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# The effect that variable erodibility has on landscape morphology and erosion rates

R. Walcott
University of Edinburgh, Institute of Geography, Edinburgh, United Kingdom (Rachel.Walcott@ed.ac.uk)

One of the major factors that influences the rate and style with which a landscape erodes is its erodibility. As Gilbert noted in 1877 with his 'law of declivities' a lithology's erodibility has the most profound influence on the gradient of the slope attained. Theoretically, this should in turn influence the instantaneous flux of water and therefore the rate of erosion of the surface down stream. I present here the results of numerical modelling experiments which investigate the role that the variation in lithology has on river basin morphological evolution. The model consists of alternate, horizontal layering of two 'lithologies' represented by end-member erodibility coefficients, one significantly more resistant than the other. As such, this model replicates a number of landscapes found on Earth such as in the Grand Canyon and in southeast Africa and on Mars. I examine, in particular, the influence that the frequency of horizontal layering has on the rate and style of erosion. The results demonstrate that while the erodibility coefficient strongly influences the style of erosion, layering has only a minor affect. In contrast the presence of lithological layering has a major effect on the rate of erosion.