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Teleconnections and internal variability of the Asian Monsoon in the last 1000 years from paleoclimate data

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The Asian monsoon is a climate phenomenon with global reach, impacting on 60% of the world's population, and extremes in its dynamics affect both the people and the economies of Asia. Investigating past climate changes in the Asian monsoon system offers a unique key to understanding its future behavior under anthropogenic perturbation, because our global past is the only truthful realization of the "Earth System experiment" we can access. Paleoclimate data are hereby the only witnesses that testify directly about the state of the Earth system in the past. However, in order to be able to infer on the climatic processes reflected in the proxy data, three inherent challenges need to be met: the datasets are heterogeneously sampled in time (i), space (ii) and time itself is a variable that needs to be reconstructed, which (iii) introduces additional uncertainties.
Addressing these issues using adapted similarity estimators, flexible network measures and numerical simulation, we infer spatio-temporal dependencies from paleoclimate networks. We then investigate, to what extent the decadal-scale variability recorded in the paleoclimate data from trees, speleothems, sediments and ice cores is due to internal variability of the Indian and the East Asian monsoon systems, and how potential teleconnections with the El Niño southern oscillation, the North Atlantic oscillation, and solar variability have varied over the last 1000 years.