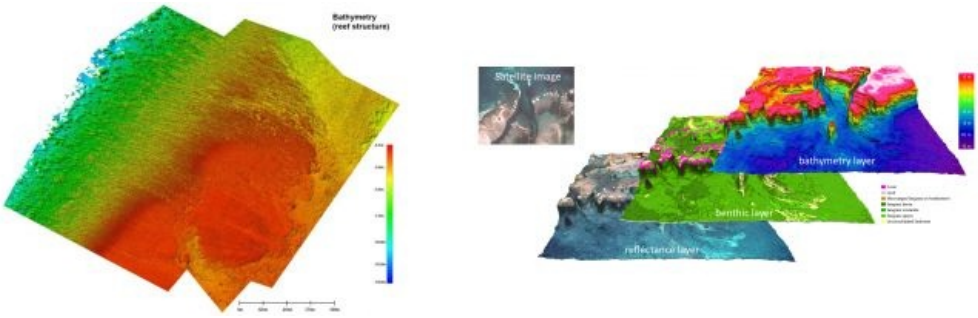
Zooming in on Bathymetric Techniques



The study of the underwater depth of ocean floors is called 'bathymetry'. The term originally refers to the ocean's depth relative to sea level. Bathymetry is the underwater equivalent to topography, which actually makes it the cornerstone of hydrographic science. There are multiple ways to derive bathymetric information. Below are a selection of articles that zoom in on various bathymetric techniques, ranging from satellite-derived bathymetry – using multispectral satellite imagery – to airborne Lidar mapping.

Improving Satellite-derived Bathymetry Using Spatial Regression Algorithms

Bathymetry is traditionally acquired using singlebeam or multibeam echosounders. This method produces accurate depth measurements along transects but is constrained by operating cost and an inability to survey in very shallow waters. Airborne Lidar is able to produce accurate bathymetric information over clear waters at depths up to 70m, but can be costly and is limited by a relatively coarse bathymetric sampling interval. Experience in Irish waters has resulted in very poor seabed detection along the east coast and limited penetration on the west coast. An efficient and cost-effective alternative is satellite-derived bathymetry. Read on...

Bathymetry of the western edge of Ningaloo Reef (Australia), including the ~500m wide sandbanks within the reef. Spatial resolution is 25cm. Data is a combination of multiple overpasses using different scanner settings.

Satellite-derived Bathymetry: Effective Surveying Tool for Shallow-water Zones

A recent article provides an overview of satellite-derived bathymetry methods and how data can be integrated into survey campaigns, and showcases three use cases. Bathymetric data in shallow-water zones is of increasing importance to support various applications such as safety of navigation, reconnaissance surveys, coastal zone management or hydrodynamic modelling. A gap was identified between data demand, costs and the ability to map with ship and airborne sensors. This has led to the rise of a new tool to map shallow-water bathymetry using multispectral satellite image data, widely known as satellite-derived bathymetry (SDB). Read on...

Pushing Lidar to the Limits: High-resolution Bathymetric Lidar from Slow-flying Aircraft

Airborne bathymetric Lidar is an ideal tool to study underwater features in the usually rather clear waters along the coast of Australia. Due to the remoteness of many of the continent's coastlines, this is often the only economically viable option for large-scale bathymetric mapping at high resolution. A new toolkit consisting of two airborne Lidar systems flown on a small and slow-flying research motorglider was trialled in NW Western Australia. The same technology will be used over the next three years in the context of a comprehensive study of submerged archaeological landscapes of the so-called 'Sea Country', more than 1,000km along the NW Western Australian coast. Read on...

Baseline data on seafloor information based on satellite images and physics-based algorithms.

Increased-resolution Bathymetry in the Southeast Indian Ocean

The disappearance of Malaysian Airlines flight MH370 on 8 March 2014 led to a deep ocean search effort of unprecedented scale and detail in the remote southeastern Indian Ocean. Between June 2014 and January 2017, two mapping phases took place: (1) a shipborne bathymetric survey, and (2) a higher-resolution search in areas where accurate mapping of the seafloor was required to guide the detailed underwater search aimed at locating the aircraft wreckage. The latter phase used sidescan, multibeam and synthetic aperture sonar mounted on towed or autonomous underwater vehicles (AUVs). This article describes the mapping of the area where the aircraft was expected to be found. Read on...

Satellite-derived Bathymetry Migration: From Laboratories to Chart Production

Routine

Much has been said about Satellite-derived Bathymetry (SDB), but with the exception of SHOM, which led to the introduction of a number of SDB charts into the French chart series, next to nothing has been implemented within the international hydrographic community. This article aims to update readers as SDB, thanks to new generation satellites and modelling, seeing the light after going through a thirty years' tunnel. Read on...

Multi-sensor Coastal Mapping: Integrating Active and Passive Sensors Provides Major Gains

Fugro has tested a multi-sensor approach to balance growing data needs with limited agency budgets. Coastal mapping programmes are quickly becoming a priority for government agencies across the globe. The desire to better define and understand the land/sea interface is based on several interrelated factors, including sea-level rise and its impacts on coastal populations, the growth of and reliance on a blue economy, and the need to maintain critical nearshore habitats in the midst of a changing landscape. Read on...

Technology in Focus: Bathymetric Lidar

With sea level rise and increases in the severity of extreme natural events, there has been a renewed push to further our understanding of the coastal zone. Fundamental to understanding risk in areas of high vulnerability is capturing the near-shore land and sea surface. Bathymetric Lidar is the most effective and cost-efficient technology to capture both the land and seafloor simultaneously to provide a continuous, detailed 3D elevation model along the coastline. Its ability to successfully capture elevation on both sides of the coastline, over areas stretching more than 100km along the coast, has made bathymetric Lidar the 'gold standard' for coastal vulnerability and near-shore benthic habitat modelling. Read on...

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