Geophysical Research Abstracts
Vol. 18, EGU2016-3899, 2016
EGU General Assembly 2016

How vegetation patterning affects sediment dynamics in complex landscapes

Jantiene Baartman (1), Arnaud Temme (2), and Patricia Saco (3)

(1) Soil Physics and Land Management Group, Wageningen University, Wageningen, Netherlands (jantiene.baartman@wur.nl), (2) Soil Geography and Landscape Group, Wageningen University, Wageningen, The Netherlands, (3) School of Engineering, The University of Newcastle, Callaghan, New South Wales, Australia

Semi-arid ecosystems are often spatially self-organized in typical patterns of vegetation bands with high plant cover interspersed with bare soil areas, also known as 'tigerbush'. Tigerbush dynamics have been studied using model simulations on flat synthetic landscapes, although in some cases straight slopes were used. The feedbacks between vegetation and more realistic and complex landscapes have not been studied yet, even though these landscapes are much more prevalent. Hence, our objective was to determine the effect of landform variation on vegetation patterning and sediment dynamics. We linked two existing models that simulate (a) plant growth, death and dispersal of vegetation, and (b) erosion and sedimentation. The model was calibrated on a straight planar hillslope and then applied to (i) a set of synthetic but more complex topographies and (ii) three real-world landscapes. Furthermore, sediment dynamics were evaluated by comparing simulated sediment output with and without vegetation dynamics. Results show banded vegetation patterning on all synthetic topographies, always perpendicular to the slope gradient. For real topographies, banded vegetation was simulated in the relatively flat, rolling landscape and in the dissected landscape when slopes were gentle. In the steep dissected landscape and the alluvial fan, vegetation was simulated to grow in local depressions where moisture is present whereas hilltops were bare. Including vegetation dynamics resulted in significantly less simulated erosion and relatively more deposition compared to simulations with uniformly distributed vegetation.