# Stochastic simulation of daily precipitation extremes in West Africa [Abstract]

**Jan Bliefernicht, Manuel Rauch, Marlon Maranan, Andreas Fink, Harald Kunstmann**

**Angaben zur Veröffentlichung / Publication details:**

Bliefernicht, Jan, Manuel Rauch, Marlon Maranan, Andreas Fink, and Harald Kunstmann. 2023. "Stochastic simulation of daily precipitation extremes in West Africa [Abstract]." In *EGU General Assembly 2023, Vienna, Austria, 23–28 April 2023*, EGU23–9370. Göttingen: Copernicus. https://doi.org/10.5194/egusphere-egu23-9370.

EGU23-9370, updated on 19 Sep 2023
https://doi.org/10.5194/egusphere-egu23-9370
EGU General Assembly 2023


# Stochastic simulation of daily precipitation extremes in West Africa

**Jan Bliefernicht**[1], Manuel Rauch[1], Marlon Maranan[2], Andreas Fink[2], and Harald Kunstmann[1,3]

[1]Institute of Geography, University of Augsburg, Germany
[2]Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany
[3]Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Campus Alpin, Garmisch Partenkirchen, Germany

West Africa is one of the most data-poor regions in the world. In-situ precipitation observations are not available for many sites or contain many data gaps, thus leading to uncertainties and biases in hydrological studies in this region. To address this fundamental problem, we present a straightforward stochastic approach based on turning bands to simulate daily precipitation fields. Our approach is based on meta-Gaussian frameworks that generate Gaussian random fields, which are transformed into "real-world" precipitation fields using transfer functions. The simulation approach is tested for multiple extremes (1991 – 2016) in the Ouémé river basin in West Africa using different model settings and the most comprehensive station-based precipitation dataset available for this region. The evaluation shows that our approach is a valuable tool for simulation of daily precipitation fields and clearly outperforms classical interpolation techniques (e.g., ordinary kriging). Moreover, the simulation method can be conditioned on observations, uses only a small set of parameters and is an efficient algorithm for ensemble generation of precipitation fields for ungauged areas and design events. In our West African research projects FURIFLOOD, the precipitation simulations are used as input information for hydrological modeling to reconstruct observed flood events and to create improved hazard maps for this region. Overall, the application of this advanced technique contributes to a better understanding of precipitation uncertainties and to the provision of improved station-based precipitation products for this challenging region.