Towed Ocean Bottom Instrument (*TOBI*) : Upgrades for the 21st Century

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History

- First scientific use in January 1990.
- Completed over 50 cruises worldwide on 14 different research ships.
- The last significant upgrade in 1995 with the addition of a phase swath bathymetry sonar and a mechanical gyro.
- New NERC capital items scheme - ~£750K (1,400K USD / 1,100K Euros).

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Existing System

- 30 kHz side-scan sonar (in house).
- Phase array swath bathymetry, 30 kHz (in house).
- 6 – 10 kHz sub-bottom profiler (in house).
- SG Brown mechanical gyroscope.
- CTD, 3-axis magnetometer.
- Light scattering sensor.
- Other sensor suites – light, chemical……..

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Present TOBI

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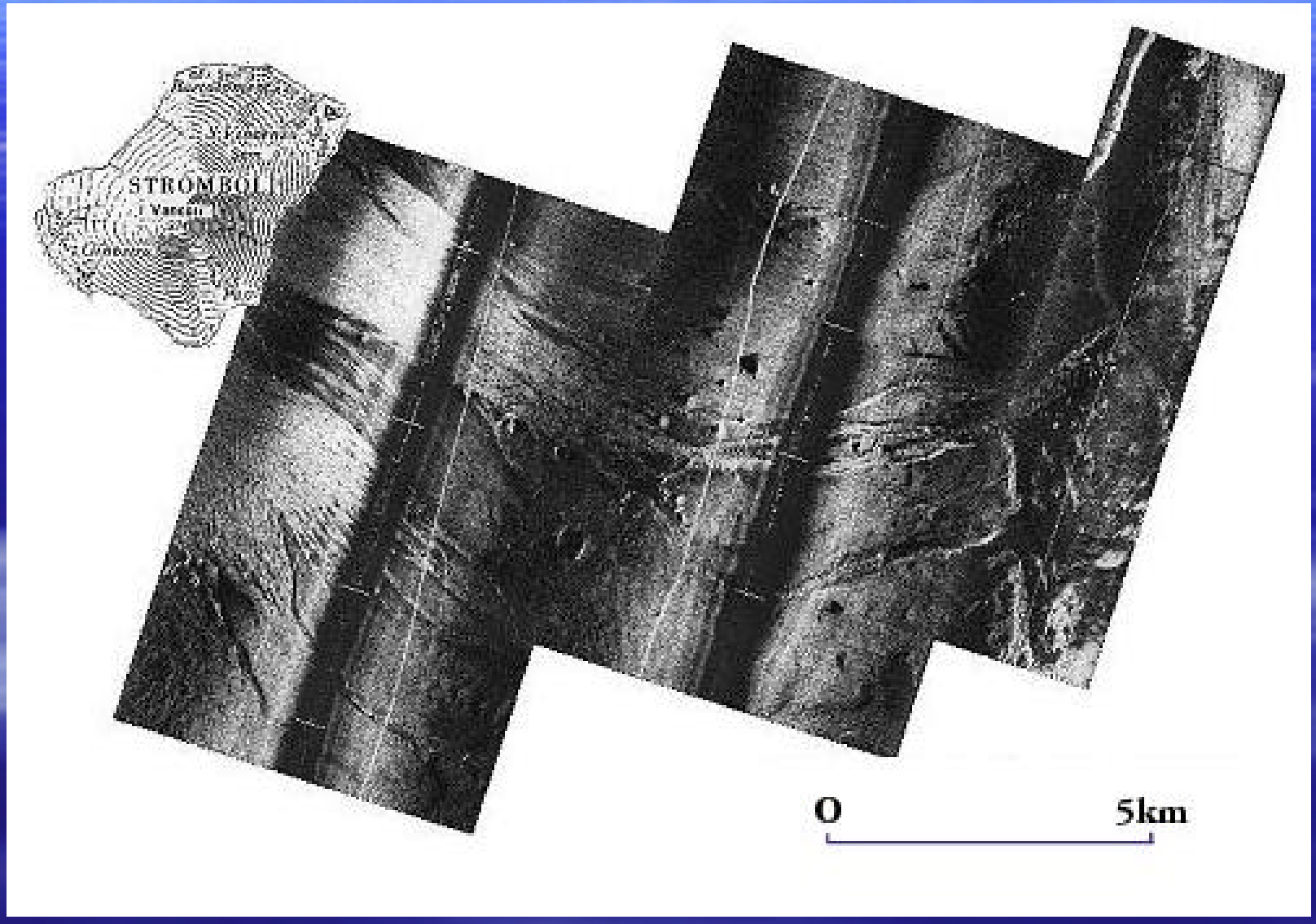
Mosaicing Side-scan



This Close

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New Specification

- 30 kHz side-scan (existing).
- 6 – 10 kHz sub-bottom profiler (existing).
- Inverted Ultra Short Baseline Navigation, iUSBL (new).
- Strap down fibre-optic (f.o.) gyroscope (new).
- Phased array / multi-beam system (new).
- Built-in self test and health check system (new).
- Fibre-optic telemetry (new).
- Auxiliary sensors – CTD, depth gauge, magnetometer, light sensors, chemical…….(existing / new).

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Telemetry and Data Logging

- 10 km, 3 power, 3 fibre (single mode) tow cable.
- 200 m umbilical, 3 power, 3 fibre (single mode).
- Handles higher data loading.
- Associated data multiplexers:
  - Modem with diagnostics, 1310/1550 nm.
  - 1 Gb Ethernet.
  - 4 x 10 Mb Ethernet.
  - 8 x RS232 / 8 x RS422.
  - 16 channel, 24-bit A/D converters.
- Real-time logging / display of bathymetric and digital data.

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New Systems – F.O. Gyroscope

- Fibre-optic gyros have superseded mechanical versions.
- Gyroscope provides full vehicle attitude.
- Provides pitch, roll and heave data.
- Greater accuracy, ruggedness and short ‘spin-up’ times (Minutes vs. Hours).
- Co-located with iUSBL system.
- 6000 m rated.
- Octans 6000.

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New Systems – Navigation

- Conventional systems not feasible (LBL, USBL) for deep-towed vehicles.
- Required area coverage (100s km) and long slant ranges (up to 10 km) are a problem.
- Inverted Ultra Short Baseline (iUSBL) system is being implemented with a wideband design.
- Accuracies: Range <10 m, Angular < 0.5 deg.
- 6000 m rated.
- Sonardyne iUSBL.
- Evening poster session for more details.

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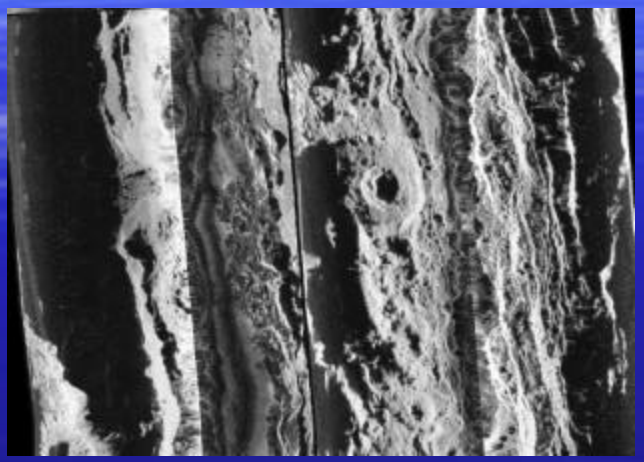
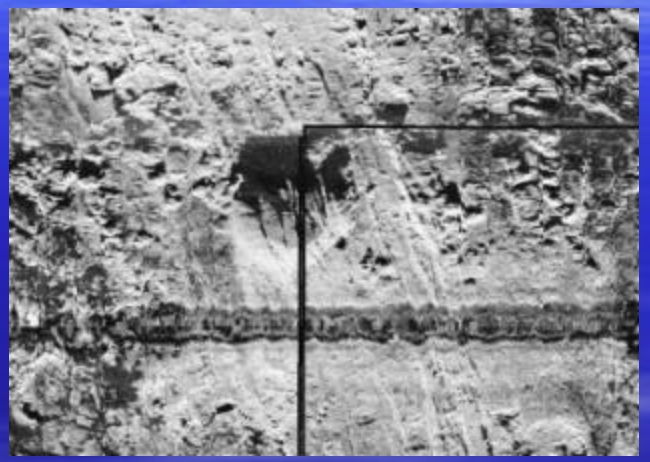
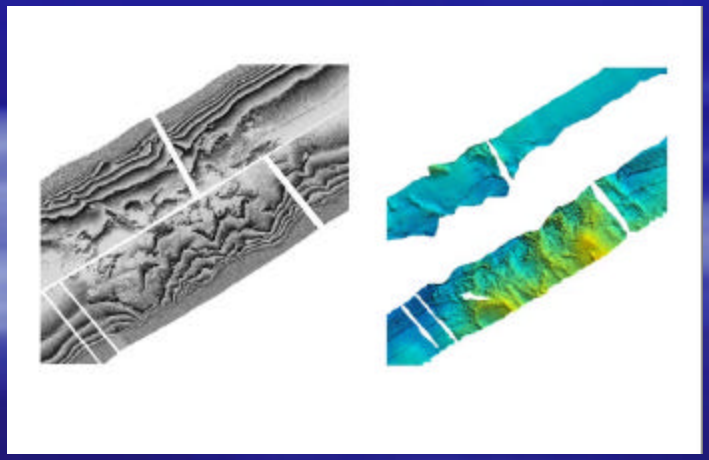
New Systems – Bathymetry

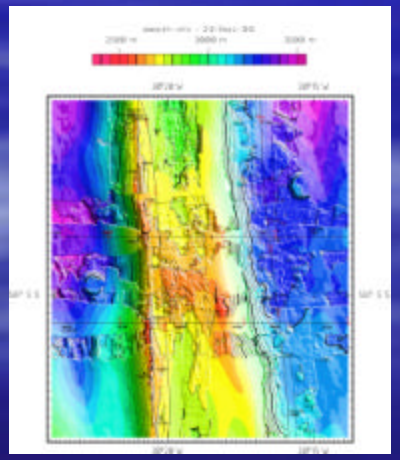
- Work with existing side-scan (0.8 x 45 deg.).
- Sub-bottom profiler performance important.
- Work at optimum ‘flying’ height (~400 m).
- Coverage 160 deg. or better, 3000m slant range.
- Resolution: 2 deg. along track or better.
- Ideally 3 m long x 1.1 m wide & max. 80 kg in water.
- Expected frequency in range 40 – 50 kHz.
- 6000 m rated.
- Phased array / multi-beam sonar options in discussion.

Typical Deliverables









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Future Enhancements

- Lots of data bandwidth available.
- Multi-beam – fill in nadir.
- Others ?

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