Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2018-158-RC2, 2018

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Flood depth estimation by means of high-resolution SAR images and LiDAR data" *by* Fabio Cian et al.

Anonymous Referee #2

Received and published: 2 August 2018

The paper presents an interesting work that joins SAR remote sensing and DEM in order to asses extension and the water depth in the area affected by the flood with a user-friendly methodology.

The paper is clearly written, and the topic apppropiate for NHESS, but some points that need a better explanation I don't feel qualified to evaluate English I suggest that minor revisions are needed before the publication

General questions

1. cap 3.1 data used. There are some data from river gauge stations that allow understanding the flood dynamic? (e.g. when occurred the flood peak?)

2. Questions about "detected flood polygon" Which is the min and max dimensions of

the polygon that you consider with the same water level? In addition, the procedure to create polygons it seems not so simple "to use also for non-GIS and RS experts". To create a gradient of water level it should be a more easy solution? In the conclusion, you suggested "Another improvement may come from the method for creating the water elevation plane", eventually this improvement required much time to be included in this work?

Specific comments

Introduction: About flood mapping, methodology, water depth estimation, SAR flood mapping in an urban and vegetated area maybe consider also some recent works (e.g. Dasgupta et al., 2018; Giordan et al., 2018; Pierdicca et al., 2018)

Line 50: "SAR data at high spatial resolution are continuously acquired by many satellites": It should better to specify that nowadays, only Sentinel-1 provide free, global and constant acquisition while CSKM and TSX provide constant acquisition only on some areas (e.g., CSKM provide continuous data only for Italy and some main cities)

Figure 12: I suggest for the colour scale to use a different colour to point out the areas where the difference of water depth between SAR and model is negligible (e.g. +/- 10 cm).

Figure 10 A and B): It should be better to discuss more the errors related to strong backscatter urban area i.e. the group of buildings in the North sector was probably flooded as results from the model, but not from SAR data, it is correct?

Line 480 - 490 and Figure 13: add some more clear considerations about the overestimation of a hydraulic model and under-estimation of SAR: I suppose that some area that should be flooded according to model was protected by a breach and not flooded in truth; while the SAR underestimate flood in the area with buildings/vegetations and when the pass is after flood peak.

Line 482: remove headspace – Conclusion. Line 515-522: In my opinion, another

factor is to take into account: A flood map should be representative of the maximum extension and water depth reached during the inundation stage. It is important to remind that SAR satellite or other images represent the flooded area and water depth at a certain date and time and, if they don't acquire at the moment of maximum flood peak, the flood maps contain underestimations. As consequence it should be necessary to take as reference the data more close to the flood peak time: For instance in this specific case, in the area of Vicenza, the aerial photo represent better the real flooded area, while in the case of Saletto is the SAR data that best fit the ground truth.

Line 534: "Another improvement may come from the method for creating the water elevation plane" see my considerations at point 2.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2018-158, 2018.