Unveiling land uplift in Ipswich Queensland using InSAR

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SUMMARY

Interferometric Synthetic Aperture Radar (InSAR) has proven to be a powerful tool for detecting land deformation caused by natural or anthropogenic activities. In this study, differential InSAR is utilised to analyse land deformation patterns within the urban landscape of Ipswich, Queensland. Employing the persistent scatter technique, data obtained from Sentinel-2 satellites spanning the timeframe of 2018 to 2023 are processed. The results revealed localised uplifts emerging in regions formerly afflicted by subsidence, particularly in the Collingwood Park area (northeast side of the Clarence-Moreton Basin), attributable to historical mining activities. Excessive groundwater extraction during past mining endeavours in Collingwood Park led to significant subsidence events in 1998 and 2008. Upon scrutinising groundwater monitoring boreholes in the study period, a consistent surge in water levels (over 12 meters) was observed proximate to areas identified for uplift by the InSAR results. This contrasts sharply with observations from the western side of the study area, where water levels exhibited minimal fluctuation, averaging around a meter throughout the study period. This highlights the role of groundwater in creating poroelastic effect in the eastern side of the study leading to a local land uplift.