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Recognition features of felsic pyroclastics of Serra do Tombo formation, Minas Gerais, Brazil

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ABSTRACT

In this contribution we report a study of poorly exposed, rhyodacitic welded-ignimbrite deposit from Minas Gerais. A petrographic study of textures indicate high temperature of emplacement. Key features include eutaxitic texture, flattened and agglutinated lapilli and glass menisci. Most of the feldspar minerals and glass are extensively altered to clay minerals, which pseudomorph the original volcanic textures. Glass menisci and spherules suggest a possible process of liquid immiscibility. Immobile trace element distribution indicates a possible link with other post-Palaeozoic felsic volcanic rocks in Brazil, a magmatism interpreted as due to basaltic underplating and partial melting of a hydrous continental crust. A peculiar feature is a high Light REE/Heavy REE ratio. Depletion in heavy rare earth elements is possibly due to a residual HREE-bearing phase in the source. The geologic context of these rocks suggests a Lower Cretaceous age and a tectonic relationship with a continental rifting event.

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1. Introduction

The study area is located in the northeast of the state of Minas Gerais, south-eastern Brazil, in the Jequitinhonha River valley (Fig. 1a). Field work, carried out during a 1:100,000 mapping project performed by the Geological Survey of Brazil, proved crucial for the understanding of the real nature of a geological formation previously interpreted as sedimentary by Hartt (1870). This formation was reassigned as Cretacic, felsic tuffs and lapilli tuffs showing gas pipes, in the geological map of Itaboim, Minas Grais (Paes et al., 2008, 2010). However, little was known so far about the lithology of this volcanic formation, due to the difficult access and to the alteration of most outcrops. The aim of this paper is describing the Serra do Tombo (hereinafter referred to as SdT) petrology after a systematic search for unaltered and fresh rock samples. SdT is now confirmed to be a large, felsic pyroclastic formation that consists of ash-lapilli tuffs and lapilli-ash tuffs. A possible conservative minimal estimate of the volume of rock may be in the order of 10 km^3, but probably it was much larger, which places this formation within the size of a medium volume, ignimbritic eruption. The SdT could be one of the largest pyroclastic units in Brazil, comparable to the Neoproterozoic welded ignimbrites (Sommer et al., 2013). The only similar post-Palaeozoic occurrences are the Lower Cretaceous rocks of Cabo de Santo Agostinho, Pernambuco (Nascimento, 2003).

2. Geological outlines

The SdT consists of volcanoclastic rocks that occur as scattered outcrops along a NE–SW trend with a length of about 75 km and a width of about 25 km (Fig. 1b). In some situations, the outcrops are continuous for a few kilometres along the edges of the plateau and their estimated thickness ranges from about 25 to 90 m. The vast majority of basal parts of SDT Unit is not exposed but seems located in different elevations probably due to valley-filling process, but there are not enough field data to evaluate the contribution of further basement fracturation. As a whole, the SdT formation unconformably lyes on top of 'horst-like'

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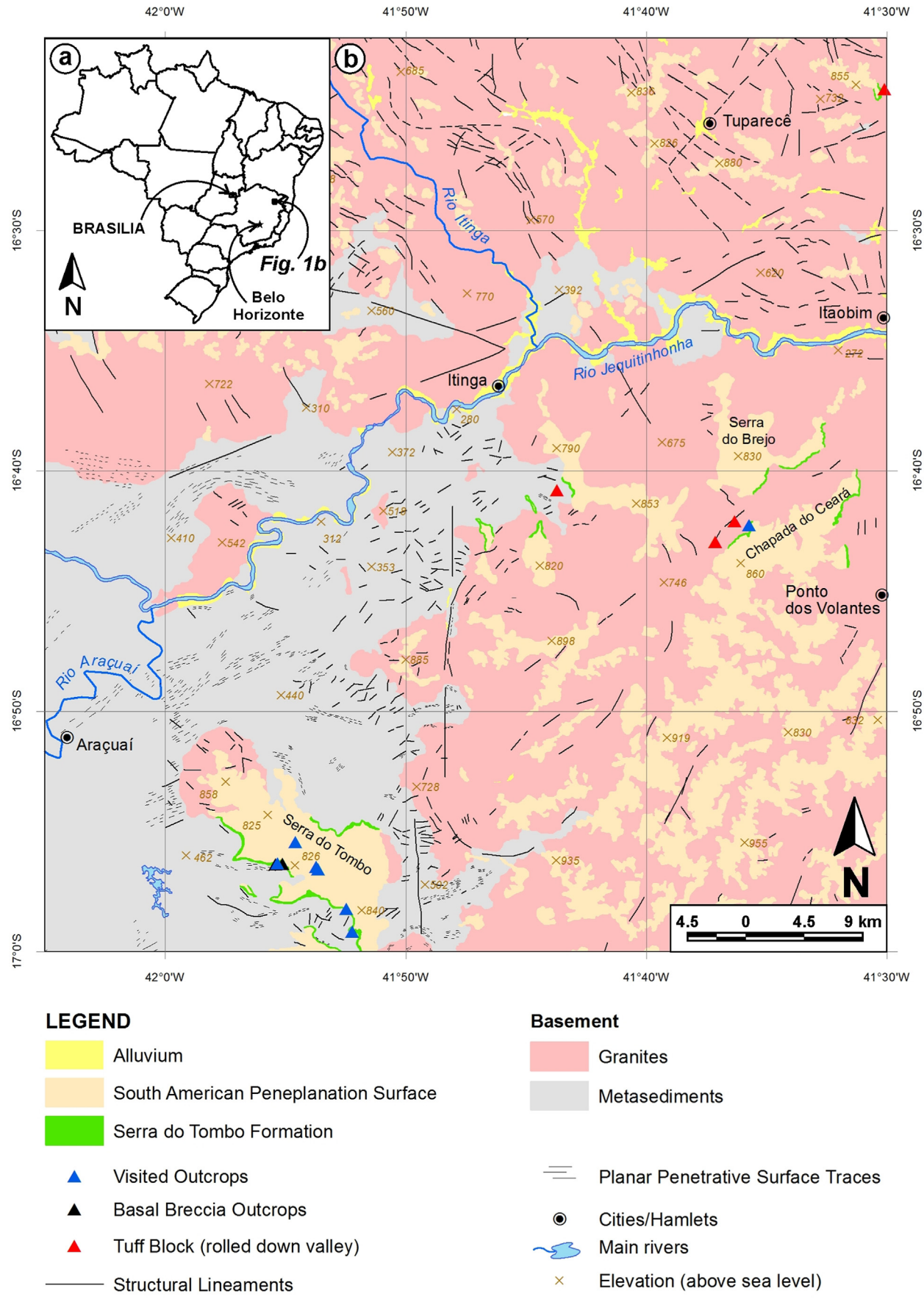

Fig. 1. Geological sketch map of SdT pyroclastic rocks. (a) Location of the study area; (b) geological sketch map of the study area (after Heineck et al., 2008; Paes et al., 2008; Mapa Geológico do Estado de Minas Gerais, 1997, escala 1:1.000.000). Symbols in figure.

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