

Investigate monthly morphological parameters and meteo-marine forcing factors on a multibarred beach

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Many sandy beaches around the world bear intertidal bars. These sand bars are a series of parallel troughs and crests on the intertidal part of the beach. The amplitudes, heights, and number of the bars vary greatly between different settings, and their morphodynamics are not fully understood yet. However, these bars may represent a first defense against the erosion of the beach, and their complete understanding is therefore crucial in coastal management. The aim of this study is to identify the key parameters in the determination of the monthly morphodynamics of a multibarred beach.

RTK GPS profiles taken along five cross-shore lines at Groenendijk (Koksijde, Belgium) were analyzed to extract the most relevant parameters to study the monthly changes and the evolution of the intertidal bars. The profile points were first tested to determine the best preprocessing method: reprojection of the points onto a fixed profile axis and interpolation techniques were evaluated.

Several morphological parameters describing intertidal bars and beach morphology, such as sand volume, bar position, and distance between bars, were calculated using the profile points. Their ranges of monthly change were then used to determine which ones were significant to describe the bar behaviour. Further statistical analysis was then applied to investigate these parameters. Meteo-marine forcings, such as wave and current parameters, were evaluated between studies.

Results indicate that sand volume is not an appropriate parameter, at least for this study site and at this time scale: its monthly evolution is lower than the mean measurement error. Also, the number of bars can't be reliably determined due to differences in length between all profiles. However, other parameters such as distance between crests, or bar asymmetry, display significant changes from month to month.

The determination of monthly evolution at Groenendijk beach is part of a BELSPO-funded project named Remote Sensing data for investigating the morphodynamics of the Belgian multi-barred macro-tidal beach (RS4MoDy). It combines camera drone surveys and historical airborne LiDAR and orthophotos to assess the morphodynamics of the zone from short-term to long-term. The final goal of this project is to produce a conceptual model of barred beach morphodynamics at many different time scales, from event to yearly evolution.

Keywords: Barred macrotidal beach morphodynamics; RTK GPS beach profiles; Storm event; Dune-beach system