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PALEOPROTEROZOIC INTERMEDIATE-FELSIC-SEDIMENTARY VOLCANICLASTIC ROCKS: THE ~1.99-1.85 Ga SOUTHER AMAZON CRATON

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INTRODUCTION

Paleoproterozoic Amazonian rocks record one of the best-preserved ancient magmatic episodes on Earth. All these volcanic/plutonic rocks are attributed to the Uatumã Supergroup that covers an area of more than 1,200,000 km^2 (Lamarão et al., 2002; Juliani and Fernandes, 2010; Fernandes et al., 2011). Recent studies evidenced that the Paleoproterozoinc magmatism of the Southern Amazon Craton has a complex magmatic evolution. Calc-alkaline volcanic systems of 1.97 to 1.85 Ga and A-Type magmatism of 1.88-1,87 Ga characterize the volcano-plutonism of the region. Andesitic- basalt, andesite, dacite, rhyodacite and rhyolite and plutotism associated characterize the calc-alkaline volcanism. These geochemical signatures suggest an ocean-continent subducion with the consequent formation of volcanic continental arcs named "Tapajonic arcs" by Juliani et al., (2013). Two areas are considered here: a) the Southern part of the Tapajós Mineral Province (STMP) and the Xingu region. In the STMP our fieldwork founds that granitoid felsic bodies are the prevailing lithotypes, although several felsic volcanic and volcaniclastic deposits and intermediate effusive rocks occur. Some sedimentary rocks also outcrop in the region. Eastern to STMP, the Xingu region is divided into two distinct formations by previous authors (Juliani and Fernandes, 2010; Fernandes et al., 2011): the basal andesitic Sobreiro and the upper felsic Santa Rosa. The Sobreiro formation is composed of massive andesitic to dacitic flows and volcanoclastic deposits, while the Santa Rosa formation is composed of porphyritic felsic rocks, massive and bedded rhyolitic lava flows, low- to high-grade welded ignimbrites and rheo-ignimbrites and volcaniclastic deposits. Differentiate the origins and empacement mechanisms of all these volcaniclastic deposits are difficult due to the lack of lateral correlation but in any case a strong description and differentiation is possible. The present contribution documents the extremely well preserved architecture of a series of felsic, intermediate and sedimentary volcaniclastic rocks found in these two regions.

VOLCANICLASTIC ROCKS

We divide our volcaniclastic rocks in primary and secondary types. The fisrt group include all those rocks related with a primary explosive or effusive volcanic activity (White and Houghton, 2006) such as lavic autobbreccias, rheo-ignimbrite autobreccias, tuffaceous volcanic deposits; conduit breccias, welded ignimbrites etc. The secondary volcaniclastic rocks consist of those deposits that are formed by non-volcanic activity and rework processes such as debris flow deposits, conglomerates, sedimentary breccias, fluvial deposits, rock avalanches deposits, etc. and that are related to other sedimentary processes. Lavas, especially rhyolite flows, and Rheo-ignimbrites tend to form clastic volcanic rocks by process of autobrecciation (fig. 1a). This occurs when these thick, nearly solid bodies breaks up into blocks and these blocks are then reincorporated into the flow again and mixed in with the remaining liquid magma. Within the volcanic conduits of explosive volcanoes, volcanic breccias form when magmas store in the conduit during quiescent period and consequently shatter by new ensuing eruptions (Fig. 1e). Emission of fresh juvenile material during an explosive eruption produces pyroclastic material by fragmentation that deposits and forms a pyroclastic deposit (Fig. 1c). If during the emplacement fresh glassy fragments deform and compact, the deposit displays the eutaxitic texture with different grade of welding (fig. 1f). Textural studies on felsic volcaniclastic rocks of STMP allowed to identify different facies of ignimbritic deposits ranging from chaotic ("breccia" group) to eutaxitic ("eutax" group) vitrophyric textures. The rocks are grouped based on their grade of welding which, given the superb preservation of our samples, allowed to recognize a wide variety of lithofacies ranging from very low-grade to high-grade ignimbrites. Rounded fragments matrix- and clast-supported comglomerate deposits (fig. 1d) as well as stream cross-bedded fluvial braidplain sediments (fig. 1b), as well as all those sedimentary processes that remobilize pre-existing material, give important information on the contribution of sedimentation that occurs in the system. As well as the presence of debris flows, and debris avalanches gives information about the water supply in the volcanic environment and the topography landscape. In fact slopes are necessary to permit the formation of these types of deposits. Finally we propose here a faciological nomenclature based on the nature and size of the grains that composed the deposits considered to differentiate both primay and secondary volcaniclastic rocks.

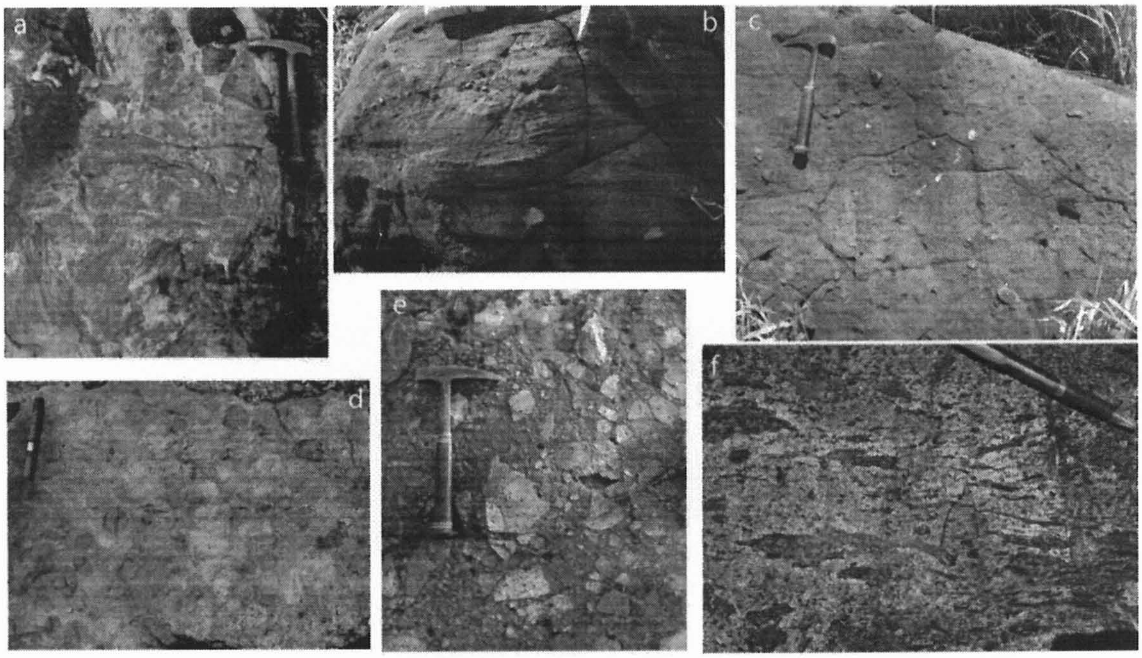

Figura 01: Different types of volcaniclastic rocks: a) felsic lava auto-breccia (Xingu); b) cross- bedding felsic fluvial sediments (Tapajos); c) intermediate lapilli flow-tuff (Xingu); d) polymictic felsic conglomerate Tapajos; e) basaltic-andesitic conduit-breccia (Xingu); f) eutaxitic texture of a felsic ignimbrite (Tapajos).

DISCUSSION

The detailed description and classification of textural features that characterized the studied deposits allows us to distinguish between different transport and emplacement mechanisms associated to different effusive and explosive eruptive styles and sedimentary environment related. We highlight here the variability in textural facies of intermediate to felsic volcanoclastic deposits of the Tapajos province and the Santa Rosa and Sobreiro formation recognized in the Xingu Region. Primary volcaniclastic rocks give information on the magmatic evolution and the type of the volcanic activity that characterized the region. Important is the associated secondary sedimentation that could improve the knowledge of the geodinamic context of the region. A regional active explosive volcanism, represented by emission of tuffaceous volcanic sediments supply lose material to be reworked in subaerial environments. Juliani et al., 2015 suggest fot the Southern Amazon Craton that complex geodinamic systems see volcanic arcs forming, with associated regions of rifting in the back-arc that drove the opening of basins. Fluvial braidplain and alluvial fan or shallow marine settings probably resedimented into these local shallow- or deep-water basins as well described also by recent works on ancient volcanic-sedimentary environment (Cas et al., 2014). We limited here to give a clear and precise description sensitive to the need to distinguish deposits formed during volcanism from non-volcanic sediments, recognizes complexity in formation of primary volcaniclastic and associated secondary deposits. New petrological and geochronological data are also provided. U-Pb SHRIMP-II zircon data on felsic rocks show ages of ca. 1.99 Ga for the STMP and ca. 1.87 Ga for the Xingu region.

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