

## **Utilization of remote sensing techniques for lithological mapping and rock identification: a case study from Nizampur, Khyber Pakhtunkhwa, Pakistan**

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The remote sensing satellite data plays a vital role in lithological mapping and rock identification studies. The recent up-gradation of these multi-spectral RS satellite systems provides potentially cost-effective and less time-consuming opportunities for scientists to better monitor surface dynamics. The current study demonstrates the utilization of modernized remote sensing techniques that will help map various lithological formations/rock bodies in the Nizampur area, eastern Kohat, Khyber Pakhtunkhwa, Pakistan. The selected image transformation techniques, such as Principle Component Analysis (PCA), Maximum Noise Fraction (MNF), and Band Ratio (BR) technique, were employed on Landsat-8 data for that purpose. The resultant RGB color-composite map, such as PCA (R: PC1, G: PC3, B: PC4) and MNF (R: MNFB1, G: MNFB2, B: MNFB3), demonstrates the distribution of the stratigraphic formation based on the spectral profile of target bodies. The Band Ratio (BR) color composite (R: BR3/2, G: BR5/1, B: BR7/2) discriminates and characterizes various rock bodies and their surface dynamics in the study area. The image processing techniques, along with the spectral reflectance curves of target material on the derived image, helped provide comprehensive information on various lithological features and their mapping. Results show strong agreement with the previous geological map of the study area. The study provides state-of-the-art RS methods and basic knowledge, which are of great help to the geologist and exploration communities.

**Keywords:** Remote Sensing; lithological mapping; Mineral Identification; multi-spectral RS satellite