

9.2 IMAGING ARCHAEOLOGICAL RUINS BY GPR AND ERT SURVEYS: THE CASE OF ANCIENT SELEUKEIA SIDERA IN PISIDIA

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ABSTRACT

Ancient Seleukeia Sidera in Pisidia, located northwest of the village of Bayat in the Atabey district of Isparta, was one of the most important colonies of the Seleucid period. Since there are few visible ruins today, as most parts of the architectural structures have been lost or hidden in the ground or moved to surrounding buildings, archaeo-geophysical investigations in the city play a crucial role. The surveys are mainly conducted using ground penetrating radar (GPR) to determine the archaeological structures' location, depth, and extent. The GPR surveys, conducted as part of the city's recent three-period excavation and surface investigation campaigns between 2020 and 2022, examined an area of approximately 5.5 ha. The results of the GPR surveys to date are also consistent with those of surveys conducted in previous research periods using magnetic prospecting. In particular, they help shed light on the urban residential areas and architecture southeast of Hisar Tepe. Identifying two roads about 5 m wide in the survey area in this region, running toward SW-NE and NW-SE, clearly indicates that Seleukeia Sidera had a regular urban plan. In some cases, ERT surveys are also conducted as a supporting method to verify GPR results. Therefore, this study focuses mainly on presenting the results of GPR and ERT surveys conducted south of the city's theater ruins. In the study, the GPR scans are performed using a shielded antenna system with a center frequency of 500 MHz, while the ERT surveys are performed using a dipole-dipole array. The results of the GPR survey detect the ruins of a hidden archaeological structure with high resolution, regular geometry, and extent in the shallow subsurface. Also, the two-dimensional (2D) inversion results of the collected apparent resistivity datasets are compatible with the results of the GPR survey in this area. According to them, the anomalies of the archaeological building ruins with relatively high resistivity ($> 700 \Omega\text{m}$) and regular geometry are located within the cultural layer under the modern surface layer, which is about 30-40 cm thick. The relatively high contrasts in electrical conductivity and dielectric constant between the ground and the archaeological target allow the identification of hidden ruins to a depth of 2 m in the survey area with high resolution. According to the results of the GPR and ERT surveys, the ruins of the archaeological structures in the ancient city of Seleukeia Sidera are mainly located about 30 cm to 180 cm below the surface. Unfortunately, this indicates that agricultural activities can potentially damage the ancient city's near-surface archaeological remains when locals use tractors, rakes, and cultivators in production. As archaeo-geophysical research progresses, it will be possible to obtain more information about the residential structures, transportation routes, and architectural background of the city in this area.

KEY WORDS : Archaeogeophysics, GPR, ERT, Pisidia, Seleukeia Sidera