

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC5
<https://doi.org/10.5194/nhess-2020-427-AC5>, 2021
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Reply on RC3

Robert P. Dziak et al.

Author comment on "Assessing local impacts of the 1700 CE Cascadia earthquake and tsunami using tree-ring growth histories: a case study in South Beach, Oregon, USA" by Robert P. Dziak et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2020-427-AC5>, 2021

Introduction

- 24: "along the Sumatra and Japan coasts" *Changed to Japan*
- 26-29: there is plenty of recent interesting papers, especially from Japanese teams, dealing with those subjects; you must add references here. *We added these references to the Introduction section.*
- 29: not sure that the term "suppression" means what you want to write. Please review this carefully. *We reviewed this term, suppression means hindered growth in the context.*
- 36: "Cascadia Subduction Zone" – add (CSZ) and use it in the rest of the paper. *We added (CSZ).*
- 38: Sometimes you talk about the 1700 Cascadia Subduction Zone earthquake, sometimes to the 1700 megathrust earthquake, etc. Please standardize. *We interchange these words to avoid repetitive text, but did edit to try to standardize.*
- 40: "in the coastal range" *Added coastal range*
- 43: replace "the ring widths of trees" by "the width of the tree rings" (and use the same wording everywhere). *We revised this sentence.*
- 45-47: and elsewhere? There are papers and technical reports available focusing especially on tree-ring analysis in earthquake research in other parts of the World that could help your demonstration (Arsdal et al., 1998; Wells and Yetton, 2004; Stoffel and Bollschweiler, 2008 in the same journal : <https://nhess.copernicus.org/articles/8/187/2008/> , etc.). Please refer to some of them to show at least a summary of the state of the art.

The point of the summary here is to state there is little tree ring work done along the Oregon coast. The paper suggested here are useful, and we'll add these to the first part of the Introduction where we describe global tree ring studies.

48: remove space after "." *Removed.*

- 50: you indicate that the tsunami may cause physical damage to trees but what about the chemical damage? Probably a way to explore in Yoshii et al. (2012;

<https://link.springer.com/article/10.1007/s00024-012-0530-4>)

We are aware of the chemical impact on trees from exposure to seawater. We note this in the text, but feel any more detail on this subject is outside the scope of our study. Also the Yoshii et al 2012 study was very interesting, the ion discriminant method for detection of tsunami inundation is best for areas of limited rainfall, which is not the case for the Oregon coast range.

- 52: "and where there is" *Where good inundation models exist.*
- 53: where are these "large population and municipal infrastructure" ? please locate on one of your figures and refer to it in the text. *This would be the town of Newport and South beach Oregon, with as shown in Figure 1. We did add >10,000 people to specific our definition of large.*

2.0 Evidence for megathrust earthquakes and tsunamis:

- 57: "On January 26, 1700" or "On the 26th of January, 1700" and remove "in the year 1700 AD" *We removed this text.*
- 58: either write "plate boundary" or replace with "plate interface" *We replaced this*
- 61: replace "The 1700 earthquake" by "It" (apply this in other parts of the document) *We replaced with "It"*
- 63: please add the map locating approximately the epicenter of the earthquakes. *This is not known*
- 64: "comprise" – strange word, please change it. *Comprise means "consist of; be made up of". We changed to "makes up".*
- 65: Simplify your sentence, for example : "The 1700 Cascadia earthquake ground motion and ... are modelled from ~05 to 1.2 g The shaking during this event should ... ". *We changed these sentences as suggested.*
- 69-70: This sentence is a bit strangely located. You should detail which timing you're looking for. If it is the date, what I expect, please indicate why. *We are discussing earthquake origin time We changed the beginning of the sentence.*
- 71: "the dates have been obtained from". *We rephrased this sentence.*
- 73-75: it would be interesting to have a map of those coastal forests – maybe add their location on one of your figures. *We agree, it is interesting, however the location will not be on our existing location maps, and would require an additional figure. We do, however, note the location relative to our study within the text.*

▪

3.0 Model of AD 1700 tsunami

- 98: provide the coseismic subsidence value from Satake et al. *We added the Satake estimate (19 m) here.*
- 104: prefer "nested" or "imbricated" to "telescoped" *We disagree, splay is a structural geology term for this type of subduction zone faults, and would prefer to keep this term here.*
- 105: "The tsunami simulation model MOST (Method of Splitting Tsunami; Titov...) used in this study is based ..." *We agree and explained the MOST acronym here.*
- 106: "wave generation and propagation". *We added this to the text*
- 108: "wave dispersion" *We added " wave" to the text.*
- 09-110: "the digital elevation model (DEM)" ... (last grid level). *We add this to text*
- 111: the spatial resolution is already indicated L.105 *We removed repeated spatial resolution.*
- 113-116: not really clear – try to make it simple or add a scheme. *We tried to simplify text.*
- 115: "above the actual MSL". *We added this to text.*

- 124: why is the Manning's coefficient chosen identical for sea and land as it should be different. Also provide reference for the 0.03 value.
- 128: is that possible to present a ancient map or drawing of the coast showing the lack of jetties or a document justifying your choice to remove them? *We are not aware of detailed ancient maps of the Oregon coast that might be useful in this context.*
- 134: the elevation reached by sea water is commonly called "run-up height" and not "tsunami water level" We made these corrections
- 142: "than in most" We changed this text
- 144-145: please refer to the articles dealing with the impact of current on trees, especially in Japan during the 2011 Tohoku tsunami. We added the references on tsunami current here
- 147-153: you discuss about the splay fault but do not indicate if they are considered or not in your modelling finally; this is not clear. The splay fault is included, and we clarify in text.

4.0 Impacts of Earthquakes.

160: add references.

- 169: remove space after "." *Removed*
- 171: "Fort Tejon" *spelled out "Fort"*
- 179: add the latin name *Picea sitchensis* – end of sentence not clear, please rewrite. *Not sure what this means...we tried to rephrase sentence to be clearer.*
- 201: which reaction? Please develop. *We add growth to the sentence for clarification.*
- 205-208: what about the effect of salt in the soil and thus in the tree growth? Several studies available to deal with this problem. *We added a sentence and a few references here to address impacts from seawater.*

- 250: show the 5 growth reductions on the figure (only 4 arrows). The other disturbances will not be in the time frame of the figure. *We changed this to read "several other disturbances..but the most notable are at 1691 and again in 1739 and 1745*
- 251: (arrows on Figure 4a).. *We added (the arrows on figure 4a)*
- 252-253: you must show a comparison between the two dataset – maybe adding the curves on the same figure / two separate figures are not easy to compare. *We appreciate the reviewers comment, but to add figures 4a and 4b to the same plot would make this a very busy plot. The long term record (4a) can be used to see disturbances at other dates 1691, 1738 and 1745. Figure 4b highlights the largest growth reductions at 1700.*

- to other inland sites" *We deleted the ", "*
- 278: same remark about "suppression" – please change word -*Change to reductions*
- 294: "another mean to" – *We changed to "another means to assess"*
- 291-294: check and refer to Perkins et al. (EOS, 2018) – *We checked and added the reference*

Summary:

- Replace "summary" by "conclusion" *Replaced*
- 316: it would be great to add a final sentence like this one: Coastal trees, especially old ones, should be preserved from logging to help to reconstruct the seismological and tsunamical history of a region, as well as they provide natural coastal protection.
- *We like this statement, but it is somewhat of a political, and we'd prefer not to add it*
- 320: "in this study will be added in ..." *We added "added" to the text*

Figure 4a and 5a: the y axis should be the same on both figures to help the

reader to compare easily. But my previous comment was to show the two on only one figure.

We made figures 4a and 4b to have the same vertical axis. Figure 5 is a separate plot form figure 4, represents a normalized scale, and we'd like to keep the axis as is.