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SESSION II – RISK ANALYSIS

**PMF ESTIMATION USING UPPER BOUNDED STATISTICAL MODELS AND ITS EFFECT ON HIGH
RETURN PERIOD QUANTILES**

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ABSTRACT

This work proposes the estimation of flood quantiles using upper bounded distribution functions, assuming its upper bound parameter as a statistical estimator of the Probable Maximum Flood (PMF). It is proposed also to use additional Non-Systematic information in order to reduce the estimation uncertainty of high return period quantiles and the PMF.

Three upper bounded cumulative probability distribution functions (referred to in this work as TDF, LN4 and EV4), were applied to some Mediterranean Rivers in Spain. Depending on the information scenario, different methods to estimate the upper limit of these distribution functions have been merged with the Maximum Likelihood (ML) method.

Results show that it is possible to obtain a statistical estimate of the PMF value and to establish its associated uncertainty. With enough information, the associated estimation uncertainty for very high return period quantiles is considered acceptable, even for the PMF estimate.

The estimates for high return period quantiles are different for the three evaluated distributions and, for the case studies, the EV4 gave better descriptive results. Also, the asymptotic behaviour approaching to its upper limit of the bounded distributions can produce significant differences with traditional unbounded distributions for medium and high return periods.

From the robustness analysis, the EV4 distribution function appears to be more robust than the GEV and TCEV unbounded distribution functions in typical Mediterranean rivers, characterized by a high torrentiality. In these cases and if there is an upper limit, the GEV quantile estimates are clearly unacceptable.