

HYDROTHERMAL ORIGIN AND DISTRIBUTION OF TABATINGA FRACTURE: AN AQUIFER IN THE CORE OF THE VEIA ALTA FLOW, AMETISTA DO SUL, SOUTHERN BRAZIL.

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ABSTRACT: We report the first description of groundwater controlled by fracture of hydrothermal origin in Ametista do Sul, southern Brazil. Ametista do Sul is located in the Paraná volcanic province where the groundwater circulation occurs through the Serra Geral Aquifer System (SGAS). The SGAS is a fractured aquifer dominated by fractures of primary (by cooling of magma flow) and secondary (tectonic) origin. The exposures inside three active mines in the Ametista do Sul mining district resulted in the identification and description of a fracture of hydrothermal origin which locally controls groundwater circulation in the SGAS. In the Cretaceous, explosion of the ascending hot water formed fractures and also geodes, all filled by amethyst and other minerals and resulting in the largest world deposit of amethyst geodes. Currently, this groundwater is widely used in amethyst mining, allowing humid drilling in the underground galleries of the Veia Alta pahoehoe flow. In the region, the fracture is called 'Tabatinga' due to the whitish clay present in its upper part. The structure is also known in the region as a 'liso' because of the presence of wet clay capping. Inside the mines, the fracture is a flat-lying structure positioned 1 m below the geodic level (2-3 m thick). The fracture has 10 cm average thickness and crosses the entire Veia Alta pahoehoe flow in the Ametista do Sul hill. The Veia Alta flow is the most productive flow in the Ametista mining district and in the world. The filling of the fracture is composed of crushed basalt hydrothermally altered with high contents of clay minerals. Inclined, filled fractures link the Tabatinga with the base of geodes as feeding channels, constraining the geode level at the base. In the Mina do Professor Léo, water only flows into the mine through the Tabatinga, not from the ceiling or walls. The water flow from the fracture is pumped out, reserved and reused in the geode extraction. The mapping of the Tabatinga fracture outside the galleries can be done because it forms springs in the valleys at the elevation of the mineralized flow. The Tabatinga fracture is a well-known prospective guide for amethyst geodes and is a groundwater resource useful for miners and for the population in general. The Tabatinga can be identified in many hills of the SGAS that were affected by Cretaceous hydrothermal activity. This first report brings new perspectives to groundwater resources in the Paraná volcanic province, setting a panorama of additional studies of hydrogeologic controls, geochemistry and flow modeling in the region.

KEYWORDS: TABATINGA FRACTURE, AQUIFER, PARANÁ VOLCANIC PROVINCE