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# Reply on RC2

Robert P. Dziak et al.

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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-AC1, 2021

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Line 170: I would define reaction wood the first time it is mentioned

Wood formed to reorient the stem of the tree after being displaced out of its vertical orientation, as could occur during a tsunami or some other environmental factor such as wind or landslide. In gymnosperms such as Douglas-fir, this wood forms on the under-side of the stem to push the stem upwards (Groover 2016). Groover, A. 2016. Gravitropisms and reaction woods of forest trees-evolution, functions, and mechanisms. New Phytologist 211:790-802. doi: 10.1111/nph.13968

Line 200: define “water-logging” or possibly show an image of the traumatic resin canals and water logging as seen with a microwood anatomy image

Here we can just describe water logging as temporary inundation from the tsunami. We did not see any unusual traumatic resin canals or other abnormalities in wood anatomy in the 5 cores that extended back to the 1700 event.

Line 203: Where any statistical analyses done to quantitatively look at the ring growth suppression? SEA or growth release analyses?

We visually inspected the original and detrended measurement time series for sudden releases or suppressions comparable to those shown in Jacoby 1997. We also calculated the Nowacki and Abrams (1997) release criteria using the original measurement time series. Although these criterial were developed for oak, they have proven sensitive to disturbance in many other species and provided a good threshold for calculation. Releases in the decade of 1700-1710 were minimal compared to releases in other decades of the dataset (about 7% of trees showing a minor or moderate release 1700-1710 compared to a maximum of 20% 1830-1840). When these release criteria are inverted to detect suppressions, approximately the same percentage show a suppression, which is also on the lower end of the range of values when comparing to other decades. Overall, suppression and release criteria reflected what was visually evident in the detrended measurement time series: that any growth impacts were subtle, and if present, could only be detected by comparing to control chronologies. We can add more description of this in the paper. Nowacki, G.J. and M.D. Abrams. 1997. Radial-growth averaging criteria for reconstructing disturbance histories from presettlement-origin oaks. Ecological Monographs 67:225-249. https://doi.org/10.1890/0012-9615

Line 245: How were the stand-wide releases detected? Or in this case, not detected

Please see above for description of release (and suppression) criteria.

Line 266: Only the 50-yr splines were used on the control chronology>? Not the NEGEX? It was slightly unclear to me why NEGEX was dropped and why 50 yr spline was used.

This is a good point. These stands have experienced repeated disturbances, presumably from major winter windstorms, that have resulted sustained and often stand-wide releases (and suppressions). Modified negative exponential (or linear regression) detrending did not filter out this background and added considerable variance within and among tree-ring datasets. Differences between chronologies were evident when 50-year splines were applied to focus on interannual to decadal-scale differences between the two sites and filter out the very long, sustained growth releases induced by other disturbance events.