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Space-to-Ground Documentation and Monitoring of Cultural Heritage: The Case of UNESCO Site - Holy Cross at Pelendri, Cyprus

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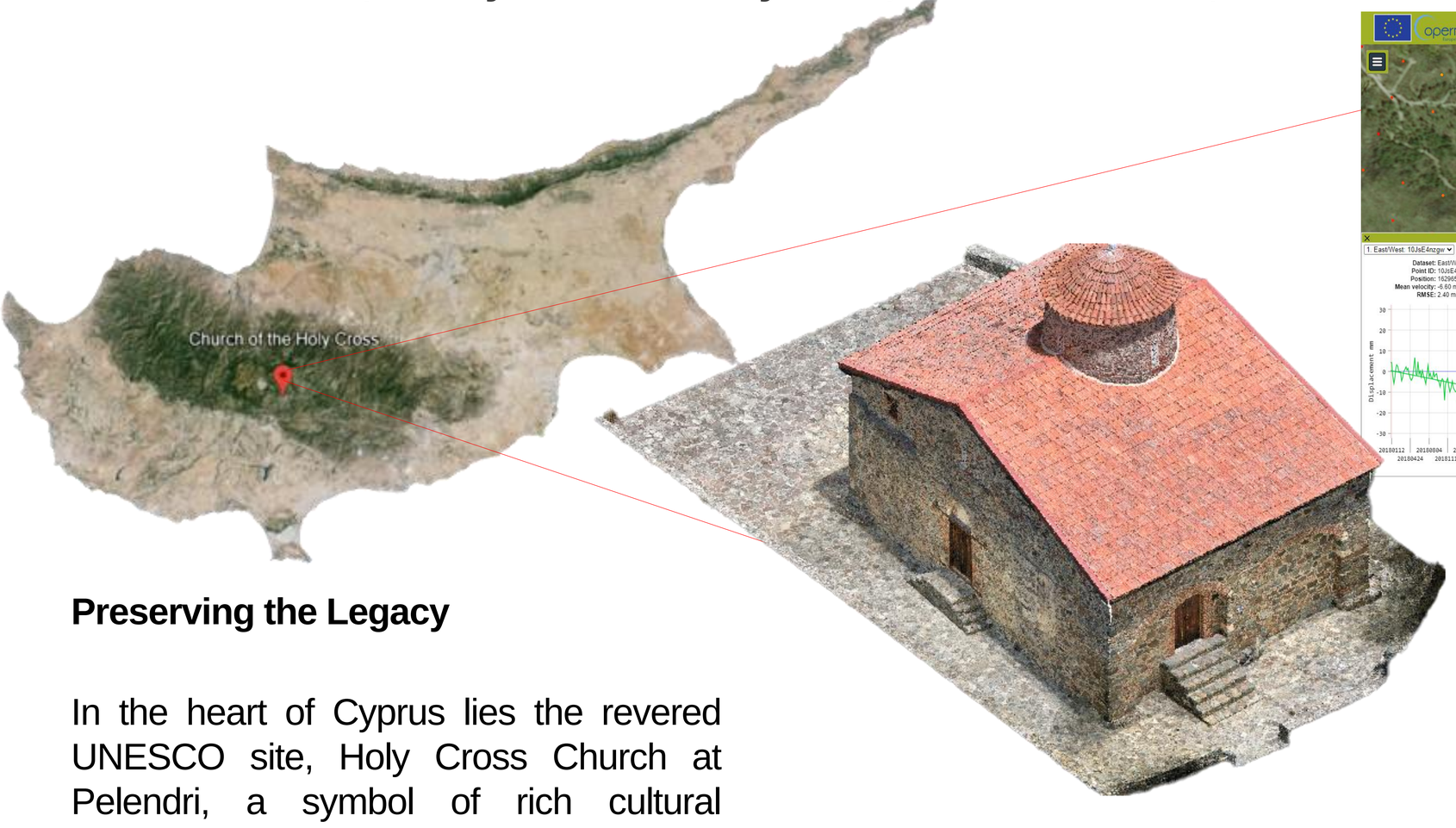

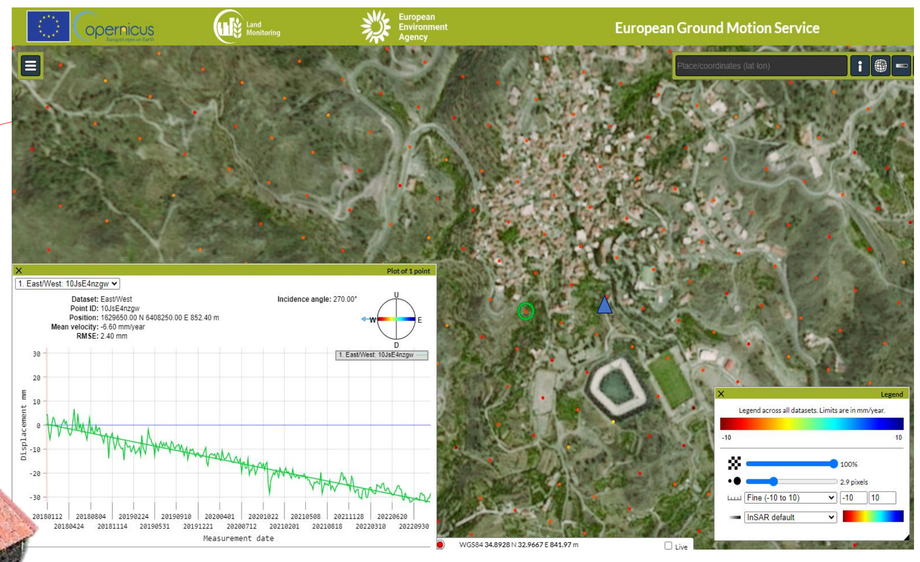

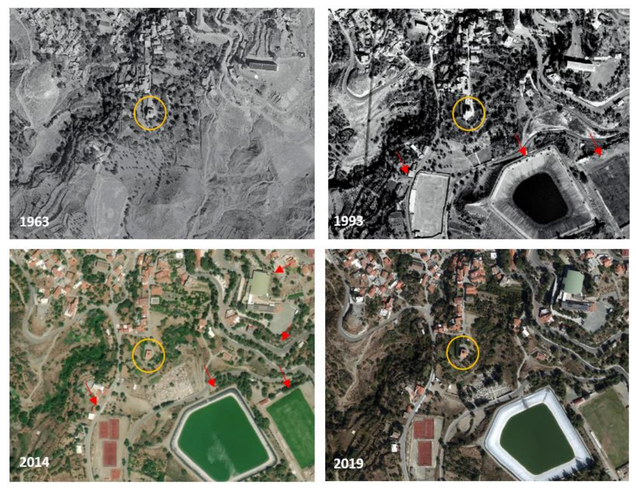

Advancements in Digital Surveying

Preserving the Legacy

In the heart of Cyprus lies the revered UNESCO site, Holy Cross Church at Pelendri, a symbol of rich cultural heritage. Utilizing advanced space-to-ground documentation and monitoring, we embark on a journey to preserve and understand this historical treasure. Through the use of advanced technologies, we ensure comprehensive documentation of the monument, capturing both its physical attributes and intangible significance. This holistic approach guarantees the continued safeguarding of this monument, ensuring its legacy endures for generations to come.

The Church of the Holy Cross: An Evolutionary Journey

The Church of the Holy Cross in Pelendri has undergone a remarkable evolution, shaped by centuries of interventions. Originally a single-aisled dome hall church in the 12th century, adorned with frescoes in 1178, subsequent alterations transformed its structure. Collapse and reconstruction led to the integration of the original apse into a new church in the 14th century. Further modifications in the 16th century included additions to the north chapel. Structural challenges resulted in collapses, leaving remnants of frescoes on surviving walls. Each layer of change adds to the rich tapestry of history within this sacred site.

Landscape Changes over time

To safeguard the preservation of cultural heritage monuments like the Holy Cross Church, it is crucial for local authorities and responsible stakeholders to collaborate in implementing appropriate planning and zoning regulations. This helps strike a balance between development and preservation, ensuring that the natural and historical character of the area is respected while allowing for sustainable growth and enhancement of the surrounding landscape. To this end, the surrounding area of the monument was examined through a timeseries of orthophotos produced by the Department of Land and Surveys, dated back to 1963 aiming to understand the impact of landscape changes over time. The overall findings indicate some significant land use changes in the southern part of the Church.

Data were also retrieved from European Ground Motion Service (EGMS) and studied to detect possible land movements occurred in the area that may affect the integrity of the monument. Through Sentinel 1 and InSAR analysis from the EGMS it was possible to capture the overall subsidence of the area.

In our pursuit to preserve the rich heritage of the monument, innovative digital surveying methods have been employed. Through a combination of Photogrammetry and Terrestrial Laser Scanning (TLS), a comprehensive digital record of this monument has been crafted. By aligning georeferenced point cloud data from Photogrammetry with TLS, we pave the way for enhanced data processing within Building Information Modeling (BIM) software.

Building a Bridge to the Future with HBIM

Our mission extends beyond documentation; we aspire to create a Historical Building Information Modeling (HBIM) model of the Holy Cross Church. This model will not only capture architectural qualities but also incorporate crucial attributes such as paradata, metadata, and data.

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