Geophysical Research Abstracts
Vol. 17, EGU2015-10452, 2015
EGU General Assembly 2015

Multi-temporal topographic models in fluvial systems: are accuracies enough to change the temporal and spatial scales of our studies?

Damià Vericat (1,2), Ester Ramos (1), James Brasington (3), Efrén Muñoz (1), María Béjar (1), Chris Gibbins (4), Ramon J. Batalla (1,2,5), Álvaro Tena (1), Mark Smith (6), and Joe Wheaton (7)

(1) University of Lleida, Fluvial Dynamics Research Group, Department of Environment and Soil Sciences, Lleida, Spain (dvericat@macs.udl.cat), (2) Forest Technology Centre of Catalonia, Solsona, Spain, (3) Queen Mary University of London, United Kingdom, (4) Northern Rivers Institute, University of Aberdeen, Aberdeen, United Kingdom, (5) Catalan Institute for Water Research, Girona, Spain, (6) Leeds University, Leeds, United Kingdom, (7) Utah State University, Utah, USA

Recent advances in topography are offering a set of opportunities that deserve a critical evaluation before being successfully applied. Terrestrial Laser Scanning opened a new world by offering the opportunity to obtain topographic models at unprecedented resolutions. The time involved in data acquisition, although has substantially improved by means of fast scanners and new mobile platforms, limited the spatial and temporal scales in which such technique could be applied. Automatic Digital Photogrammetry or Structure from Motion is now offering a new set of opportunities and challenges. This technique possesses the trilogy a geomorphologist is looking to fully understand how landforms change and which are the main causes and consequences: speed, cost and resolution. But, a set of questions arise after all post-processing involved in these novel datasets: are accuracies enough to jump at large spatial scales? Can we repeat topographic surveys and depict small magnitude but relatively high frequent landform deformations overcoming the minimum level of detection of our comparisons?

In this paper we present some of the preliminary results obtained in the background of MorphSed (www.morphsed.es). Morphsed is analysing the morpho-sedimentary dynamics of a fluvial system at multiple temporal scales. Multi-event topographic models (DEMs) are obtained by means of Structure from Motion using close range aerial photography obtained in a 12-km channel reach of the wandering Upper River Cinca (Southern Pyrenees, Iberian Peninsula). Topographic channel changes are critically analysed based on the quality of the developed models. DEMs obtained at different periods are compared (DoD). Two general comparisons are performed: (a) comparison of topographic models obtained before and after low magnitude channel changes, and (b) comparison of models acquired before and after major channel disturbances. Special attention is paid to the role of the ground control, data density and resolution. A spatial distributed minimum level of detection is estimated and the distributions of cells above and below these values are reviewed. DoDs are thresholded, the morphological budget calculated and results compared. Finally, some general rules to consider when our field-data acquisition design is being developed are presented.