Review of ***Coastal vulnerability assessment: through regional to local downscaling of wave characteristics along the Bay of Lalzit (Albania)***

Manuscript # **nhess-2018-113**

The manuscript presents a vulnerability assessment to storm-induced inundation in an Albanian coastal stretch by using a vulnerability index. The topic is on the scope of NHESS and can be of interest for NHESS readers. In what follows, some comments are given.

[1] The first comment is purely formal. Although the index used by authors can formally be denoted as a coastal vulnerability index, I recommend authors to do not use CVI to refer to the index to avoid misunderstandings with readers since CVI is usually employed to name the Coastal Vulnerability Index developed by Gornitz et al (1994) and all variations used by USGS and others. Take this in consideration and apply throughout the manuscript.

[2] *Lines 14-18 (pag 2).* The interpretation of the runup model of Stockdon et al (2006) does not seem to be formally correct. The 2% factor is common to many of runup models (and, probably, the most used statistical value in flood-hazard assessments), and it refers the value exceeded by 2% of the runup values induced during a given wave-state (which is characterized by the use of *Hs*).In essence, the idea is to select a statistical description of the runup distribution (induced by the random wave state) and its selection will depend on the objective of the analysis. This 2% does not refer to probability of exceedance or return period as the text seems to suggest.

[3] *Lines 18-24 (pag 2).* This type of observation has also been previously done for other runup models. It is due to the fact that if the model is going to be fed with deepwater input data (as it is the case of most of runup models), if wave conditions significantly modify during propagation (diffraction, irregular bathymetry), used data will not properly represent real nearshore conditions. In any case and, just regarding the use of the Stockdon runup model, I include here two references that can be helpful.

Plant & Stockdon. (2015). How well can wave runup be predicted? Comment on Laudier et al.(2011) and Stockdon et al.(2006). *Coastal Engineering*, *102*, 44-48.
Stockdon et al (2014). Evaluation of wave runup predictions from numerical and parametric models. *Coastal Engineering*, *92*, 1-11.

[4] *Line1 (pag 3)*. The right cite of Bosom García and Jiménez Quintana (2011) is Bosom and Jiménez (2011). Please change through the manuscript.

[5] Section 2.3 (pag 6). Please mention that this is (or it is based on) the index/method proposed by Bosom and Jiménez (2011).

[6] Lines 9-10 (pag 6). Please be explicit with the “physical meaning” of used intervals. (e.g something like this... *The minimum value correspond to a configuration in which the beach is not overtopped and, in consequence, the hinterland is well protected from inundation for the tested conditions. On the other hand, the maximum value ….*).

[7] *Lines 8-9 (pag 7)*. With this approach you are assuming that the probability of the hazard (runup) is the same that the probability of the wave height. However, this is not exactly true since *Ru* depends on *Hs* and *Tp*. The strict way to obtain the 38-years time-series of annual maxima *Ru*, will be to compute *Ru* of all conditions during each year and to retain the maximum value every year.

[8] Line 14-15 (pag 7). The use of a given *Tr* is not conservative by itself. The appropriateness of the used value will depend on the safety level of the analysis (which should be related to the value of the hinterland potentially exposed to inundation).

[9] *Lines 21 to 30 (pag 7).* Here I have some doubts about the authors' approach. If the objective is to do a ***seasonal analysis***, the approach is easier than the used by authors. Essentially will be to split each original time series into *N* series, where *N* is the number of seasons to be used in the analysis (2, 3, 4) and, then, to apply GEV (as it was previously done with the total time-series) to each seasonal-representative annual maxima *Ru* time series. Of course, if authors want to use nearshore data, offshore conditions need to be propagated towards the coast. So with this, direction is implicit to the analysis since each seasonal data set will only include waves corresponding to such season, and if there is any directional preference, this will be reflected in the analysis.

[10] *Line 1 (pag 8)*. If **[9]** is applied this is not true, you will obtain N (being N the number of seasons) time series of annual maxima with the same data number than using the total time-series.

[11] *Lines 2-4 (pag 8).* A threshold value of *Hs* 3 m seems to be high for the area to apply POT. Why authors used this value? How many average storms per year do you obtain? To which percentile of the cumulative distribution is equivalent this value?

[12] *Line 8 (pag 8).* The use of the empirical formula of Callaghan et al (2008) is quite problematic and, probably, not directly applicable. The formula (used coefficients) was obtained with data from a wave buoy in Botany Bay (Australia) where conditions are expected to be substantially different to the one sin the study area.

[13] *Lines 14-15 (pag 8)*. This will depend on the characteristics of the wave climate of the study site (see comment [7]).

[14] *Section 3.2* Results presented here cannot formally be named as seasonal analysis but directional analysis. As the text indicates *(line 14, pag 10)* authors divide wave sin directions and apply EVA to each (directional) dataset.

[15] *Pag 11.* Results showing T calculated in function of H using eq 5 are not valid (see comment 13). Coefficients of eq 5 have to be derived from local data.

[16] *Results, Discussion and Conclusions* maybe affected by previous comments. Adapt these sections once you decide on them.

[17] *Section 5.* The comment that using deepwater or nearshore waves give a more reliable CVI assessment is not necessarily true. This will permit to use a wave height more representative of local wave conditions. But, the vulnerability assessment will be more robust or valid provided that CVI properly reflect the conditions of the area. To validate this, you need to compare calculations with reality (e.g. are the vulnerable area usually affected by inundation?).

Formal issues

Fig [1] Please combine Figs 1 (need to be improved) and 2 (also to be improved) in just one figure.

References. Please check them carefully. Some of them are incomplete (e.g. Armaroli and Duo, 2017; Battjes'71), badly cited (De Leo et al. 2017), authors bad included (Bosom and Jiménez 2011; Oscar Ferreira et al. 2017).

Please check the grammar through the manuscript.