Fugro Services:
Marine Expertise and Experience in Hydrography

Presentation for the
Hydrographic Committee on Antarctica

Don Ventura, Fugro Pelagos Incorporated

11 October 2012

Company Profile

Fugro provides the **people, equipment, expertise and technology** that support the exploration, development, production and transportation of the world's natural resources.

Resources

14,000 Employees

70 Vessels

75 CPT Trucks

27 Laboratories

29 Jack-up Platforms

60 Aircraft

250 Land-based Drill Rigs
17 Offshore Drill Rigs

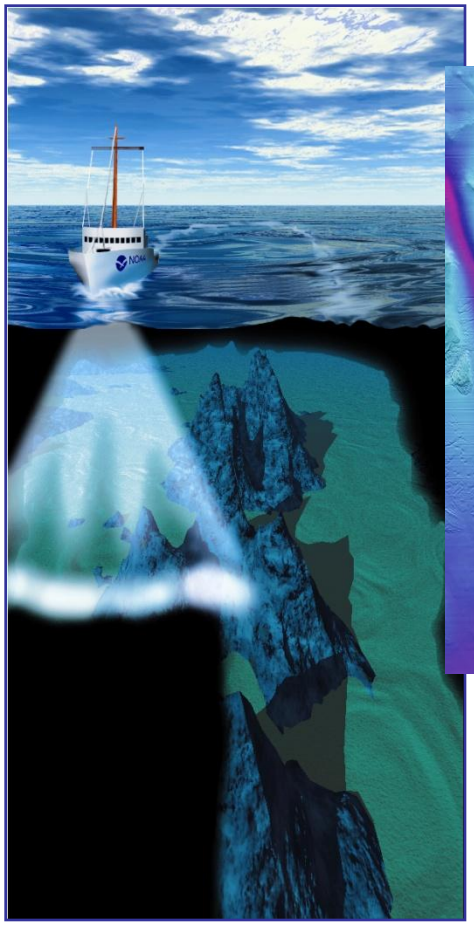
151 ROVs

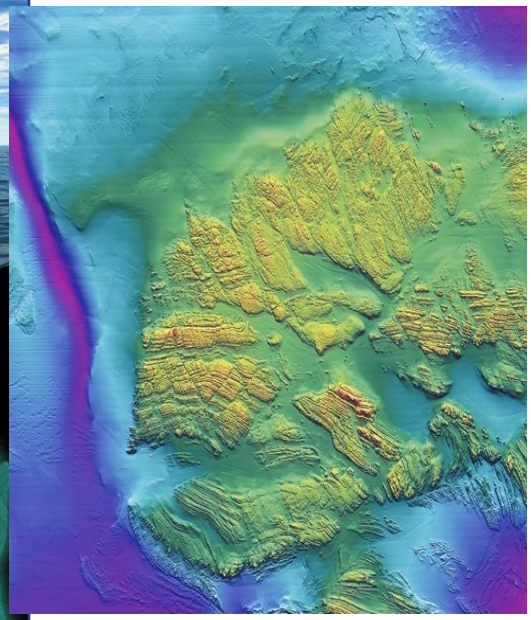
8 AUVs

282 Offices

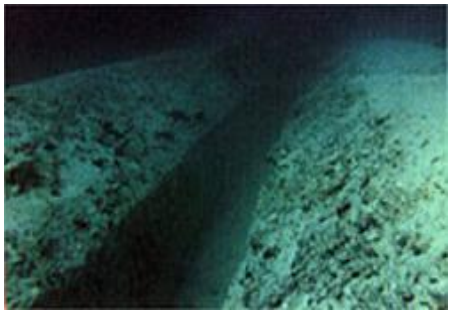
Fugro's **people, vessels, equipment** and **facilities** are continually growing in number and capability in order to meet the demand for continuous high quality services in ever-more challenging regions of the globe.

Fugro Pelagos Services & Products

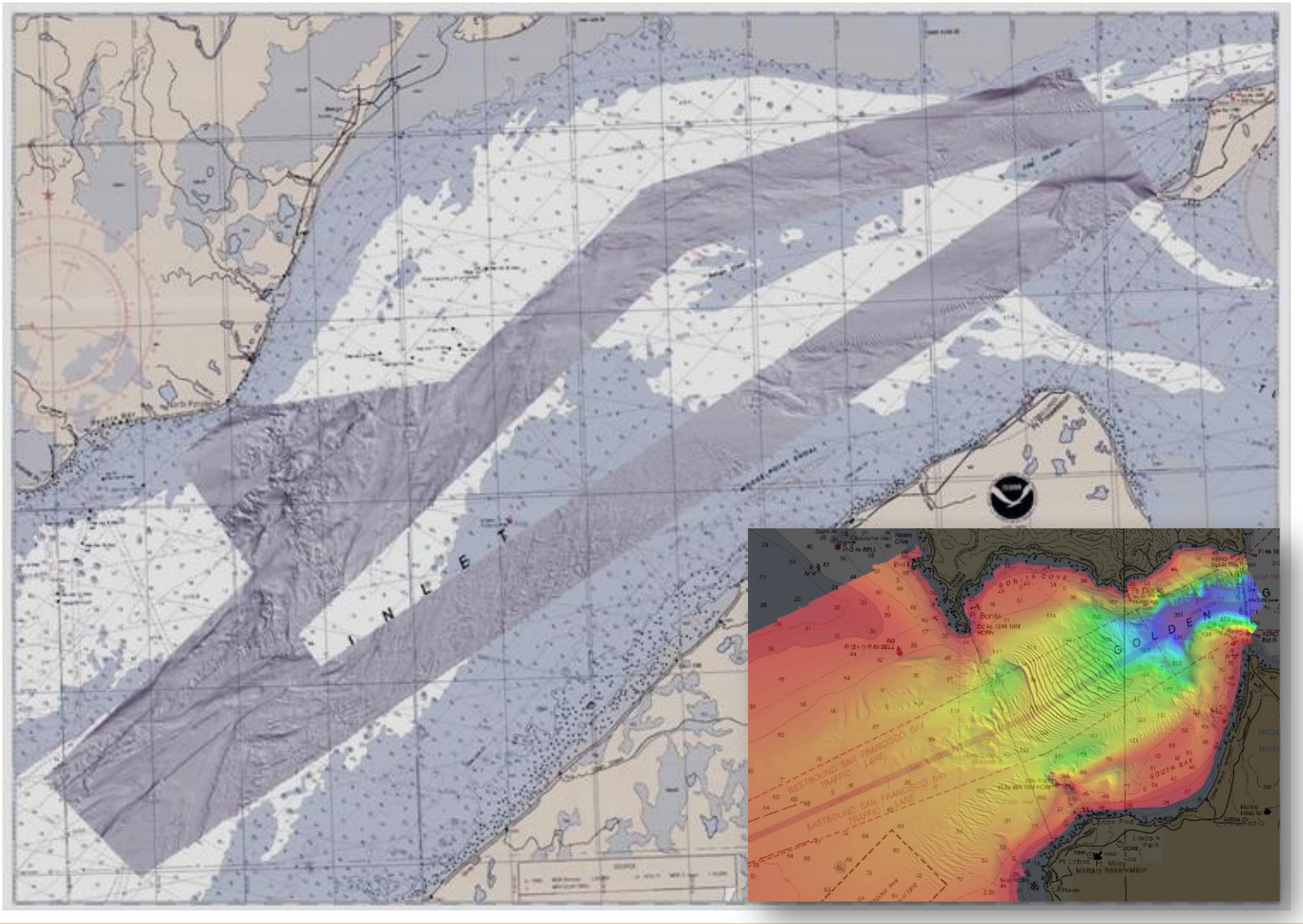




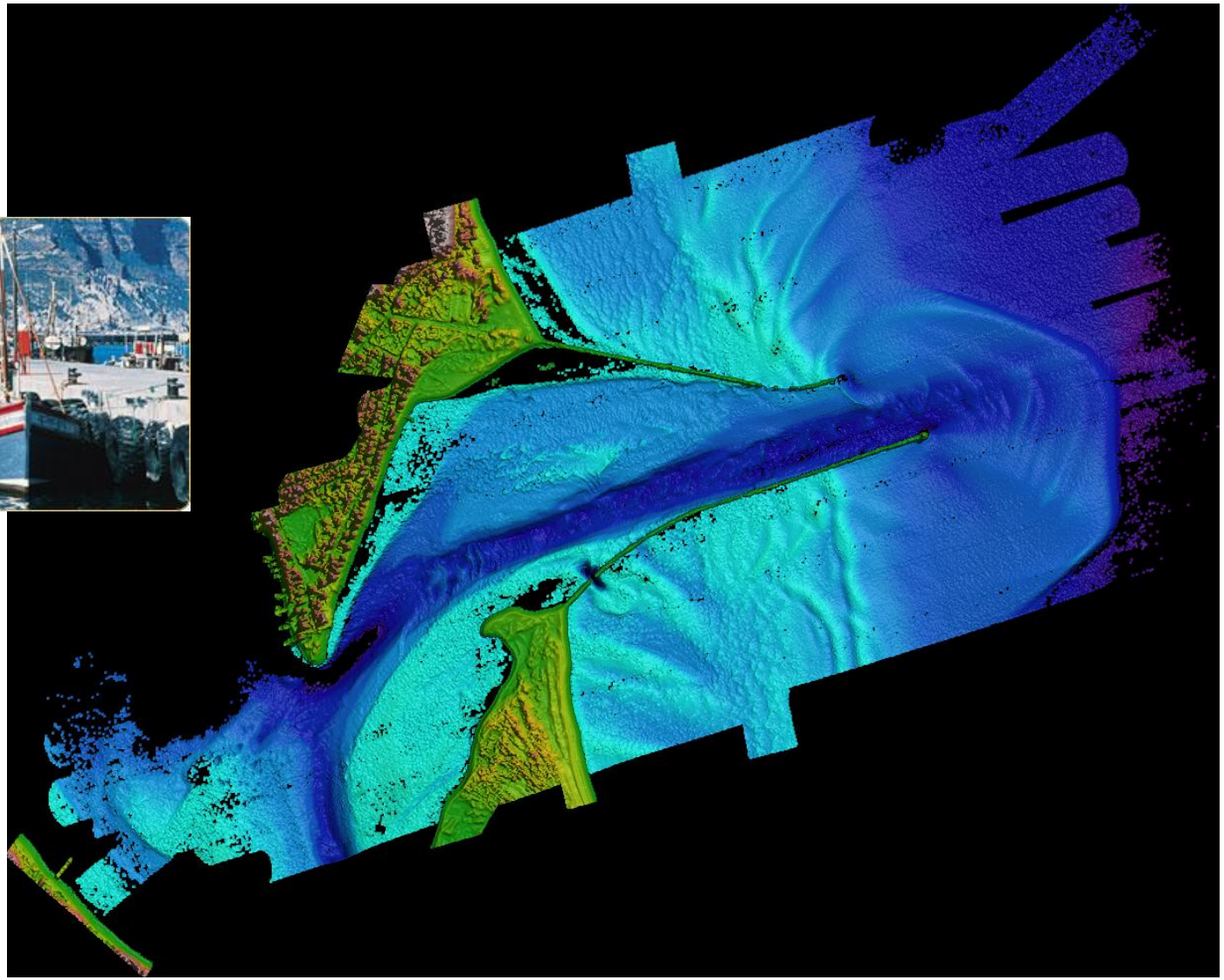
- Services Lines
  - Hydrographic Surveying/Charting
  - Cable Route Survey
  - Coastal Zone Mapping
  - UNCLOS/EEZ
  - Ports and Harbors Survey
- Product Lines
  - Positioning software
  - Positioning signals



Hydrographic Charting

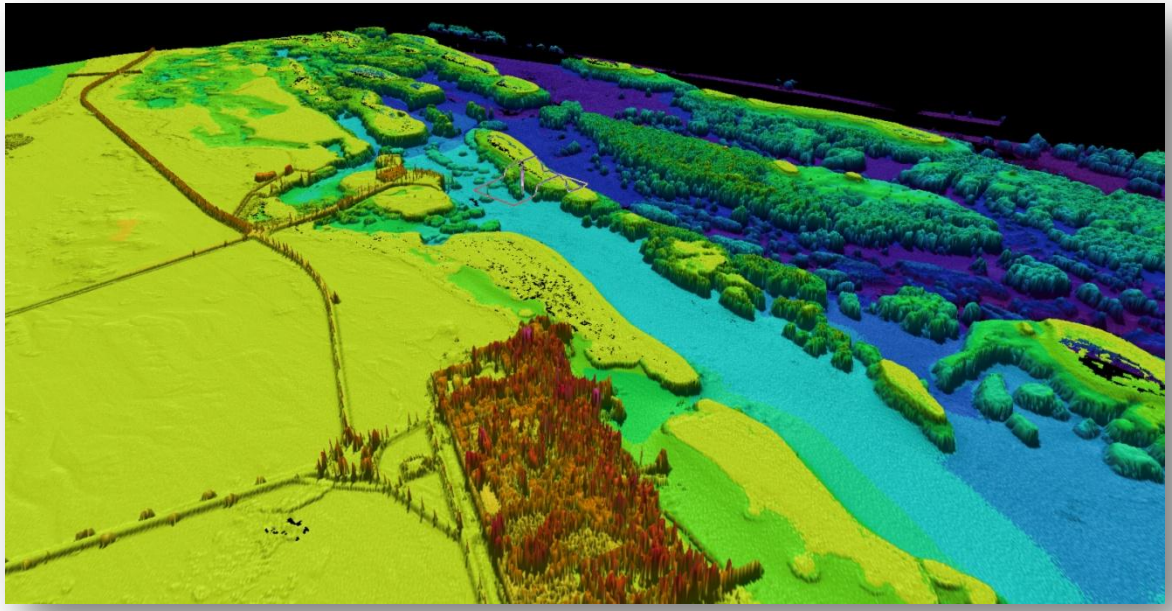


Ports & Harbor Surveys

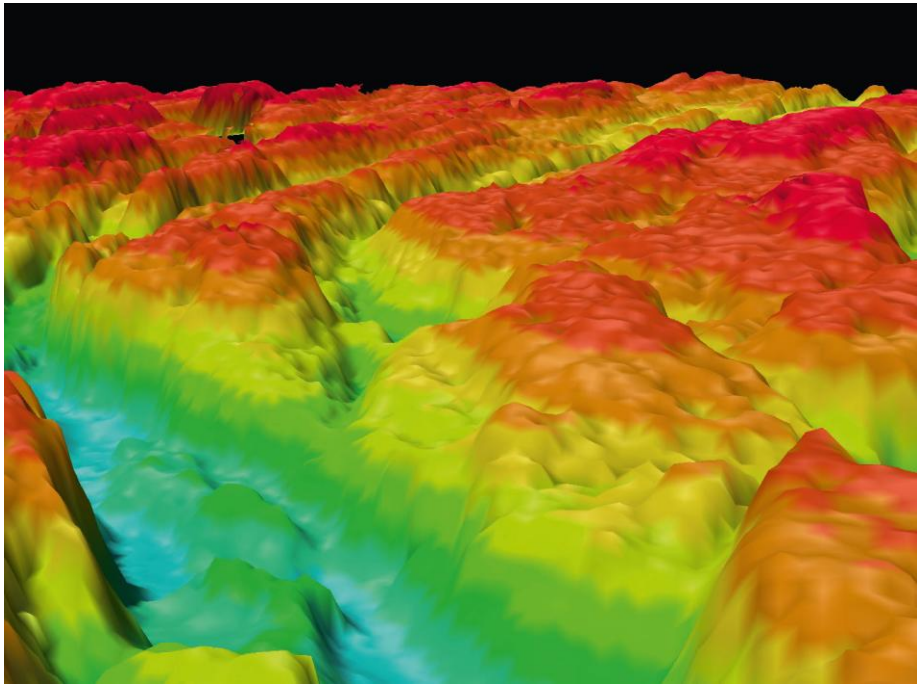


Fugro ALB Systems: Optech SHOALS 1000T

- Optech SHOALS 1000T
  - 2000Hz
  - Nd:YAG pulsed dual frequency laser
  - 532, 1064nm (green and near-IR)
  - IR reflects from seasurface; green from seabed
  - Orientation and navigation through Applanix POS AV410 IMU
  - Includes 8mp digital camera firing at 1Hz; resolution 8-20cm



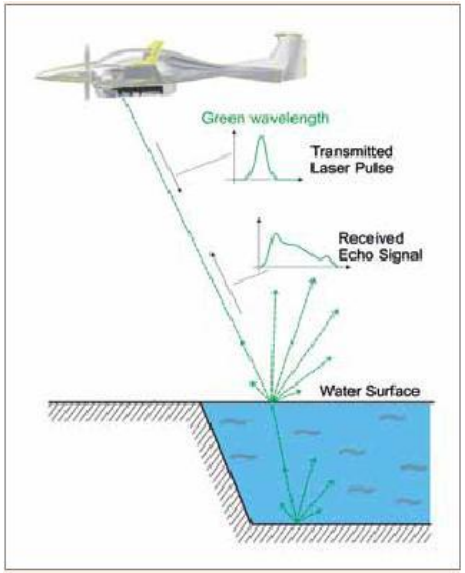
Fugro ALB Systems: Fugro LADS Mk3

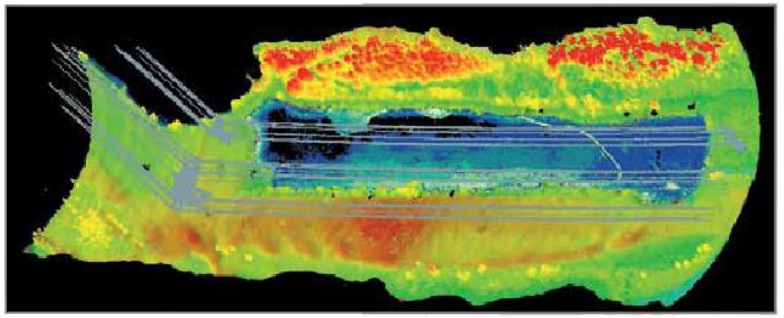


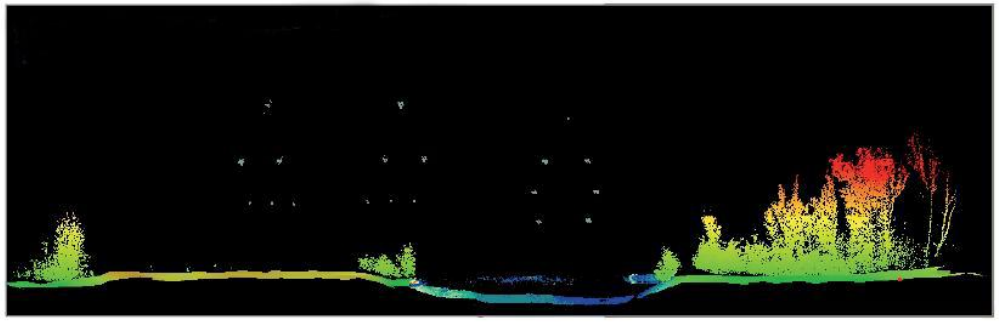
- System designed and built by Fugro ALB
- Capable of meeting IHO Order 1a
- High powered laser capable of depths to 80m subject to environmental conditions
- Large aperture receiver and automatic gain control for superior system performance
- Efficiently utilizes aircraft of opportunity
- Designed for continual upgrade and enhancements

Fugro ALB Systems: Riegl VQ-820-G

- Developed by RIEGL Laser Measurement Systems
- System purchased in 2012 (co-owned by FPI and FLC)
- 250 KHz Laser; only 26kg
  - Suited for topo and hydrographic survey
  - Coastline shallow water mapping
  - Riverbed profiling

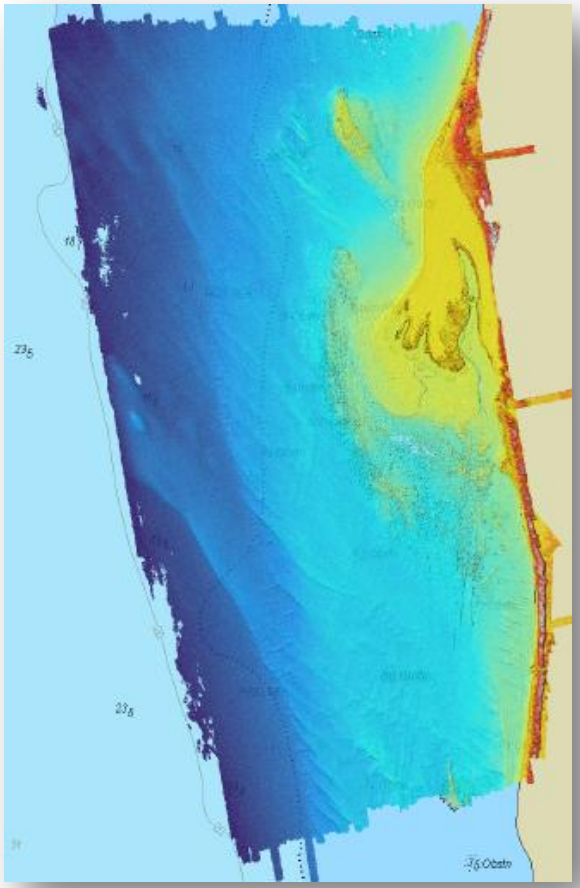




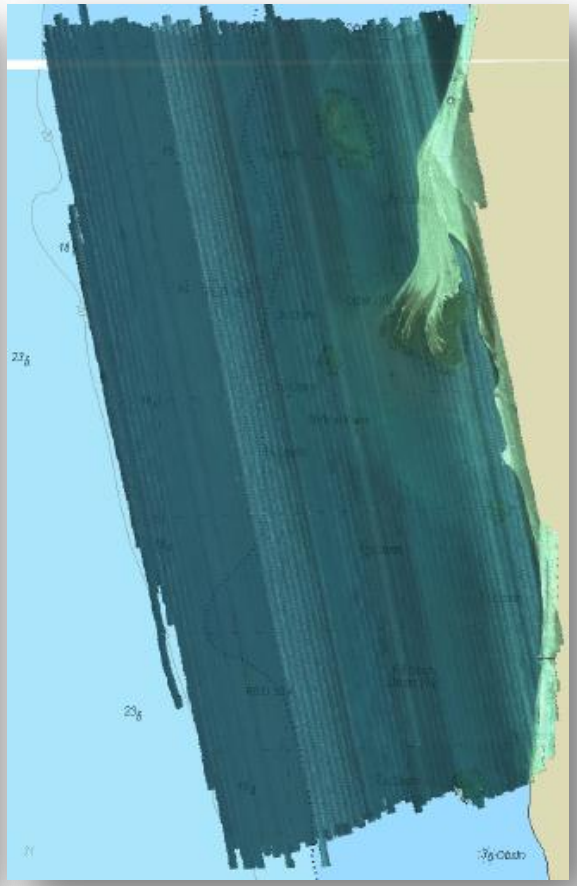


Fugro ALB systems can operate from fixed or rotary wing aircraft

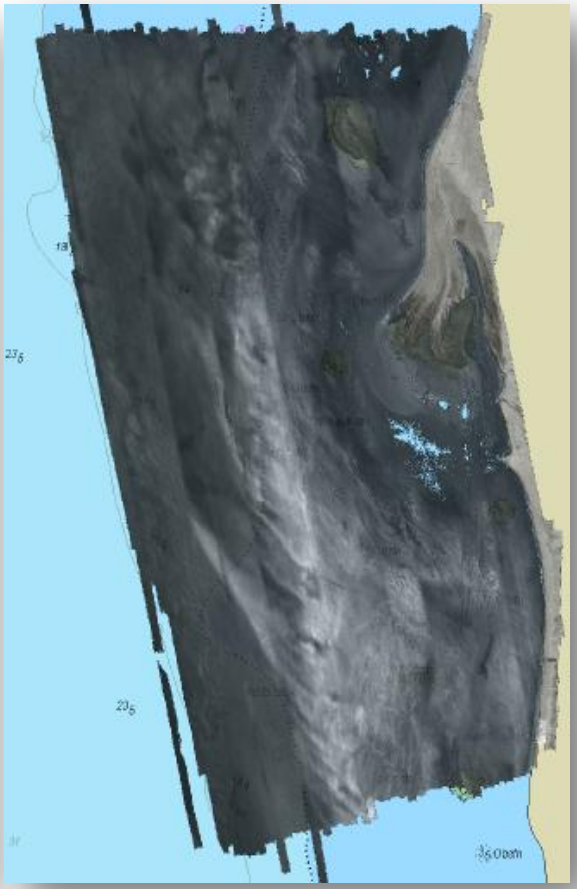
Multiple products from single acquisition



Bathymetry

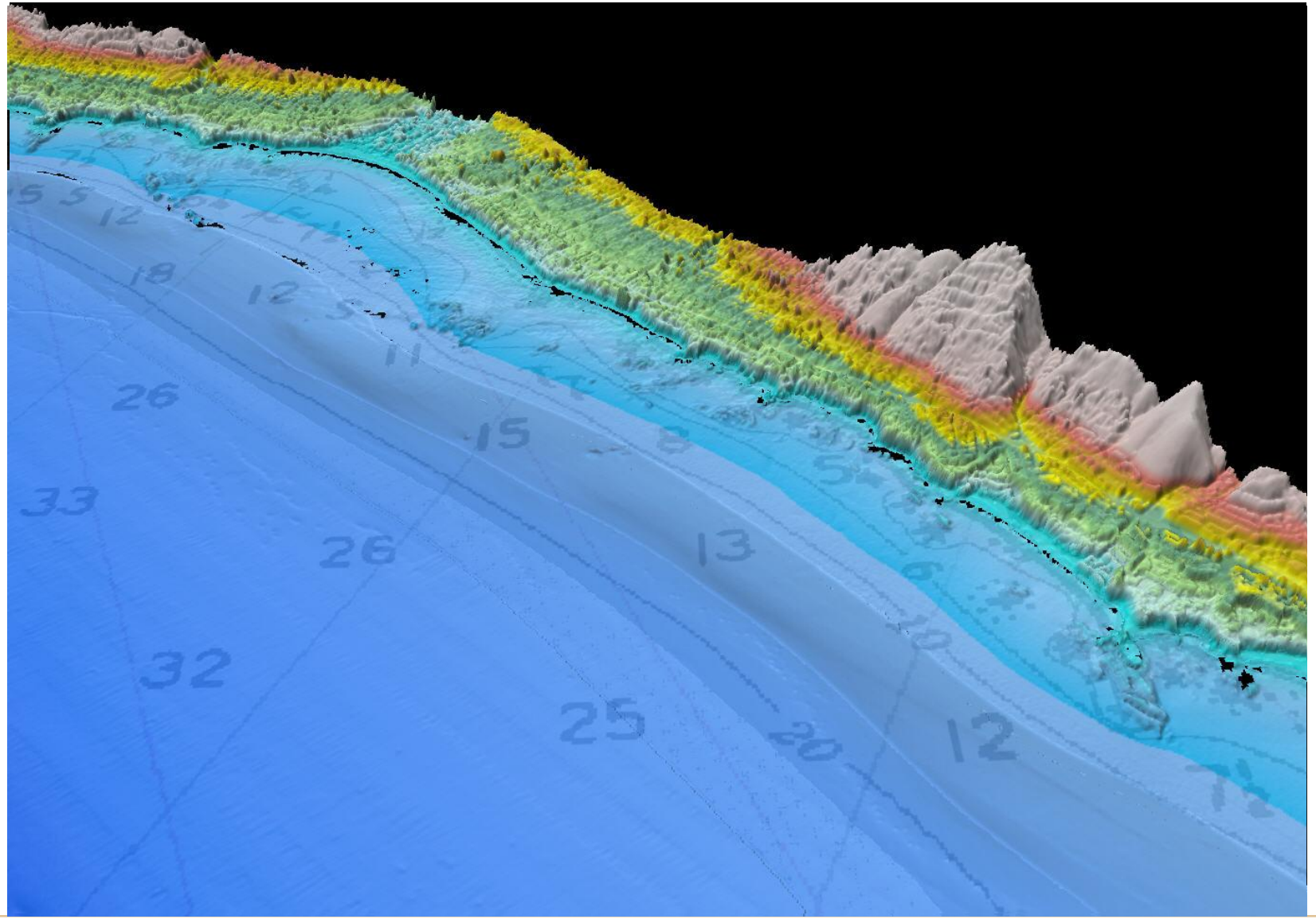


Imagery

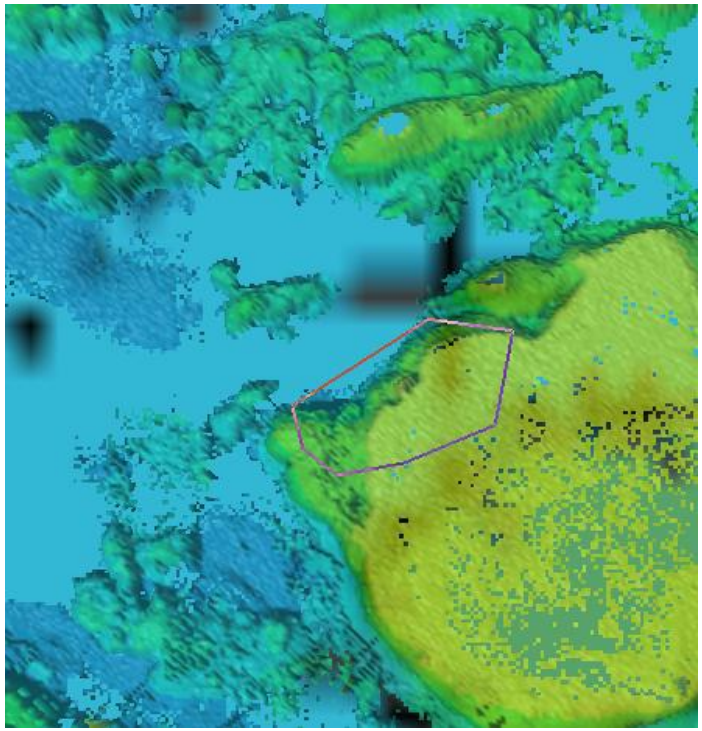


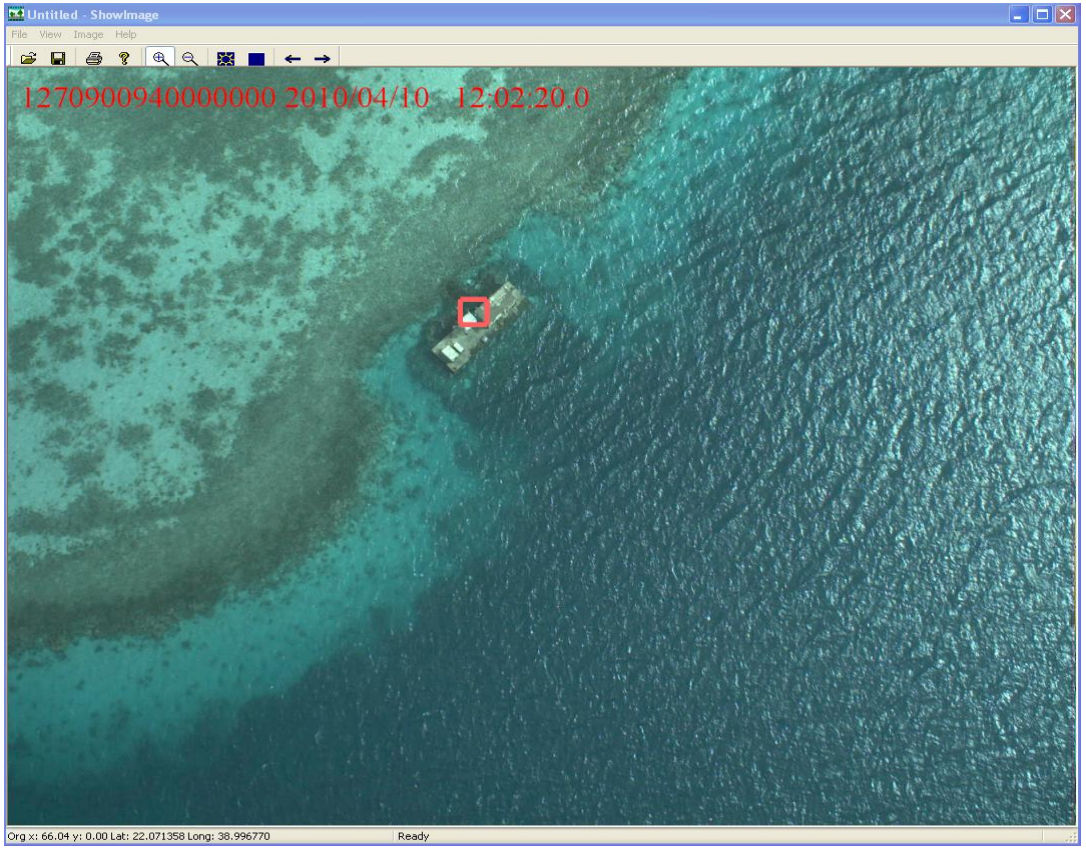
Reflectance

Closing the Gap with ALB



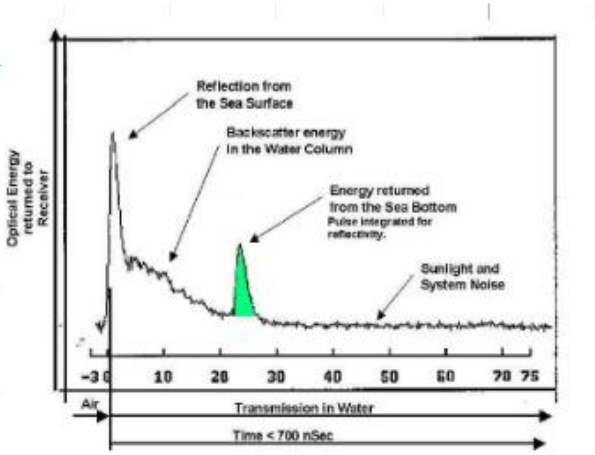
Additional Datasets – Digital Imagery





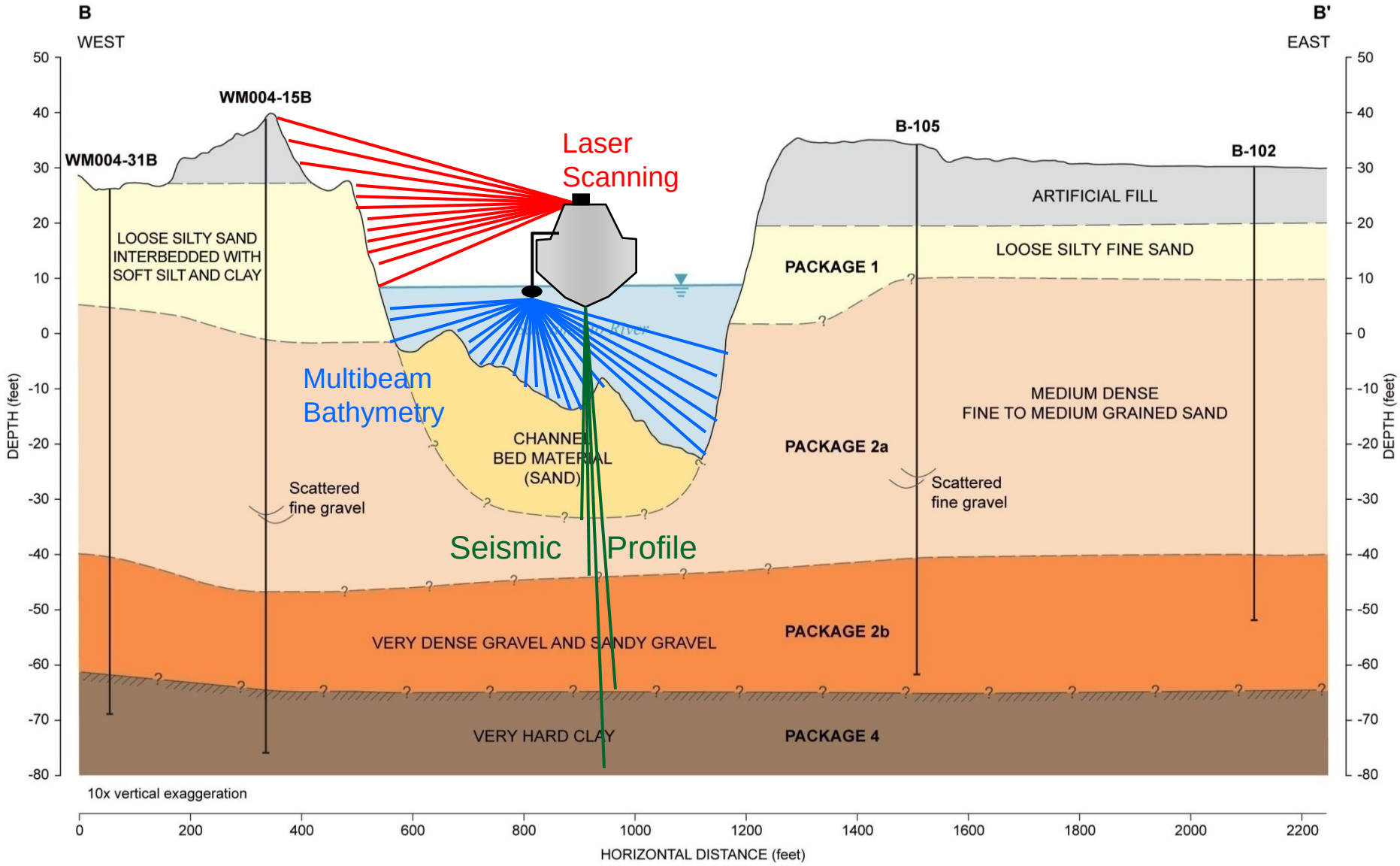
In addition, geo-referenced digital downward looking imagery is used in conjunction with the Lidar data, particularly for the correct interpretation of cultural detail. For example, the geo-referenced imagery is useful to discriminate between boats, navaids and jetties in harbours and marinas, or to identify isolated anomalies as above.

Additional Datasets – Reflectivity

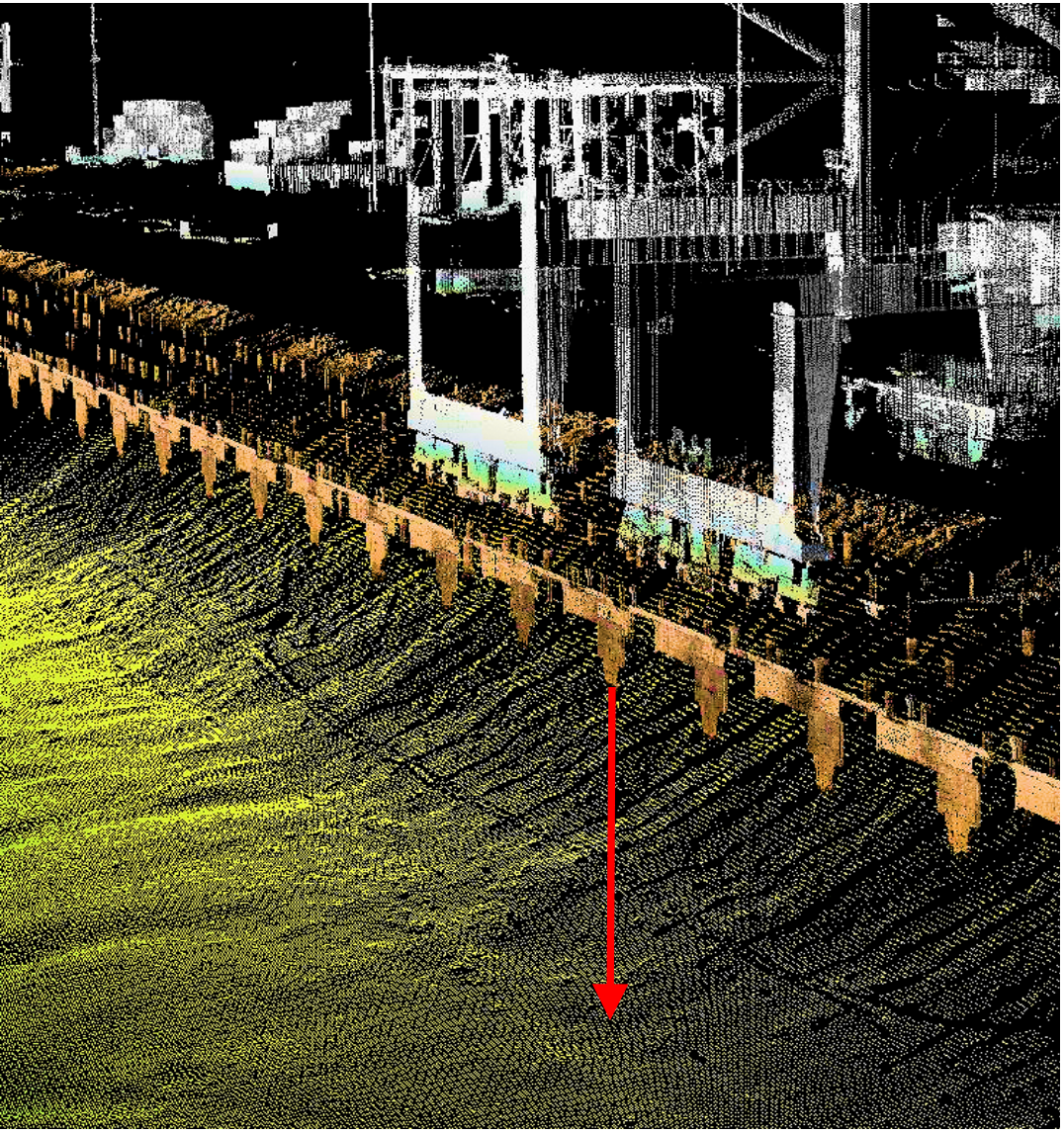


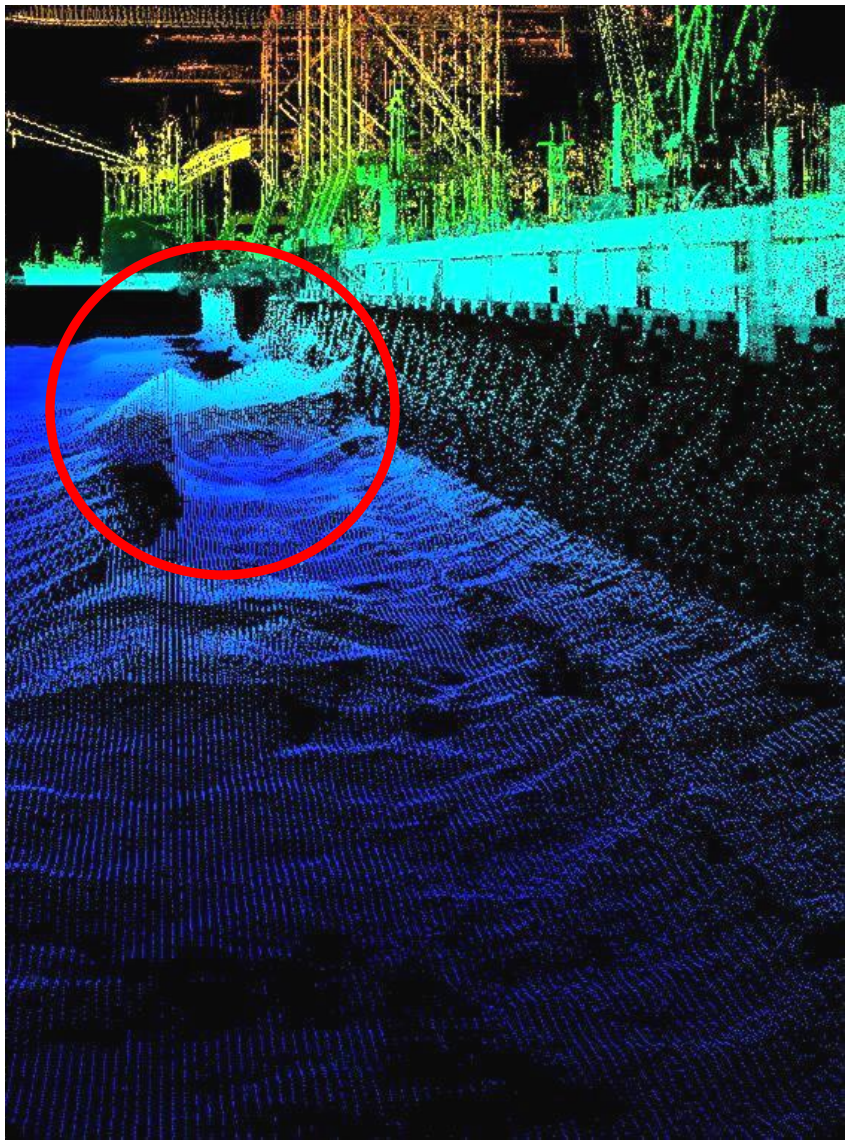
The reflectivity of an ALB pulse represents a measure of the amount of energy reflected from the seabed for each individual laser pulse at the wavelength of the laser, 532 nm (green/blue).

Fugro BOATMAP – Operational Concept



BOATMAP – High Resolution Port Infrastructure





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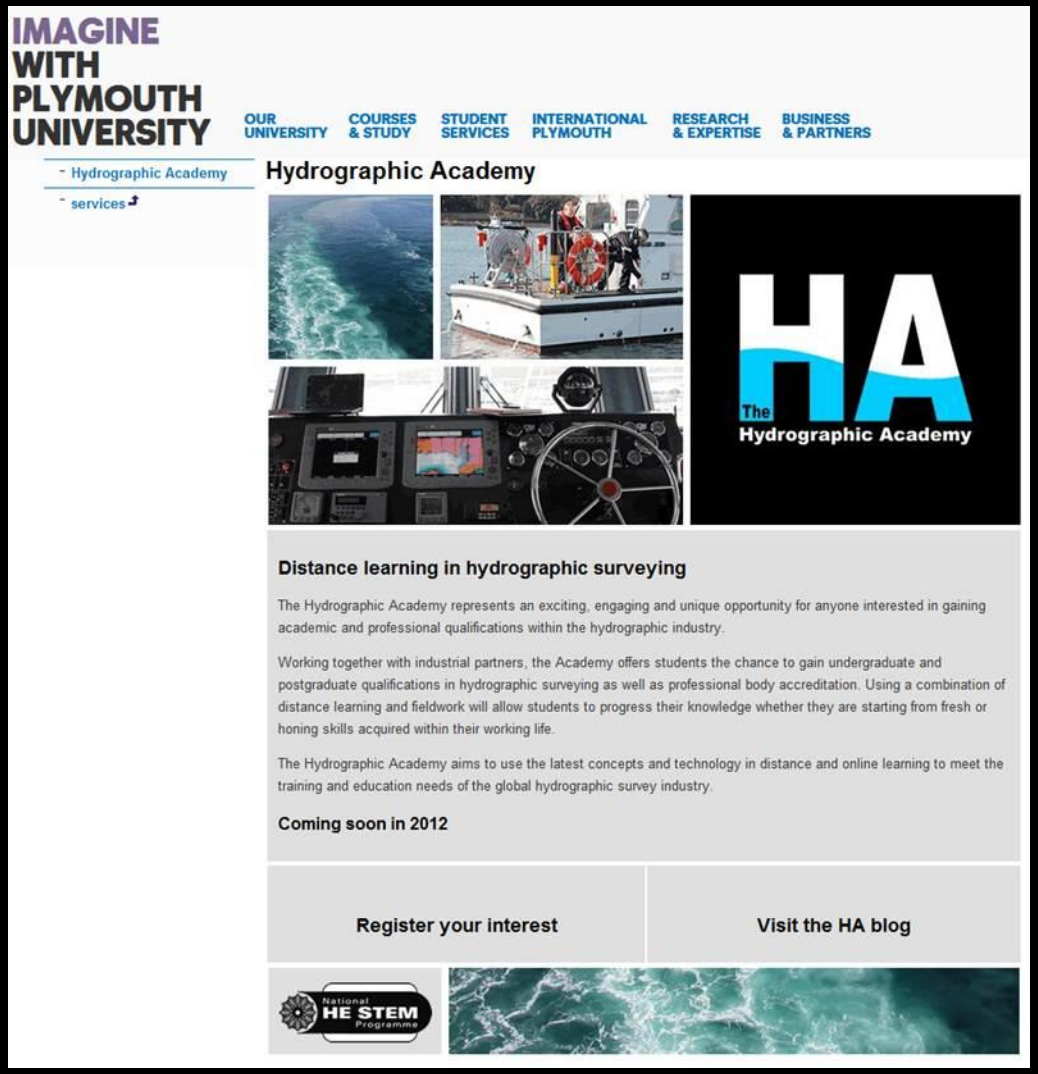

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- Whole modules self-contained on a USB stick
- No need for an internet connection
- Tutor support by email/Skype
- Online discussion area

Thank You