

## Lithofacies discrimination using the airborne polarimetric synthetic aperture radar data

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Polarimetric contrast enhancement and decomposition using the multi-polarization SAR data were applied in order to discriminate the lithofacies. JPL/AIRSAR data of the Kalgoorlie area, Western Australia were used. The Kalgoorlie area is known for many gold deposits in the greenstone belt. The geology of the area consists mainly of greenstone (basalt, dolerite, etc.) and granitic intrusive rocks. The area shows gentle topographical features and is an arid area with weak vegetation coverage (30-50 %).

In order to distinguish the surface lithology, (1) L-band polarimetric contrast enhancement between 2 geologic units and (2) simple scatters decomposition have been applied using the L-band AIRSAR data.

The objective of the L-band polarimetric contrast enhancement between 2 geologic units is to enhance difference in the polarimetric signature between the two surface lithologies and create a color image for lithofacies discrimination. By creating polarimetric signatures using the polarimetric SAR data (Zyl, 1987), the polarimetric variations of the transmit and receive waves have been compared in order to maximize their contrast. A color image was created from the contrast enhanced images.

The simple scatters decomposition is a method to decompose the Mueller matrix data into simple scatter components. The backscatter features from the surface geological features and roughness are decomposed into simple scatter components. The single scatter components that have been obtained are 1) Sphere-plate, 2) Dihedral corner reflector, 3) Wire, and 4) Pedestal. The wire components are considered as vegetation so have been removed and a color image was created using B:G:R= Sphere-plate: Dihedral corner reflector: Pedestal.

The L-band contrast enhanced image created from enhancement between 2 geologic units show more detail difference of the lithofacies than the L-band false color image B:G:R=VV:HV:HH and highly matched the published 1:100,000 scale geological map. The polarimetric contrast enhancement between 2 geologic units method is an excellent method to identify and notice the surface lithofacies.

The surface features can be recognized from the color of the simple scatters decomposition image. Also, 15 geological units were noticed from the image. The advantage of this method is its ability to provide information of the surface features.