



# Towards a tesserae colour chart of Daphni monastery byzantine mosaics

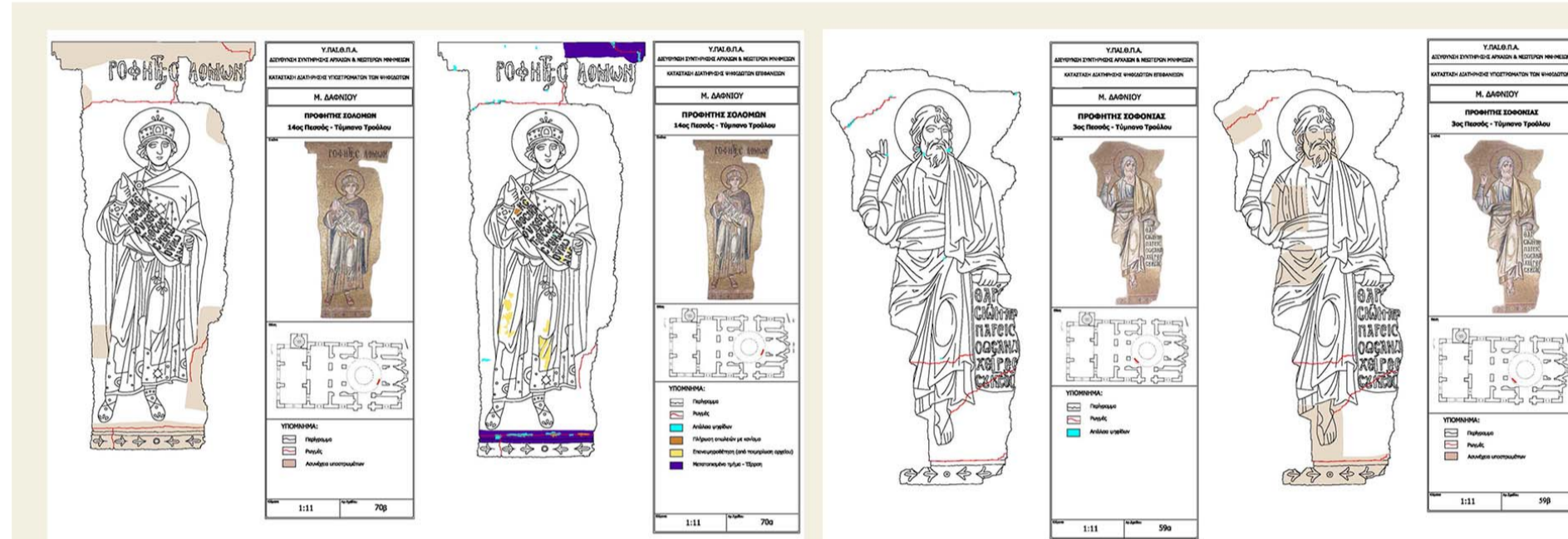
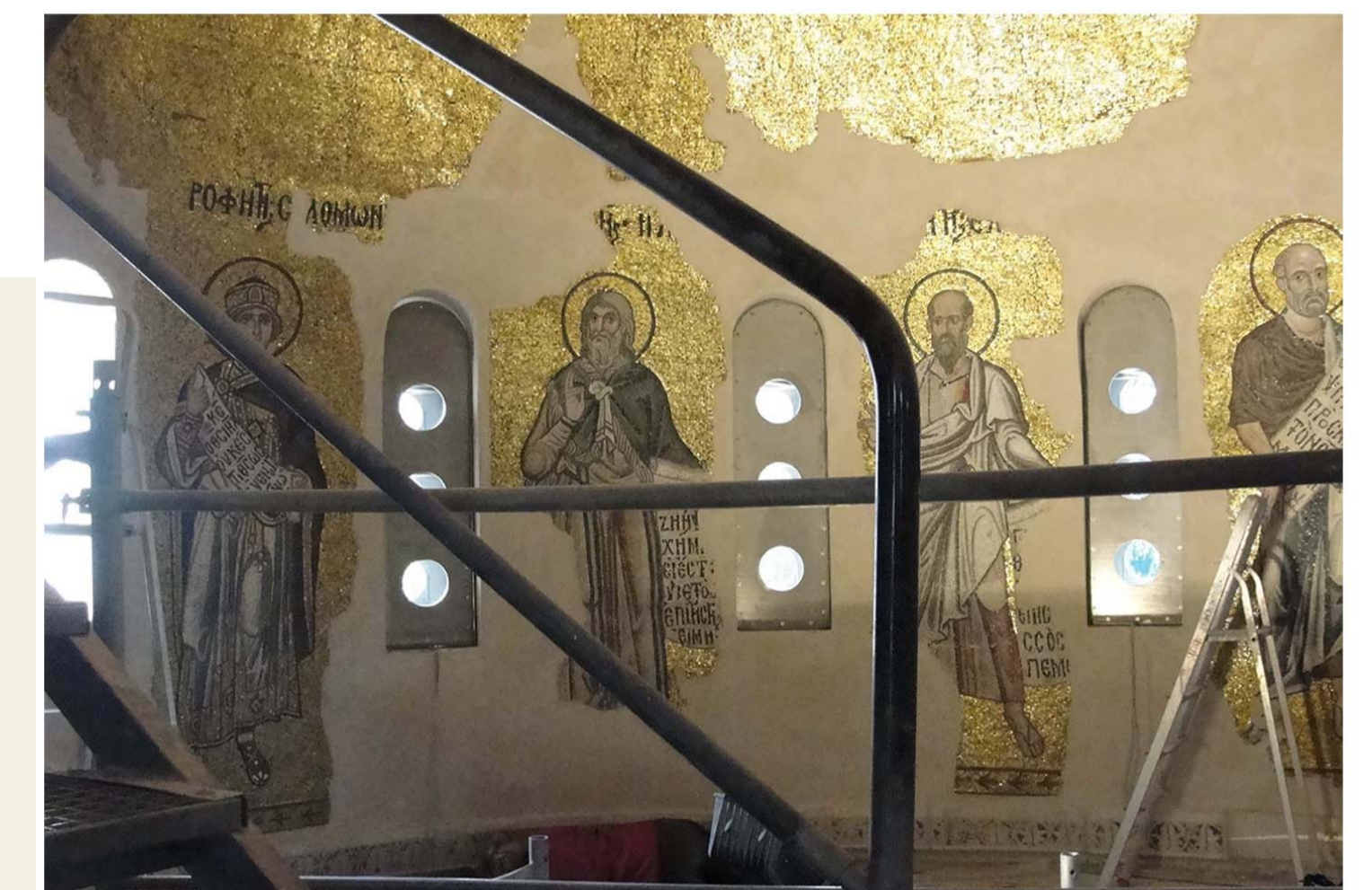
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## Introduction

The Monastery of Daphni (Athens, Greece) dating from the 11th century is an important monument of the Byzantine period, included in the UNESCO World Heritage List due to its architecture and wall mosaic decoration. A large scale conservation project, aiming at the restoration and stabilization of the building as well as the conservation of the mosaics, after major earthquake damages in 1999, was carried out by the Hellenic Ministry of Culture. The project was co-funded by the European Union and it was completed in 2015. During the conservation and restoration project, an extensive network of scaffolding in the Katholikon (church building) provided access to the existing mosaics, giving the opportunity to observe and record all tessellated areas.

## Scope and methodology

Although a large number of Byzantine monuments decorated with wall mosaics survive today, the study of the mosaics tends to focus mainly on iconographical and stylistical issues, as history of art scholars usually employ a pictorial approach for the study of mosaics. In recent years though, research programs for a more composite understanding of the production and distribution of Byzantine mosaics have been accomplished. To this direction, the present pilot study, initiated in 2015, is based on a more technological path, aiming to determine the colors of the tesserae as well as the choice of corresponding materials for the creation of the particular depictions (style). It is a pilot research intending to combine and bridge traditional macroscopic observation with digital documentation, recording and measuring techniques. The project is based on existing data about the mosaics along with additional information obtained via systematic examination and non destructive optical techniques

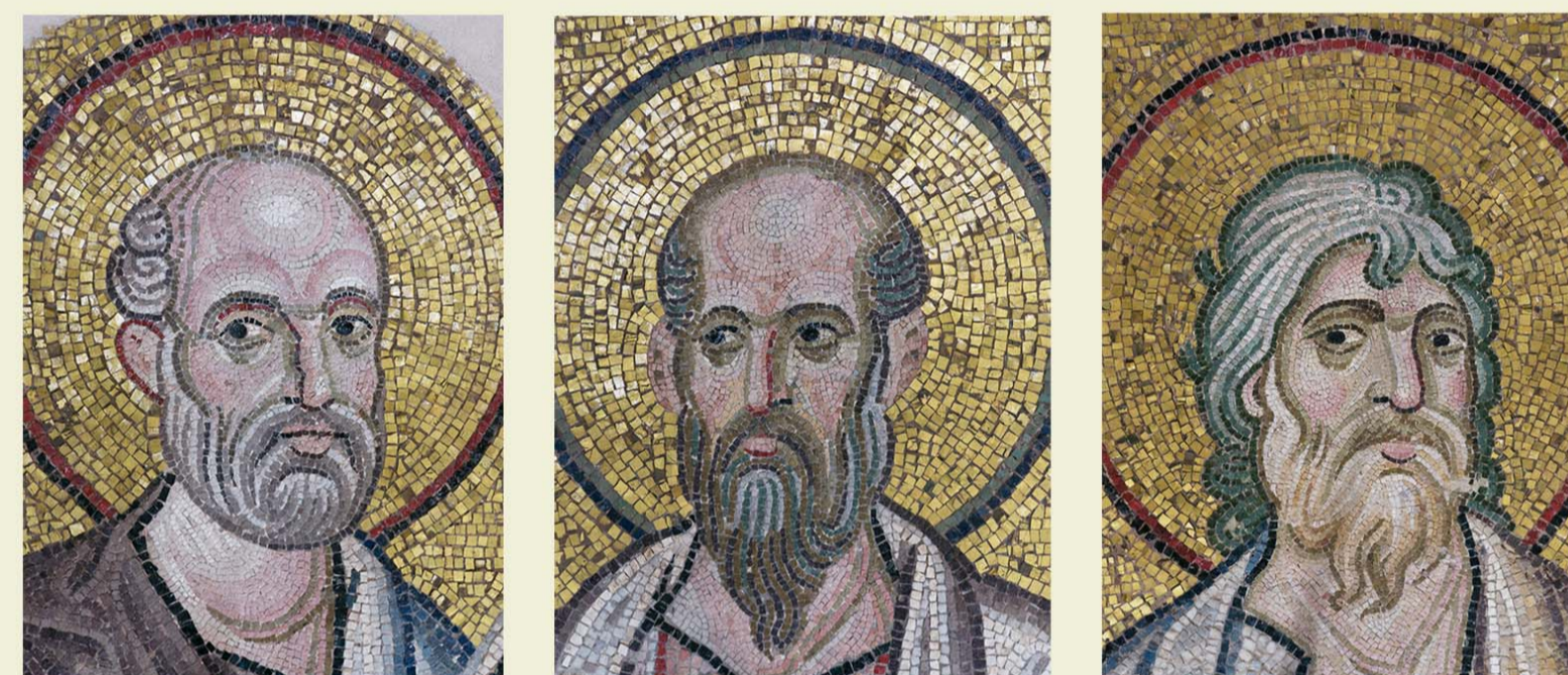


## Conservation documentation

The conservation of mosaics project has produced multiple documentation archives providing data for their condition and previous interventions. The documentation consists of analog and digital photographs, orthophotos produced by photogrammetry methods, conservation records, including graphic documentation of condition mapping using Cad software. Furthermore, research of archival sources -publications, studies and conservation records- provided information about earlier observations and interventions.

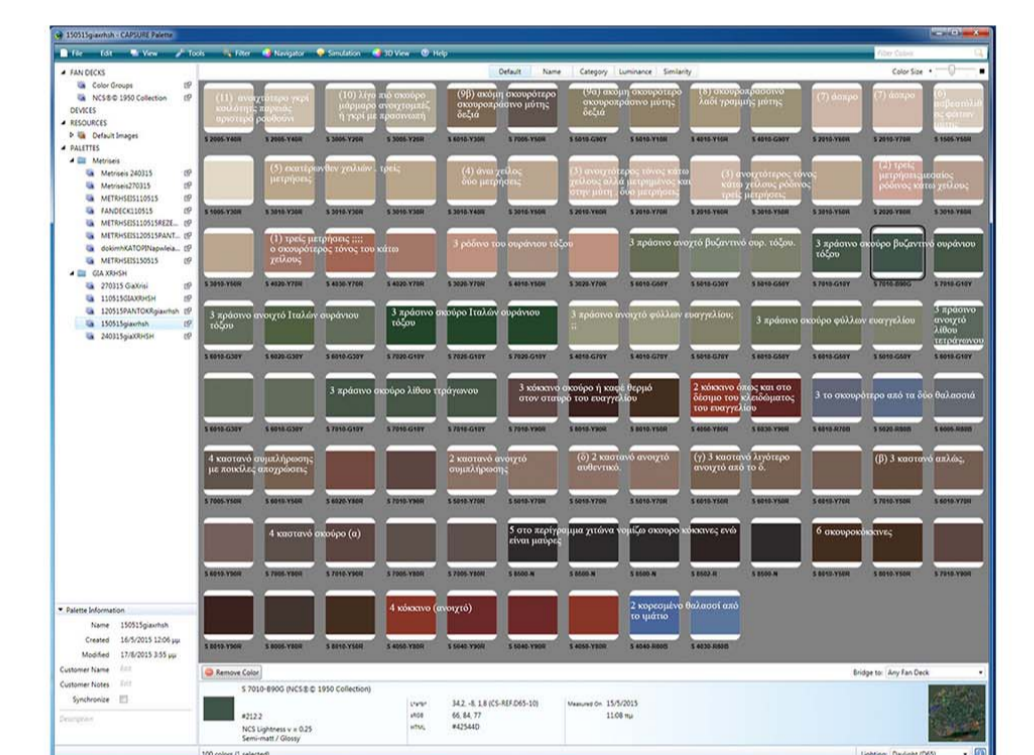
## High resolution photography

High resolution photography was used in order to record details of depictions and the colour of tesserae. The photographs were taken using a variety of equipment, digital cameras and video recorders. Several series of pictures were taken with natural light, as well as using artificial light sources of appropriate temperature with a variety of filters.



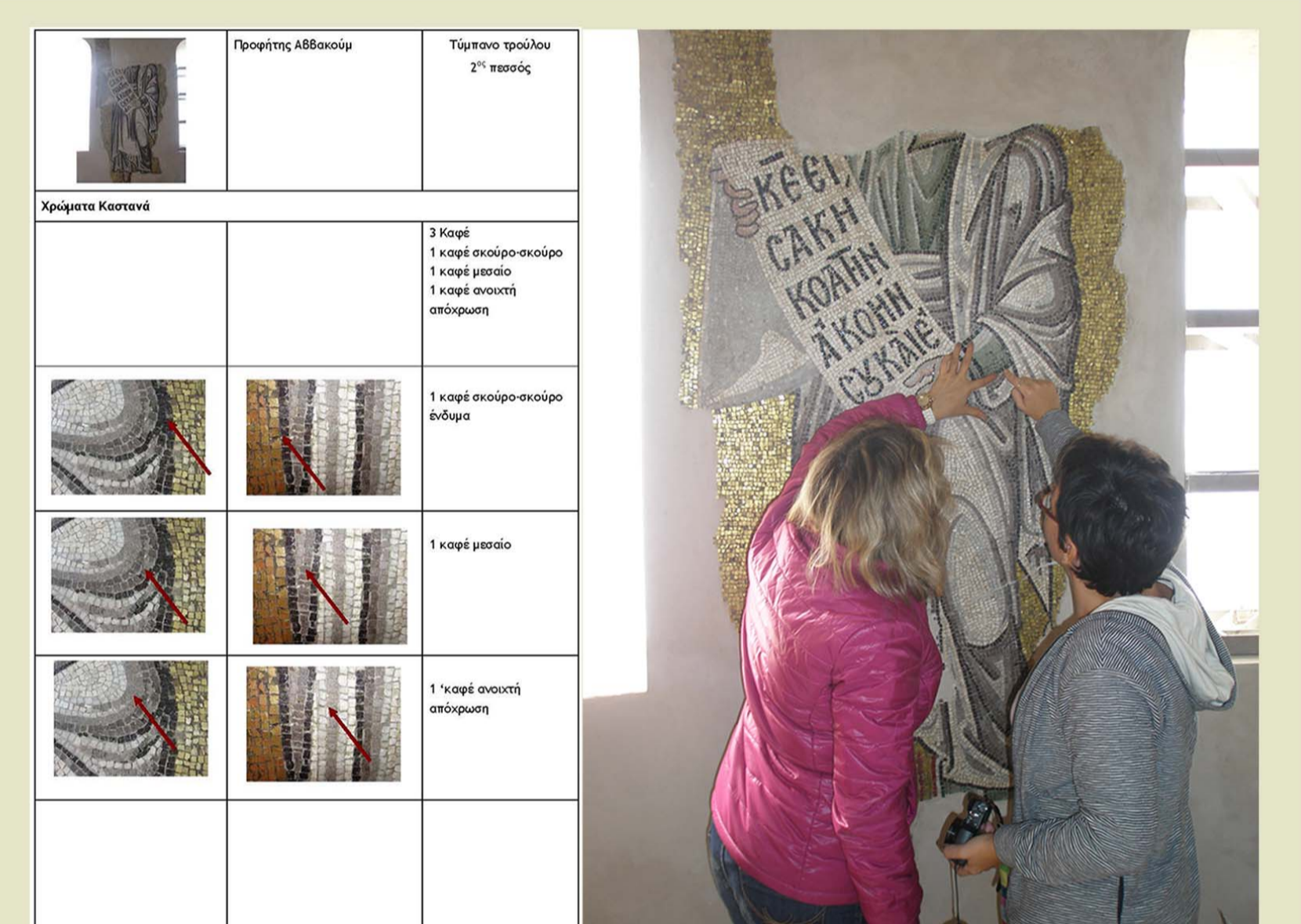
## Colour measurement

Along with visual examination, colours and hues evaluation was carried out on the cupola's tesserae using a portable colorimeter (COLSCAN, NCS COLOUR SCAN 2.0). The results and the colour charts will be assessed in parallel with macroscopic examination charts.



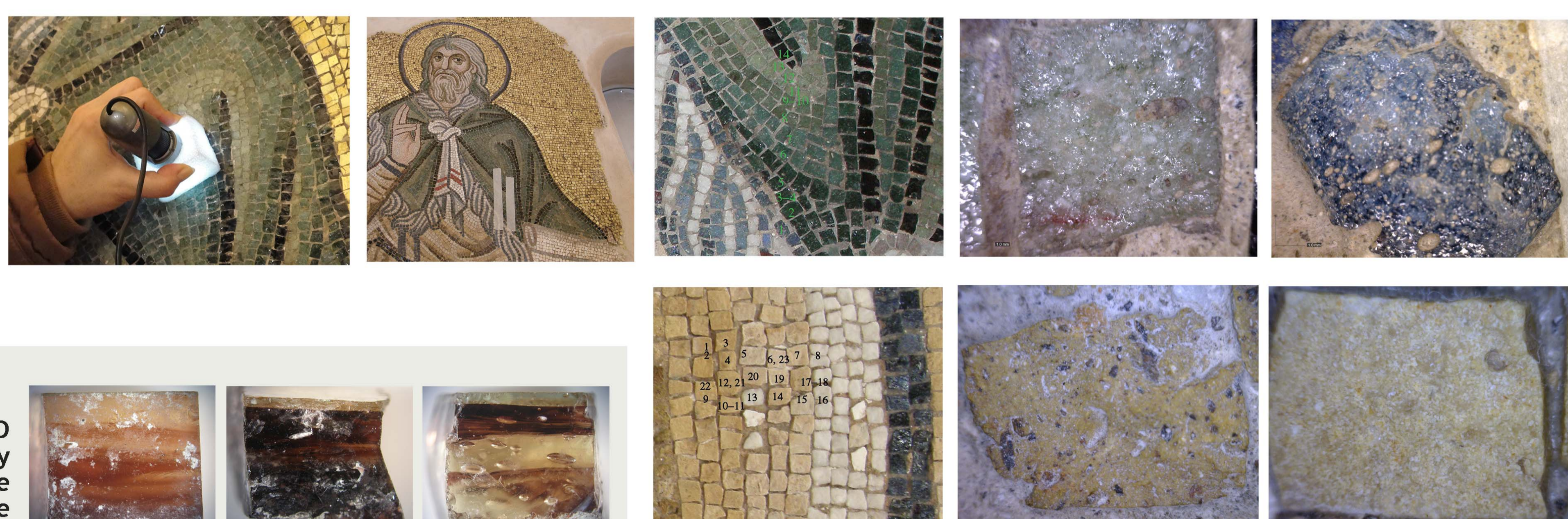
## Macroscopic examination

A systematic macroscopic examination was carried out in order to identify materials and colours of the tesserae. For this examination natural light was used, as well as several artificial light sources. All observations were documented and recorded in data sheets. The different colours were described using both conventional characterizations and terms used in mosaics literature. Additional observations on technical details, irregularities or exceptional use of colours were pointed out for further investigation and interpretation.



## Microscopic examination

Microscopic examination was carried out in situ using a digital portable microscope (Dino-Lite, AM211, with adjustable focus and magnification from 10x to 200x) connected to a portable computer (Sony Vaio). Following optical examination, the details of the tesserae surface were recorded in order to distinguish among different hues or to verify the sort of the material. Microscopic examination was carried out on selected colours of glass and stone tesserae on different depictions of the same iconographic circle (the Prophets, on the base of the dome). The procedure incorporated selection of the appropriate area, temporary marking (using masking tape) and microscopic imaging. Selected microscopic images were later correlated to the macro-digital images taken during examination.



## Gold and silver tesserae

The study of the metal-leaf (gold and silver) glass tesserae was part of a PhD research on the nature and decay of this type of glass tesserae. The study revealed that for Daphni mosaics the simultaneous use of metal-leaf tesserae with different colour support glass have been preferred. According to the colour of support glass the gold tesserae were classified in three main categories: yellowish, aqua and roughly purple, while the silver ones in two: yellowish and aqua. Specifically for gold tesserae the three categories include a broad range of shades e.g. the purple tesserae varied from colourless with a light red-pinkish hue to dark purple colour or brownish-amber hue.



## Future work

By the time the conservation project was concluded and the scaffolds were removed. The access to the mosaics was limited to the Narthex only. In future, in situ measurements will continue, when special equipment for mosaic and building maintenance (like a special scaffolds or a scissor lift) will be available. At present, the collected data is being processed and analyzed. Moreover, the examination of loose tesserae, available due to damages of the monument, is planned. Finally, the most challenging part of the project would be the best possible correlation of the results of all aforementioned studies and techniques in order to obtain a colour chart for the mosaics of Daphni.

## Acknowledgements

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