

## Abstract

The use of satellite images during the early stages of mineral exploration has been very successful in pointing out the presence of minerals such as smectites and kaolinite important in the identification of hydrothermal alterations. These same minerals are key to the soil swelling properties and their identification from space makes remote sensing a good tool in the characterization of soils in terms of swelling potential. Here several methods used for spectral enhancement of multispectral images are used on an Enhanced Thematic Mapper image (ETM+) in order to detect these minerals on soils, in an area in the central Kenya, where swelling soils are a major problem in the ever-expanding urban centres surrounding the Nairobi city. The techniques were based on separation of the areas based on the presence of iron oxides, hydroxyl bearing minerals and vegetation cover. The imagery was subjected to several data enhancement techniques before interpretations that included; principle component analysis, band rationing and minimum noise fraction. Interpretations were done based on observations made after these manipulations which gave characteristic differences between the heavily vegetated terrain consisting of high iron oxides and thus red soils and the low lying scarcely vegetated grasslands consisting of dark grumosolic soils. Spatially varying micro-topography consisting of gilgai topography and evident in the ETM+ panchromatic band 8 was used to further identify areas with swelling soils. This micro-relief complimented the spectral interpretations. The results were confirmed by field surveys and reveal a new method of integrated image interpretation in terms of spectral and spatial resolutions in identifying soils physical/chemical properties.