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Recording, Visualization and Documentation of 3D Spatial Data for Monitoring Topography in Areas of Cultural Heritage

Emmanouel Maravelakis (1), Antonios Konstantaras (1), Anastasia Axaridou (2), Ioannis Chrysakis (2), and Michalis Xinogalos (3)

(1) Technological Educational Institute of Crete, Special Account, A.F.M. 090042189, D.O.Y. A' Herakleion, Herakleion, Greece (Corresponding Author e-mail: akonstantaras@chania.teicrete.gr), (2) Foundation for Research & Technology – Hellas, (3) Astrolabe Engineering

This research investigates the application of new system for 3D documentation of land degradation and its effect [1,2] on areas of cultural heritage via complete 3D data acquisition, 3D modeling and metadata recording using terrestrial laser scanners (TLS) [3,4,5]. As land degradation progresses through time it is important to be able to map and exactly replicate with great precision the entire 3D shape of the physical objects of interest, such as landslides, ground erosion, river boundaries, mad accumulation, etc. [1,2] TLS enables the extraction and recording of a very large number of points in space with great precision and without the need for any physical contact with the object of interest. Field specialists can then examine the produced models and comment on them both on the overall object of interest and on specific features of it by inserting annotations on certain parts of the model [6]. This process could be proven to be very cost effective as it can be repeated as often as necessary and produce a well catalogued documentation of the progress of land degradation at particular areas. The problem with repeating TLS models lies on the various types of hardware equipment and software systems that might be used for the extraction of point clouds, and the different people that might be called to analyze the findings. These often result in a large volume of interim and final products with little if no standardization, multiple different metadata and vague documentation [7], which makes metadata recordings [8] crucial both for one scientist to be able to follow upon the work of the other as well as being able to repeat the same work when deemed necessary. This makes the need for a repository tool proposed by the authors essential in order to record all work that is done in every TLS scanning, and makes the technology accessible to scientists of various different fields [9,10], eg. geologists, physicists, topographers, remote sensing engineers, archaeologists etc. allowing them to interchange their knowledge, findings and observations at different time frames. Results outline the successful application of the above systems in certain Greek areas of important cultural heritage [3,11] were significant efforts are being made for their preservation through time.

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Keywords

spatial data, land degradation monitoring, 3D modeling and visualization, terrestrial laser scanning, documentation and metadata repository, protection of cultural heritage

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