Poster: Historical heritage assessment and monitoring using remote sensing: the case study of Wolvesey Castle

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Abstract

Conservation of historical heritage sites requires a balance between respecting historical authenticity and addressing environmental risks. This study focuses on Wolvesey Castle in Winchester, managed by English Heritage, using a multi-temporal remote sensing approach to monitor its structural vulnerability and environmental exposure. For this, we utilised a combination of satellite-derived indices, including Land Surface Temperature (LST), Normalised Difference Vegetation Index (NDVI), Normalised Difference Moisture Index (NDMI), and Normalised Difference Water Index (NDWI). These indices were employed to assess thermal stress, vegetation dynamics, moisture retention, and water presence across the site.

Average annual values were analysed alongside time series covering several years of observations, in order to capture environmental trends and anomalies. Data from Landsat-8 and Sentinel-2 satellites were processed and integrated with preliminary surface deformation analysis from PS-InSAR products. Results highlighted major seasonal fluctuations in LST, moderate human intervention to vegetation, variable moisture availability, and localised water retention patterns within the castle walls. Surface deformation analysis also indicates signs of subsidence trend, although further high-resolution radar observations are recommended for detailed structural monitoring.

This study shows that satellite remote sensing offers a non-invasive, cost-effective tool that can complement the traditional methods in historical site conservation. By detecting early signs of environmental stress and structural change, this approach supports policy makers and gives them a better view for implementing the best strategies necessary. The findings at Wolvesey Castle underscore the importance of integrating spectral indices, deformation monitoring, and conventional site inspections to protect historic structures under dynamic environmental pressures

Keywords

Remote sensing, Historical heritage