

## Are all beaches alike? Alongshore variability of the Belgian coast

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At first sight all beaches look similar, they gently slope down from land to the sea. However, if you have ever visited different parts of the Belgian coast, you might have noticed some clear differences; such as the presence of dunes, a sea dike or groynes. Then, how closely related are the different beaches along the coast?

In engineering practise it is often assumed that the coast is rather uniformly shaped at least within a section (~250 m) or even over several kilometres. On the other hand, locations only a few kilometres apart may exhibit different response to storms or other extreme events (Crapoulet et al., 2017, Houthuys, 2012). Due to the availability of high-resolution surveys of the coastal area, the validity of these assumptions can be tested.

The Belgian coast's topography is surveyed each year with lidar from an aeroplane (Eurosense, 2020). This results in a high-resolution point cloud or digital terrain model (DTM), from which profiles perpendicular to the coastline are taken. These profiles can be obtained as either a local cross-section or averaged over a distance along the coastline. In a local context it is investigated over which distance the beach profile remains the same within a coastal section. In the regional context resulting profiles for each coastal section are correlated to find out where similar profiles exist along the coast.

In areas without groynes local and averaged beach profiles differ only several centimetres, which is close to measurement accuracy. This confirms profile uniformity within a beach section. However, groynes locally disturb the beach. As a result, the local beach profile near a groyne can deviate more than 0.5 m from the mean. However, on more than approximately 10 m from the groynes the profile is uniform. For dunes alongshore uniformity does not hold. Deviations there range to several metres, underlining the complex shape of dunes.

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### Bibliography

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