Measuring the dependence in hydrology:

Pearson's rho coefficient vs Kendall's tau measure

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Hydrological processes often involve random variables in time and space which are
dependent upon each other. For instance, in a flood event the volume of water and
the peak discharge are usually strongly positively dependent, while, in a rainfall storm
event, the mean rainfall intensity and the duration are negatively associated. Tradition-
ally, the canonical Pearson's coefficient is used to quantify the dependence. However,
the link between the variables is rarely linear, especially when these are extremes; in
addition, Pearson's coefficient exhibits problems of existence when the variables are
characterized by fat-tailed distributions. Actually, other measures like Kendall's tau
and Spermann's rho are available in Literature, which allow to quantify any kind of
dependence and do not present such problems of existence. These are tested using
simulated data.