

SPATIO-TEMPORAL AND CROSS-SCALE INTERACTIONS IN HYDROCLIMATE VARIABILITY: A CASE-STUDY IN FRANCE

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1 Response to RC1

The authors present a wavelet-based framework for understanding the variability in precipitation, temperature and streamflow in France. Especially interesting is the cross-scale analysis. However, the discussion of these results were not well done. The authors have only reported the results. More discussion on these trowing light on the physical intuition and learning derived is needed. It was also not clear if the cross scale implied across spatial scales ... in which case, one driving others is confusing as the manifestation of a variable, while having spatial variability, need not necessarily always have a causal connection. In the case of streaflow, this is clear due to the network nature of the flow. If the cross-scale is across wavelet scales, in that, for each time series, the dependence is between low-frequency vs. high frequency, then how does this dependence manifest in space needs to be disscussed.

10

We thank Referee 1 for his comments. Section 2.2.4, Line 99 specifies that Cross-scale interactions refer to phase-phase and phase-amplitude couplings between time scale of a given time series, so no spatial information is accounted in the methodology used. Additionally, cross scale interactions are estimated on each homogeneous region as identified by the clustering algorithm so spatial information within each region is also lost. The spatial dependence of those cross-scale interactions is discussed by comparing the characteristics of those interactions for each region. A much more complex test would be to test the cross scale interactions between any pair of stations, but that would be prohibitive in terms of computational cost. This is however an interesting topic, that could be explored in a future work. We also took into consideration the lack of physical insight and have provided additional explanation of our results, especially for cross-scale interactions. We started from the characteristics highlighted in Figure 3, and linked them climate and watershed characteristics known to show variability at the time scales detected in the cross-scale interactions.

20