



## **A weather generator for hydro-meteorological hazard applications**

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A new multi-site weather generator is proposed here. Multi-site weather generators are designed to simulate the space-time variation of precipitation and temperature at more than one location. A semi-parametric multi-site precipitation generator was recently proposed by Breinl et. al. (Breinl, K., Turkington, T. and Stowasser, M. 2013. Stochastic generation of multi-site daily precipitation for applications in risk management. *Journal of Hydrology*, 498: 23-35). A univariate Markov process was used to model precipitation occurrence at five sites in two study areas, with precipitation amounts simulated by resampling observations and then sampling and reshuffling from a parametric precipitation distribution (Breinl et. al., 2013). In this work, the precipitation model by Breinl et. al. (2013) is implemented in a weather generator for daily precipitation and temperature. The daily precipitation generator is extended for a considerably larger network of 19 sites in the Salzach catchment (Austria) and further improved to reduce the duplication of historical observations in the simulation output. Temperature is modelled using an autoregressive-moving average model (ARMA), simulating mean daily temperature at three of the 19 sites. Extreme values have also been considered, as they are often important for hydro-meteorological hazard applications. In the proposed weather generator, power transformations reduce the bias of generated extreme temperatures. The parametric models for precipitation are comprised of Weibull distributions for low precipitation amounts and Generalised Pareto distributions to more accurately capture moderate and extreme precipitation. With its abilities to reproduce the spatial variability of precipitation as well as unobserved extremes, the proposed weather generator is particularly recommended for flood hazard and risk assessment.