Error of the modelled peak flow of the hydraulically reconstructed 1907 flood of the Ebro River in Xerta (NE Iberian Peninsula)

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The estimation of the uncertainty of the results of the hydraulic modelling has been deeply analysed, but no clear methodological procedures as to its determination have been formulated when applied to historical hydrology.

The main objective of this study was to calculate the uncertainty of the resulting peak flow of a typical historical flood reconstruction. The secondary objective was to identify the input variables that influenced the result the most and their contribution to peak flow total error.

The uncertainty of 21-23 October 1907 flood of the Ebro River (NE Iberian Peninsula) in the town of Xerta (83,000 km2) was calculated with a series of local sensitivity analyses of the main variables affecting the resulting peak flow. Besides, in order to see to what degree the result depended on the chosen model, the HEC-RAS resulting peak flow was compared to the ones obtained with the 2D model Iber and with Manning's equation.

The peak flow of 1907 flood in the Ebro River in Xerta, reconstructed with HEC-RAS, was 11500 m3·s-1 and its total error was ±31%. The most influential input variable over HEC-RAS peak flow results was water height; however, the one that contributed the most to peak flow error was Manning's n, because its uncertainty was far greater than water height's. The main conclusion is that, to ensure the lowest peak flow error, the reliability and precision of the flood mark should be thoroughly assessed. The peak flow was 12000 m3·s-1 when calculated with the 2D model Iber and 11500 m3·s-1 when calculated with the Manning equation.