

Electrical Resistivity Imaging for investigating the Augustus' Villa - Somma Vesuviana, Italy

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Archaeological prospection is one of geoarchaeological survey methods from long ago. In the early stages when geological survey method was used for investigating archaeological remains, measurement and analysis in geology were only applied to archaeological prospection. Afterward, many survey methods to accommodate geological characteristics of archaeological remains have been developed. This paper presents the result of electrical resistivity survey carried out using a new electrical resistivity survey method and system in the archaeological site at Somma Vesuviana, Italy.

The Somma Vesuviana site is called the *Augustus' Villa*. This site has been excavated by the Tokyo University since 2002. This site had been destroyed and buried by the eruption of Monte Vesuvio in the days of the Romans. However, the ancient structures and artifacts has been preserved in a good condition. The marble statues, beautiful fresco paintings, and mosaic tile floorings has been unearthed. In addition, some archaeological structures : column, wall, and so on, has been excavated in about 8m deeper. If we find these structures using archaeological prospection in this site, it requires wide-scale, deeply and high-resolution measurement and three-dimensional inversion analysis. Therefore, the authors have been developed the three-dimensional resistivity survey system using surface potential and the new data acquisition system *MEDUSA* (Arai 2005).

The electrical resistivity survey was carried out in 2005 and 2007. The survey area in 2005 is located on east side of the excavation trench. This size is 15m by 15m. The applied survey method was the surface potential method with the *MEDUSA*, and the total numbers of measured data is 4,572. These data was computed with three dimensional inversion analysis. The result showed a high resistivity part like a structural object under the ground. In fact, the building of Roman date was unearthed under this area in the following year, 2006. The authors consider that the high resistivity part is the excavated buildings : apsis and wall. However, it was difficult that we suppose this high resistivity part as object like the apsis, because the size of parameter blocks for analysis were too big to expect an archaeological features. This size of blocks is 1m by 1m by 2m.

In the 2007, the authors investigated a large area on south-side of the excavation trench. This size is 170 m by 10 m, and very narrow shape. Resistivity data was acquired on some survey line using pole-pole array method, and three dimensional data set was gotten from measured data on each line. The total numbers of data is 23,233. In this inversion result, it is difficult that we suppose some structure relating to the excavated archaeological remains. On the other hand, a distribution of the similar resistivity in a direction from Monte Vesuvio toward this site is shown as the result. This distribution and direction seems volcanic ash flow from Monte Vesuvio.

Archeological prospection is useful method for both archaeology and geology. Nevertheless, it is insufficient to detect archaeological remains and geological structure. In the future, more high-resolution survey is required for geoarchaeology.

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Reference :

Haruki Arai, et al. 'Three Dimensional Resistivity Survey System using Surface Potential', The 6th International Conference on Archaeological Prospection, Rome, Italy, 2005, p.191-194