

## Tectonics and Global Erosion Rates

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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 a development of accurate landscape evolution models. During the past decades scientists have been studying and measuring erosion rates on local and global scales. A major objective of these studies is to try and discover the controlling factors of erosion rates. Due to limitation of available data in the past, the analysis used to be relatively basic. Thanks to abundant newly obtained erosion rates data, combined with new high resolution DEMs, a more complete and comprehensive analysis can be made, and correlation of erosion rates with factors related to basin morphometry, climate and tectonics is possible. The study is based on previously obtained and published erosion rate data and sediment yield measurements published by the U.S. Geological Survey and an analysis using GIS. In this work we focus on the connection between erosion rates and tectonic related factors: fault distribution, peak ground acceleration (PGA) and distance to tectonic plate boundaries. Bivariate correlation analysis shows the following characteristics. 1) Erosion rates are strongly related to tectonic activity factors. They are positively correlated to PGA and negatively correlated to distance to tectonic plate boundary. 2) Distance to tectonic plate boundary is an indirect measure of tectonic activity as generally, the further away from a plate boundary the more likely the basins are in a tectonically stable environment. Despite this being the case, this parameter is as good an indicator for erosion rates as PGA. 3) There is a correlation between slope and tectonic related factors. A positive correlation with PGA and a negative one with distance to tectonic plate boundary. This might mean that tectonic related factors affect erosion rates through slope. Tectonically active areas tend to develop steep slopes which in turn are responsible for higher erosion rates. 4) On a global scale almost 30% of variance in erosion rates can be explained by a combination of only two factors –distance to tectonic plate boundary and PGA.

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