ABSTRACT

According to data from the 2023 Geological Agency, Indonesia is estimated to have a geothermal potential of 23,591.75 MWe. However, the exploration and utilization of geothermal energy in Indonesia is only about 5% due to high costs and long time in exploration activities. As a result of the investigation of geology, geophysics, and geochemical data, there are 362 geothermal potential locations spread throughout Indonesia. On the island of Sumatra itself, there are 104 geothermal hotspot locations, one of which is Mount Pusuk Buhit in Samosir Regency. The remote sensing method and gravity method were carried out to identify manifestations in the form of hot springs in the area. The data used in these two methods are Landsat-8, DEMNAS, and GGMPlus gravity data. DEMNAS data is used to obtain Fault Fracture Density (FFD), which is the density of faults and fractures around manifestations. As a result, the manifestation was in low to medium FFD (0 - 3.14 km/km^2) which is close to the intersection zone between straightness and fault. The structure is suspected to be the path of hydrothermal fluid rise and strengthens the suspicion that Mount Pusuk Buhit still has geothermal energy potential. Furthermore, the analysis of NDVI and LST shows that the hot springs are at medium vegetation density with a surface temperature of 27.92°C - 41.80 °C. The gravity method is used to determine the geothermal constituent layers under the manifestations, namely soils, clays, sandstones, andesite, riodasite, diorite, gabro, basalt, periodotite, tufa, gabro, and alkaline igneous rocks.

Keywords: *Pusuk Buhit, remote sensing, gravity method, geothermal, Landsat-8, LST, NDVI, FFD, GGMPlus.*