Natural Hazards
and Earth System
Sciences
Discussions

Interactive comment on "Space-time clustering of climate extremes amplify global climate impacts, leading to fat-tailed risk" *by* Luc Bonnafous and Upmanu Lall

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Thanks very much for the helpful comments We will clarify the estimation process in the Methods section as suggested We will provide the references for the multitaper and wavelet analysis and dsicuss the supplemental figures in the main text We used the 10 year return period to allow for a nonparametric analysis. Choosing a 100 year or larger return period would require an extrapolation of the probability density function fit to the data and we wanted to keep our analysis stable with respect to choosing a different density function automatically at each of the locations – the power associated with the choice of density functions is typically low, while the implications for changes in the

tail beyond the length of record are significnant. Further, since the probability varies with time – an assumption of stationarity is not really valid here, as demonstrated, it is problematic to add that choice to the density fitting process – a threshold exceedance process makes more sense to use to illustrate how the exceedance probabilities are changing. Finally, the test of clustering implies that the number of events exceeding the threshold across the spatial domain is much higher than what we expect by chance if there were no spatial clustering. In synthetic experiments with similar processes, we find that the ratio of events under dependence vs no depedence for higher thresholds is still significant if we assume a log normal distribution applies at all sites. However, since the number of exceedances over the finite record is much smaller, the result is much noisier.

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