Interactive comment on "Space-time kriging extension of precipitation variability at 12 km spacing from tree-ring chronologies and its implications for drought analysis" *by* F. Biondi

Anonymous Referee #2

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The paper introduces the reconstruction of spatio-temporal distribution of rainfall (I would prefer to say water availability) anomalies of the period of 1650-1976 using tree-ring chronology and spatio-temporal statistics. The results are very interesting and scientifically relevant in our times, when climate variations (change?) are of ample interest in hydrology and water management. Extending time series of climate variables beyond the instrumental time series helps the understanding of the processes.

The applied methodology is sound: Based on detailed field sampling, 17 sets of tree cores were collected, and the data set was extended from Tree-Ring Data Bank by another 5 sets. Since dendrology lies very far from my field of expertise, I would not

dare to judge this part of the methodology.

Advanced statistical methods were used to create representative tree-ring chronologies for the 22 sites, correlate the tree-ring widths with measured rainfall depths and to reconstruct the spatio-temporal variability of the rainfall. Nevertheless, I would prefer to use the term water availability instead of rainfall, since the tree rings are related to the water taken up by the plant and not the rainfall directly, although the rainfall is the most important but not the only factor in it.

The methods are reasonably well explained. The title describes the topic properly, and the structure of the article is logical. But we have to admit that it is not easy to read the article: the text is very complex, especially in the discussion part. Long sentences (5-7 lines) with several brackets and references make the reader's life difficult.

We cannot agree enough with the statement on Lines 7-8 on page 4315: "Information derived from the past, such as the tree-ring reconstructions I presented, requires careful consideration." As the Author points out, the applied statistical methods are based on certain assumptions, like linearity and stationarity (and I would add isotropy), which is not necessarily the case of weather and climatic processes. Compared to the scale of the latter, the studied area is relatively small and this is the reason why no really clear overall spatial patterns could be identified in the interpolation results. Thus, in my view, the effort of spatial analysis did not really pay off in this case. Nevertheless, the introduced methods can be used on data with a larger spatial spread. Stating that the "Multi-century long dendroclimatic records with km-scale spatial resolution are therefore essential tools for designing management practices with the objective to achieve drought resiliency in individual watersheds" is a bit enthusiastic, but we can agree that these records help in understanding (spatiao-)temporal patterns of hdyro-climatic variables, and this leads to the design of better climate scenarios.

A few specific suggestion:

Breaking up long sentences into shorter and grammatically simpler ones would in-

crease the understandability of the text.

Fig. 3 – too small characters on the axes.

Fig. 4 – too small characters and messy appearance.

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