AN OVERVIEW OF CLIMATE-RELATED SIGNALS IN BORE HOLE TEMPERATURE PROFILES IN BRAZIL.

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Results of temperature logs carried out in bore holes and water wells located in 87 localities in Brazil were examined in an attempt to detect the presence of climate-related signals at depths. The procedure adopted is based on identifying characteristic curvatures in temperature profiles, that are not related to other perturbing factors such as variations in thermal properties (arising from changes in characteristics of rock strata) and alterations in local thermal regimes induced by groundwater flows. Out of a total of over two hundred temperature logs nearly twenty were found to exhibit inversions in the vertical distributions of temperatures that are characteristic of recent climatic warming events. The observational data were compared with results of simple analytical models of climatic changes. The close fit between theoretical models and experimental data indicate that changes in ground temperatures have taken place in several localities in Brazil, during the last few decades. The magnitude of temperature increase is in the range of 1 to 40C and the warming episode began during the last 50 to 100 years. Historic records of air and soil temperatures at some of the main meteorological stations in southern Brazil also reveal similar trends. It is possible that changes in vegetation cover and soil use has contributed to the observed rise in ground temperatures. Comparison with results of geothermal investigations carried out in other regions of the northern hemisphere indicate that magnitudes of climate-related signals are smaller in lower latitudes.