



GPR prospecting and 3D virtual model of the St. John Co-Cathedral, Valletta (Malta)

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This work is based on several geophysical measurements performed to investigate the flooring of the co-Cathedral of St. John in Valletta, Malta, in order to identify and map possible burial sites and/or passages never investigated or documented before. This study can also provide information about possible structures beneath the whole marble floor, which is made of an entire series of tombs that do not always hide a burial site. In fact, several knights were buried outside Malta and over the years the position of the tomb slabs have changed without proper documentation. The GPR data have been gathered with a commercial pulsed Ris Hi-System and a prototypal reconfigurable stepped frequency system [1], implemented by IBAM-CNR. The data have been taken along orthogonal grids with interline step 30 cm and processed using the Reflexw software. With regard to the Ris-Hi mode system (that is equipped with a dual antenna at 200 and 600 MHz), the data at 600 MHz are considered here. With regard to the reconfigurable system, the data with the high frequency antenna is considered here (the centre of the band is at about 520 MHz). The processing consisted of a zero timing, a time cut, a subtracting average or a background removal (depending on the room), a gain vs. the depth with a consequent a subsequent Butterworth filter. Finally, the data have been migrated with a propagation velocity heuristically evaluated on the basis of the sequential migrations method [2]. The results show strong anomalies most of which ascribable to burial sites. The floor of the Co-Cathedral is constituted by adjacent funerary inscriptions, but the GPR has revealed that we do not have a corresponding continuous of tombs under the inscriptions. We have identified surely many tombs, but they do not correspond in all the tomb slabs. Moreover, the tombs in general do not appear to have the same size neither of the same depth, and we also deem that not in all cases the positions of the tombs coincide with those of the upper-lying mosaic inscriptions. Finally, a 3D model of the monument was constructed and data integrated into virtual reality products.

References

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- [2] R. Persico, M. Ciminale, L. Matera, A new reconfigurable stepped frequency GPR system, possibilities and issues; applications to two different Cultural Heritage Resources, Near Surface Geophysics, vol. 12, n. 6, pp. 793-801 (doi: 10.3997/1873-0604.2014035), December 2014.