Abstract

This research integrates geology with remote sensing techniques to establish characteristic features that can be used to discover iron ore mineralization within the Neoproterozoic rocks of Mutomo – Ikutha area in south eastern Kenya. The association of hornblende gneiss and shearing as well as alteration processes near the mineralized regions appear to play an important role in the distribution and localization of the iron mineralization The methods used in this research include Image processing techniques applied on the digital subset ETM+ data that cover Mutomo – Ikutha area and geological field mapping. These techniques generated several products of enhanced satellite imagery, such as colour composite images, ratio images and principal component images. These techniques have been successfully used in the lithological discrimination of iron ore bearing sheared hornblende gneisses. The capabilities of remote sensing data to characterize the iron ore bearing gneisses, in addition to characterization and mapping the hydrothermal alteration zones helped in identification of iron mineralization regions. Extensive field geologic and geochemical investigations to the pronounced zones delineated by the image processing technique, led to discovery of four locations of high iron anomalies with some iron mineralization, mainly connected to the studied Neoproterozoic hornblende gneisses. Chemical studies were carried out using atomic absorption spectrophotometer (AAS) and X-Ray florescence, for some selected mineralized samples. Petrographic analysis and physical properties of the iron minerals were carried out as well. These investigations confirm the present iron mineral to be magnetite ore enriched with phosphates. The magnetite is found in close association with apatite chalcopyrite, quartz, and chlorite. Relics of corroded magnetite grains are occur along the Tiva river bed as well as along the road sides.