

SHRIMPING with TOBI and BRIDGET

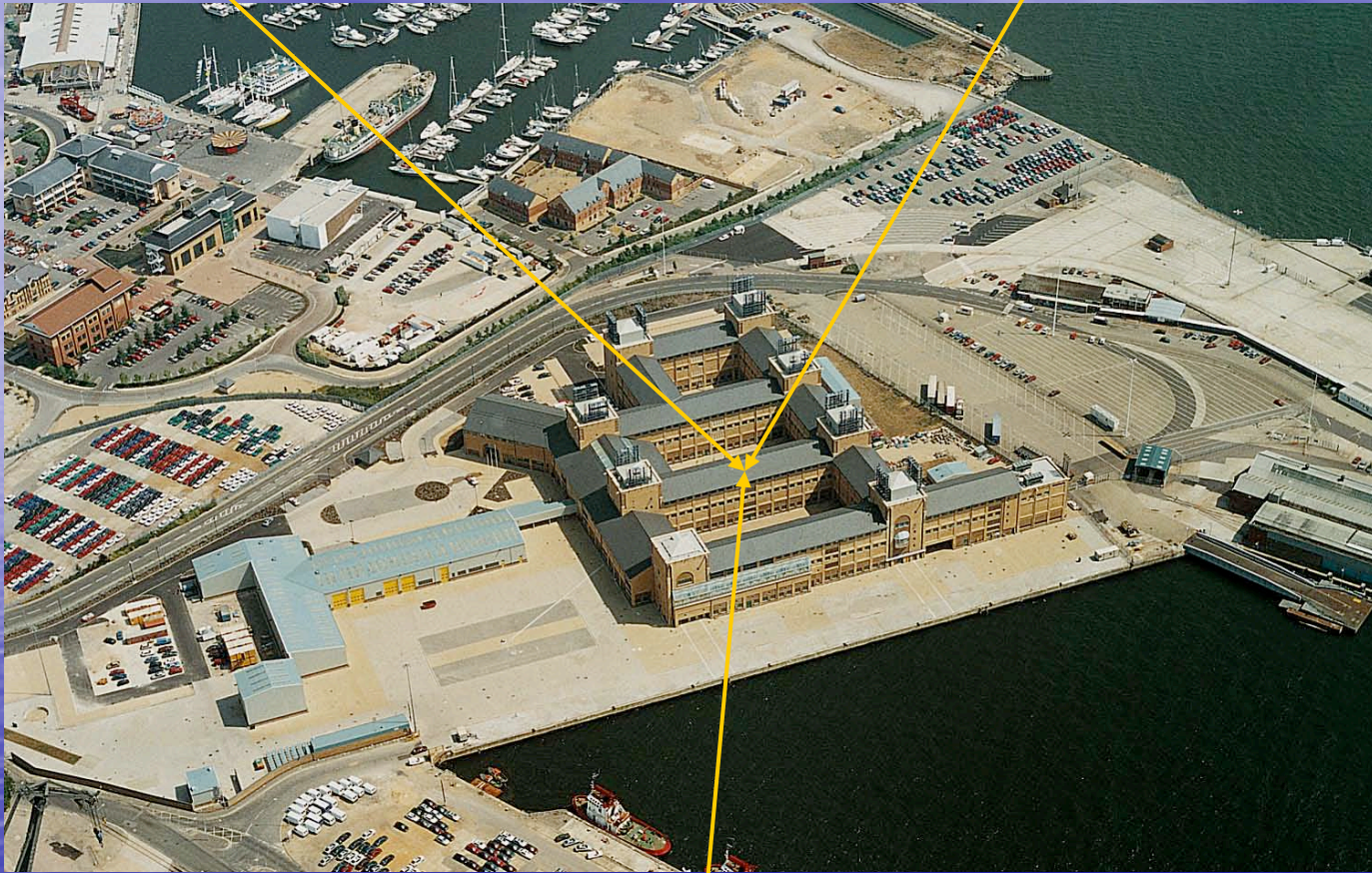
An overview of the Deep Platforms Group at the
National Oceanography Centre, Southampton
(NOCS), UK

Ian Rouse

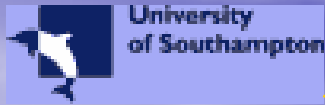
Head Deep Platforms Group

Research Vessel Base,
Barry

Institute of Oceanographic Sciences,
Wormley



Departments of Oceanography and Earth Sciences,
University of Southampton



University
of Southampton



NATURAL
ENVIRONMENT
RESEARCH COUNCIL



**National Oceanography
Centre, Southampton**

UNIVERSITY OF SOUTHAMPTON AND
NATURAL ENVIRONMENT RESEARCH COUNCIL



Scientific Research

Teaching

National Facilities

National Marine Facilities Division



Sea Systems

Programme planning :
Cruise programme
Project management

Ships :

RRS Discovery

RRS James Cook

Scientific/Engineering :

Deep Platforms

Sensors & Moorings

Ship Systems

IT:

Equipment database
Equipment tracking

Underwater Systems

Laboratory

Core Repository

International

Project Offices

RRS James Cook

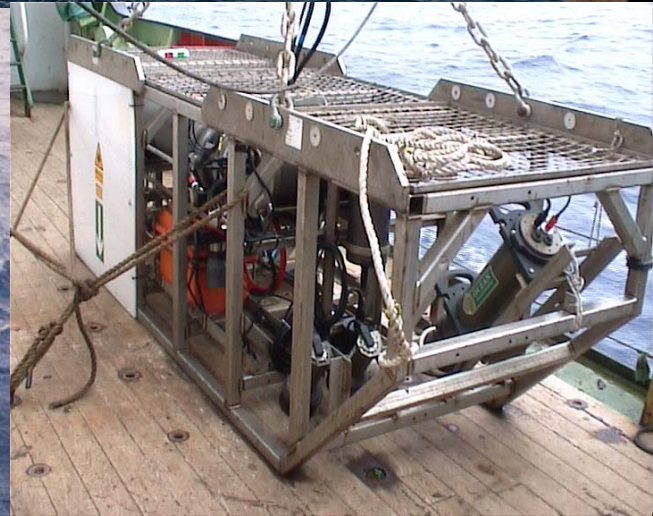
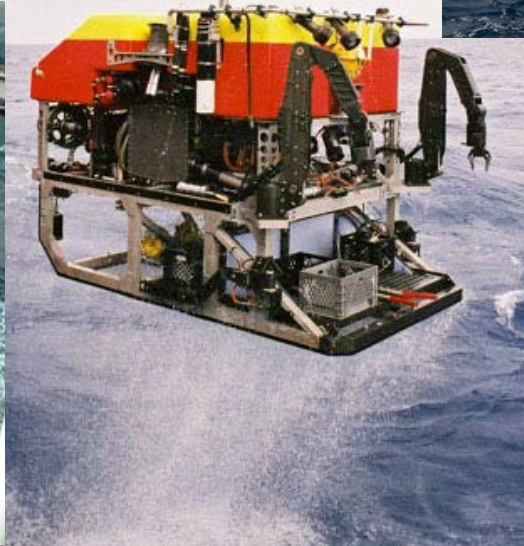
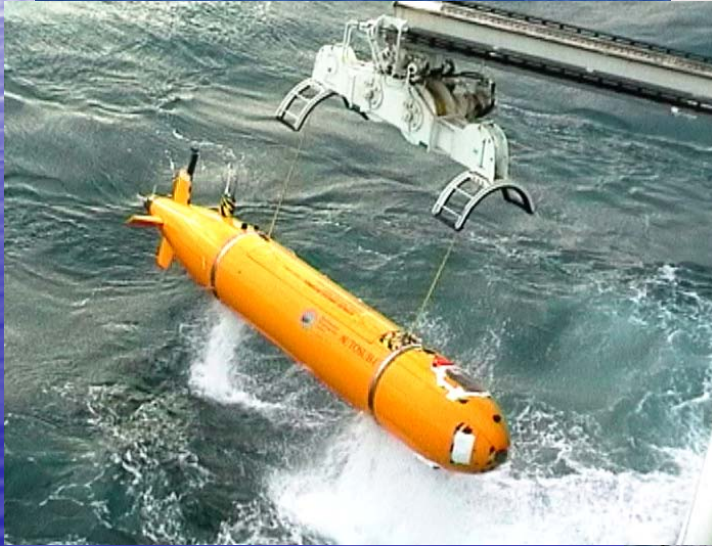


Discovery replacement

RRS Discovery



Deep Platforms Group Vehicles



TOBI- Towed Ocean Bottom Instrument

- Developed in mid-eighties at IOS
- First scientific cruise in 1990
- Designed as a deep-water multi-instrument platform
- Combines sidescan, profiler and bathymetry sonars along with other scientific instruments

TOBI World-wide operations



Marion Dufresne - Indian Ocean



Urania - Tyrrhenian Sea



JCR - South Georgia, Antarctica



Sonne - Pacific Coast of Costa Rica

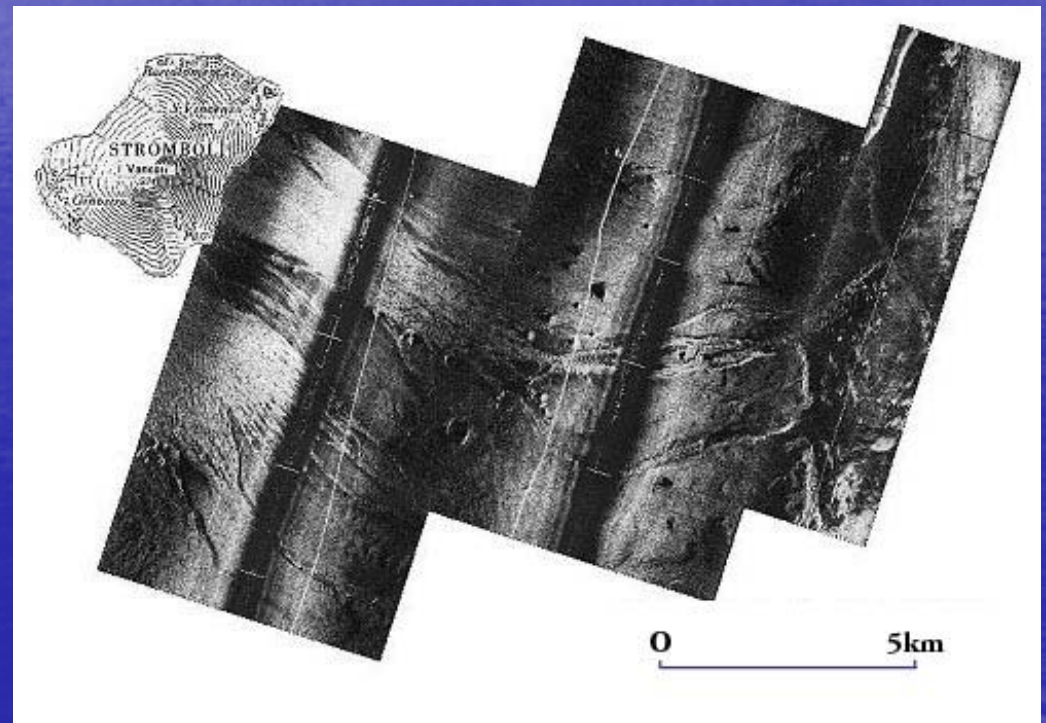
TOBI Instrument compliment

- 30kHz sidescan sonar
- 6 - 10kHz chirp sub-bottom profiler sonar
- Tri-axial flux gate magnetometer
- CTD
- Gyrocompass
- Swath bathymetry capability
- Two-bodied tow system for stability
- Light scattering sensor string/ MAPR string

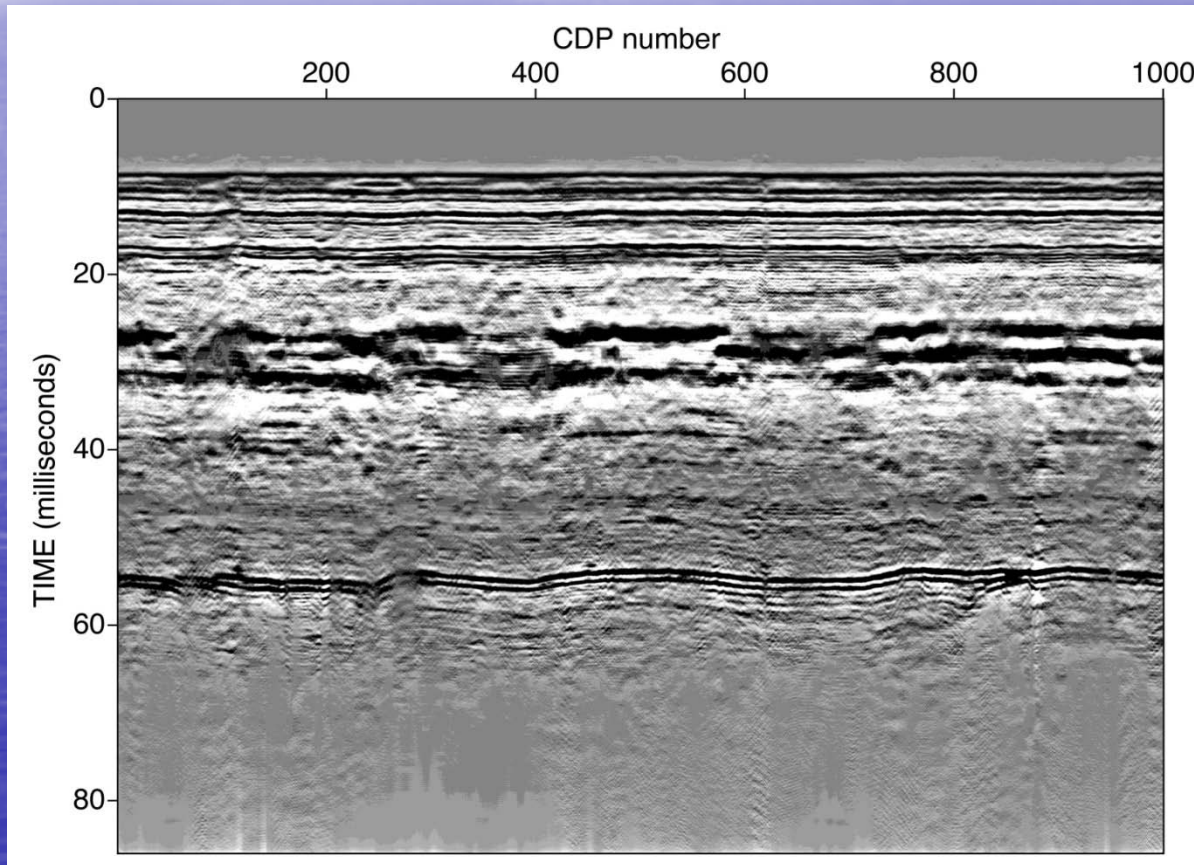
TOBI Modes of Operation

- Full survey mode – lawnmower
- Exploration mode – follow interesting features, signals etc.
- Work area reconnaissance

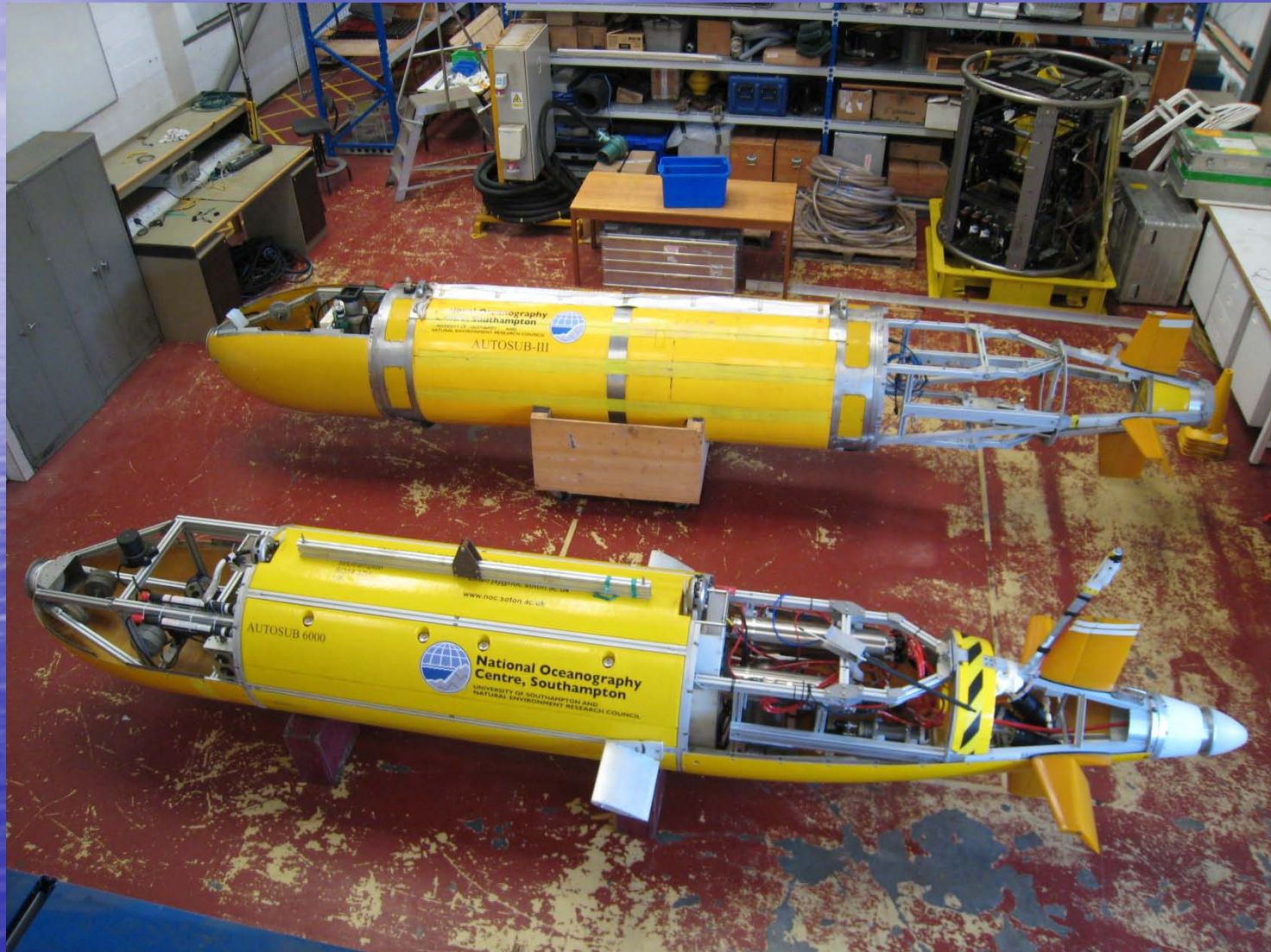
TOBI Sidescan images



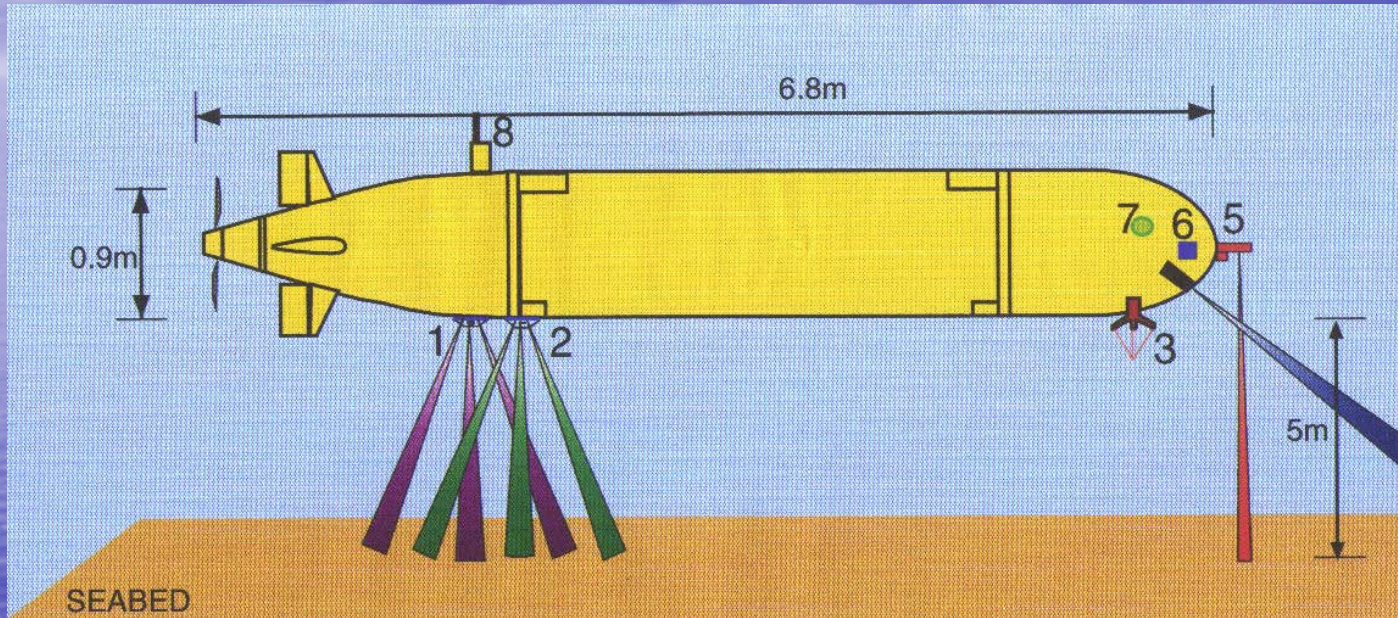
TOBI Chirp profiler



Asub3 & Asub6000



Autosub basic sensor compliment



1. ADCP - 1200KHz (3-D nearbed flow @ 1Hz with 10cm vertical resolution).
2. ADCP - 300KHz (Vehicle bottom tracking used for navigation).
3. ADV Ocean (point 3-D flow measurement @ 16Hz).
4. Forward-Looking Sonar (bathymetry and terrain-following navigation).
5. DopBeam (1.75MHz single axis, pulse-to-pulse coherent Doppler measuring axial flow velocity with sub-cm resolution, measuring flow along its axis; these will be used to estimate the turbulence spectra on the space domain).
6. CTD and Transmissometer sensors.
7. Pressure sensor (depth).
8. GPS Antenna (position fixing when surfacing)

AUTOSUB-1

Replaceable propeller blades.....

Control surfaces.....

Vehicle control packages.....

GRP panels.....

Foam Buoyancy.....

GFRP Pressure vessel.....

Length - 7m
Diameter - 0.9m
Air weight - 1500kg

.....GPS antenna, Modem

.....Light, RDF, Argos, DGPS

.....Emergency abort

.....ADCP

.....Altimeter

.....Scientific instrumentation

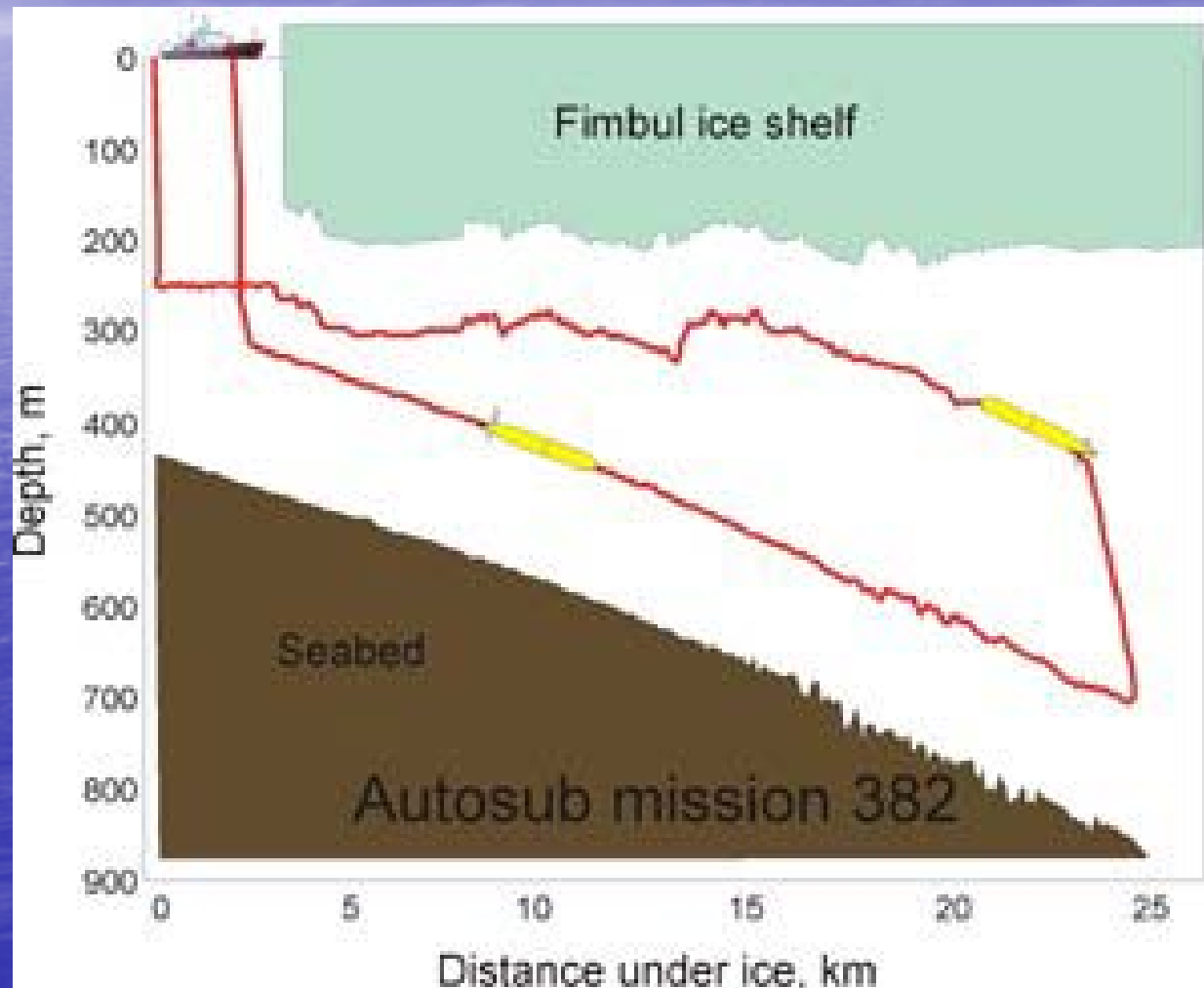




Autosub Digital photography

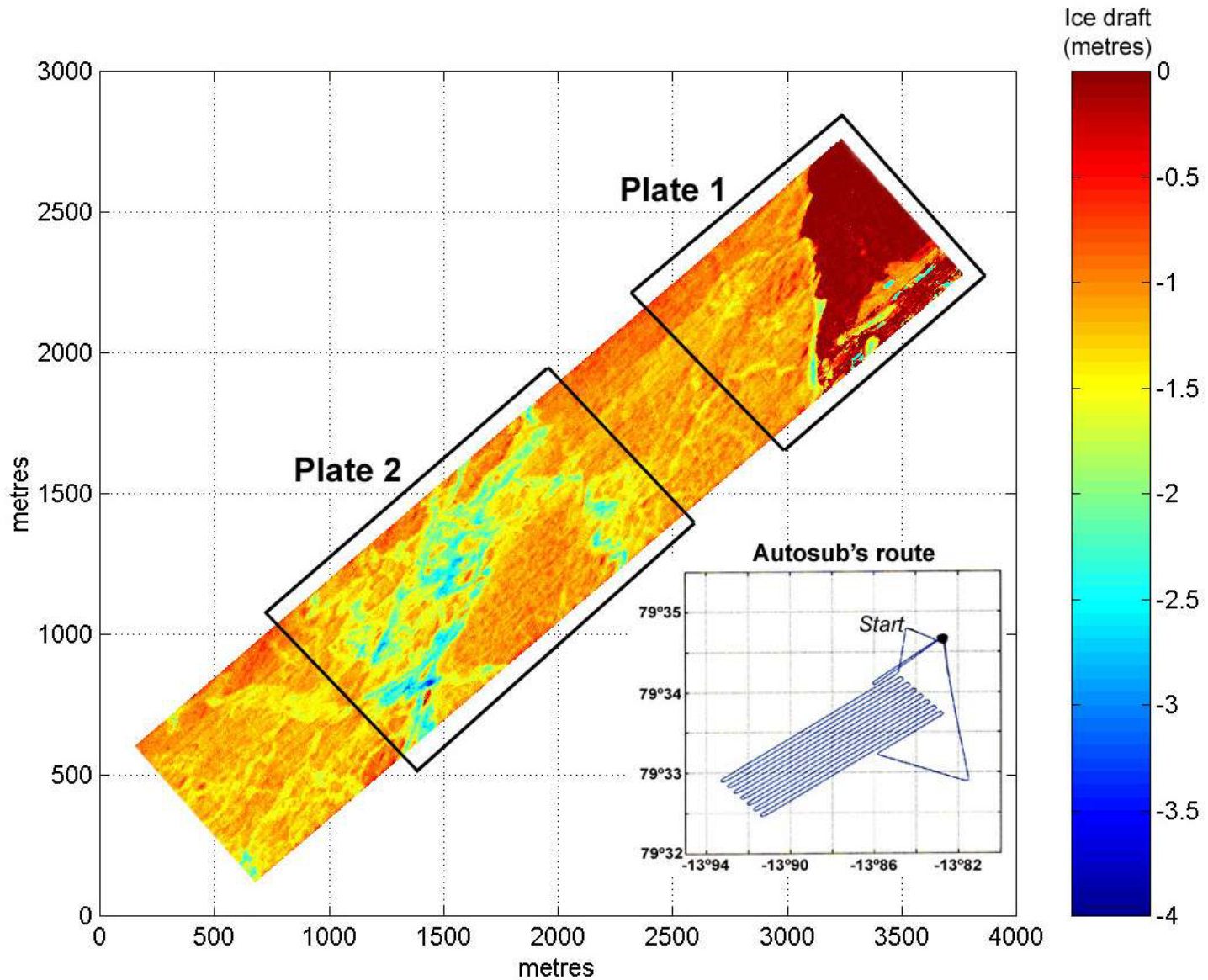


Autosub Under ice mission

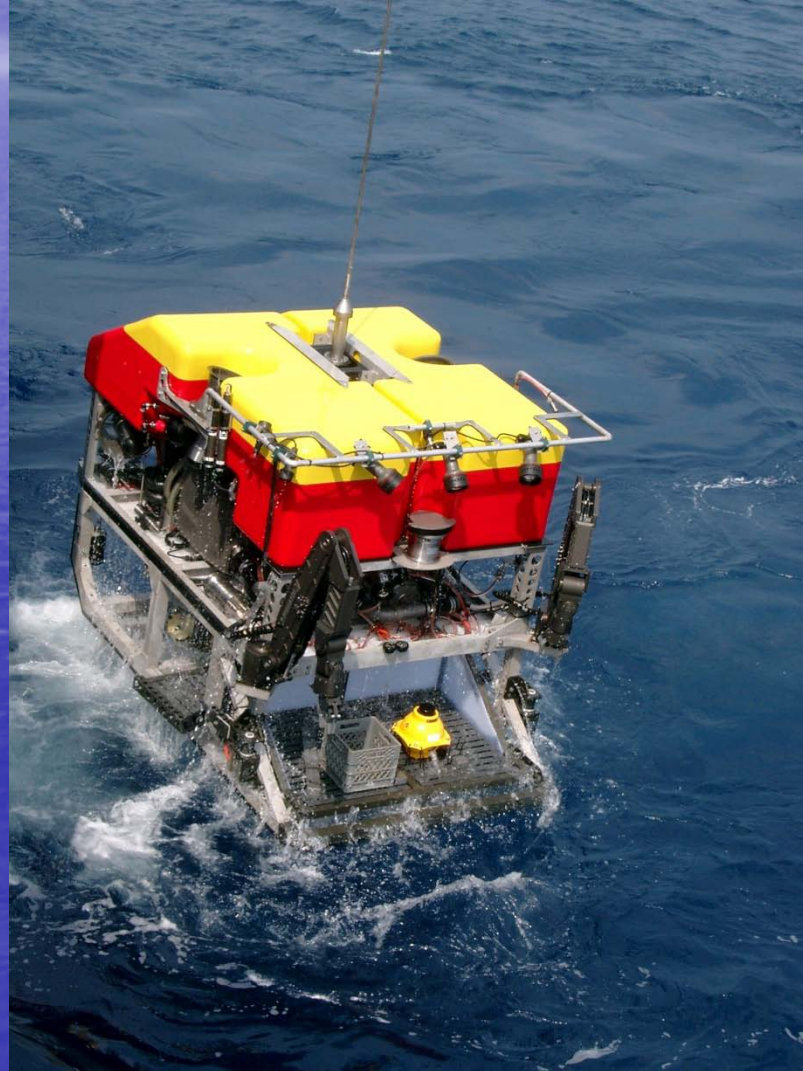


Mission 367

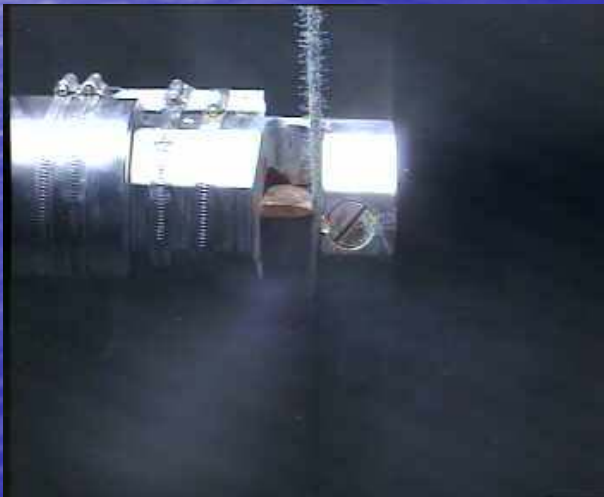
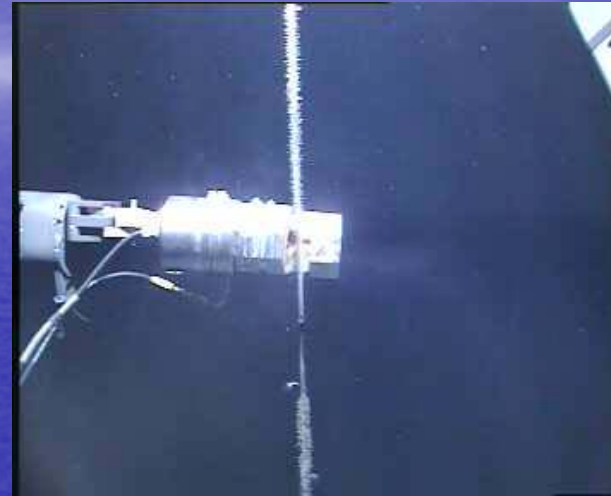
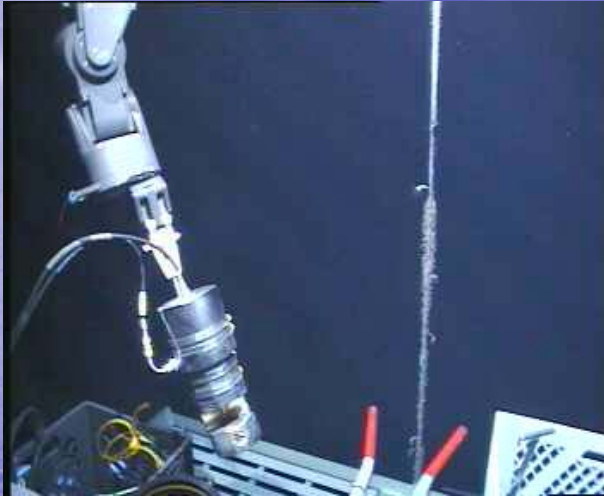
Scanning the underside of landfast ice using EM2000



Isis ROV



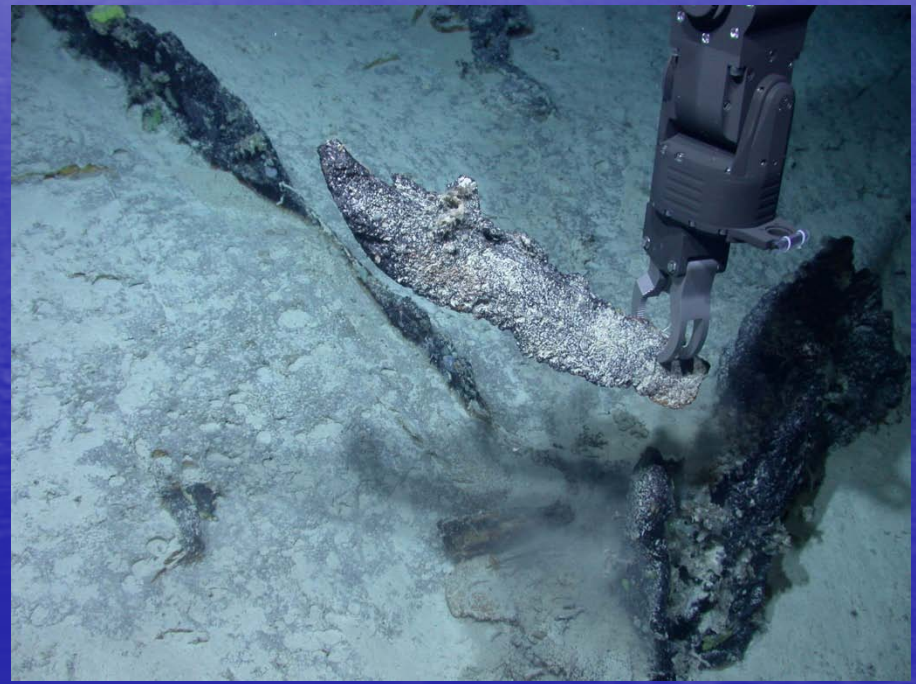
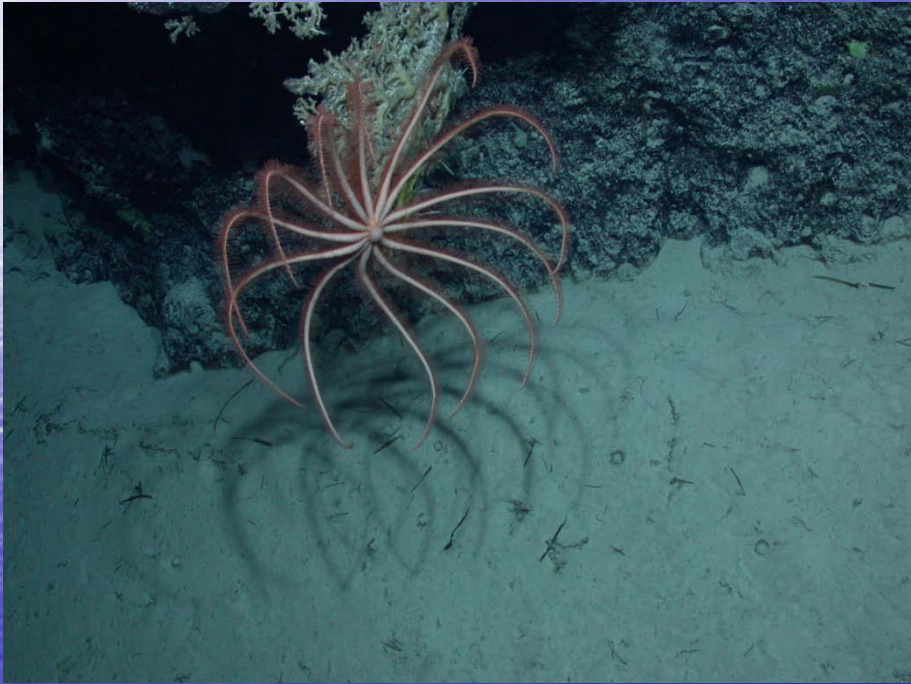
Isis Recovery of stuck moorings



Isis control room



Isis photography and sampling



SHRIMP – Seafloor High Resolution Imaging Platform



SHRIMP on the deck of RRS Discovery

System Specification

Vehicle:

Dimensions 2.5x1.0x1.0m (ltxhw)

Weight 1T in air

Depth rating 6000m

Power Supply 1500Vac @ 2A max

Cameras:

Colour Video Simrad CCD

B&W Video Simrad SIT

Stills Ocean Instrumentation Ltd M7

Lights:

Video 2 x Deep Sea Power & Light 400W HID

Stills Ocean Instrumentation Ltd F1200 Flash

Instrumentation:

Optical Scale 3 x C-Map Systems 10mW laser

Heading +

Pitch/Roll AOSI EZ-3 compass

CTD AML Smart CTD

Altimeter Simrad Mesotech 808-A 200m range

Telemetry:

Fibre-optic Focal 903 multiplexers, video plus RS-232

Video recording:

DVD Sony GXR3 and GXR7 DVD recorders

Hi-8 Sony EV-S9000E

Data recording:

Instruments Onto computer hard drive in ASCII text format



SHRIMP deck components – from l to r: 1500Vac power supply, Recording and monitoring equipment rack, Fibre-optic multiplexer.

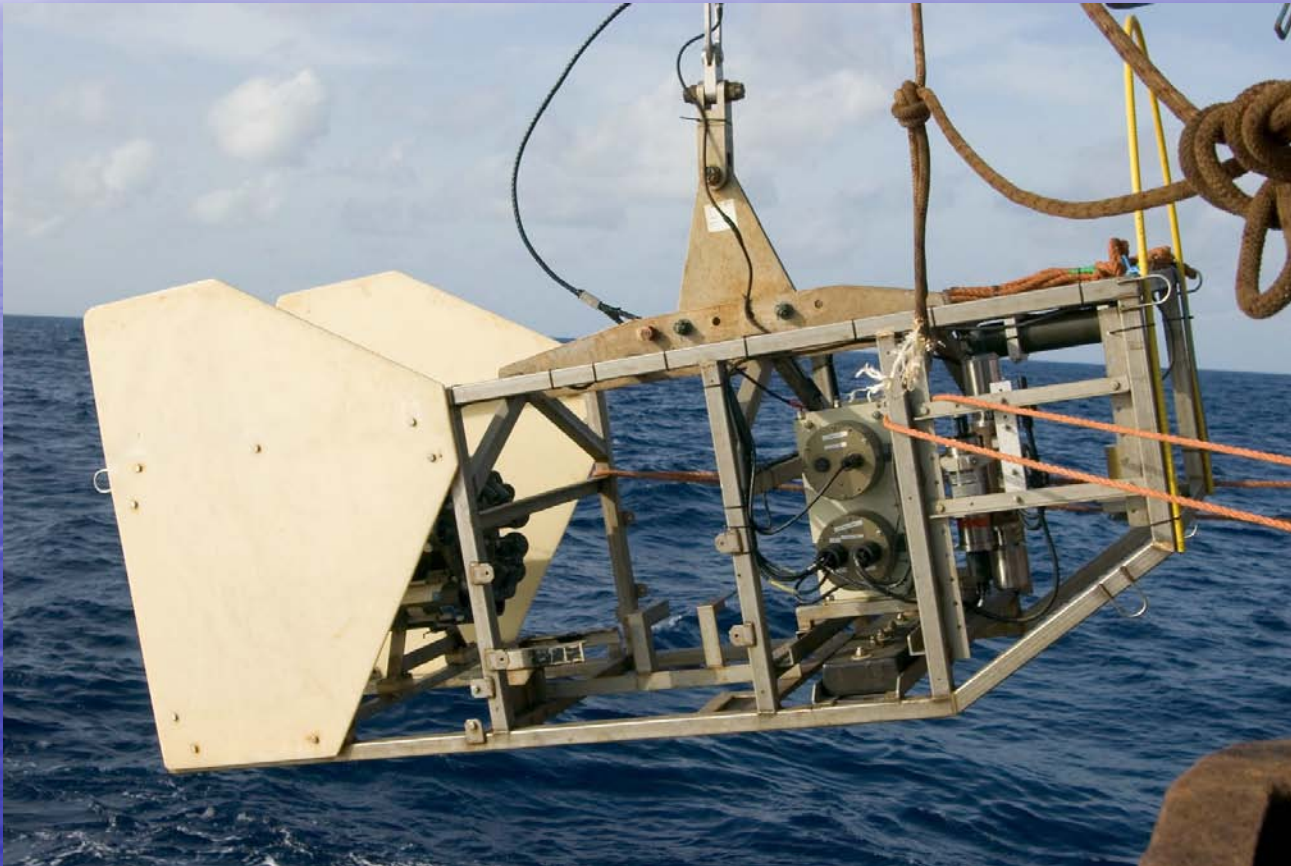


SHRIMP being deployed from RRS
Discovery during cruise D281T



Close-up of the SHRIMP vehicle lighting gantry

BRIDGET Chemical sensor vehicle



BRIDGET specification

- 12 bottle water sampling rosette
- CTD
- Nephelometer
- Mn and Fe sensors
- Transmissometer
- Light scattering sensor
- Vehicle attitude and altitude

Future Developments

- Autosub 6000
- TOBI Swath Enhancement
- Gliders
- Low Frequency Profiler

Autosub 6000

- 6000m depth capability
- 300km range
- Lithium ion polymer power source
- Improved hydrodynamics
- Improved mechanical efficiency

New TOBI

- Multibeam to give co-registered data set
- Reversed USBL navigation
- Fibre-optic telemetry
- Improved vehicle sensors

Deep-towed low frequency profiler

- Designed to profile through 'hard' acoustic surfaces such as sand
- 1 – 4 kHz plus extension to 10kHz
- Vehicle based on Mini-TOBI design
- 6000m depth rating

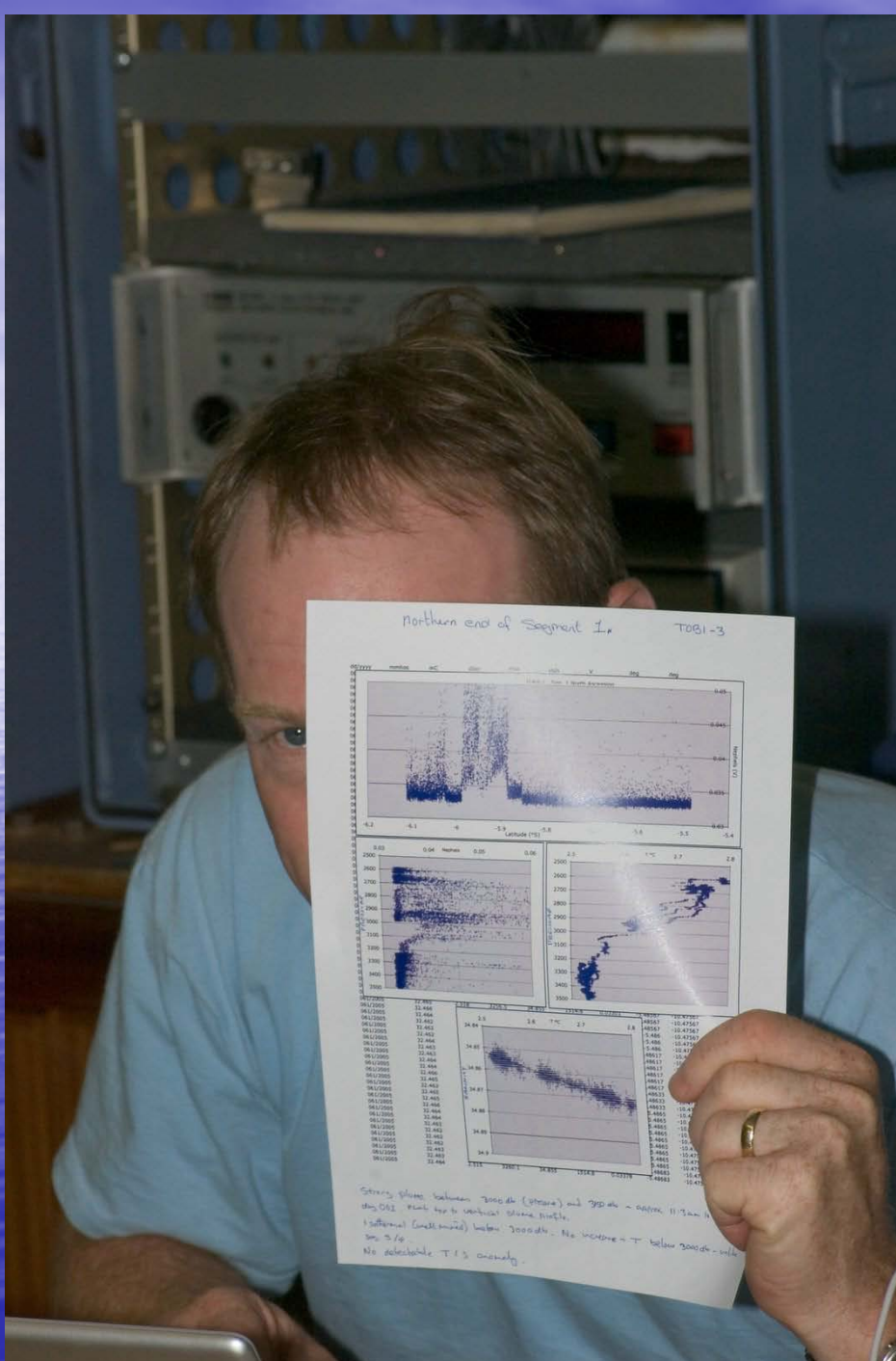
Structure of the Deep Platforms Group

- Currently 10 staff plus 2 vacant posts
- Budget ~€1M plus capital bid
- 5 mechanical 7 electronic/computer

Staff requirements for 24 hour operation

- ISIS – 8
- Autosub – 4
- TOBI – 3
- SHRIMP/BRIDGET - 2

Real Data!



Strong glass between 3000m (3000m) and 3500m - approx 11.3m/s
The O21 unit top to vertical sigma theta
1 internal (external) below 3000m. No moisture - T below 3000m - salt
see 2/3
No detectable T/S anomaly.