EGU23-16222, updated on 12 Jun 2023
https://doi.org/10.5194/egusphere-egu23-16222
EGU General Assembly 2023

Comparison of Stochastic versus Deep Learning methods for simulation and prediction of hydroclimatic time series

Nikolaos Tepetidis, Theano Iliopoulou, Panayiotis Dimitriadis, and Demetris Koutsoyiannis
Department of Water Resources and Environmental Engineering, School of Civil Engineering, National Technical University of Athens, Greece (nikostepe191201@gmail.com)

Deep-learning methods are receiving great scientific attention and increasingly gaining popularity in a variety of water-resources tasks as well. Yet till now they are less employed for the simulation of hydroclimatic timeseries, the stochastic properties of which are usually challenging and dealt by the application of stochastic methods. The latter are well-established for the analysis and simulation of hydroclimatic processes and are particularly successful in capturing their long-term dependence behavior, so-called Hurst-Kolmogorov (HK) dynamics. In this work, we aim to assess the suitability of a state-of-the-art deep learning algorithm, called Transformer Neural Network (TNN) for hydroclimatic processes, as it is claimed to have a good performance in time series data. The Transformer Neural Networks is a novel architecture that aims to track relationships in sequential data while it is suggested that it can handle long-range dependence. We apply the TNN for the simulation and prediction of timeseries from various hydroclimatic processes (such as rainfall, runoff, temperature) and evaluate its performance in relation to the application of the HK algorithms.