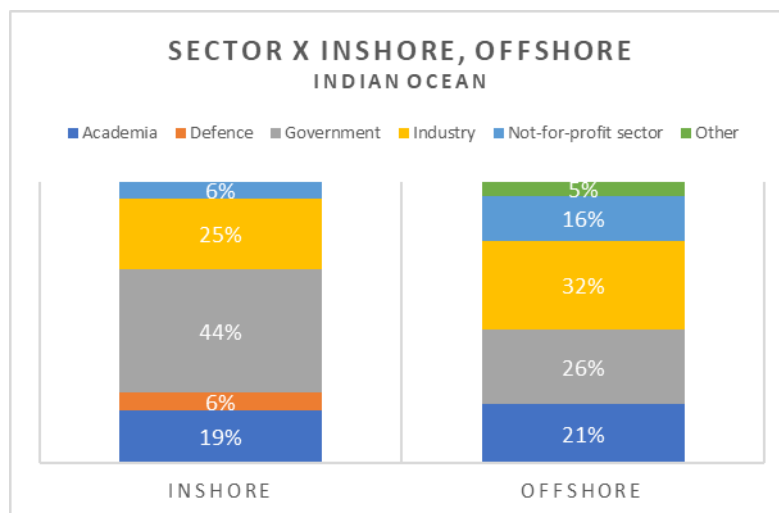
The one area of interest in the Indian Ocean that was specifically called for as a priority for mapping by respondents was:

- The Kenyan EEZ

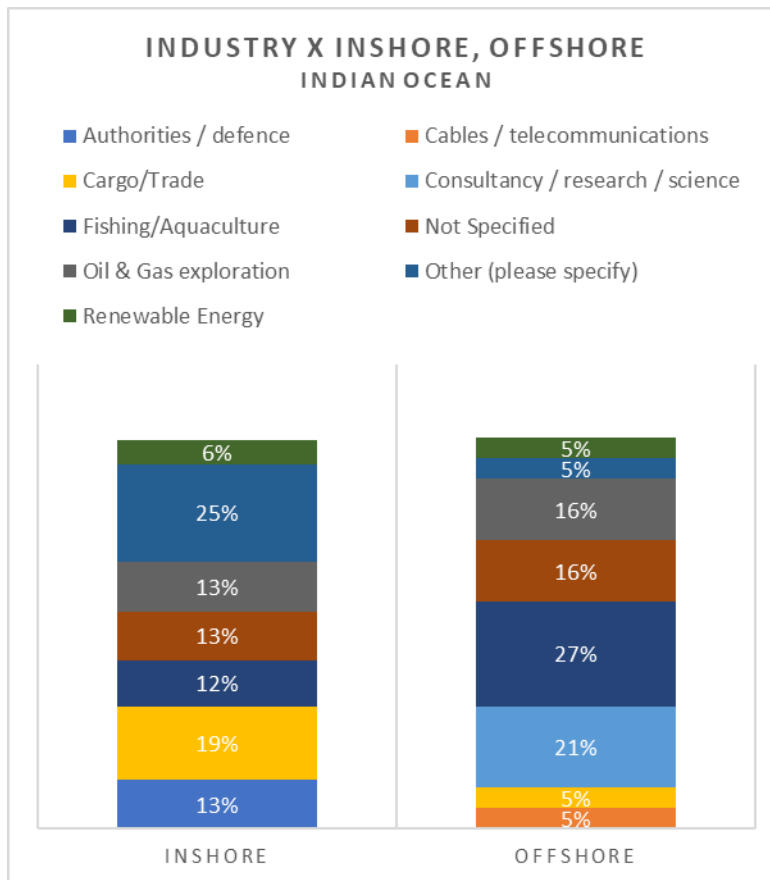
Inshore versus Offshore Priorities



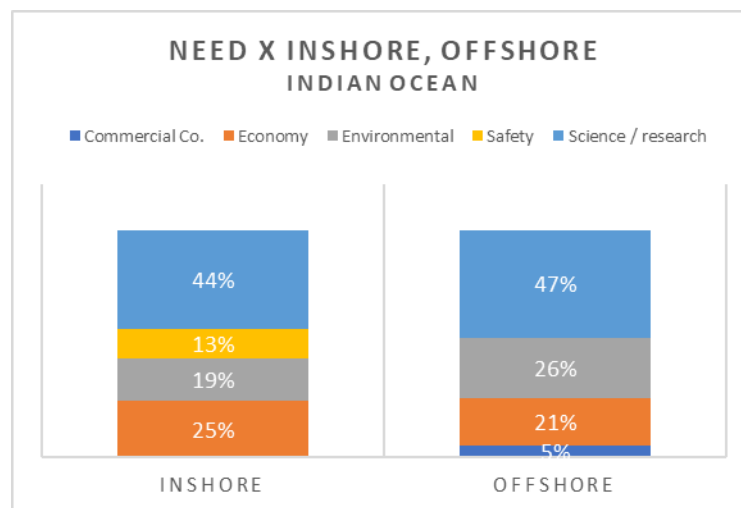
54% of the respondents require offshore research as opposed to 46% requiring inshore waters. The general trend by respondents in the Indian Ocean is there is a need to map both coastal and offshore waters.



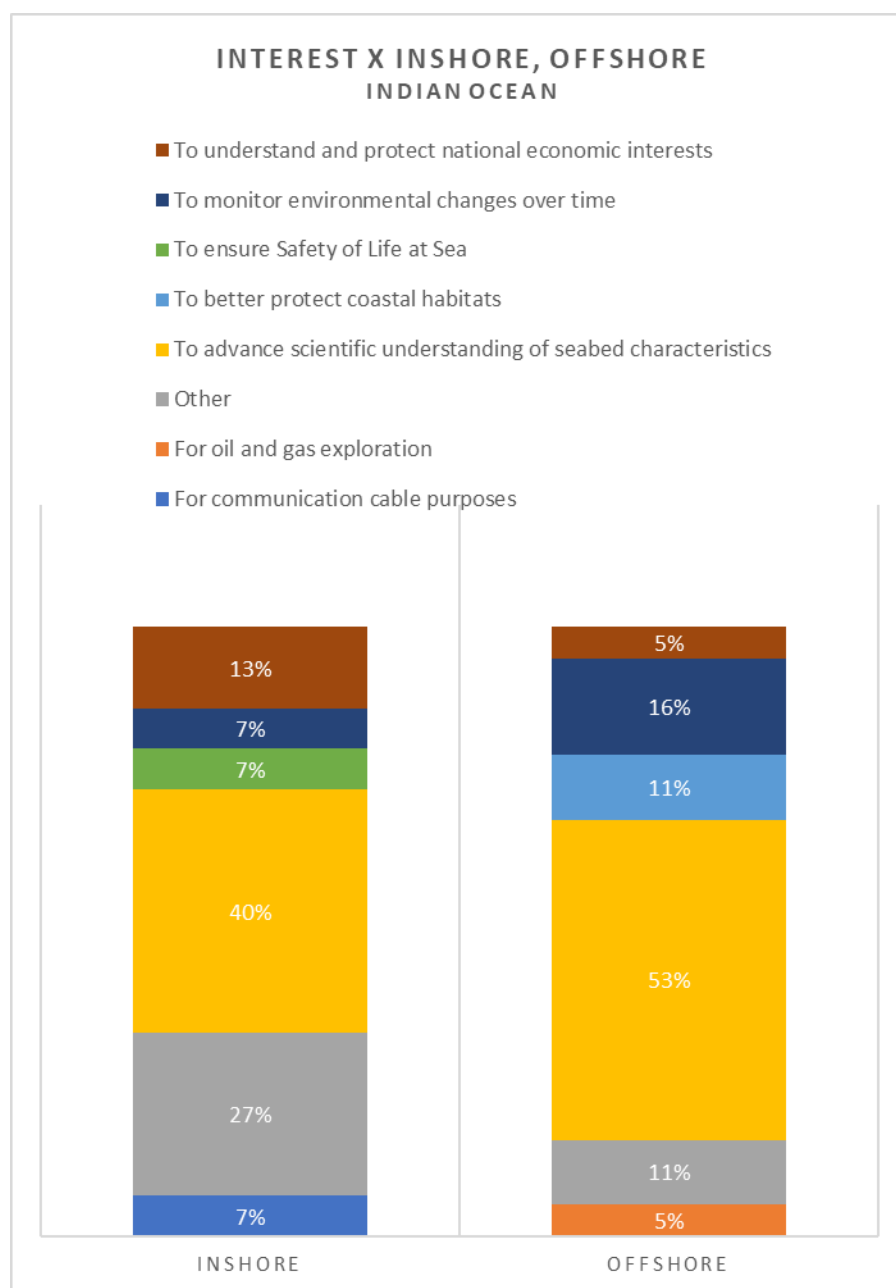
From the respondents who chose Offshore, 32% belong to industry followed by the Government sector (26%) and academia (21%). Alternatively, those who chose Inshore mostly comprised of those from the Government sector (44%) and the industry sector (25%).



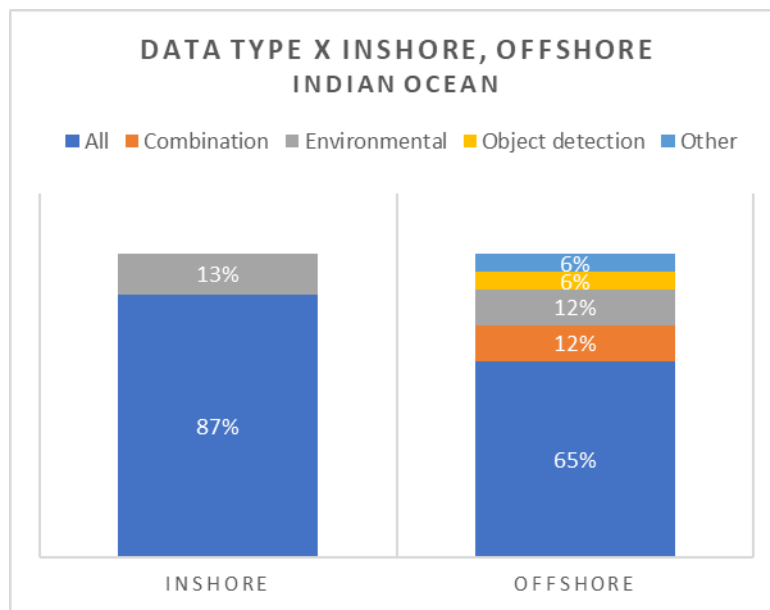
In terms of industry, respondents who chose Offshore were mostly from the fishing/aquaculture industry (27%) and consultancy/research/science industry (21%). Respondents who chose inshore, on the other hand, were mostly from other sectors (25%) and cargo/trade (19%).



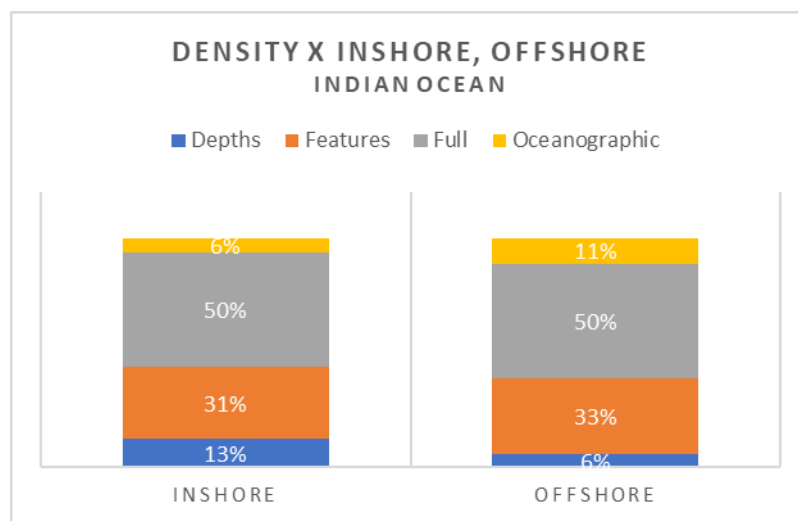
In terms of offshore respondents' research, science/research (47%) is the most popular requirement, followed by environmental (26%) and economy (21%). The same goes for inshore research with 44% of respondents selecting science/research. However, inshore research differs as the economy is the second most popular need with 25% whereas environmental requirement consists of 19%.



More than half of the respondents who chose offshore were interested in mapping the Indian Ocean to advance scientific understanding of seabed characteristics (53%). Similarly, 40% of respondents who chose inshore are also interested in mapping the Indian Ocean to further scientific understanding of the characteristics of the seabed.



The results show that the vast majority of respondents seek all data types and environmental data alone in the offshore region, whereas inshore whilst the preponderance is again for all data types, however there is a call across all data types specified.

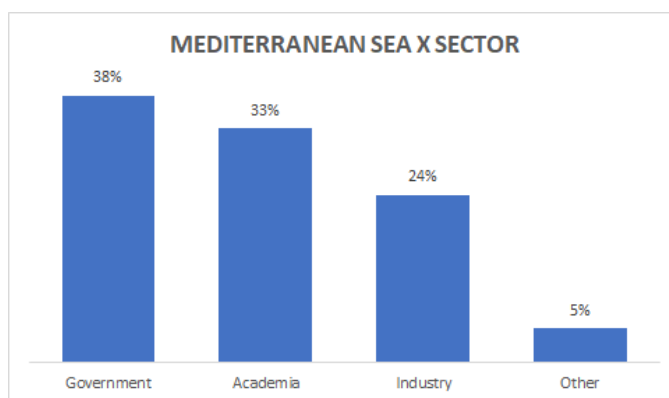


50% for both the offshore and inshore research prefer the full density data. It is followed by features at 33% and 31%, respectively.

REGION 7: MEDITERRANEAN SEA

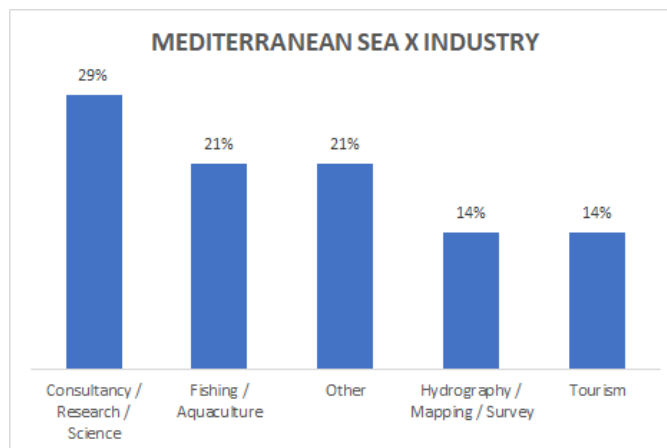
Respondents interested in the Mediterranean Sea require inshore and offshore waters, with a small percentage requiring 200 meters in depth. Responses mostly came from the government, academia, and industry sectors. They represent various industries with the most operating for consultancy/research/science, fishing/aquaculture, and other industries. In the context of the required information, the most preferred data types are all data types. Still, some respondents require a combination of types or object detection only. When asked about the level of data density required, most chose a full density. Other chosen options were features and depths.

Maritime Sector



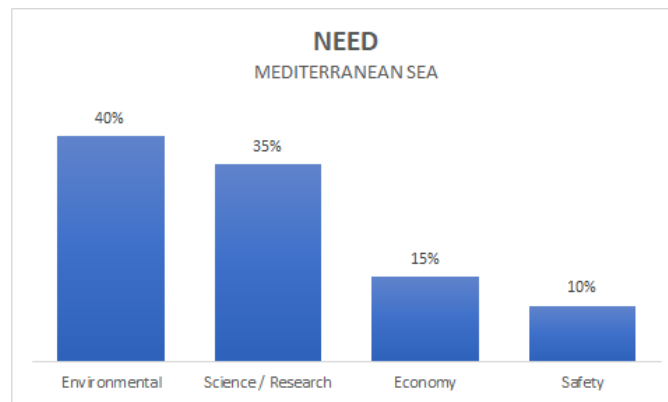
Of the 40 responses in the Mediterranean 38% of the respondents represent government, yet interestingly none had a defence interest as there were no responses from the defence arena. Two other sectors predominantly with 33% coming from the academia and 24% from industry, with 5% representing other sectors.

Industries Represented



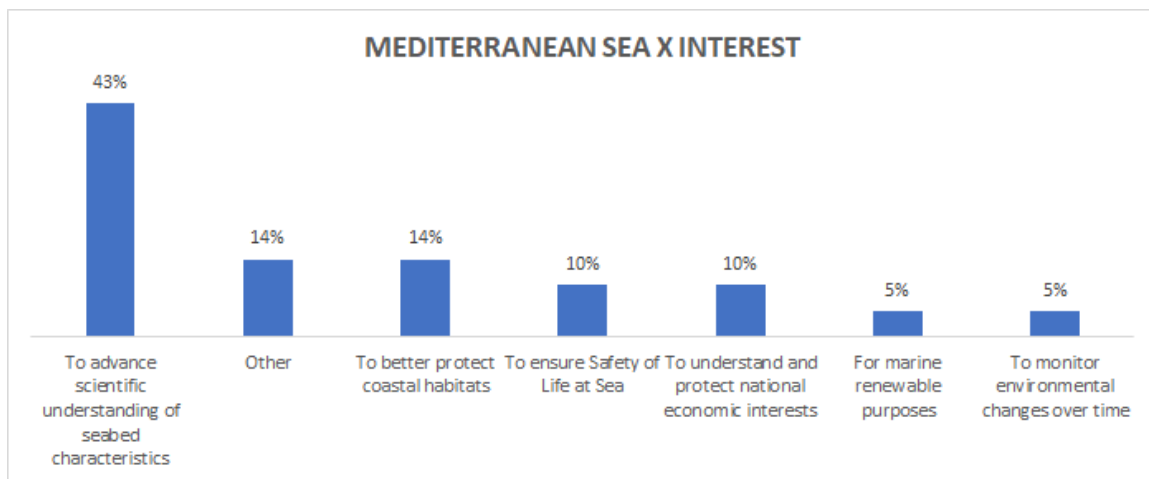
The respondents with an interest in the Mediterranean Sea represent various industries, consultancy/research/science (29%), fishing/aquaculture (21%) hydrography/mapping/survey (14%) and tourism (14%). Interestingly of the 12 ocean regions only 4 called for seabed mapping needs from a tourism perspective (Atlantic North, Mediterranean, Pacific North and Pacific South). Of these 4 regions calling for seabed mapping to support tourism the Mediterranean was the second highest.

Seabed Mapping Need



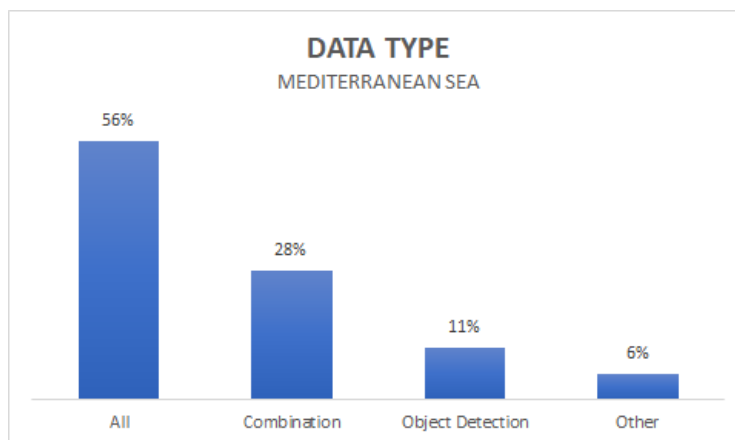
The environment (40%) is the most desired need of the respondents. Then, there are 35% that require seabed mapping for science/research and 15% economy. Only 10% showed an interest in safety.

Interest for Ocean Floor Mapping



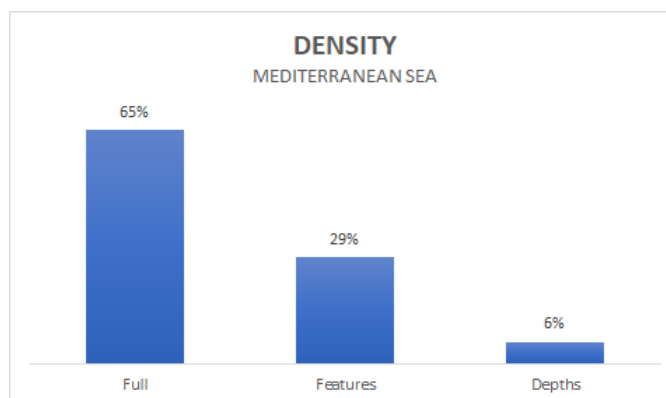
Like all the 12 ocean regions the main benefit of mapping the seabed was to advance scientific understanding of seabed characteristics with 43% of the respondents calling for this. While 14% have other reasons and another 14% have the better protection of coastal habitats as there stated interested.

Chosen Data Types



More than half of the respondents (56%) interested in the Mediterranean Sea require all data types. This aligns with all the 12 ocean regions in wanting access to all data types. Some 28% think a combination of data types is needed, while 11% require object detection.

Required Data Density



The most required level of density of the data is full insonification (65%), with 29% that require features, and 6% that require depths alone. Again, this aligns and corresponds to the results seen across all 12 ocean regions.

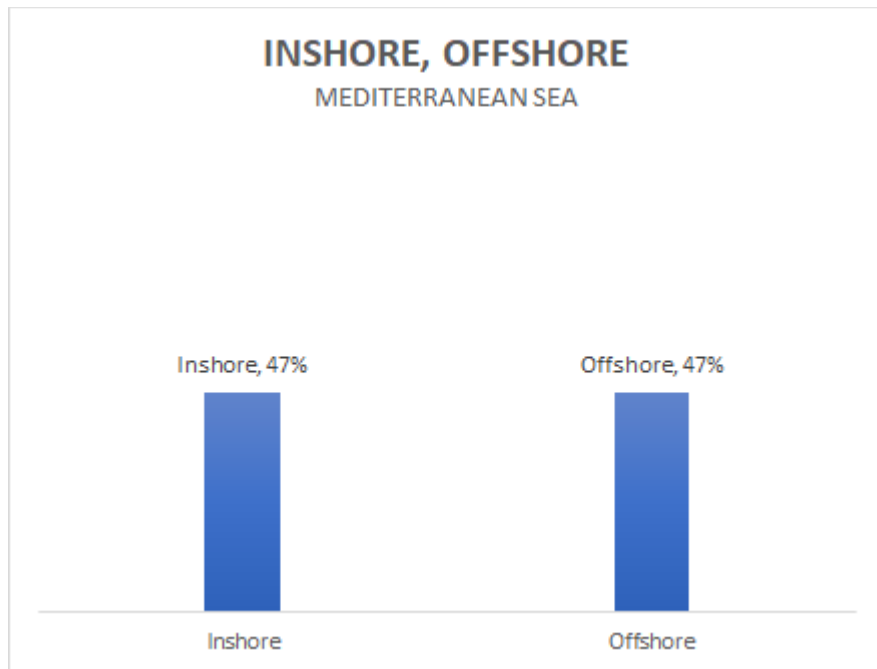
Priority Areas for the Region

The following are areas which were specifically specified by some of the respondents as priorities for mapping in the Mediterranean Sea:

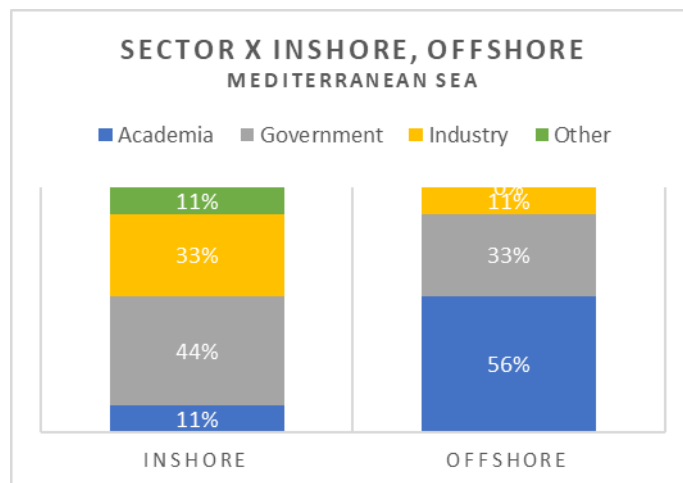
- Central Mediterranean Sea
- The whole Mediterranean basin (0-30 m)
- Seepage, shelf and slope bedforms, slope channels, continental shelf
- Seabed types and Geophysical properties
- Mediterranean Sea and especially Balearic Island
- Italy's shelf areas
- Ionian Sea
- Hotspot of Biodiversity in the Mediterranean Sea (cold water coral sites), and coastal areas affected by human impact and marine litter accumulation

- Underwater banks off the north of Tunisia
- Cretan Basin at the Aegean Sea
- Area of Interest is the coastal zone of the island of Crete
- Azores Triple Junction and Ionian Sea (Greece)

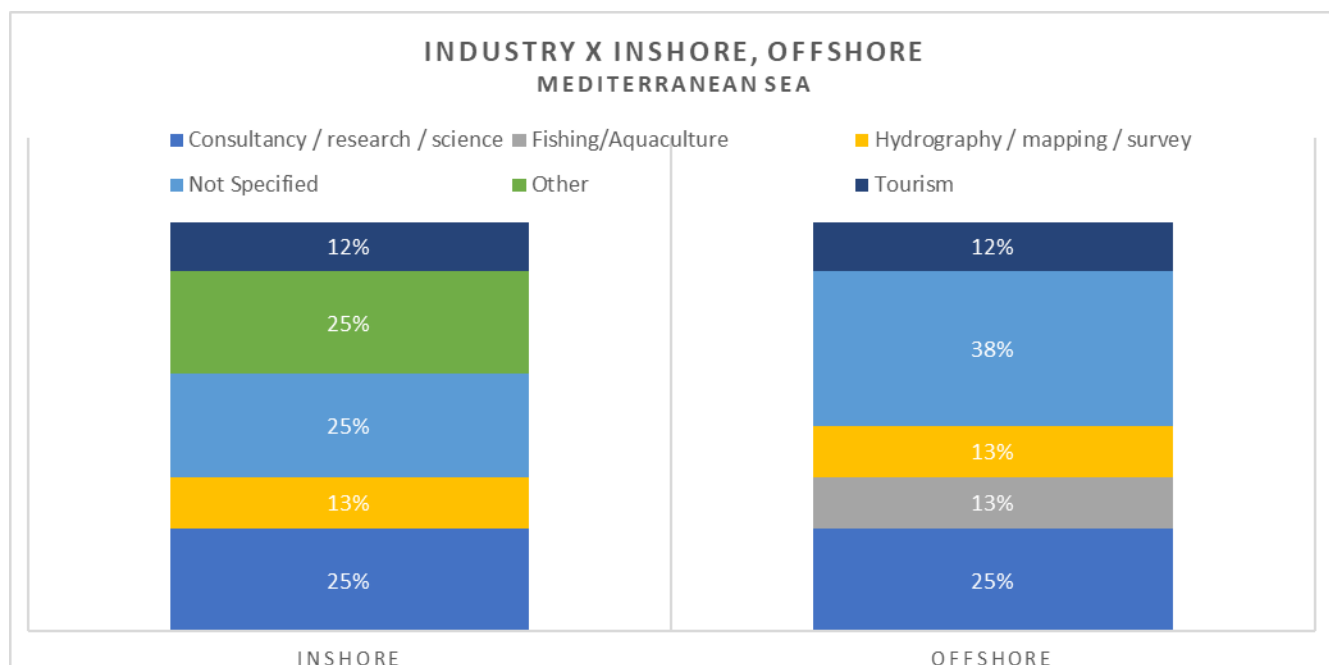
Inshore versus Offshore Priorities



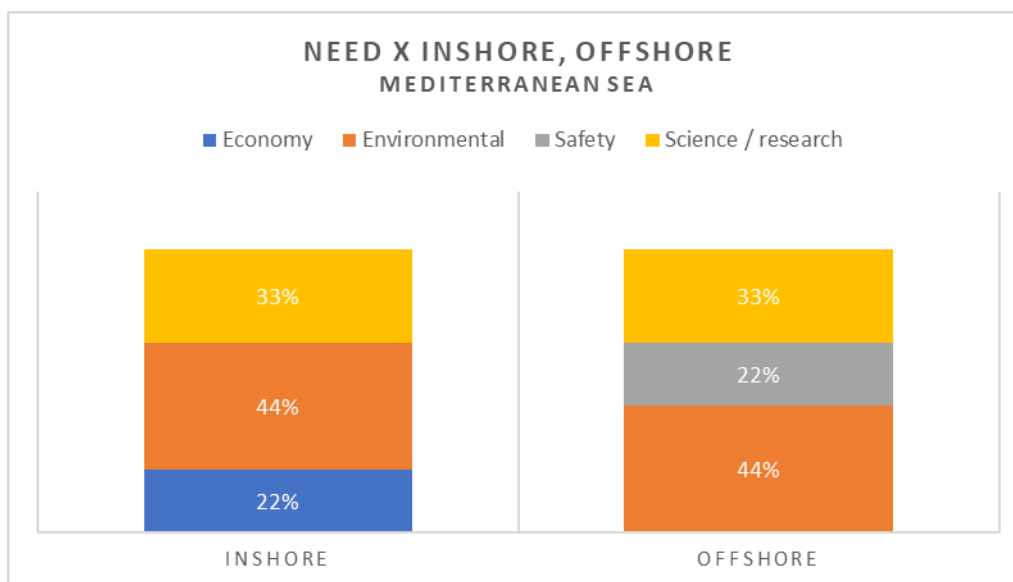
There was an equal call for mapping Inshore and offshore within the Mediterranean Sea with 47% of respondents, respectively. The remaining 5% saw that up to the 200m contour as the highest priority.



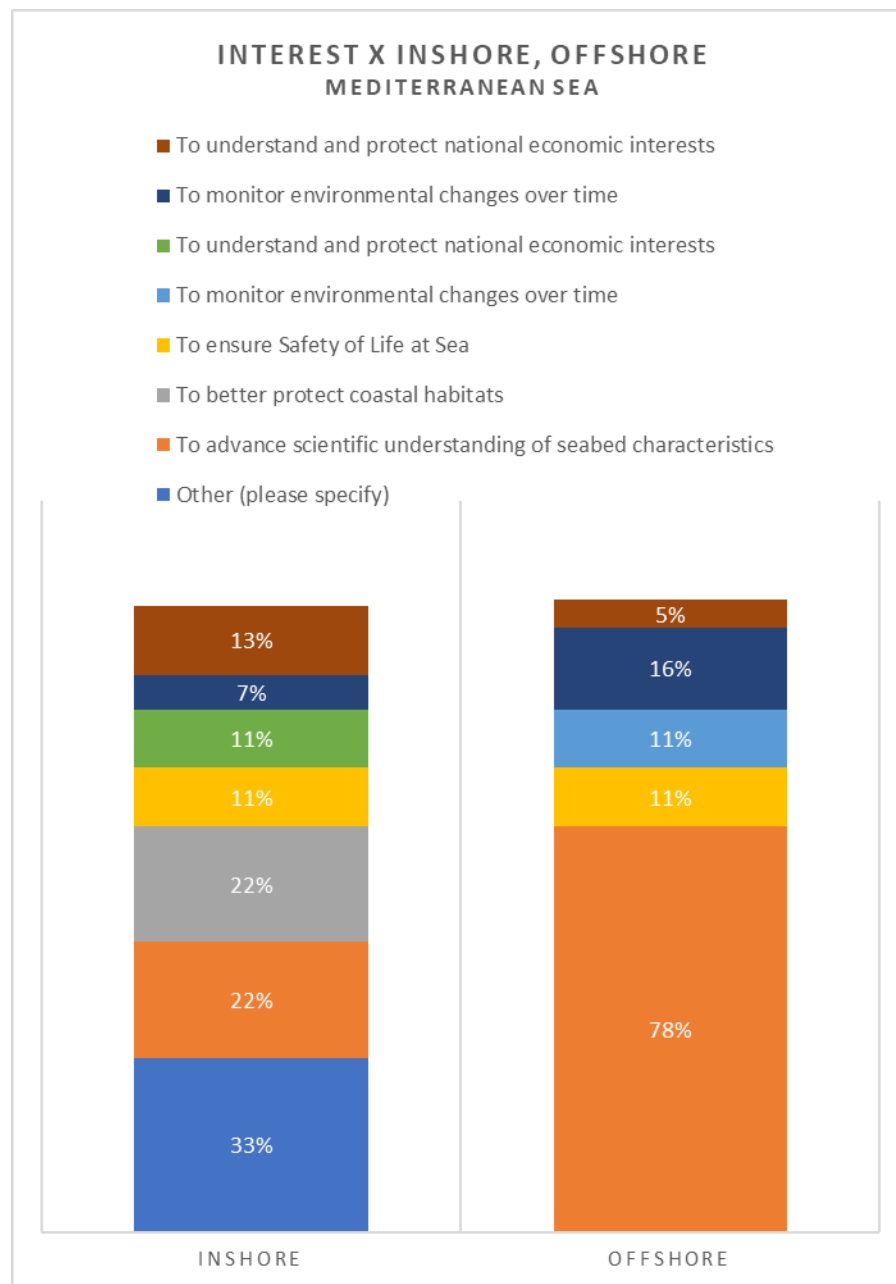
For those who are interested in offshore, 56% are from academia and 33% are from the government. Conversely, respondents who show interest in inshore 44% are from the government and interestingly industry sector at 33% is second with only 11% from academia.



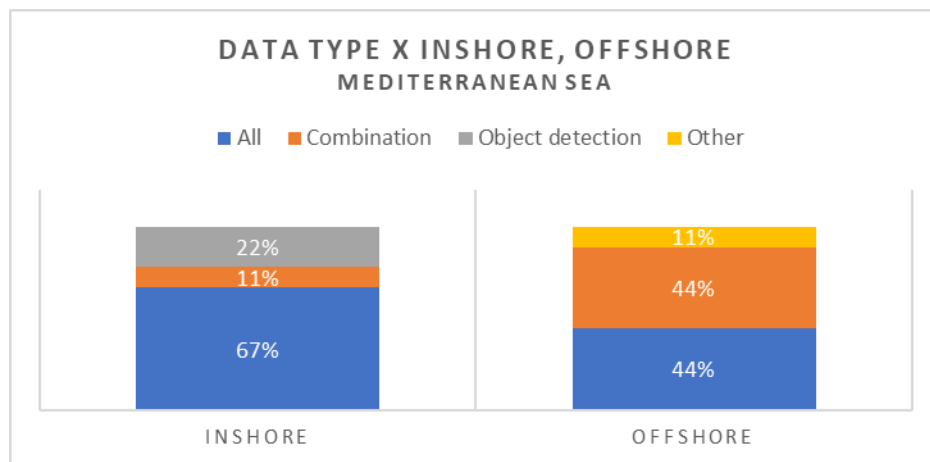
In the context of industry, respondents who showed interest in offshore the largest response has come from industries not specified in the maritime space (38%) and consultancy/research/science (25%), tourism and fishing. The respondents who specified inshore, however, are from similar industries including consultancy/research/science (25%), industries not specified in the maritime space (25%), and other industries (25%). It is interesting to see that there was no call for seabed mapping in the inshore waters withing the fishing/aquaculture industries.



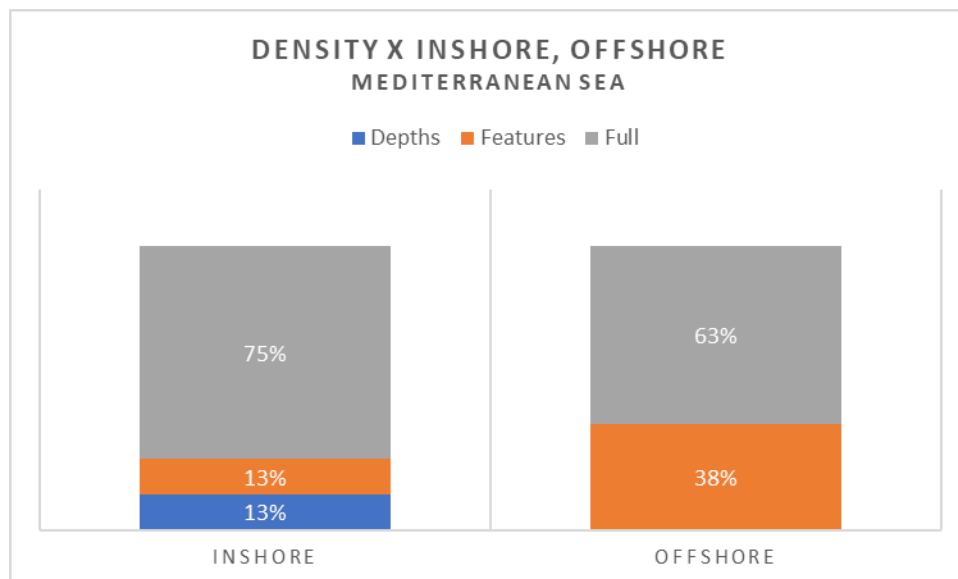
Inshore and offshore requirements were very similar with 44% having an environmental requirement, 33% with an interest in science/research. The remaining 22% differed with offshore having a safety need and onshore an economic need. It was surprising to see an offshore deeper water need for seabed mapping from a safety perspective and not see this in the shallower inshore waters.



The vast majority of respondents (78%) who prioritised offshore are interested in mapping the Mediterranean Sea to advance scientific understanding of seabed characteristics. In contrast, the respondents who prioritised inshore are focusing on other reasons (33%), better protection of coastal habitats (22%), and advancement of scientific understanding of seabed characteristics (22%).



All data types are mostly required by the majority of respondents. This consists of 44% of the offshore respondents and 67% of the inshore respondents. It was interesting to see that of the 21 respondents for the Mediterranean Sea only 9 respondents answered this question.

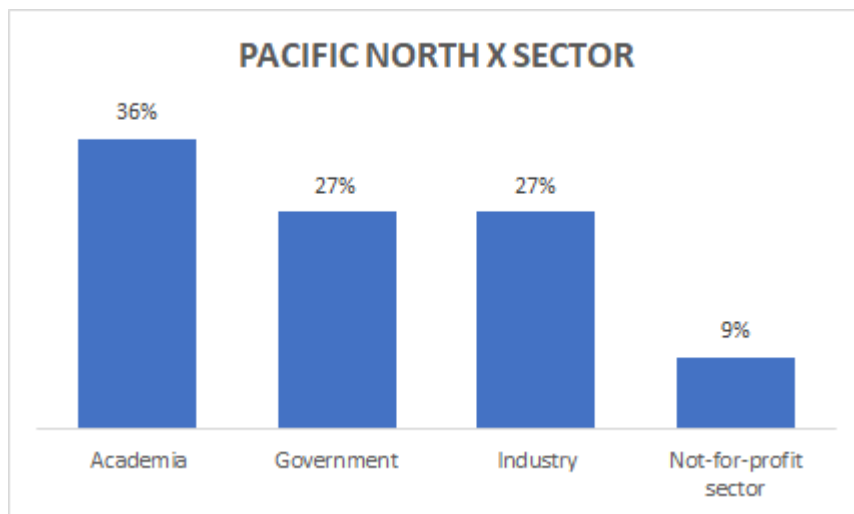


As seen across all the ocean regions the most preferred data density of all respondents is full insonification. For those who chose inshore, 75% need this density level, whereas 63% from offshore need it. Again, of the 21 respondents to the Mediterranean Sea only 8 specified a data density need.

REGION 8: PACIFIC NORTH

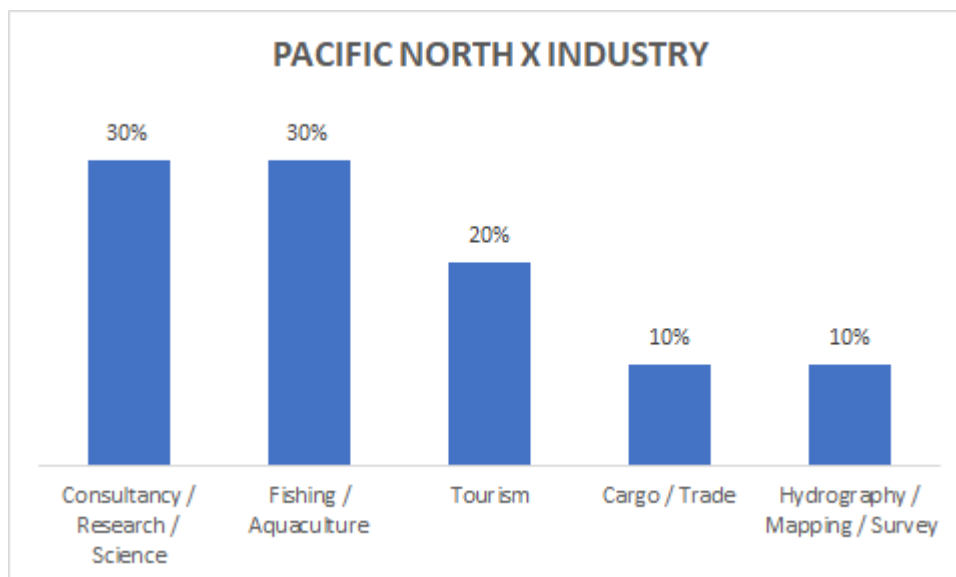
The respondents are made up of representatives from academia and the consultancy, research, and science industry. Environmental concerns are regarded as the most important need in the area. In relation to this, respondents are particularly eager to develop a scientific understanding of seabed characteristics. Moreover, the respondents' preferred data type is all types, and they require full density of data.

Maritime Sector



Overall, 11 responses were received from the Pacific North region which is quite small in comparison to responses for the other ocean regions. Of the total responses 36% of the respondents come from academia followed evenly by the government (27%) and industry (27%) sectors with not for profit (9%).

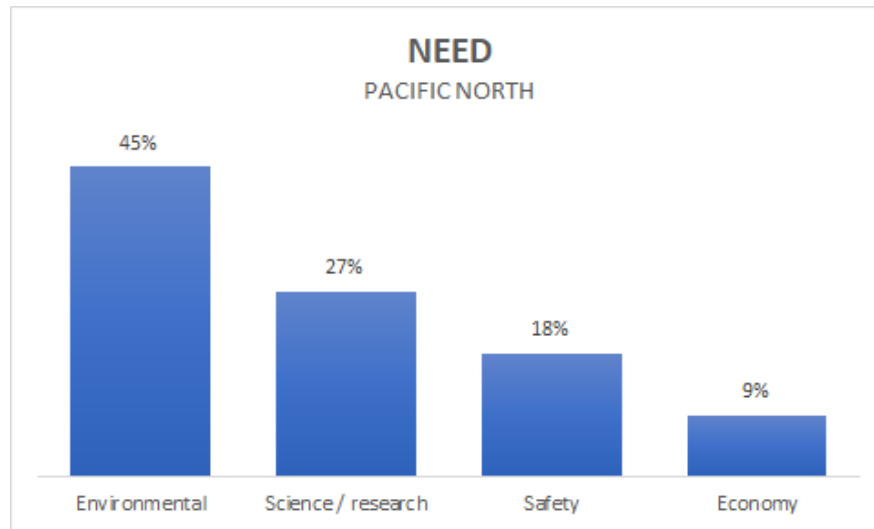
Industries Represented



Respondents interested in the Pacific North are mostly from the consultancy/research/science industry (30%) and fishing/aquaculture (30%). The fishing/aquaculture level is the highest by far across all ocean regions. This

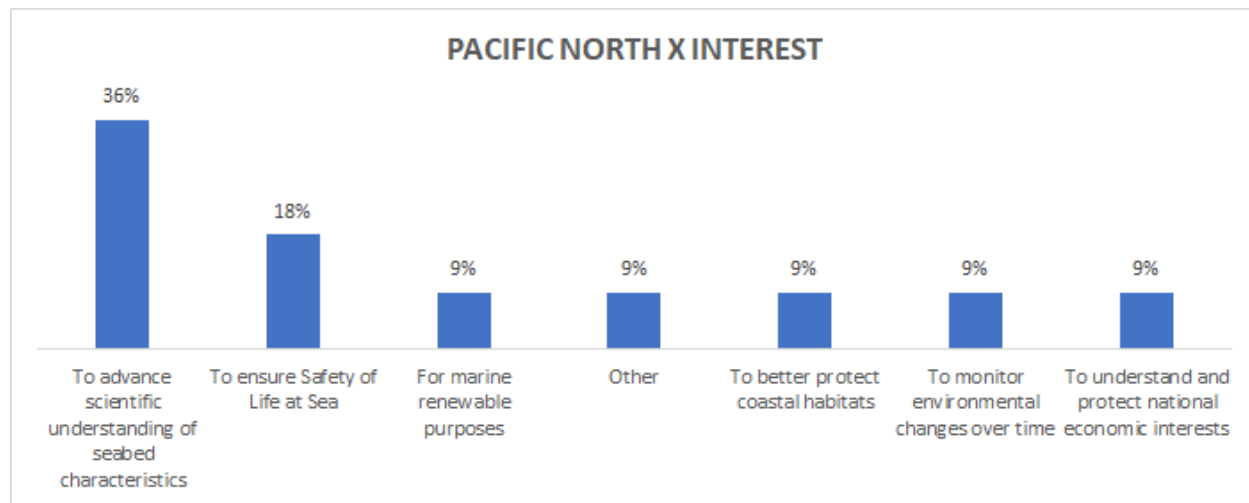
was followed by the tourism industry (20%), again the Pacific North region should the highest tourism industry level across all 12 ocean regions. The remaining industry interests lay within cargo/trade 10%, and hydrography/mapping/survey 10%.

Seabed Mapping Need



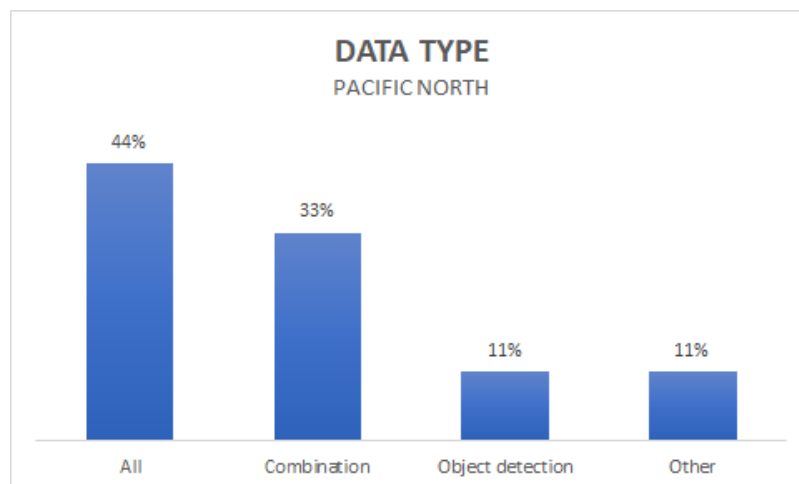
For Pacific North, and akin to the 12 ocean regions the preponderance for seabed mapping needs lay within environmental (45%) which was followed by science/research (27%). The remaining seabed mapping needs were called from a safety (18%) and economy (9%) perspective.

Interest for Ocean Floor Mapping



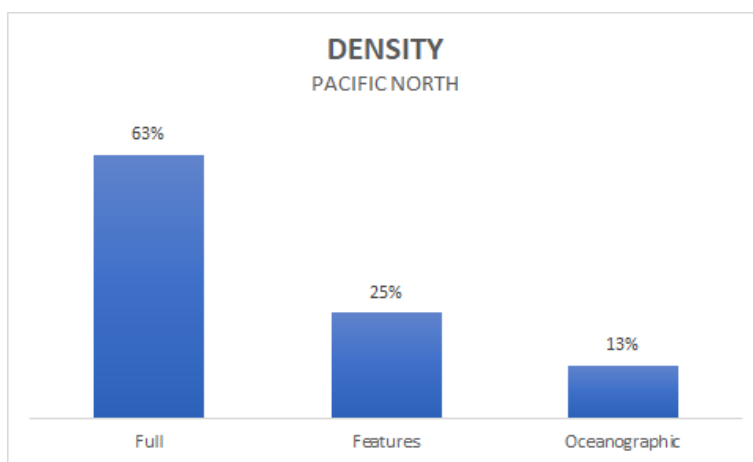
Of the 11 responses the top 2 reasons for mapping the seabed were seen as follows: 36% of the respondents saw advancing the scientific understanding of seabed characteristics as to why they are interested in mapping the ocean floor and 18% to ensure the safety of life at sea.

Chosen Data Types



The most preferred data type for the Pacific North is all types (44%) and whilst this aligned with all the 12 ocean regions comparably it was the lowest by a significant margin whereas most other regions were 60%+. However, 33% of the respondents prefer a combination data type and again when this was compared to the 12 ocean regions the Pacific North was the highest in wanting a combination of data types.

Required Data Density



63% of the respondents require full density of data and this was the 4th highest of the 12 ocean regions and 25% only required a features dataset. What was interesting was that the Pacific North was the only one of the 12 ocean regions where there was no call for depth data alone.

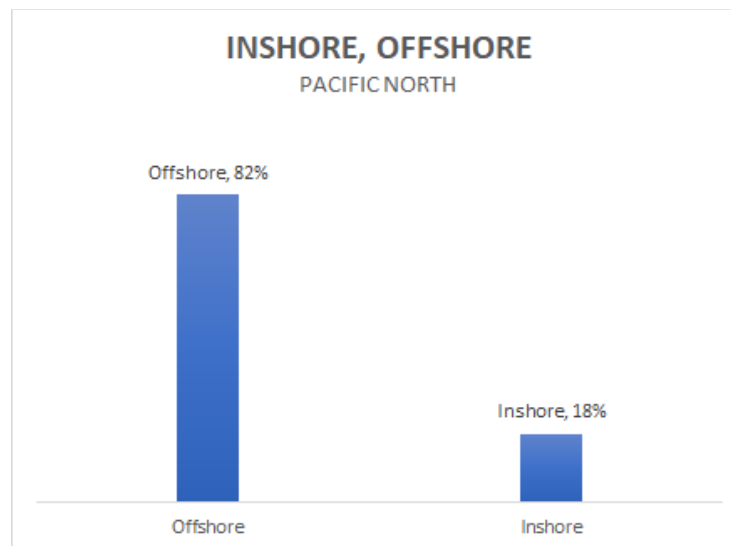
Priority Areas for the Region

Of the responses received for the Pacific North those respondents that specified a particular area to be mapped stated the following areas of interest/need:

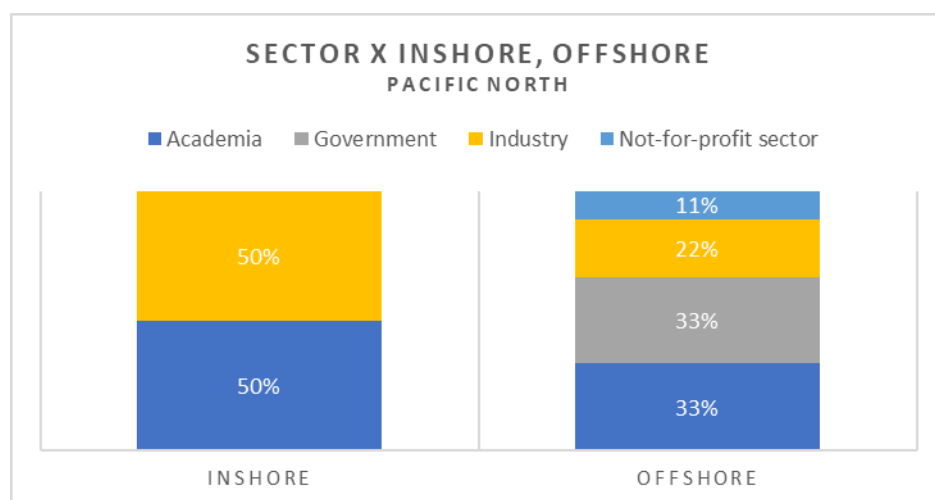
- West pacific
- Tonkin and Thai gulf
- Pacific Marine Protected Areas
- Mesoamerica next reefs & Pacific islands
- Ma'alaea Bay, Hawaii, USA - Coral Reef Eco System Restoration

- Gulf of Alaska, Eastern Bering Sea
- EEZ and sea-lanes
- Cocos Island
- Areas of W coast of N America EEZ not yet mapped

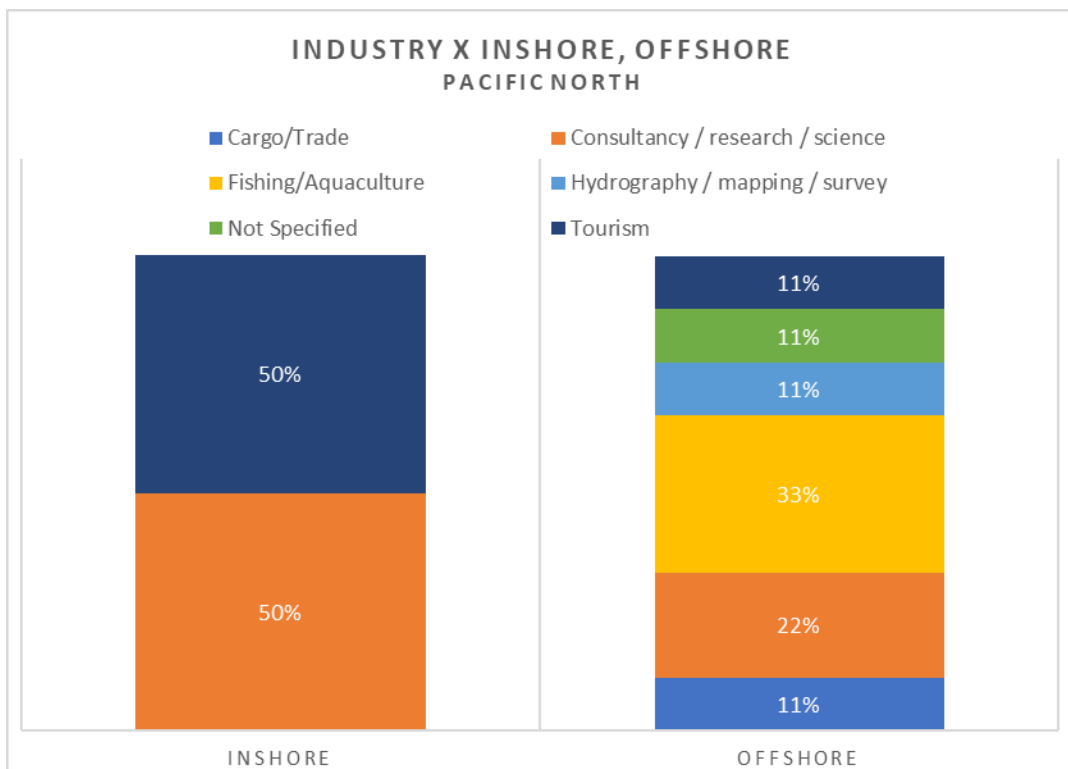
Inshore versus Offshore Priorities



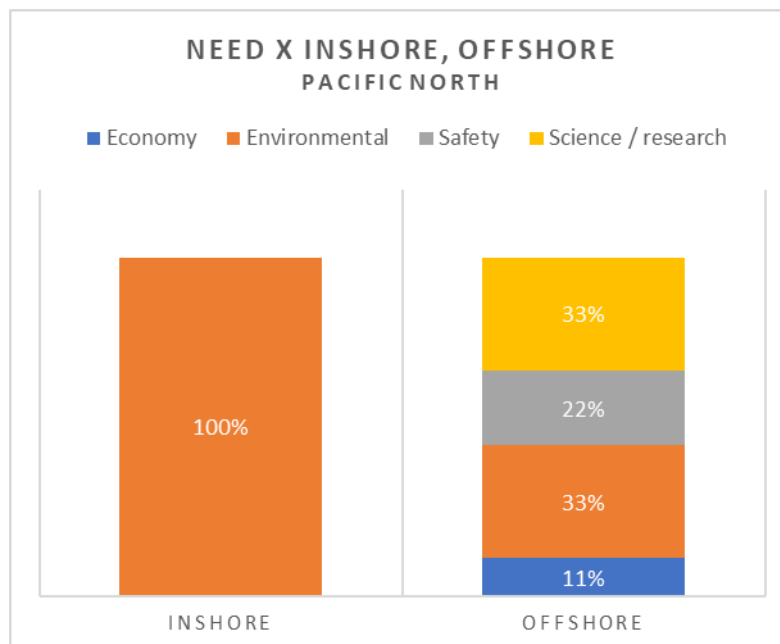
Of the 11 responses there was an overwhelming Priority for the offshore at 82% to be mapped and this was the second high call across the 12 ocean regions (Arctic being the highest (Black Sea not considered as it was made up of only 3 responses)).



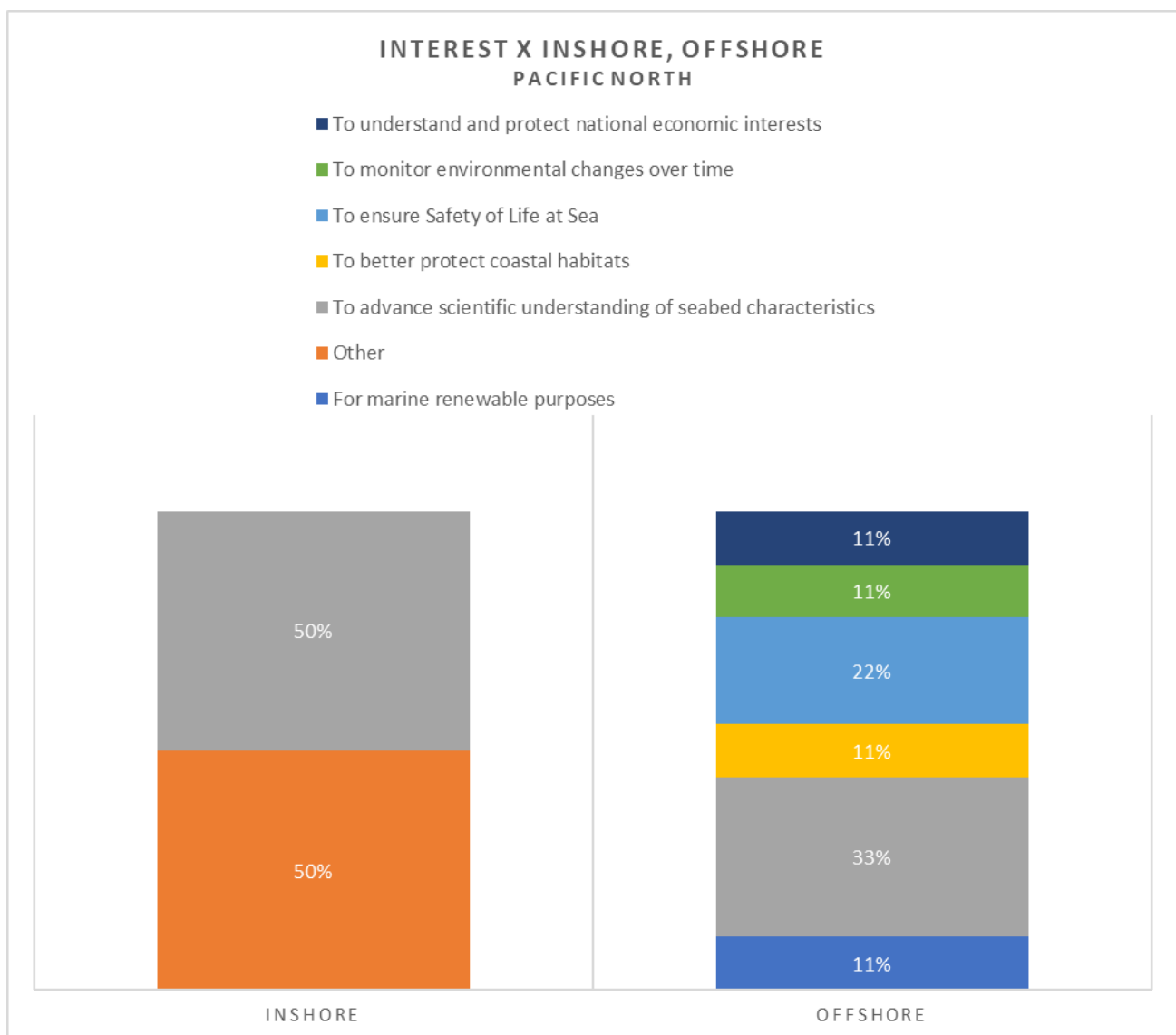
Of those who selected offshore in Pacific North, the majority come from academia and government at 33% each. Alternatively, respondents who chose inshore are split equally between the industry sector (50%) and academia (50%). It was interesting to see that there were no responses from Government in the inshore region of the North Pacific.



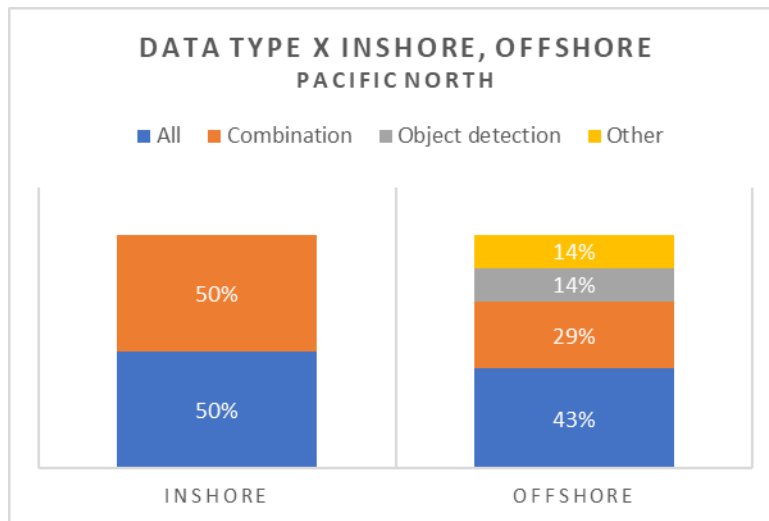
The offshore respondents come mostly from the fishing/aquaculture sector (33%), yet there is no call for fishing/aquaculture in the inshore areas. Meanwhile, for the inshore respondents, half are from the tourism industry (cruise ships predominantly) while the other half are from the consultancy/research/science industry.



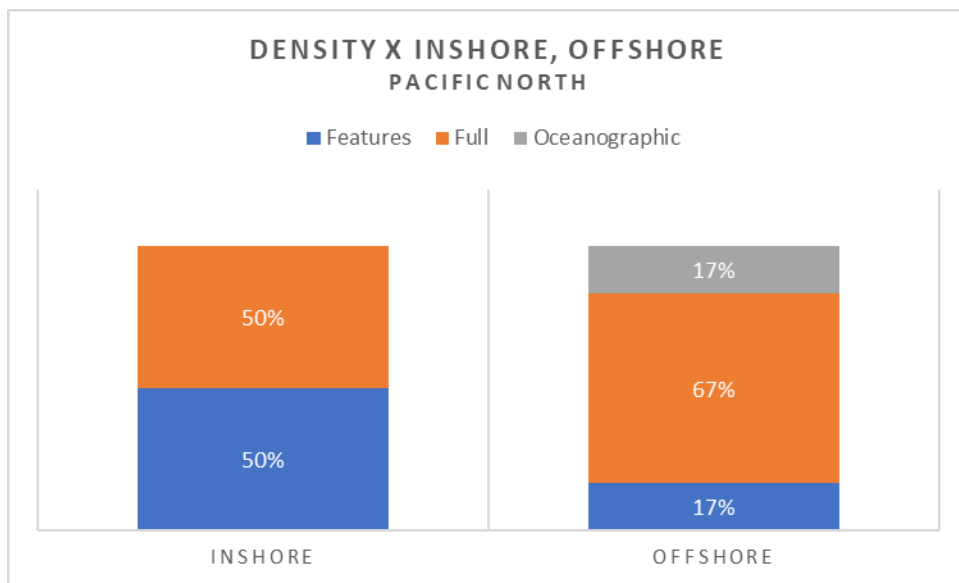
Offshore results were split between environmental and scientific/research both with 33%, safety followed with 22% and economy on 11%. Inshore results were all for environmental concerns, this was the only ocean region of all 11 that stated a single factor for need for inshore waters.



33% of offshore respondents are interested in advancing scientific understanding of seabed characteristics and 22% in ensuring safety of life at sea. Inshore respondents are equally split between advancing scientific understanding of seabed characteristics (50%) and other reasons (50%).



Of the 7 offshore respondents 43% require all data types and 29% call for a combination of data types. Compared to 50% of inshore respondents requiring all data types and 50% seeking a combination of data types, however it should be highlighted that there were only 2 responses for inshore data types.

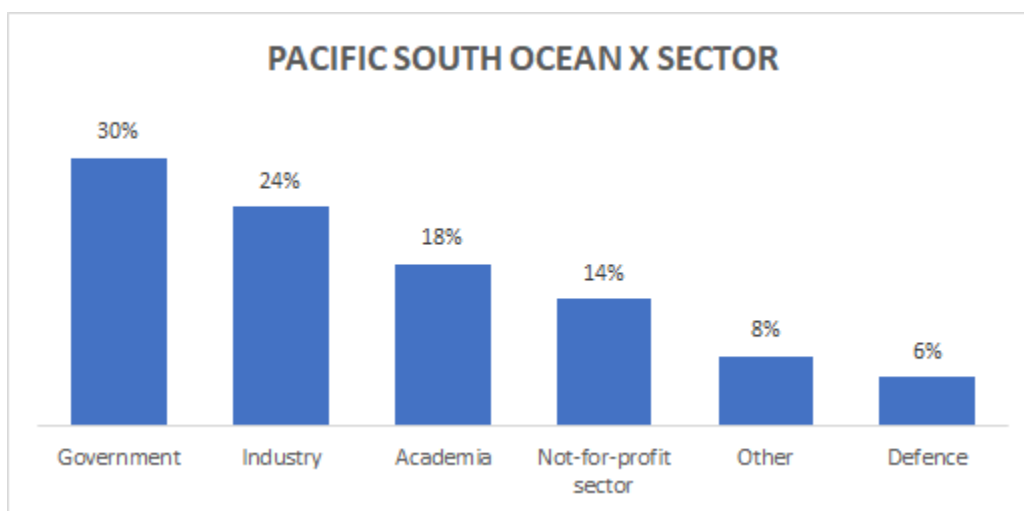


Density requirements of 6 offshore respondents chose full insonification (67%). While for the 2 inshore respondents, one chose full while the other chose features only.

REGION 9: PACIFIC SOUTH

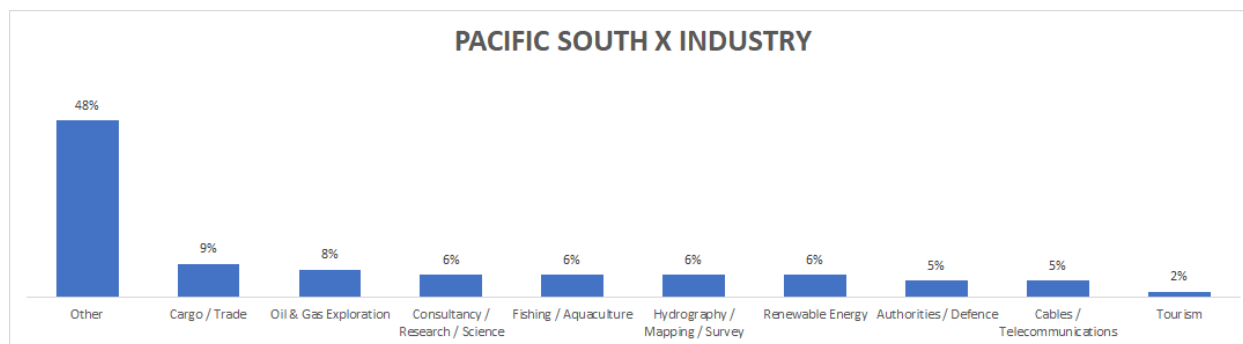
The Pacific South region saw the greatest number of respondents (127) across the 12 ocean regions by far (second was Atlantic North with 99 respondents). Most of the respondents in Pacific South are from the Government, industry and academia sectors. Research/science is stated as the most significant need for seabed mapping in the Pacific South. Further, the respondents tend to be interested in mapping the ocean floor in order to advance scientific understanding of seabed characteristics, and they prefer all types of data.

Maritime Sector



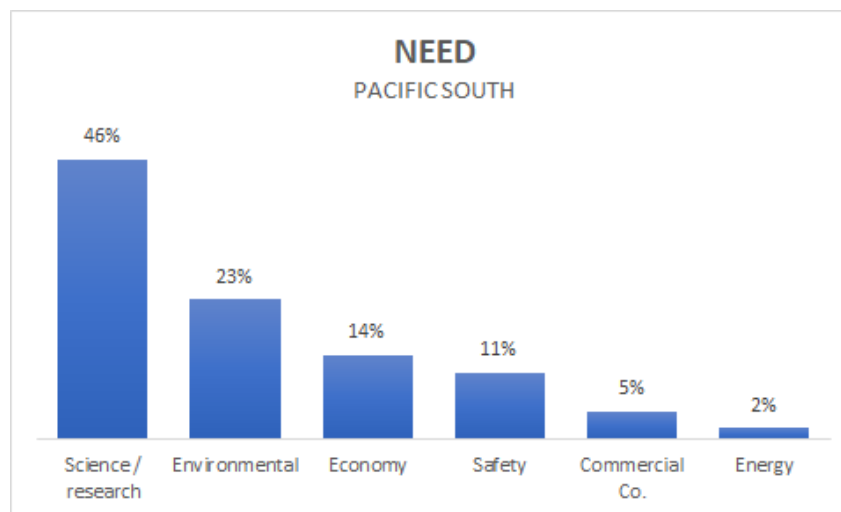
Of the Pacific South survey respondents (127 which was the highest across all 12 ocean regions), 30% represent the Government with 24% coming from industry and 18% from academia. The remaining responses are made up of the not-for-profit, other and from the defence sectors.

Industries Represented



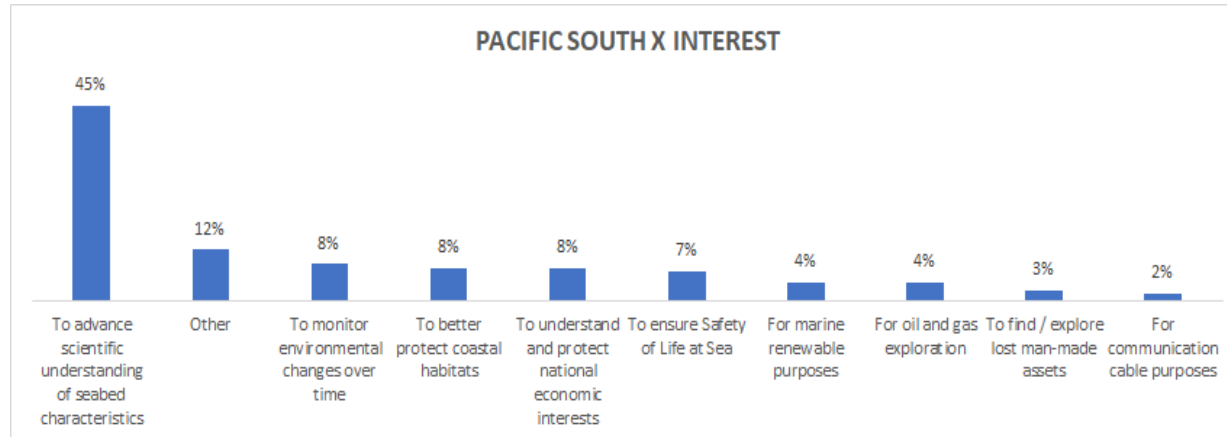
48% of the respondents with an interest in the Pacific South region were from “other” wider industries (academia make up a large proportion of these respondents). Of the remaining industries as can be seen there is a similar proportion across cargo/trade, oil & gas exploration, consultancy/research/science, fishing/aquaculture, hydrography/mapping/survey, renewable energy, authorities/defence and cables/telecommunication. Interestingly this similar level of industry spread has not been observed across so many industry types in all the other 12 ocean regions.

Seabed Mapping Need



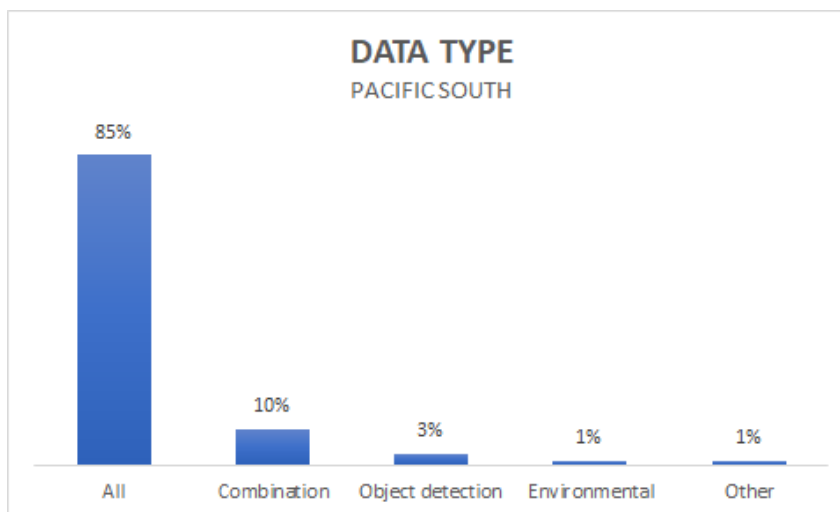
With 109 responses and the highest of the 12 ocean areas the most significant need for the Pacific South is science/research (46%), followed by environmental (23%) and economy (14%). The results seen align and corroborate with all the other ocean regions and with such a significant number of responses it provides confidence and credibility to the mapping needs seen in other ocean regions where there was a much smaller dataset.

Interest for Ocean Floor Mapping



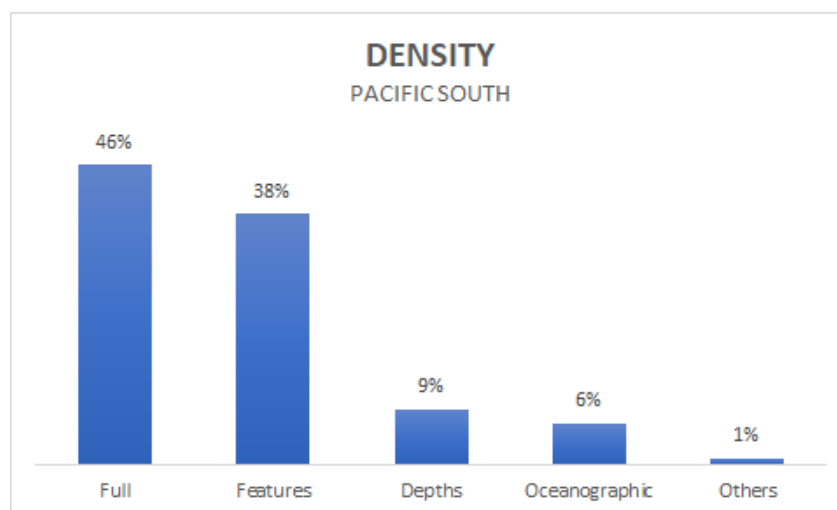
For interest in the Pacific South, 45% of the 111 respondents are interested in mapping the ocean floor to advance scientific understanding of seabed characteristics. This is in line with the results seen from the other 11 ocean regions.

Chosen Data Types



Of the 91 responses to this question 85% have a need for all data types and of the 12 ocean regions the Pacific South region was the joint second highest (with Atlantic North (the Baltic (100%) has been discounted with only 3 responses).

Required Data Density



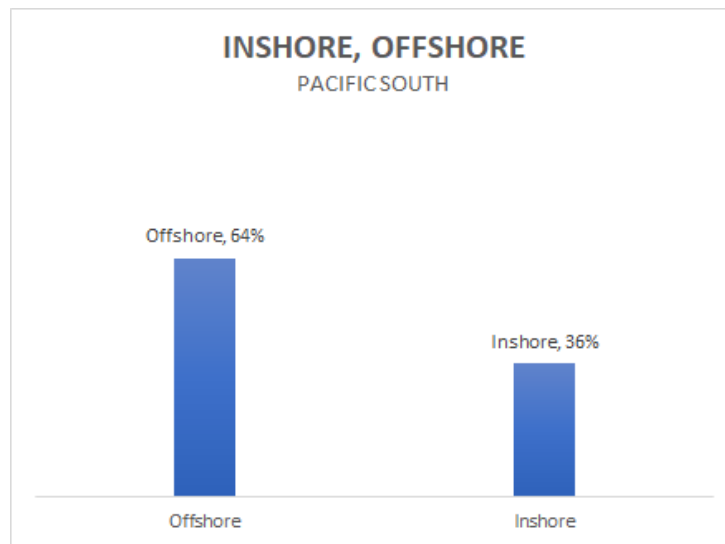
Of the 94 responses 46% of the respondents require full insonification data for Pacific South. It is followed by the 38% who require features only. These priorities align with the 12 ocean regions.

Priority areas for the Region

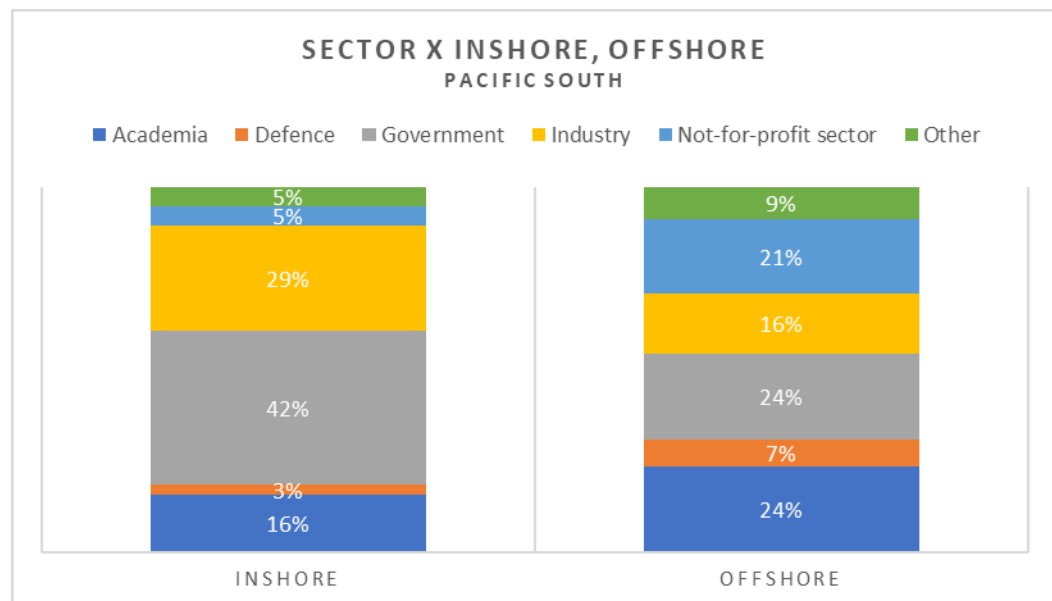
In the Pacific South region, the following areas were specified by respondents as priority areas to have the seabed mapped:

- Carnegie Ridge
- Cocos Ridge
- Galapagos Island's EEZ

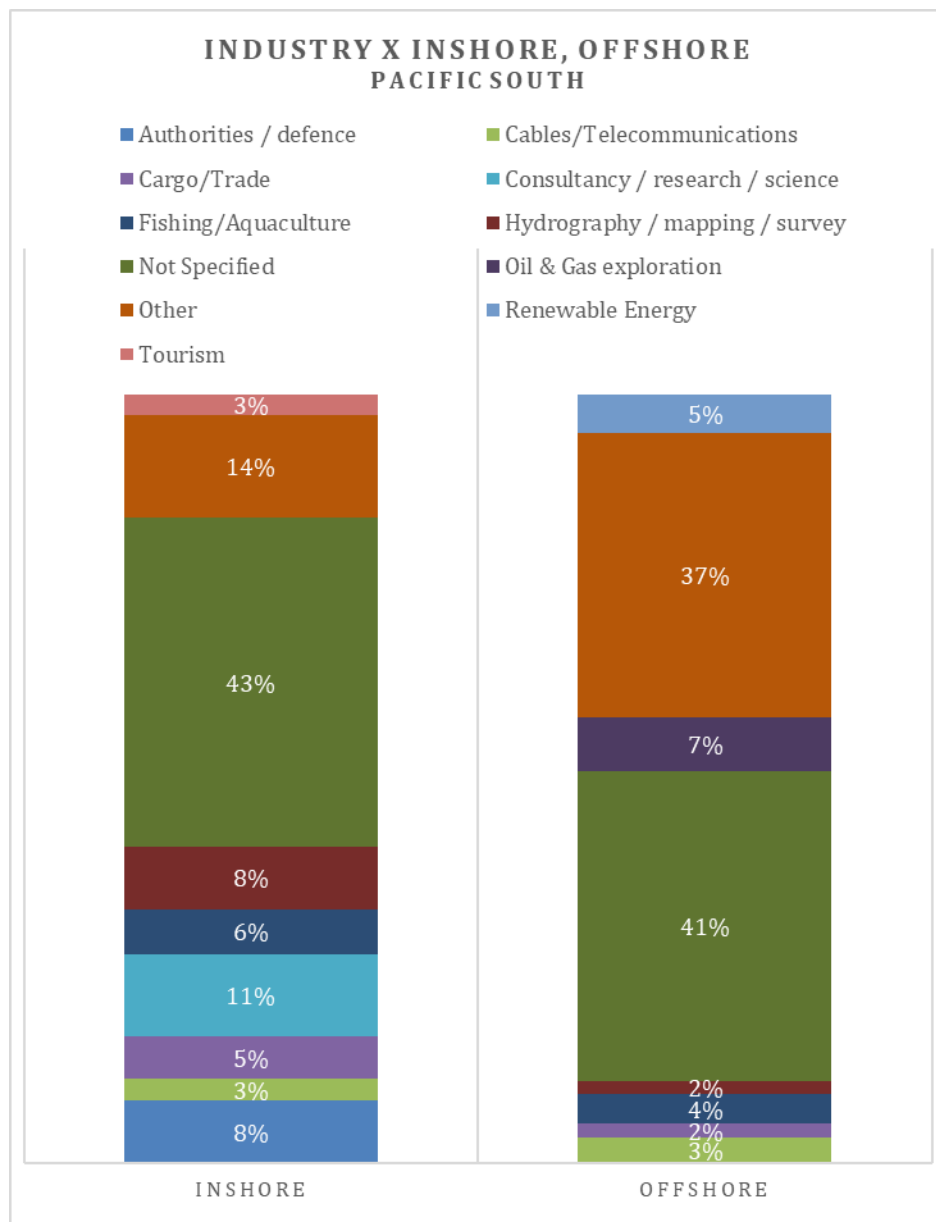
Inshore versus Offshore Priorities



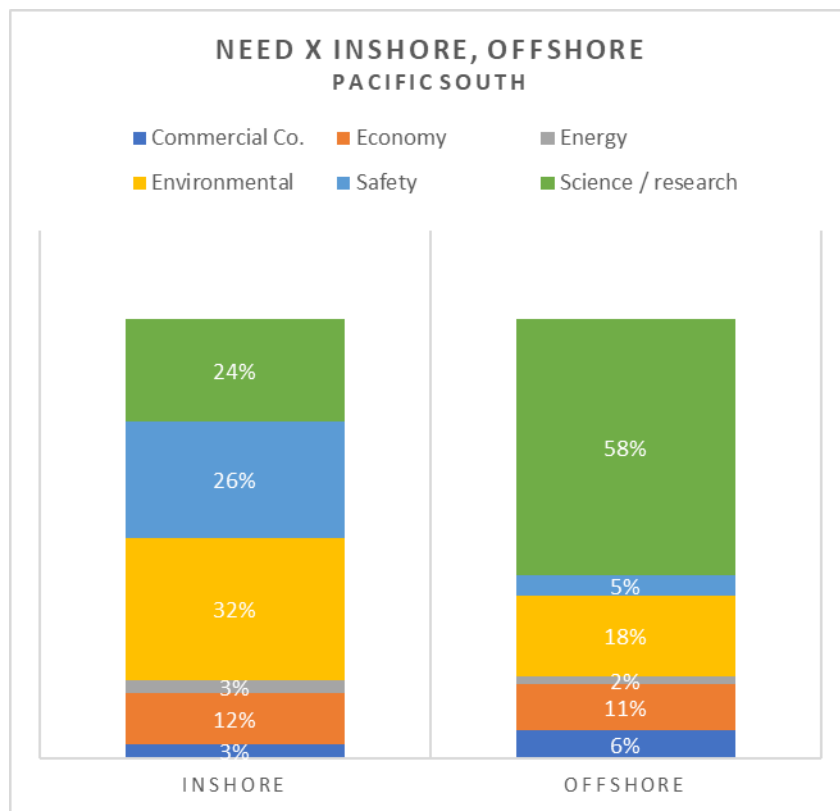
For the 111 Pacific South respondents, offshore areas (64%) were identified as the highest priority whereas the inshore waters (36%) were seen as a priority for seabed mapping.



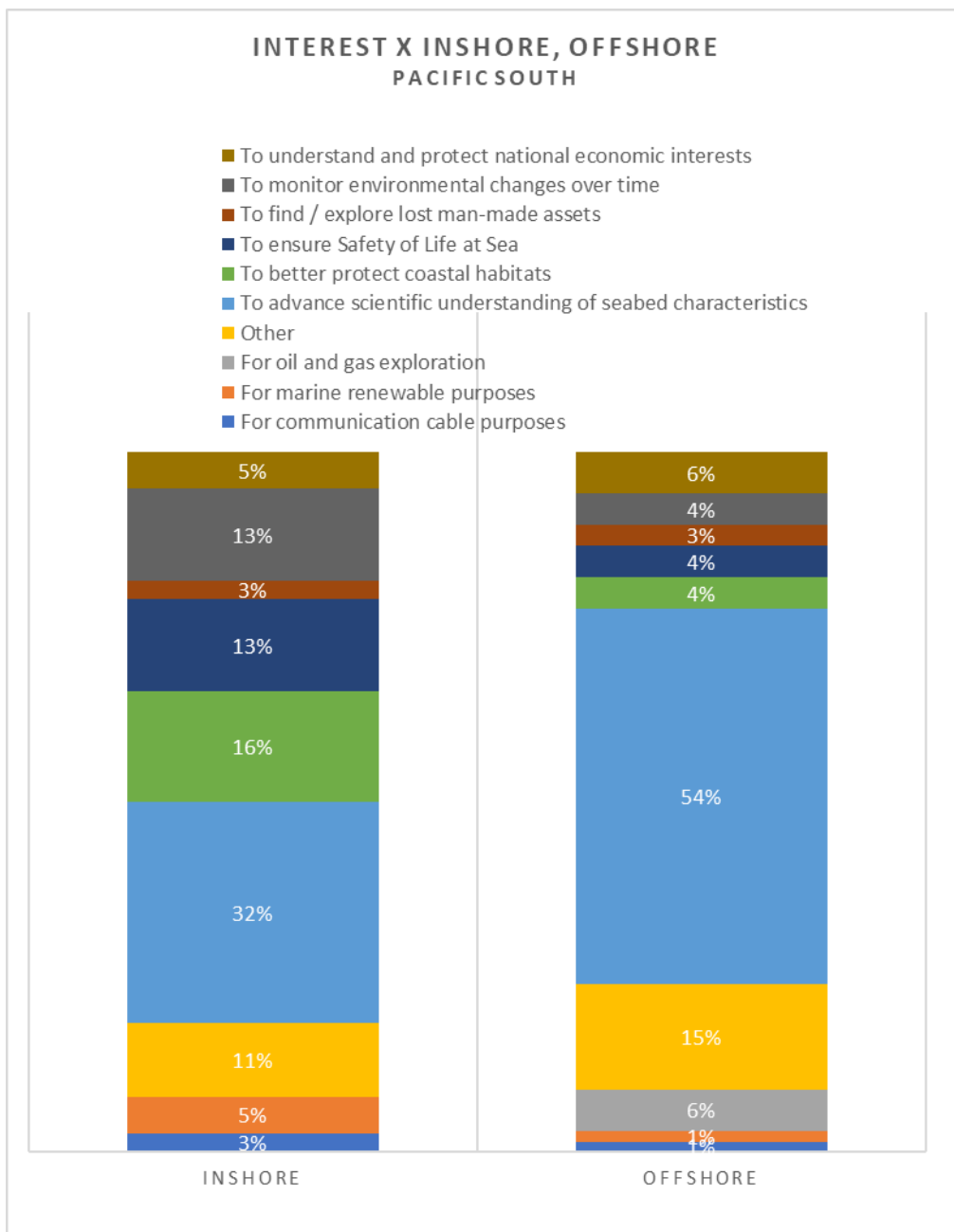
Of the 106 respondent's academia and the government, at 24% each make up the two leading sectors for offshore. Whereas inshore, 42% of responses are from the government and industry with 29% is the second sector.



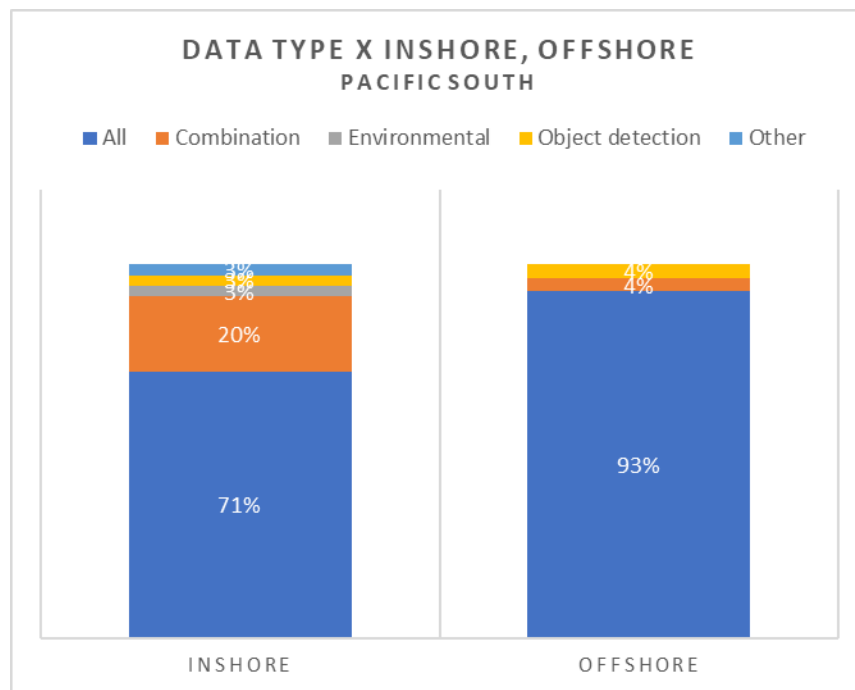
The industry where most of the respondents belong to are not specified for both offshore (41%) and inshore (43%) with other (academia in large part) industries making up the next highest sector. Compared to other ocean regions the Pacific South see greater diversity in industry sectors particularly in the inshore regions.



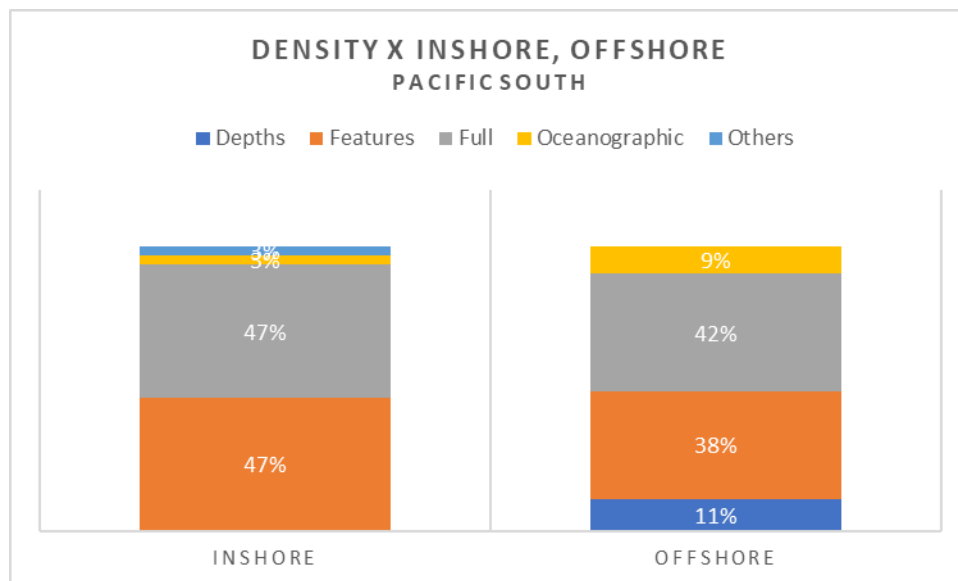
It is interesting to see that 58% of the offshore respondents see the need to map the Pacific South for science/research purposes. In contrast, the highest need from an inshore perspective, is that for environmental reasons (32%), which is followed by 24% science/research.



Of the 66 responses to this question 54% of the offshore respondents and 32% of the inshore respondents are interested in mapping the Pacific South to advance scientific understanding of seabed characteristics. As previously stated, we are seeing again in the Pacific South region a far greater diversity and spread of interests and needs to map the seabed when compared to the other ocean regions.



Of the 35 responses to this question 93% of the offshore respondents and 71% of the inshore respondents require all data types in mapping the Pacific South.

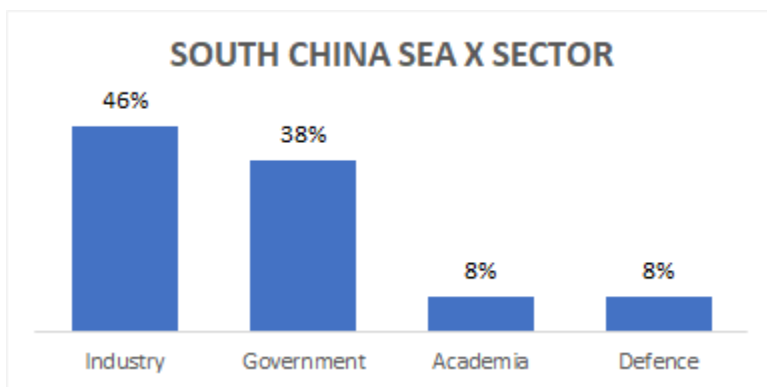


Like the Pacific North we have seen an equitable split in the need for full insonification and those who require only features data with 42% of respondents who chose offshore required full density data and 38% require features only. Inshore requirements were nearly half of the respondents requiring both full density and features. Interestingly of the 12 ocean regions the Pacific North and Pacific South are the only 2 regions where respondents call equally for either full insonification and or features datasets.

REGION 10: SOUTH CHINA SEA

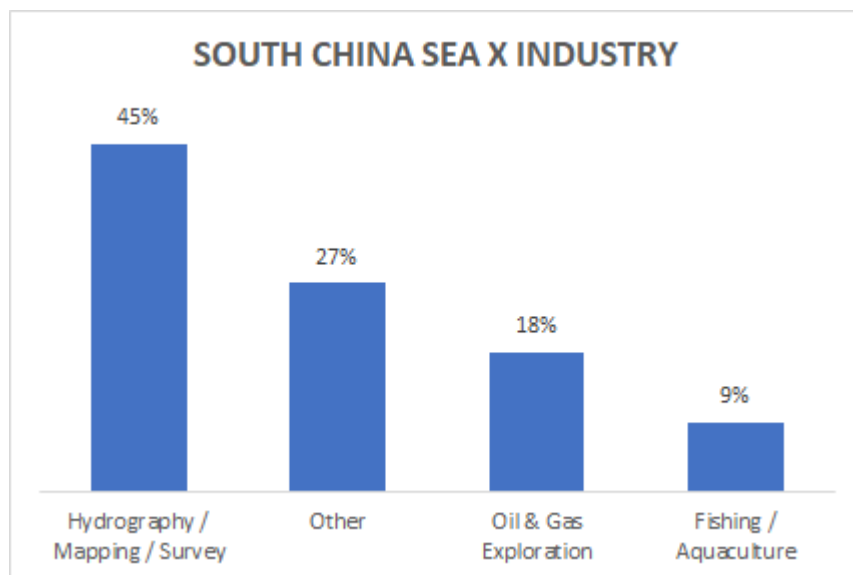
The South China Sea saw the highest industry level percentage (43%) across all 12 ocean regions. Within the industry respondents a significant number were from the hydrographic/mapping/survey industry. The trends in the South China Sea were like those called for in the Atlantic North and with Government the second highest sector as respondents. Interestingly there were only 8% within the academia sector and this was by far the lowest representation across all 12 ocean regions. In terms of need, the most desired for the South China Sea is safety. In addition, respondents cited an advance in scientific understanding of the characteristics of the seabed as their top reason for wanting to map the ocean floor.

Maritime sector



The South China Sea produced most results from industry (46%) and the government with 38%. It should be highlighted that the 8% academia representation was by far the lowest level across all 12 ocean regions. Finally, whilst defence had 8% responses when viewed across all ocean regions this was the second highest level.

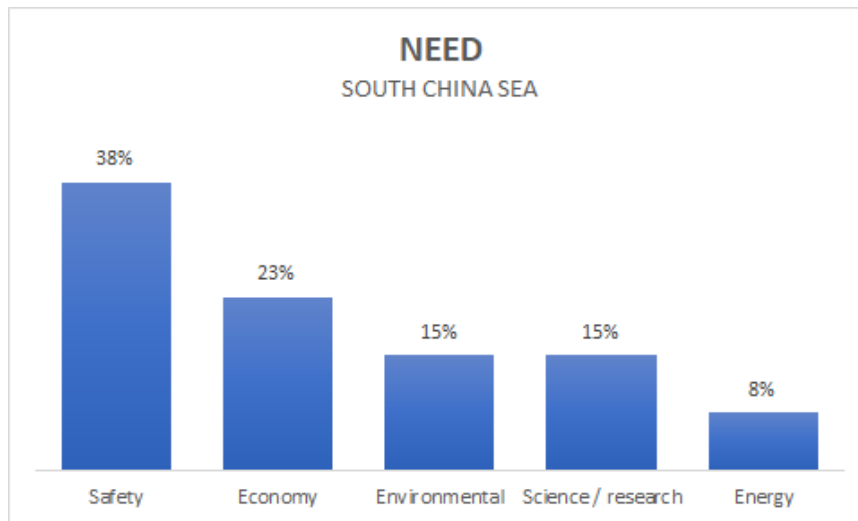
Industries Represented



The South China Seas attracted the majority of responses 45% from the hydrography/mapping/survey industries, other wider industries followed with 27%, 18% oil & gas exploration and 9% from

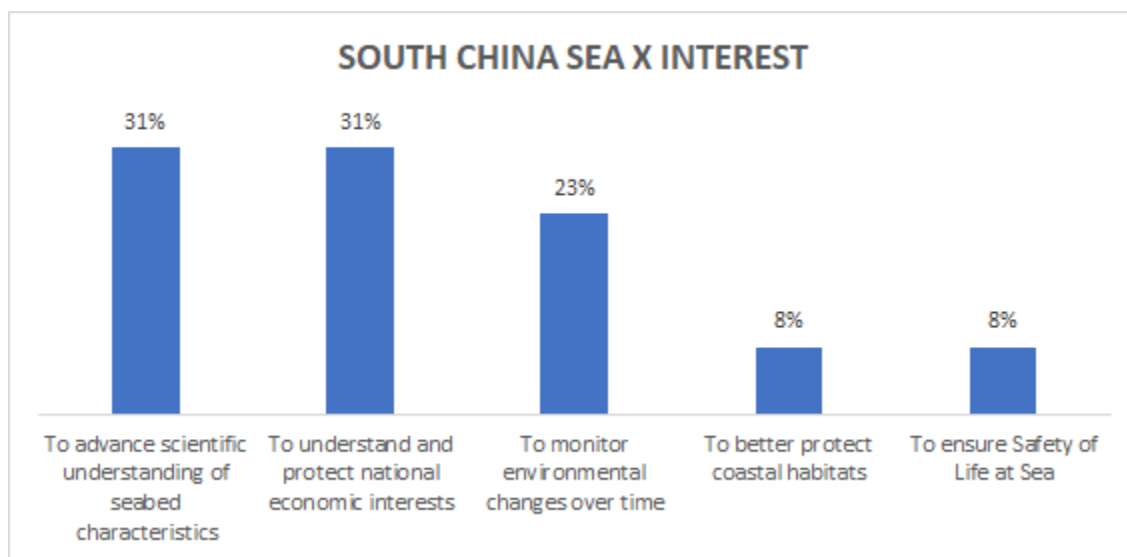
fishing/aquaculture. Interestingly of the 11 industry categories for this question the responses for the South China Sea all sat within the 4 categories listed.

Seabed Mapping Need



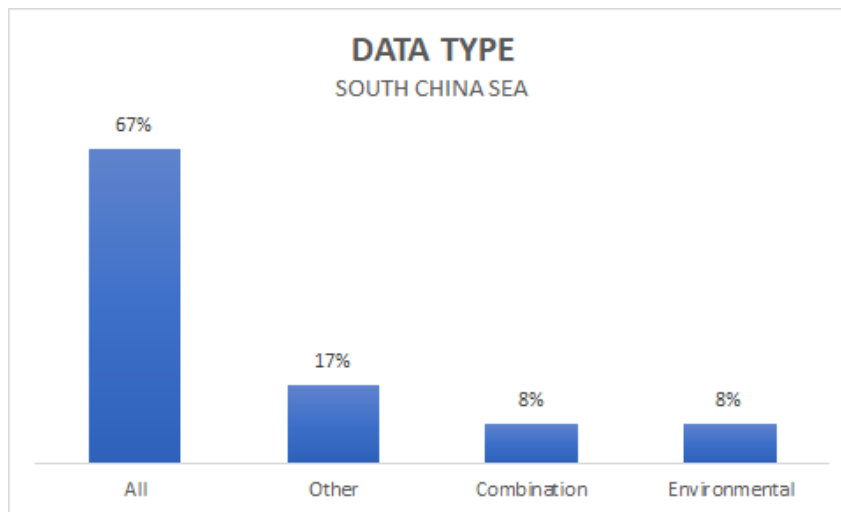
The most desired need by respondents in the South China Sea was for safety (38%). The economic need was the highest (discounting the Black Sea with only 4 respondents) across the 12 ocean regions and with Atlantic North following closely.

Interest for Ocean Floor Mapping



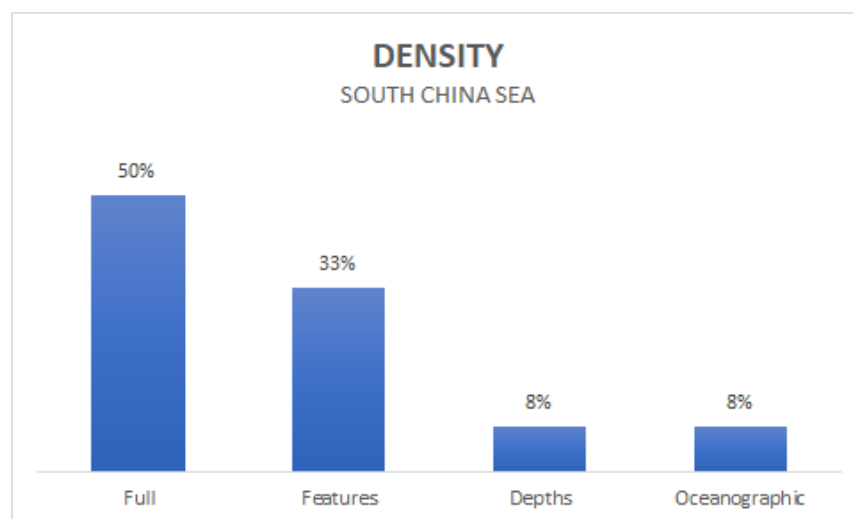
The top reasons why respondents want to map the ocean floor is to advance scientific understanding of seabed characteristics (31%) and to understand and protect national economic interests (31%). Other reasons include monitoring environmental changes over time (23%), better protecting coastal habitats (8%), and ensuring safety of life at sea (8%).

Chosen Data Types



Like all the 12 ocean regions the respondents for the South China Sea desire all data types (67%) and 17% require other data types.

Required Data Density



Again, like the other 12 ocean regions the data density requirements for the South China Sea saw most of the respondents seeking full data density and this was followed by 33% who require features.

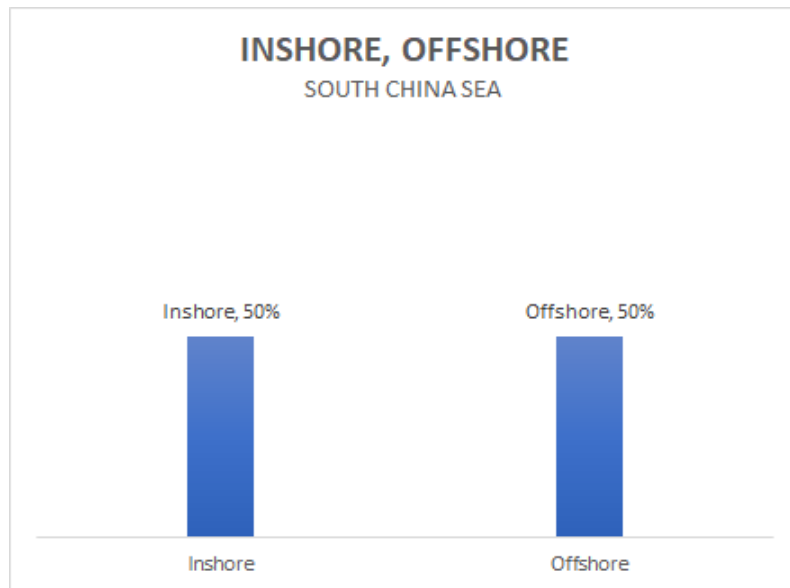
Priority areas for the Region

In the South China Sea, the respondents specified a specific need or priority for seabed mapping in the following areas:

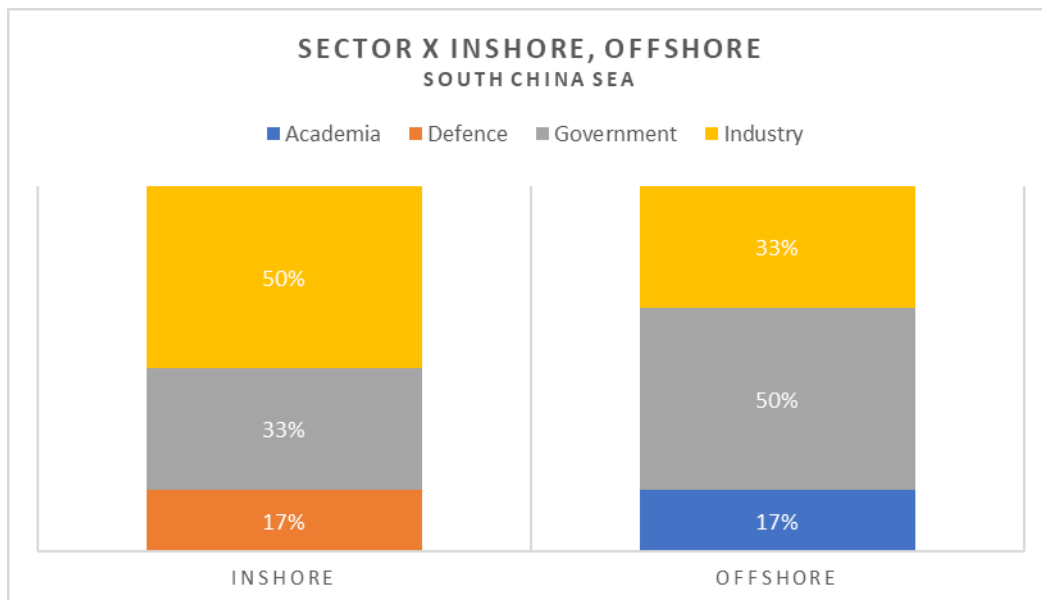
- Western part of Banda Sea, Indonesia
- Waters near Mui Ke Ga in Vietnam
- Pocket zones between countries in the Indo-West Pacific Ocean
- North Natuna Sea (a part of South China Sea)
- Large marine ecosystem Indonesia Sea

- Eastern Indonesia
- Areas with unreliable sounding data
- Areas with high traffics and contain many obstruction/hazards to navigation
- Areas less than 200m depth

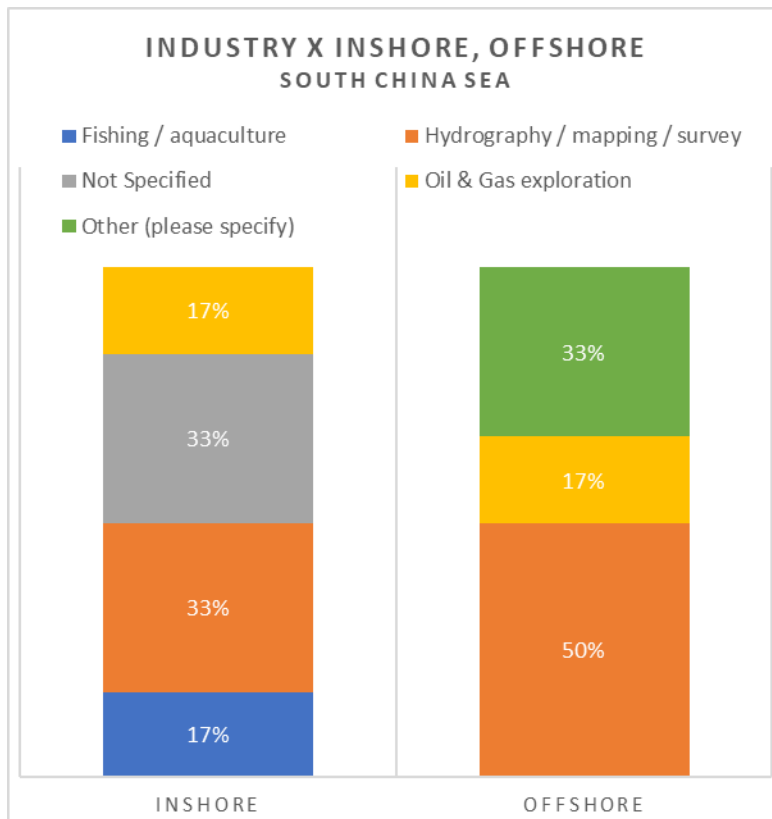
Inshore versus Offshore Priorities



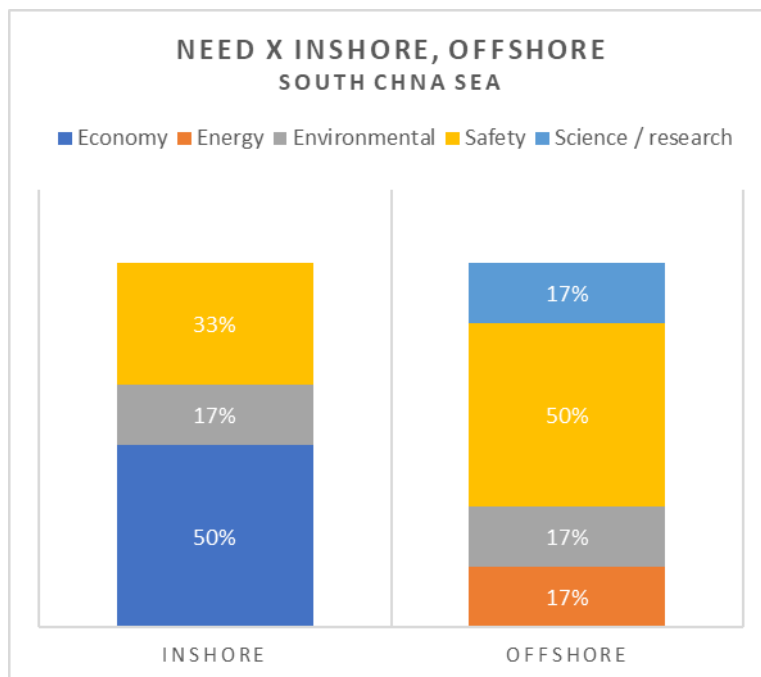
Priority is equally split between inshore (50%) and offshore (50%).



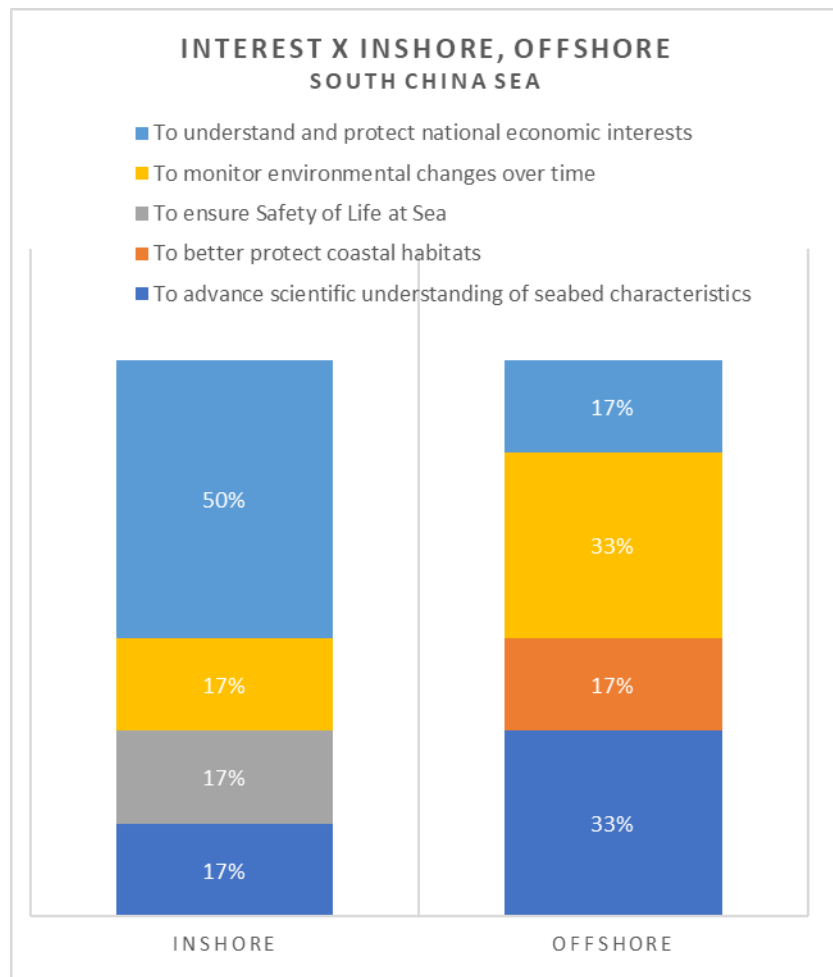
The combined percentage levels for Government and industry are the same for both offshore and inshore (83%). It is interesting to see that for the third sectors academia has priority for offshore waters whereas defence has a priority for inshore waters only.



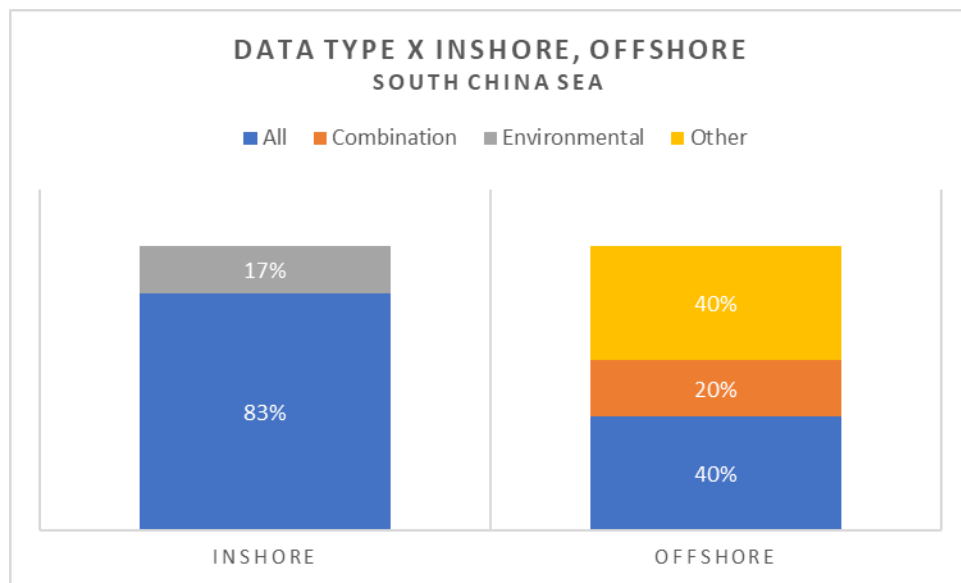
50% of the offshore respondents belong to the hydrography/mapping/survey industry. For the inshore respondents, the hydrography/mapping/survey industry and not specified industries are at 33% each. There is also a priority for seabed mapping by the fishing/aquaculture industries for inshore waters only.



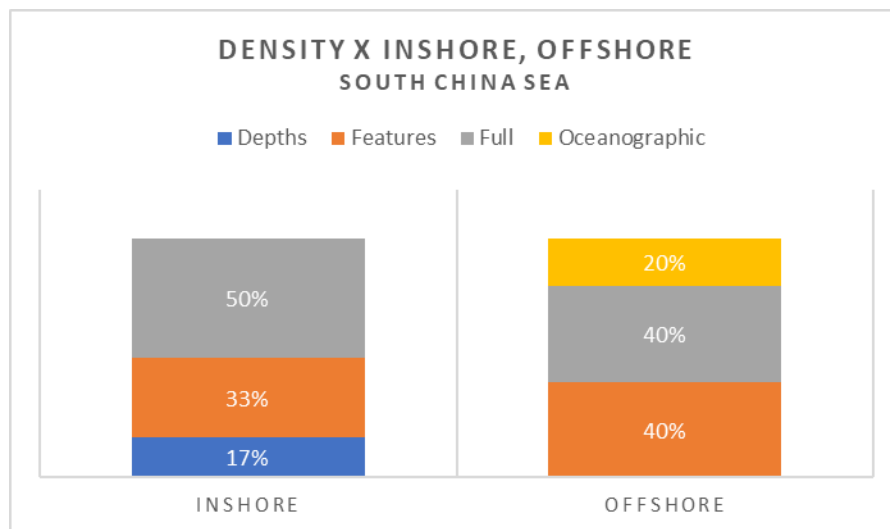
Among offshore respondents, half believe that mapping the South China Sea is necessary for ensuring safety, while half of those responding inshore are more concerned with economic needs. This corroborates with the results seen from previous questions in the South China Sea.



The respondents who chose offshore are interested in mapping the South China Sea in order to monitor environmental changes over time (33%) and to advance scientific understanding of seabed characteristics (33%). Meanwhile, half of the inshore respondents want to understand and protect national economic interests. It should be emphasised that a 50% score in South China Sea to better understand and protect economic interests was by far the highest level seen across all 12 ocean regions with the majority scoring 15% or less.



As seen across all 12 ocean areas the highest call is for all data types, what is interesting is a 17% call for environmental data in the inshore waters, this has not been seen across the 12 ocean regions.

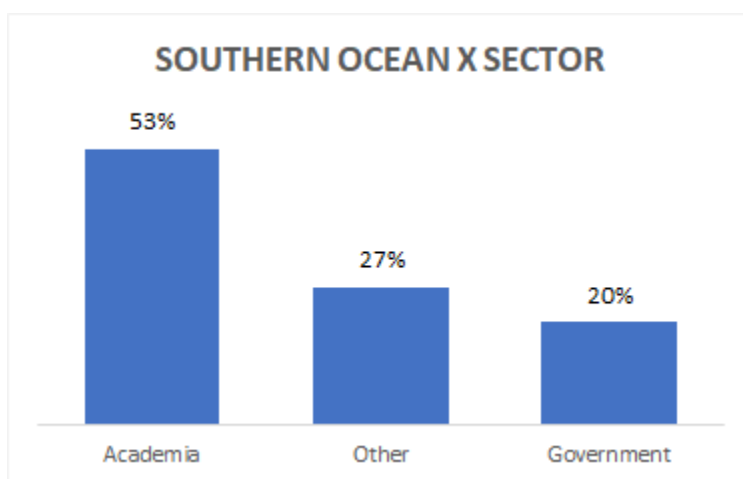


Like all 12 ocean regions the respondents from the South China Sea want full insonification of the seabed to be followed by features data.

REGION 11: SOUTHERN OCEAN

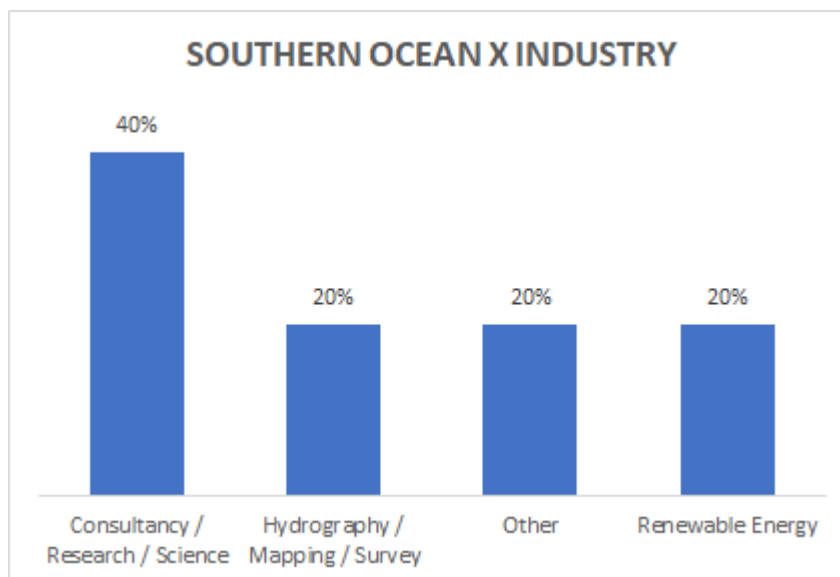
The two main sectors interested in the Southern Ocean region are academia, other sectors, and the government, with the most represented industry being consultancy/research/science. Seabed mapping is needed mainly for environmental and science/research purposes. Furthermore, half of the respondents are interested in the reason of advancing scientific understanding of seabed characteristics. Offshore waters are the more popular choice of water depth for Southern Ocean respondents. While most are interested in all data options, some respondents chose object detection and environmental data types that they need. In the matter of data density, more than half prefer a full density. It is not surprising to see that the needs and requirements by the respondents for the Southern Ocean closely align to those of the Arctic.

Maritime Sector



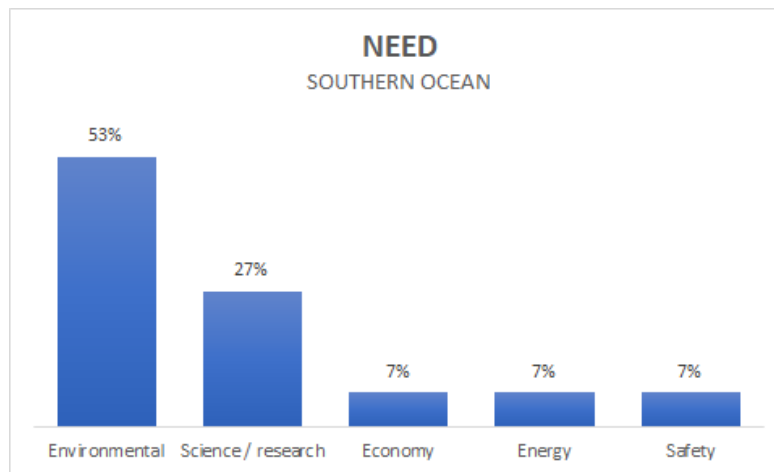
The Southern Ocean produced 53% responses from academia, followed by 27% from other sectors and 20% from the government sector. It is believed that a large percentage of the other and Government respondents come from the science and environmental fields.

Industries Represented



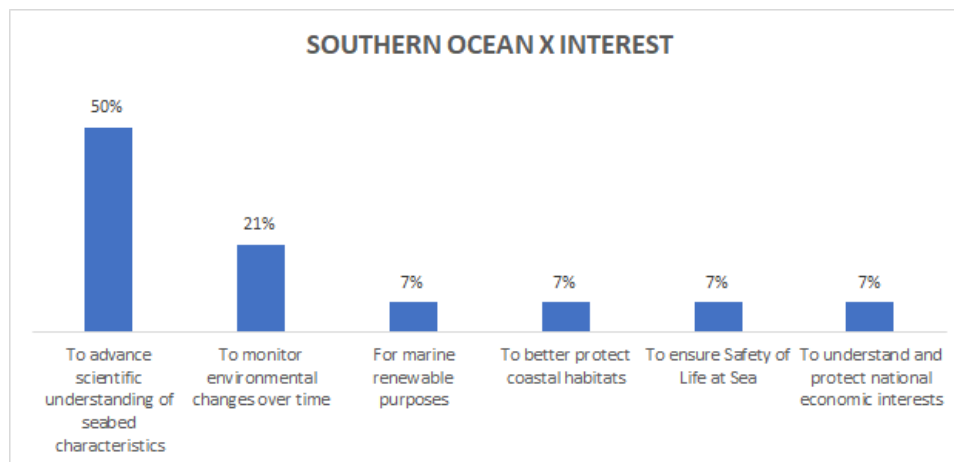
40% of the respondents concerned with Southern Ocean come from the consultancy/research/science/industry. The hydrography/mapping/survey, other wider industries, and renewable energy are split equally by 20%. It should be highlighted that a 20% call from the Renewable Energy industries is the second highest across all 12 ocean regions (Atlantic North the highest (32%)).

Seabed Mapping Need



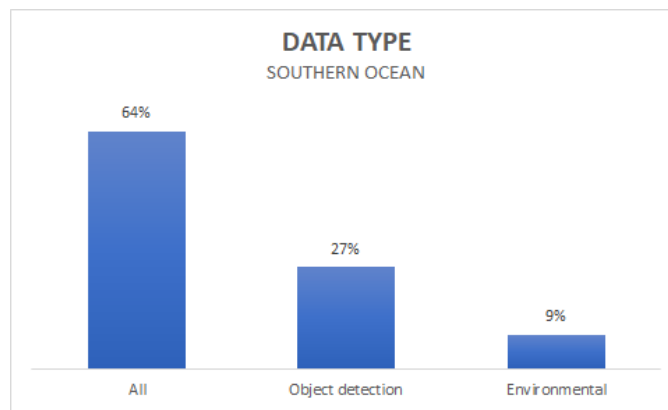
The most significant need for the Southern Ocean is environmental (53%) and this was by far the highest across all 12 ocean regions. This was followed by science/research (27%) and combined these make up 80% of all responses.

Interest for Ocean Floor Mapping



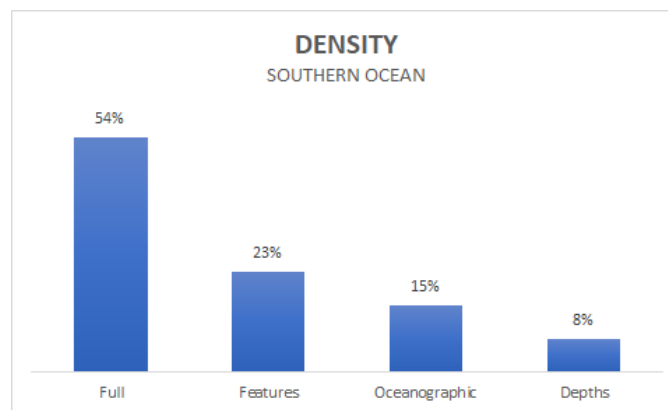
Half of those interested in the Southern Ocean want to map the ocean floor to advance scientific understanding of seabed characteristics, and 21% say their reason is to monitor environmental changes over time.

Chosen Data Types



There are three chosen data type options for the Southern Ocean. The options selected are all (64%) data types, followed by object detection (27%) and environmental (9%) data types.

Required Data Density



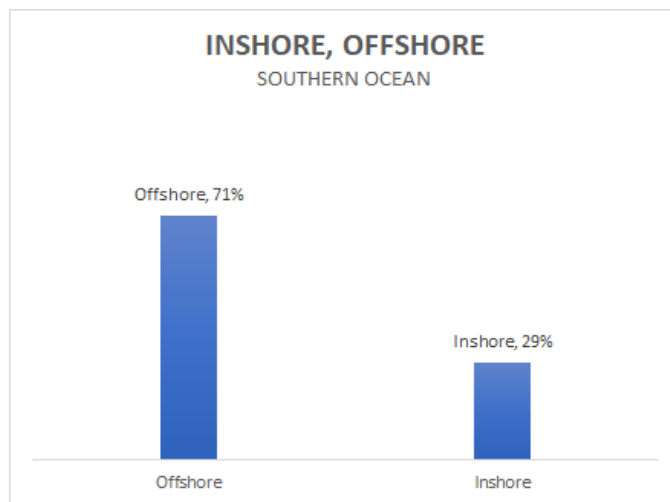
The trend for both full insonification and features data is seen in the Southern Ocean like all other 12 ocean regions.

Priority areas for the Region

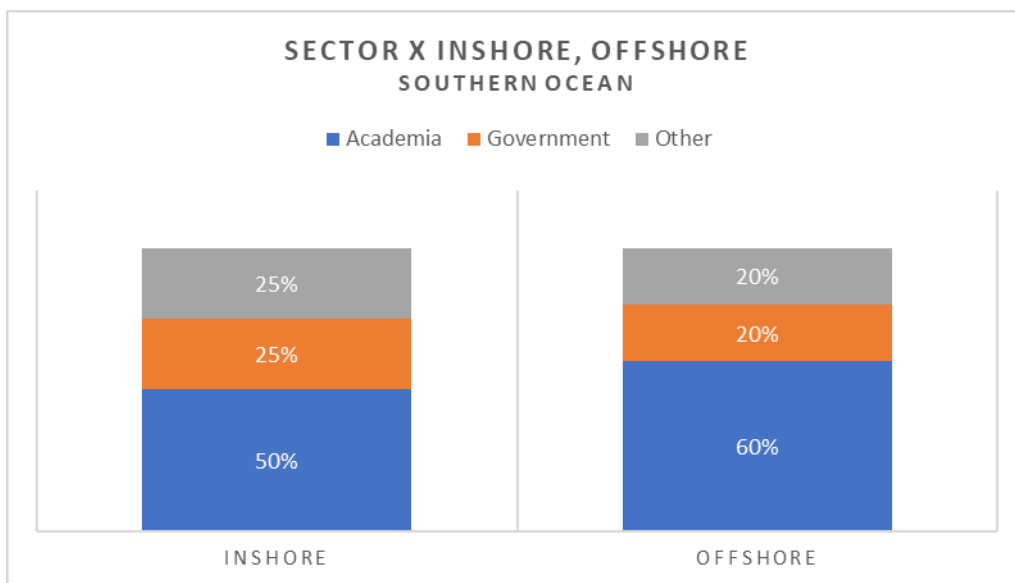
The respondents for the Southern Ocean stated a specific preference or priority need for the following areas to have seabed mapping:

- Southern Ocean
- Antarctic
- ZEE
- Southern Ocean and Antarctica
- Southern hemisphere - largely unknown. And high-resolution mapping (AUVs)
- Lucky Strike vent field
- East Antarctica

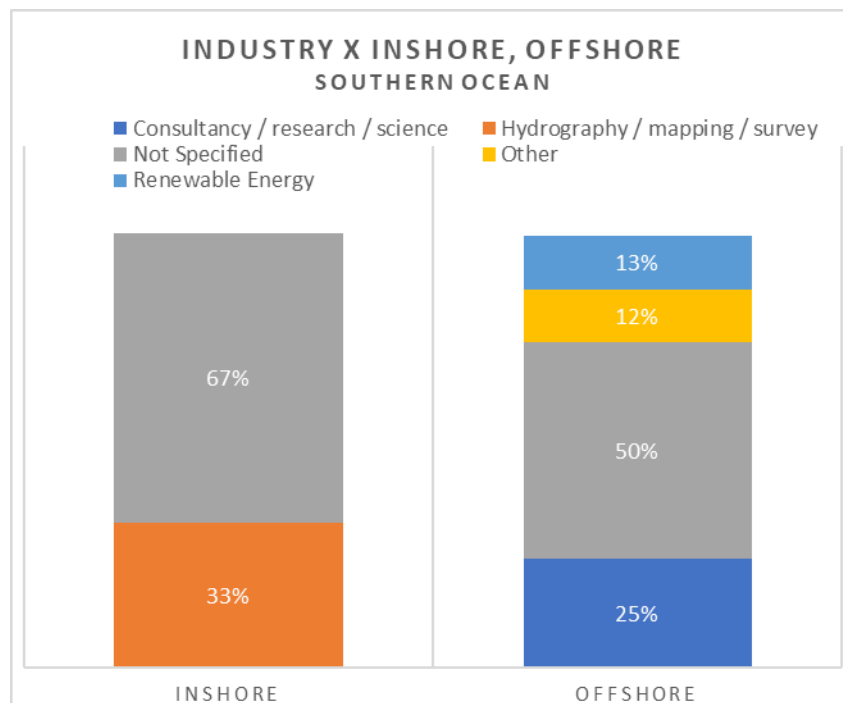
Inshore versus Offshore Priorities



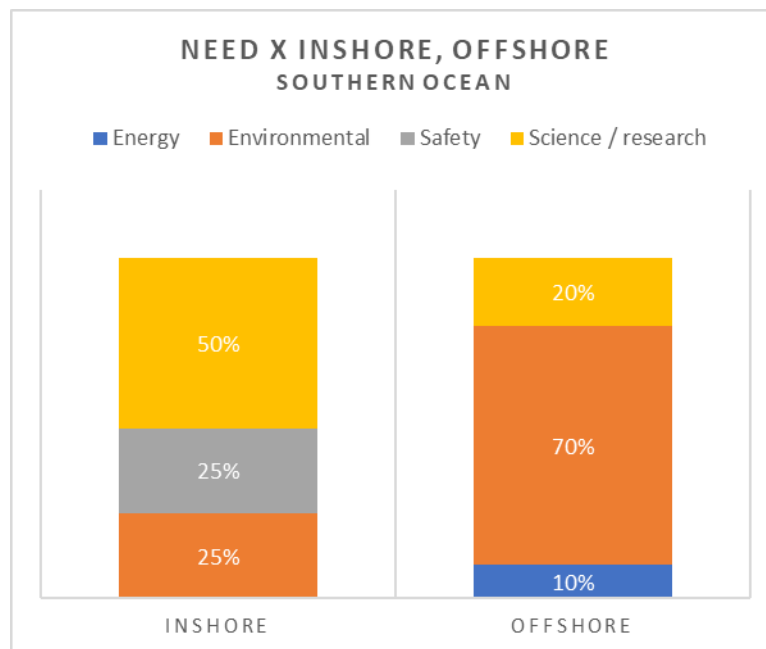
Of the respondents interested in the Southern Ocean, 71% require offshore research and 29% require inshore waters.



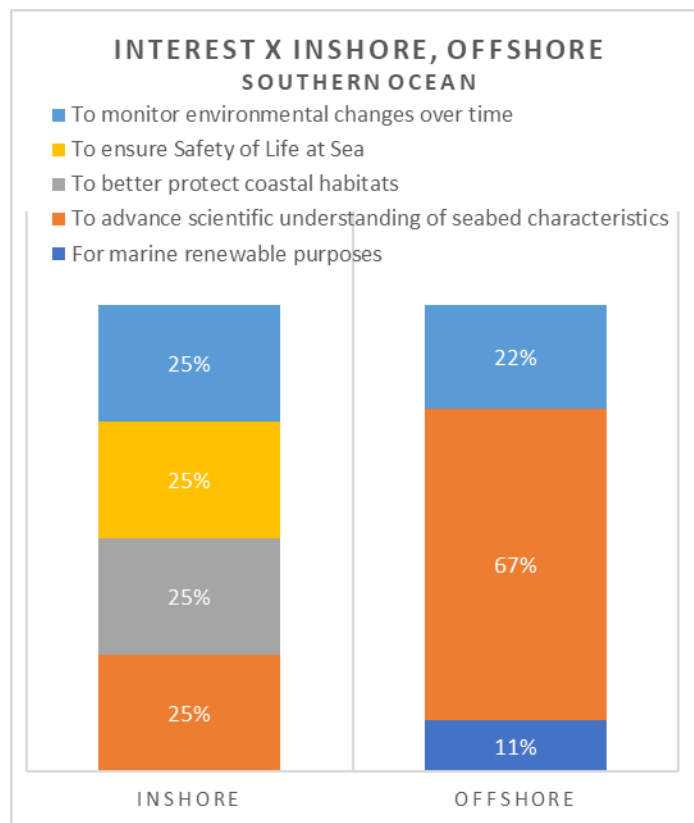
More than half (60%) of offshore respondents and half of the inshore respondents come from academia. The rest are equally distributed among the government and other sectors.



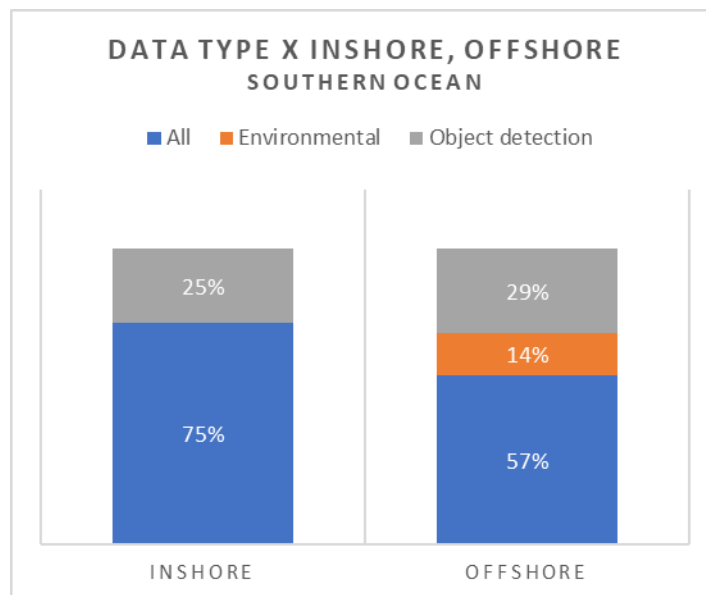
Inshore respondents represent one specified industry: hydrography/mapping/survey (33%), while the remaining 67% have not specified a maritime industry. Half of the offshore respondents have not specified a maritime sector, however, 25% are under consultancy/research/science.



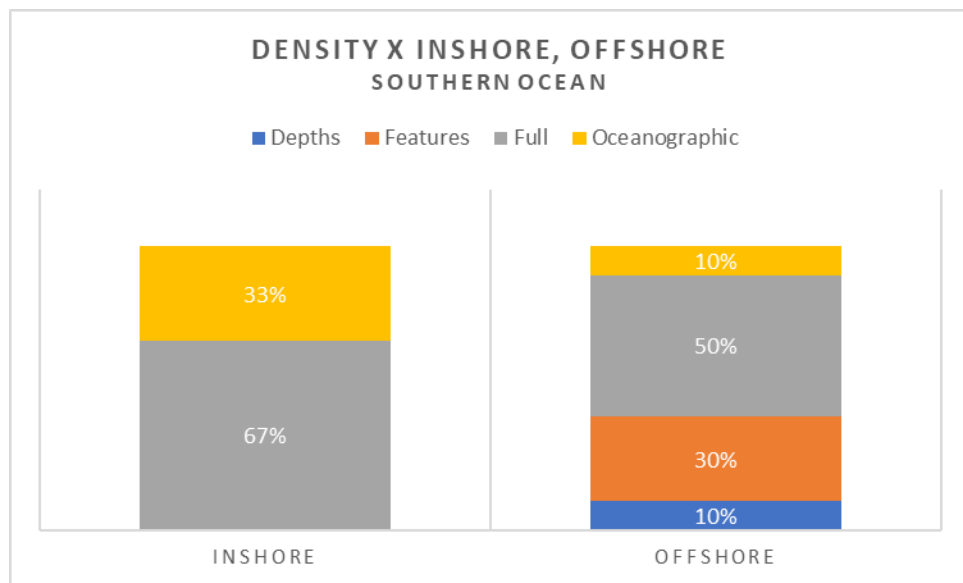
The majority (70%) of offshore respondents need seabed mapping for environmental reasons. Whereas half of the inshore respondents (50%) need it for science/research.



Offshore respondents primarily are interested in advancing scientific understanding of seabed characteristics (67%). The inshore respondents are equally divided among understanding seabed characteristics, environmental change monitoring, marine renewable purposes, coastal habitat protection, and ensuring safety of life at sea.



Many respondents interested in offshore (57%) and inshore (75%) chose all data types as options. The remaining 25% of those who are interested in inshore chose the data type object detection. For offshore, 29% chose object detection and 14% chose environmental.

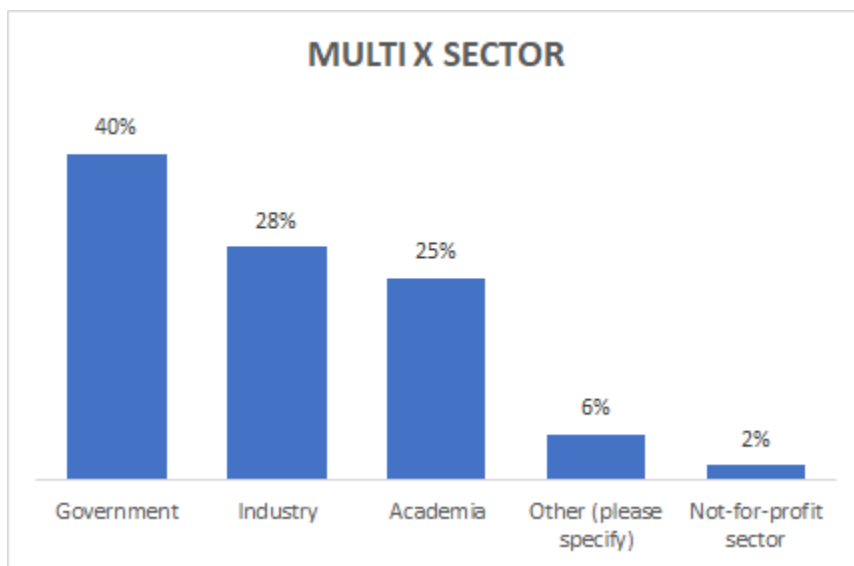


67% of inshore respondents require full density data and 33% prefer oceanographic density. For those who chose offshore, 50% chose full density and 30% features.

REGION 12: MULTIPLE AREAS OF INTEREST

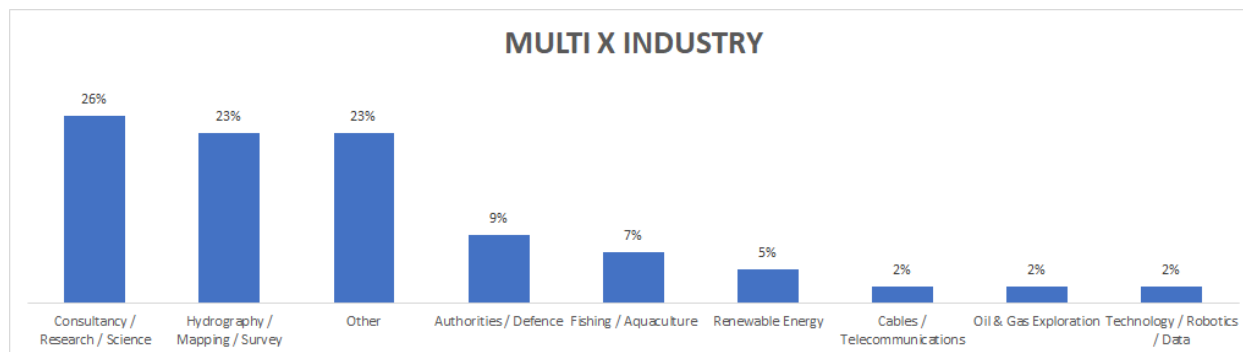
Respondents interested in more than one ocean primarily operate under the government, industry, or academia. Several industries were represented, but the most common ones belong to consultancy/research/science, hydrography/mapping/survey, and others. The responses were equally divided between inshore and offshore waters concerning water depth. The most common need for mapping is for environmental purposes. A substantial number of respondents also saw the need for science/research and safety. Understanding seabed characteristics is the leading interest for mapping, but other reasons for interest closely follow this. All data types and a full level of data density were the most chosen options concerning the information they required.

Maritime Sector



The responses from those with multiple areas of interest produced 40% results from the government sector, followed by 28% from those who work in industry and 25% academia. The rest operate in other sectors (6%) and the 2% in the not-for-profit sector.

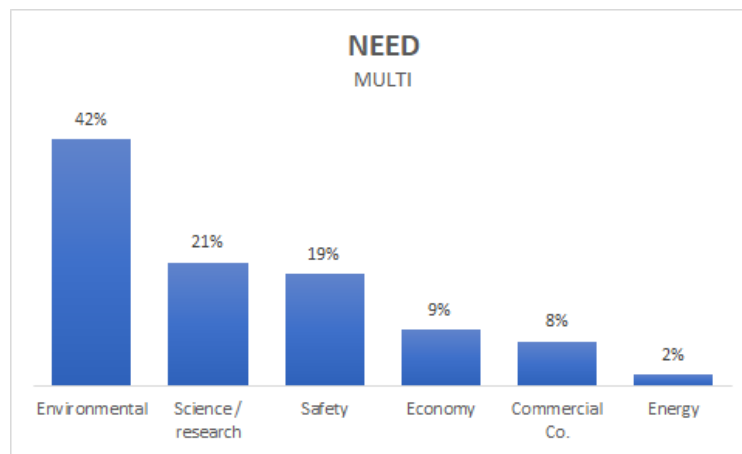
Industries Represented



Of the 53 responses to multi-oceans 26% of the respondents with an interest in multiple areas belong to the consultancy/research/science industries followed by the hydrography/mapping/survey industries 23% and other wider industries 23%. Other industries include authorities/defence 9%, fishing/aquaculture 7%,

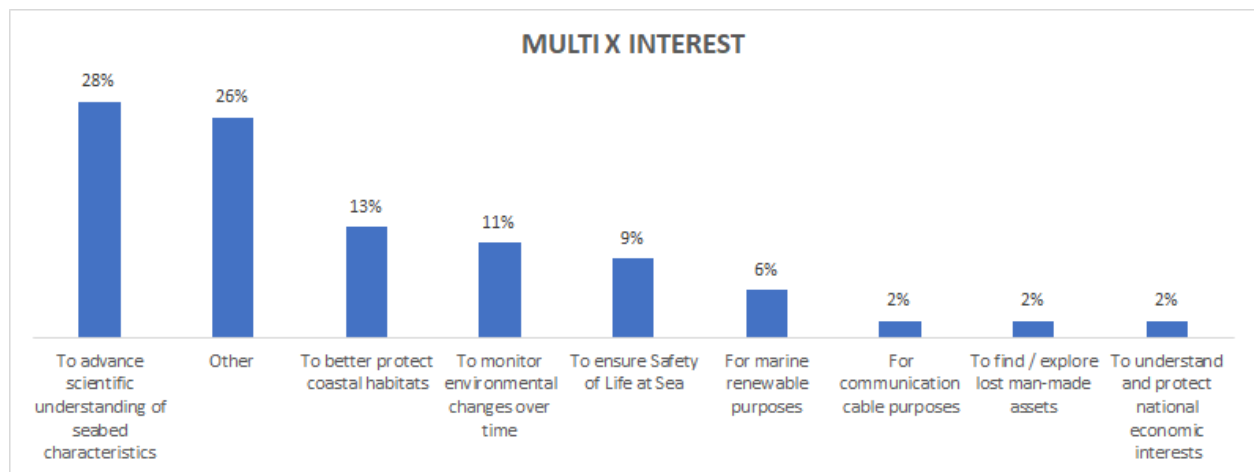
renewable energy 5%, cables/telecommunications 2%, oil & gas exploration 2%, technology/robotics/data 2%.

Seabed Mapping Need



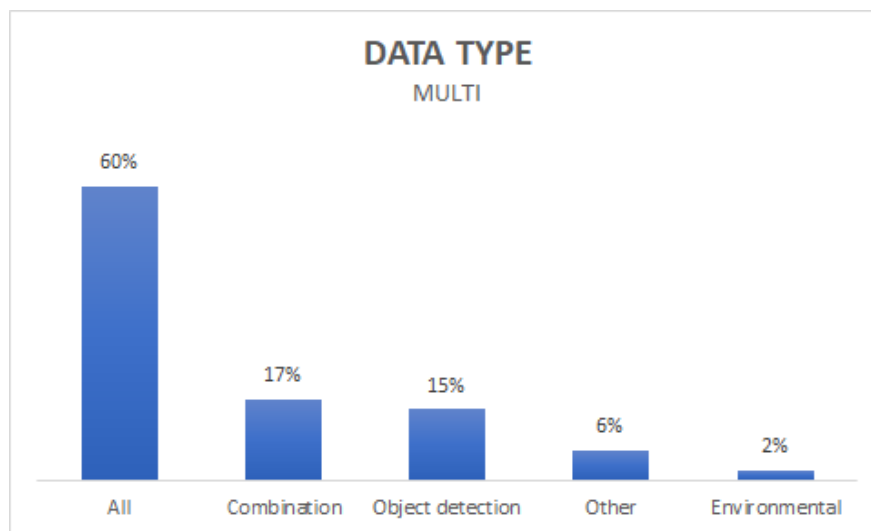
The most significant need for multiple areas is environmental (42%). Science/research needs (21%) come next, followed by safety (19%).

Interest for Ocean Floor Mapping



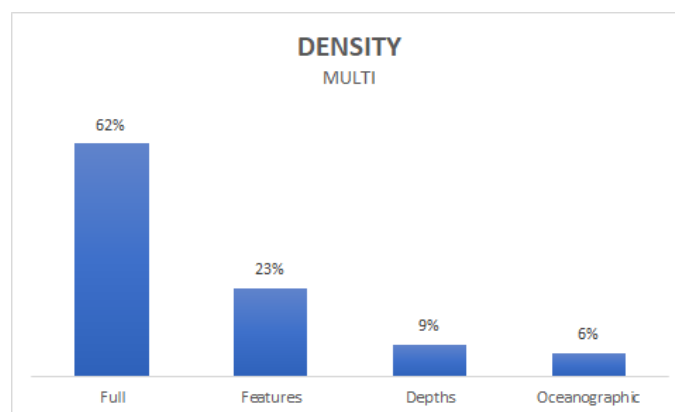
28% of the respondents saw advancing the scientific understanding of seabed characteristics as the reason they are interested in mapping the ocean floor. Other interests (26%), better protecting coastal habitat (13%) followed by 11% monitoring environmental change.

Chosen Data Types



More than half of the respondents (60%) who expressed interest in multiple areas require all data types. However, 17% feel a combination of data types is needed, 15% chose object detection.

Required Data Density



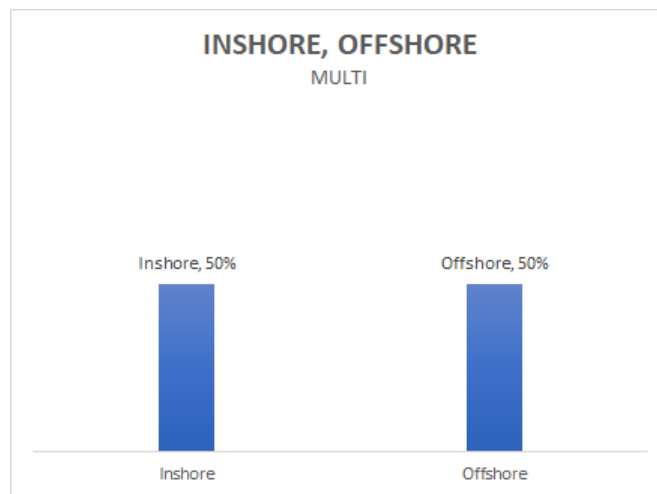
The most required level of density of the data is full insonification (62%). There are 23% that require features, 9% that require depths, and 6% that require an oceanographic level of density.

Priority Areas for the Region

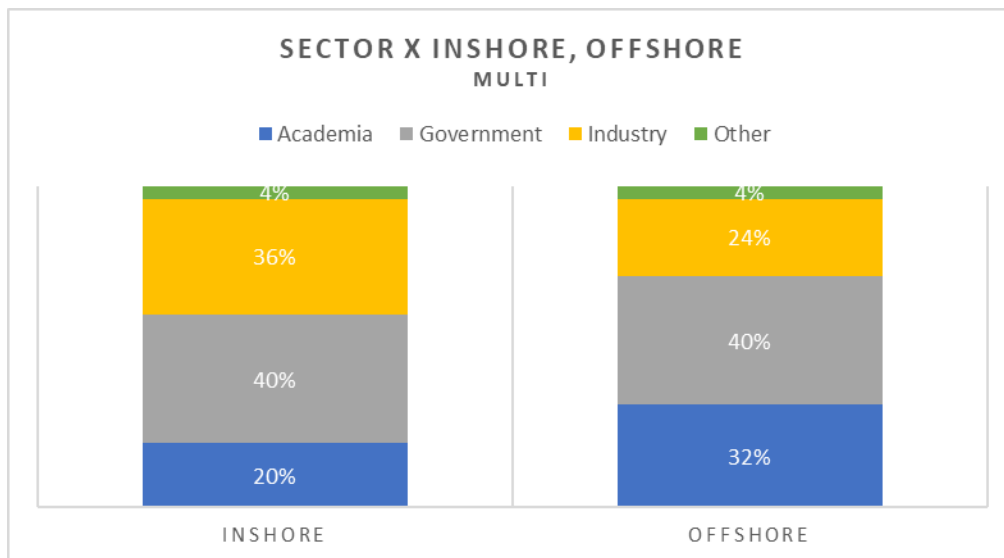
Of the respondents who answered this question additional areas specified as a priority for seabed mapping which has not been covered by individual ocean regions are:

- The US EEZ
- The Great Lakes

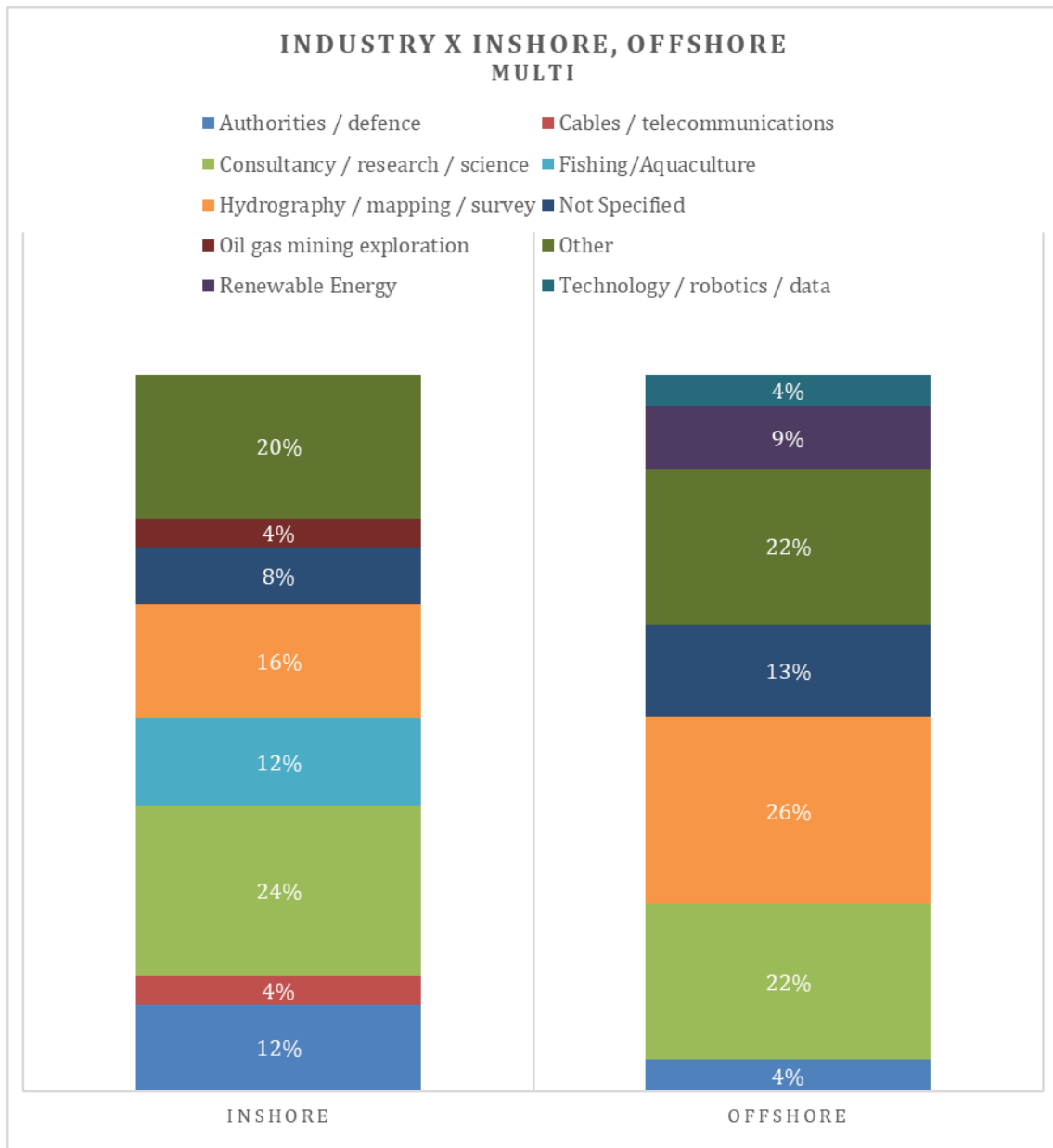
Inshore versus Offshore Priorities



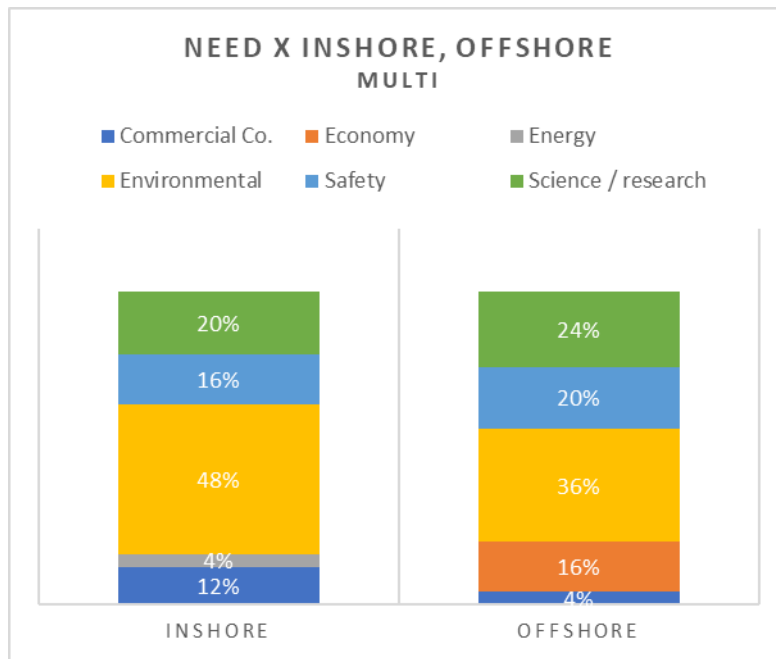
Priority for inshore and offshore of multiple areas is equally split at 50%.



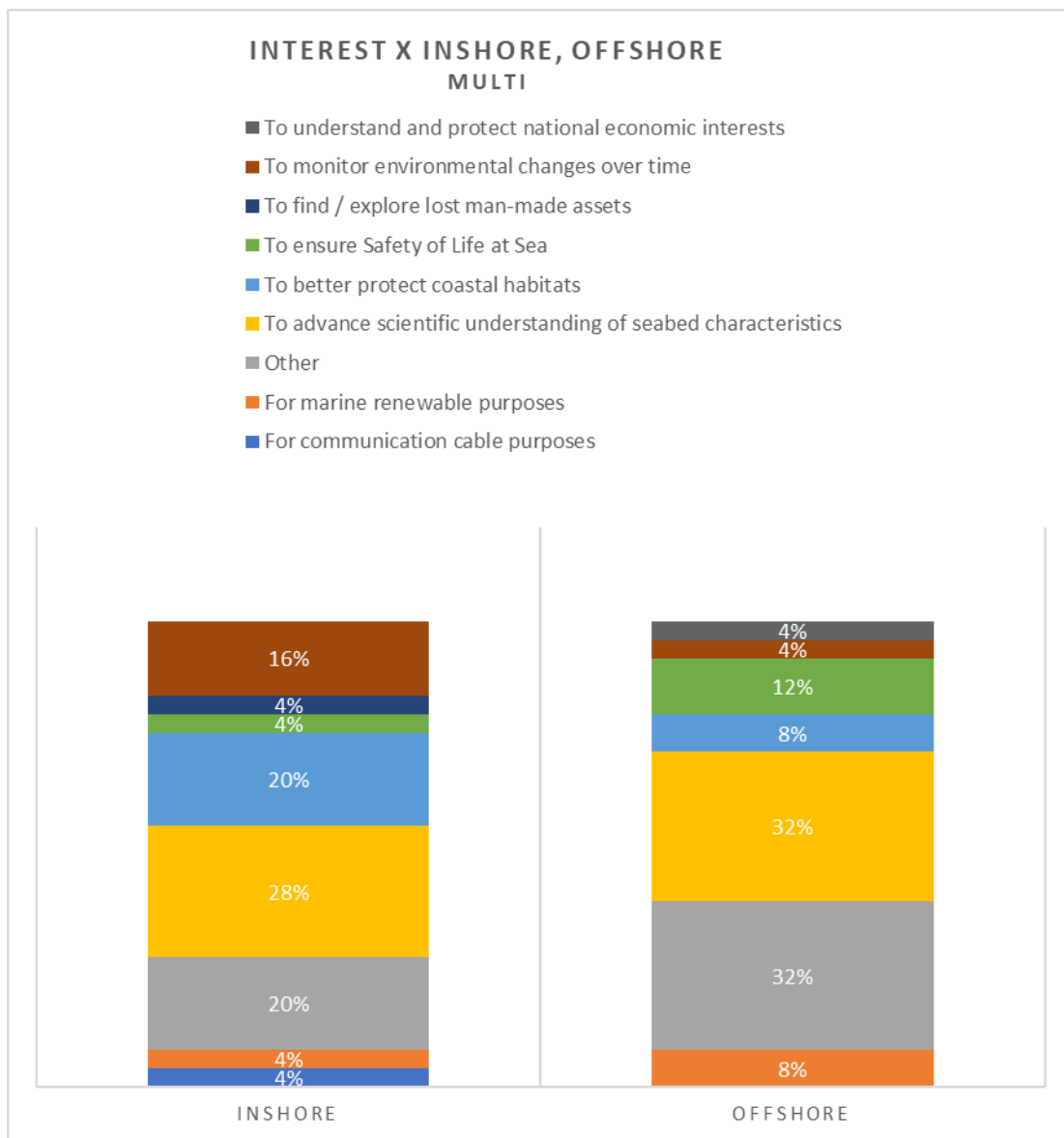
For multiple ocean areas, most of the offshore and inshore respondents are from the government sector (40% each). However, it is followed by the academia (32%) for offshore and industry sector (36%) for inshore.



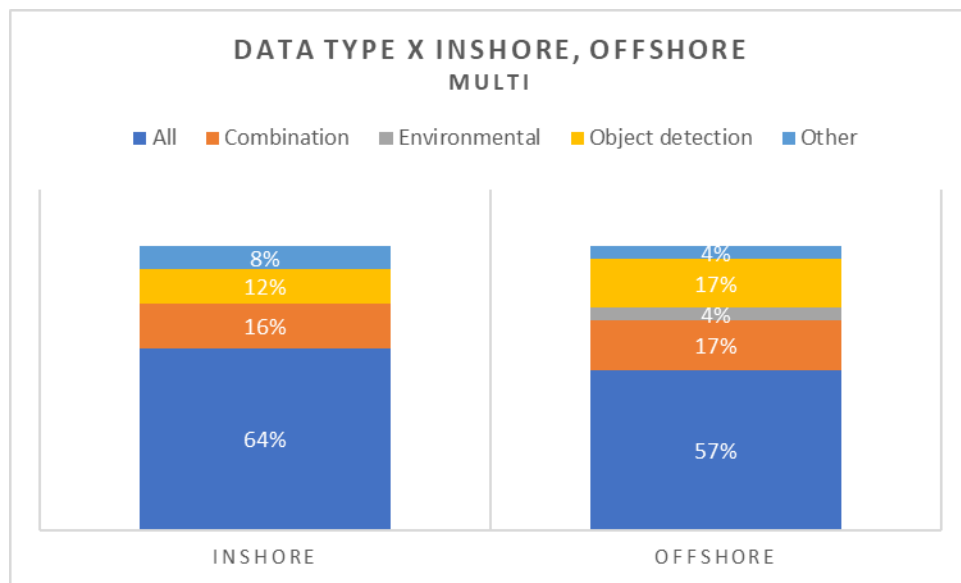
For the respondents who chose offshore as a priority, 26% are from the hydrography/mapping/survey industry followed by consultancy/research/science industry (22%) and other industries (22%). However, for the inshore respondents, most come from the consultancy/research/science industry (24%).



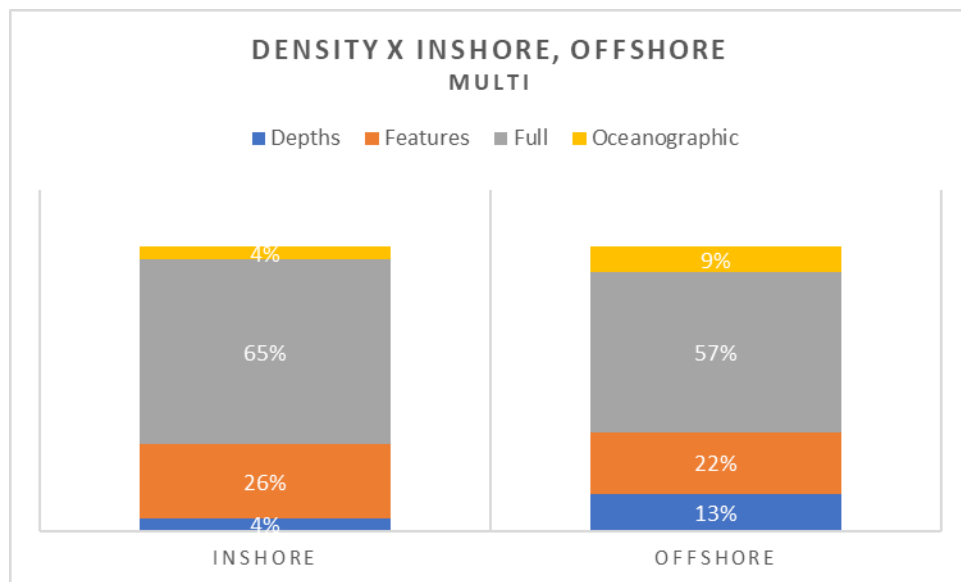
Both offshore and inshore respondents underscore the environmental aspect of the need for mapping multiple areas in their responses, at 48% and 36%, respectively. Furthermore, both also saw the need for science/research (24% and 20%, respectively) and safety (20% and 16%, respectively) purposes.



Respondents who chose offshore are interested to advance understanding of seabed characteristics and other reasons, each at 32%. Likewise, for those who chose inshore, 28% are also interested in advancing scientific understanding of seabed characteristics.



Both the offshore and inshore respondents prefer all data types, 57% and 64%, respectively.



For data density, 57% of the respondents who chose offshore required full density, 22% prefer features only, 13% depths, and 9% oceanographic density. Respondents who selected inshore also preferred the full density (65%), followed by features only (26%), and depths and oceanographic, both 4%.

CONCLUSION AND NEXT STEPS

The 796 online survey responses received across 90 countries have been sub-divided across 12 ocean regions. A tabulated quantitative analysis was conducted to identify the needs, requirements and interests for seabed mapping within each specific ocean regions.

From this, sector requirements and industry needs were identified along with the data types and data densities sought after. The results shown in the main body of this report show that there are differing and specific needs on an ocean regional basis for mapping the world's seabeds.

It is recommended that the bulleted prioritisation needs for seabed mapping on an ocean regional requirement as shown in Section Three are forwarded to the IHO, IOC, HOs and bodies who have interests and responsibilities in waters beyond national jurisdiction (outside of EEZs). The intent of this exercise is to obtain views from such agencies such that the survey prioritisation list is enhanced and validated / updated so that it evolves into an accepted internationally global seabed mapping prioritisation list.

In addition, a globally recognised and supported priority list will be transposed into a framework for a potential global model that reflects all categories and seabed survey priority needs. Extrapolating the priorities and needs across pan-maritime stakeholders / sectors will result in a global first, a never-before-attempted quantification of the strategic environmental, social and economic benefits and bringing them together within one model.

The overarching strategic benefits model will provide evidence and enable deep seated analysis across financial, social, economic and environmental drivers to draw out the value of mapping particular areas of the seabed. From this a seabed survey prioritisation strategy can be generated enabling Seabed 2030 to continue to provide global leadership to allow it to meet its 2030 target of mapping the world's oceans.