Science Advances

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advances.sciencemag.org/cgi/content/full/3/9/e1701683/DC1

Supplementary Materials for

Scale-dependent erosional patterns in steady-state and transient-state landscapes

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Published 27 September 2017, *Sci. Adv.* **3**, e1701683 (2017)
DOI: 10.1126/sciadv.1701683

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Scale-dependent erosional patterns in SS and TS landscapes

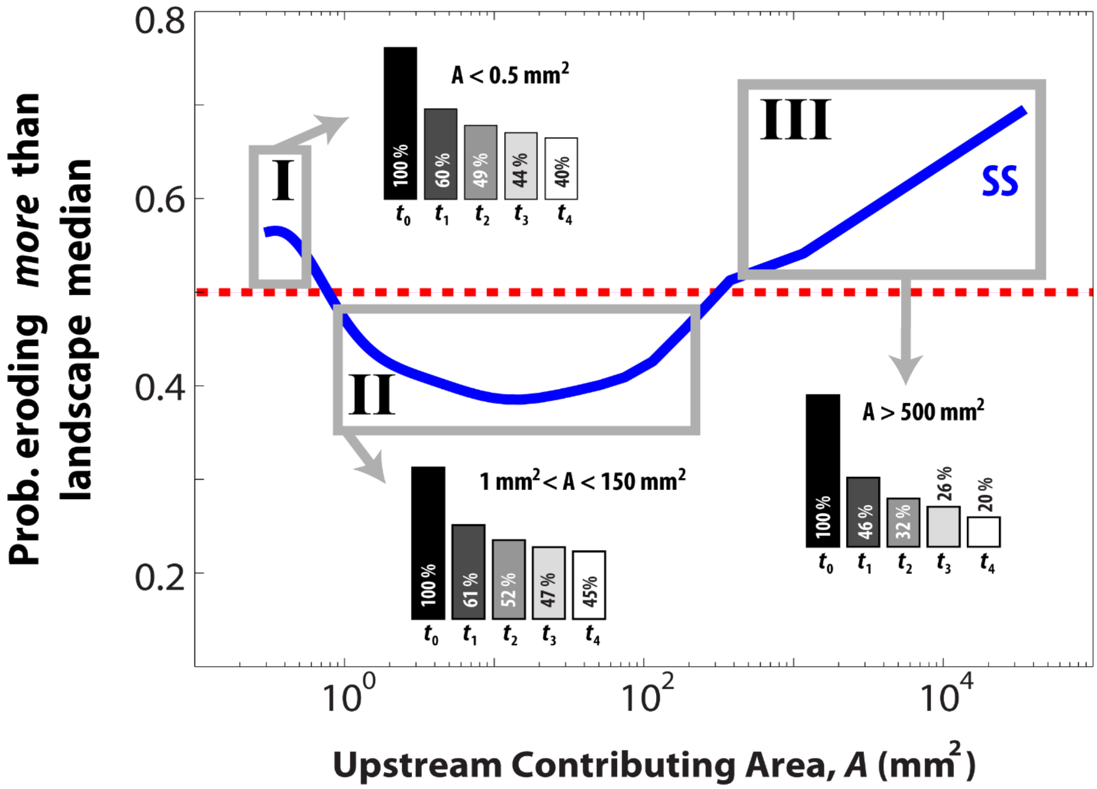

fig. S1. Dynamic landforms at SS. The shape of the E50-area curve reveals that the likelihood of eroding more (or less) than the median of the landscape is nonlinearly related to the upstream contributing area, *A*. We examine the dynamic nature of steady-state landscapes within three ranges of upstream contributing areas: (**I**) $A <$ 0.5mm^2, with a higher likelihood of eroding more than the median of the landscape; (**II**) 1 mm^2<A<150 mm^2, with a lower likelihood of eroding more than the landscape median; (**III**) A>500 mm^2, with a higher likelihood of eroding more than the landscape median. We identify at a given time (t_0) the location of all the pixels on the landscape within each of the three ranges defined above (100%). For each subsequent topography (measured 5 min apart), we compute the percentage of pixels on those locations, which are still characterized by A in the same interval as initially defined. The inset plots show that, in each area range, a significant percentage of pixels change their upstream contributing areas over time, illustrating the dynamic nature of steady-state landscapes.

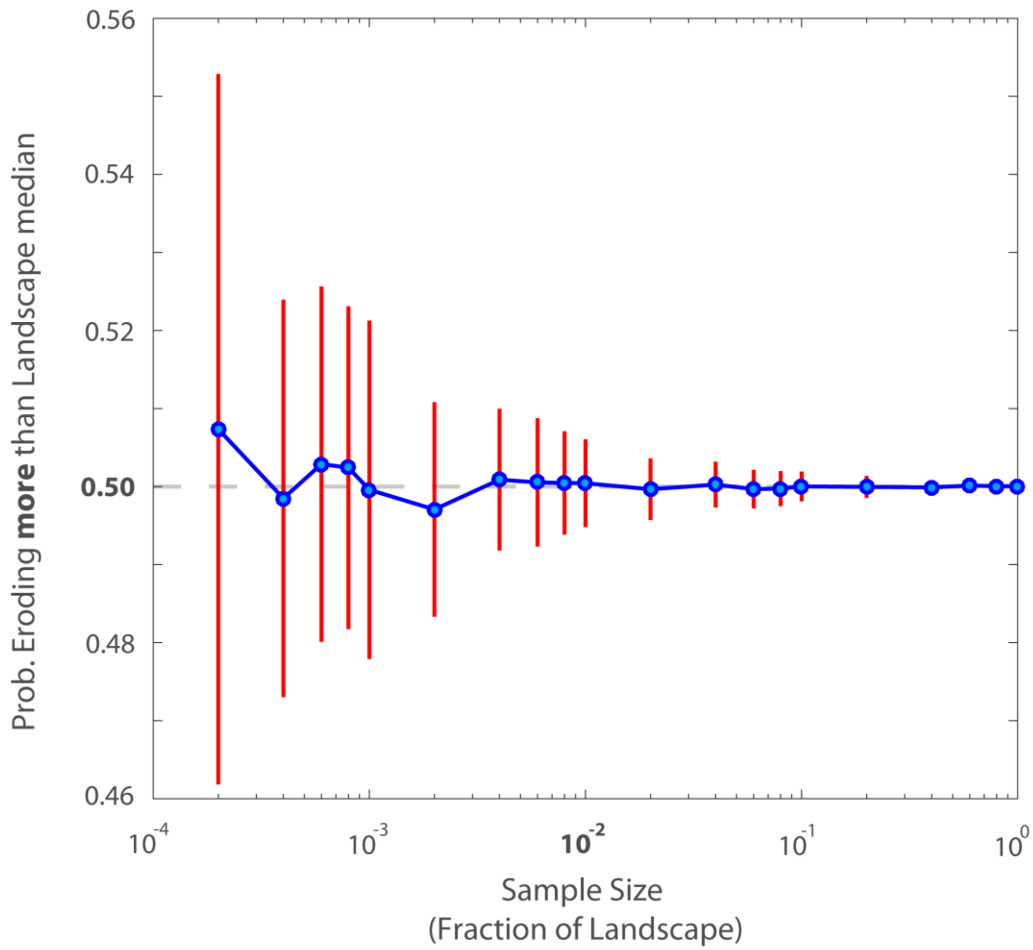

fig. S2. Estimation of the probability of erosion larger than the landscape median at SS for different sample sizes. Blue circles correspond to the estimated probability of eroding more than the median of the landscape (Y axis) by using 100 randomly selected samples of a given size (X axis). The red lines correspond to standard deviations estimated from the 100 samples. Note that to construct the E50-area curve we used 100 bins, which have a constant sample size equal to 0.01 fraction of the landscape. From the results corresponding to sample size equal to 10^{-2} shown in this figure, we can conclude that the patterns depicted by the E50-area curves (see Fig. 3 and 4 in the main text) are statistically significant.

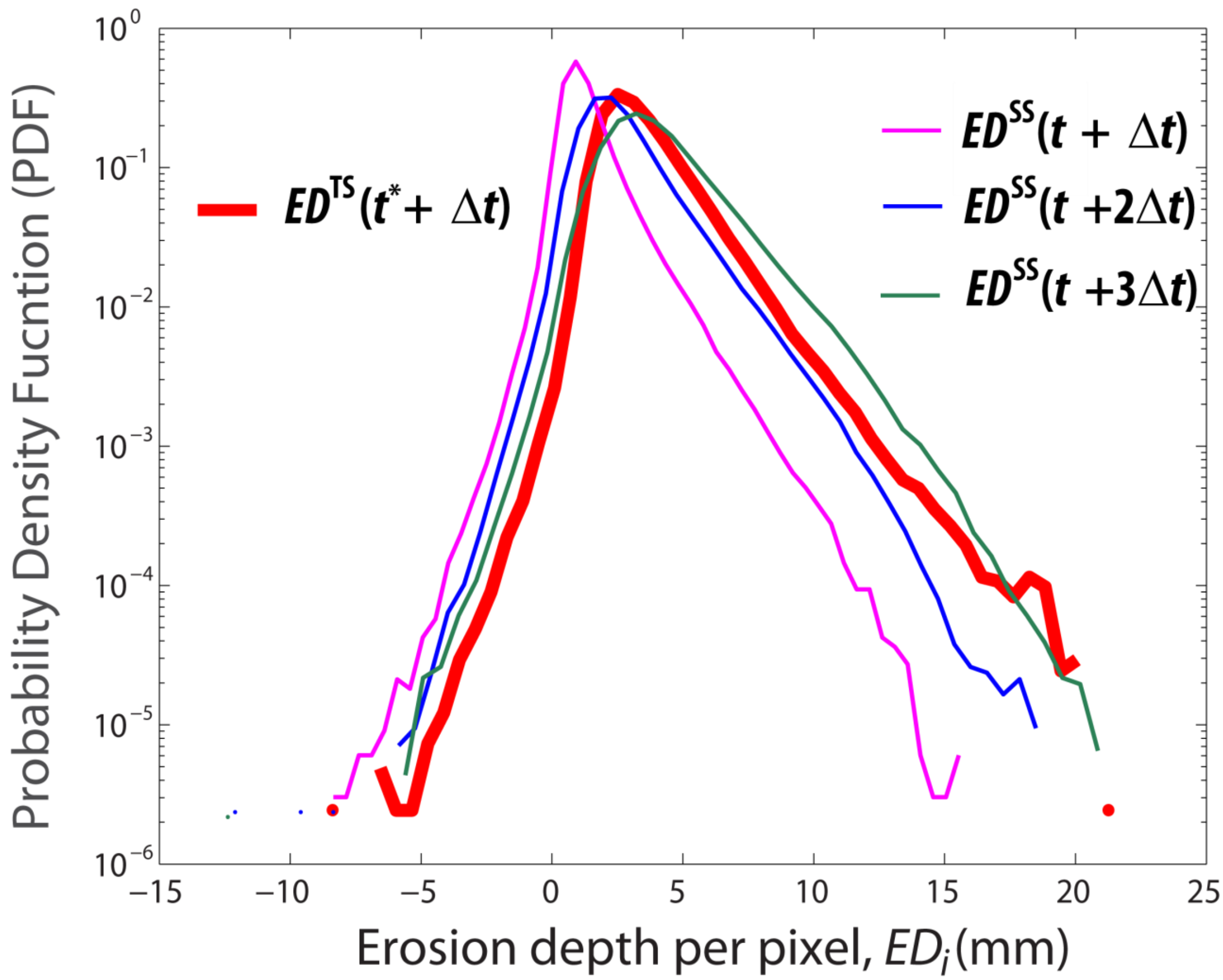

fig. S3. Comparison of the SS and TS landscapes in terms of the aggregate statistics of ED. Probability density functions (PDFs) of erosion depth per pixel, ED_i, in the TS landscape, subject to a five-fold increase in precipitation intensity during 5 minutes (Δt) starting at time t* (red curve), and the SS landscape during 5 (magenta), 10 (blue), and 15 (green) minutes.