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Consistency between observed and projected seasonal trends in dry periods and heavy precipitation events in Central Eastern Germany

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This contribution examines seasonal changes and their temporal stability in precipitation frequency distribution and extremes for a 200-year long study period (1901–2100), based on daily and monthly observation data (1901–2012) as well as an ensemble of regional climate projections (1961–2100). Twelve regional climate model runs from the EU project ENESEMBLES and five regional climate models used within the German project REGKLAM – some of them with different runs – were analyzed.
The study was done for a small area (150 x 150 km) in Central Eastern Europe and within the transition zone between maritime and continental climates. Regarding the trends of average annual precipitation, this region is in the transition zone between increasing precipitation totals in northern Europe and decreasing ones in southern Europe. The focus is on seasonal changes, as annual changes are negligible.
Different extreme precipitation indicators based on daily and monthly precipitation data were studied and compared with respect to the WMO reference period 1961–1990. The trend towards drier conditions during the summer half year – already visible in the observation data – is sustained in the regional climate projections. Nonetheless, there are some shifts in the timing of those precipitation decreases. While the drought trends were strongest during the first vegetation period (April to June) within the observation period, the regional climate models project the strongest precipitation decreases to occur within the second vegetation period (July to September). Trends towards an increase in frequency and magnitude of heavy precipitation events are most substantial during the winter months in both – observations as well as climate projections. There are also some tendencies for increased heavy precipitation during summer months, but these are less robust.
Further, detailed analyses on the reasons for the shift in the drying trend from early to late summer in observations as compared to climate projections are necessary to enhance the trust in climate model results.