

SPECTROSCOPIC STUDIES OF COMMON, RARE AND NEW MINERALS IN REFUGES WITH ROCK ART IN SÃO PAULO AND PARANÁ

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INTRODUCTION

In the case of rock supports, a highly highlighted feature is moisture in its various forms, which intervenes in almost every type of chemical change as a solvent or carrier (moving items such as salts or acids) or as a direct agent (hydration) so that rain washes the rock surface and the water from the pores acts physically and/or mechanically, as in the swelling or shrinkage of minerals, hydraulic pressure and removal of surface grains and paints.

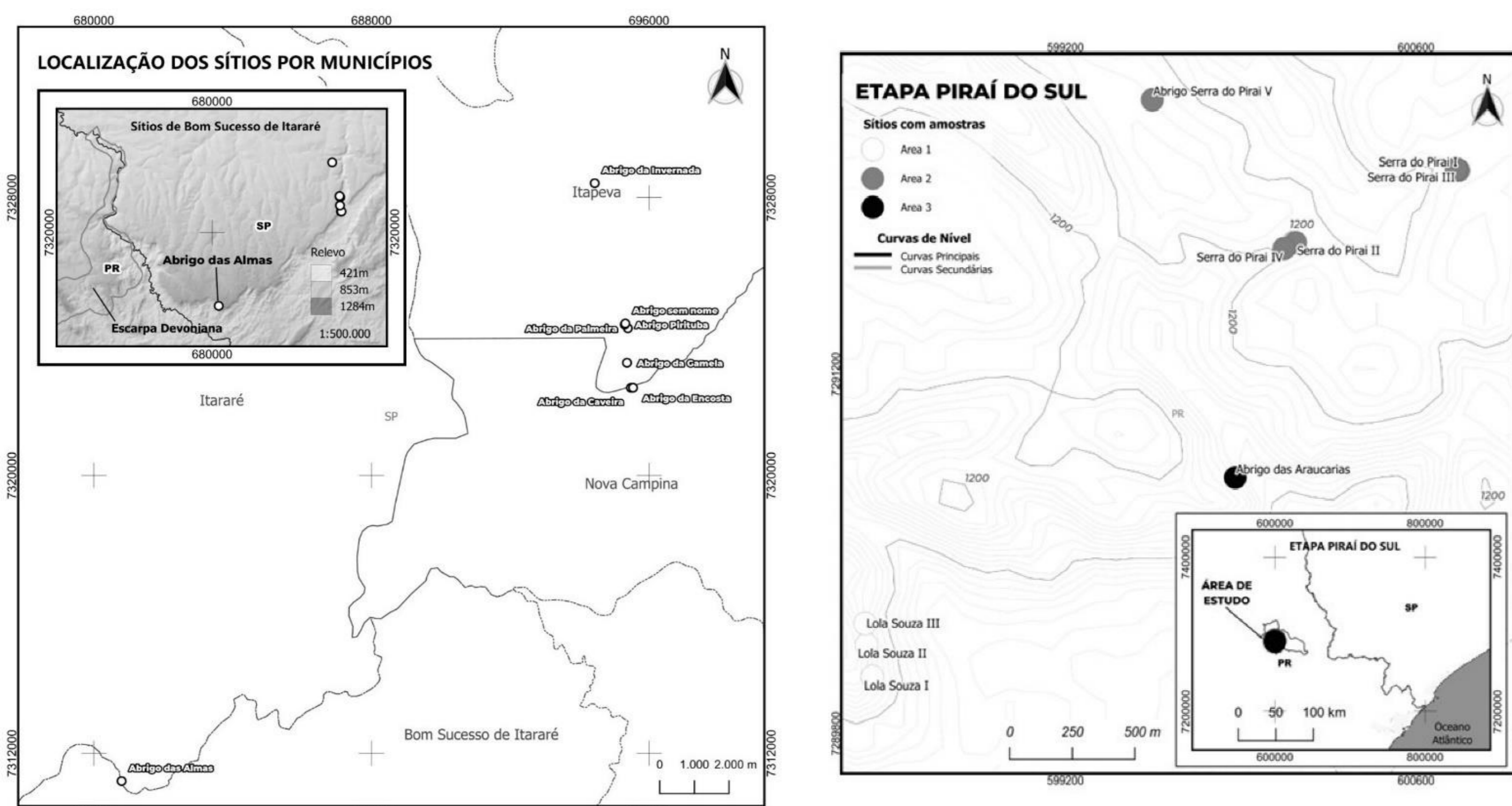


Figure 1 – Study locations in the two states

MATERIALS AND METHODS

XRD - The diffractometer used was a Bruker brand, D8 Advance da Vinci model, with $\text{CuK}\alpha$ radiation, a LYNXEYE detector, and TWIN-TWIN optics, enabling operation with fixed optics. The SUITE DiffractEVA program and the PDF-2 database (ICDD), version 2022, from the Institute of Geosciences at USP were used to identify phases.

FTIR - The FTIR-ATR spectra were obtained with a resolution of 4 cm^{-1} , in the spectral range of 400 to 4000 cm^{-1} , using a Bruker Alpha equipment (KBr optics and DTGS detector) coupled to an ATR accessory (Platinum, diamond crystal, single reflection).

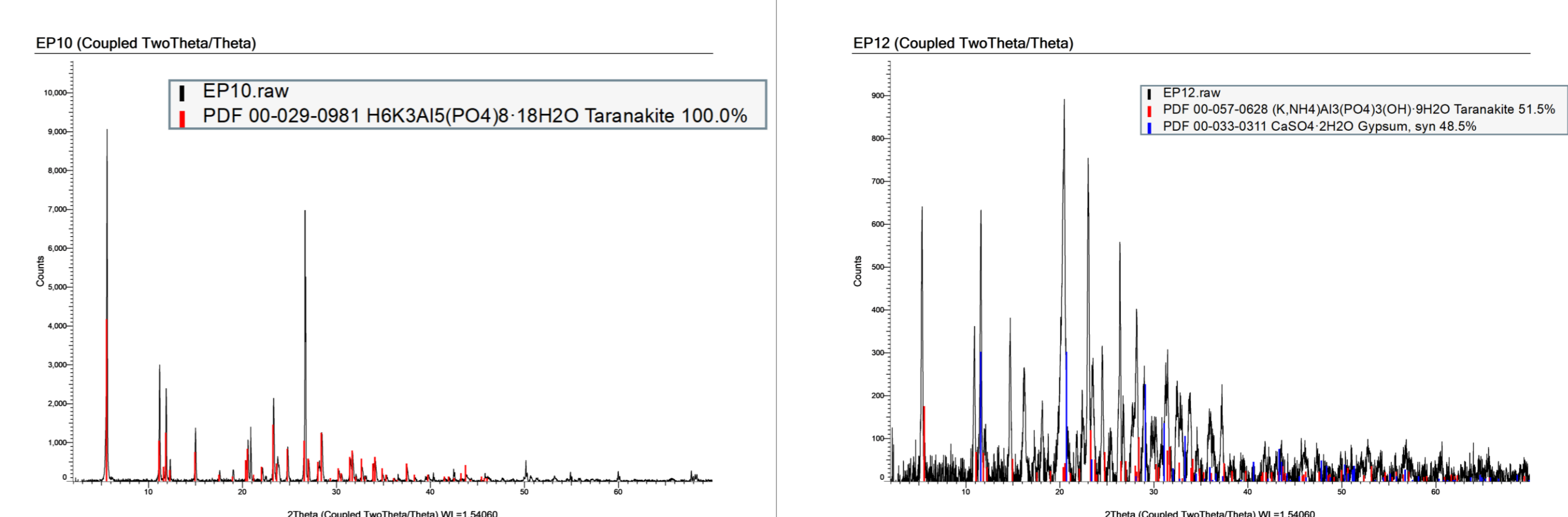
RAMAN - A Renishaw inVia Reflex device was used, coupled to a Leica DM2500 M microscope, containing lasers with excitation at 785 nm (diode laser, Renishaw) - 500 mW - and at 532 nm (diode laser, Renishaw) - 500 mW . The equipment also contains two diffraction gratings, one with 1200 lines (when using the 785 nm laser) and one with 2400 lines (when using the 532 nm laser), in addition to a thermoelectrically cooled CCD detector (1040×256 pixels). Wire 4.4 software was used during data collection. Baseline subtraction was performed using Fityk 1.3.1 software.

RESULTS: THE CASE OF RARE MINERALS



In two of the samples collected around the Metamorfose refuge, the presence of an unusual mineral was verified, at first supposed to be scarbroite ($\text{Al}_5(\text{CO}_3)(\text{OH})_{13} \cdot 5\text{H}_2\text{O}$) because its X-ray diffractogram bears some resemblance to that of this mineral. The chemical data, however, suggest it is an Al nitrate and not an Al carbonate as expected if it were scarbroite. Additional studies are being carried out and are needed to characterize this new mineral.

A LIKELY NEW MINERAL: THE AMMONIUM EQUIVALENT OF TARANAKITE



In the IR, the weak absorption at 1434 cm^{-1} suggests the presence of NH_4 species. This result is reinforced by the characteristic profile of ammonium equivalent of taranakite ($(\text{NH}_4)_3\text{Al}_5\text{H}_6(\text{PO}_4)_8 \cdot 18\text{H}_2\text{O}$) in the spectrum shown in its main bands observed at 529 , 600 , 950 , 1011 , 1052 , 1092 , 1182 and 1434 cm^{-1} , with the typically less intense band at approximately 1460 cm^{-1} of NH_4 not observed due, probably, to the low concentration of the species in the analyzed aliquot (which gives a less intense spectrum).

