



Multi-year drought frequency analysis at multiple sites by operation hydrology: a comparison.

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Time series analysis techniques have been since a long time applied to frequency assessments of multiyear droughts, i.e. periods lasting more than one year when the availability of water resources keeps constantly below the expected value. Such periods, while being correctly considered as a normal expression of long - term variability in the hydroclimatic time series, now raise concern on water planners and managers in many Mediterranean areas owing to the growing pressure of civil and agricultural uses on water resources, and are recognised by many as the real test bench in the planning and management of complex systems featuring regulated resources. The paper focuses on the comparison of two models for generating yearly availabilities at different supply sources with specific regard to their ability to provide reliable results in terms of the return period of critical periods of different length. The models considered are 1) the extension to the multiple sites case of a Markov mixture model, explicitly accounting for drought occurrences and 2) a multivariate ARMA model. Both models are applied to the system of sources supplying Palermo (Italy) and its environs. Results show that only under certain conditions is the novel multisite model able to produce more severe drought events than its ARMA counterpart.