Assessing multiyear drought statistics via regional models of yearly streamflow

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The paper tackles the issue of the reliability of drought statistics (duration and magnitude) of multiyear droughts estimated using regional models of yearly streamflow. Such models provide a convenient way to assess annual streamflows and their variability in ungauged sites. In the paper we use a regionalized model of yearly streamflow in Sicily that borrows from regionalized index flood models, in that it is composed by a growth curve of yearly streamflows indexed by their mean and a model regressing mean annual streamflow on climatic and physiografic features of the basins. The growth curves are three – parameter probability density functions such as a three parameter lognormal and the Generalized Extreme Value.

We use the model to generate both independent and serially related, when appropriate, time series of yearly streamflow and use them to compute drought statistics with given return periods (e.g. 10, 500, 100 years). Results are compared with statistics drawn from historical streamflow records. The paper also compares the performances, from the standpoint of drought statistics reproduction, of the regionalized model with those from simple two parameter at-site probabilistic models.