HYDROGEOPHYSICS OF GROUNDWATER RESERVOIRS IN ALTER DO CHÃO - PA USING SHALLOW REFRACTION SEISMIC DATA

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Introduction

The Alter do Chão aquifer, located in the Northern region of Brazil, is considered one of the largest freshwater reservoirs in the world, with great strategic importance for the country's water supply. Studying it is important for understanding its characteristics, preservation and exploration planning. Santarém is the main city in western Pará and is located on the Alter do Chão aquifer. Geological and hydrogeological studies were used in an integrated analysis for cartographic representations and three-dimensional models to elucidate the aquifer. The aim of this work is to characterize the groundwater reservoirs in the region, using shallow refraction seismic data, a geophysical technique widely used in water resource exploration.

Method and/or Theory

The methodology is based on the analysis of seismic wave propagation in different materials whose velocities vary according to density, porosity and degree of saturation. This technique is particularly useful for identifying soil and rock layers, determining aquifer depths, and delimiting recharge and discharge zones, and is therefore essential for the hydrogeophysical study of aquifers. Geophysical and geological data available from the National Agency of Petroleum, Natural Gas, and Biofuels (ANP) were used to identify interfaces, structures, and faults. Using the OpendTect software, a model for the aquifer was created to improve the characterization of the aquifer.

Results and Conclusions

The results include the identification of the geological layers that make up the aquifer, such as the thickness of the unsaturated zone (vadose zone), the depth of the water table, and variations in the composition of materials that may indicate areas of greater water productivity. In addition, mapping these structures is essential for understanding the water dynamics of the region and for the sustainable management of underground resources. In this way, the integration of seismic data with hydrogeological information can provide a more complete and detailed view of aquifer systems, helping in the preservation and rational use of this important natural resource, essential for the economic and social development of the Amazon region.