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Detection and Monitoring of Small-Scale Mining Operations in the Eastern Democratic Republic of the Congo (DRC) Using Multi-Temporal, Multi-Sensor Remote Sensing Data

Christian Walther and Michaela Frei

Federal Institute for Geosciences and Natural Resources (BGR), Remote Sensing, Germany (christian.walther@bgr.de)

Mining of so-called "conflict minerals" is often related with small-scale mining activities. The here discussed activities are located in forested areas in the eastern DRC, which are often remote, difficult to access and insecure for traditional geological field inspection. In order to accelerate their CTC (Certified Trading Chain)-certification process, remote sensing data are used for detection and monitoring of these small-scale mining operations. This requires a high image acquisition frequency due to mining site relocations and for compensation of year-round high cloud coverage, especially for optical data evaluation. Freely available medium resolution optical data of Sentinel-2 and Landsat-8 as well as SAR data of Sentinel-1 are used for detecting small mining targets with a minimum size of approximately 0.5 km^2. The developed method enables a robust multi-temporal detection of mining sites, monitoring of mining site spatio-temporal relocations and environmental changes. Since qualitative and quantitative comparable results are generated, the followed change detection approach is objective and transparent and may push the certification process forward.