INFERENCES ON PALEOHYDRAULIC AND DIAMOND CONCENTRATION FROM THE ANALYSIS OF THE FLUVIAL ARCHITECTURE OF THE ARAÍ FORMATION IN THE RORAIMA STATE (NORTHERNMOST BRAZIL)

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The Araí Formation, the lowermost unit of the Roraima Supergroup (Middle Proterozoic), is supposed to be a diamond-bearing stratigraphic unit and the main source for Quaternary alluvial diamonds exploited in northernmost Brazil, Guyana and Venezuela. The uppermost portion of the Araí Formation consists of a fluvial succession composed of fine- to medium-grained sandstone and, secondly, conglomerate and mudstone. In the studied region, mudstone becomes an important component towards the top of this stratigraphic unit. Detailed outcrop sketches, including facies description, paleocurrent data and gamma-ray logging, has allowed the characterization of the geometry and size of the major architectural elements within the Araí Formation. Outcrop features were compared to their sub-surface extend through the execution of several GPR profiles undertook at and nearby the described outcrops. Integration of surface and shallow-subsurface data has allowed the 3-D delineation of the main components of the system (channel, bar and flood-plain) as well as the definition of some basic parameters related to paleohydraulic reconstruction, such as channel width, depth and sinuosity, bar geometry and accretion surfaces and available grain size for bed and suspended load fluvial transport. On the other hand, heavy mineral analysis performed in samples collected at different levels highlights some aspects related to their distribution within the architectural elements and hence the relationship between possible diamond occurrence and fluvial geomorphology and paleohydraulics.