

# Subsidence Observation of an Industrial Solid Waste Landfill in Dhahran, Saudi Arabia, Using SBAS-InSAR techniques

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## Abstract:

This study focuses on the subsidence observation of an industrial solid waste landfill in Dhahran, Saudi Arabia, utilizing Interferometric Synthetic Aperture Radar (InSAR) technology. The data for this investigation was collected from the Alaska Satellite Facility (ASF) using the ASF data search platform from 2016 to 2023. The Small Baseline Subset (SBAS) technique, employed in interferometric synthetic aperture radar (InSAR) and HyP3+Mintpy for time series analysis, was utilized to monitor ground deformations over time. The InSAR analysis showed a subsidence rate of 4.32cm/yr in the landfill area, highlighting potential ground movements that could have implications for infrastructure stability and environmental considerations. To validate the accuracy of the InSAR results, Ground-Based Navigation Satellite Systems (GNSS) data was used, providing additional confidence in the observed subsidence patterns. Safe Management (SM) for Industrial Waste plays a pivotal role in the transportation, treatment, and safe disposal of industrial and hazardous waste generated in the Dhahran region. These services provided handling of petroleum and petrochemical industry wastes, hydrocarbon sludges, drilling fluids, slurries, solids, contaminated soils, and oil spills. This research contributes to the understanding of subsidence phenomena in industrial solid waste landfills, particularly in the context of Dhahran, Saudi Arabia. The integration of InSAR technology, specifically the SBAS technique, with GNSS validation enhances the reliability of the observed subsidence rates. The findings of this study, in conjunction with SM's waste management services, hold significance for environmental monitoring, infrastructure management, and the sustainable development of waste disposal facilities in the region.

**Key words: SBAS-InSAR, GNSS, Landfill, Waste, Dhahran**