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Assessing variations and trends in drought conditions over Central Europe

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The relevance of drought is still often underestimated for moderate climate regions like central Europe. This is connected to the slow development of droughts, which not only hampers the identification of their start and end, but also makes their impacts not immediately noticeable. Nonetheless, several drought events in recent years (e.g. 1992, 2003, 2015) demonstrated that droughts are a relevant factor for several economic activities (e.g., agriculture, water dependent industries, energy supply, etc.) in Central Europe. This is particularly true for the vegetation period, where increasing evapotranspiration rates due to rising atmospheric temperatures are intensifying existing drought conditions that originally developed from rainfalls deficits.
This contribution studies the long-term variability of drought conditions and evaluates seasonal climate trends for period 1951–2015. The temporal variability of drought is assessed at different drought time scales representing different potential drought impact categories (meteorological, agricultural, hydrological) based on a collective of approx. 90 stations from Germany, Poland and the Czech Republic. Drought intensity and duration is evaluated using different indices at monthly and daily time scales. Some of these indices are purely precipitation based and others also integrate temperature in order to estimate water balance effects.
The analyses show distinct seasonal variations in the precipitation, temperature and resulting drought trends. Particularly dry years over the entire study area have been 2003, 1959, 1953, 1982 and 2015 with 2003, 1983 and 1976 belonging to the driest summers and 1964, 1972 and 2014 representing the driest winters. Drying trends over most of the study area were observed for spring, while the trends for the other seasons are less distinct and more spatially variable, respectively. For calculated drought trends also East-West-gradients are assessed that may be connected to the gradient in continentality over the study area or changing circulation pattern.