

Characterization of the Tanzanian geothermal resources and their potential

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Abstract

Tanzania's geothermal potential was estimated in the early 1980th based on analogy method. The high- and low-temperature systems mainly occur within the eastern and western branch of the East African Rift System (EARS). Outside the EARS only low-temperature systems occur in the Precambrian Tanzanian Craton and in the sedimentary basins of the coastal area. Viable high-temperature systems are related to Kilimanjaro, Ngozi and maybe Meru volcano.

Beside the few mentioned high-temperature prospects, a significant number of fault-related low-temperature prospects exist in the entire country. New results of surface exploration by Geothermal Power Tanzania Ltd. (GPT) in 2012 and 2013, partly done in cooperation with the Geological Survey of Tanzania and the University of Dar es Salaam, are presented.

Beside water chemistry and related solute geothermometry, gas species and isotopes (including noble gases) were analyzed and partly also flow rates were determined.

The paper covers all types of surface manifestations in the whole country and focusses on several examples from SW Tanzania, e.g. Isange spring at Livingstone fault, a newly discovered hot spring and the well-known hot springs at Mbaka fault, two well-known hot springs at the western escarpment (Mampulo & Kasumulu sampled 2006), a group of springs along Ifisi fault which are utilized as thermal spa (Ikumbi springs sampled 2007) as well as prominent examples from northern Tanzania like Maji Moto and hot springs at Lake Manyara and Lake Natron. Nyongoni hot spring in the coastal area of eastern Tanzania and Ngozi high-temperature geothermal system are separately discussed in two companion papers.

Finally, latest results from Mbaka drill core analyses as well as analyses of hot fluid samples from the Mbaka exploration drill hole at Kilambo site are presented.

Together with geological/structural context and considering latest published data an assessment of the resource potential as well as a first evaluation of the economic viability of those low-temperature resources is given.