

## PREFACE

Mineral exploration plays a pivotal role in the development and growth of a nation's economy. In the case of India, a country endowed with rich geological diversity, mineral exploration holds immense significance. Mineral exploration plays a pivotal role in the development and growth of a nation's economy. Lithium, a vital component in lithium-ion batteries, has emerged as a key resource in the pursuit of sustainable energy and technological advancement. As India accelerates its transition towards electric mobility and renewable energy, the exploration of lithium mineral deposits within the country assumes significant importance. Currently, India heavily relies on imports for its lithium requirements, predominantly from countries like China. By unlocking its own lithium resources, India can establish a robust domestic supply chain, reducing its reliance on external sources and enhancing national sovereignty. In the context of lithium mineral exploration in India, remote sensing plays a vital role in identifying potential lithium-rich areas, optimizing exploration efforts, and minimizing costs. By analysing remote sensing data, geologists and researchers can identify lithological features and anomalies associated with lithium deposits. This information enables targeted exploration, directing efforts towards areas with a higher probability of lithium occurrence. Hyperspectral imaging has revolutionized the field of mineral exploration by providing detailed spectral information of minerals and rock formations. It captures data across a wide range of electromagnetic wavelengths, allowing for the identification of specific mineral signatures. Lithium-bearing minerals, such as spodumene, lepidolite, and petalite, exhibit distinct spectral characteristics that can be detected and analysed using hyperspectral data. Granite is indeed a significant lithological structure found in the Katghora area of Chhattisgarh, India the presence of granite formations in the area contributes to the geological diversity and potential economic significance of the region. The software's used for the process is ArcGIS Pro 10.0, ENVI 5.6.3, ArcMap, Excel and Google earth pro. Geological survey of India's previous geological exploration have indicated presence of lithium in the region and thus, this study has used multispectral and hyperspectral data to explore lithium pegmatites and granites using various remote sensing techniques like band ratios, Mixed Tune Match filtering, minimum noise fraction, Principal component analysis Spectral Angle Mapper and some more which is explained in the study elaborately. Thus, integration of remote sensing techniques, geophysical survey and geospatial analysis enhances exploration efficiency and decision-making processes.