



Comparing Landscape Evolution Simulations Using Taylor Diagrams

Marco Van De Wiel (1) and Tom Coulthard (2)

(1) Coventry University, Centre for Agroecology, Water and Resilience, Coventry, United Kingdom

(marco.vandewiel@coventry.ac.uk), (2) School of Environmental Sciences, University of Hull, United Kingdom

The simulated outputs of landscape evolution models (LEMs) can be compared and contrasted to observed topographies, to simulated outputs of other LEMs, and to simulated outputs from other scenarios using the same LEM. This, however, requires a suitable set of metrics to do perform these comparisons. Currently, no agreed set of such metrics exists, resulting in a wide range of different types of LEM comparisons reported in the literature, which themselves may not be comparable.

One key output which can, in principle, be obtained from all LEM simulations is a map of difference (MOD) between final simulated topography and the simulation's initial topography. This MOD shows spatial patterns of erosion and deposition over the study region. Differences in MODs from different simulations can be compared using a range of comparison metric (e.g. Pearson correlation, Nash-Sutcliffe efficiency, root-mean-square differences,...). The Taylor diagram that is commonly used in climate sciences provides an elegant approach to visualize three different comparison metrics.

Here we explore the potential of using Taylor diagrams of MODs to effectively visualize similarities and differences in between LEM simulation outputs. Examples illustrate how a Taylor diagram of MODs can be used 1) to compare simulated output with observed empirical data, 2) to compare simulations from different LEMs, 3) to compare outputs of sensitivity analyses with the same DEM, and 4) to compare predictions from “what if”-scenarios.