

RELATIONS BETWEEN FLUVIAL EROSION PROCESSES, LONGITUDINAL PROFILE MORPHOLOGY AND ROCK STRENGTH AT PARANA FLOOD BASALT PROVINCE, BRAZIL

LIMA, Adalto G., Departamento de Geografia, Universidade Estadual do Centro Oeste, Rua Camargo Varella, 03, Guarapuava 85040-080 Brazil, adalto@unicentro.br

The stepped morphology of the rivers profiles flowing over basalt is in large part related to differences in jointing style between internal levels of flows. Levels with vertical to subvertical jointing respond for knickzones (KZ), levels with many horizontal/subhorizontal jointing respond for zones of low slope, i.e, step zones (SZ). Plucking is commonly considered the main mechanism of erosion in these rivers. However, the existence of features such potholes suggests that abrasion could play some role in the erosion of these beds and be responsible for most of the SZ. This study sought to identify the lithological characteristics of KZ and SZ and its relationship with plucking and abrasion, through a detailed field survey. We analyzed the Rio das Pedras (drainage area of 330 km²), located at Parana Flood Basalt Province, southern Brazil. It was found that the SZ are predominantly formed in the vesicular-amygdaloidal basalts (58%), while the remainders (42%) are formed in basalts with horizontal/subhorizontal jointing. The KZ are usually sculpted in massive basalts (63%), either with vertical or horizontal jointing, however it is significant the occurrence of KZ in vesicular-amygdaloidal basalts (37%). The rock strength in the river bed is variable 45-68 R (Schmidt hammer units). The average strength of massive basalts are higher than the average of the vesicular-amygdaloidal basalts ($p = 0.05$). Excluding the values below 50 R, considered as the result of weathering, the average strength of the vesicular-amygdaloidal basalts is 58 R and 61 R for the massive basalts. Plucking is dominant in all KZ and SZ with horizontal/subhorizontal jointing. Abrasion is an important process when the SZ are carved into vesicular-amygdaloidal basalt. But bed morphologies carved by abrasion are more developed when the vertical/subvertical jointing is between 3 and 5 m². Above this interval plucking quickly eliminates the features of abrasion, which tend to be small. Below this range, abrasion occurs more evenly distributed, creating beds with smoothed surfaces and restricted formation of potholes. One way or another, abrasion is linked to the lower strength of vesicular-amygdaloidal basalts, which determines a lower resistance to erosion and creates reaches with low slope (SZ).

[2010 GSA Denver Annual Meeting \(31 October –3 November 2010\)](#)
[General Information for this Meeting](#)

Session No. 99--Booth# 4

[Geomorphology \(Posters\)](#)

Colorado Convention Center: Hall B

8:00 AM-6:00 PM, Monday, 1 November 2010

Geological Society of America *Abstracts with Programs*, Vol. 42, No. 5, p. 240

© Copyright 2010 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.
