Study Project: Soil moisture and temperature dynamics at a relict charcoal hearth site

Contact: Dr. Anna Schneider, anna.schneider@b-tu.de

Analysis of monitoring data (soil water contents, matric potentials, soil temperature, precipitation, air temperature) from a measurement transect in the Tauersche Forst, Brandenburg. Data are recorded from June 2018 for three soil profiles: 1. reference forest soil, 2. relict charcoal hearth ditch, 3. relict charcoal hearth platform. The aim of the monitoring is to identify and characterize effects of the anthropogenic soil modification at the relict charcoal heart site on soil moisture and temperature, within the technogenic soil horizons and in soil horizons below.

Monitoring data are provided as a MSExcel spreadsheet giving the time series in different temporal resolutions (recorded values in 15 min timesteps, daily mean values, monthly mean values). The main task of the project is a descriptive analysis of the monitoring data, using basic statistic parameters and diagrams. Additionally, the study project should focus either on a detailed explorative statistical analysis of the time series data, or on a detailed discussion of the monitoring data in comparison with similar data from the literature.

Methods / Software: statistical analyses of time series data, MSExcel, R (optional), literature review

Basic tasks:

- check monitoring data: complete time series for all sensors, any gaps in the time series, implausible/faulty data for any sensors,…?
- describe meteorological conditions in the monitoring period, based on precipitation and air temperature from the site; get relevant meteorological data from nearby DWD weather stations, compare them with data measured on site
- basic descriptive statistics: determine mean values for horizons instrumented with multiple sensors, ranges of values, etc.; calculate normalized soil water contents; determine temperature and moisture ranges in addition to provided monthly mean values; …
- describe soil temperature, soil water content and matric potential time series in relation to meteorological background; prepare diagrams to support the descriptive analysis
- plot and analyze pF/WC relations for sensor positions, compare with laboratory-based relations

Additional tasks (will be specified depending on the candidate's interest): statistical time series analysis, literature review and discussion

References:

Schneider, A., Hirsch, F., Bonhage, A., Raab, A., Raab, T., 2020. The soil moisture regime of charcoal-enriched land use legacy sites. Geoderma 366. 10.1016/j.geoderma.2020.114241

Schneider, A., Hirsch, F., Raab, A. Raab, T., 2019. The temperature regime of a charcoal-enriched land use legacy soil. Soil Science Society of America Journal.
doi: 10.2136/sssaj2018.12.0483