Geophysical Research Abstracts
Vol. 14, EGU2012-7524, 2012
EGU General Assembly 2012

Calibration of a physically based soil erosion model for different kind of biological soil crust

O. Cerdan (1), M. Le (1), O. Malam Issa (2), C. Valentin (3), JL. Rajot (4), and JF. Desprats (5)

(1) Bureau de Recherches Géologiques et Minières, RNSC RMT, Orleans, France (o.cerdan@brgm.fr), (2) GEGENA, Université de Reims, Reims, France, (3) BIOEMCO, IRD, Bondy, France, (4) BIOEMCO, UMR IRD 211, Paris, France, (5) BRGM, RIS/RIC, Montpellier, France

Biological soil crusts occur extensively in semi-arid regions; in western Niger, they are associated with various types of physical soil crusts. The objective of this study is to elaborate and calibrate a dynamic erosion model coupling the Shallow Water equations with the Hairsine-Rose model for different sediment size classes. The study is based on runoff measurements performed in situ on ten 1-m2 plots under simulated rainfalls. Biological soil crusts capped pre-existing physical soil crusts with a percentage cover between 39 and 80% on structural crusts compared to 4 and 29% on erosion crusts. Calibration is firstly performed on the saturated infiltration capacity of the different crust types using a minimising algorithm where the distance is based on the Nash–Sutcliffe coefficient. The result is that whatever the suction values we find a power relation between the infiltration of BSC and the infiltration of BSC overlying physical soil crusts. The erosion model is also calibrated to take the different types of crust into account. These results will contribute to evaluate the potential role of biological soil crusts in soil and water redistribution modelling in arid environment of western Niger.