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1 RIVER SLOPES ON BASALTS: SLOPE-AREA TRENDS AND LITHOLOGIC CONTROL

2 Adalto Gonçalves Lima^{a1}, Diego Moraes Flores^b3 ^a*Departamento de Geografia, Universidade Estadual do Centro-Oeste, 85040-080,*4 *Guarapuava, PR, Brazil*5 ^b*PPGF, Universidade de São Paulo, 05508-000, São Paulo, SP, Brazil*6 **Abstract**

7 River incisions in continental basalts are distinct and heterogeneous. Knickpoints and the
8 predominance of erosion by plucking contribute to that distinction, whereas significant
9 differences in the vesicularity and jointing of basaltic flows are suggested as controls on the
10 heterogeneities of incisions. We investigated 11 small river channels (<80 km long) installed on
11 continental basalts of the Paraná Volcanic Province, South Brazil, using slope-area analysis ($S =$
12 $k_s A^\theta$), to explore the possible relationships of steepness (k_s) and concavity (θ) indices with
13 characteristics of flow basalts. Channels were chosen that did not present signs of significant
14 tectonic interference on a longitudinal profile, i.e., convex reaches and prominent knickpoints.
15 The data were extracted in a Geographic Information System (GIS) environment from digital
16 topographic maps at a scale of 1:50,000. Basaltic flow zones and morphologies, jointing styles,
17 as well as river bed morphologies and erosion processes were surveyed in the field. The
18 longitudinal profiles of the rivers are stepped, and the lower slope reaches are associated
19 predominantly with vesicular basalts and basaltic breccias. Knickpoints are generated by
20 contrasts in the erodibility of the substrate due to vesicular-massive differences and the partial
21 insertion of channels in tectonically fractured zones (lineaments). The normalized steepness
22 index (k_{sn}) is positively correlated ($R^2 = 0.8$) with the knickzone index (the ratio between the

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