The Coastline: Boundary Condition

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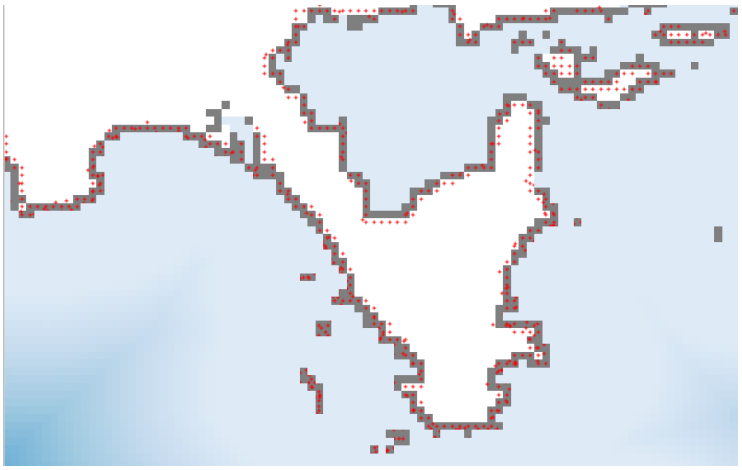

Red data points along the coast assist the inshore mapping.

Importance of the Coastal Boundary

The edges of dbSEABED mappings - the inshore areas - have proven difficult to map from existing data in terms of materials and mesoscale features. Aerial and satellite imaging of these areas to classify materials is often mislead by shifting sands, algal growths/rafts, and sediment color. In any case, dbSEABED deals with the actual sample/description/analysis data to serve as ground-truthing for those imagings. Small vessel surveys that can access the shoal inshore, with its strong currents and breaking-waves are far less frequently databased and published than deeper-water large-vessel surveys.

However an abundance of coastal data exists for the beaches, cliffs, etc. which are very accessible but just beyond the dbSEABED boundary. Substrates there frequently relate well to the inshore substrates. Coastal sand dunes, coastal cliffs, muddy-sandy deltas are examples where this happens. In contrast, continental shelf samplings by larger vessels are a poor guide to the inshore substrates.

Defining the Coastal Strip

To identify the coastal cells from which such data can be used we have 3 complementary methods: (i) vertices of the GSHHS digital shoreline shapefiles (Global Self-consistent, Hierarchical, High-resolution Geography Database (“http://www.soest.hawaii.edu/wessel/gshhg/”), (ii) the strip made by all cells at centre of a 3x3 window where the max is positive and the minimum is negative; (iii) all elevation cells in SRTM30+ (“http://topex.ucsd.edu/WWW_html/srtm30_plus.html”) which are between +1 and -1 m ASL. The three methods pick up slightly different coastal delineations. For example (iii) detects semi-submerged rock and reef areas, but misses segments where the coast descends rapidly to water depths >2m.

Applications in Gridding

Their combination allows data above SL, but very close to shore to be recognized as lying in search radii. Datasets that can be picked up this way include the Harmonized World Soils Database (HWSD; “http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/harmonized-world-soil-database-v12/en/”); various beach sand datasets for tourism, turtle hatcheries, mineral sands; photographic compediums such as Panoramio (“https://en.wikipedia.org/wiki/Panoramio”; now defunct) and Galloway (1978; “https://trove.nla.gov.au/work/12782814?q&versionId=15115397”); barrier island samplings; coastal vulnerability datasets, presented as coastal ribbons; etc. Note, however, that some of this pedological data cannot be used over the land-sea strandline.

Summary

dbSEABED mappings are a model of the materials and features expected in the marine zones, and have a boundary condition – the shoreline – which needs to be delineated, and have its materials and features defined.

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