

## **Evaluation of various modelling approaches in flood routing simulation and flood area mapping**

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An essential process of flood hazard analysis and mapping is the floodplain modelling. The selection of the modelling approach, especially, in complex riverine topographies such as urban and suburban areas, and ungauged watersheds may affect the accuracy of the outcomes in terms of flood depths and flood inundation area. In this study, a sensitivity analysis implemented using several hydraulic-hydrodynamic modelling approaches (1D, 2D, 1D/2D) and the effect of modelling approach on flood modelling and flood mapping was investigated. The digital terrain model (DTMs) used in this study was generated from Terrestrial Laser Scanning (TLS) point cloud data. The modelling approaches included 1-dimensional hydraulic-hydrodynamic models (1D), 2-dimensional hydraulic-hydrodynamic models (2D) and the coupled 1D/2D. The 1D hydraulic-hydrodynamic models used were: HECRAS, MIKE11, LISFLOOD, XPSTORM. The 2D hydraulic-hydrodynamic models used were: MIKE21, MIKE21FM, HECRAS (2D), XPSTORM, LISFLOOD and FLO<sub>2</sub>d. The coupled 1D/2D models employed were: HECRAS(1D/2D), MIKE11/MIKE21(MIKE FLOOD platform), MIKE11/MIKE21 FM(MIKE FLOOD platform), XPSTORM(1D/2D). The validation process of flood extent achieved with the use of 2x2 contingency tables between simulated and observed flooded area for an extreme historical flash flood event. The skill score Critical Success Index was used in the validation process. The modelling approaches have also been evaluated for simulation time and requested computing power. The methodology has been implemented in a suburban ungauged watershed of Xerias river at Volos-Greece. The results of the analysis indicate the necessity of sensitivity analysis application with the use of different hydraulic-hydrodynamic modelling approaches especially for areas with complex terrain.