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Assessment of the impacts of storm events for developing an erosion index

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1 Assessment of the impacts of storm events for developing an erosion index

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8 **Abstract**

9 During a storm event, strong winds combined with low atmospheric pressure and high water level
10 conditions generate surge which often cause significant beach erosion. Over the years, a number of
11 storm erosion indexes have been developed combining marine factors, but none of them incorporate
12 wind and large-scale atmospheric factors of the storm events. The occurrence of wind storms was
13 examined along the Belgian coast within a time span of 14 years (1994-2007) with respect to the local
14 marine and large-scale atmospheric factors (circulation weather types, CWT and the winter North
15 Atlantic Oscillation, NAO) under which the events took place. It was shown that 181 wind storms
16 were recorded (average of 14 events per year). This was characterized by a calm period with a range of
17 annual events from 6 to 14 between 1994 and 2001, following by an energetic period of frequent
18 events reaching up to 18 events per year for the most recent years. However, only 8% of the wind
19 storms were related to the measured erosion events. Based on the assessment of the wind storm
20 characteristics, the events were filtered with respect to the high water level, and the occurrence of
21 primary and secondary CWTs in order to identify the potential erosive wind storm events. Results
22 indicated that more than 63% of the wind storms were related to the measured sand volume loss of the
23 beaches. Also, it found that the occurrence of severe wind storms is regulated by the winter NAO
24 index. Based on these considerations, an index for the intensity of the wind storm activity is built to
25 model the induced erosion volume. A reliable and robust erosion model can help to better prepare
26 coastal managers and coastal communities for preventing the morphological impacts of severe storms

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