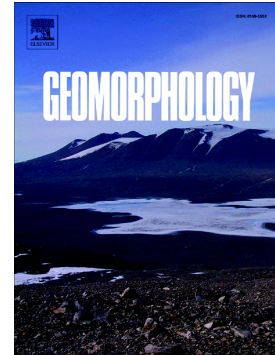


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# Controls on spatial variations of glacial erosion in the Qilian Shan, northeastern Tibetan Plateau

Jie Wang<sup>1,\*</sup>, Pan Yao<sup>1,\*</sup>, Beibei Yu<sup>1</sup>, Liyang Zou<sup>1</sup>, Fei Wang<sup>1</sup>, Jonathan M. Harbor<sup>2</sup>

<sup>1</sup> Key laboratory of Western China's Environmental Systems (Ministry of Education), College of Earth and Environmental Sciences, Lanzhou, Gansu 730000, China

<sup>2</sup> Department of Earth, Atmospheric, and Planetary Sciences, Purdue University, West Lafayette, IN 47907 1397, USA

\* Corresponding Authors. E-mail address: wangjie@lzu.edu.cn(Jie Wang), yaop16@lzu.edu.cn(Pan Yao)

## Abstract

Understanding interactions between topography and glacial erosion is a key to advancing knowledge of mountain landscape evolution and is often hampered by the lack of quantitative data for glacial erosion. Here, we examine spatial variations in glacial erosion in the Qilian Shan using a power law model ( $y = ax^b$ ) fit to cross profiles of glacial valleys. We further analyze the impacts of glacial dynamics, topography, and lithology on the degree of glacial erosion using qualitative and quantitative methods. Although the distribution of glacial erosion is controlled by the combined effects of glacial dynamics, topography, and lithology, average glacier size or ice flux and mean slope above the equilibrium line altitude are dominant controls. In addition, the topographic data analyzed through a  $b$ - $FR$  diagram suggests two opposite types of glacial valley cross-profile development: temperate (maritime) glacier valleys are mainly dominated by overdeepening; while continental glacier valleys are mainly dominated by a widening process, although this varies with lithology.

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