Exploring the Interplay between Basin Rearrangement and Landsliding in a Post-Rifting Landscape, Southern Brazil

Santos, M. (FCTE - UNESP, CAMPUS DE OURINHOS) ; Calegari, S. (UFES) ; Marques, K.P.P. (USP) ; Batezelli, A. (UNICAMP) ; Salamuni, E. (UFPR) ; Peifer, D. (University of Tuebingen) ; Fernandes, N. (UFRJ)

RESUMO

Landsliding interacts with bedrock channel incision, which plays a crucial role in soil erosion, nutrient fluxes, and global climate. Increased channel incision can steepen hillslopes and facilitate landslides. Large landslides in particular contribute substantial sediment volumes to valley bottoms, creating dams and temporary lakes along the channels and shielding the bedrock. As a result, upstream channel incision is delayed, restraining erosion and topographic decay. Limited research has been conducted on the relationship between landslides and drainage reorganization in Brazil. In this study, we focus on exploring this relationship within the central axis of the Ponta Grossa Arch, Brazil. We quantitatively analyze the topography and empirically investigate sedimentation and drainage patterns to identify ancient landslides, associated dams and lakes. Our research examines the normalized channel steepness and its potential correlation with landslides and steepening slopes. We calculate a χ (chi) map for the Tibagi and Cinzas river networks to detect signs of divide migration and potential links with landslides. Our findings reveal Late Pleistocene landslides in the Tibagi and Cinzas catchments clustered in three specific areas. A notable rearrangement occurred between the two major tributaries of these catchments, wherein the Laranjinha River (located in the Cinzas basin) captured a significant portion of the Congoinhas River (located in the Tibagi basin). This change resulted in an expanded drainage area for the Laranjinha River, leading to accelerated erosion. The landslides near the wind gap primarily consist of boulders from resistant sandstones, supported by a fine-grained mass. The Congoinhas River was dammed, leading to the deposition of fine-grained sediments (~85% clay/silt) and the formation of paleosols with high carbon content. This process contributes to a delayed response of the landscape to disturbances, while also promoting carbon sequestration.

PALAVRAS CHAVES

Quantitative Geomorpholog; Landslide; Divide Migration