

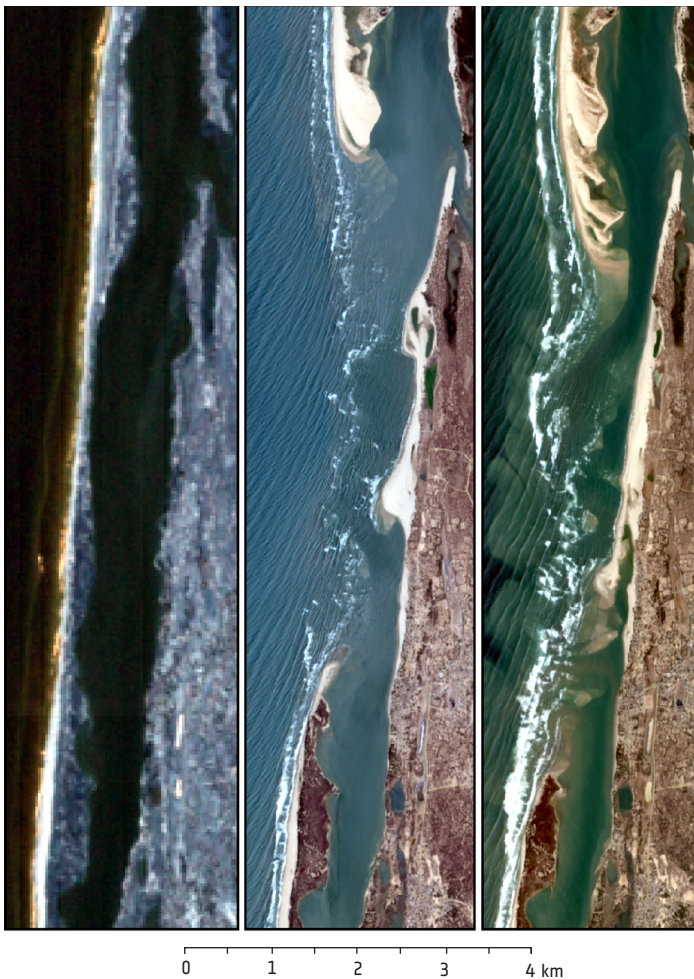
## → SHORELINE MAPPING AND CHANGE DETECTION

Coastal erosion can cause flooding, rock falls, land slides, loss of land and damage to infrastructure. Sediment deposition and moving sandbanks obstruct port inlets and reduce maritime safety. Regular monitoring of shoreline changes allows a better understanding of the processes involved and makes it possible to identify susceptible locations, so that measures may be taken to reduce risk to people, businesses and infrastructure.

This service will deliver coastline maps for selected regions identified in consultation with local experts. The method works by identifying land-water boundaries in time series of SAR data and high-resolution optical images. Vertical location of the shoreline relative to mean sea level is determined for each image. Estimates of the horizontal location of the shoreline corresponding to mean sea level, and the locations of high and low water lines are determined from statistical analysis and tidal modelling. The time series of contour lines yields a course map of intertidal bathymetry, which may be combined with other maps of shallow-water bathymetry.

### Langue de Barbarie, Senegal

Landsat-5 26-Feb-1998    Sentinel-2 14-Apr-2016    Sentinel-2 27-Feb-2018



Coastline changes in Saint-Louis, Senegal. After the flood of October 2003, an artificial breach was opened in Langue de Barbarie, to release flood water. Since then the city has not been flooded by the river because the wide breach allows the water to escape, but tidal range has risen sharply. Currents and waves now erode the coast south of the breach, while sediments are deposited to the north, moving the breach southward at a rate of around 1km per year.

#### DESCRIPTION

Shoreline maps at 10m resolution for selected locations, with estimated locations for high and low water lines. In areas with a flat topography, a second map of intertidal bathymetry will be available.

For locations where the coastline changes rapidly maps may be updated annually. 'Before and after' maps for specific locations are available on request, as part of a wider environmental impact assessment service

#### USE

- › Updates to existing charts and maps.
- › Defining legal and other boundaries.
- › Assessment of coastal change dynamics.
- › Risk mapping for coastal hazard management.
- › Coastal zone planning and development.
- › Monitoring impacts of coastal defence initiatives.

#### INPUT PRODUCTS

- › Sentinel-1 SAR and Sentinel-2 MSI data
- › Tidal model output
- › Sea level data from altimetry and tide gauges

#### SPATIAL RESOLUTION AND COVERAGE

- › 10m resolution for up to 100km coverage per map
- › Coverage determined in consultation with stakeholders

#### BENEFITS

Improved strategy and decision making:

- › Safety of navigation
- › Understanding of shoreline change dynamics
- › Informed planning of coastal defences
- › Safety for coastal populations
- › Reduced risk to buildings, business and infrastructure

#### DELIVERY FORMAT

- › GEO-TIFF, NetCDF

#### FREQUENCY

Frequency of the mapping is determined in consultation with stakeholders to meet local needs.

- › Baseline mapping.
- › Annual update to maps for rapidly changing coastlines.
- › Seasonal maps where change dynamics indicate a need.