

SPECTRAL AND TEXTURAL CHARACTERISTICS OF LITHOLOGIC TYPES USING LANDSAT AND RADARSAT DATA: APPLICATION TO MAPPING IN AN ARCTIC DESERT.

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In an area of arctic Canada the ability to characterize rock types based on remotely sensed and ground data was assessed. Fourteen previously identified rock types (formation or group level) were characterized based on: chemistry, mineralogy, ground spectra, LANDSAT TM and radarsat data. Rock samples from 55 locations were collected from areas overlapping the 14 known rock types. They were assessed for major oxides, mineralogy and were measured for spectral response in the 400 to 2500 nm range. Reflectance spectra were reduced in the visible part of the spectrum by lichens; however spectra reflect the underlying mineralogy in the shortwave infrared part of the spectrum. Training sites of known lithology were used to test the separability of each rock type based on LANDSAT TM bands 1-7 and various band ratios. TM data were effective in separating the various lithologies. The various lithologies were characterized by different weathering patterns that produced characteristic surface patterns. RADARSAT data with a spatial resolution of 25 metres was used to characterize these patterns. LANDSAT TM and Radarsat were combined to predict lithologic groupings. Discriminant analyses of TM data including band ratios (5/7, 3/1 and 4/3) resulted in classification accuracies greater than 85%.