

Interactive comment on “Storm-induced sediment supply to coastal dunes on sand flats” by Filipe Galiforni-Silva et al.

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Storm-induced sediment supply to coastal dunes on sand flats Filipe Galiforni-Silva, Kathelijne M. Wijnberg, and Suzanne J.M.H. Hulscher

The manuscript submitted by Galiforni-Silva et al. on storm-induced sediment supply to coastal dunes on sand flats is a well-crafted piece of research that clearly shows how storm surges can contribute to the build-up of dunes where sand flats provide a surface for aeolian supply. The paper complements our understanding of the range of processes - in this instance storm surges - involved in the construction of coastal dunes. The manuscript does not have any flaws that should prohibit its publication. The data and methodology are pertinent to the aims of the study and clearly produced

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results that substantiate these aims. The methods used by the authors are sufficiently detailed and transparent to enable reproducibility. The combination of field observations and modelling enables a better apprehension of patterns of multi-decadal sedimentation. The data interpretations and conclusions are robust, viable and reliable. In terms of applicability of these findings elsewhere, the results confirm the processes of storm surge-induced sedimentation that led to the build-up of an anomalous dune, now well abandoned inland in Ghyvelde, isolated within a sand-flat environment near a former tidal inlet in the Flemish Coastal Plain, further south of the present Texel Island site (See reference 1 below). The manuscript has given proper attention to previous references on the subject and study area.

Minor comment: Regarding the armouring effects discussed on page 20, could there be a salt-crusting effect too that contributes to armouring? (See reference 2 below)

Minor typo/grammatical points and accords that I have corrected:
• Page 2, line 2:
• ...for a tide-dominated beach on the coast of France, ...
• Page 4, lines 7-14:
Storm surges with maximum water levels between the 75 quartile (0.86 meters) and 1.9 meters above MSL are classified as mild, whereas maximum water levels between 1.9 and 2.6 meter above MSL are classified as normal storm surges, and above 2.6 meters as extreme storm surges. To determine the local storm climate, we used a 29-year long time series of hourly water levels collected at the 'Den Helder' tide gauge.
• Page 6, Line 3:
• ... areas where more accretive or erosive events occurred, regardless of their magnitude and trends over time.
• Page 8, Line 8:
• ... of possible storms for validation based only on periods of mild storm surges.
• Page 9:
• 4 Results. 4.1 Supra-tidal development Figure 5 presents elevation difference maps over consecutive years. Maps show that deposition patterns in the supra-tidal zone occur over at least ten different years. For some years, as between 1998-1999 (b.) and 2003-2004 (e.), the deposition extended from the north to the south of the flat, and occurred at least 100 meters landward of the mean spring high tide level (i.e. higher elevations). For other periods, such as j., l. and r., the deposition occurred much closer

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to the MSHTL, although also oriented from north to south. For others, such as m, the deposition occurred only in the southern tip of the flat. Erosion patterns exceeding 0.16 meters occurred only over a few years,... â€” Page 15, Line 9: Â”... flat, breaking waves start to erode the beach. â€” Page 15, Line11: Â”... As water depth increases, there â€” Page 17, Line 2: Â”... supra-tidal still occurred. Using... â€” Page 20, Line 5-6: Â”Â”However, surprisingly, numerical modelling has also shown that such shore-parallel supra-tidal deposits are not from the sub-tidal zone as previously hypothesized, but are rather a product of.. â€” Page 21, Line 6: ...Â”reworked by wind and potentially other storms... .

- Reference on inland dune development from storm-surge deposition over sand-flat: Anthony, E.J., Mrani-Alaoui, M., Héquette, A., 2010. Shoreface sand supply and mid- to late Holocene aeolian dune formation on the storm-dominated macrotidal coast of the southern North Sea. *Marine Geology*, 276, 100-104. <https://doi.org/10.1016/j.margeo.2012.01.001>

- Reference on salt-crusting and impact on dune grain stability Langston, G., McKenna Neumann, C., 2005. An experimental study on the susceptibility of crusted surfaces to wind erosion: A comparison of the strength properties of biotic and salt crusts. *Geomorphology*, 72, 40-53. <https://doi.org/10.1016/j.geomorph.2005.05.003>

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