Review of **A Bayesian network approach to modelling rip current drownings and shore-break wave injuries**
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Authors analyse two beach safety-related hazards in the Atlantic French coast and propose a BN-based model to describe/predict them as a function of a hazard and an exposure component, each one comprising relevant variables characterising environmental (hydrodynamic and climatic/weather) conditions. The topic is in line with one of the targets of NHESS and, in this sense, the manuscript can be of interest for many NHESS readers.

In what follows, some observations/comments/suggestions are given.

General comments

[1] The proposed model includes different environmental variables to characterize the hazard and exposure components. With respect to the ***exposure component***, the implicit hypothesis is that the meteorological conditions together the time of occurrence should indicate the beachgoers affluence. Although it seems a reasonable assumption, it would be recommendable to perform an independent validation because the errors/uncertainty in this "submodel" (weather conditions controlling number of beachgoers) should affect the predictability skill of the overall model (dependence of the probability of SZI on number of beachgoers). In a previous paper (Castelle et al 2019), the authors concluded the need of better quantify exposure to better explain SZI. Is there any curve of affluence for the studied beaches which can be used to "validate" the conceptual model of exposure?

[2] Line 137. Please define "tidal gradient".

[3] Line 148. Please specify the number of the "Figure".

[4] Figures 3 and 4 can easily be combined in just one.

[5] Lines 196-198. One of the implications of discretizing injuries in binary form (and duplicating cases when exceeding 1) is to artificially augment data to be used in the BN. May this affect the real representativeness of environmental conditions affecting SZI? Also, this may also artificially increase the BN predictive performance.

[6] Figure 6.b. The confusion matrix indicates a poor performance of the model to predict injuries. I assume that this matrix corresponds to one of the tested fold runs (in fact, one with the poorest performances). However, as it is presented it seems that this is the overall performance of the model, which if so, it indicates the absence of reasonable predictive model. Please put the matrix in the right context.

[7] You propose three different metrics to measure the BN predictive performance. Do we really need to use all of them to identify the best number of bins to be used in the model? If so, how their results must be jointly interpreted (integrated)?

[8] Line 252. **M** is defined, but where do you use it?

[9] Line 278-279. So, finally, how many bins are selected for each BN. Looking to the final BNs (figures 10 & 12), you have selected 6 for shore-break and 7 for rip-current. However, the variation in prediction for both when changing from 6 to 7 is almost the same. Why didn´t you use the same number of bins in both BNs? This should give more consistency to the analysis since input variables which are almost the same will be discretized in the same way.

[10] Line 258. Are you using “complexity” to refer to the number of bins used. I would not say this is complexity but “level of definition” (or similar). I understand “complexity” by the number of components/variables used in the model.

[11] Line 289. You mention that beach profiles were taken only at one location. Unless that the beach is alongshore uniform, this may significantly affect to the role of IFS within the BN. Since you are using sinuosity (to predict rip SZI) as a measure of beach departure from alongshore uniformity, I presume that the slope will change along the beach. Do you have an estimation of the range of variation of IFS? Maybe this is the reason for the very low contribution of IFS to the variance.

[12] Line 293. I think that figures referring % variance of Exposure and Hazard are wrong (figure 9c). Exposure is the larger than hazard.

[13] Figure 9. Can you use the same scale in the X-axis for both hazards for an easier visual comparison? Are figures 9b and 9d just a zoom of figures 9a & 9c after removing the first two contributions (hidden variables)? If yes, please indicate, as it is written it suggests they were obtained independently.

[14] Lines 294-301. When you compare the contribution of hazard latent variables to the variance for shore-break and rip-current hazards, you obtain a larger contribution in the case of rip than for shore-break. May this indicate that the built model (selected variables) for the shore-break is worse than the one for rips? (e.g. the above-mentioned potential effect of neglecting variations in IFS -comment [10]-)

Line 297. If we compare the %variance of exposure variables (hour, temp, I) in both hazards (fig 9b & 9d), they are very similar (different ordering but same order of magnitude).

Line 300. Formally, you are not including wave energy as a variable in your BN. Consider that wave energy will involve a non-linear combination of H and T and the observed contribution of these individual variables may significantly vary when combined to characterize wave energy.

[15] Line 311. Where the update for larger wave heights (and the resulting change in % of shore-break injuries) can be seen?

[16] Lines 315-318. I would say here that the most likely IFS during a shore-break hazard is a steep slope whatever the tidal elevation is. Then, if you want you can highlight secondary differences in IFS, but in any case you are just concentrating in one single class for intermediate IFS (27.5 to 35), but when you refer to intermediate you could also include (20 to 27.5) and then, the probability at both tide levels would be almost the same. Furthermore, trying to draw any conclusions about IFS at low tide does not seem to make much sense, since IFS is measured above mean sea level.

[17] Lines 321-323. What are larger tidal gradients? If we consider the three central bins as representative of medium-low gradients, they are concentrating a similar % of occurrence. In fact, if we compare the probability distribution is almost similar to the prior one (Fig 11a).

[18] Lines 326-328. It is not clear from Figure 12b that more sinuous shorelines show increased probability of injuries. The updated distribution of Sin is quite similar to the prior distribution. Are the small changes detected large enough to support your conclusion?

[19] Lines 329-332. I disagree that your analysis is really reflecting that the peak of rip injuries (13h – 15 h) is much earlier than the one for shore-break one (14 to 16.33). Both bins overlap, which may be associated with the comparison of different bins resulting from using 6 classes in shore-break and 7 classes in rip for a same variable (Time).

According to Castelle et al (2019) "*For low TR, daily minimum tide elevation, which is when channel rip activity is maximised, tends to occur during the patrolled hours in the mid-to-late afternoon (Fig. 12b) when beach attendance (exposure) is maximised*". This does not seem to fully support your conclusion.

[20] Legend of Figure 13. Please change the legend to something similar to the one used in Fig 11 (e.g. Scenario with low sinuosity resulting in a higher probability of shore-normal wave direction). As it stands, it seems that you build the scenario by fixing booth sinuosity and direction.

[21] Lines 347-348. I agree with this comment. It would be interesting to assess the profile of people injured by shore-break and rips to identify potential factors affecting their relative exposure.

[22] Lines 359-360. See also the combination of video images and numerical modelling to help managing beach safety (Jiménez et al. 2007. Beach recreation planning using video-derived coastal state indicators. Coastal Engineering, 54, 507-521).

[23] Section 5.2. Please adjust comments on the role of different environmental factors according to your response to previous comments [e.g. 16, 17, 18, 19]