Geophysical Research Abstracts
Vol. 13, EGU2011-3034, 2011
EGU General Assembly 2011

Langbein and Schumm revisited

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The classic 1958 paper on variations in erosion rate with mean annual precipitation was originally based on evidence from a wide range of gauging stations and reservoir sedimentation rates in the southern USA, and the trend observed is barely supported by the evidence presented. The underlying rationale is that, as precipitation increases, the increase in uncultivated vegetation cover increases infiltration rates and so reduces runoff and soil erosion. This rationale is widely accepted, despite little further direct supporting evidence over the last 60 years. There are good reasons for this lack of evidence, due to the multiplicity of confounding variables, but it is also possible to question and enrich the original hypothesis, by modelling the growth of vegetation in response to rainfall, and estimating runoff and erosion. One conclusion is that , although the original rationale remains valid, it is greatly modified as the climate becomes more seasonal. In monsoonal seasonality (wet summers), the Langbein and Schumm effect is weakened, and in Mediterranean seasonality (wet winters) the effect is largely absent. The suggested reason for this change is that , at the end of a dry summer, vegetation is sparse, so that autumn rain falls on a relatively bare surface, generating high erosion rates. It is also worth noting that the L&S effect only applies to soil erosion, so that, where other processes such as mass movements (on high gradients) or chemical denudation (on low gradients) are dominant, the same relationship does not apply.