Geophysical Research Abstracts
Vol. 15, EGU2013-12683, 2013
EGU General Assembly 2013

Flood extent maps from satellite imagery, hydrometric data and downstream water surface slope to constrain uncertainty in inundation modelling based on SRTM or LiDAR topography

Kun Yan (1), Giuliano Di Baldassarre (1), Jeffrey Neal (2), Dimitri P. Solomatine (1,3)

(1) UNESCO-IHE, Institute for Water Education, Delft, the Netherlands (k.yan@unesco-ihe.org), (2) School of Geographical Sciences, University of Bristol, Bristol, UK, (3) Water Resources Section, Delft University of Technology, the Netherlands

Flood inundation modelling is one of the essential steps in flood risk assessment. However, in many rivers and floodplains the desirable input data are not sufficient or unavailable. A potential opportunity to fill this gap might be offered nowadays by the global remote sensing data, which can be freely (or at low cost) obtained from internet, such as the Shuttle Radar Topography Mission (SRTM). However, it is not clear to what extent modellers can trust or make use of these topographic data.

Previous studies have assessed the usefulness of SRTM topography data in supporting flood inundation modelling of one-dimensional (1D) hydraulic model in a medium-large scale river (River Po) considering the major source of uncertainty (parameter and inflow) (e.g. Yan et al., 2012). This study attempts to prove the potential value of SRTM topography in supporting two-dimensional (2D) inundation modelling. The usual practice by modellers is to apply a normal depth (calculated from the energy slope) as the downstream boundary condition. The energy slope is usually unknown and is estimated as the average bed slope under the assumption of uniform flow near the downstream boundary. Being a study involving the attenuation of the flood wave, a steeper energy slope is expected. Thus, the inundation modelling results (e.g. water levels, inundation extent) are affected by this assumption. The sensitivity and the interrelationship of energy slope, roughness coefficients for the prediction of water stage and flood extent are investigated for both high resolution topography (i.e. LiDAR) and global topography (i.e. SRTM) in a river reach of the Dee, in the United Kingdom. Through the comparison of the two models, the performance of the SRTM-based Model in reproducing the food extent and downstream water levels were demonstrated.

Reference: Yan, K., Di Baldassarre, G., Solomatine, D.P. (2012). Exploring the potential of SRTM topographic data for flood inundation modelling under uncertainty. Journal of Hydroinformatics, in press.