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Flash floods simulation in small basins, using a two –dimensional hydraulic model

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The paper aim is to present Potop, a bi-dimensional hydraulic model used for analysis of two representative flash flood events which took place in Romania.
This work has been carried out for the Hydrate project, which is a currently ongoing EC funded project that is aiming to improve techniques for flash flood forecasting.
The program models the non - permanent two- dimensional water movement with free surface, through the numerical integration of the Saint – Vénant equation system, formed by the continuity equation and the simplified movement equations (maintaining only the friction term), written in the plan on the Ox and Oy directions.
The numerical integration is made in the implicit scheme, by linearization and the application of the double deflection method extended to the plan, alternatively on the network lines and columns.
The representative results offered by the model consisted in maps which contained the network scheme and the terrain topography. Also, at any time step during the flood: graphics representing the precipitation variation, levels of the water free surface, instantaneous or maximum recorded depths, water speed, depth hydrograph or levels of the free surface in any network knot and discharge hydrograph in any solicited section or in a singular knot in which it was imposed a rating curve or a discharge hydrograph.
POTOP Model implementation is based on the DTM of the basins, which is a ASCII type GRID, obtained from the SRTM DTM with 90 m resolution, after the interpolation at 30 m. The model use the rating curve at the basin outlet as limit condition
different rain producing scenarios on the basis of the historical records in the area, in slope and river channel roughness scenarios (corresponding to some forestation/deforestation or silting/river bed regulation scenarios)
The model was calibrated and validated in two small basins: Moneasa and Feernic. Meantime, it was used in an ungauged basin, Grinties, where an importing flash flood was occurred.
Taking into consideration the fact that the model was not calibrated on historical data and the limited amount of topographical data, all the simulations results should be regarded as general and preliminary results.
Despite this preliminary aspect, the results show the potential of using a two – dimension hydraulic model approach for the simulation of flash floods formation in small basins, for estimating the most vulnerable and critical area within the basin and also for estimating the efficiency of different flood control measures and actions.