Natural Hazards and Earth System Sciences Discussions

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
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Comment on nhess-2021-31

Anonymous Referee #2

Referee comment on "Spatially compounded surge events: an example from hurricanes Matthew and Florence" by Scott Curtis et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-31-RC2, 2021

General comments

This paper considers the spatial compounding of storm surge in Eastern North Carolina during Hurricanes Matthew and Florence. While the study provides a useful method for understanding the spatial extent of surge hazards and informing emergency management activities, I am not convinced that all of the data presented actually represent wind-driven storm surge. Hurricane Florence's winds dropped to 45mph by the end of the day on September 14, and the storm appears to have left the study area by September 15. This suggests to me that the peak water levels associated with $\Delta t>3$ in the northern part of the study area in Figure 5 are actually driven by another process, not by wind-driven surge. This would likely mean that the time distributions of the two hurricanes are actually more similar than reported here.

Specific comments

Line 106: It is unclear to me what distribution the K-S test was applied to. The text says it was used to evaluate the distributions of tide magnitude and timing – was this done at each location within the study site, or was the spatial distribution compared at each time after landfall? This is clarified a bit in Tables 1-2 but should be explained in the Methods.

Line 125: The authors never explain why the stable variogram was chosen. Were other variograms tested? The results of the model testing should be presented, if not in the paper then in a supplement.

Line 115: "n is the total number" of what?

Figure 3: I don't think is it necessary to show an example of a semivariogram. The authors could point out these features on the fitted semivariograms in Figure 6.

Figure 4: Do the crosses indicate that rivers near Cape Fear reached flood stage during both storms, but no rivers near Lake Mattamuskeet ever reached flood stage (since there are no black crosses)? Please explain what "near" means in the caption (near to what?).

Figure 6: These data should be plotted on separate graphs so that the semivariogram for Matthew can be seen more clearly.

Technical corrections

Figure 2: The day/time text is difficult to read because it overlaps the storm track line and other text. Please adjust so this information is more legible.

Wind speeds are reported in knots in the text but m/s in Figure 2. Please be consistent.

Line 161: Replace “boxes” with “squares” to be consistent with the Figure 5 caption.

Line 181: This reference should be for Table 4.