→ COASTAL BATHYMETRY MAPPING

DESCRIPTION

This service provides estimates of water depth in shallow near-shore water to a depth of 15m or more in clear water with good under-water visibility. Reliability is improved if local measurements of depth and water turbidity are available to support the data processing.

USE

› Fine-scale bathymetric mapping of shallow water to complement existing charts and fill gaps

› Updating of bathymetric charts for regions with rapidly changing bathymetry, such as moving underwater sand dunes, estuaries and deltas.

INPUT PRODUCTS

Optical data at 10m resolution from Sentinel-2 MSI.

› Commercial high resolution data for fine scale bathymetry when requested for specific projects.

› Local, geo-located measurements of water depth and turbidity from selected locations (if available)

› Local information on bottom substrate and habitats at selected locations (if available).

SPATIAL RESOLUTION AND COVERAGE

› 10m resolution maps derived from free Sentinel-2 data.

› Finer resolution (1-5m) available on request, using commercial data where user bears the cost of data acquisition.

› Vertical resolution depends on depth and water quality, and ranges from 10cm in very shallow water to 1-2m at depths over 6 metres.

BENEFITS

Improved strategy and decision making:

› Safety of coastal navigation.

› Bathymetric estimates in areas where no data is available from conventional hydrographic surveys.

› Bathymetric maps for hallow regions inaccessible to hydrographic survey ships.

› Frequent updates for areas with rapid change in bathymetry.

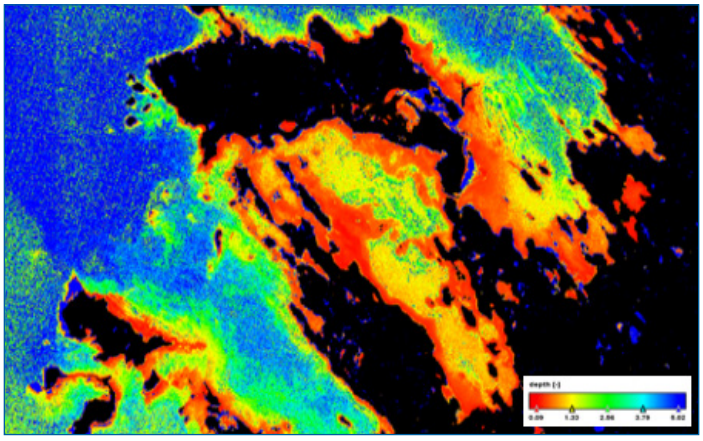
DELIVERY FORMAT

› GeoTIFF, NetCDF

FREQUENCY

› Single baseline maps for areas with low rate of change

› For rapidly changing areas updates may be available annually



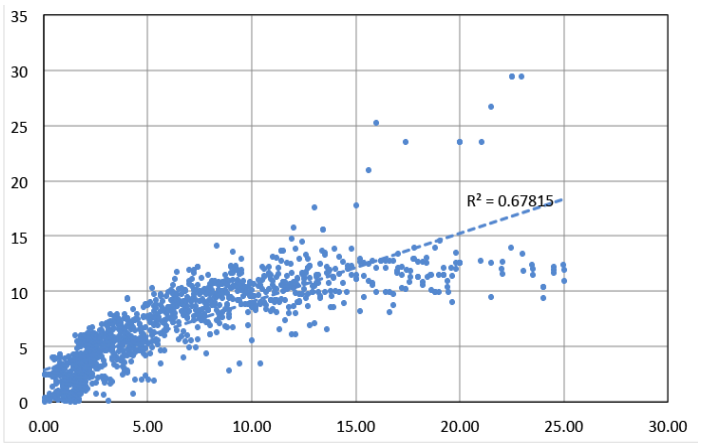
Bathymetry map of Vilsandi National Park (Estonia) obtained from a Sentinel-2 image using the SWAM model.

There is lack detailed bathymetry data in many parts of the world. Sonar-based hydrographic mapping is time consuming and expensive, and hydrographic survey ships cannot access some of the most shallow coastal areas.

Bathymetric estimates derived from satellite data can achieve good accuracies in such areas, especially if supported by some *in situ* depth measurements. If so, bathymetric retrieval is relatively fast, and can be quite accurate. Where no *in situ* data are available, analytical model inversion can retrieve water depth and bottom type simultaneously, but the method is time consuming. The retrieval requres water quality information. If this is not available from independent measurements it must be retrieved from the satellite data. In this case the, accuracy of the bathymetric maps may be reduced, particularly in areas where water quality is spatially variable.

Bathymetric accuracy and vertical resolution depend on water quality and water depth. In clear oceanic waters results are reliable down to 15-20m. For very shallow water accuracies may be a high as 10cm, but reach 1-2m in depth over 6 m. In turbid coastal waters maximum depths and accuracies drop significantly.

In regions with persistent cloud cover for much of the year it may be difficult to find suitable satellite data. However, bathymetric mapping is typically a one-off activity and thus not time-critical. The exception is areas where the bathymetry can change rapidly over relatively short time scales, such as river estuaries, sand dunes and deltas.



Correlation between sonar and Sentinel-2 bathymetry in a coral reef environment (Lizard Island, Australia).