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Heavy precipitation in mid-elevation mountain systems in Central Europe: case study of the Krušné hory/Erzgebirge (Czech Republic, Germany)

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This study investigates characteristics of heavy precipitation in the Erzgebirge at the border of Germany and the Czech Republic, as an example of Central European mid-elevation mountain systems. These mountain systems, generally characterized by a relatively high population density, are particularly sensitive to high impact weather events. Many natural hazards in these areas are associated with heavy precipitation events (e.g., flooding).
The analyses have been done for 160 gauging stations with daily precipitation records within 1960–2013. Heavy precipitation events are calculated and studied at different time scales from one-day events to ten-day events, with all days showing non-zero precipitation values. Reference heavy precipitation events are selected according to the return period values that are calculated from the fitted Generalized Extreme Value distribution. Thereby, events exceeding the 2-year return period value are defined as heavy precipitation reference events. The Weather Extremity index has been calculated for these events.
The analysis shows that the most extreme events occur mainly during the summer half year. August and May seem to be particularly susceptible to extreme heavy precipitation events. The most extreme rainfall event within our analysis was August 2002, emerging as a 9-day event with a return period of more than 200 years. This event, as well as two other of the most extreme ones, have been examined in more detail (e.g., with respect to orography, seasonality and synoptic conditions). The analyses show i.e. that the Vb van Bebber's track of cyclones is especially prone to extreme heavy precipitation events.