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REPORT OF THE PLANNING WORKSHOP ON A MARINE GEOSCIENCE MAPPING PROGRAM IN THE AUSTRALIAN OCEAN TERRITORY

BY

*H. M. J. STAGG, N. F. EXON, J. B. COLWELL,
P. A. SYMONDS, D. HEGGIE, P. J. HILL, & J. B. WILLCOX*

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**REPORT OF THE PLANNING
WORKSHOP ON A
MARINE GEOSCIENCE MAPPING
PROGRAM IN THE AUSTRALIAN
OCEAN TERRITORY**

Gold Creek Homestead, Gungahlin, ACT

18-20 February, 1997

compiled by

*H.M.J. Stagg, N.F. Exon, J.B. Colwell, P.A. Symonds,
D. Heggie, P.J. Hill & J.B. Willcox*



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DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY

Minister for Primary Industries and Energy: Hon. J. Anderson, M.P.
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Secretary: Paul Barratt

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PREFACE

In February, 1997, the Australian Geological Survey Organisation convened a marine geoscience planning workshop in Canberra. The workshop, subject of this report, had the objectives of:

- Presenting for comment AGSO's draft plans for work in the Australian Ocean Territory (AOT) in the coming years;
- Providing a forum for other organisations to present their views/plans on the geoscience requirements for mapping in the AOT; and
- Preparing a draft report outlining priorities for a mapping program in the AOT which AGSO, and other organisations, can then use to provide input and guidance to their planning processes.

While the workshop was designed to be cross-sectoral and multi-disciplinary, inevitably some interests were either under-represented or not represented. These areas include, *inter alia*:

- Tourism;
- Specialist industrial and research areas, such as shipbuilding and climate forecasting;
- Mariculture;
- Oceanography-related research disciplines.

Therefore this report should not be viewed as a definitive document providing exhaustive documentation of geoscience needs in the AOT, but as a planning aid for organisations working in Australia's offshore. The overall government priorities for work in the AOT will be established as part of an Oceans Policy and within a Marine Science and Technology Plan.

SUMMARY

Marine science has a major responsibility to collect, process, interpret, store and disseminate data to characterise Australia's marine environment, and to understand the physical, chemical, biological and geological processes that operate within it. This is crucial to the management and ecologically sustainable use of Australia's area of maritime jurisdiction as required by the United Nations Convention on the Law of the Sea (UNCLOS).

As an aid to planning processes within the marine science community, a major marine geoscience workshop was convened by the Australian Geological Survey Organisation (AGSO) in Canberra in February, 1997. The workshop was attended by a broad range of sectoral interests. The workshop, subject of this report, had the objectives of:

- Presenting for comment AGSO's draft plans for work in the Australian Ocean Territory (AOT) in the coming years;
- Providing a forum for other organisations to present their views/plans on requirements for mapping in the AOT; and
- Preparing a draft report outlining perceived national priorities for a mapping program in the AOT which AGSO, and other agencies, can then use to provide input and guidance to their planning processes.

Most of the sectors represented at the workshop have their main interests directed at the water column, seafloor, or shallow substrate. Only the exploration part of the petroleum sector stands out as having a level of focus directed significantly below the seabed, because of its need to understand the controls on sedimentary basin formation, and hydrocarbon generation, migration and entrapment. The continuous coring provided by the Ocean Drilling Program (ODP) provides a vital link between these two areas, in that it provides information on both modern and ancient earth processes.

This partitioning of interests creates some differences in the science-needs and approaches of the sectors, and thus in their science priorities. Some sectors are mainly science users (e.g. Environment), some are mainly science providers (e.g. academia, AGSO, CSIRO), whereas still others are both users and providers (e.g. Petroleum).

Despite these differences in sectoral interest, some major, common priorities arose during the workshop:

- The paramount need for detailed digital information on the depth and form of the seafloor throughout the marine zones, focussed on high-use areas. The issue of which organisation(s) should be responsible for the collation, storage and dissemination of bathymetric data and information is fundamental to future marine science, and should be considered at the national level, including by the Oceans Policy IDC and the Marine Science and Technology Plan.
- Information on the nature of the seafloor and shallow substrate (sediment type, physical properties etc) is required at all water depths. While sediment information is required by a wide range of organisations, usually for a single purpose, there is little use of samples for purposes beyond those for which

they were acquired. It is evident that there is scope for increased efficiencies in marine science through more widespread and rational use of sediment samples.

- Integrated science programs should largely be targeted in the following geographic regions - whole of the southern / southeastern margin; northwest margin; Lord Howe Rise / Norfolk Ridge area; northeast (Great Barrier Reef / Torres Strait); and remote territories.
- The need for co-ordination, co-operation and consultation in marine science throughout all sectors to best utilise human and technological resources (including ship-time), and build on strengths. Several areas of cross-sectoral data and information exchange were recognised (e.g. bathymetric information from 2 and 3D petroleum seismic surveys; rock samples from bottom fishing trawls; physical properties of core samples).
- The need for national cross-sectoral databases and meta-databases, particularly for information with significant cross-sectoral interests (e.g. bathymetry, sediment characteristics), to produce an integrated view of the structure and function of Australia's marine environment, thus maximising gains and progress.

BACKGROUND

Introduction

In ratifying the United Nations Convention on Law of the Sea (UNCLOS) in 1994, Australia took on the responsibility for an ocean territory (the 'Australian Ocean Territory', or AOT)¹ that has an area approximately twice that of onshore Australia (Fig. 1).

Two major responsibilities came with the ratification of UNCLOS. Firstly, there is the requirement that Australia must support its claim to the AOT beyond the 200 nautical mile Exclusive Economic Zone (EEZ) before the United Nations by submitting supporting technical data before 2004. This process is well in hand, and the acquisition of basic data by AGSO is scheduled to be completed by mid-1998. Secondly, while ownership of offshore resources provided under UNCLOS bestows certain rights, it also carries a range of obligations to further advance exploration and marine research, so as to sustainably exploit, preserve and protect the marine environment.

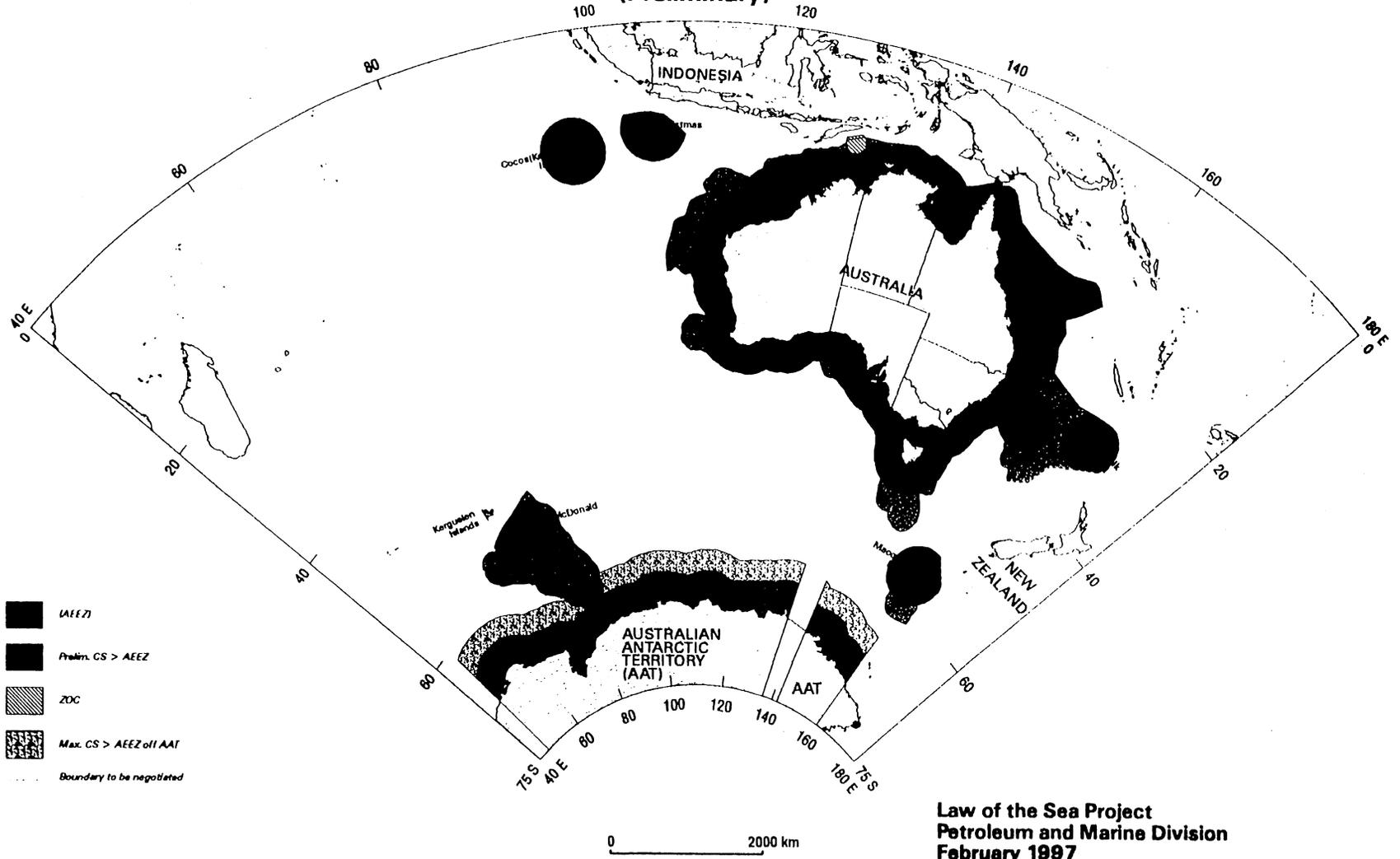
Management of Australia's areas of marine jurisdiction involves important international responsibilities and presents one of the great national opportunities of the future. There are opportunities for significant rewards in a wide range of key areas including petroleum, minerals, tourism, fisheries and mariculture, pharmaceuticals and biotechnology, marine transport and shipbuilding, offshore engineering, and environmental management. Marine geoscience, in particular, has an important role to play in many of these areas through the provision of information on the nature, evolution and resources of the seafloor, and underlying sediments and rocks. It was the overwhelming opinion of the workshop participants that a strong marine geoscience and seabed mapping capability is essential if Australia is to have the ability to understand and manage the environment and resources within its vast marine zone.

Exploration, definition and surveying of Australia's new marine jurisdiction underpins progress in all sectors, and there are large overlaps in the survey, data and knowledge requirements of each sector which need to be identified in order to maximise gains and progress. This requires the harnessing of the knowledge base across federal, state and private agencies, to a common purpose and leading to an integrated view of the structure and function of Australia's marine environment. In particular:

- surveying, characterising, understanding and monitoring the marine (water column and seafloor, and including coastal) environment is important for all sectors within government and industry as it aids integrated management and use of the territory. For example, such information is important to both managers and users of fisheries habitats/ecosystems; shipping safety such as seafloor charting and ocean currents;

¹ In this report, we will follow the lead of other meetings and workshops in using the term 'Australian Ocean Territory' or 'AOT' to refer to the area covered by the Australian Exclusive Economic Zone plus the area covered by the Legal Continental Shelf beyond the EEZ, as defined under Article 76 of the United Nations Convention on the Law of the Sea. We note the Department of Environment, Sport and Territories recommendation that, to avoid legal difficulties over the use of the word 'Territory', the area should be referred to as the 'Australian Maritime Estate'.

Australia's Marine Jurisdictional Zones (Preliminary)



Law of the Sea Project
Petroleum and Marine Division
February 1997

Figure 1: Australia's marine jurisdictional zones as at February, 1997.

- marine engineering design data for offshore facilities and structures; and for locating new niches for bioexploration for pharmaceuticals.
- living and non-living resource inventories are important to both managers and users in the fishing, mineral, oil and gas, and pharmaceutical industries. Such inventories are also important to identifying and locating special/unique features of interest to the tourism and recreation sectors.

Responsibilities relate to ensuring that Australia:

- ⇒ has internationally acceptable marine jurisdictional boundaries to ensure a secure investment environment.
- ⇒ has improved ocean/marine management leading to reduced uncertainty and capital outlay.
- ⇒ identifies priority areas for management, development and research.
- ⇒ encourages new knowledge, new frontiers and new opportunities.
- ⇒ has increased safety and security.
- ⇒ has an enhanced maritime capability.
- ⇒ has state-of-the-art integrated data network and information systems.

Opportunities arising include:

- ⇒ vast potential economic returns arising from improved knowledge of processes affecting marine/submarine living and non-living resources. This will result in more efficient and effective management and exploitation of known resources, as well as the identification of new frontiers and opportunities.
- ⇒ providing assistance to other countries, setting standards in management, technologies, practices etc. based on our enhanced and internationally recognised marine capability. This could include potential export earnings from the development of new technologies and methodologies etc., and sharing of our information and data networks with others.

Role of AGSO in the AOT

As Australia's national geoscience agency, the Australian Geological Survey Organisation (AGSO) has been given a clear role in providing data and information that will facilitate management of the AOT. While this role is principally directed at the non-living resources of the AOT (particularly petroleum and minerals), recent work has demonstrated that geoscience-related information can have major spin-offs for other resource industries, such as fisheries. Therefore, it is imperative that an Australian

program of AOT mapping and management be both multi-disciplinary and cross-sectoral, if the program is to be carried out efficiently.

The need for such a program was recognised in the 1996 Federal Budget with the allocation of additional funding to AGSO (\$6.41m in 1996-97 and \$10.31m in 1997-98) for an 'Australian Ocean Territory Mapping Program' (AOTMP), that would allow:

- Completion of technical data acquisition to document Australia's claim under UNCLOS for areas beyond the EEZ;
- Initiation of a seabed mapping program to provide information for resource and environmental management for the entire EEZ; and
- Continuation of data acquisition to support the Petroleum Acreage Release program and the promotion of petroleum prospectivity in Australia.

Within the AOTMP, AGSO is formulating the FRAME project (for Framework and Resources of the Australian Marine Environment), which is scheduled to commence in 1997-98. FRAME has two principal approaches to the resource management issue, as follows:

1. Determine the geological framework and petroleum potential of the AOT beyond those areas that are currently considered prospective by the petroleum exploration industry. The principal techniques required are the acquisition of remote-sensing geophysical data with emphasis on seismic reflection data of the type presently acquired by the RV *Rig Seismic*, ground-truthed by direct geological sampling.
2. Seabed mapping and sampling to determine the seabed morphology and character. Such information is important to an understanding the geological framework of the AOT and also provides information that is fundamental to general management of the AOT and to a wide variety of specialist fields, for example: urban and coastal impacts of pollution; oceanography; fisheries management; marine engineering design for offshore facilities and structures; shipping safety; bioexploration for pharmaceuticals. The principal techniques employed here include swath-mapping and seabed sampling through coring, dredging and shallow drilling.

Development of FRAME Project

Development of the FRAME project is proceeding in stages, as follows:

- Internal meetings within AGSO to determine geoscience priorities of relevance to AGSO.
- A round-table conference with representatives of the relevant agencies in the Department of Primary Industries and Energy (DPIE), to allow incorporation of wider portfolio priorities into FRAME (held in November, 1996).

- A major marine geoscience mapping workshop was convened in February, 1997, at which relevant interested agencies (inside and outside DPIE) were present. The workshop, subject of this report, had the objectives of:
 - Presenting for comment AGSO's draft plans for the FRAME project in the coming years;
 - Providing a forum for other organisations to present their views/plans on requirements for mapping in the AOT; and
 - Preparing a draft report outlining perceived national priorities for a mapping program in the AOT which AGSO can then use to provide input and guidance to its planning of FRAME.
- Finalisation of the project plan and budget by March 1997, with implementation of the project in 1997-98.

Workshop Format

The major part of the planning workshop comprised a series of keynote addresses by representatives of some of the principal sectors with a potential interest in geoscience mapping in the AOT. A full list of the workshop participants and the titles of the addresses are given in Appendices 1 and 2. Table 1 shows the relationship between sectoral groupings and the organisations represented at the workshop. As noted in the Preface to this report, *while sectoral participation in the workshop was broad, it was by no means all-inclusive.*

All addresses and subsequent discussions were recorded by a team of *rapporteurs*. These *rapporteur* notes are included as Appendix 3.

At the conclusion of the formal addresses, a small team reviewed all the *rapporteur* notes and distilled from them what were perceived to be the key technical issues and geographic areas of concern for each sector. From this review, a brief report tabulating these issues and areas was presented to the workshop participants for discussion and amendment. This report is an expansion of the original workshop draft, incorporating the comments made during those discussions. The kernel of this report addresses four areas:

- 1. What are the key issues of importance to each sector?**
- 2. What are the technical requirements for information for each sector?**
- 3. What are the geographical priorities for each sector?**
- 4. What are the issues that have strong cross-sectoral relevance?**

Table 1: Sectoral Representation of Workshop Participants

LIVING	NON-LIVING
FISHING AIMS, CSIRO, AFMA, BRS Fisheries, Universities	PETROLEUM APPEA, Woodside, BRS Petroleum, AGSO, Universities
PHARMACEUTICALS & BIOTECHNOLOGY AIMS	MINERALS BRS Minerals, AGSO, Universities
	DEFENCE RAN Hydrographic Service, DSTO, DOD, OSI
	ENGINEERING APPEA, Telstra, Universities
	TRANSPORT AMSA
ENVIRONMENT AIMS, CSIRO, Biodiversity Group & ERIN (Environment Australia), Sydney Water, AGSO, APPEA, BRS, Universities	
GOVERNMENT POLICY DEST, DIST, DPIE, APPEA	
GOVERNMENT INFORMATION RAN Hydrographic Service, ERIN, AGSO, AODC, NRIC, ABARE, APPEA	
TECHNOLOGY Nautronix, STN Atlas, SeaBeam, Fugro, LADS Corp., Seismic Supply, Benthic Geotech, Universities, APPEA	
ACADEMIA / RESEARCH ANU, COGS, Uni of Sydney, OSI, James Cook Uni., Antarctic CRC, CSIRO, AIMS, AGSO	

KEY SECTORAL ISSUES

Government Policy

Sectoral Organisations Represented: DEST; DIST; DPIE; APPEA

- Development of national Oceans Policy with a strategic, integrated design; due for release in mid-1998 as part of the International Year of the Oceans.
- In parallel with the development of the Oceans Policy, a national Marine Science and Technology Plan is also being developed for release in early 1998; this plan will be based on cooperation and consultation, will build on existing activities and plans, and add value through the recognition of synergies.

Petroleum and Minerals

Sectoral Organisations Represented: AGSO; BRS; APPEA

- There is a world-wide trend towards petroleum exploration moving into deep water and/or frontier areas.
- AGSO and BRS have a strong role in providing the strategic data and interpretations that are needed to encourage this move by the exploration industry in Australia.
- Studies relating to the release of petroleum acreage should include a mixed portfolio of potential areas which could be brought to fruition in a range of time frames, from short-term to long-term.
- There is an important role for government research in enticing petroleum exploration to under-explored and/or 'out of favour' basins through new data and ideas. That is, AGSO surveys should focus on areas where industry is not currently active.
- Government research in areas being actively explored by the petroleum industry should focus on 'adding value', particularly through providing solutions to generic problems. Government research should also avoid duplicating industry work in actively explored basins.
- APPEA made the case that appropriate 'ingression' seismic should have a different focus to industry seismic, and that a protocol should be established for such work, whereby:
 1. Permission is obtained from existing permit holders;
 2. Ingression data is provided *gratis* to permit holders; and
 3. Terms of confidentiality are the same as for industry
- Other APPEA suggestions included: Enticing ODP to the Australian continental shelf; Seeking joint ventures with ODP for southern hemisphere issues; and acquiring LoS seismic data to support Australia's claims in Antarctica.

- The highest priority areas for petroleum-related frontier basin work by AGSO are the southern/southwestern margins (regional seismic and sniffer transects), offshore Queensland, Lord Howe Rise; South Tasman Rise; west Tasmania-Otway Basin. This was strongly supported by industry. While there is still work to be done in northwest Australia, particularly in deeper water, this is considered to be of lesser priority by APPEA.
- Minerals exploration research is generally considered to be of low priority. However, work should be undertaken on an opportunity/needs basis.

Defence and Hydrography

Sectoral Organisations Represented: DOD, DSTO; RAN Hydrographic Service; AODC

- Activities fall into two main categories: 1) Provision of bathymetric data and charts for safe navigation (Hydrographic Service) and to support defence and national infrastructure; 2) Provision of advice to the Australian Defence Organisation, for the enhancement of its maritime systems and operations, principally through the application of science and technology related to acoustic, magnetic and electric systems for detection, classification and tracking..
- Hydrographic Service priority activities are the maintenance of charting service, information management, and development of new digital products.
- Hydrographic Service priority areas are mainly concentrated in the north, although the service has Australia-wide responsibilities, mainly related to safe navigation.
- New assets are coming on line for the Hydrographic Service in the next two years. While these vessels are dedicated to hydrographic work, the Hydrographic Service consults widely in setting priorities and actively seeks close cooperation with other organisations (government and non-government).
- DOD particularly needs oceanographic (including seafloor) information down to 5000 m water depth. For continental shelf areas (less than 200 m water depth), seafloor data, sediment data, and geomagnetic data are especially important. Priority areas are all areas to Australia's north, approaches to all major ports, and 'choke points' where shipping routes are physically restricted by the bathymetry or geography.
- DSTO has no data acquisition program of its own, but acquires the data it needs through collaboration and 'piggy-backing' on the programs of other organisations.

Engineering

Sectoral Organisations Represented: Woodside Offshore Petroleum; Telstra

- Major requirement is for 'site' surveys. These can be localised over small areas (for installation of structures), or regional along corridors (for cable or pipeline laying).
- Principal data requirements are for high-resolution swath-mapping / sidescan sonar and information on the thickness and physical properties of shallow sediments (a few metres for cable laying, up to hundreds of metres for major structural installations).
- Geological hazard information, at all scales from local to regional, is important.
- Priority geographical areas for structures are dependant on the location of the resource that is being accessed - that is, the location is more likely to be in a highly explored area.
- Priority areas for telecommunication cable laying are primarily off the east and west coasts (Perth, Port Hedland, Darwin, Cairns, Maroochydore and Sydney are the most likely cable landing points).

Fisheries and Mariculture

Sectoral Organisations Represented: AIMS; CSIRO; AFMA; BRS

- Information on the nature of the benthic communities and biodiversity inventory is a high priority for all sectors involved with living resources.
- Australian fishing catch is not expected to expand greatly in the future. The emphasis will be on improving sustainability of existing resources and managing ecological impacts.
- Most commercial fishing takes place in continental shelf waters. However, exploratory bottom and pelagic fishing will continue in deeper waters.
- Most important non-biological requirements are for high-quality bathymetric data and seabed / substrate information. High-resolution swath-mapping / sidescan sonar is an essential requirement. These data assist in defining legal limits of fisheries and benthic/pelagic habitats.
- Priority geographic areas include: Macquarie Island; Heard and McDonald Islands; Cocos/Keeling and Christmas Islands; North West Slope; Albany-Esperance; central Great Australian Bight; southeast Australian shelf and slope; South Tasman Rise and East Tasman Plateau; Lord Howe Rise - Norfolk Ridge; Timor-Arafura Seas; Tasman Sea seamounts; Torres Strait; Great Barrier Reef; Gulf of Carpentaria.

Pharmaceuticals and Biotechnology

Sectoral Organisation Represented: AIMS

- Information on the nature of the benthic communities and biodiversity inventory.
- Biogeographical mapping of resources for pharmaceutical / bioproducts discovery programs.
- Need to access project data accumulated over a long period of time from marine bioprospecting operations.
- Need for jurisdictional mapping to define authorities responsible for control of bioresources.

Environment

Sectoral Organisations Represented: AIMS; AGSO; Sydney Water; Environment Australia; Antarctic CRC

- Environmental work in the AOT can be broadly divided into three groupings:
 - 1) Investigation of specific or general problems with pollutants;
 - 2) regional environmental studies (eg palaeoclimate); and
 - 3) bioregionalisation and biodiversity studies.
- Investigation of urban and rural pollutant problems requires analysis of water and sediment quality for contamination, generally by nutrients, heavy metals and hydrocarbons. These studies are typically concentrated at 'point source' problem areas, particularly around major population centres or river discharges.
- Regional environmental studies are generally based on the analysis and interpretation of geochemical cycles in estuarine, shelf and margin sediments with implications for assessments of: environmental and palaeoclimatic change, local oceanography and upwelling, and benthic fisheries. These studies are typically located at selected areas throughout the AOT.
- In the areas of biodiversity and bioregionalisation, the priorities are firstly, to establish and manage a National Representative System of Marine Protected Areas, and secondly, to develop a rigorous and systematic approach to bioregionalisation.

Academia / Research

Sectoral Organisations Represented: COGS; University of Sydney (including Ocean Sciences Institute); James Cook University; Australian National University

- Universities have interests and expertise both in geological sampling and remote-sensing of both the sea-surface and the seabed. However, most expertise is concentrated in sedimentological analysis - in contrast, AGSO expertise tends to be more concentrated in geophysical applications. Therefore, there are obvious benefits in AGSO and universities carrying out collaborative and complementary work.
- Universities have major expertise and equipment to undertake process studies involving currents, waves and sediment transport.
- University research is reliant on access to non-university ships for sampling and data acquisition, again pointing to the importance of collaboration with other organisations.
- Universities need to rethink their approach to marine geoscience, in order to participate in national programs, rather purely in than local studies. This will require a reorientation of thinking by universities (and AGSO) to make better use of the expertise in the universities.
- The meeting of the Consortium of Ocean Geosciences for Australian Universities (COGS) in Adelaide in September 1997 provides an opportunity for a major reorientation of university marine geoscience towards national goals.

Government Data and Information

Sectoral Organisations Represented: RAN Hydrographic Service; ERIN/DEST; AGSO; AODC; NRIC; ABARE; BRS; APPEA

- As with the scientific and industry sectors, the information of most importance to government is digital bathymetry and information about the seafloor physiography and sub-strate characteristics.
- There is urgent need for improvement in the quality and quantity of information in national databases, as well as for making them more widely available. As much data as possible should be placed in the public domain since many users have restricted access to funds.
- The explosion in data and information volumes makes it difficult or impossible for central agencies to keep comprehensive and up-to-date databases. Therefore, meta-databases (databases describing data) are becoming increasingly important as a means of directing users to the relevant agency to gain access to key data sets. The Marine and Coastal Data Directory of Australia (the 'Blue Pages') is a good example of this approach.
- Given the high cost of acquiring data sets in the vast AOT, increased use should be made of existing data sets that might have been acquired for other purposes - for

example, 3-D seismic data sets contain a large quantity of detailed bathymetric information; cores acquired for sedimentological study can provide physical properties information of value to the Australian defence Organisation.

Technology Development

Sectoral Organisations Represented: Nautronix; STN Atlas; SeaBeam; Fugro; LADS Corporation; Seismic Supply; Benthic Geotech; Universities; APPEA; AGSO

- Acquisition of marine geoscience information is highly technology-intensive. Because of the vast geographic area involved, a robust and energetic technology development sector is an essential prerequisite to the efficient acquisition of geoscience information in the AOT. Marine geoscience and other ocean studies both drive and are driven by advances in technology.
- Swath mapping, in the full range of water depths from coastal to abyssal, is recognised currently as being the most efficient method of acquiring high-resolution 3-D bathymetric information. Data sets of this type have high cross-sectoral value, providing information on such diverse subjects as tectonics, morphology, shallow gas seeps, engineering foundation studies, benthic and pelagic habitats, and navigation hazards.
- Enhanced sampling capabilities beyond the standard techniques of petroleum exploration drilling and shallow dredging and coring are important if optimum use is to be made of new data sets, particularly swath-mapping. Of particular importance are shallow drilling techniques, exemplified by PROD, and deeper scientific drilling as carried out by the Ocean Drilling Program.

TABLE 2: TECHNICAL REQUIREMENTS BY SECTORS

	Gov't Policy	Petroleum & Minerals	Defence & Hydrog.	Engineer.	Fisheries & Maricult.	Pharm. / Biotech.	Environ.	Academia / Research	Gov't Data & Info.	Technology
Bathymetry & seafloor characteristics	2	2	2	2	2	2	2	2	2	2
Shallow sediment composition and processes	-	1	2	2	2	1	2	2	2	2
Geotechnical properties	-	-	1	2	-	-	-	1	-	-
Sediment & water quality	2	-	-	-	1	1	2	2	2	-
Basin Geology	2	2	-	-	-	-	-	1	1	2
Margin-wide framework studies	-	2	1	-	-	-	1	1	1	-
Benthic organisms	2	-	-	-	2	2	2	1	2	-
Seabed currents	-	-	1	1	2	1	1	1	-	-
Information management	2	2	2	2	2	2	1	1	2	-
Geological database (inc. surficial sed)	-	-	2	1	1	-	1	2	2	-
Geophysical databases	-	1	2	2	-	-	-	1/2	2	-

RATINGS:

- 2 = rated important by most representatives of sector**
- 1 = rated important by some representatives of sector**
- = not rated**

TABLE 3: GEOGRAPHICAL PRIORITIES BY SECTORS

	Gov't Policy	Petroleum / Minerals	Defence & Hydrog.	Engineer.	Fisheries & Maricult.	Pharm. / Biotech.	Environ.	Academia / Research	Gov't Data & Info.	Technology
North	-	-	2	-	2	-	2	1	-	-
Northwest	-	1	2	1	1	-	1	-	-	-
West	-	-	1	1	-	-	1	-	-	-
Southwest	-	1	1	-	1	-	1	1/2	-	-
South	-	2	1	-	1	-	1	-	-	-
Southeast	-	1	1	-	2	-	2	1/2	-	-
East (LHR / NR)	-	2	1	1	1	-	-	-	-	-
Northeast	-	1	2	1	2	-	1	1/2	-	-
Remote territories	-	1	1	-	2	-	1	-	-	-
Antarctica	-	1	1	-	1	-	1	1	-	-
Overseas	-	1	1	1	-	-	-	-	-	-
Other	see note 1	-	see note 2	see note 3	-	see note 1	see note 1	see note 4	see note 1	see note 5

RATINGS:

2	=	rated important by most representatives of sector
1	=	rated important by some representatives of sector
-	=	not rated

NOTES:

1. Government policy and data / information, pharmaceuticals / biotechnology, and environment / biodiversity sectors have interests which are AOT-wide
2. Defence specified geographic priorities as including approaches to major ports and 'choke' points (ie a confining sea gap through which shipping from or to particular ports or regions is forced to pass by virtue of coastline and/or ocean depth constraints).
3. Engineering interests are in the areas where seabed structures (petroleum exploration/production facilities; submarine cables) are under construction.
4. Universities are currently active on the continental shelf and in the coastal zone and estuaries, particularly in the southwest, southeast and northeast.
5. Being essentially a service sector, technology participants did not indicate specific geographic areas of interest.

ISSUES OF CROSS-SECTORAL IMPORTANCE

Bathymetric Databases and Information

The acquisition, storage and dissemination of digital bathymetric information was a unanimous requirement of the sectors represented at the workshop. However, it was also recognised that, while information on the seabed was fundamental to all branches of marine science, such information is not systematically available in a useable form. There is a strong preference for data acquired by swath-mapping rather than profile data.

From this issue, a fundamental question arises:

Which organisation(s) is/are to be responsible for the collation, storage and dissemination of bathymetric data and information?

While the RAN Hydrographic Service sees this function as its natural role on the continental shelf, they are not well-resourced in relation to the magnitude of the task to carry it out. It is suggested here that we are at a critical point in time for resolution of this issue. While the volume of bathymetric data currently available in the AOT is already very large, the potential increase due to new data being acquired by swath-mapping is several orders of magnitude. If decisions on the allocation of responsibility for handling these new data sets are not made in the earliest stages of their acquisition, then major national problems of data handling will inevitably ensue.

Workshop participants were strongly of the view that the issue of bathymetric data handling should be considered at the highest levels, including by the Oceans Policy IDC and the Marine Science and Technology Plan.

Nature of the Seafloor and Shallow Substrate

The requirement for access to information on the composition and properties of the shallow substrate in the AOT was almost as important as the requirement for bathymetric data. Such data are required for:

- Defence
- Engineering
- Environmental studies
- Biological habitats
- University research

While sediment information is acquired by a wide range of organisations, usually for a single purpose, there is little use of samples for purposes beyond those for which they were acquired. It is evident that there is enormous scope for increased efficiencies in marine science through more widespread and rational use of sediment samples.

The workshop also noted the importance of introducing more sophisticated sampling techniques, beyond those that have traditionally been used (ie dredging, grab samples,

shallow coring etc). Such techniques include continued / increased access to the Ocean Drilling Program and new technologies represented by, for example, PROD.

Geographical Priorities for Integrated Science

While individual organisations will continue to have sector-specific geographical priority areas, during the workshop it emerged that there is a number of areas that are common to several sectors. It is important, therefore, that science programs in these areas should be broadly integrated to ensure that efficiencies are obtained through cross-sectoral coordination. These priority geographical areas include:

- Southern and southeastern margin
- Northwest Australia
- Lord Howe Rise - Norfolk Ridge region
- Northeast Australia (particularly the Great Barrier Reef and Torres Strait)
- Remote territories (Macquarie Ridge; Kerguelen Plateau; Australian Antarctic Territory)

Importance of Inter-Agency Collaboration to Increased Efficiency

Throughout the workshop, it was apparent that many organisations had data needs that were common; the common need for bathymetric and sediment information is referred to above. In a number of instances, different organisations require access to the same basic data, but for very different purposes. For example, a single sediment core might have value to a geologist studying sediment dynamics, to an engineer surveying an undersea cable route, to a biologist studying benthic habitats, and to a defence scientist investigating acoustic propagation characteristics for submarine warfare.

Given the high cost of acquiring marine scientific data and the vast area of the AOT, it is therefore self-evident that all organisations stand to benefit through actively pursuing outside collaboration. While there is provision for some coordination of agency activities through bodies such as HOMA, there is very little in the way of formal structures to encourage the collaboration of scientists at the project level between different sectors. That such a need exists is shown by the attendance at the workshop and the evident lack of awareness of attendants of activities in other sectors.

The workshop took no specific action to address cross-sectoral coordination, but did note that it was an important issue that needs addressing, particularly by the Oceans Policy IDC and the Marine Science and Technology Plan.

National Cross-Sectoral Databases and Meta-Databases

While the specific requirement for a national approach to the handling of bathymetric and sedimentological information is noted above, workshop participants also repeatedly made reference to the need for national databases and meta-databases to handle all information of cross-sectoral interests. This need has obviously been recognised in earlier fora (the so-called 'Blue Pages' are an excellent example of what is required); however, it is important that the issue is continually assessed at the highest levels, given the likely explosion in new information in the AOT in the coming years.

APPENDIX 1

List of Workshop Participants

Name	Organisation
Norman Alavi	Australian Oceanographic Data centre
Nic Bax	CSIRO Division of Marine Research
Gary Bickford	Sydney Water
Steve Blake	ERIN
Mark Bolger	RAN Hydrographic Service
Cameron Buchanan	AGSO
Peter Butler	AGSO
Bob Burne	Australian National University
John Carlson	Australian Maritime Safety Authority
Jim Colwell	AGSO
Peter Davies	University of Sydney (COGS)
Steve Dutton	AGSO
Neville Exon	AGSO
Dave Feary	AGSO
Anne Felton	University of Hawaii
Clinton Foster	AGSO
Lindsay Gee	Nautronix
Barry Goldstein	Australian Petroleum Production & Exploration Association
Brian Groves	STN Atlas
David Heggie	AGSO
Peter Hill	AGSO
Mark Hudson	RAN Hydrographic Service
Alex Isern	University of Sydney
Chris Jenkins	Ocean Sciences Institute
Ralph Jensen	Department of Industry, Science & Tourism
David Johnson	James Cook University
Adrian Jones	Defence Science & Technology Organisation
John Kennard	AGSO
Ian Lambert	Minerals Resources Branch, Bureau of Resource Sciences
Chris Lawson	AGSO
Chao-shing Lee	AGSO
Ian Longley	Australian Petroleum Production & Exploration Association
John Macdonald	Australian Maritime Safety Authority
Kevin McLoughlin	Fisheries Resources Branch, Bureau of Resource Sciences
John Marosszeky	Telstra
Steve Miller	SeaBeam Inc
Peter Murphy	Australian Institute of Marine Science
Bernadette O'Neil	Biodiversity Group, Environment Australia
Garth Paltridge	Antarctic Cooperative Research Centre
Trevor Powell	AGSO
Geoff Rohan	Australian Fisheries Management Authority
Ron Sait	Minerals Resources Branch, Bureau of Resource Sciences

Fred Smits	National Institute of Water & Atmospheric Research, New Zealand
Howard Stagg	AGSO
Rupert Summerson	National Resource Information Centre
Roger Summons	AGSO
Phil Symonds	AGSO
Ian Tamblyn	LADS Corporation
Alex Taylor	Woodside Offshore Petroleum
Richard Thackway	Biodiversity Group, Environment Australia
Thomas Weber	STN Atlas
Ian Wegener	Seismic Supply
Roy Whitworth	AGSO
Barry Willcox	AGSO
David Williams	Australian Institute of Marine Science
Mike Williamson	Benthic GeoTech
Paul Williamson	Petroleum Resources Branch, Bureau of Resource Sciences
Commodore R.J. Willis	RAN Hydrographic Service

APPENDIX 2
GEOSCIENCE MAPPING PROGRAM IN THE AUSTRALIAN
OCEAN TERRITORY: PLANNING WORKSHOP
Talks Presented

Session 1: Chair: Clinton Foster (AGSO)

Trevor Powell *AGSO*
AGSO current directions and future possibilities

Clinton Foster *AGSO*
Petroleum & Marine Division and the Australian Ocean Territory Mapping Program

Howard Stagg *AGSO*
AGSO's Australian Ocean Territory Mapping Program: background and early plans

Phil Symonds *AGSO*
AGSO's UN Law of the Sea Program: achievements to date and plans for the future

Session 2: Chair: Peter Davies (COGS)

Steve Blake *Environment*
Management and science needs in Australia's Ocean Territory from the perspective of Environment Australia

Ralph Jensen *Department of Industry, Science & Tourism*
Preparation of the Commonwealth's marine Science and Technology Plan

David Williams *Australian Institute of Marine Science*
The importance of seabed studies to the Australian Institute of marine Science

Session 3: Chair: Phil Symonds (AGSO)

Paul Williamson *Bureau of Resource Sciences*
Frontier petroleum studies in the Australian Ocean Territory: the government perspective

Barry Goldstein & *Australian Petroleum Production and Exploration*
Ian Longley *Association*
Frontier petroleum studies in the Australian Ocean Territory: the explorer's perspective

Alex Taylor *Woodside Offshore Petroleum*
Seabed studies related to the building of offshore structures and pipelines

Session 4: Chair: David Williams (AIMS)

Commodore R.J. Willis *RAN Hydrographic Service*
The RAN Hydrographic Service: operations and future directions

Adrian Jones *Defence Science & Technology Organisation (DOD)*
The requirements of DSTO's Maritime Operations Division for oceanographic data

Neville Exon *AGSO*
Mineral resources in the Australian Ocean Territory

Session 5: Chair: Alex Taylor (Woodside Offshore Petroleum)

Peter Davies *Consortium for Ocean Geosciences of Australian Universities*
Marine geoscience and seabed mapping programs at Australian universities

Brian Groves & Thomas Weber *STN Atlas*
Overview of STN Atlas multibeam echosounders and their capabilities

Steve Miller *SeaBeam Inc*
Recent developments at SeaBeam: new sonars, software, and a 3-D flyby of Perth Canyon

Fred Smits *National Institute of Water & Atmospheric Research, New Zealand*
Marine geoscience research at NIWA

Session 6: Chair: Gary Bickford (Sydney Water)

Kevin McLoughlin *Bureau of Resource Sciences*
Seabed studies and fisheries development

Geoff Rohan *Australian Fisheries Management Authority*
Seabed studies and fisheries management

Nic Bax & Roland Pitcher *CSIRO Division of Marine Research*
Continental shelf habitats

Nic Bax (for Tony Koslow) *CSIRO Division of Marine Research*
Slope and deepwater habitats

Session 7: Chair: Nic Bax (CSIRO)

Gary Bickford *Sydney Water*

Water column and seabed studies needed to deal with urban pollution of estuaries and the ocean

John Marosszeky *Telstra*

Seabed surveying requirements and other marine issues related to the secure installation of optical fibre submarine telecommunication cables

Peter Murphy *Australian Institute of Marine Science*

Pharmaceuticals and biotechnology in the Australian Ocean Territory

Session 8: Chair: Neville Exon (AGSO)

Richard Thackway & *Biodiversity Group, Environment Australia*

Bernadette O'Neil

Biodiversity Group: activities and priorities

Bob Burne *Australian National University*

Bioregionalisation studies in the Australian Ocean Territory

APPENDIX 3

RAPORTEURS NOTES OF TALKS PRESENTED

Session 1 Talk: 1 Chair: Clinton Foster Rapporteur: Jim Colwell

SPEAKER: Dr Trevor Powell
ORGANISATION: AGSO

TITLE: AGSO current directions and future possibilities

1. PRIORITIES OF ORGANISATION/SECTOR:

- Government developing Oceans Policy and Marine Science and Technology Plan.
- Number of issues currently under discussion within Government which impact on marine geoscience.
- Petroleum exploration still a major concern for Government 12 -14 years supply at current production rates.
- Government has produced a green paper on Sustainable Energy which will become a white paper.
- UNCLOS has led to Australia having particular responsibilities.
- AGSO looking to develop a marine program into the 21st Century. Needs to make decision on platforms and what is the most cost-effective way of exploring and managing Australia's vast area.
- Need synergies with other groups.
- From this planning workshop, we should aim to develop proposals for Government on the way marine geoscience mapping should be undertaken.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

Historical perspective/background:

- Mid 1960s first marine work (BMR).
- decision to acquire Rig Seismic; mid 1998 charter expires.

- start of Continental Margins Program; main focus on petroleum.
- ratification of UNCLOS leading to Government focus on importance of offshore.
- Cabinet decision to replace CMP with AOTMP.
- mid 1998 complete data collection for Australia's claim under UNCLOS.

SPEAKER: Dr Clinton Foster

ORGANISATION: AGSO

*TITLE: Petroleum and Marine Division and the Australian Ocean Territory
Mapping Program*

1. PRIORITIES OF ORGANISATION/SECTOR:

- Australian Ocean Territory Mapping Program
 - Petroleum
 - Coasts
 - Oceans
- Importance of databases.
- Currently have Government. funding for 5 Rig Seismic cruises: 4 for Law of Sea purposes, one for petroleum.
- Need for consultation and cooperation between all agencies.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

SPEAKER: Howard Stagg
ORGANISATION: AGSO

TITLE: AGSO's Australian Ocean Territory Mapping Program: background and early plans.

1. PRIORITIES OF ORGANISATION/SECTOR:

- FRAME (Framework and Resources of Australia's Marine Environment). A component of Australian Ocean Territory Mapping Program (AOTMP)
- Australian Ocean Territory = EEZ + Legal Continental Shelf beyond EEZ.
- Australian Ocean Territory Mapping Program to provide:
 - data for Australia's UNCLOS claim
 - data in support of petroleum acreage release and to promote petroleum prospectivity.
 - Resource and environment management.
- Geoscience mapping of AOT gives geological framework which in turn gives understanding of geological controls on resources (living and non-living).
- Need to know:
 - shape of seabed and underlying strata.
 - composition of substrate.
- Need enhanced sampling capability e.g. Portable Remotely Operated Drill PROD.; need swath mapping capability; need access to suitable platform(s)..
- Swath mapping to give information for geoscience, LOS definition, modern processes, marine engineering, fisheries etc.

AGSO Draft Work Plan:

Priorities:

1) Geological framework and frontier basins

Currently have portfolio of project areas: Work still required on North West Shelf (eg margin framework; Malita-Calder and Roebuck for 'frontier' basins; deep-water Otway, western margin of Tasmania, and southern margin framework & basins; Lord Howe Rise and South Tasman Rise are priority areas

2. Swath Mapping

Existing coverage (eg. Macquarie Ridge, South Tasman Rise/west coast of Tasmania) by exchange of ship time.

Number of possibilities in next 12 months, including eastern margin of Tasmania (using *Melville*, in April 97) and southwest Australia (with French, in 97-98?).

Priority areas are: east Tasmania-New South Wales; NW Tasmania-Otway; SW Australia; margins of Exmouth & Scott Plateaus; Mellish Rise - Kenn Plateau; Norfolk Ridge; Three Kings Rise.

Generally consider that southeast has issues of a consistently high priority.

3. Sampling

Ocean Drilling Program: Leg 182 in Great Australian Bight approved by ODP; other proposals may get upgrading to drilling legs.

PROD: first priority is identified targets on southern margin from Bremer Basin to South Tasman Rise.

4. AGSO's Environmental Geoscience projects

Fall into two groups:

- Water and sediment quality; AGSO acts as technical experts to a range of organisations;
- Biogeochemical data sets: suitable for interpretation of geochemical cycles in shelf and margin sediments.

Geological Framework Priorities:

Northwest Australia, Lord Howe Rise, South Tasman Rise, western Tasmania-Otway basin, southern margin

Swath-mapping & Sampling Priorities:

SE quadrant of AOT, Norfolk Ridge-Three Kings Rise, SW Australia, Coral Sea, Scott and Exmouth Plateaus for swath-mapping;

Great Australian Bight for ODP and southern margin for PROD sampling.

Geographic Priorities:

Southeast Australia and southern margin; Lord Howe Rise - Norfolk Ridge - Three Kings Rise; southwest Australia; northwest Australia.

Priority Tools:

- Continued access to current tools
- Assured access to platform(s)
- Gain access to swath mapping
- Improved sampling capability through PROD and continued support of ODP.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

*SPEAKER: Phil Symonds
ORGANISATION: AGSO*

TITLE: AGSO's UN Law of the Sea Program: achievements to date and plans for the future.

1. PRIORITIES OF ORGANISATION/SECTOR:

- AGSO's Law of Sea Project providing geoscience advice and information mainly to define Australia's offshore jurisdiction.
- Need to optimise definition of Australia's Legal Continental Shelf/claim.
- Primary clients: DFAT, Attorney Generals Dept, DPIE.
- Australia has ten years after UNCLOS came into force to acquire data to back up its claim i.e. to 16/11/2004.
- To define legal continental shelf need: foot of continental slope, 2500m isobath, possibly sediment thickness. Various computations needed. Series of formulae, series of cutoffs.
- Australia needs data in 6 out of 9 areas; these areas are the current focus of AGSO's LOS project.
- Using a safe minimum approach to data acquisition: data spacing of about 30 nautical miles.
- LOS surveying has spin-offs for resources etc.
- LOS Surveys:
Completed 94/95: South Tasman Rise; Wallaby and Exmouth Plateaus
1996: Lord Howe Rise/Norfolk Ridge
1997: Kerguelen Plateau, Great Australian Bight, South Tasman Rise
1998: Macquarie Ridge, ? Naturaliste Plateau.
- Data sets:
Bathymetric data plus sediment thickness from seismic profiling
Satellite data helps target LOS lines
- 30 000 line km of data will be collected during LOS surveys. Variety of data needed because of complexity of many margins. Need to look at remote and/or deep-water basins which may have similarities to currently explored basins.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

SPEAKER: Steve Blake

ORGANISATION: ERIN, Environment Australia, Department of Environment, Sport & Territories

TITLE: Management needs in Australia's Maritime Estate from the perspective of Environment Australia, Department of Environment, Sport & Territories.

1. PRIORITIES OF ORGANISATION/SECTOR:

- Oceans Policy
- Coasts and Clean Seas initiative
- Bio-physical regionalisation of the EEZ
 - Coherent national digital bathymetry
 - Coherent national benthic substrate data set
- National Representative System of Marine Protected Areas National Marine Information System (NatMIS); a marine WWW site Maintaining several marine & coastal WWW sites
- State of Environment Reporting

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Digital bathymetry + physiography
- Surface samples - soft sediment habitats + sediment/geochemical parameters
- Habitat maps - from swath mapping

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- Possibility of future funding through the Oceans Policy
- Dissemination of information via NatMIS
- Seafloor mapping data (metadata information) made more widely available by the Marine and Coastal Data Directory of Australia (Blue Pages) WWW site.

4. OTHER POINTS:

Main areas of interest are:

- Water quality
- Coastal habitats

- Marine habitats
- Living resources
- Oceans Policy (work program and consultation strategy to be underway shortly). Strategic integrated design (ie collaboration with all stakeholders). Due for release in mid-1998 as part of the International Year of the Oceans. Close integration with the DIST-led Marine Science & Technology Plan
- Special needs of Australian Antarctic Division, Great Barrier Reef Marine Park Authority, Bureau of Meteorology and the Territories Office.
- Access to national data sets for bathymetry and benthic substrate information
- Secretariat support to HOMA and the Marine Data Group
- Representation on CSDC, GEOTAG, and GOOS Expert Sub-group
- Close working relationship with the State/NT marine agencies
- Marine Policy development
- Coastal Policy development
- International obligations

***SPEAKER:* Dr Ralph Jensen**
***ORGANISATION:* Department of Industry, Science & Tourism**
***TITLE:* Preparation of the Commonwealth's Marine Science and Technology Plan**

1. PRIORITIES OF ORGANISATION/SECTOR:

- Marine Science and Technology Plan which will:
 - Be based on cooperation/consultation
 - Build on existing activities and plans
 - Add value through recognition of synergies

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

Input to design of plan

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- Key document was 1995 PMSEC report
- Scoping paper due soon
- Draft Plan approx. August
- Release with Government approval early 1998 in "The Year of the Ocean"
- Plan not of itself a vehicle for significant new funding

SPEAKER: David Williams

ORGANISATION: Australian Institute of Marine Science

TITLE: The importance of seabed studies to the Australian Institute of Marine Science

1. PRIORITIES OF ORGANISATION/SECTOR:

- Key priority: Mapping and distribution of benthic habitats throughout GBR (5-150 m depth)
- Coastal habitats
- Water quality
- Shelf bathymetry
- Shelf substratum
- Geographic focus: GBR region and NW Australia

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

Shelf bathymetry and imagery

Bottom sampling

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

DISCUSSION1. PRIORITIES OF ORGANISATION/SECTOR:

- Shelf mapping number one priority
- Hydrographer will take about 10 years with six swath-mapping vessels
- Deepwater mapping has less broad support
 - AGSO estimate 10 years for one vessel, swath-mapping 10 months per year
 - NZOI estimate 600 days for swath-mapping NZ territory above 1000 m.
- Bring together disparate data sets in a coherent whole
- Data bases must be improved and made widely accessible
- Meta-databases very important
- As much in public domain as possible, as many potential users lack funds
- Make use of existing petroleum exploration bathymetric data
- Seismic 3D speculative shoots could provide excellent bathymetric data
- Case should be put to Marine Science & Technology Plan for Antarctic geoscience including bathymetry; as UNCLOS data must be in by 2004

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:4. OTHER POINTS:

- Habitat mapping need not be done in detail everywhere
- Antarctic priority depends on political will
- MS & T Plan will provide ammunition for getting priorities within agencies, and for funding agencies for universities and museums

SPEAKER: Paul Williamson

ORGANISATION: Bureau of Resource Sciences (Petroleum)

TITLE: Frontier petroleum studies in the Australian Ocean Territory: the government perspective

1. PRIORITIES OF ORGANISATION/SECTOR:

Public good (framework type studies) data of a relevant, high quality and timely nature to support acreage release, and extend out ~14 years supply of oil. New fields now tend to be worked out in say 10-15 years.

DPIE priorities and objectives

Strong upstream petroleum industry; encourage exploration; support release of exploration acreage; protect environment; and give advice on prospectivity.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

Need for databases and analyses to enhance perceived prospectivity.
Need for broad geoscientific information such as seismic profiling, sampling, potential field data, swath mapping and satellite data.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

The move to contestability in provision of government research means a cooperative approach is likely to be needed to assemble and assess data and prospectivity.

4. OTHER POINTS:

AGSO's role: new framework data, interpretation & publication, provision of data to industry, create familiarity with the areas.

Industry could be more involved in the acreage release program for the future.

Release of data: 2(3) years for basic, 5(6) years for interpretive.

CONCLUSION:

Future strategies will be to encourage exploration into the deeper water frontier regions, particularly for gas. Industry worldwide have increasingly shown interest in deep-water potential in spite of the likelihood that only giant fields will be viable.

Studies relating to acreage to be released should include a mixed portfolio of potential prospects which could be brought to fruition in the short, medium (say Lord Howe Rise) and long-term (tied to the UNCLOS datasets).

SPEAKERS: Barry Goldstein & Ian Longley
ORGANISATION: Australian Petroleum Production and Exploration Association
(APPEA)

TITLE: Frontier petroleum studies in the Australian Ocean Territory: the explorer's perspective

1. PRIORITIES OF ORGANISATION/SECTOR:

AGSO's work should focus on areas where the industry is not active.

It should entice explorers to out-of-favour basins in order to provide a maximum leveraging of the taxpayers dollar in support of private enterprise.

'Ingression seismic' should add value, and should only be undertaken within an exploration permit following consultation, data should be gratis to the permit holders, and terms of data confidentiality should be the same as for industry.

AGSO 'petroleum' priorities.

- APPEA recommends that the Southern margin/ SW margin (particularly the Ceduna, Eyre & Recherche depocentres, and possibly the Stansbury Basin (some of the oil strandings on Kangaroo Island may be sourced out of the basin) and Bremer Basin be regarded as very high priority for AGSO reconnaissance deep seismic in 1997/8. The presence of lacustrine shales, bitumen seeps, and oil shows in some Duntroon Basin wells (off structure) were noted.
- Other favoured regions are offshore Queensland Plateau - Lord Howe Rise, and deep-water fans in the Browse Basin and off the Ashmore Platform.
- Also, APPEA support for Australia's Antarctic claims.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- ODP work on the continental shelf
- Deep seismic transects and sniffer work on southern margin
- Need for heat flow studies (very little done since Cull, 1980's)
- AGSO overseas 'aid' projects (eg. Ragay Gulf) which would give advantage to Australian enterprise.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

SPEAKER: Alex Taylor
ORGANISATION: Woodside Offshore Petroleum
TITLE: Seabed studies for offshore exploration and development

1. PRIORITIES OF ORGANISATION/SECTOR:

Site surveys to support exploration drilling and seismic as well as emplacement of pipelines, platforms, and port facilities maintenance.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Limited opportunities due to the localised nature of the activities.
- Some benefits may accrue for the exploration activities based on the regional bathymetry, sub-bottom profiling and high-resolution seismic.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

Detailed information for use in studies of seabed topography, mechanical properties, shallow gas seepage.

4. OTHER POINTS:

DISCUSSION

1. PRIORITIES OF ORGANISATION/SECTOR:

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- *Rig Seismic* should be used for 1997/8 petroleum type projects in consultation with APPEA.
- AGSO work should concentrate on areas such as the GAB and not the well-explored areas as it has tended to do in the past.
- AGSO should consider letting out multibeam surveys (swath-mapping) to private enterprise. This would be used for management purposes of the AOT.
- Foreign aid (C-S Lee): APPEA could not consider any financial support unless goals were closely aligned. There would need to be an advantage for Australian explorers.
- Chris Jenkins requested that engineering-type data be made available for academic studies, even if such data were in production areas. Barry Goldstein agreed to present this idea to APPEA.

SPEAKER: Commodore R.J. Willis
ORGANISATION: RAN Hydrographic Service

TITLE: The RAN Hydrographic Service: operations and future directions.

1. PRIORITIES OF ORGANISATION/SECTOR:

- Safe navigation
- Support Australia's defence & national infrastructure
- Provision of defence geographic information
- Hydrographic surveys
- Information management
- Charting service
- New product development
- Geographic responsibilities and priority regions:
 - Charting responsibility down to AAT, onto Kerguelen Plateau, PNG (via memorandum of understanding). Basically covers whole of AEEZ and extended Continental Shelf and beyond except in a few areas e.g. Lord Howe Rise
- National development interests - ports, resource exploration and exploitation
- Defence interests mainly in north
- GBR and Torres Strait - ship draught constraints - need continuous surveying.

Current/future priorities:

- Information management
- Maintenance of charting service
- New products: ECDIS and raster charts

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

Wants close co-operation with other organisations

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- Data availability: Available under licensing agreement - commercial full cost, research at cost of reproduction.

4. OTHER POINTS:

New assets:

Moresby and Flinders to be replaced by two new 2500 tonne ships (Leeuwin and Melville), each with 3 motor launches. Leeuwin will be launch in mid 1998 and Melville in mid 1999. These ships will be equipped with a STN ATLAS Fan sweep 20 system
Mapping progress to date - only 45% of area shallower than 50m surveyed to modern standards.

- Try to widely consult in setting priorities - state governments, port authorities, CSIRO, AGSO, EPA, ERIN etc.

SPEAKER: Adrian Jones
ORGANISATION: Defence Science & Technology Organisation
TITLE: The requirement of DSTO's Maritime Operations Division for oceanographic data.

1. PRIORITIES OF ORGANISATION/SECTOR:

- DSTO, Maritime Operations Division: Mission - to shape and interpret Australian Defence Organisation's strategy in maritime systems and operations.
- Clients - RAN, RAAF, HQ ADF
- Require oceanographic (including seafloor) data to support development/use of military sonar, magnetic (and electric) detection systems, and acoustic and visual mine detection systems
- Main areas of interest: sonar - all areas to Australia's north & continental shelf down to 5000m, port approaches, choke points; mine warfare - port approaches; magnetic (and electric) detection systems - continental shelf areas down to 200m.
- Ocean bottom and acoustic properties of seafloor in shallow ocean regions are very important.
- Acoustic requirements for (active/passive) sonars - transmission loss, ambient noise level, reverberation level. Infer these from oceanographic data - velocity of sound versus depth (temp. and salinity); bathymetry, ocean bottom acoustic properties; or infer these variables from core samples, acoustic measurements, geophysical properties etc. Also need information on ocean surface and seafloor roughness, wind speed, seastate, biological activity in ocean.
- Mine warfare - interested in acoustic backscatter, mine burial, acoustic propagation from ship to mine - water depths of 5 - 200m. Seabed properties - surface roughness, sediment type, acoustic backscatter; top 1-2 metres to resolution of 10-15cm need sediment density, shear strength, grain size, porosity versus depth. Other information needed - water turbidity, light level versus depth, currents, hydro-dynamic shear stresses at seafloor interface.
- Magnetic and electric detection systems - need to know level of offshore geomagnetic noise (and electric field) from shore out to 200m depth. Need fine grid of data over continental shelf at spacing from 100m (shallow depth) to 10km (deep water) depending on ocean depth. Need to know contemporaneous thunderstorm activity, solar and ionospheric indices.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Seafloor data currently provided by Ocean Sciences Institute (Jenkins at OSI)
- Some geomagnetic data currently provided by AGSO (Barton at AGSO)
- Provision of data that is specific to Australia's unique environment - data for Australian area needed, not international
- Aeromagnetic data useful if collection coordinated with ship-measured magnetic data
- Data from multisensor core logger would be very useful - to help ground truth modelling of acoustic transmission
- MOU with AGSO (Whitworth at AGSO) for pilot study to extract ocean bottom acoustic properties from seismic data may lead to large scale extraction of acoustic data from seismic

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- Obtain data in future by: attempting to influence the collection of oceanographic data around Australia; piggyback on other research cruises

SPEAKER: Neville Exon
ORGANISATION: AGSO

TITLE: Mineral resources in the Australian Ocean Territory

1. PRIORITIES OF ORGANISATION/SECTOR:

- Resources involved - phosphate, placer deposits, construction materials, Mn nodules and crusts, hydrothermal polymetallic sulphides.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Phosphates - well assessed; no FRAME priority.
- Placer deposits - heavy minerals - well assessed and no FRAME priority; diamonds - off Kimberley area in ancient river channels - possible FRAME priority, but adequately worked already in some nearshore areas.
- Construction materials - sand/gravel - high volume/low value, but essential for cities - geoscience could help off main population centres, particularly eastern Australia. Potential FRAME priority, on a cooperative basis.
- Mn nodules/crusts - deep sea - contain Ni, Cu, Co. Co crusts could be important; around Australia South Tasman Rise has significant Mn crusts, Cape Leeuwin nodule field largely outside Australia's marine jurisdiction - low FRAME priority but should be studied on an opportunity basis.
- Hydrothermal polymetallic sulphides - usually mid-ocean ridge settings, eg Manus Basin area - 1500m water depth; rich in Cu, Zn, Au - no FRAME priority; CSIRO already conducting research.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- Sand & gravel could be considered to be a State or local government problem, but AGSO could get involved on a cooperative basis when it has necessary equipment or skills.

SPEAKER: Peter Davies

ORGANISATION: Consortium for Ocean Geoscience of Australian Universities

TITLE: Marine geoscience and seabed mapping programs at Australian universities.

1. PRIORITIES OF ORGANISATION/SECTOR:

- Carry out marine geoscience research based on direct sampling of seafloor and sub-seafloor.
- Carry out marine geoscience research based on remote-sensing of seafloor and sub-seafloor.
- Both approaches must be linked to national priority research initiatives.
- Because of immense areas involved, marine geoscience research will be applicable to wide geographic areas.
- Flexibility.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Provision of ships for direct sampling; emphasis on linked sampling of both seafloor and sub-seafloor.
- Provision of ships and ancillary equipment for 'remote-sensing'.
- Need to be flexible in ship and equipment provision and procurement.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- Major resource available for marine geoscience are approx. 95 scientists and students at Australian universities.
- This expertise is concentrated in sediment analysis area (core analysis; sediment properties; palaeoclimate/paleoceanography etc), but also some expertise in 'geophysics' area (swath-mapping collection/processing/interpretation). By contrast, most AGSO expertise is in geophysics. Universities and AGSO share expertise in biostratigraphy.

4. OTHER POINTS:

- Universities will need to rethink their approach to marine geoscience, in order to participate in national programs rather than their more traditional involvement in local studies (in order to support "Health and Wealth" initiative represented by tourism [\$12b]; petroleum [\$9b]; fishing [\$2b]; and pharmaceutical industries). AGSO has to rethink its approach to universities in order to effectively utilise the university resource, and particularly the training requirement.
- Accordingly, it will be necessary to identify priorities for more co-operative and focussed approaches (possibly involving a geographic focus).
- The September 1997 COGS meeting in Adelaide will provide an opportunity to begin 'reorientation' of university marine geoscience research towards national goals. AGSO reorientation also to begin.

PROD Presentation

- Prototype for MMAJ operational; has capability of 25 m sub-bottom penetration, in depths up to 6 km.
- Australian drill to have 100 m sub-bottom penetration, in depths up to 2 km - will be in the water by December 1997.
- Australian drill will have capability for: rotary drilling; hydraulic piston core; heat-flow; core penetrometer; slim-line logging; re-entry; and hole instrumentation.

*SPEAKER: Brian Groves
ORGANISATION: STN Atlas*

TITLE: Overview of STN Atlas multibeam echosounders and their capabilities

1. PRIORITIES OF ORGANISATION/SECTOR:

- Demonstration / sale of equipment
- Development of new instruments

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- | | | | |
|--------------------------|-----------|---------------|-------------------|
| • Hydrosweep DS-2/15 kHz | >10,000 m | 4 x v. depth | 1500 pixels/sweep |
| • Hydrosweep MD-2/30 kHz | >4000 m | 8 x v. depth | 1500 pixels/sweep |
| • Hydrosweep MD-2/50 kHz | >1500 m | 8 x v. depth | 1500 pixels/sweep |
| • Fansweep 20/100 kHz | >600 m | 12 x v. depth | 4000 pixels/sweep |
| • Fansweep 20/200 kHz | >300 m | 12 x v. depth | 4000 pixels/sweep |

SPEAKER: Steve Miller
ORGANISATION: SeaBeam Inc

TITLE: Recent developments at SeaBeam: new sonars, software and a 3-D flyby of the Perth Canyon

1. PRIORITIES OF ORGANISATION/SECTOR:

- Demonstration / sale of equipment
- Development of new instruments

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- Deep water: SB2100 family - 12 kHz standard instrument; 4 kHz sub-bottom profiler (CHIRP); 36 kHz 'coastal' system; combined 12/4 kHz or 12/36 kHz systems
- Shallow water: SB1000 family - 50 kHz system; 180 kHz system; combined 50/180 kHz system
- Work is underway to understand / quantify / use backscatter returns

SPEAKER: Fred Smits

ORGANISATION: National Institute of Water and Atmospheric Research (NIWA)

TITLE: Marine geoscience research at NIWA

1. PRIORITIES OF ORGANISATION/SECTOR:

- Essentially identical to Australian priorities, with a similar difficulty in dealing with the vast area of NZ's Antarctic claim.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- NZ's hydrographic service has been transferred from RNZN to Land Information New Zealand (LINZ - limited liability Crown Research Institute); much hydrographic work is contestable.
- A Research Vessel Committee supervises and co-ordinates ship and shipboard equipment use (including RNZN research vessels).
- NZ has a huge area that needs to be surveyed for LOS claims - approx. 1m km²
- NIWA vessels (*Tangaroa* and *Kaharoa*) are run by a separate company, in order to ensure that all costs are fully transparent, and that the vessels pay their way.
- NIWA have undertaken a full study of multi-beam sounders - uses; operation; economics, in order to clarify 'tool versus toy' benefits.

DISCUSSION

1. PRIORITIES OF ORGANISATION/SECTOR:

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- Emphasis of AGSO contribution to PROD development; will hopefully result in AGSO having significant non-commercial PROD usage. AGSO usage being negotiated currently.

SPEAKER: Kevin McLoughlin
ORGANISATION: Bureau of Resource Sciences (Fisheries)

TITLE: Seabed studies and fisheries development

1. PRIORITIES OF ORGANISATION/SECTOR:

- To promote the sustainable development of Australia's fisheries by providing scientific advice and information on the resources and the environment.
- The landed weight of Australia's fisheries catch is not expected to expand greatly—emphasis will be on improving the sustainability of existing resources and managing ecological impacts.
- The focus is predominantly on shelf resources—the majority of fishing occurs here and the bulk of the value of Australia's fisheries comes from shelf resources. However, developing potential resources in deeper water and external territories will be important.

Fisheries boundaries for many Commonwealth fisheries extend out to the limit of the EEZ. However, very little exploratory fishing has been undertaken in many parts of the EEZ. Examples of fisheries where further work is needed are: the North West Slope Fishery where very little fish trawling has taken place below 200m, and the Western Deepwater Fishery where a single research survey was undertaken by CSIRO in 1991 (approximately 95 stations in depths between 200 and 1400 m). In the Great Australian Bight a trawl fishery operates on shelf resources to depths of about 200 m. Some fishing for orange roughy takes place in the GAB in depths of 800-1000 m, but little fishing has occurred in depths of 200-800 m and below 1000 m. Very little is known of resources in deep water off north east Australia, and further research is needed to ensure sustainable development in areas such as near Macquarie Island and Heard and McDonald Islands.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Demersal fishing (predominantly trawling) occurs mostly in waters less than 200 m. Good bathymetry data is needed for research and management of these resources.
- Fisheries managers require information on resource status. There is an increasing need for information on the spatial distribution of fish stocks in fisheries modelling and bathymetric data is an important input.
- Detailed habitat information is required for shelf areas and bathymetric information will be an important component of this work.

- Fish species found in deeper waters are generally characterised by low productivity. Initial catches of the accumulated biomass of such species can be high, but long-term sustainable yields are relatively low. Nevertheless, exploratory fishing will continue in deeper waters and external territories and the resources found will be important to the Australian fishing industry. Detailed charts of bottom topography are important to identifying potential grounds for exploratory fishing, and to assist in the design of random stratified surveys.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- The value of the fishing industry in 1995-96 was \$1.6 billion. Commonwealth production represents about 20% of the value.
- Jurisdiction is a complex mix of State and Commonwealth responsibility.
- The Fisheries Resources Branch of BRS has 14-15 scientists and an annual budget of approximately \$1.5 million.
- One of the products of the Fisheries Resources Branch is an annual review of the status of Commonwealth fisheries.
- The Fisheries Resources Branch has close liaison with other research agencies including CSIRO and State fisheries departments.

SPEAKER: Geoff Rohan

ORGANISATION: Australian Fisheries Management Authority

TITLE: Seabed studies and fisheries management.

1. PRIORITIES OF ORGANISATION/SECTOR:

- Managing Commonwealth fisheries at an ecologically sustainable level.
- Providing for economically efficient fishing operations.
- Achieving efficient and cost-effective fisheries management and administration.
- Areas of interest - Distant:
 - Macquarie, Heard and McDonald Islands
 - Cocos/Keeling and Christmas Islands
 - Cascade Plateau and STR
 - Norfolk Ridge, LHR, STR, Gascoyne Plateau
 - Timor/Arafura Seas continental shelf
 - Duddel and Volsello Shoals
- Areas of interest - Near
 - Beachport Canyon off SA
 - Troughs and ridges adjacent to Albany-Esperance
 - Seamounts adjacent to NSW
 - Horseshoe south of Lakes Entrance

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

In management of the demersal (bottom dwelling) fishery, accurate information on seafloor topography will assist in:

- defining the legal limits of a fishery,
- defining areas of established or traditional fishing and where developmental fishing may take place,
- provide value to industry in achieving cost-effective harvesting of available resource.
- research,
- effective compliance,
- establishment of marine protected areas.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

4. OTHER POINTS:

- Need knowledge of the bottom to define type of fisheries, eg. Scott Reef area, Timor Sea.
- Orange roughy around Tasmania - need to control areas fished.
- Currently formulating development plan for southern remote areas - Cascade Plateau, STR.
- New fisheries on the Macquarie Ridge and around Heard/McDonald Is, - Patagonian toothfish. Caught in canyons at depths of 500-600m plus depths.
- Swath-maps produced by AGSO used to define protected area in orange roughy grounds in area of seamounts south of Tasmania.

SPEAKERS: Nic Bax & Roland Pitcher

ORGANISATION: CSIRO Division of Marine Research

TITLE: Continental shelf habitats

1. PRIORITIES OF ORGANISATION/SECTOR:

CSIRO marine sector focus areas are:

- multiple-use management of Australia's EEZ
- marine living resources around Australia
- marine conservation management
- marine products and biotechnology
- estuarine and coastal waters

Shelf habitat project components (excluding estuaries):

- definition of habitat types (mainly from information from bathymetry fishermen and acoustic surveys)
- validation with underwater video and sediment samples
- influence of water currents on habitat and habitat use
- habitat use by fish and invertebrates
- experimental work - effects of trawling
- sediment dynamics
- impact of biota removal on sediment transport

Focus areas: Southeast shelf, NW Shelf, Torres Strait, GBR, Gulf of Carpentaria.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Bathymetry maps needed for ocean models and defining shelf habitat.
- For shelfal areas, very accurate bottom topography is required - particularly 25-200m water depth; high-resolution swath mapping for bathymetry and backscatter seafloor characterisation.
- Physical, acoustic and geochemical sediment properties are required to interpret acoustic backscatter seafloor characterisation and to further define habitat
- Data visualisation tools for topographical and habitat mapping

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- Active sampling programs in focus areas (physical samples, single-beam bathymetry and bottom typing, photographic surveys)
- Ongoing research on sediment dynamics

4. OTHER POINTS:

- Discrimination of bottom types (hard/soft/rough) is done by acoustic mapping using depth-corrected RoxAnn bottom echo algorithms. Data is collected digitally and signal analysed. Ongoing research on signal processing to improve bottom-type discrimination, particularly macrobenthos.
- Habitats and bottom types are also studied by a towed video system (200m max. depth at the moment), ROV, sediment samples.
- Habitat use by invertebrates demonstrably related to acoustic and physical sediment properties

Supplied dot points/abstract:

- A major focus of CSIRO's marine sector and the Division of Marine Research is multiple-use management of Australia's EEZ. One component of multiple-use management is the marine living resources.
- Sustainable management of Australia's marine living resources requires a systems level approach to management - sometimes called ecosystem management. The difficulty has been how to effectively manage a complex system.
- Spatial management (together with management of individual species) may provide a robust systems-level approach to sustainable management of marine living resources.
- Identifying marine benthic habitat is a prerequisite to effective spatial management of marine living resources. This requires knowledge of the physical characteristics of the seafloor and its effect on the biota.
- Physical seafloor characteristics are also important in planning and development for industrial and defence use of marine resources. Biota (and their lack) impact physical characteristics of the seafloor (e.g. sediment stability) and its utility to users.
- Multiple-use management of Australia's EEZ has varied goals and customers. The physical and biological characteristics of the seafloor, their interaction and use provide one common framework for multiple-use management.

- The Division is researching seafloor characteristics and use in the following areas in Australia:
 - Torres Strait
 - Gulf of Carpentaria
 - Southeast Shelf
 - Deepwater seamounts off Southern Tasmania
 - North West Shelf
 - Great Barrier Reef

SPEAKER: Nic Bax (for Tony Koslow)
ORGANISATION: CSIRO Division of Marine Research

TITLE: Slope and deepwater habitats

1. PRIORITIES OF ORGANISATION/SECTOR:

General priorities as for previous presentation.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Previous studies conducted in co-operation with AGSO (input: swath-data, bottom sampling and photography) include:
 - Slope off southern Tasmania, where orange roughy and oreo aggregate over seamounts
 - Shelf edge and upper slope off west Tasmania - blue grenadier aggregate and spawn in canyons.
- In general topographic maps aid fishers and stock assessment, and allow surveys and management of fish resources in the most effective manner.
- Seamounts concentrate resources and influence pelagic environment

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

Active survey program - physical samples

4. OTHER POINTS:

- NZ fishers privately contracted swath-mapping to locate new orange roughy grounds.
- New grounds for orange roughy discovered off South Australia, but these have not been mapped systematically.
- Macquarie Island / Ridge is focus of new, potentially major deepwater fishery for Patagonian toothfish.
- Northwest slope targeted for future fishery and biodiversity surveys.

DISCUSSIONMain points of discussion

- Increasing use of swath-mapping for fisheries management and strategies in US and Canada - both bathymetry and backscatter data used.
- Norfolk Island area - AGSO surveys show seamounts and ridges - no significant fishing activity known at present.
- Lord Howe Rise has been fished (sometimes heavily) for orange roughy for a decade
- Very little is known about benthic organisms in deep water areas - may be of biotechnological value.
- AGSO completed a HMR1 swath-survey on the Macquarie Ridge in 1994 - the data are of great interest for fisheries work (CSIRO, AFMA and BRS).
- AGSO and DSTO are co-operating in a study of acoustic properties of the sea bottom - of interest to CSIRO.
- Rock samples brought up in bottom trawls and during seabed studies are potentially very useful for geological work - AGSO expressed interest in obtaining such samples. AFMA has an observer onboard trawlers operating in the newly opened up areas of Heard/Macquarie. AFMA has agreed to try to provide rock samples.
- Re release of swath-data to fishermen - positions of fishing vessels in remote areas are now monitored by satellite, and besides, fishers in these areas are on TAC quotas, so management is relatively easy.

SPEAKER: Gary Bickford
ORGANISATION: Sydney Water

TITLE: Water column and seabed studies needed to deal with urban pollution of estuaries and the ocean

1. PRIORITIES OF ORGANISATION/SECTOR:

- to be a successful business
- to protect the environment
- to protect public health
- to reduce risk to public health
- to prevent environmental degradation
- to provide water and waste water services to people in Sydney, Blue Mountains and the Illawarra

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Provide environmental information for river, estuaries and offshore on the continental shelf for both water and sediment quality eg
 - nutrients, nitrogen and phosphorus and others,
 - identifying the importance of the sediments in controlling algal blooms
 - mapping toxicants such as heavy metals and petroleum and industrial chemicals
 - identifying sedimentary processes and sediment transport
 - identifying and mapping the nature of the seabed important for biological communities
 - monitor water and sediment quality

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- management of geoscience components of environmental 'health'
- new technology developments for monitoring the status of environmental 'resources'
- geological and geochemical data bases for long term monitoring and environmental assessment of the coastal zone.

4. OTHER POINTS:

- Environmental monitoring is expensive
- transparency of the 'science' and peer review to obtain the best result for customers.
- environmental monitoring occurs in a regulatory (legislative) framework.
- complexity of the environmental issues requires integrated multidisciplinary research and needs to involve all relevant agencies
- technology for long term monitoring
- identify pollution sources

SPEAKER: John Marosszky

ORGANISATION: Telstra

TITLE: Seabed surveying requirements and other marine issues related to the secure installation of optical fibre submarine telecommunication cables

1. PRIORITIES OF ORGANISATION/SECTOR:

- providing telecommunication services to Australia and other nations

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- by providing knowledge of the seafloor eg 'hardness' and its suitability for laying of optical fibre cables in detail to water depths up to 2000 m and also more generally for water depths in the deep sea.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- new technology developments for seafloor coring to a 'few' metres.
- bathymetric mapping
- remote-sensing techniques to examine seafloor 'properties'
- knowledge of seismic activity, eg faulting, vents
- knowledge of sedimentary process on continental slope, eg slumping and seafloor stability

4. OTHER POINTS:

Notes supplied by speaker:

Telstra installs, maintains and operates submarine telecommunication cables in the Pacific, Asia and Indian Ocean regions.

1. Route Planning

In the initial route planning, all existing available data (including bathymetry, geology, sedimentology, seabed stability, oceanography, meteorology, seismicity, other geohazards and man made factors including fishing, petroleum, mining etc) are

investigated to identify a route suitable for detailed surveying. This planned route must be economical in length, free of natural and man made hazards to the greatest extent possible and suitable for cable installation and burial activities.

2. Route Survey

The aim of the route survey is to identify a safe and viable route for cable installation. The data requirements of a route survey are dependant on the nature of the features along that route but always include swath bathymetry, sidescan and subbottom profiling. Bottom sampling is usually undertaken by a combination of grab samples, coring (piston/gravity/vibro), rock coring and CPTs. Additional information collected from time to time includes bottom temperatures, bottom photos, magnetometer data, current information (meters or ADCP) and cable burial assessments.

3. Australian Seabed Mapping and Telstra's needs

Telstra's general requirements for high quality information usually occur at the Route Planning stage to determine suitable corridors for detailed surveying. As optical fibre submarine cables are becoming more advanced and consequently carrying more traffic (a capacity equivalent to 200,000 simultaneous telephone calls), there is a greater need to protect them from damage by trawling, anchors and the like. Burial of the cable to 2000m water depth is undertaken for cables installed on Australia's continental margin.

The data generally required to plan a route includes bathymetry, surface sedimentology, isopach information (particularly important for areas of burial), bedforms, sediment stability and some basic geotechnical information. Much of this information is available from a variety of sources, however the largest void is the availability of detailed subbottom data including sediment thickness and structure to determine buriability.

Other information that is important at a route planning stage that could be provided from the AOT mapping program could include geohazard assessments (slope stability etc), resource potential (mining, petroleum, fishing) and maritime heritage (identification of significant wrecks - Sydney/Kormoran).

The geographical areas of most interest are off the West and East coast of Australia (the major cities of Perth, Port Hedland, Darwin, Cairns, Maroochydore and Sydney are the most likely landing locations for submarine cables).

Technical priorities are for high resolution subbottom data of the upper 2m of the seabed in water depths down to 2000m and for geotechnical information on the sediments/seabed within the same area. Detailed swath bathymetry and sidescan is also essential over the full range of water depths for international cable routes.

SPEAKER: Dr Peter Murphy
ORGANISATION: AIMS

TITLE: Pharmaceuticals and biotechnology in the Australian Ocean Territory

1. PRIORITIES OF ORGANISATION/SECTOR:

Organisational priorities of AIMS (biotechnology & pharmaceutical areas only)

- biotechnologies/genetics
- pharmaceuticals/bioproducts

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Biogeographic mapping of resources for pharmaceutical/bioproducts discovery programs
- Access project data accumulated over a long period of time from marine bioprospecting operations
- Jurisdictional mapping to define authorities responsible for control of bioresources

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

Yes, but coordination and resources are needed.

4. OTHER POINTS:

DISCUSSION

1. PRIORITIES OF ORGANISATION/SECTOR:

Telstra

- geographic priorities for Telstra are currently the western sea-board, but the future will be new information for cables from the eastern seaboard

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

Telstra

- new information required on seafloor properties to 2000 m

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

Telstra

- new information on seabed and development of the eastern seaboard continental slope

AIMS and marine bioproducts

- mapping of substrates is important for macrophytes
- mapping of areas such as oil seeps, hydrothermal vents, cold seeps, and mineral locations may provide new opportunities to identify important microbial communities

4. OTHER POINTS:

Telstra

- the geological contractor retains raw seafloor data for Telstra, and Telstra retains the right to access that data
- can these seafloor data be made available despite the often variety of formats these are collected in?

SPEAKER: Bernadette O'Neil (vice Gordon Anderson) & Richard Thackway
ORGANISATION: Biodiversity Group, Environment Australia

TITLE: Biodiversity Group: activities and priorities

1. PRIORITIES OF ORGANISATION/SECTOR:

- Meet legislative responsibility to protect and preserve wildlife.
- Establishment of National Representative System of Marine Protected Areas (MPAs).
- Management of Marine Protected Areas.
- Understand and develop multiple use based on cooperative arrangements underpinned by biodiversity conservation objectives.
- Current activities include: a proposal for the declaration of a marine park in the Great Australian Bight with a mammal protection zone and a benthos protection zone; and development of a National Representative System of MPA's

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Develop and maintain a national GIS map of MPA's.
- Help identify 'ecologically meaningful regions'.
- Help improve the database on MPAs
- Document habitats and ecosystems within MPAs in a sound way
- Help understand the likely disturbances and identify risks
- Help develop an agreed set of methodologies for recognising and selecting MPAs.

The above requires the following accurate data/sound knowledge:

- digital bathymetry
- map of sedimentary basins
- database of the texture, nature and origin of the sea floor materials
- morphology of coast and seabed
- water column attributes

- compendium/classification of habitats /communities /ecosystems /threats /disturbances /risks

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- Spin-off is a geologically rigorous approach to regionalisation studies

4. OTHER POINTS:

SPEAKER: Bob Burne
ORGANISATION: Australian National University

TITLE: Bioregionalisation studies in the Australian Ocean Territory

1. PRIORITIES OF ORGANISATION/SECTOR:

- How to develop a rigorous and systematic approach to “bioregionalisation”.
- How to document and communicate the results in a way that furthers the national interest.

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:

- Provide knowledge of the crust below the seabed; data on the fabric, terrane of the craton and the age, thickness and composition of the sedimentary basins within it.
- Provide sound data about the topography of the surface below the seabed; in other words good detailed bathymetry.
- Provide detailed data on the texture and nature of the sea floor materials; in other words, what are the properties of the sediments and their faunal origin and composition.

3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:

- A sound method of investigating these issues.
- Better databases for “ecosystem biogeography” that will adequately describe ecosystem domains in terms of their distribution in space and time.

4. OTHER POINTS:

- RVB and colleagues are developing a biogeography mapping system appropriate to the concept of hierarchies (time and space). The system is based on topography (depth and slope), classification of sediment types and their distribution and the nature of adjacent coastal lands.
- An important issue is the complexity of coordination between the various agencies holding key data and scientific knowledge.
- AGSO could develop a good database for sediment type including chemical/physical composition.

DISCUSSION/SUMMARY**1. PRIORITIES OF ORGANISATION/SECTOR:**

Suggestions and topics for the Thursday wrap-up:

- Agencies to ID their areas of mapping interest and priority (RVB)
-
- ID agency sensitivities in the FRAME summary document so that they are on the table and awareness is heightened (PD)

- What sort of “formal” organisation or structure could be used to further the aims and ideals exposed by the FRAME workshop?
Suggestions included HOMA, AMIRA, AMSA

- What sort of document should come out of the workshop. AGSO record?

What is the next step in furthering the process begun at this workshop? A bigger conference including oceanographers? Ralph Jensen put up the challenge of a how do Australia’s marine scientists get together to decide their future as a group?

2. HOW MARINE GEOSCIENCE CAN HELP THOSE PRIORITIES:**3. SPIN OFFS OF PRIORITIES FOR MARINE GEOSCIENCE:****4. OTHER POINTS:**

APPENDIX 4 RELEVANT ACRONYMS

AAT	Australian Antarctic Territory
ABARE	Australian Bureau of Agricultural and Resource Economics
ACRES	Australian Centre for Remote Sensing
AEZ	AAT Exclusive Economic Zone
AFMA	Australian Fisheries Management Agency
AGSO	Australian Geological Survey Organisation
AIMS	Australian Institute of Marine Science
AMISC	Australian Marine Industries and Sciences Council
AMRIP	Australian Marine Research in Progress
AMSA (1)	Australian Marine Science Association
AMSA (2)	Australian Maritime safety Authority
AMSAT	Australian Marine Science and Technology
AMSTAC	Australian Marine Science and Technology Advisory Committee
AODC	Australian Oceanographic Data Centre
AOT	Australian Ocean Territory
AOTMP	Australian Ocean Territory Mapping Program
APPEA	Australian Petroleum Production and Exploration Association
ARGC	Australian Research Grants Committee
ASTEC	Australian Science and Technology Council
BRS	Bureau of Resource Sciences
COGS	Consortium for Ocean Geosciences of Australian Universities
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEST	Department of the Environment, Sport and Territories
DFAT	Department of Foreign Affairs and Trade
DIST	Department of Industry, Science and Tourism
DOD	department of Defence
DPIE	Department of Primary Industries and Energy
DSTO	Defence Science and Technology Organisation
EEZ	Exclusive Economic Zone
ERIN	Environmental Resources Information Network
FRAME	Framework and Resources of the Australian Marine Environment
FRDC	Fisheries Research and Development Corporation
GEOTAG	
GBRMPA	Great Barrier Reef Marine Park Authority
GOOS	Global Ocean Observing System
HOMA	Heads of Marine Agencies
IDC	Inter-Departmental Committee
IMO	International Maritime Organisation
LCS	Legal Continental Shelf
LNG	Liquified Natural Gas
DOD	Ministry of Defence
M(SL)A	Minerals (Submerged Lands) Act
NRIC	National Resource Information Centre
OSI	Ocean Sciences Institute, University of Sydney

OTEC	Ocean Thermal Energy Conversion
PM & C	Prime Minister & Cabinet
PMSEC	Prime Minister's Science and Engineering Council
PROD	Portable Remotely Operated Drill
P(SL)A	Petroleum (Submerged Lands) Act
RAC	Resource Assessment Commission
RAN	Royal Australian Navy
SOMER	State of the marine Environment Report
UNCED	United Nations Conference on the Environment and Development
UNCLOS	United Nations Convention on Law of the Sea (also LoS)