Geophysical Research Abstracts
Vol. 18, EGU2016-5465, 2016
EGU General Assembly 2016

Emergence of river dynamics through changing vegetation patterns

Mijke van Oorschot (1,2), Maarten Kleinhans (1), Hans Middelkoop (1), and Gertjan Geerling (2)

(1) Faculty of Geosciences, Universiteit Utrecht, PO Box 80115, 3508 TC, Utrecht, the Netherlands, (2) Department of water quality & ecology, Deltares, PO Box 177, 2600 MH, Delft, the Netherlands

Riparian vegetation interacts with morphodynamic processes in rivers to create distinct habitat mosaics supporting a large biodiversity. The aim of our work is to quantitatively investigate the emergent patterns in vegetation and river morphology at the river reach scale by dynamically modelling the processes and their interactions.
Here, we coupled an advanced morphodynamic model to a novel dynamic riparian vegetation model to study the interaction between vegetation and morphodynamics. Vegetation colonizes bare substrate within the seed dispersal window, passes several growth stages with different properties and can die through flooding, desiccation, uprooting, scour or burial.
We have compared river morphology and vegetation patterns of scenarios without vegetation, with static vegetation that does not grow or die and several dynamic vegetation scenarios with a range of vegetation strategies and eco-engineering properties.
Results show that dynamic vegetation has a decreased lateral migration of meander bends and maintains its active meandering behavior as opposed to the scenarios without vegetation and with static vegetation. Also the patterns in vegetation and fluvial morphology and the vegetation age distribution mostly resemble the natural situation when compared to aerial photos of the study area.
We find that river dynamics, specifically sinuosity and sediment transport, are very sensitive to vegetation properties that determine vegetation density, settlement location and survival.
Future work will include the effects of invasive species, addition of silt and the effect of various river management strategies.