Accurate and high resolution bathymetric data is a necessity for a wide range of coastal oceanographic research and is especially important when studying the environmental health of benthic habitats that are often disturbed by human or natural phenomena. Utilising the WorldView-2 and WorldView-3 satellites, we are able to see further into the water and support bathymetric studies around the globe. Remote sensing of the shallow ocean floor has become much clearer as a result of the additional spectral bands, including coastal blue. Several research studies have shown that a combination of costal blue with yellow, and the more tightly focused green band, can discriminate underwater features more efficiently and with remarkable accuracy, agility and collection capacity.

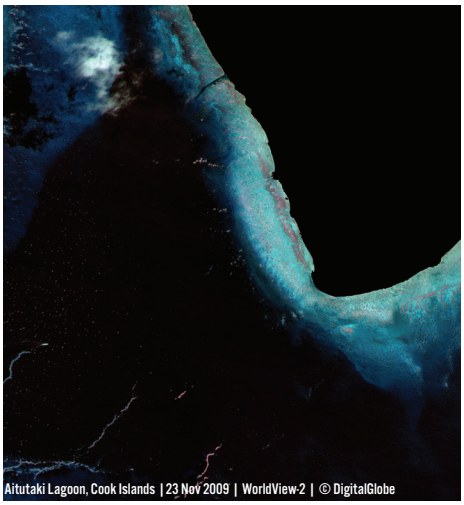
SATELLITE BASED BATHYMETRY

Coastal environments are some of the most dynamic and constantly changing regions in the world. Monitoring and measuruing these changes is critical to marine navigation and for the construction of harbours, pipelines, and other critical infrastructure in the coastal zone or shallow off-shore areas. An important parameter for any of these applications is water depth.

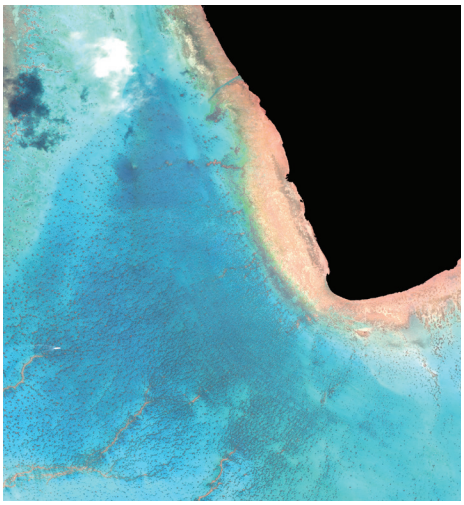
Traditionally bathymetry is a lengthy, delicate and expensive process. It deploys airborne LiDAR and/or labour-intensive marine acoustic sonar with vessels to slowly survey the sea floor. These studies can have an adverse impact on the environment, incur high mobilisation costs for equipment, and require government permits, which can add months to the timeline of a project.

The derivation of ocean water depth from satellite imagery with eight spectral bands is a cost effective method of remote sensing the aquatic environment. This approach takes into account that different wavelengths of light are attenuated by water to differing degrees. WorldView-2 and WorldView-3 are able to map bathymetry in water depth of up to 10 - 15 metres under optimal conditions.

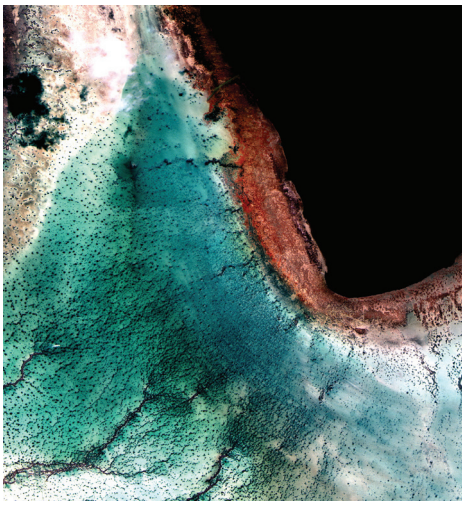
The smaller wavelengths (e.g. blue and green light) penetrate water more than longer wavelengths (e.g near infrared, shortwave infrared). When water is clear and the seafloor is bright (e.g. sandy) estimates of depth can be derived from the reflectance measured by the satellite or by using stereoscopic measurements. When multiple visible-wavelength spectral bands are used together, the effects of the seafloor reflectance variability and water turbidity are lessened.



Using bathymetry, submerged aquatic vegetation can be identified



Using bathymetry, a deep lagoon can be identified



Using bathymetry, linear reef flats can be identified

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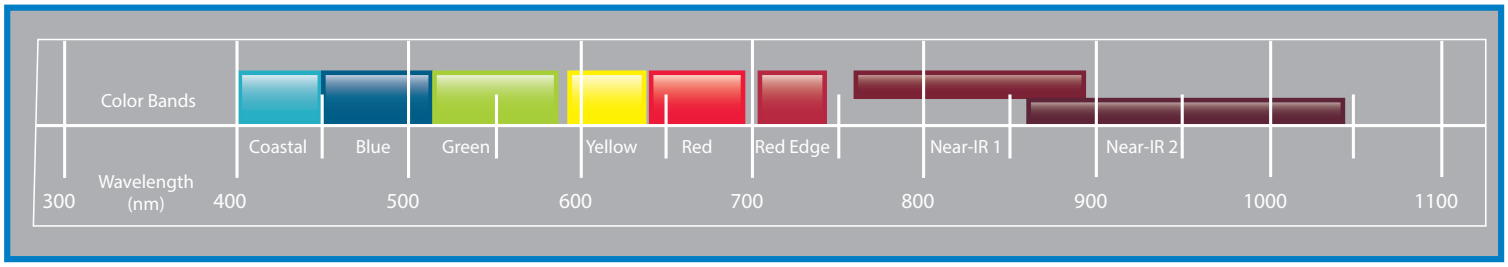


UPDATING NAVIGATIONAL HAZARDS

Current nautical charts are critical to the safety of marine navigation. Global coverage and continuous collections allow you to create and update charts rapidly. Satellite imagery has the added advantage of being able to access even the most remote locations around the globe including at risk properties and infrastructure that may be too dangerous to map using other methods.

COASTAL MONITORING

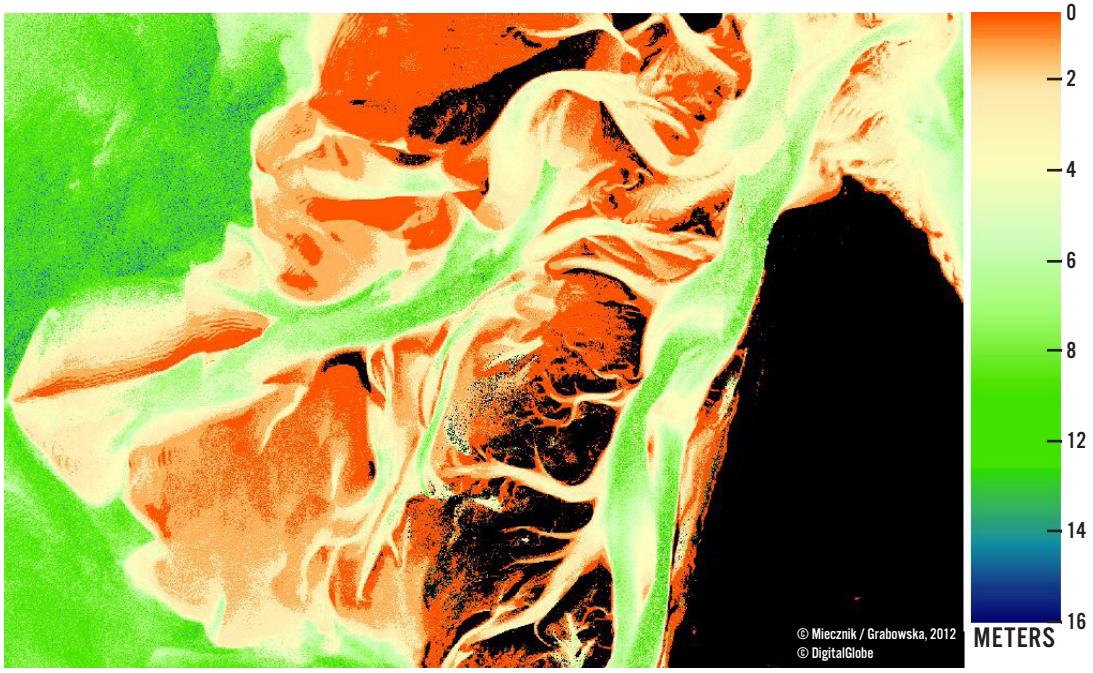
In order to understand the impact on coastal communities from destructive marine forces such as tsunamis, high-wave flooding, coastal inundation and storm surges, experts must have precise land-to-shore depth and elevation data. An additional benefit of using satellite imagery is that the coastline can be extracted from the data to ensure a perfect spatial match with the bathymetry mapping. This allows for historic coastline mapping that can identify patterns of erosion and deposition and provides unprecedented continuity and critical insights.

MARINE HABITAT MONITORING

Government agencies monitor coastal areas to document changes to protected habitats. The ability to map large underwater areas and classify marine habitats with great detail enables more efficient responses and a better understanding of the environment. This is particularly useful for change detection occurring as a result of pollution, erosion, coastal off-shore projects and man-made hazards. Categories of identification include vegetation classes such as sea grass, macro-algae, mussel beds, coral reef types and substrates such as sand, gravel, boulders and rocks. In addition, dredged areas can be accurately mapped.

ARCHIVE

Bathymetric analysis can be applied to satellite images with good water clarity that already exist within the European Space Imaging archive. If no suitable image is available, direct satellite tasking can be carried out to acquire a new image of the specific area of interest using WorldView-2 or WorldView-3. Using our expert staff we will manually plan the acquisition taking into account real-time weather assessments to ensure we deliver the best image possible.



This image shows bathymetric analysis of Moreton Bay, Australia, to determine water depth. This study was conducted by Grzegorz Miecznik and Dorota Grabowska for their research project of WorldView-2 bathymetric capabilities

ABOUT THE COMPANY

Based in Germany and established in 2002, European Space Imaging is the leading premium supplier of global very high-resolution (VHR) satellite imagery and derived services to customers in Europe, North Africa and CIS countries.

With over 15 years' experience, we have developed a reputation for expert and personalised customer service and an unbeatable track record for supplying tailored very high resolution imagery solutions to meet the diverse projects and requirements of our customers.

To strengthen our offering, the WorldView Global Alliance was formed in 2011 in cooperation with DigitalGlobe and Space Imaging Middle East. This revolutionary partnership offers complete end to end global imagery products and services from three of the industry's most premium and credible suppliers.

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