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## **Groundwater and transmissivity exert a strong effect on drainage density and landscape evolution**

**Elco Luijendijk**

Hannover, Germany (elco.luijendijk@posteo.net)

The role of groundwater flow in landscape evolution and the evolution of stream networks has long been debated but is still uncertain. This contribution explores the role of groundwater in the evolution of stream networks using a new model code, GOEMod, that simulates coupled groundwater flow, overland flow and erosion. The model results show that groundwater flow exerts a strong control on drainage density in humid areas. Drainage density is inversely correlated with transmissivity. Stream networks evolve by a newly identified process named groundwater capture, whereby streams that receive more water and incise faster draw the watertable below adjacent streams, which causes these streams to fall dry. This process is more efficient in areas with high transmissivity due to a relatively flat watertable. This contribution also discusses sensitivity analyses that compare the importance of groundwater to other landscape evolution processes. In addition, a set of model experiments is discussed that explores the persistence of stream networks in response to changes in base level, groundwater recharge and other parameters.