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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The Floodwater Depth Estimation Tool (FwDET v2.0) for Improved Remote Sensing Analysis of Coastal Flooding" *by* Sagy Cohen et al.

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This article presents a clever approach to estimate flood depths using high resolution flood extent images from remote sensing, and digital elevation maps. Given the widespread availability of remote sensing products, the main challenge of such type of products is finding good quality DEM in all world regions, as also mentioned by the authors. The operational use of the FwDET tool in near real time during flood emergencies gives it additional importance, and stresses the need for a computationally efficient tool as demonstrated in this article, in comparison to the previous version. The article is relatively short, though self-contained, and is rather convincing about the added value

of version 2.0 of the tool. – We thank the referee for the time and effort in reviewing the manuscript. The comments are useful and constructive. See our response to each point below. Revised manuscript with Track Changes is attached as 'Supplement'

I'd appreciate a clearer description of methods, at times a bit unclear. –The methodology was clarified in response to Referee #2 comments and our own new review.

Also, evaluation based on actual measurements would give much more strength to the model (see further comments below). – See our response to these comments below.

Last point, I think that the choice of the modeled inundation map to compare with the FwDET estimate can change substantially the results. It would be useful to see a sensitivity analysis of choosing different time steps around the peak of simulated inundation maps, to understand the limitations of choosing the maximum flood depths, as currently done (more comments below). – See our response to these comments below.

Specific comments: P2 l27: It was also recently used [. . .] – changed

P4 l24: is 3 a footnote or part of the model name (UnTRIM)? –This is how it was referenced in the original paper, but we now changed it in the text to 'Version 3' for clarification.

P4 l35: please add some more quantitative details to the statement "compared favorably" —The sentence was changed to: "The street-level model subsequently generated hourly inundation outputs for floodwater depths in meters, which compared favorably with three municipally-owned water level sensors (RMSE = 4.61 cm), and 18 USGS-reported high water marks (RMSE = 9.73 cm) in southeast Virginia, as noted in Loftis et al. (2018, 2019)."

P4 l37-38: are the authors assuming that the remote sensing floodwater extent is representative of the maximum extent for this event? This assumption should be better clarified and its soundness proved. Why not simply using the simulated map which is

the closest in time to the moment when the flood image was taken? The same considerations apply to case #3 (p5 l5-6). –The FwDET calculation is not compared to remote sensing observations in these two case studies as explained at the start of this section (p4 l15). This is because the tool only calculates water depth, and thus in order to evaluate it we need an independent source which specifically provides water depth. To accomplish this, and to isolate the tool's bias due to its calculation approach, we use the modeled flood extent rather than a remote sensing derived one. Potential biases due to the remote sensing input are looked at with the other case studies.

P6 l7-8: these sharp transitions are not really visible with the current zoom level. – We added a red circle in figure 2d to direct the viewer (in the text) to an example of these artifacts.

Sect 3: the authors could comment on the availability or not of point measurements. Including these in the comparison would strengthen the results. This can also be inferred from photos taken during the flooding near known features, such as buildings, bridges etc. –There were very few high-water mark observations for case study #1 and none for case study #2. In response to the reviewer's previous comment, we added more information about the model accuracy. That being said, and as explained in the methodology, the two model case studies are used here as true water depth results in order to isolate biases in the methodology due to inundation extent observation (i.e. remote sensing). In both cases the models were calibrated against observations.

Figure 4, right panel: The current legend location on top of the Chesapeake Bay Bridge is unusual and gives the impression to the reader that there is something to hide. Please move the legend on a sea area. –Done. The map extent was also changed to align it with Figure 2.

Figure 6: Units are missing in the legend. –Added

Please also note the supplement to this comment:

https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2019-78/nhess-2019-78-AC1-supplement.pdf

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