Orographical and stochastic storm transposition for estimation of large return period floods.

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This paper deals with the problem of effective estimation of flood peaks quantiles for large return periods is strongly conditioned by the lack of reliable data associated with extreme floods, producing large uncertainty in upper tail estimation of the distribution function. The research makes use of the storm transposition principles incorporating meteorological and topographical factors. Through a practical case study (Palancia river basin-Spain) the research shows the feasibility of the practical application basically oriented to optimal dimensioning of large dams and other flood control and protection hydraulic infrastructures. Key concepts introduce in the method include the central gradient linked to the depth of maximum precipitable water in the atmosphere, and its variation in different directions around a given geographical point, allowing isolating in practice the influence of the topography in the transposition procedure. The final goal is to derive and quantify the hypothetic precipitation amounts and distribution under extreme meteorological conditions, obtained from relevant variables like the temperature of the sea, temperature of the upper air masses, wind, pressure, distance to the coast, height, etc. This allows an extension under meteorological basis from the actual historical sample. Although the core of the investigation is the storm transposition, a comprehensive approach to the general problem previously outlined is presented, including deterministic storm parameterisation, a proposal for the practical incorporation of flood seasonality in the analysis, and rigorous links with the PMP (probable maximum precipitation) and PMF (probable maximum flood) concepts, the effective consideration of the actual diversity of hydrographs patterns associated with a given return period, and a detailed implementation of the general methodology proposed, including the above mentioned case study of the Palancia river (east of Spain).