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Earth Surface Dynamics Discussions

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

Anonymous Referee #1

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This paper investigates sand supply to coastal dunes in an inlet setting using both field surveys, Lidar data, and numerical modelling using Xbeach. The authors conclude that a significant amount of sand deposited in the dunes is supplied from the sand flat fronting the dunes, which is a reasonable suggestion. The manuscript has been substantially improved from the first version. I do have, however, a few specific comments that the authors might want to consider.

Specific comments

The Xbeach model runs comprise 12 surge events but only one bathymetry (surveyed in 2009) is used. Would this introduce error in the simulations? Do you have any idea? You might want to address and discuss whether or not changing bathymetries might affect you results. I am also somewhat surprised that you use ADCP data from the tidal

inlet to validate the simulations over the sand flat. The inlet is a totally different environment with different processes (tidal currents vs wave-driven currents) being dominant. Moreover, the fit between the simulated and measured current speeds (Figure 4) is not great. I doubt that the validation exercise is relevant for conditions at the tidal flat and I actually suggest you leave out the validation and just go with the fact that you use the model in default mode.

Sediment deposition at the sand flat is caused by 'an onshore-directed water flux' (p.15, l.9). Could you be more specific? What drives this current? Is it homogeneous in the vertical? Are the simulated current speeds averages over the water column, or is there vertical segregation? Why is the current onshore when the flat is inundated?

The sediment deposition is calculated through regression techniques (p.18). Could you tell us a bit more about how you actually calculate those volumes? Do you use the scatterplots in Figure 10? In the discussion section, you compare the volume increase in the dunes with the volume increase from annual Lidar data, and with the results of numerical simulations of storm events. You conclude that between 27% and 67% of the sand added to the dunes come from the sand flat. Where does the rest come from, then? I do not think you can make this direct comparison. The annual Lidar surveys would miss all the sediment being bypassed across the sand flat during the period between two surveys, and the simulations comprise only surge situations with non-storm events left out. In short, I believe all the sand comes from the subtidal and is subsequently transported across the sand flat. If the sand flat were not replenished from offshore/longshore sources, it would have disappeared a long time ago.

Technical corrections

p.4, lines 8 & 10: 'storms surges' should be 'storm surges'.

p.5, l.1-3: The dune area has been defined as the area lying above the +3 m contour and the sand flat is located between +1.5 m and the MSHTL (earlier defined as +0.66 m). What lies in between?

p.9, l.3: ….deposition patterns in the supra-tidal zone occur between at least ten different years'. What does this passage mean?

Figure 7: What do the black and the red boxes represent?

p.16, l.15: 'interdal' should be 'intertidal'.

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