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Spatiotemporal patterns of synchronous heavy rainfall events in East Asia during the Baiu season

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Investigating the synchrony and interdependency of heavy rainfall occurrences is crucial to understand the underlying physical mechanisms and reduce physical and economic damages by improved forecasting strategies. In this context, studies utilizing functional network representations have recently contributed to significant advances in the understanding and prediction of extreme weather events.

To thoroughly expand on previous works employing the latter framework to the East Asian Summer Monsoon (EASM) system, we focus here on changes in the spatial organization of synchronous heavy precipitation events across the monsoon season (April to August) by studying the temporal evolution of corresponding network characteristics in terms of a sliding window approach. Specifically, we utilize functional climate networks together with event coincidence analysis for identifying and characterizing synchronous activity from daily rainfall estimates with a spatial resolution of 0.25° between 1998 and 2018. Our results demonstrate that the formation of the Baiu front as a main feature of the EASM is reflected by a double-band structure of synchronous heavy rainfall with two centers north and south of the front. Although the two separated bands are strongly related to either low- or high-level winds which are commonly assumed to be independent, we provide evidence that it is rather their mutual interconnectivity that changes during the different phases of the EASM season in a characteristic way.

Our findings shed some new light on the interplay between tropical and extratropical factors controlling the EASM intraseasonal evolution, which could potentially help improving future forecasts of the Baiu onset in different regions of East Asia.

Further details: F. Wolf, U. Ozturk, K. Cheung, R.V. Donner: Spatiotemporal patterns of synchronous heavy rainfall events in East Asia during the Baiu season. *Earth System Dynamics* (in review). Discussion Paper: *Earth System Dynamics Discussions*, (2020)

