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Surface Deformation Studies in South of Johor Using the Integration of InSAR and Resistivity Methods

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Abstract : Over the years, land subsidence has been a serious threat mostly to urban areas. Land subsidence is the sudden sinking or gradual downward settling of the ground's surface with little or no horizontal motion. In most areas, land subsidence is a slow process that covers a large area; therefore, it is sometimes left unnoticed. South of Johor is the area of interest for this project because it is going through rapid urbanization. The objective of this research is to evaluate and identify potential deformations in the south of Johor using integrated remote sensing and 2D resistivity methods. Synthetic aperture radar interferometry (InSAR) which is a remote sensing technique has the potential to map coherent displacements at centimeter to millimeter resolutions. Persistent scatterer interferometry (PSI) stacking technique was applied to Sentinel-1 data to detect the earth deformation in the study area. A dipole-dipole configuration resistivity profiling was conducted in three areas to determine the subsurface features in that area. This subsurface features interpreted were then correlated with the remote sensing technique to predict the possible causes of subsidence and uplifts in the south of Johor. Based on the results obtained, West Johor Bahru (0.63mm/year) and Ulu Tiram (1.61mm/year) are going through uplift due to possible geological uplift. On the other end, East Johor Bahru (-0.26mm/year) and Senai (-1.16mm/year) undergo subsidence due to possible fracture and granitic boulders loading. Land subsidence must be taken seriously as it can cause serious damages to infrastructures and human life. Monitoring land subsidence and taking preventive actions must be done to prevent any disasters.

Keywords : interferometric synthetic aperture radar, persistent scatter, minimum spanning tree, resistivity, subsidence
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