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HYDROCHEMICAL AND WATER FLOW STUDY OF THE UNSATURATED ZONE AT AN EXPERIMENTAL STATION IN THE ADAMANTINA FORMATION, NORTHWEST SÃO PAULO STATE, BRAZIL

1BERTOLO, R. A.; 1HIRATA, R. C. A. 1Instituto de Geociências/USP, São Paulo, Brasil

The aim of this work is to characterize the hydraulics and the geochemistry of the infiltration water along the unsaturated zone of the Adamantina Formation until the water table. This is the basis for developing a method to assess the degree of vulnerability of the aquifer in a detailed scale. An experimental station was installed for this purpose, corresponding to a large-diameter borehole of 1.5m diameter and 10m depth, where 12 tensiometers and 12 suction lysimeters were installed along its wall. The hydraulics of infiltration (storage, flow directions and velocities) is characterized by correlating the monitored soil-water potentials with the soil hydraulic conductivity data and the soil-moisture characteristic curves, obtained through lab experiments with non-deformed soil samples. These data are used to calibrate a software that simulates flow and transport processes through the unsaturated zone. The water-rock interaction is characterized by modeling the water chemical analysis data in an equilibrium mass transfer software. Such results allow the determination of the main chemical reactions between the water and the soil minerals. The model is calibrated by comparing its results with the data of chemical and mineralogical analysis of the soil samples. The hydraulic and hydrochemical modeled scenarios are then used as background conditions for simulating the behavior of contaminants of concern in the soil, such as nitrate, sugarcane vinasse and chromium. These results are expected to serve as basis for the development of a strategy for protecting water wells of social importance.

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