

## Satellite derived shorelines for monitoring energetic meso-tidal beaches (South Portugal)

Shoreline position data offers extremely valuable information for understanding coastal dynamism and beach changes. This research applies the SHOREX system for defining the shoreline position from free mid-resolution Landsat-8 and Sentinel-2 satellite imagery. This system allows a massive and automatic definition of the Satellite Derived Shorelines (SDS) over large regions and periods. The accuracy and utility of the resulting SDS have been previously assessed with positive results in the Mediterranean. This work presents the first assessment for SDS extraction carried out in a tidal and moderate to highly (during storms) energetic environment. The barrier beach of Praia de Faro in Ria Formosa (Algarve, South Portugal) was chosen for that purpose.

The accuracy of the SDS was defined by measuring, in 14 dates, the differences in position with respect to the shoreline deduced from DGPS profiles obtained simultaneously or on close dates to the imagery acquisition. The water level at the time of the satellite images acquisition was estimated using oceanographic data and run-up formulations. This level was associated with the SDS, allowing their comparison with DGPS derived shorelines, not always simultaneous in time.

The accuracy results are positive, with errors about 5 m RMSE. SDS from both satellites offer similar accuracy and bias and therefore they can be used together. These results support the application of the SDS derived with this methodology in high energy and dynamic beaches. The extracted shorelines, with a high revisited frequency, can offer key information on the behavior of the beaches and allow monitoring their response to episodes as coastal storms and the subsequent recovery. Of particular relevance, it is the application of such methodology to coastal areas with high vulnerability or with low accessibility, where it is very difficult to acquire continuous field data.

**Keywords:** shoreline-position variability, beach changes, short-term coastal monitoring, Landsat-8, Sentinel-2, coastal storms.

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