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An Attempt to Increase Estimation Accuracy of Differential SAR Interferometry using Polarization

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Differential SAR Interferometry (DInSAR) is a method to estimate surface displacement in line of sight direction between observations, which have provided us innovative insights into crustal movement. Although we estimate precious displacement using DInSAR analysis, the accuracy of results depends on the observation and surface conditions of the analyzed area. Here, we focus on the decorrelation as one of the main sources of measurement error. In the resolution-cell of vegetation and various scatters, the observed phase is not sometimes deterministic, resulting decorrelation. Thus, to decrease decorrelation area and improve the accuracy of estimation, we propose DInSAR analysis using polarimetric information.

Polarized wave is denoted by the combination of horizontal (H) and vertical (V) component. By using polarized wave, four SAR images (HH, HV, VH, VV) can be observed, where XY indicates polarization of observed (X) and transmitted (Y) wave. Since an arbitrary scatter condition can be obtained from these four images, we can estimate a scatter condition creating maximum coherence in the resolution cell (Cloude and Papathanassiou, 1998). In this study, we tried to estimate surface deformation from an optimized scatter condition. SAR images used in this study are observed by PALSAR instrument on Japanese satellite (ALOS) and covered with land subsidence area in Chiba prefecture. By using this analysis, we can reveal subsidence in the condition of better coherence.

Keywords: Differential SAR Interferometry, Polarization, Interferometric Coherence, Land Subsidence