

## A Historical View on the Degradation on Seismic Performance of The Parthenon, Greece and Muography as the Potential Eval

AOKI, Shimpei<sup>1\*</sup> ; TANAKA, Hiroyuki<sup>2</sup> ; OHSHIRO, Michinori<sup>3</sup> ; YAMASHITA, Maria<sup>4</sup>

<sup>1</sup>Faculty of Letters, Kansai University, <sup>2</sup>Earthquake Research Institute, the University of Tokyo, <sup>3</sup>Faculty of Letters, Komazawa University, <sup>4</sup>Graduate Division of Arts and Sciences, Komazawa University

To reinforce the Parthenon against earthquakes, the process of disassembling and reassembling Doric columns is obligatory. For this, the column strength and durability is required to withstand the reconstruction process. Wooden rods in the dowels of each drum provide the mechanical strength of each column, however some of these rods may have been damaged during the Venetian bombardment of the Acropolis on September 26, 1687. Due to the size of the Parthenon's Doric columns, muography is more appropriate to image the internal structure than conventional radiographic techniques. Muography may be utilized as a non-destructive technique targeting the inside composition of the Parthenon's Doric columns, potentially providing the following information: (1) the durability of the columns against future earthquakes, and (2) the magnitude of the internal damage sustained during the Venetian bombardment. The results of this muographic survey would aid conservator's efforts to protect the Parthenon along with the possibly of applying to other cultural properties. Secondly, the state of the wooden rod inside the column will provide evidence for the time and temperature around the column (based on the geometrical structure and thermal conductivity of the column) which would contribute further evidence to historical discussions particular to the Parthenon, such as estimates of the amount of gun powder stored in the Parthenon by the Ottoman Empire and information on the aforementioned siege. Muography may supplement efforts to preserve and protect the Parthenon as well as contributing to our understanding of the historical events that have occurred in this ancient structure.

Keywords: a Historical View, the Degradation on Seismic Performance, the Parthenon, Muography