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Earth Observation Societal and Economic Applications, Challenges and Benefits (5)

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DETECTING ARTISANAL SMALL-SCALE MINING ACTIVITIES IN ANGOLA USING VERY
HIGH-RESOLUTION IMAGERY

Abstract

Mining in Angola holds significant economic potential, ranking second in positive contributions to the gross domestic product (GDP). Despite their contribution to the economy, local communities receive few benefits. This situation has led people facing difficulties to engage in numerous small-scale artisanal mining (ASM) activities in the country's mining regions. ASM activities in Angola pose substantial threats to both the environment and socio-economic concerns. These activities contribute to deforestation, soil degradation, water contamination and biodiversity loss. Therefore, monitoring ASM is a very important aspect of economic stability and environmental preservation. Considering that ASM activities often occur in remote and challenging areas, the Angolan government faces difficulties in mapping and monitoring them. Remote sensing methods have become important tools for monitoring areas that are inaccessible or unsafe for traditional field survey methods. This research explores the application of Object-based image analysis (OBIA) and support vector machine (SVM) classifier to identify, quantify and analyze the spatial response of land cover due to surface mining activities. Very high-resolution (VHR) satellite imagery was employed to map and monitor ASM mining activities in the provinces of Lunda Norte and Lunda Sul, in Angola. Our results demonstrated the ability of the method to produce highly accurate land use and land cover maps, able to identify active mining areas and deactivated zones where a transition from mining activities to natural soil and vegetation has occurred. The results were integrated into the Web GIS Platform called Tech-Minas, with resources for data visualization, navigation and analysis. The platform incorporates the Harmony geospatial module, which is an AI enabled, natural language processing engine that enables users to query and analyze complex data. Tech-Minas was developed to address the needs of the mining sector in third world countries and is currently being customized to be used for the National Agency for Mining Resources of Angola, as well as by a wide range of companies in the mining sector in Angola.