MHYST – a reach-scale approach to the computation of inundated areas: application to the June 2016 Seine basin flood

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Traditionally, flood inundation extents are computed using numerical resolutions of the Shallow Water Equations (SWE) in one or two dimensions, with various simplifications adapted to the wide range of rivers. However, the lack of topographical and roughness data and the large computation time often restrict the use of these models to rather small areas and well-documented reaches. These drawbacks urged the development of alternative, simple conceptual methods such as HAND (Height Above Nearest Drainage, Nobre et al., 2016) or EXZECO (Pons et al., 2010) able to rapidly derive static flood maps from DEM information, but at the price of a general overestimation of inundated areas.

MHYST is a simplified hydraulic method based on the DEBORD formulation (Nicollet and Uan, 1979) and hydraulic geometry assumptions (Leopold and Maddock, 1953), which builds a reach-scale relation between HAND values and discharges for a steady uniform flow. Once the relation is constructed, the model can simulate any event, as long as streamflow observations or simulations are available. It looks for the reach-scale HAND value corresponding to the daily discharge and derives an inundation map from DEM elevations.

We test this approach on a recent (May-June 2016) major flood event on the River Loing (a tributary of the River Seine upstream Paris) for which observational data allow us to analyse its sensitivity to its different components.

References

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