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Evaluation of simulated drought induced forest dieback

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A recent meta-analyses reviewed 88 locations where researchers reported drought induced forest dieback globally since 1945. We applied the global dynamic vegetation model LPJ-GUESS, driven by two climate datasets to investigate the reproducibility of these drought events in space and time. As a measure of drought we calculate two indices: 1.) the aridity index (AI) as precipitation divided by potential evaporation and 2.) a modified version of the Palmer drought severity index (PDSI).
The calculated drought indices correlate well with independently derived PDSI time series for Northern America. The PDSI yields a more significant correlation. Overall, our trends in the PDSI agree with other trend analysis. Applying three different length and strength of drought events, we were only able to reproduce at most 9 locations of the reported 88 locations. And there were many other areas in our model affected by severe drought events since 1948.
The reasons for this may be that: 1.) the locations were chosen for other reasons than strong drought events; 2.) Our model resolution is too coarse to capture small scale drought events; 3.) Each gridcell in the model is flat and does not have ridges, hillsides and valleys; 4.) The soil in our model has only nine texture classes and does not vary in depth globally.