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Detection of temporal trends on floods in Spanish basins

David Santillán, Luis Mediero, and Luis Garrote
Technical University of Madrid, Madrid, Spain (david.santillan@upm.es)

Traditional flood frequency analyses usually assume stationarity on the flood regime. However, if a temporal trend is identified, non-stationarity should be assumed and time-varying parameters should be used. A detection analysis on flood magnitude was conducted in several Spanish basins by the use of the Mann-Kendall test. A prior pre-whitening procedure was applied to remove the effect of serial correlation. Temporal trends on flood seasonality were tested by directional statistics and the mean day of flood. However, large basins in Spain are highly regulated by several large dams located upstream, which usually reduce the frequency and magnitude of floods. Hydrologic series prior to the construction of the largest dams are not long enough to conduct any statistical analysis. In addition, hydrologic data show long-term trends or oscillations with periods of a given length, which varies temporally and spatially. Consequently, the minimum record length should be longer than this period, being the minimum equal to 30 years. A tool was developed to restore observed regulated series to natural regime series from observed data in the dams located upstream of a gauging station. A detection analysis was conducted both locally and at a regional scale.