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Analysis and interpretation of full polarimetric SAR data

Yinan Tang¹ Motoyuki Sato²

Sato Lab., Graduate School of Environment Studies, Tohoku University

¹ tang11a@cneas.tohoku.ac.jp (6074)

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PALSAR is a space-borne Japanese remote-sensing sensor, which has full polarimetric observation mode. Polarization is a property of electromagnetic wave. Many polarimetric radar systems are designed to transmit and receive microwave radiation of orthogonal polarization pairs, such as horizontally polarized (H) or vertically polarized (V) wave. A target generates a backscattered wave with a variety of polarizations. It is the analysis of these pairs of orthogonal transmitting and receiving polarization combinations that gives the target information.

The objective of my research is examining polarimetric characteristics of a target in an image with different position, observed by GB-SAR

With a Double Ridged Horn antenna and VNA, the measurement was carried out in outdoor. A material with low dielectric constant was used as a target stand for reducing reflection. Fig.1 describes the system of the experiment. The radar image is constrained by the radar measuring parameters: 1) bandwidth; 2) frequency step; 3) scan aperture length; 4) scan step.

Through the experiment the scattering matrix of sphere shown in the next equation is verified

$$\begin{bmatrix} S_{hh} & S_{hv} \\ S_{vh} & S_{vv} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (1)$$

Next the scan length and scan step are changed and difference of the images are examined. Fig.2 describes the cross section of the image across the target. We can find when the scan step is larger than 5cm there are outstanding side lobes. Some large noise are also observed for the image with 5cm step



Fig.1 The system of experiment

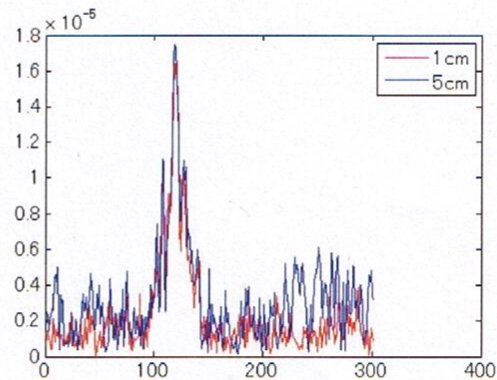


Fig.2 The cross section of the image across the target