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Natural Hazards and Earth System Sciences
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Discussions

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

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Reply and correspondence to #1 anonymous Reviewer's comments

We are grateful to #1 anonymous reviewer for his/her critical comments on our paper submitted to Natural Hazards and Earth System Sciences. The reviewer mainly claims the following points: i) the dendrochronological analysis presented here does not meet the standards of contemporary tree-time research (A "chronology" is defined as the mean of a number of trees); 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; ii) a basic comparison of the (mean) chronology with observational climate (and perhaps other) data, that could explain some of the variance

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beyond the effects of the 1995 seismic event, is missing; iii) 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.

In short, the reviewer mainly claims that the only one sample of tree-rings is not enough to meet the standards necessary for the conclusion that the 1995 Kobe earthquake affected the tree-ring growth which can be used for identifying seismic fault events and for dendrochronological studies related to geomorphological processes. Firstly, we agree to the reviewer's (i) and (iii) comments that only one sample of tree-rings is not enough to demonstrate that the tree was damaged by the Kobe earthquake on the co-seismic fault scarp. The following documents also answer that the reviewer's question that how this single tree was selected for ring width measurement. As shown in Fig.2, we had observed immediately two days after the 1995 Kobe earthquake that the trees were damaged by the earthquake on the co-seismic fault scarp and then confirmed that most of damaged trees were withered after three months of the earthquake as documented in the text. We selected one damaged tree that was tilted on the fault scarp and survived the earthquake damage for 20 years after the 1995 event. To confirm this tree was damaged and survived on the co-seismic fault scarp as we observed immediately after the earthquake, we have also carried out a trench excavation across this fault scarp as shown in Fig. 2a, which has been reported by Lin (2018, in prepare). By the trench investigation, we have confirmed that the 1995 co-seismic fault scarp (co-seismic offset) occurred at the site where the trees were damaged and tilted. The direct observations carried out immediately after the earthquakes and trench investigations confirmed that the sampled tree was truly damaged and tilted by the 1995 earthquake on the co-seismic fault scarp. We have also tried to find out other more damaged trees that were tilted on the fault scarp and survived from the 1995 earthquake, but it is difficult to find such sample trees on the fault scarp. In the ii) comment, the reviewer suggests that a basic comparison of the (mean) chronology with observational climate (and perhaps other) data is necessary. Following the reviewer's comments and suggestions, we will add one figure (Figure S1 attached below) to discuss the relationship between the climate (precipitation and temperature in the study area during 1980∼2015. As shown in the figure, both the precipitation and temperature largely increased in the period 1997-2000 but the tree-ring width shows dramatic reduction in the period of 1995-2000. This fact indicates that the annual change of precipitation and temperature in the study area does not directly influence the tree-ring growth of the sample tree developed on the fault scarp, and therefore demonstrate that the changes in the tree-ring width was not caused by the climatic change but by the influence of the 1995 seismic faulting event. Based on the documents above, we will revise the manuscript by taking into account the reviewer's comments and suggestions.

Figure S1. Graphs showing that relationship between the changes of precipitation and temperature and the tree-ring width. (a) Annual change of precipitation and temperature in the central-western Awaji Island (data from Japan Meteorological Agency, 2017). (b) A growth grave for the tree rings.

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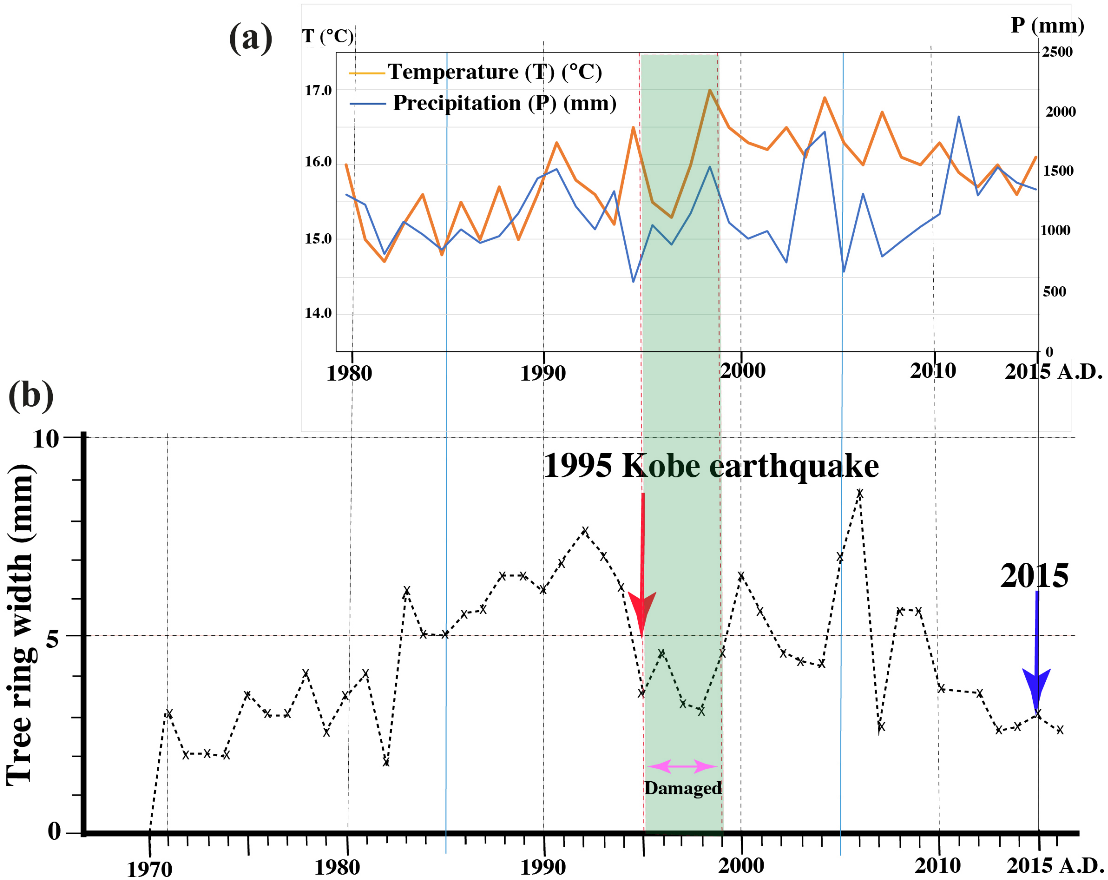

Fig. 1.

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