PRESIOUS

Predictive digitization, restoration and degradation assessment of cultural heritage objects

D3.2 – First differential scan data of degrading surfaces

Project Ref. No.	FP7-ICT-2011-9 – FP7-600533
Project Acronym	PRESIOUS
Project Start Date (duration)	1 Feb 2013 (36M)
Deliverable Due Date	31 Jul 2013 (M6)
Actual Delivery Date	21 Jul 2013 (M6)
Deliverable Leader	Dirk Rieke-Zapp – (BREUCKMANN GMBH)
Document Status	Final
Dissemination Level	PU

Address
Sem Sælands vei 5, Gamle fysikk 3rd floor
Gløshaugen, NTNU, NO-7491 Trondheim,
Norway

http://presious.eu

Contact person
Catalina Hellesø
catalina.helleso@ime.ntnu.no
+ 47 73 59 1452

Deliverable Identification Sheet

Project Ref. No.	FP7-ICT-2011-9 – FP7-600533
Project Acronym	PRESIOUS
Document Name	PRESIOUS-D3.2-19072013-v1.0
Contractual Delivery Date	31 Jul 2013 (M6)
Deliverable Number	D3.2
Deliverable Name	First differential scan data of degrading surfaces
Type	STL data files (http://presious.eu/resources/3d-data-sets), report
Deliverable Version	1.2
Status	Final
Associated WP / Task	WP3 / T3.1
Author(s)	Dirk Rieke-Zapp - BREUCKMANN GMBH
Other Contributors	
Project Officer	Philippe Gelin
Abstract	This document accompanies the resulting scan data from the first differential scans taken in March/April 2013 in Greece and Norway respectively.
Keywords	
Sent to Internal Reviewer	19.07.2013
Internal Review Completed	23.07.2013
Circulated to Participants	19.07.2013
Read by Participants	30.07.2013
Approved by General Assembly	31.07.2013

Contents

1. THE DATA CAPTURE PROCEDURE

A Breuckmann smartSCAN ^{3D} –HE R4 white light scanning system was used for both scanning campaigns in Elefsis, Greece, and Trondheim, Norway, that took place in March and April 2013, respectively.

In Elfesis a more than 2.2 m tall column drum with a diameter of approximately 1.2 m was scanned (Fig 1.). While only a small area is of interest for the successive erosion scans, the complete column was captured to provide a reference frame for future scans. Overview scans around the column were taken with a large FOV of 850 mm yielding an x,y-resolution of 0.300 mm and a z-resolution (along the viewing direction of the scanner) of 0.016 mm. In total 78 scans were taken and aligned to cover the whole column in this resolution. The part that was already scanned in 2010 and will be evaluated in detail to study erosion within the PRESIOUS project, was captured by 37 additional scans with a FOV of 400 mm yielding a nominal z-resolution of 0.007 mm. All scans were aligned using edge alignment – index marks were placed in part of the model, but not used for alignment. The resulting model of the complete column represents a very large data set at highest resolution. The data is also available at different levels of detail. The analysis takes place on subsets of the data in order to increase the speed of analysis, viewing and processing. Scans were taken after sunset to ensure optimum contrast of the projected pattern required for white light and stereo-metric scanning.

Figure 1. Visualisation of the 3D scanning results from Elefsis in OPTOCAT software (left). Data acquisition with a Breuckmann white light scanning system (right).

Several smaller areas were scanned at the Nidaros Dome in Trondheim. The number of scans per area varied between 12 and 29 scans. Different FOV were installed to adjust working distance or amount of detail captured – FOV of 125, 250 and 400 mm were used with nominal z-resolution of 0.002, 0.004, and 0.007 mm, respectively. Scanning was partly done outdoors at temperatures close to freezing.

Figure 2. Scanning outside of the north entrance of Nidaros cathedral (left). The result from monochrome texture mapping (lower right image) using sensor imagery provides an added value for documentation and visualisation.

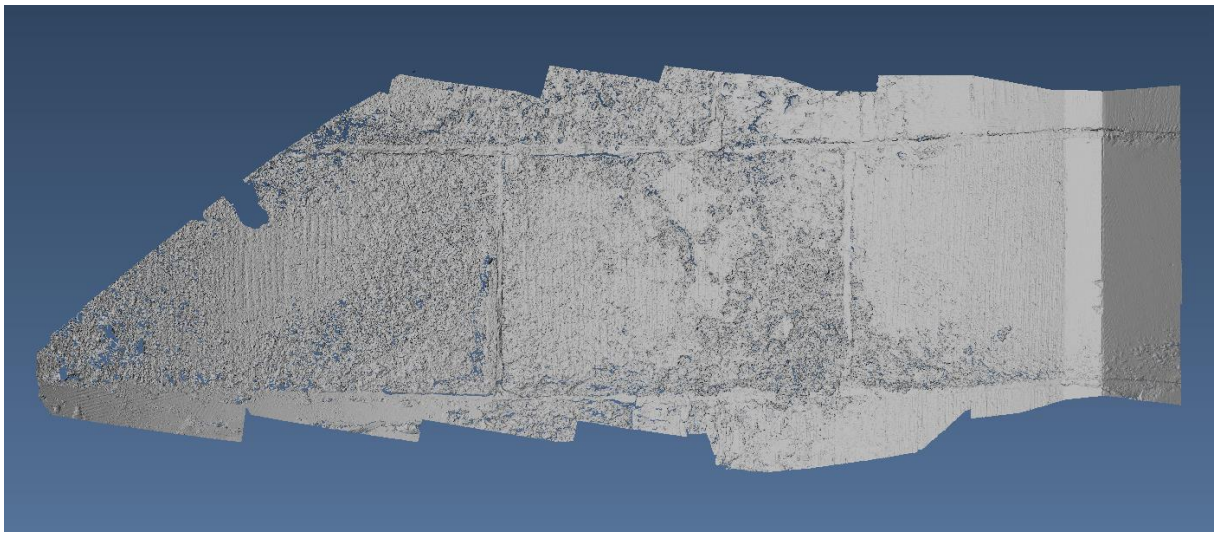
The scanned area spans approximately 1 by 0.9 m² and shows stones affected by erosion. The resolution in x, y is approximately 0.1 mm with z-resolution of 0.007 mm. Please also note the two mason marks engraved in the rocks (top right image). Such details are hardly visible in the textured image.

For all areas scanned in Greece and Norway the scans were aligned using OPTOCAT software. The resulting STL files were saved with different compression rates keeping full resolution data as well as data that is easier to handle. The resulting model, merged in single STL, PLY or OBJ files, are available online http://presious.eu/resources/3d-data-sets . The latest release of OPTOCAT software allows for texture mapping with sub-pixel accuracy and data export into OBJ files for use in third party software. For better accuracy a smartSCAN ^{3D} HE with monochrome cameras was used for the scans of the PRESIOUS project. The colour version of this sensor or an additional set of colour images taken with an external camera would be more suitable for colour reproduction of texture mapping.

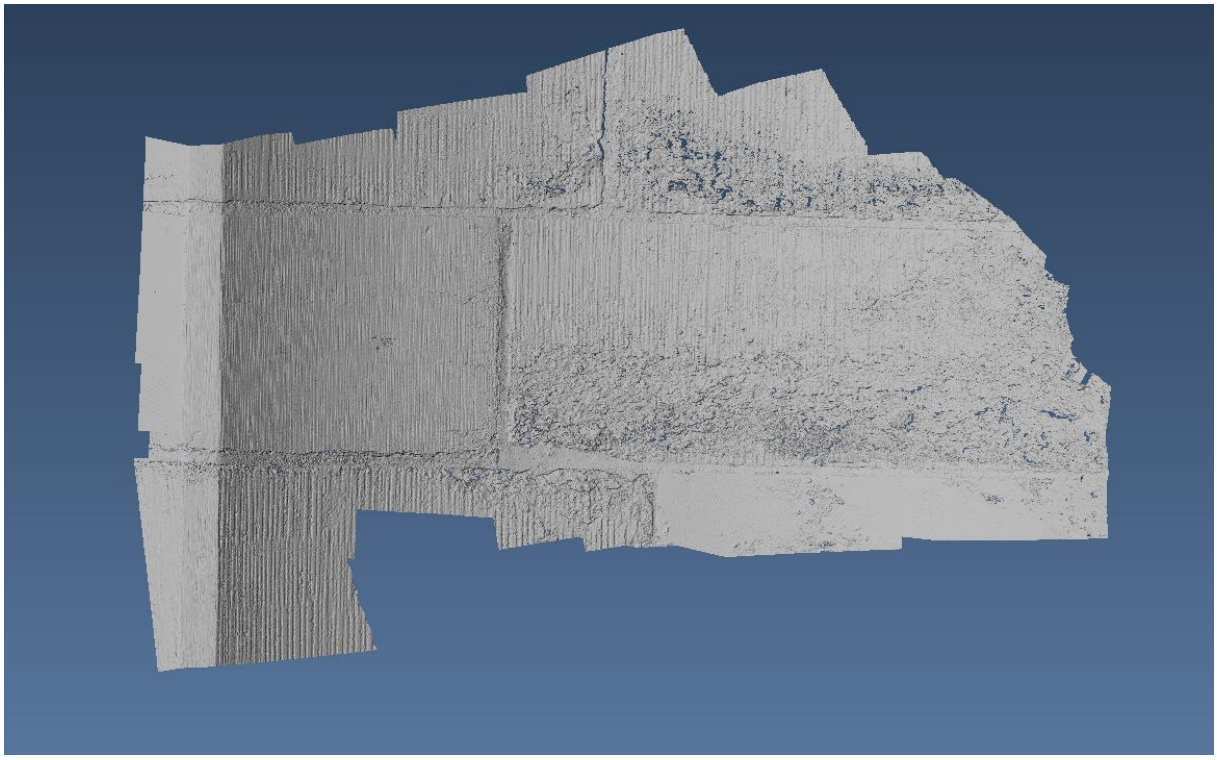
2. LIST OF FILES

Five scans were taken that are referenced as follows:

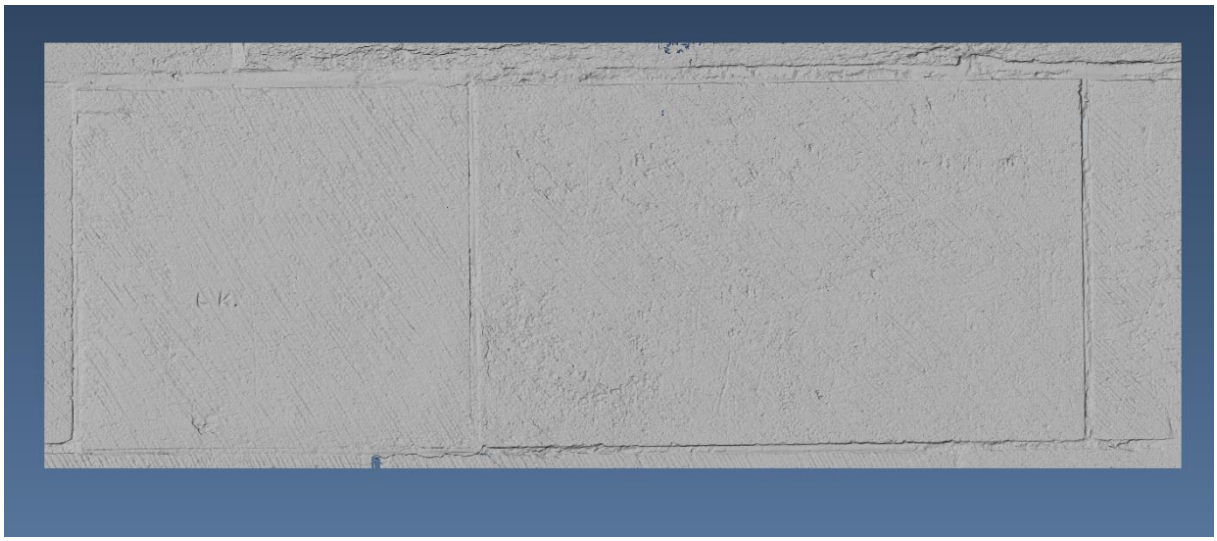
*Greece, Elefsis, **pillar**, acquired 20.03.2013.*



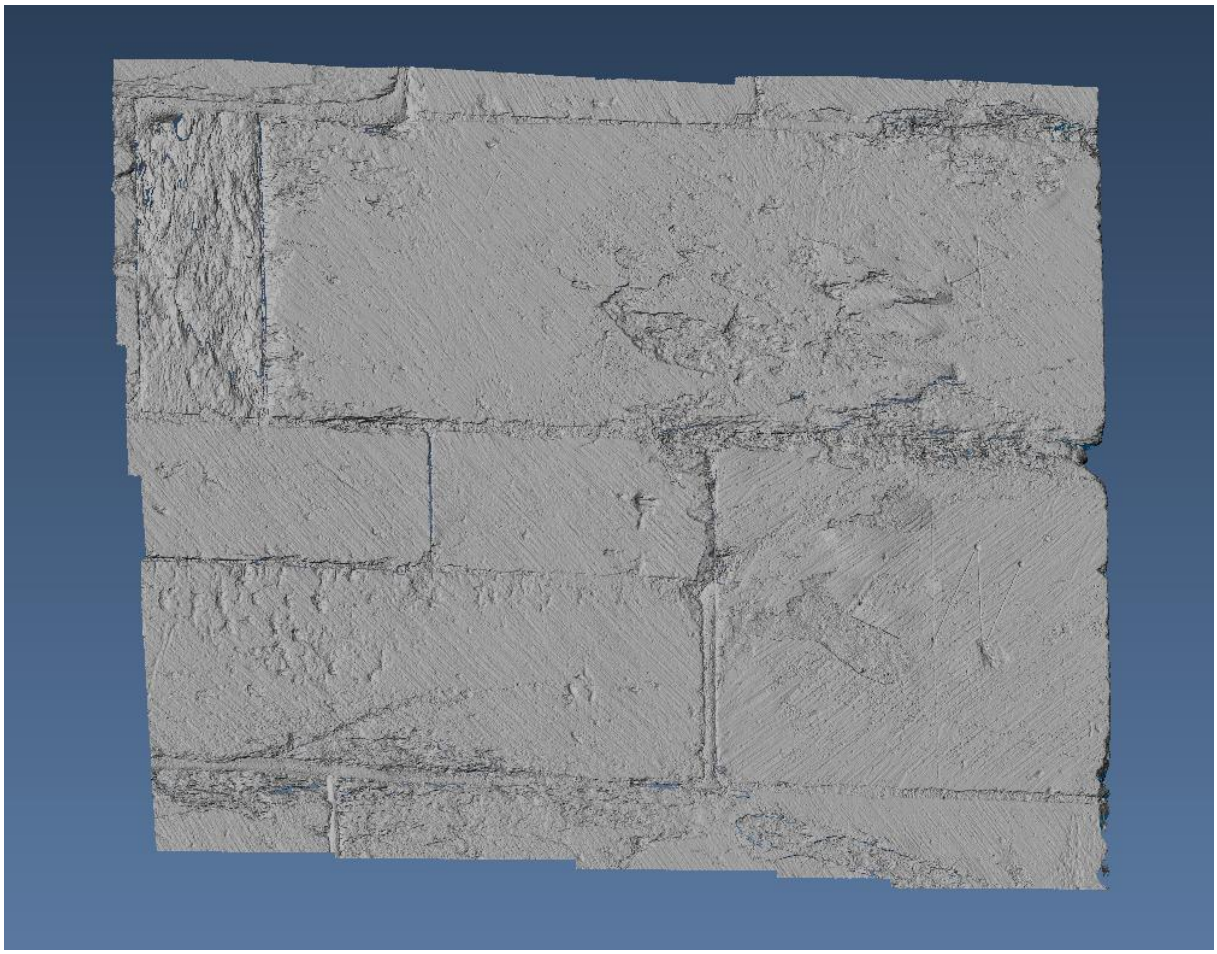
*Norway, Trondheim, **tower south**, acquired 23.04.2013.*



*Norway, Trondheim, **tower north**, acquired 23.04.2013.*



*Norway, Trondheim, **outdoors North 1**, acquired 23.04.2013.*



*Norway, Trondheim, **outdoors North 2**, acquired 23.04.2013.*