Geophysical Research Abstracts
Vol. 15, EGU2013-5233, 2013
EGU General Assembly 2013

An analysis of bedload and suspended load interactions

alain Recking (1) and Oldrich Navratil (2)

(1) Irstea, ETNA, St Matrin d'Hères, France (alain.recking@irstea.fr), (2) Université de Lyon 2, Laboratoire EVS/IRG UMR 5600 (navratiloldrich@gmail.com)

Several approaches were used to develop suspension equations. It includes semi-theoretical equations based on the convection diffusion equation (Einstein 1950; Van Rijn 1984; Camenen and Larson 2008; Julien 2010), semi-empirical tools based on energy concept (Velikanov 1954; Bagnold 1966), empirical adjustments (Prosser and Rusttomji 2000). One essential characteristic of all these equations is that most of them were developed by considering continuity between bedload and suspended load, and that the partitioning between these two modes of transport evolves progressively with increasing shear stress, which is the case for fine bed materials. The use of these equations is thus likely to be welcome in estuaries or lowland sandy rivers, but may be questionable in gravel-bed rivers and headwater streams where the bed is usually structured vertically and fine sediments potentially contributing to suspension are stored under a poorly mobile surface armour comprising coarse sediments. Thus one question this work aimed to answer is does the presence of an armour at the bed surface influence suspended load?
This was investigated through a large field data set comprising instantaneous measurements of both bedload and suspension. We also considered the river characteristics, distinguishing between lowland rivers, gravel bed rivers and headwater streams. The results showed that a correlation exist between bedload and suspension for lowland and gravel bed rivers. This suggests that in gravel bed rivers a large part of the suspended load is fed by subsurface material, and depends on the remobilization of the surface material. No correlation was observed for head water streams where the sediment production is more likely related to hillslope processes.
These results were used with a bedload transport equation for proposing a method for suspended load estimate. The method is rough, but especially for gravel bed rivers, it predicts suspended load reasonably well when compared to standard convection diffusion equations.