

Paper Number: 3495

Application of Multispectral Image Landsat OLI and ASTER for Detection of Gold Mineralization in Macossa District – Mozambique

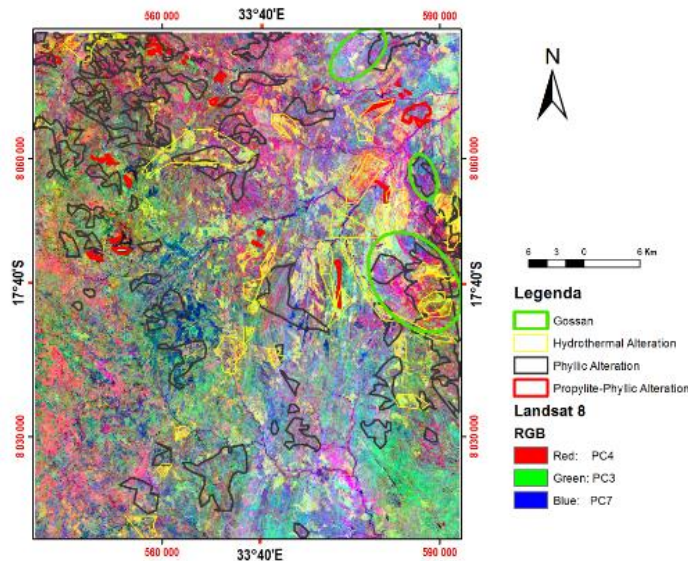
Cumbane, F. A.

Student of Eduardo Mondlane University, Department of Geology – Mozambique, geocumbane@gmail.com

The study area in Macossa district is part of the geologically units of Bárúè Complex, Metamorphic Mudzi Complex and suite of Guro. The metasedimentary rocks of the Bárúè Complex would have been pushed towards the Zimbabwe Craton during successive tectonic events, and it allowed the occurrence of remobilization process of metals (gold, iron, titanium) and enrichment metasediments [1]. This work appears as a way to map gold mineralization, through identification of hydrothermal alteration zones from Landsat OLI and ASTER images.

The bands of spectral SWIR and VIR in ASTER were Juxtaposed and transformed into an image with a spatial resolution of 30 meters. They were applied the following processing techniques to identify alteration zones in ASTER and Landsat OLI images: the technique of color combination of images, bands ratios and PCA (principal component analysis). The processing and enhancement of images was done with software Envi 5.0 and ILWIS, and its outputs maps were prepared and elaborated in ArcGIS 10.2. In Landsat 8 images (fig.1), were mathematically determined the relationship between PCA and the bands ratios, and it shows that PC4, PC3 and PC7 are used to map the hydrothermal alteration, due to its high reflectance on the ratios (4/2, 6/5 and 6/7), respectively [2]. In ASTER images, combination of bands at 468 in RGB system allow the identification of alteration zone and, the ratios R (4/6) G (5/6 /) and B (5/8) were applied for the detection of type of alteration that occurs in the study area [3]. The presumable occurrence of gossan in the area was detected using ASTER color combination of 621 in RGB [4].

The application of satellite image (ASTER and Landsat OLI) proved to be effective in mapping alteration zones, which are potential sites for the occurrence of different mineralization, such as gold. The predominant type of alteration in the study area is phylitic alteration, although the propylite-phylitic alteration can be found in the area.



The areas in green circle are very potential in mineralization because they were also recognized as the area where gossans occur. (Fig.1). The major part of alteration occur in the Neoproterozoic rocks belong to Bárúè Complex Unit. These rocks comprise Granite - Gneiss, Gnaiss-Metagrauvaque and Gneiss leucocratic of Monte Tomonda. Beside the known geological units already recognized, new intrusion unit was detect in ASTER image in the north part of the area.

Fig.1. Identification of hydrothermal alteration using PC4, PC3 and PC7 in RGB Landsat OLI and overlapped with alteration detected in

ASTER.

References:

- [1] Consortium GTK (2006), Notícia Explicativa Vol2, Escala 1 : 250 000. MRM, DNG, Moçambique.
- [2] Chaquisse, C.R. (2011), detecção de zonas de alteração hidroter mal, ASTER e Landsat-TM, Tete
- [3] JOGMEC (2005), ASTER data na Envi Basics Processing, Japão.
- [4] Kujjo, C.P. (2010) Application of remote sensing for Gold exploration, Sudan.

