

USEFULNESS AND LIMITATIONS OF REMOTE SENSING TECHNOLOGIES IN GEOLOGIC MAPPING OF TROPICAL AND ARID TERRAINS

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This paper discusses the advantages and limitations of the present and future remote sensing technologies to tackle geologic problems, particularly in mapping and mineral exploration. Environmental parameters determine whether surface phenomena associated to geology can be detected by remote sensing. The most important of these parameters are climate, soil cover and vegetation which combine to determine the amount and quality of exposure in an area. Desert terrains are ideal for remote sensing applications because rocks are well exposed, and their spectral and spatial attributes can be measured with relative ease. With little cloud cover and low humidity, a wide selection of image data is available and atmospheric calibration is reasonably straightforward. Most approaches entail qualitative distinctions based on overall albedo and spectral characteristics unique to particular rock units. In humid environments, rocks are obscured by vegetation and soils, and atmospheric effects are more of a problem. Vegetation conceals outcrops and jeopardizes mapping and exploration efforts. Lithologic mapping in deeply weathered and/or heavily vegetated humid terrains requires an indirect approach. Geologic features are likely to be expressed as topographic attributes. Image analysts must rely their interpretation on geomorphic manifestations of lithologies, structures and mineralized systems. Here we present case studies that comprise each of these scenarios, proposing a reasoned thematic approach that tailors image processing to specific attributes of interest. The arid to semi-arid terrains of Eritrea, Oman, Peru, Chile and NE Brazil and the tropical to sub-tropical terrains of the Amazon and Central Brazil are considered in our analysis.