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Stream laws in analog tectonic-landscape models

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Additional Supporting Information (Files uploaded separately)

Raw data: DEMs, and pictures of models: https://doi.org/10.5880/fidgeo.2022.029

Introduction

This supplementary material contains

- Description of channel extraction and channel metrics
- Description of the calculation of the eroded volumes.
- Description of acquisition time methods
- Table S1, where we present the models and the applied boundary conditions
- Figure S1, in which we describe the experimental apparatus
- Figure S2, in which we show the streams longitudinal profiles of streams for every model
- Data set, in which we uploaded the raw DEMs and picture of the models presented in the main text.

Channels extraction and channel metrics

Channels are extracted from every basin at every time step using the function "klargestconncomps" implemented in TopoToolBox (Schwanghart and Scherler, 2014). In doing so, channel width is not considered, and channels are computed pixel by pixel considering elevation and slope difference between neighbors pixels, all having a common basin outlet and watershed manually selected by the user. From these channels, values of ks and θ are computed by power law regression between local slope and area (slope-area regression).

Eroded volumes

We create a numeric regular grid on the model surface. The eroded volumes are extracted calculating the cumulative difference in elevation (Δz) of the same cells at consecutive times. The cells dimension is function of the horizontal resolution of the laser scan (here 0.05 mm). Knowing the cell dimensions and the corresponding Δz, is it possible to obtain the total volume of eroded material at every time step.

Acquisition time

Data have been collected at specific times. These times are (min): 15, 30, 45, 60, 90, 120, 150 ,180, 240, 300. These times correspond to the moments when laser scans have been taken.

Model name	Imposed regional slope (degrees)	Rainfall rate (mm h^{-1})
mod1009	10	9
mod1022	10	22
mod1070	10	70
mod1509	15	9
mod1522	15	22
mod1570	15	70
mod2009	20	9
mod2022	20	22
mod2070	20	70

Table S1. Models name and relative boundary conditions applied.

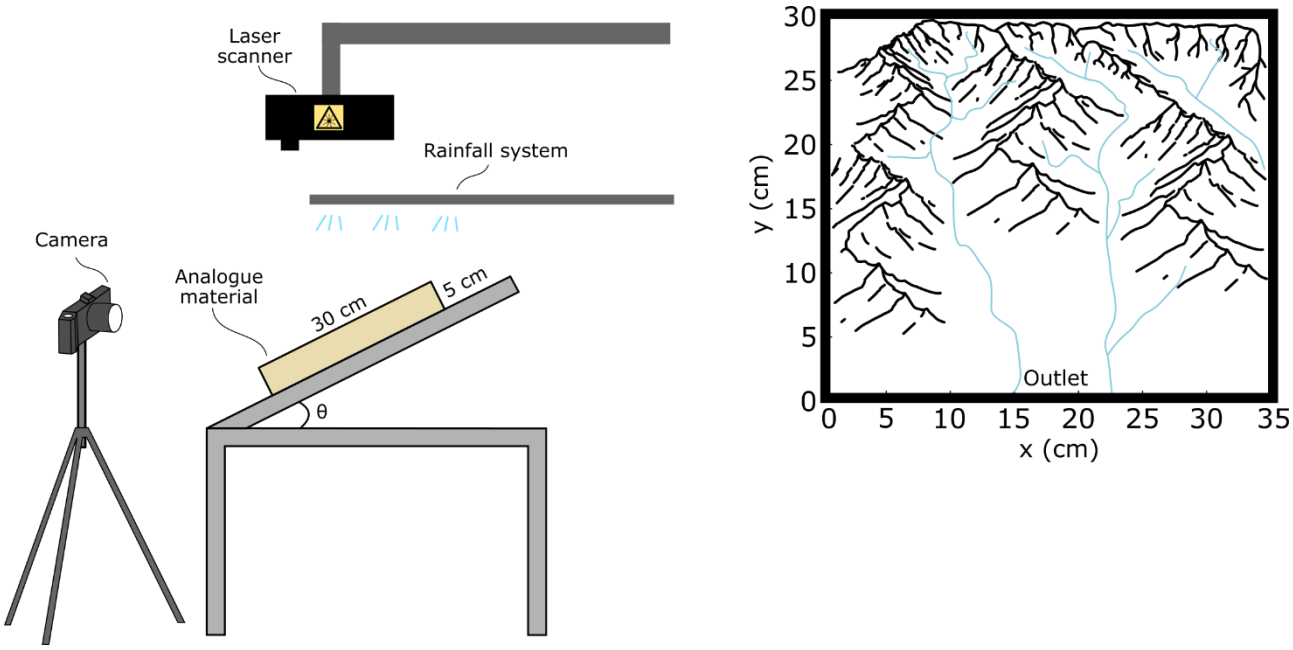

Figure S1. Schematic representation of the experimental setup. A Plexiglass box (30×35×5 cm^3) lays on a reclinable table and is filled with analogue material. The rainfall system (commercial sprinklers) provides rainfall over the model surface. A single camera and a high-definition laser scan provide records for the experiments. Modified after Reitano et al. (2020).

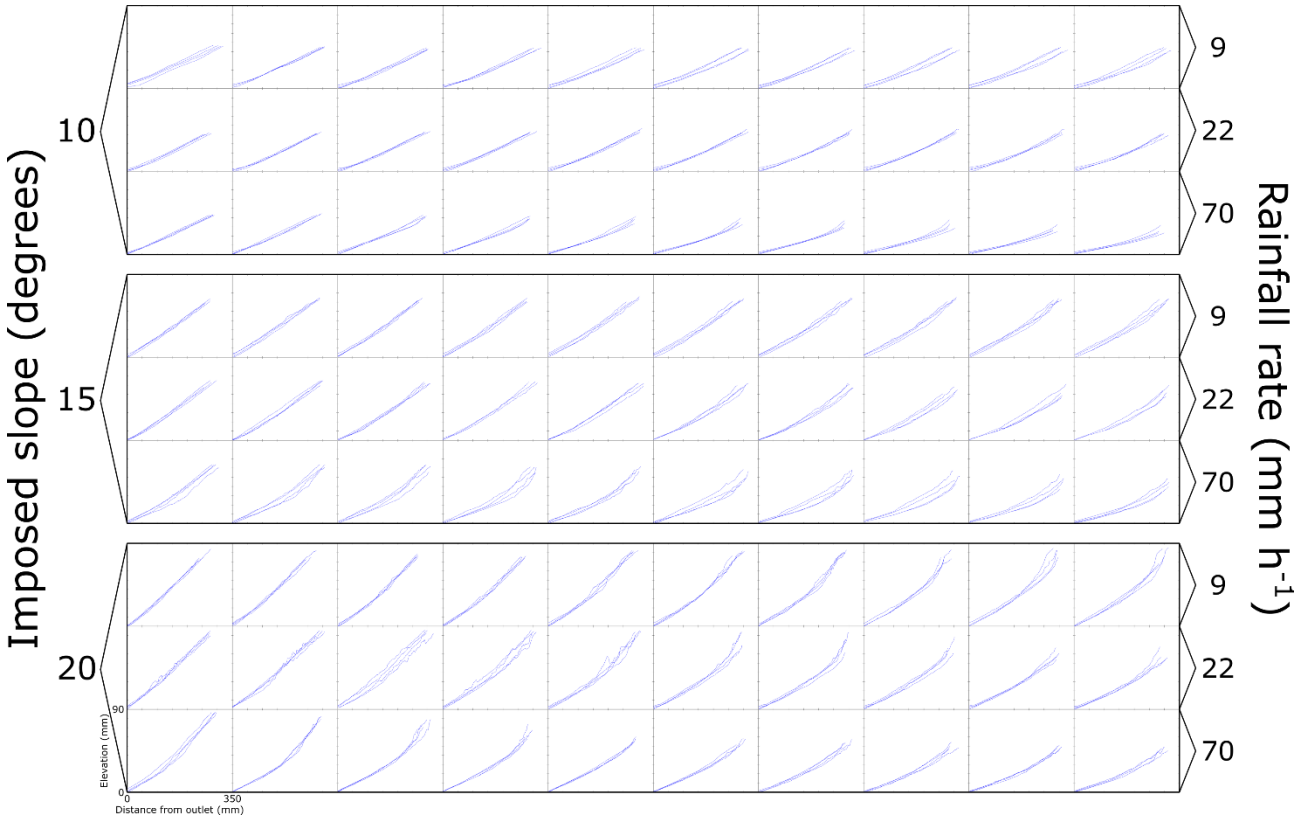

Figure S2. Streams longitudinal profiles of the four rivers described in the main text, for every model at every time step.

References

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