Geophysical Research Abstracts
Vol. 20, EGU2018-9364, 2018
EGU General Assembly 2018

Can bedload help to predict suspended load in gravel bed rivers?

Clément Misset (1), Alain Recking (1), Oldrich Navratil (2), Cédric Legout (3), Alain Poirel (4), and Marine Cazilhac (4)

(1) UR ETGR - Irstea, Université Grenoble Alpes, Grenoble, France (clement.misset@irstea.fr), (2) Laboratoire Environnement, Ville, Société - UMR 5600, Université Lumiere Lyon 2, Bron, France, (3) IGE - UMR 5564, Université Grenoble Alpes, Grenoble, France, (4) EDF - Division Technique Générale (DTG), Grenoble, France

Suspended load prediction is crucial for water resource management as the transport of fine sediment is associated to important socio-economic stakes such as pollutant transport, riverbed clogging or reservoir siltation. Several semi-theoretical equations were proposed to estimate suspended load using river reaches averaged parameters as often done for bedload (Bagnold 1966, Camenen and Larson 2008, Celik and Rodi 1991, Van Rijn 1984). These formulas developed for lowland rivers with sandy sediments usually consider a progressive increase of suspended load fraction with increasing shear stress. However, Gravel Bed Rivers (GBR) have usually armored bed with fine sediments potentially contributing to suspension stored under a poorly mobile layer of coarse sediments. Thus, the use of usual suspended load equation developed for sand bed rivers and considering a linear transition from bedload to suspended load could be questionable in GBR. Indeed in such rivers, the release of fine sediments from the river bed could be controlled by the armor mobilization and the initiation of bedload transport.
Therefore, the main question addressed in this work aims to answer to which extent bedload can be used to predict/model fine sediment load in GBR? It was investigated by analyzing a dataset of 3011 instantaneous field measurements of both bedload and suspended load on 85 rivers collected in literature studies. A dimensionless empirical relation between the two modes of transport was deduced from this analysis. It was then tested with a reach average bedload formula to reconstruct suspended fluxes on 8 alpine GBR that were not used in the calibration step. Promising results were obtained for alluvial rivers. Suspended sediment loads were predicted reasonably well in comparison with standard equations.