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Structural Mapping and Identification of Hydrothermal Alteration Zones Through SRTM and ASTER Images in Macossa, Mozambique



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Application of remote sensing in recent years for mineral exploration and geological mapping has been developed [1]. Hydrothermal alteration zones form when hydrothermal fluid, which is composed of magmatic metals, reacts with a rock [2], when it travels through the rock fractures and faults. So understanding the structural setting is very important to predict the hydrothermal mineralization area. This study aims to map hydrothermal alteration zones and principal structures in the study area that is located in East edge of Mozambique belt. The study area is concerned in Mozambique mobile belt and is composed by Mesoproterozoic metasediments of medium to high metamorphic grade [3]. These metasediments were intruded by magmatic rocks and pegmatites veins that can be related with some mineralization [3]. In this study, SRTM and ASTER (*Advanced Spaceborne Thermal Emission and Reflection Radiometer*) images were obtained and processed to map the principals structures and alteration zones. From SRTM data, it was possible to map structures (Fractures, faults and foliation) by making shade and relief images. ASTER data were pre-processed by applying atmospheric correction. Enhancement methods such as False Color Composite (FCC) image and Band Ratio (BR) have been applied to ASTER data to map hydrothermal alteration zones. FCC images were created by combining ASTER SWIR bands 468 in RGB (red, green and blue) and FCC image for bands ratio 4/6, 5/6 and 5/8 for red, green and blue respectively was made. In accordance to DEM obtained by SRTM, the study area is constituted by two main fractures and faults domains. The first domain is composed by fractures and faults oriented in NNE-SSW and they are cut by small fractures and faults that form the second domain, with WNW and EES to E-W trend. According to FCC image obtained by band ratio of ASTER SWIR, the main alteration zones appear in pink color in the images. It is in concordance with results obtained by FCC obtained by bands 468. It was possible to realize that the principal hydrothermal alteration zones are associated with fractures and faults of the first domain, oriented in NNE-SSE trend, so areas affected by the deformation phase that lead to the formation of such structures are target for further study. The methods applied in this study showed high efficiency of remote sensing for mapping geological structures and hydrothermal alteration zones that can be studied more.

References:

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