Review of Characterizing Storm-Induced Dune Erosion: Implications to Coastal Modeling

Importance and Primary Contribution
The authors present a unique dataset based on observations of dune erosion caused by Hurricane Sandy in 2012 and discuss the implications of their observations for wave-impact dune erosion models, which are primarily developed from experimental data.

This is a societally important topic as coastal sand dunes frequently protect backing ecosystems and infrastructure from coastal flooding and waves during storms. With climate change, wave impacts on coastal dunes may increase. Scientifically, there is a paucity of field data to analyze/improve the results of dune erosion models. This data set makes a significant contribution to field observations of dune erosion.

Organization and Clarity
Overall, the paper is well written and well organized. I have a few suggestions for improved readability:

Figure 1: More information about the number of profiles at each site and the alongshore extent of each site would provide more context for the reader to interpret the results. This could be presented as a table inset into the figure, perhaps with a reduced location map size, or presented as the alongshore density of profiles plotted on the map.

Figure 2: Please present the study site associated with each profile.

Results/Figure 3: It seems awkward that you present the results for Figure 3a, and then results for Figure 4 followed by results from Figure 3b and 3c. I suggest combining 3a and Figure 4 into one figure and 3b and 3c into a separate figure to improve flow of the manuscript.

Figure 3a: Including a histogram of the percent change in dune slope would be useful (or some measure of distribution spread in the text on page 9), especially if the data are not approximately normally distributed. If readers use the percent change in dune slope in a wave impact model, as you suggest in the discussion, it is important that they understand the uncertainty in the relationship.

Figures 3 & 4: I assume the dashed line in these figures is the ordinary least squares fit to the data. I suggest explicitly defining the line in a legend or in the figure caption.

Figures 3 & 4: It is difficult to interpret the points plotted in these figures because of their density. I suggest reducing the point size so individual points are visible or presenting the results as a heat map.

Figure 5d, e, f: Do the mean and standard deviation give a good representation of the distributions of beach width, dune volume above surge, and impact hours? In other words, are the distributions reasonably normal? If the distributions are non-Gaussian, it may be useful to present the median and the 16^{th} and 84^{th} percentiles (or something similar).

Throughout the text “e.g.” and “i.e.” should be set off by a comma.

Use “Here, we” or “Here we” consistently.

Use “time-series” or “time series” consistently.

Page 3: add comma between models and which

Page 4: Sentence beginning with “Data from undeveloped regions…” is very long. I suggest dividing it into two sentences.

Page 4: What are the standard deviations associated with the mean dune crest elevations? Are the distributions Gaussian?

Page 5, last line: suggest replacing “predicted” with “hindcast”

Page 8 and Figure 2 caption: suggest changing the word “expected” to “hindcast”

Page 9 suggest adding (negative θ_T) after “increases” and (positive θ_T) after “decreases”

Page 11: suggest changing “these models” to “wave-impact models”

Page 12: suggest incorporating the paragraph starting with “The large multi-state region” into the first paragraph is sub-section 5.1 to improve readability

Page 13: suggest changing the phrase “narrow dunes are more likely to be eroded faster and decrease…” to “narrow dunes are more likely to be completely eroded or decrease…”

Page 15: suggest changing “...to future storms…” to “…as a result of Hurricane Sandy…”

Research Content
The research is of high quality. I have a few minor comments and questions.

What is the uncertainty/error in offshore wave height and wave length simulated with COAWST for Hurricane Sandy?

What is the uncertainty in your estimate of $R_{2\%}$? Can you estimate it based on information in Stockdon et al. (2006)? How does this uncertainty relate to the freeboard for profiles that you hindcast to be in the collision regime but appeared to be overwashed, like in Figure 2d? Could the magnitude of uncertainty in your estimate of $R_{2\%}$ explain why, for places where overwash occurred, the TWL was within 0.5 m of the dune crest?

At the end of the first paragraph on Page 12, what are the potential reasons that the dune trajectory erodes downward in half of the data? This is an interesting and important finding, so I was looking for a little more discussion of it.