"CenSeam"
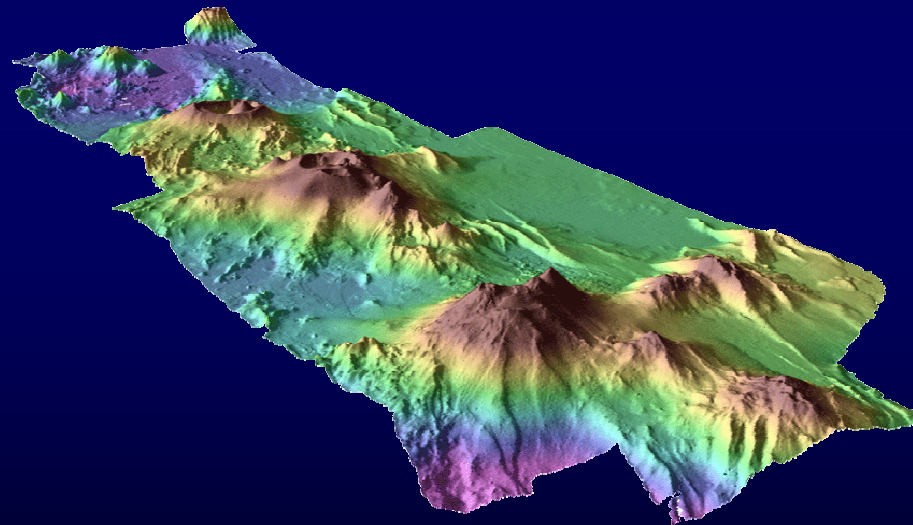## developing a global baseline and synthesis of seamount biodiversity data

Malcolm Clark, Ash Rowden, Karen Stocks, Mireille Consalvey

This afternoon…

- General introduction to seamounts and the CenSeam programme
- Seamount biodiversity
- Censeam activities
- Impacts of human exploitation
- Where are we heading, and how can we improve linkages with the ISA

Census of marine life on Seamounts

What roles do seamounts play in the biogeography, biodiversity, productivity, and evolution of marine organisms and what is their effect on the global, oceanic ecosystem?
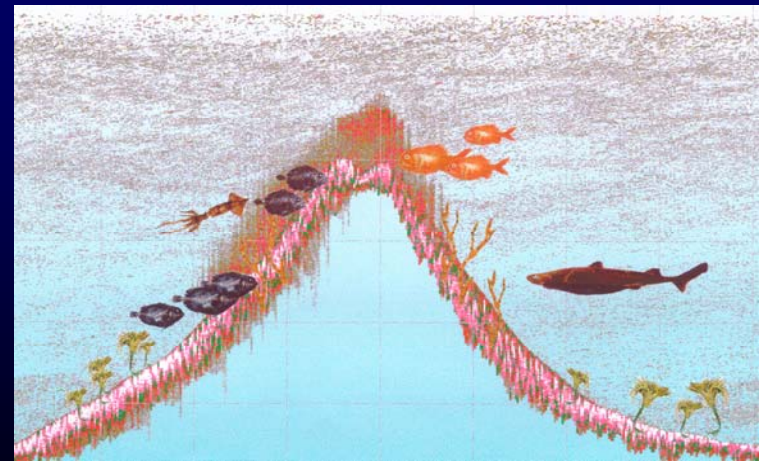
CenSeam themes

- What factors drive seamount **community structure**, diversity, productivity, and endemism, both at the scale of whole seamounts and individual habitats within seamounts?

- What are the key **processes** influencing the differences in communities observed between seamount and non-seamount regions, among seamounts, and among habitats within an individual seamount?

- What are the **impacts** of exploitation (fisheries, mining) on seamount community structure and function?

Seamounts-what are they??

- Elevated seafloor topography, generally isolated to an extent, and usually volcanic

- Definition important
  - >1000 m "seamount"
  - 250 (500) - 1000 m "knolls"
  - <250 (500) m "pinnacles", "hills"
  - Recent more general use of "seamount"
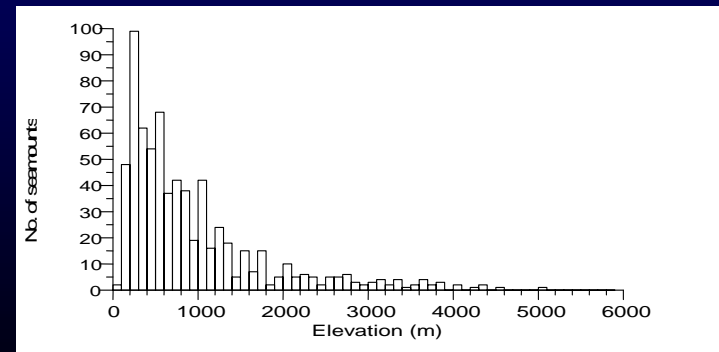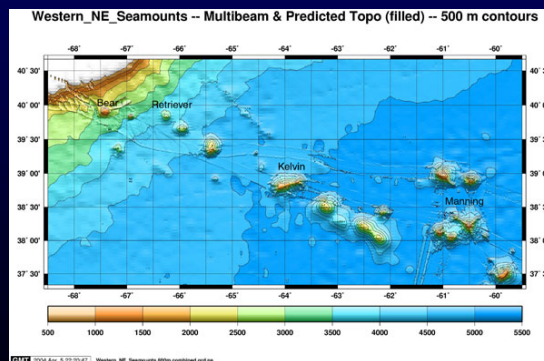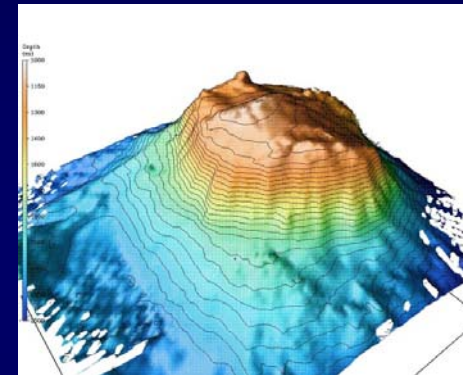
Seamounts-where are they?
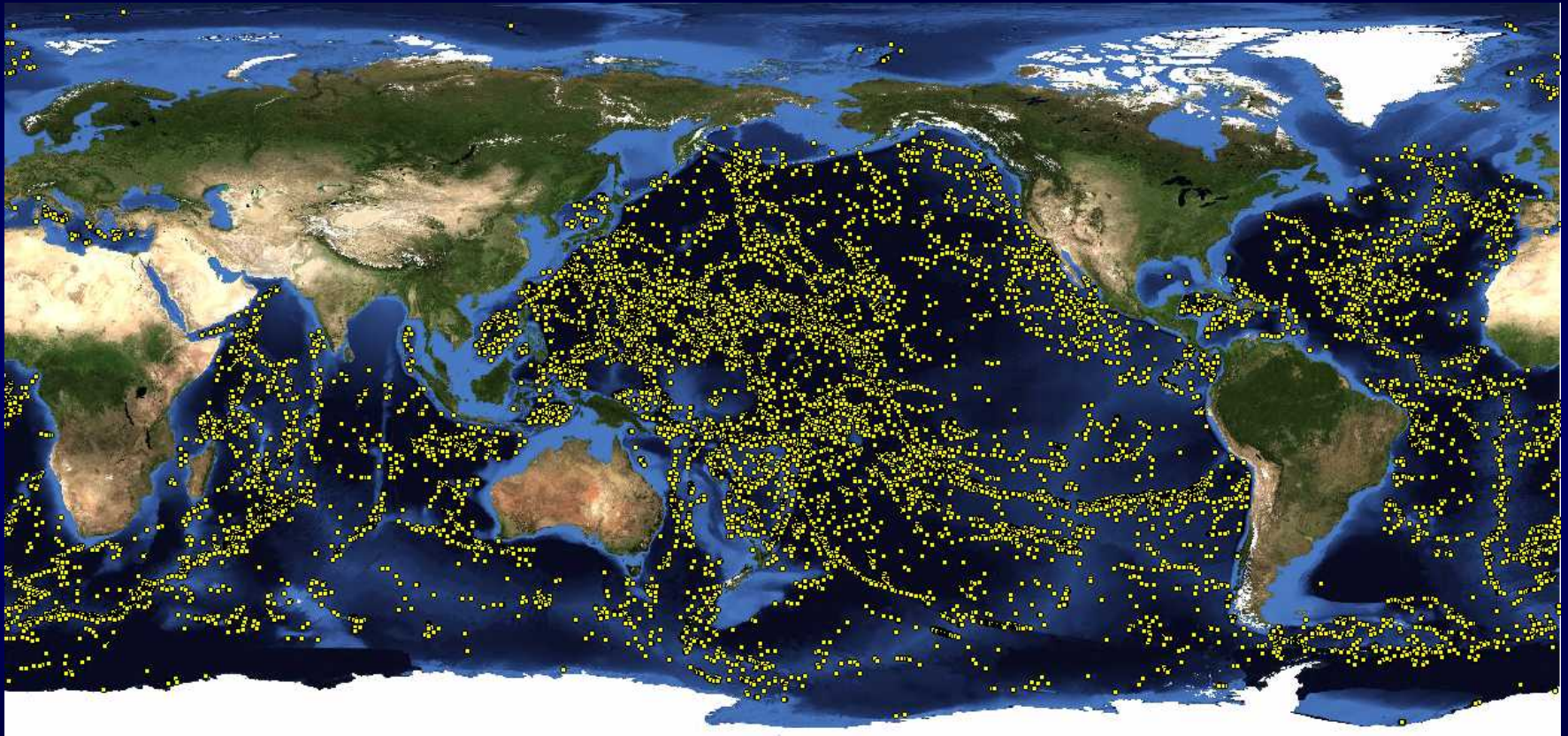
?50,000+ (>1000 m), many more (<1000 m)

Marine life on seamounts-what do we know?

- High biodiversity (number of species)
- High levels of endemism (unique/localised fauna)
- Highly productive (high species abundance)
- High level of isolation (different communities, sources of speciation, relict faunas)
- Important role in ocean biogeography ("stepping stones")

BUT, what do we REALLY know?

Data from SeamountsOnline

- 325 seamounts

- 12,189 faunal records

- Over 3000 taxa (not all to species level)

Sampled Seamounts

325 sampled [partial, yellow; well, red (only about 50); blue, not in db]

Sampling on seamounts

- Variety of gear used
- Level of sampling
- Sampling design
- Taxonomic detail
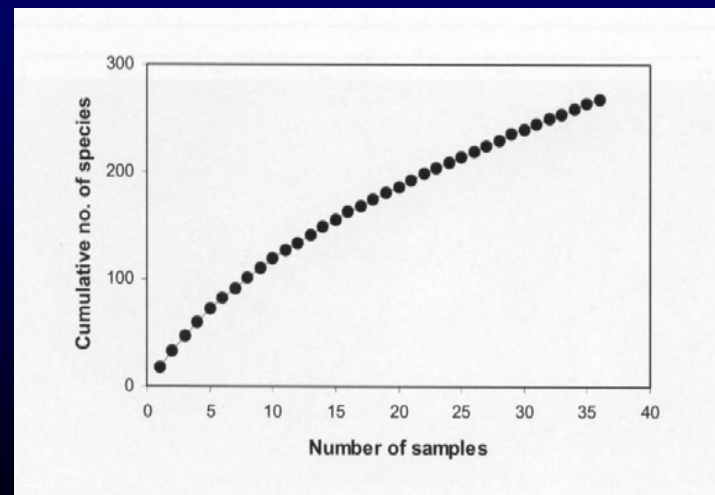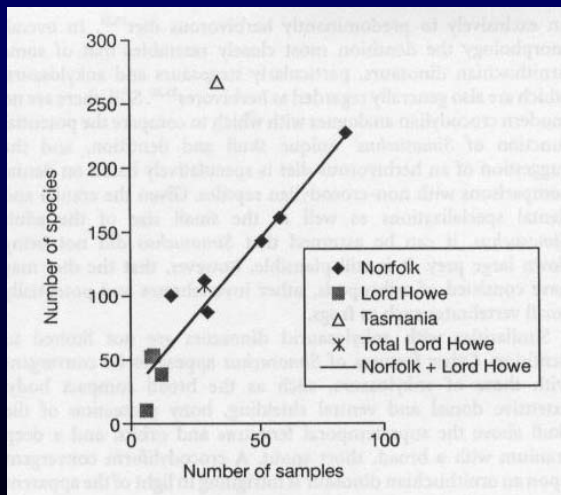
Seamount variability

- Seamounts cover a wide range of:
  - Locations
  - Depths
  - Oceanographic conditions
  - Substrate types
  - Geological activity

- **Variability** is probably more characteristic than generality
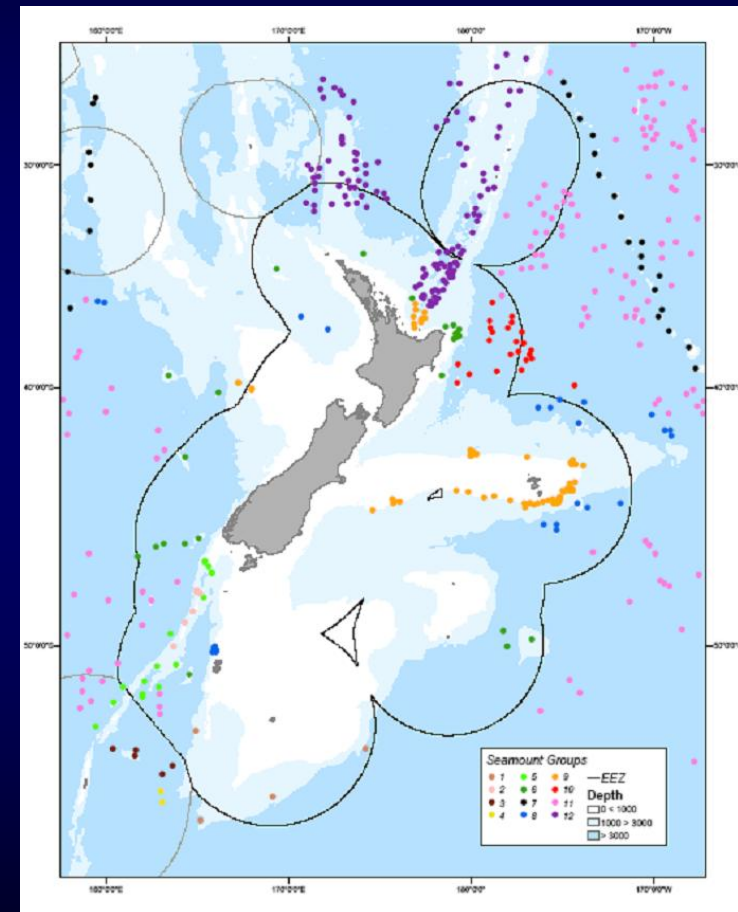
NZ physical classification from Rowden et al 2005

What does CenSeam intend to do?

- Coordinate existing and planned programs where appropriate, and ensure that opportunities for collaboration between programs are maximized

- Catalyze new seamount expeditions and sampling activities

- Promote data management, integration, and analysis of existing and new information on a global scale

- Encourage public education and outreach

Coordinate and expand research

- Standardized methods and data reporting (Working Group established)
- Forum for seamount researchers
- Work with established programmes like OASIS, New Zealand, New Caledonia, Alaska, New England etc
- Minigrants to expand involvement, work up old samples/data etc

Current research programmes
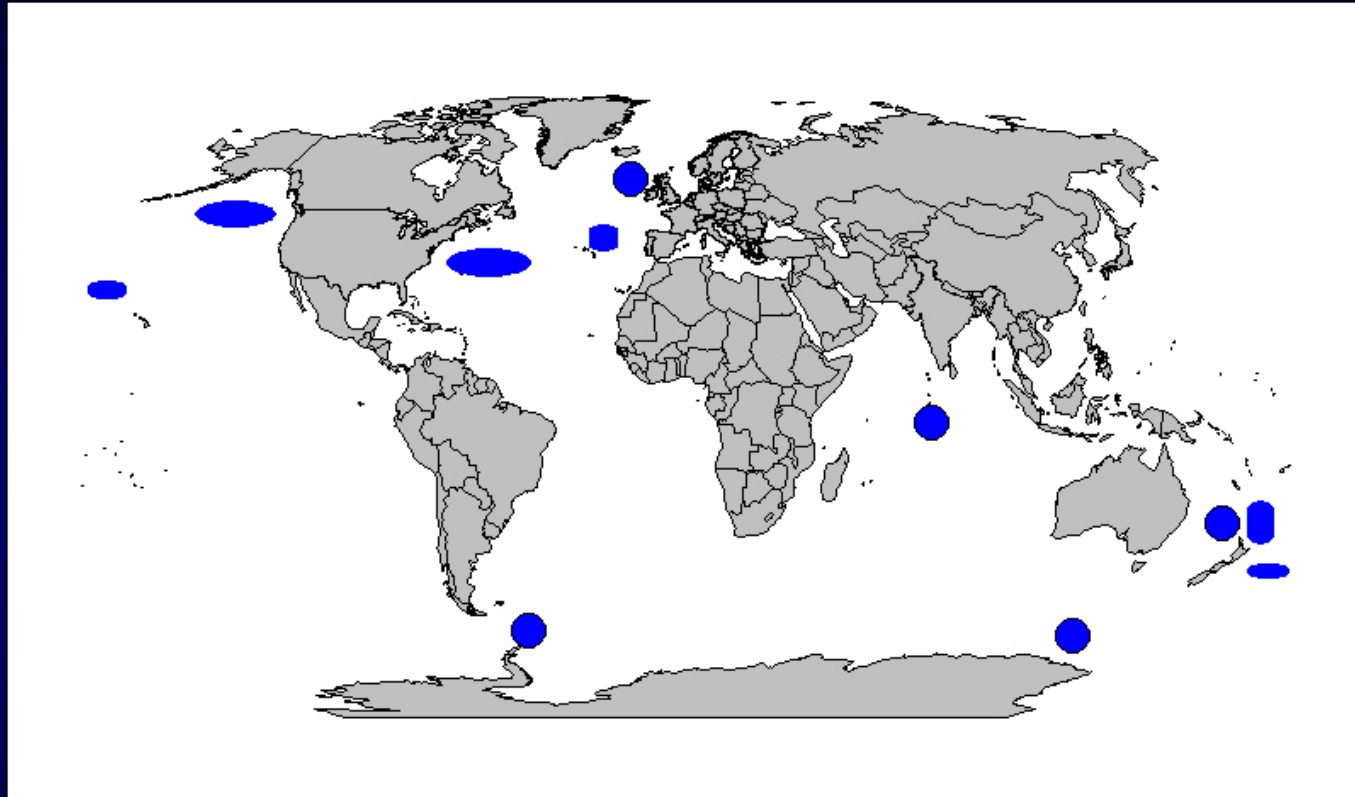
- Links established with all of these
- Information collated on sampling gear, design, data
- List of seamount taxonomic expertise compiled

2005 Seamounts workshop

- In conjunction with meeting to discuss Blackwells Seamount Book
- Establish CenSeam organisation and networks
- Support publication of the book
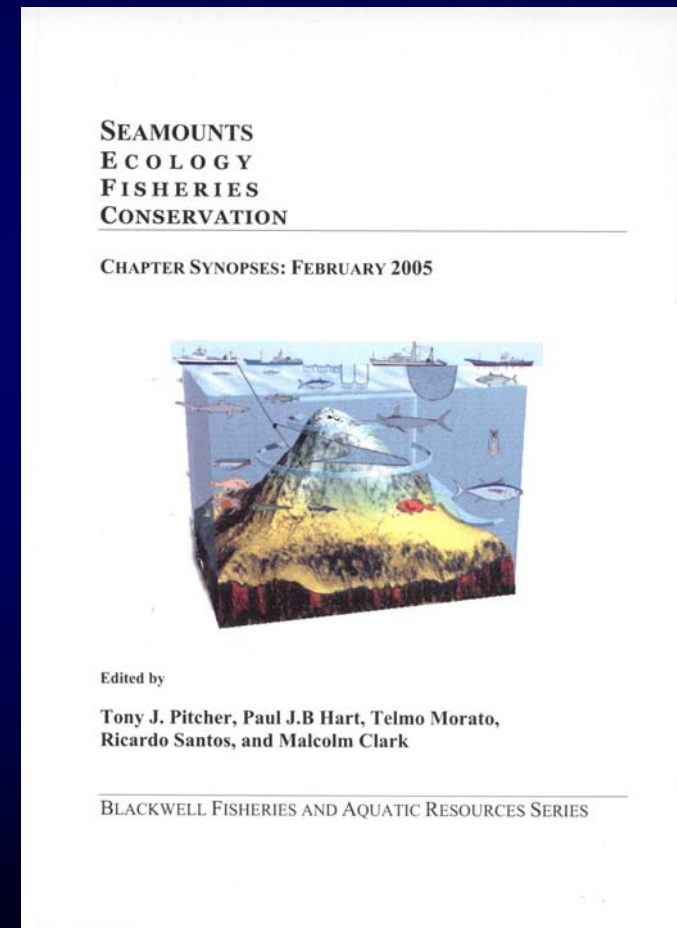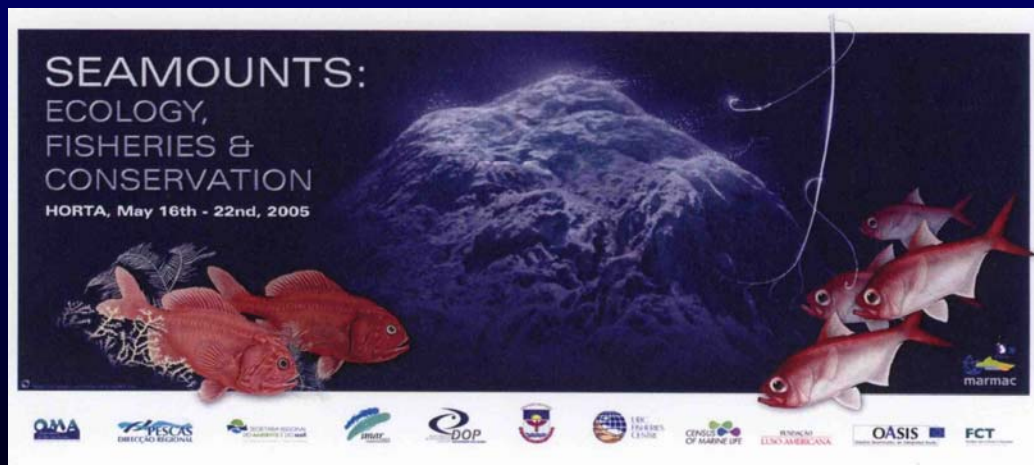
Foster new expeditions

- Determine major gaps in seamount data and areas surveyed

- Discuss objectives and methods between seamount researchers

- Proposal planning support
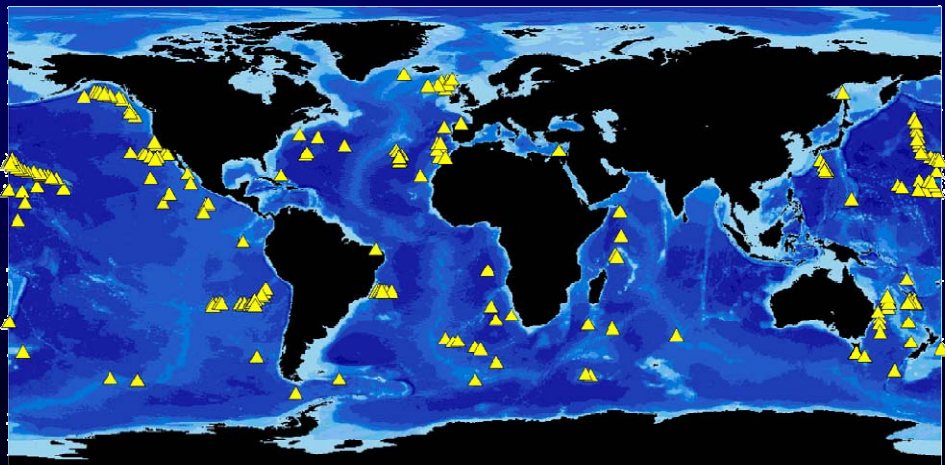
Priority areas for future surveys

Southern Pacific Ocean

Southern Indian Ocean
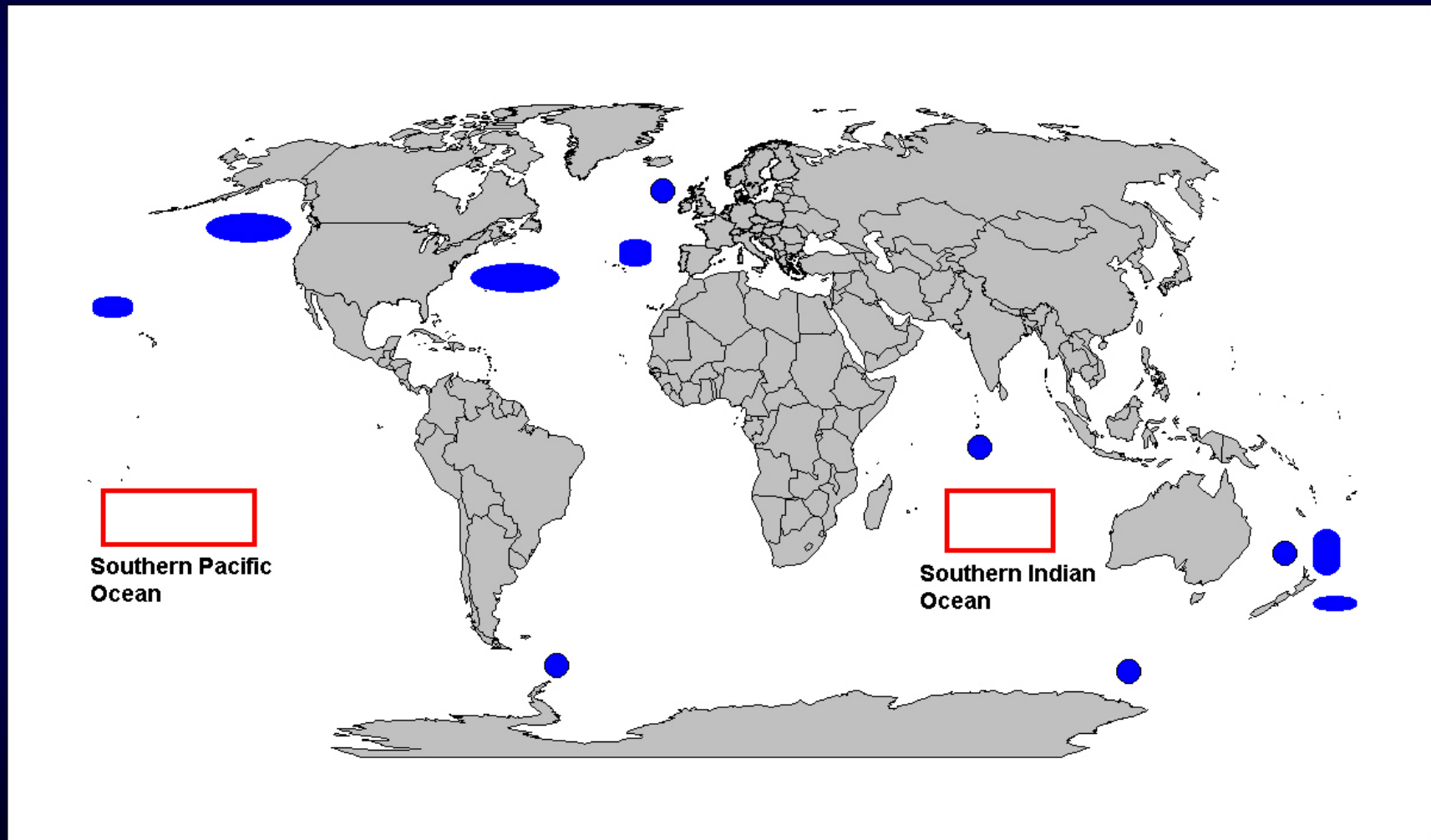
CenSeam survey associations

- Antarctic region (Scott seamounts), NZ Feb 2006

- East New Zealand, seamount biodiversity & impacts of fishing, NZ May 2006

- Central-Western Pacific, GEF/IUCN/DOQ, 4 months from Jan-Apr 2007
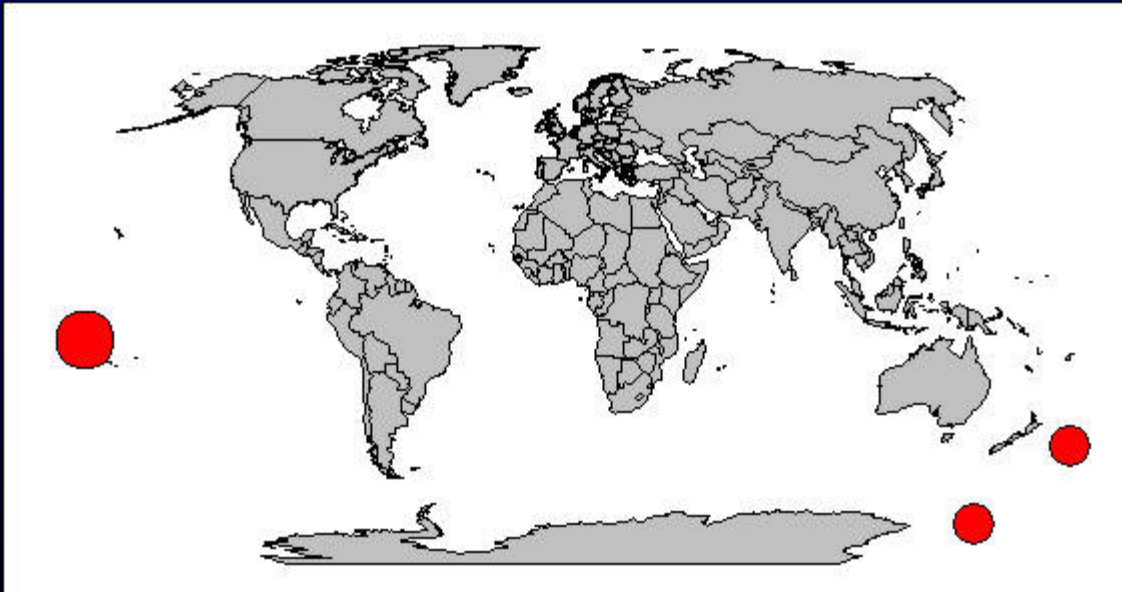
Data management and analysis

- Expand global Seamount database and information systems

- Minigrants for data digitization, taxonomic checks

- Comprehensive global data analyses towards end of program (Working Group established, currently active work on corals-seamounts-fishing)
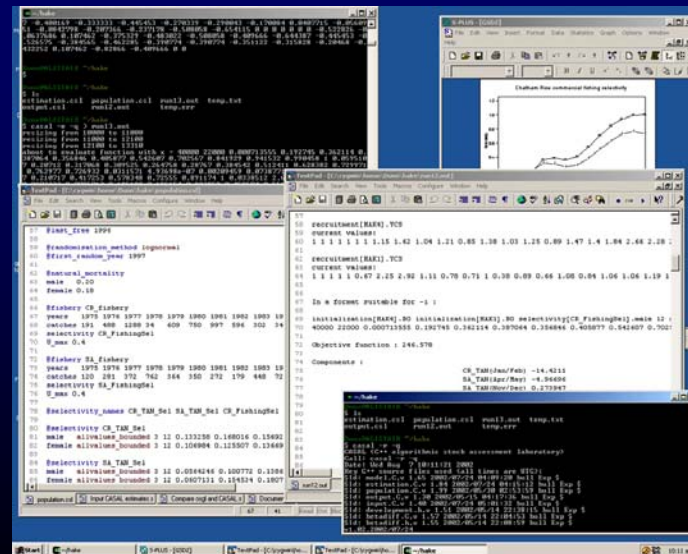
Good progress to date

- Data Analysis Working Group established, meeting planned for in January, in association with work on seamount corals for Netherlands Govt (IOC, CBD, UNEP to feed into UNGA discussions)

- ISA-sponsored workshop of DAWG (and wider group) to consider seamount biodiversity in relation to human impact. Jamaica, March 2006

- Seamounts OnLine is being expanded (wider range of data), and new data made available through CenSeam-associated programs (e.g. NZ data)

- Grants being considered for variety of tasks (e.g. work-up of old samples, getting data in electronic format, online taxonomic guides, add-on survey participation and analysis).

Impacts of mining/fishing

- **Direct physical effects**
  - Alteration of physical structure of the seafloor
  - Mortality of infauna
  - Mortality of epifauna, especially benthic invertebrates
- **Indirect effects**
  - Sediment resuspension
  - Change in chemical composition of substrate
  - Waste products discarded
- **Impact on the seamount ecosystem**
  - Faunal composition
  - Relative abundance of species
  - Structural complexity changes
  - Size/age structure
  - Overall drop in system productivity

ISA workshops

Deep-Seabed Polymetallic
Nodule Exploration:
Development of Environmental
Guidelines
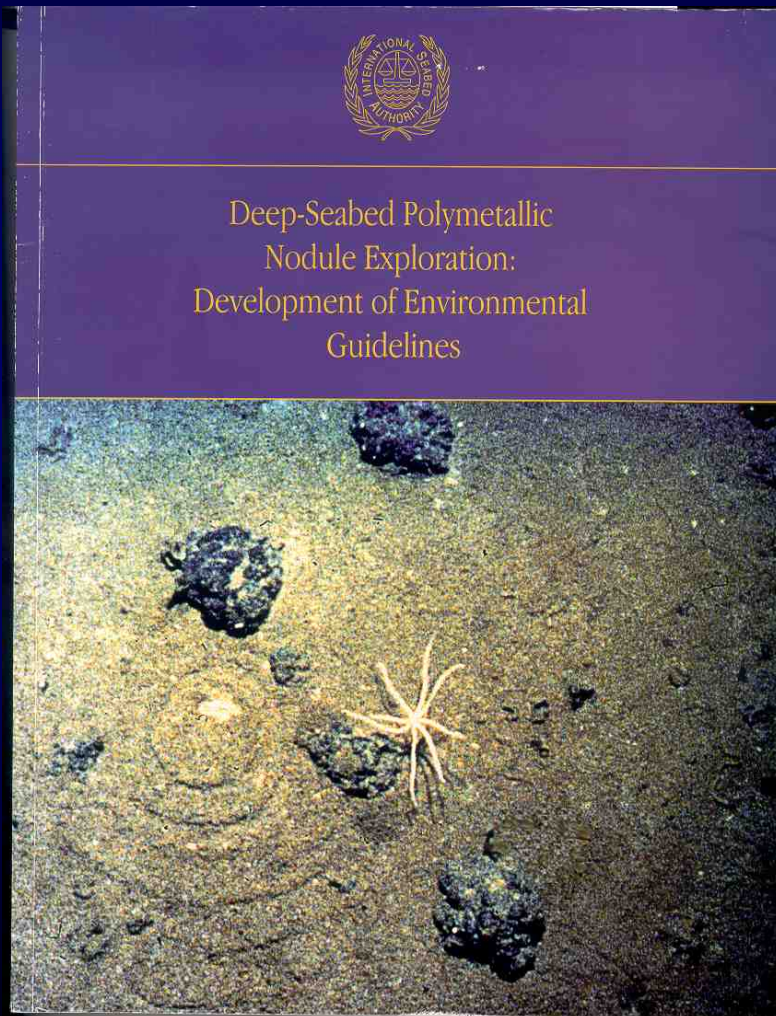
Workshop For The Establishment Of Environmental
Baselines At Deep Seafloor Cobalt-Rich Crusts And
Deep Seabed Polymetallic Sulphides Mine Sites In
The Area, For The Purpose Of Evaluating The Likely
Effects Of Exploration And Exploitation On The
Marine Environment

6-10 September, 2004
Kingston, Jamaica

AGENDA

International Seabed Authority, 13-20 Port Royal Street, Kingston, URL: http://www.isa.org.jm

What do we need to know...?

- **What is there?**
  - Biodiversity
  - Species abundance
  - Level of endemism
  - Special characteristics (e.g. slow growth)

- **What are the effects of the mining operation?**
  - Type of effects of the mining method
  - Spatial scale of disturbance
  - Temporal scale-Longevity of effects
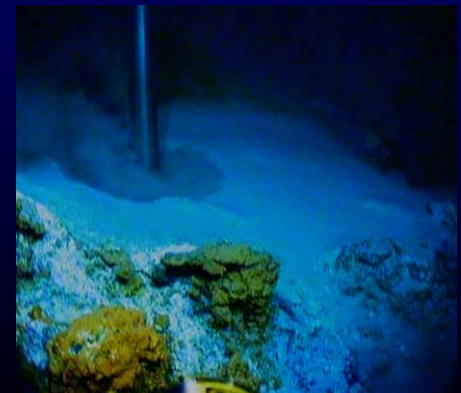
What do we need to know (cont)

- **What is the impact on the habitat?**
  - Effect on fauna
  - Effect on geology
  - Effect on ecological processes

- **How can this impact be managed?**
  - Area of mining
  - Method of mining
  - To ensure biodiversity/productivity of seamount system is maintained
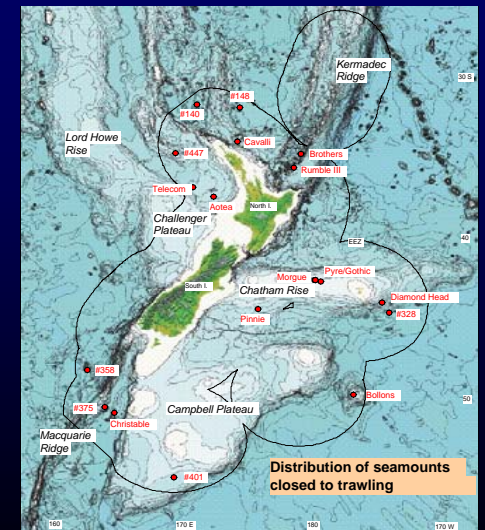
What can CenSeam do…?

- Biodiversity

  – Compilation of existing global biodiversity data

  – Collection of new samples and data

  – Result in improved information on faunal composition, and seamount community structure and function

  – This workshop is an important contribution to this process.

What can CenSeam do (2)

- Data and databases

  - Sampling and data protocols established for global consistency
  - Expansion of existing databases (SeamountsOnline, OBIS)
  - Data exchange (e.g. incorporate geological data from ISA, EarthRef, db). Physical data critical for biodiversity
  - Robust and consistent analyses on global datasets
  - Predictive capability on fauna and effects

What can CenSeam do (3)

- Communication

  - Linkages with other CoML programmes with similar objectives in various habitats (e.g. ChEss, MarEco)
  - Linkages with National Programmes on biodiversity and human impacts
  - Increased multidisciplinary approach
  - Input of experts into Environmental guideline preparation
  - Provision of information and advice into management
  - Ultimately help achieve exploitation and conservation

By 2010….

1) Fostered a stronger seamount research community, and greater cooperation and collaboration

2) Progressed more globally representative sampling of seamount types and locations

3) Answered some of the key science questions through the improved data- although much will remain unknowable

4) Contributed scientific information to inform management and conservation of seamounts

Acknowledgements

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http://censeam.niwa.co.nz