

Contributions to the understanding of the Angra do Heroísmo Hydrothermal Reservoir, Terceira Island, Azores

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Introduction

Volcanic source heated hot springs occur over the Azores region, onshore and offshore. Most of those hot springs are linked to young active volcanic edifices as stratovolcanoes. Repeated volcanic eruptions and arrested magma on low seated dykes are the main heat source for heating the rainfall water infiltration on highlands in the surroundings and beyond the volcanic systems. The upflow zones of the hydrothermal reservoir are evidenced by fumaroles, hot springs, cold springs and gas emissions, as radon and carbon dioxide, on the neighbourhoods of the volcanic active centres. However, lateral flows and geological control of the fluid dynamics leads to hidden hydrothermal reservoirs, as the case of the Angra do Heroísmo Hydrothermal Reservoir.

Directly above the Angra do Heroísmo town and proximal villages, southern part of Terceira Island, in Azores Archipelago, Portugal, natural tiny evidences of hydrothermal reservoir comes from spring's outflow discharging on coastal boundaries, precluding an eventual low seated hot reservoir. Municipality water well drilling on the vicinities of the Angra do Heroísmo reinforces the hypothesis for the presence of hot fluids on the island base aquifer, a Hydrothermal Reservoir.

In this paper we compiled and make data interpretation outlining the presence of a Hydrothermal Reservoir under the Angra do Heroísmo town and make consideration for future exploration tasks, crucial for the reservoir evaluation. Moreover, we give insights to the future developments of this beneficial natural resource and possibilities of direct utilization of the heat and the water resource as swimming pools, greenhouses, balneotherapy, modern SPA, and therapeutic use.

Conclusion

Hydrothermal features on springs, shallow drilled wells, radon gas emissions, and alteration minerals outlines a low seated Hydrothermal Reservoir in the Angra do Heroísmo vicinities. The reservoir is probably the result of a mixing process which includes the upward hydrothermal fluid heated by local active volcanic magma sources with fresh water basal aquifer. In this paper we firstly present a conceptual model of the hydrothermal reservoir and make evaluation of in situ heat source power potential.

The water could be used, among others, in medical SPA, balneology, therapeutic, swimming pool, cosmetic products, and district heating. The proximity to potential end users, namely in tourism industry, turns the probable resource into a most likely feasible geothermal reserve.