EXTRACTING OLIVINE-RICH PORTIONS OF
ULTRAMAFIC ROCKS USING ASTER TIR DATA

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ABSTRACT:

There are several studies for extracting ophiolitic rocks using thermal properties. The algorithms developed to discriminate olivine-rich rocks among ophiolite units, even altered to serpentinite. Within this study, it was objected to recognize peridotite group rich in olivine minerals among ophiolitic rocks or mélange, and to map them with distinct boundaries. Besides, these results may point to the chromite occurrences related to dunite rocks as well. These algorithms were applied to ophiolitic units around Cankiri region. Various rock types exist within the area and were mapped during previous studies. Target ophiolitic rocks have extensive outcrops in Eldivan Mountain. The ophiolitic rocks cover most of ophiolitic sequence around the study area. The purpose is to discriminate olivine-rich portions of ultramafic lithologies with their thermal infrared properties. Olivine-rich ultramafic rocks have intense reflection near 10.60 and 10.75 micrometers and absorption around 8.5. Those can be identical for extracting dunite or olivine-rich units using ASTER data. Band ratio algorithms were developed by comparing olivine reference spectra with ASTER TIR bands 12, 13, and 14. Consequently, olivine-rich lithologies were clearly identified, and were checked during ground truth in 15 different locations. Petrographical determinations indicate that 13 of 15 samples are mostly serpentinized but still contain olivine, less orthopyroxene and clinopyroxene as relicts. Additionally, target unit's boundaries were distinctly mapped among ophiolitic mélange within the area.

TOPIC: Multi-spectral and hyperspectral remote sensing
ALTERNATIVE TOPIC: Remote sensing applications