

# Establishing a Three-Dimensional Model and Digital Documentation of Beaufort Castle by Using GPS, 3D Laser Scanning and Digital Photogrammetry

Mohammad Abboud, Mohammad Nasrallah, Mohammad Issa, Hiba Moussa and Hanan Abou Ali (Lebanon)

**Key words:** Laser scanning; Photogrammetry

## SUMMARY

Archaeology aims to document and explain the origins and development of human culture, its history, cultural evolution, behavior, and ecology. The increase in threats facing archaeological sites such as terrorist attacks, archaeological thefts and natural disasters requires increasing the efforts to preserve archaeology worldwide. Advances in the three-dimensional (3D) laser scanners and modeling techniques provide a reliable accurate tool for preserving archaeological sites. Terrestrial laser scanners and unmanned aircraft vehicles (UAV) are two major approaches used in 3d modelling particularly for archaeological purposes. To test the performance of each of those methods, a 3D model was generated for Beaufort castle in Arnoun, South Lebanon using both procedures. The terrestrial laser provided higher positional accuracy compared to photogrammetry. Data collected by both the terrestrial laser scanner and UAV photogrammetry was aligned and merged resulting in 3D model, with planar and perpendicular geometries. This study demonstrates the potential of using the integration of terrestrial laser scanning and photogrammetry in 3D digital documentation and spatial analysis for Lebanese archeological sites alongside GPS technology.

---

Establishing a Three-Dimensional Model and Digital Documentation of Beaufort Castle by Using GPS, 3D Laser Scanning and Digital Photogrammetry (10742)

Mohammad Abboud, Mohammad Nasrallah, Mohammad Issa, Hiba Moussa and Hanan Abou Ali (Lebanon)

FIG Working Week 2020

Smart surveyors for land and water management

Amsterdam, the Netherlands, 10–14 May 2020