

THERMAL AND RADAR REMOTE SENSING IN SUPPORT OF GEOTHERMAL EXPLORATION IN KENYA

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ABSTRACT:

Two remote sensing projects have been conducted since 2011 within the “GEOTHERM Programme – Promoting the Use of Geothermal Energy” in the Kenyan Part of the East African Rift Valley.

The first project was a high resolution thermal infrared campaign to detect fumaroles at the Silali volcano. An area of 2,000 km² was covered with thermal images with a spatial resolution of 3 m. A variety of Hot Spots as well as fault and fissure systems with temperature anomalies were identified. In the thermal data sets linear structures could be recognized and traced which are not visible in the field and satellite data and were therefore unknown before the thermal survey was conducted.

A second project aims to improve the knowledge about the geological and structural evolution of the Paka volcano. This is realized by sampling and age dating all Paka relevant lava flows characterized from Landsat TM data and the existing geological map, performing an InSAR study to detect surface movements for the time periods between 2006 to 2010 and in 2013, and by generating a high resolution digital terrain model (DTM) of the survey area. The results of the ⁴⁰Ar/³⁹Ar age dating suggest protracted volcanic activity during the past 0.4 million years. Three phases of pronounced volcanic activity can be recognized: (1) between 0.428 and 0.372 Ma, (2) between 0.160 and 0.126 Ma, and (3) between 0.039 and 0.012 Ma. During these intervals basaltic and trachytic lava flows were repeatedly erupted. To further support the structural analysis a high resolution (DTM) was generated using Pleiades satellite. Both InSAR studies show surface movement on the eastern flank of Paka volcano. The combination of surface movement, age dating and DTM allows a detailed structural analysis of the area.

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