Preliminary Results on Geothermal Exploration Potential in Olkaria Using Landsat ETM and Digital Elevation data.

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Abstract

Kenya is one of the leading countries globally with significant geothermal resources with rich geothermal potential sites being along the Rift Valley and a few outside the rift. In Kenya today, there is a lot of awareness and emphasis toward clean, green and renewable energy, geothermal being one of them. Geothermal energy offers a great potential source with the capability of producing over 10000 MW of energy in Kenya. Geothermal energy contributes about 284MW into the national grid, but plans to increase this to 5000MW by the year 2030 is what the government, GDC and KenGen and other private sectors are targeting.

Geothermal power is one of the safest and environment friendly energy harvested in Kenya since 1956. This energy manifests itself on the surface as hot-spring, steam jets, geysers, mudpools, altered grounds, sulphur deposit, silica sinters, geothermal grass, young lava flows caldera and fumaroles along the Kenyan Rift after which geophysics, geochemistry and geological exploration methods are used for citing the wells for drilling.

By using remote sensing and GIS technique we will be able to provide preliminary mapping information showing the geothermal resources around Olkaria. This information will be used as a guide during exploration by providing additional information in relation to accessibility.

In this study we develope a model based on globally available free datasets for initial exploration which have minimum cost. The GIS model has environmental suitability analysis and Land Surface Temparature analysis. Environmental suitability GIS data layers have been constructed from ASTER DEM. This includes data on topographical slopes and surface water drainage. Other datasets used are LandUse LandCover data from Landsat and Land Surface Temperature analysis processed from Landsat Thermal band. The motivation for this work is the proposition that analysis of satellite visible and thermal data provide useful and cost-effective option in identification of geothermal anomalies from relatively large areas of thermal ground .

Keywords: Geothermal, modelling, Land Surface Temperature, Olkaria, GIS