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Seasonal response function for daily streamflow generation

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Daily streamflow timeseries show particular features, extremely high and at the same time extremely low values, unrecognizable in streamflow aggregated at greater time scale, which does not enable the use of ARMA type models, successfully applied to monthly and annual timeseries. Alternatively shot noise (SN) models have been proposed to reproduce short time scale streamflow series. Referring to a linear SN approach (Claps and Murrone, 1993; Murrone, 1997) recently proposed, it has been showed that seasonal model parameters variability affect model performance. The system is made up of two or more linear reservoirs, each of them representing contributions from different runoff components, having different characteristic times because of different dominant processes. The system response, to rainfall event, is the outcome of a linear combination of the single reservoir response function. The coefficients of this combination (recharge coefficients) responsible for the non-linearity in the rainfall-runoff transformation, rather than characteristic times, have been found to be variable over the year. Depending on the number of seasons identifiable within the hydrologic year, there is a number of model parameters which is greater than in the case of a constant response function and complex model identification. When applied to region with very dry seasons hardly recognizable, it's actually possible to reduce the number of seasons, generally a wet and a dry period with a more or less sharp transition period. Providing constant linear reservoir characteristic time, it will be show that a few season varying model parameters, generating a seasonal variable response function, are needed to achieve a better model performance. We will discuss applications to different catchments, characterized by different climatic conditions, switching between dry and wet seasons.