

FACIES AND DEPOSITIONAL ARCHITECTURE OF FURNAS FORMATION IN GUARTELÁ CANYON (EARLY DEVONIAN), PARANÁ BASIN, BRAZIL: FLUVIAL OR SUBTIDAL SYSTEM?

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ABSTRACT: Fluvial and subtidal settings may exhibit similar features, particularly in sand-dominated deposits, relatively to lithology, mineralogy and sedimentary structures, as follows: (i) dominance of sand with subordinated gravel, (ii) high mineralogical maturity, (iii) medium to large cross bedding, (iv) tabular beds of variable thickness. These characteristics are ubiquitous in modern and ancient depositional systems. The Furnas Formation is a sedimentary unit (Early Devonian) whose interpretation is controversial: some authors interpreted it as a fluvial braided system, while other have considered its origin associated with coastal to shallow tidal-dominated sea. The Guartelá Canyon represents a key area where the Furnas Formation shows excellent exposures from the base to the top. This study deals with new arguments based on detailed facies analysis, architecture reconstruction and paleocurrents that allow to consider the Furnas Formation in this areas as portion of a huge fluvial system. Five lithofacies were described and interpreted: large cross-bedded sandstone, small cross-bedded sandstone, low-angle cross-laminated sandstone, low-angle cross-stratified sandstone and conglomeratic sandstone. Large and small cross-bedded sandstone facies represents sandy dunes and downstream migrating sandy bars. Low-angle cross lamination and low-angle cross stratification lithofacies suggest the existence of bedforms produced under upper flow regime as humpback dunes. Conglomeratic sandstone lithofacies is constituted by thin and extensive beds, generally planar, may represent the deposition of a sand-gravel mixture associated with discharge peaks during flow migration. These lithofacies occur associated with architectural elements that represent large tabular to lenticular bedforms. We defined two architectural elements: planar to concave-up bar and minor channels. Planar to concave-up bar is characterized by boundary surfaces planar or concave-up and sharp bottom and planar top. Erosive and concave bottom is related to the action of subaqueous channelized forms, which are common in fluvial deposits and are not found in subtidal settings as shallow seas. Minor channels commonly occur close to the top of planar to concave-up bar, suggesting the presence of cross bar channels that cut across the bars top. Cross bar channels and upper flow structures developed on the top of bars suggest that the construction of the bars was related to relative variation of the water level due to the growing of the bar and the normal and flood flow alternance. Paleocurrents data indicate a dominant direction, thus suggesting a unidirectional flow, differently from tidal settings which show bidirectional current trends. This lithofacies model indicates a probable fluvial system for the southeastern part of the Furnas Formation in the Guartelá Canyon region.

KEYWORDS: FURNAS FORMATION, FLUVIAL SYSTEM, GUARTELÁ CANYON