Dynamic sand: Towards a resilient Belgian coast

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At some parts of the Belgian coast, dunes are replaced by dikes which form a fixed boundary in the coastal zone. In order to maintain a sustainable and climate-resilient coast, combining coastal safety objectives with natural development like wind-blown sand transport gets more important. Opposed to storm-wave processes, leading to beach erosion, quantitative understanding of wind-blown (Aeolian) processes, leading to accretion, is necessary. Wind-blown sand from the beach allows dunes to grow vertically with sea-level rise, thereby ensuring long-term coastal safety. Moreover, it is crucial for the biodiversity within the coastal region. For the past two years, the dynamic morphological behavior of the coast as a result of sand transport by wind is studied with innovative monitoring techniques at Mariakerke-Bad and Koksijde. It is noticed that sand transport dynamics are dependent on local conditions such as beach dimensions, beach topography and also meteorological and surface characteristics. Results show that the typical beach topography at Mariakerke-Bad (artificial cliff and high beach) changes rapidly during onshore moderate wind conditions (9 m/s). The artificial cliff and high beach, introduced and managed by the coastal town, changes towards a beach with a more natural slope. Based on our results, we are able to understand the dynamics of wind-blown sand transportt at a managed beach and to quantitfy the time scales at which sand transport events take place.

Keywords: wind-blown transport; monitoring techniques; coastal resilience; managed beach; topographical changes