Mapping of economically potential mineral zone using aster image in the Northwest Mohmand district, Pakistan

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This study presents an integrated approach to mapping carbonate minerals in the remote and difficult-to-access regions of Northwest Mohmand District, Pakistan. A combination of newly developed remote sensing techniques, including the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Image. The X-ray diffraction (XRD) and petrographic analysis were used to validate the results with the classified ASTER image. The ASTER image was first acquired and pre-processed using a range of techniques such as iterative adaptive re-weighted regression (IARR), principal component analysis (PCA), and minimum noise fraction (MNF) were applied to the image. The results of the obtained classified image were then compared with the mineralogical analysis of the collected rock samples through XRD and petrographic analysis, which confirmed the presence of high concentrations of dolomite and calcite, indicating the presence of carbonate deposits. The integration of these techniques demonstrates that remote sensing can be an effective tool for identifying and mapping mineralized zones in remote areas.

Keywords: Potential Mineral Zone; PCA; IARR; XRD