

MULTI-CHANNEL PATTERNS IN BEDROCK CONTROLLED RIVERS: AN EXAMPLE FROM THE XINGU RIVER IN THE ALTAMIRA REGION, PARA STATE, BRAZIL

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ABSTRACT

Multi-channel pattern (anabranching or anastomosing) is characteristic of a number of rivers in diverse environmental settings worldwide, but most attention has been directed towards alluvial rivers. Relatively few studies have considered the geomorphological descriptions of multi-channel rivers in erosional settings where bedrock crops out extensively in channel beds or banks. A magnificent example of a mixed bedrock-alluvial multi-channel river is provided by a ~ 200 km long reach of the Xingu River in the Altamira region (“Volta Grande do Xingu” region). The objectives of this paper are record and describe the morphologic units of the multi-channel reach of the Xingu River. The study is based on visual interpretation of aerial photos from 1980 (1:60.000 scale) and 2004 (1:30.000 scale), and field investigations (topographic, bathymetric, geological and geophysical integrate data). The catchment of the Xingu River is situated in the Amazonia region of Brazil, and has an area of about 504.000 km². The Xingu river originates on the Roncador mountain at an altitude of up to 800 m and flows northward for ~1500 km to its confluence with the Amazon River. In the studied reach the Xingu River is incised into the crystalline rocks of the Xingu Complex and confined to a wide valley cut into the bedrock. The active channel evolution and sedimentation are restricted within this zone, described as a macro-channel. The macro-channel consists of relatively steep macro-channel banks either side of the wide macro-channel floor (4 to 7 km wide). The floor comprises thin alluvial deposits scattered over and between patches of exposed underlying bedrock, giving rise to a wide variety of morphological units. The main morphological units identified in the macro-channel are: 1) bedrock pavement; 2) bedrock topographic high (hills), and 3) bedrock core bar. The bedrock pavements are extensive horizontal area of exposed rock, with no significant alluvial cover. The bedrock core bars are broad and thin (< 10 m) accumulation of coarse to fine alluvium on top of bedrock, colonized by vegetation and inundated during seasonal high flows, that cover the areas (stable alluvial islands) between distributary channels. The distributary channel network shown a strong structural control, related to the main fault zones and fracture patterns in the bedrock. The morphological features identified in the distributary channels are: 1) cataract; 2) rapid; 3) bedrock outcrop, and 4) boulder bed.

Keywords: Xingu River; Bedrock-controlled channel; Multi-channel pattern; River pattern