

Drought analysis

As the first step in investigating the predictability of droughts and issue a skillful forecast, a statistical analysis of drought periods in the project region has been performed to get a grasp of how best to capture and quantify regional droughts on different time scales. The procedure to capture drought periods (in reanalysis data) has been defined as the following:

- The climatic water balance (P-E) is calculated from ERA5 reanalysis data of precipitation (P) and evapotranspiration (E).
- A moving average across the whole time span is used to smooth out short-term variance in the data.
- The annual cycle of the water balance is subtracted from the data.
- A threshold is set (e.g. the lower 5% percentile) to identify times where the water balance shows values below the threshold as drought periods.
- Time gaps of a certain length are allowed. If they occur, the drought periods occurring before and after are joined.

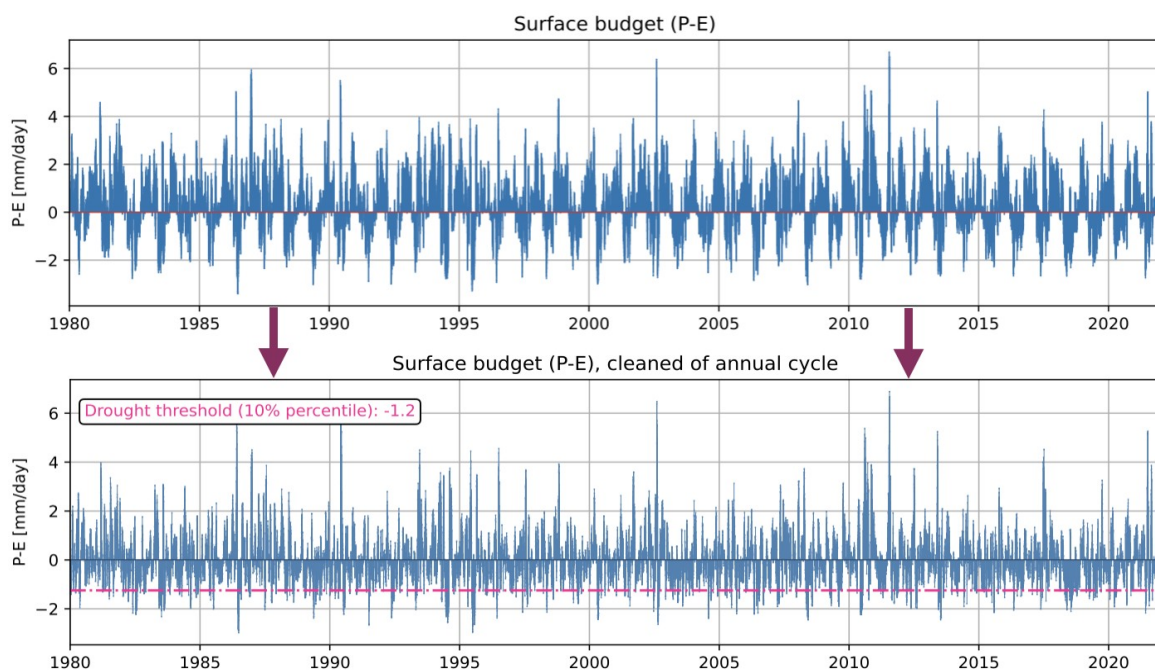


Figure 1: Procedure showing the annual cycle being subtracted from the climatic water balance (precipitation minus evapotranspiration) and setting a threshold below which periods are identified as droughts

Investigation of regional drought in large-scale context

In order to analyze the predictability of drought in the project region (lower Spree catchment), connections between regional drought periods and large-scale geopotential height over Europe (figure 2), weather patterns as well as the NAO index have been investigated. The data used is ERA5 data of 500 hPa geopotential height, the 40 weather types by the DWD and the monthly mean NAO index time series by the NOAA Climate Prediction Center.

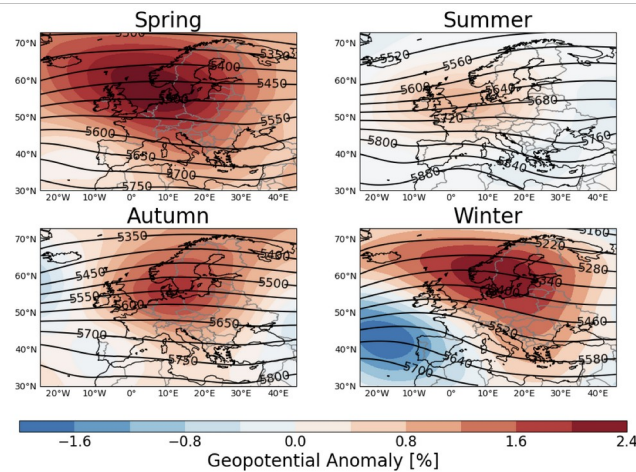


Figure 2: ERA5 500 hPa geopotential height relative anomaly of driest (below 5th percentile of monthly precipitation anomalies) months in the analysis region and isohypsies of all months, 1959-2020

Publications

Abstract IUGG conference poster, July 2023

Hauke, C., Ulbrich, U., Rust, H. (2023): Prediction and predictability of hydrological extreme events in the region Berlin-Brandenburg for risk assessment in the joint project SpreeWasser:N, XXVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG) (Berlin 2023). <https://doi.org/10.57757/IUGG23-4083>

Abstract EMS conference oral presentation, September 2023

Hauke, C., Ulbrich, U., and Rust, H.: Prediction and predictability of hydrological extreme events in the region Berlin-Brandenburg for risk assessment in the project SpreeWasser:N, EMS Annual Meeting 2023, Bratislava, Slovakia, 4–8 Sep 2023, EMS2023-542, <https://doi.org/10.5194/ems2023-542>