Evaluation of Erosion Rates on a Global Scale

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Understanding the mechanisms and controlling factors of erosion rates is of great importance as it is a vital component of both geochemical and sediment mass balance studies, and a deep understanding of these processes will enable us to develop accurate landscape evolution models. During the past decades scientists have been studying and measuring erosion rates using different methods. Some examples use sediment yield, measure the rates of active surface processes, and estimate exhumation rates through fission tracks, denudation rates using cosmogenic isotopes and even erosion rates through mass land wasting. A major objective of these studies is to try and discover what the controlling factors of erosion rates are.
Although erosion rates and sediment yield on a global scale have been studied in relation to topographic conditions, due to lack of available data in the past, the analysis was relatively basic. Thanks to abundant newly obtained erosion rates data, combined with new high resolution DEM data, a more complete and comprehensive analysis can be made, and correlation of erosion rates with factors such as basin morphometry, climate or tectonic plate boundaries is possible.
This study is based on previously obtained and published erosion rate data and sediment yield measurements published by the U.S. Geological Survey. It uses the ASTR GDEM, a 30-m DEM, and ArcGIS in order to analyze the relationship between basin morphometry and erosion rates. In addition, tectonic plate data published by Nordpil based on Bird (2003), and the WorldClim, global climate data based on Hijmans et al. (2005), are used in order to examine any correlation between erosion rates and tectonic plate boundaries, and erosion rates and climate.
Preliminary results show that: 1) Erosion rates are positively correlated to basin relief and mean slope; 2) they are also positively correlated to the precipitation amount and range; and 3) they are negatively correlated to distance to tectonic plate boundary.

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