72. Mapping the cancellation of the El Alamein conflict landscape through a multi-temporal assessment of anthropogenic impacts based on open-access satellite imagery

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Publicly accessible satellite imagery offers opportunities to document anthropogenic transformations in desert landscapes where field monitoring is limited. This study aims to identify the main processes at work in the northern Egyptian Western Desert, quantify their spatial development and classify their (i) environmental, (ii) morphological and (iii) cultural or archaeological implications. The analysis focuses on urban expansion, irrigated agriculture, oil extraction, quarrying and transport infrastructure, including their interaction with desert landforms and World War II remains. The method combines satellite repeat photography and GIS analysis across eight study areas and one comparison area. Historical Google Earth Pro imagery and Esri World Imagery Wayback were integrated with Sentinel-2 Level-2A data. Images were georeferenced and organized in a multi-temporal geodatabase, from which feature counts, lengths and areas were derived to describe the extent and evolution of anthropogenic interventions. The Normalized Difference Vegetation Index (NDVI) supported the identification of cultivated surfaces, while spatial overlay assessed the overlap between construction or quarrying footprints and possible military remains. These observations were interpreted through three complementary impact categories, distinguishing measurable surface changes from inferred environmental degradation and heritage loss. In the New Alamein study area, mapped agricultural land increased from 3.28 to 135.58 km² between 2007 and 2025, while along the Rod El Farag–El Dabaa corridor 285 of the 741 possible wartime positions mapped in 2012 (38.5%) lay within construction or quarry footprints by 2025. The results reveal spatially uneven transformations and show that combining image comparison with GIS indicators supports preliminary impact assessment.