PROCESSING OF SYNTHETIC APERTURE RADAR DATA AS APPLIED TO THE CHARACTERIZATION OF LOCALIZED DEFORMATION FEATURES

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ABSTRACT

Satellite-based Interferometric Synthetic Aperture Radar (InSAR) has been used by the geoscience community for many years to obtain ground deformation measurements of large-scale spatial features. Researchers have also begun applying InSAR to detect small-scale spatial features associated with geotechnical engineering applications. However, there is a significant lack of understanding on how to obtain ground deformation measurements associated with civil infrastructure because of the generally large spatial resolution of the imagery as compared with the limited spatial scale of the deformation features.

In this study, InSAR processing techniques were evaluated for two demonstration sites to enhance the understanding of detection of small-scale spatial features. The sites consist of a predominately urban site (Los Angeles, California) and a predominately rural site (outside of Mosul, Iraq). Localized deformation features were identified at both of these sites using InSAR processing techniques recommended in this research

InSAR coverage allows for the detection of small movements (<1 cm) covering small spatial extents (<100 meters) by scanning large areas (100 km^2) instead of or in addition to current surveying practices which provide spatially limited point measurements. This coverage and the ability to conduct deformation investigations on civil infrastructure using archived InSAR data make the use of InSAR well suited for geotechnical engineering applications.