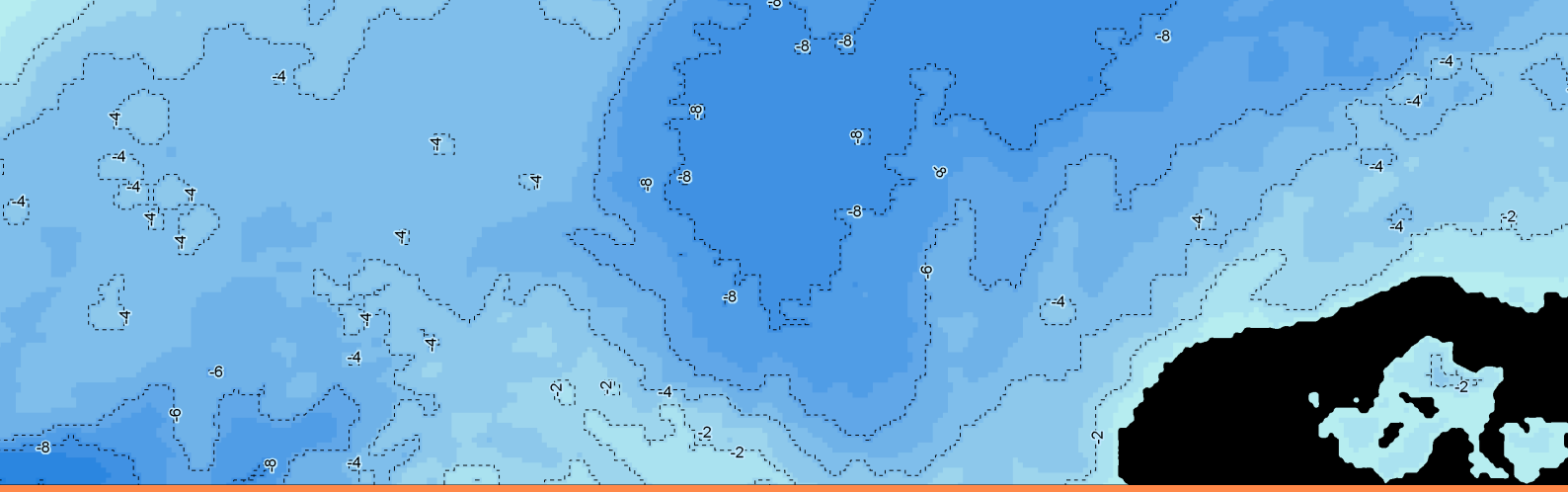


BATHYMETRIC MAPPING FROM SPACE

For rapid screening and feasibility studies

SATELLITE BASED MAPPING OF BATHYMETRY

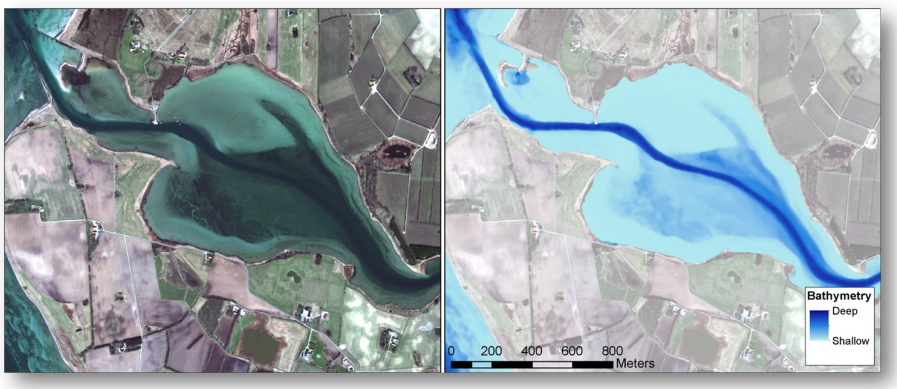
Coastal environments are some of the most dynamic and constantly changing regions of the globe. Monitoring and measuring these changes is critical to marine navigation and for construction of harbors, pipelines and other critical infrastructure in the coastal zone or shallow off-shore areas.

One of the most important parameters is information about water depth. But in many parts of the world existing nautical charts are not accurate enough. Traditional methods include echo sounding and mapping using multi-beam sonar instruments or airborne LIDAR but the cost of this type of survey is high. Furthermore, getting the necessary permits can be very time consuming and the actual surveys pose a health and safety risk to the involved personnel.

NEW SATELLITE TECHNOLOGY

Bathymetric maps can also be generated from multi-spectral satellite images. The approach exploits the fact that different wavelengths of light are attenuated by water to differing degrees and with the newest generation of satellites this technology can be used to map bathymetry in water depth down to 25-30 meters under optimal conditions.

WorldView-2 from DigitalGlobe is the first commercial high-resolution satellite to provide 1.84 m resolution multi-spectral imagery, plus a Coastal Blue detector focused increasing the depth penetration of the technology. But a number of other satellites also provide suitable data for bathymetric mapping on a global scale at similar resolutions.



SUMMARY

CLIENT

- Oil & gas industry
- Offshore renewable industry
- Port and terminal operators
- Environmental agencies
- Consultants and contractors
- Emergency response companies

CHALLENGE

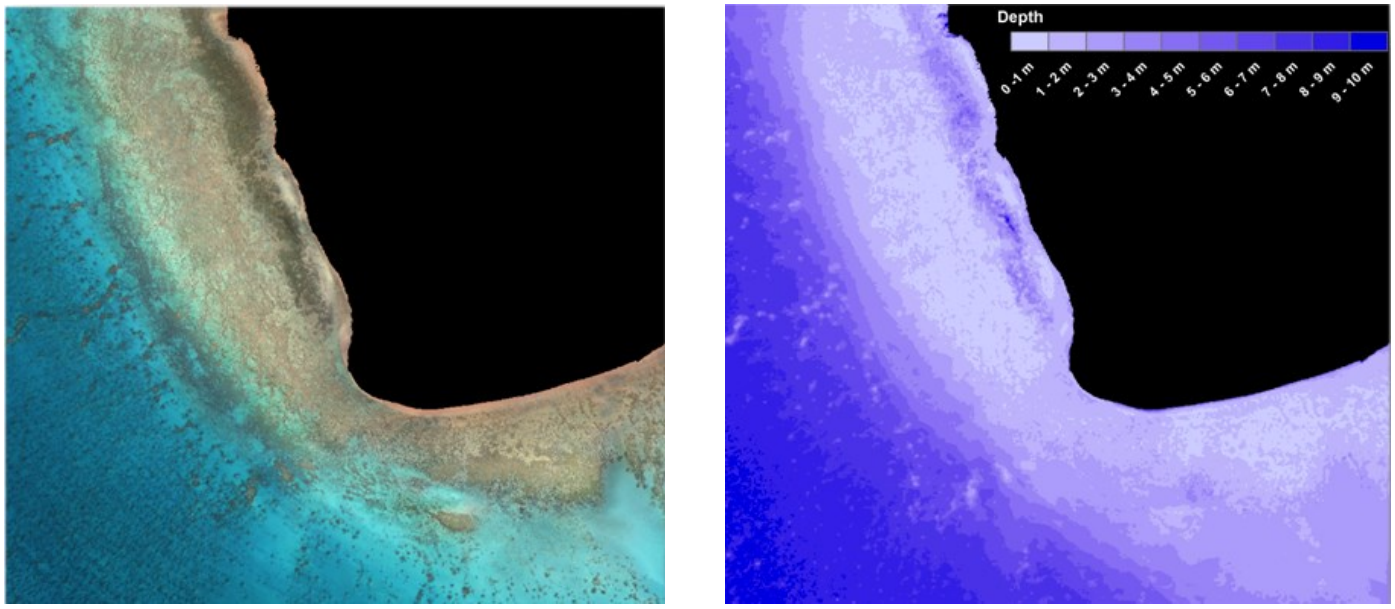
- Lack of detailed bathymetric data
- High cost of using traditional mapping methods

SOLUTION

- Satellite derived bathymetry in 2 m grid can be produced for shallow water areas, enabling 1 m contour lines
- Associated habitat maps can be produced on demand from the same input data

VALUE

- Fast delivery even for very remote areas
- Does not require flying or sailing permits
- Cost-effective compared to existing methods
- Can be repeated at desired time i ntervals to monitor changes



Example of bathymetry map derived from WorldView-2 satellite image. Image © DigitalGlobe.

COASTLINE MAPPING

As an additional benefit the coastline can be extracted in the same process in order to ensure a perfect spatial match with the bathymetric mapping. Historic coastline mapping can be done to document patterns of erosion and deposition up to 50 years back in time.

COASTAL HABITAT MAPPING

Maps of coastal habitats and substrates are often difficult and expensive to produce. With remote sensing very detailed maps of coastal habitats can be produces. Categories 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 DATA OR NEW COLLECTION OF IMAGES

The mapping can be based on satellite images that already exist in the archives. An initial screening for images with good water clarity will be performed. If no suitable images exist, a new acquisition of high resolution satellite images will be planned. In additional to WorldView-2 a number of other satellites exist that can be used for bathymetric mapping.

In close collaboration with satellite operators, DHI GRAS will seek to get the best image quality that will enable accurate mapping.

ACCURACY

The accuracy of the mapping depends on local conditions. In cases with optimal water quality and visibility (e.g. no suspended sediment and calm water), vertical accuracies better than 1 m or 10% of the depth can be achieved. Positional accuracy is within 5 m (CE90%) according to DigitalGlobe specifications and can be further improved using ground control data.

ABOUT DHI GRAS

DHI GRAS is a DHI owned company specialised in satellite remote sensing. Since 2000, DHI GRAS has successfully completed more than 200 projects in more than 50 countries. DHI is the expert in water environments - an independent consulting and research organisation specialised in water and environment with more than 1000 staff worldwide and offices in 25 countries.

OUTPUT

- Bathymetric grid file in 2 m resolution
- Depth contour lines with 1 m intervals
- PDF map layouts
- Original satellite images used will be delivered as well

Contact: DHI GRAS - gras@dhi-gras.com
For more information visit: www.dhi-gras.com