

Interactive comment on “Tsunami hazard assessment in the southern Colombian Pacific Basin and a proposal to regenerate a previous barrier island as protection” by L. J. Otero et al.

Anonymous Referee #1

Received and published: 28 April 2013

Comment on paper NHESD – Tsunami hazard in the Colombian Pacific Basin by L.J. Otero et al. The paper focus tsunami hazard assessment in Tumaco – Colombia. The area was impacted by several tsunamis in the past. Recently, the 1979 tsunami destroyed one of the barrier Islands in front of Tumaco city – the Island of El Guano, causing massive destruction in the city. The authors establish two earthquake scenarios based upon the seismic catalog of the region and investigate the effectiveness of the El Guano barrier island in dissipating tsunami energy. Due to the very short tsunami travel time to Tumaco region the authors question about the effectiveness of the local TWS and propose the re-habilitation of the barrier island system to protect

C155

the inhabitants of Tumaco. The paper is clearly written (minor corrections are needed) and the structure is well organized. The abstract clearly summarizes the paper. The length of the paper is adequate. In my opinion, the subject is very interesting, and the topic is quite appropriate to be published in NHESD. Having said that, I believe that the paper should be published in NHESD, although some points must be clarified. I would like the authors to answer the following questions: 1. On page 1179: the authors state that they assume as instantaneous the deformation of the ocean bottom due to the earthquake, and that the initial movement of the water over the epicentral area is computed using Okada's formulae. After this sentence the authors state that rupture speed was 2-6km/s. I believe that this value is not used by the authors in their calculations. If not, why is this value presented in the text? 1. On page 1180: it is written that "...in the Colombian Ecuadorian Pacific Region tsunamis with wavelength greater than 5 km are expected. Why 5km? Is this value correct? For 5km wavelength and depths of 4kms the shallow water approximation is no longer valid. I believe this is a misprint that the authors can easily correct. 2. The set of equations presented on page (2) and (3) do not include tide terms, but all results presented by the authors include the tide. How was the effect of tide included in the calculations? 3. The same set of equations include bottom friction. The authors do not make any comment about bottom friction (if it is used or not) during the on land propagation of the tsunami. Moreover, the simulations with and without the El Guano Island are different: in the presence of the barrier island bottom friction should play an important role. The authors should clarify this point. 4. Do the authors use or neglect the Coriolis term in the simulations? 5. The authors present Maximum Inundation maps for the different scenarios but they never explain how they compute the Energy flux. This should be clearly explained in the text as it is the quantity used to discuss the effectiveness of the barrier island. 6. The comment on Figure 10 needs to be improved. If I understood well, the authors compare the ratio of Energy fluxes for the 7 potential sources presented in figure 5. Do they simulate the same parent earthquake (in the 7 different sources) to produce the tsunami scenario? This sentence needs clarification "Figure 10 shows the relationship

C156

between the tsunami generating sources and the energy fluxes (with and without) were (?) associated with the speed and wave heights. . .” Other Corrections 1- Section 1 and 2.1 i) Figure 1 should have geographical coordinates ii) The quality of this figure does not permit a clear comparison of the past and present position of the islands. This figure needs improvement and geographical coordinates 2- Section 2.2: i) The authors present a description of the seismo-tectonic regime of the area but the figures that illustrate this section are very poor. The authors should include a new figure or re-arrange figures 2 and 3 to show: the location of the plate limits, the location of the subduction zone, the Panama fault (that is quoted in section 5), the Cabo-Corrientes - Buena Ventura and the location of the 5 epicenters:1906, 1933,1942, 1958,1979. 3- Section 3.1 i) The contract number of Transfer project should be included in the text: Contract no.: 037058 4- Section 3.2 i) Page 1182 line 13 “(Mw≤59)” should be corrected to ““(Mw≤5.9)” ii) Page 1184 line 10 “Guziakov, 2001” should be corrected to “Gusiakov,2001” ii) Page 1182 line 20, this sentence is too long and needs re-phrasing: “Based on the spatial distribution. . . identified”. iii) In my opinion, Table 1 is not needed in this study, only the references of the works by Beck and Riff, Mendonza and Dewey, and Gustcher are needed. 5- Section 3.3 i) The title of this section should be changed to: DEM (Digital Elevation Model) and tsunami source to distinguish from the next sections where simulation results are presented. ii) Line 13 page 1184 “Mw=8.6, would be produce a rupture area” should be corrected to “Mw=8.6, would produce a rupture area” iii) Table 3 is not needed. It is enough to say that the cell size of each grid was chosen in order to keep $CFL \leq 0.5$. iv) Figures 8 and 9 have different captions. Maximum Flooding and Maximum Current Flooding? The scales (in figures 8, 9 and 13) have no units (meters?); the black contours represent the shoreline? What mean the white spots in figures: 8, 9a, 9b, 13? v) The authors should add El Guano and Tumaco in figures 8, 9 and 13 to facilitate the analysis of these figures.

Please also note the supplement to this comment:

<http://www.nat-hazards-earth-syst-sci-discuss.net/1/C155/2013/nhessd-1-C155-2013->

C157

[supplement.pdf](#)

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1173, 2013.

C158