

The Use of Geodetic Techniques in the Documentation of an Archaeological Excavation Site

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Key words: Engineering survey; Laser scanning

SUMMARY

In archaeological sites which are under excavation there is often the need for rapid documentation of the area. Whilst this is a dynamic process and therefore requires fast and preferably non-immersive documentation techniques suited to cover larger areas, it is still essential to provide high accuracy. Also, many excavation areas may often remain open to visitors and consequently only short periods are available for field work.

The aim of this study is to present the documentation of the archaeological site of Amyclae in Sparta, Greece using different types of geodetic techniques. The site of Amyclae includes a large number of important findings such as retaining walls which are architecturally designed to work with the steep slopes of the hill, circuit walls, evidence of foundations dating to various periods, and a circular altar. Found at the site is also archaeological evidence of the Throne of Apollo Amyklaios.

For the documentation of the site, data from land surveys (total station surveying, Global Navigation Satellite Systems -GNSS surveying), terrestrial laser scanning (TLS), and aerial digital images from UAV are collected in two different epochs (2015 and 2017). The data are georeferenced into a common reference system. From the data, digital surface models of the archaeological site are produced and a geometrical comparison of the surface models is made in order to establish the progress of the excavations. Also, whilst 3D modelling from laser scans is a powerful tool, a 3D model by itself lacks important context information which can be added by combining data from different sensors. For example, by displaying the site grid acquired by land surveying, archaeologists that were not at the site can relate written reports to the 3D model. For the visualisation of the site's temporal evolution, a texture-mapped model will be developed by combining the 3D mesh and the images which provide texture information.

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The paper describes the methodology followed for the data collection and data processing pipeline and discusses on the practical aspects and difficulties for such types of documentation projects. Finally, the paper reports on the produced results in the form of 3D models of the site and 2D results in the form of plans and sections.

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