Frequency analysis of annual maximum suspended sediment concentrations in Abiod wadi, Biskra (Algeria)

Authors: Benkhaled, A., Higgins, H. Chebana, F**.** Necir Abdelhakim.

Abstract

Sediment transport processes in the Mediterranean semi-arid areas have interested a great number of hydrologists and statisticians. Frequency analysis (FA) procedures are commonly applied for several hydrological events such as floods and droughts. However, in general, FA is not widely applied to treat suspended sediment concentration (SSC), especially in semi-arid regions. In the present study, an FA was performed on SSC data from 1979 to 1991 observed upstream from the Foum El Gherza dam, which is located at Biskra in the South–East of Algeria. This dam is problematic in terms of silting. Therefore, this study is mainly motivated by providing an FA model and risk evaluation in order to assist dam managers to better evaluate the potential of silting resulting from SSC transport to the reservoir. Probability distributions commonly used in hydrology were tested to SSC data recorded at the M'chounech station on Abiod wadi located upstream the dam. All the FA steps were considered; including classical techniques (e.g. goodness-of-fit tests, statistical criteria) as well as recently developed tools (tail distribution classification). Their application led to the selection of the lognormal distribution (LN2) to fit the considered data, and hence an accurate risk assessment could be obtained. Because of the presence of a slight trend, non-stationary models are also considered in the present study.

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