

## Surface Elevation Dynamics Assessment Using Digital Elevation Models, Light Detection and Ranging, GPS and Geospatial Information Science Analysis: Ecosystem Modelling Approach

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**Abstract :** Surface elevation dynamics have always responded to disturbance regimes. Creating Digital Elevation Models (DEMs) to detect surface dynamics has led to the development of several methods, devices and data clouds. DEMs can provide accurate and quick results with cost efficiency, in comparison to the inherited geomatics survey techniques. Nowadays, remote sensing datasets have become a primary source to create DEMs, including LiDAR point clouds with GIS analytic tools. However, these data need to be tested for error detection and correction. This paper evaluates various DEMs from different data sources over time for Apple Orchard Island, a coastal site in southeastern Australia, in order to detect surface dynamics. Subsequently, 30 chosen locations were examined in the field to test the error of the DEMs surface detection using high resolution *global positioning systems* (GPSs). Results show significant surface elevation changes on Apple Orchard Island. Accretion occurred on most of the island while surface elevation loss due to erosion is limited to the northern and southern parts. Concurrently, the projected differential correction and validation method aimed to identify errors in the dataset. The resultant DEMs demonstrated a small error ratio ( $\leq 3\%$ ) from the gathered datasets when compared with the fieldwork survey using RTK-GPS. As modern modelling approaches need to become more effective and accurate, applying several tools to create different DEMs on a multi-temporal scale would allow easy predictions in time-cost-frames with more comprehensive coverage and greater accuracy. With a DEM technique for the eco-geomorphic context, such insights about the ecosystem dynamic detection, at such a coastal intertidal system, would be valuable to assess the accuracy of the predicted eco-geomorphic risk for the conservation management sustainability. Demonstrating this framework to evaluate the historical and current anthropogenic and environmental stressors on coastal surface elevation dynamism could be profitably applied worldwide.

**Keywords :** DEMs, eco-geomorphic-dynamic processes, geospatial Information Science, remote sensing, surface elevation changes,

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