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Mapping precipitation extremes for pluvial flood risk management in the Sirba river basin, Burkina Faso.

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Sahelian Africa is increasingly exposed to extreme hydrological events. Both fluvial and pluvial floods are becoming more severe and frequent, posing significant new threats to the livelihoods of local communities. To enhance resilience to floods, the development of effective operational tools for assessing risk and supporting decision-making is crucial. When it comes to pluvial floods, the first step towards this goal is to improve the understanding of extreme daily and sub-daily precipitation events and their spatial patterns in the target areas. Within the SLAPIS Project framework, this work does so for the Sirba river basin (Burkina Faso and Niger) proposing a methodology to address the challenges posed by the scarcity of hydrological data typical of the Sahel region. First, it was assessed how well gridded precipitation products (ERA5, TRMM, TAMSAT) match observed rainfall records. Then, bias correction of selected datasets was performed and tested to evaluate its reliability when spatially interpolated through the whole basin. The Metastatistical Extreme Value Distribution was finally applied to the corrected datasets to investigate the precipitation extremes exploiting the bulk of the available data, unlike classical extreme value analysis, which relies on only a small subset of the data. This procedure resulted in the production of extreme daily and sub-daily precipitation maps with enhanced accuracy and robustness, providing novel information on events that can cause pluvial flooding at the settlement scale. The methodology adopted in this study could be applied to other Sahelian basins where enhanced knowledge of extreme precipitation magnitudes and patterns is needed.