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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Tree-ring response to the 1995 M_w 7.2 Kobe earthquake, southwest Japan" *by* Sujian Lin and Aiming Lin

Anonymous Referee #1

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Review "Tree-ring response to the 1995 Mw 7.2 Kobe earthquake, southwest Japan" submitted by Sujian Lin and Aiming Lin to Natural Hazards and Earth System Sciences

A disc sample of a beech tree from a surface rupture zone in southwest Japan is used to assess the influence of an earthquake-produced lateral displacement (up to 1.8 m) in 1995 on tree-ring width. The ring width series contains four rings from 1995-1998 that are smaller than the preceding rings from 1983-1994. This observation is used as prove for the earthquake's influence on the beech tree's cambial activity and support for the more general notion that dendrochronological studies can be employed to identify seismic events.

Whereas the description of the rupture zone, the 1995 earthquake and aftermath, the environmental setting of the site, and the published tree-ring evidence related to seis-

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Discussion paper

mic events are all fine, the dendrochronological analysis presented here does not meet the standards of contemporary tree-ring research. As the term "dendrochronology" indicates that tree-ring studies include data of more than one tree, typically at least a dozen trees or so. A "chronology" is defined as the mean of a number of trees.

While I understood that several trees in the study region were affected by the 1995 earthquake, it remains unclear why only one tree was used in this dendrochronological analysis. Considering a single sequence of 46 rings of one Fagus crenata is just not enough to support conclusions on the seismic impact on cambial activity. It also remains unclear how this single tree was selected for ring width measurement, given the fact that the authors report about several trees being affected by the rupture zone.

The 46-year ring width sequence reveals narrow rings from 1995-1998 compared to the 12 rings preceding the earthquake. However, the inter-annual (and decadal scale) variance of ring width series is typically also affected by other factors influencing tree growth. A basic comparison of the (mean) chronology with observational climate (and perhaps other) data, that could explain some of the variance beyond the effects of the 1995 seismic event, is missing.

Finally, dendrochronologists typically compare the samples of the trees affected by a specific event with samples of trees that were not affected by the same event. The latter is often labeled a "reference" or "reference chronology". In the current study, this reference would need to be developed from trees growing in the same region, but not in the immediate vicinity of the lateral displacement, so that damage of the root system etc. can be excluded. Again, the reference should combine the ring width measurement series of many trees and the mean chronology of these samples (as well as the co-variance among trees) can be used to evaluate the pre- and post-1995 deviations in the affected trees.

Since these basic dendrochronological procedures were not considered in this study, and since the conclusions rely on just the ring width series of a single 46-year old tree,

the manuscript does not meet the standards necessary for publication in an international journal. I recommend rejecting this paper.

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