Paper Number: 3826

Preliminary remote sensing analyses of the Alid Volcanic Geothermal District (ERITREA)

Galgaro, A.[1], Ninfo A. [1], Nicola Pirola[1], Cultrera M. [1], Di Sipio E. [2], De Carli M. [3], Filmon Tesfalslasie[4], Domenico Montanari[5] and Giordano Montegrossi[5]

[1]Dept. of Geoscience, University of Padova, Italy.

[2]GeoCentre of Northern Bavaria -Friedrich-Alexander University, Schlossgarten 5 Erlangen, Germany

[3]Dept. of Industrial Engineering, University of Padova, Italy

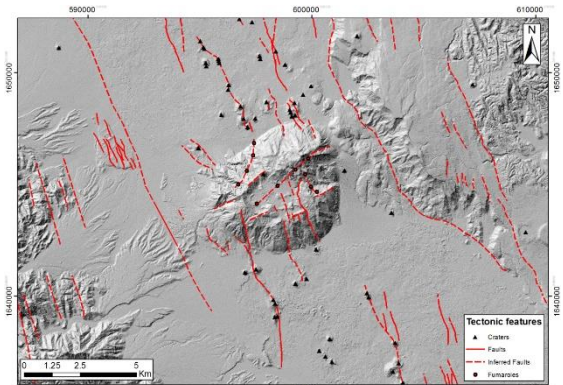
[4]Univerity of Osmania, university of Osmania, Hyderabad (India)

[5]CNR-IGG, Pisa, Italy

The principal aim of this work was to improve the characterization of Mt. Alid geothermal system (eastern Eritrea), considered the most favourable geothermal resource of the country and the best energy sources in terms of economic and environmental point of view. To conduct a detailed remote sensing analysis, a high resolution digital elevation model has been provided, the new ALOS DEM (courtesy of JAXA). Before its use, it required a validation process, using GCPs and other already validated data, such as SRTM. With the aid of different DEMs, Bing and Google high resolution images and processed Landsat 8 acquisitions, a remote sensing analysis has been conducted, in order to characterize geological, geomorphological and geostructural features of the Alid area and surrounding. Two main structural lineaments have been found: a NNW-SSE normal fault system, strictly related to the regional rift tectonic context, and a NE-SW trend with a dextral strike-slip component, related to the presence of the underlying shallow magma intrusion. The results obtained from the remote sensing approach have revealed that the crossing of the two fault systems caused the ascent of geothermal steam to the surface, since the position of fumarolic vents seems to be closely related. The mapping of geological units has brought the realization of and an updated and more accurate geological map of the Alid geothermal district. A preliminary fieldwork, aimed at validating the remote sensing analysis, was carried out confirming, to a first approximation, the validity of the produced thematic mapping. The thermal normalization of ASTER TIR night images, despite the complexity of local topography and the high daily temperature, has revealed the presence of thermal anomalies which can be related shallow thermal manifestations such as fumaroles and has given us promising results for further advanced studies through TIR remote sensing.

In conclusion, the remote sensing approach has been shown to be a useful resource for the analysis of geological and structural morphologies, especially for places like the Eritrean Lowlands, where the arid climate and the logistics can be serious problems for the acquisition of geological information. Moreover, the high resolution DEM has brought to an has brought to an improvement of new important structural

data.



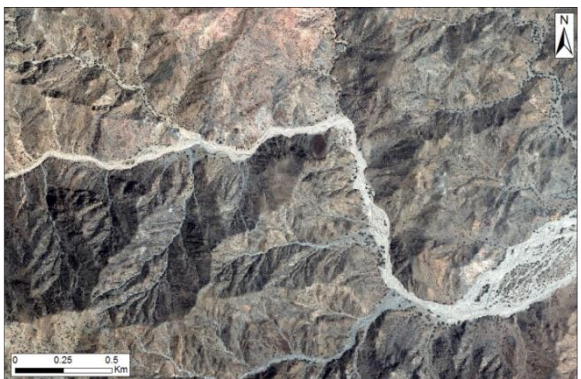


Figure 1: Structural map of the Alid volcanic district (sx), and an example of a structural lineament deducted from the surface drainage remote analysis (dx).