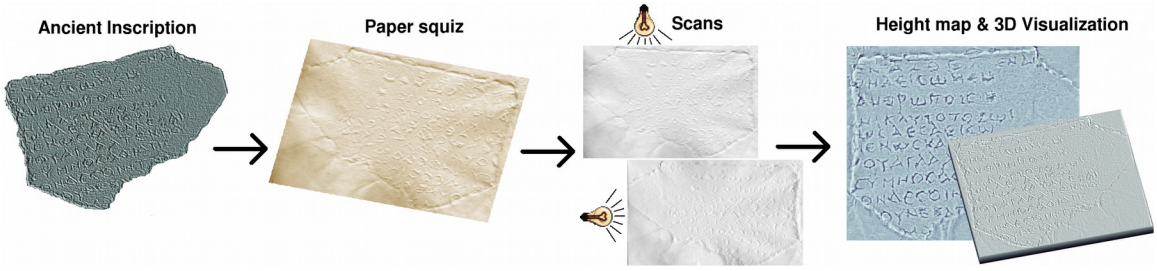
“Assessing the Role of Digital Epigraphy in Epigraphic Studies”

Eleni Bozia

The purpose of this collaboration was twofold: 1. We purported to conduct a pilot study on a number of severely weathered ektypa from the Aleshire collection housed at the University of California, Berkeley so as to determine whether the technique of shape-from-shading (SFS) utilized by the Digital Epigraphy and Archaeology project (DEA) can reveal letters and shapes lost to the naked eye. 2. The DEA team aimed to develop collaboration with an epigraphic team that had no previous experience in digital tools and had thus far performed traditional study on their collection of ektypa.

With regards to the methodological efficiency of the DEA toolbox, the DEA team develops computer-assisted methods for the facilitation and enhancement of traditional research, which are financially accessible to the average scholar as well as user friendly. The SFS technique is a cost effective method that requires only a regular image scanner with which one can scan the ektypon from two different lighting directions. The algorithm then utilizes the scanned images to reconstruct in high resolution the original 3D surface. The user can store the 3D output digitally, study the squeezes, and also analyze them quantitatively, using automated statistical tools. The obtained surfaces are segmented into smaller box-shaped regions, containing single letters. These letters are classified into groups of same characters or symbols and then an atlas (average) letter shape is created for each character. For the construction of those atlases we employ a functional minimization method that registers the surfaces of same letters to the unknown average surface, which is also estimated simultaneously. Using the estimated atlases, an automated analysis of the inscribed letters is performed. This framework can be effectively used for the study of the variations of the lettering techniques within an inscription or a set of inscriptions. The figure below summarizes the entire process.



To find the answer to the first question, Prof. Nikolaos Papazarkadas and John Lanier (UC Berkeley) selected three sample squeezes with hard-to-read inscribed fragments and scanned them, using a regular flatbed scanner (Expression 10000XL by EPSON). Each fragment was scanned four times by rotating the squeeze 90 degrees each time, according to the SFS process. Details and illustrations of the results can be found on http://www.digitalepigraphy.org/news/inscriptions_revealed_using_sfs_method/

As concerns the nature of the collaboration between the two teams, the epigraphists, albeit initially reserved as to cost of the technology and the quality of the results, they determined that "the biggest difference is that it takes several hours in the museum in order to read what it can be read, while with the digitized ektypon, this could have been done conveniently at home". They also noted that "the difference between SFS and RTI is obviously the cost" and "what was most impressive was the depthtmap, which is very useful and can be used for publication."

The only hindrance on their behalf, regarding the evaluation of the digitization results, was the fact that some of them did not have access to a laptop with a graphics card and were thus unable to view the 3D images at home. They expressed the request to lower the quality of the images and therefore their size so as to be viewable. Such an approach, however, would undermine the digitization results, as the quality of the images is what increases the readability of weathered letters. Consequently, an issue of accessibility was raised – accessibility of the original artifact which depends on the museum and geographical distances and accessibility of a regular computer.