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Global patterns in the hydroclimate of the last millennium

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Most evidences show that the hydroclimate of the last millennium was mainly characterized by short-term variations related to events of internal variability. However, some reconstructions suggest that several regions also experienced long-term variations that could be attributed to the external forcing. External forcing, and particularly volcanic eruptions and solar activity, contributed to the transition from the Medieval Climate Anomaly (MCA; ca. 950-1250) to the Little Ice Age (LIA; ca. 1450-1850). These periods were mainly characterized by different global temperatures, but a phase opposition between MCA and LIA has been also observed in the hydroclimate of some particular regions. Most of these regions are located around equator, where displacements of the Intertropical Convergence Zone (ITCZ) could explain a different behaviour for MCA and LIA, and in extratropical areas, probably affected by the alteration of certain modes of variability as a result of expansions and contractions of the Hadley cell.
In this work, a compilation of several studies about reconstructed hydroclimate at particular locations has been performed, to obtain a global view where spatial patterns and dynamical mechanisms can be better assessed. The reconstructions used in this compilation include proxy data from tree rings, marine and lake sediments, speleothems, ice cores and documentary information. These sources provide information about precipitation, moisture, level of lakes and river flows during the last millennium, which can be linked to drier and wetter conditions. In particular, hydroclimatic conditions in the periods around MCA and LIA have been assessed for different regions to obtain a global pattern. Apart from this compilation based on reconstructions, analyses based on simulations from two different models (ECHO-G and CESM-LME) have been performed, to evaluate whether the spatial patterns obtained from reconstructed data are consistent with the results from model simulations and to go deeper into the mechanisms and causalities behind these hydrological patterns.