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# THE CAESAREA GERMANICIA (?) ARCHAEOGEOPHYSICAL INVESTIGATIONS

## CAESAREA GERMANICIA (?) ARKEOJEOFİZİK ARAŞTIRMALARI

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**ABSTRACT**

The ruins in Dulkadiroğlu (Kahramanmaraş) are thought to belong to Caesarea Germanicia in the Roman Period. Research and excavations carried out in the region have revealed that the spread of archaeological remains is more than 150ha. Presence of Byzantine, Seljuk and Ottoman Period ceramics as well as Roman Period cultural remains indicates an uninterrupted settlement in the research area. Archaeogeophysics provide information about location, depth and dimensions without damaging the archaeological remains. Detailed search of the mosaic-based structure on the settlement plan, which was unearthed through illegal excavations, was carried out along 6 profiles with the GPR measurements. GPR depth maps containing four important reflection hyperbolae were created by comparing the results both among themselves and with the existing surface conditions. It is thought that three of these reflections belong to the remains of archaeological structures that started at a depth of about 20 cm, and one of them originated from a metal pipe. It was determined that GPR reflections belonged to wall remains of Villa Rustica from Early Byzantine Period or to a Roman bath and a metal pipe. One of the ceramic sherds found shows that this structure was reused in the Middle Byzantine Period (11-13th century AD).

**Keywords:** Caesarea Germanicia, archaeology, archaeogeophysics, ground penetrating radar

**ÖZET**

Dulkadiroğlu (Kahramanmaraş)'nda bulunan kalıntıların Roma Dönemi'nde kurulan Caesarea Germanicia'ya ait olduğu düşünülmektedir. Bölgede gerçekleştirilen araştırma ve kazılar, arkeolojik kalıntıların yayılımının 150 hektardan fazla olduğunu ortaya koymuştur. Roma Dönemi kültür kalıntılarının yanısıra Bizans, Selçuklu ve Osmanlı Dönemi seramik parçalarının bulunması, araştırma alanında kesintisiz bir yerleşimi göstermektedir. Arkeojeofizik yöntemler, arkeolojik kalıntılara zarar vermeden kalıntıların konumu, derinliği ve boyutları hakkında bilgi vermektedir. Kaçak kazılarla günyüzüne çıkarılan yerleşim planı üzerindeki mozaik temelli yapının detaylı araması Yerradarı (GPR) ölçümleriyle 6 profil boyunca gerçekleştirilmiştir. Sonuçlar hem kendi aralarında hem de mevcut yüzey koşulları ile karşılaştırılarak dört önemli yansıma hiperbolü içeren GPR derinlik haritaları oluşturulmuştur. Bu yansımalardan üçünün yaklaşık 20 cm derinlikte başlayan arkeolojik yapı kalıntılarına ait olduğu, bir tanesinin ise metal bir borudan kaynaklandığı düşünülmüştür. GPR yansımalarının Erken Bizans Dönemi'ne ait Villa Rustica'nın duvar kalıntıları veya bir Roma hamamı ile metal bir boruya ait olduğu

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belirlenmiştir. Bulunan seramik parçalardan biri, bu yapının Orta Bizans Dönemi'nde (MS. 11-13. YY) yeniden kullanıldığını göstermektedir.

**Anahtar Kelimeler:** Caesarea Germanicia, arkeoloji, arkeojeofizik, yer radarı

## INTRODUCTION

The remains unearthed in the Dulkadiroğlu district, one of the central districts of Kahramanmaraş, are thought to belong to Caesarea Germanicia, which was founded in the Roman Period (Figure 1). It was revealed that the spread of archaeological remains is more than 150 hectares, during the research and excavations carried out by the Kahramanmaraş Museum (under the scientific consultancy of Assoc. Prof. Dr. Oktay DUMANKAYA) in the region, Although the concentration of Roman Period cultural remains in the research and excavations was remarkable, the discovery of Byzantine, Seljuk and Ottoman Period ceramic pieces indicates an uninterrupted settlement in the research area for centuries (Dumankaya, 2018a; Dumankaya, 2018b; Dumankaya, 2019; Akyol, Ok, and Dumankaya, 2021; Ok and Dumankaya, 2022).

In 2009, a mosaic floor belonging to the Roman Period was unearthed in the Namık Kemal Neighbourhood of Dulkadiroğlu district, on block 445, parcel number 20. However, there is a dense settlement in the designated archaeological reserve areas and this situation necessitated expropriations to carry out the excavations. However, the expropriation period covers an average of 2-4 years, which makes it difficult to conduct scientific research. For this reason, it is aimed to determine the possible archaeological cultural remains in the area by using the archaeogeophysical method without any archaeological excavation. In 2019, it was decided to carry out ground penetrating radar (GPR) as a geophysical survey to determine the spread area of the building remains on the aforementioned islands and parcels (Figure 2).

It can be followed from national and international publications that the geophysical methods applied in different parts of the world to date have been quite successful in archaeological searches. The applications made in our country have ensured the establishment of a strong link between engineering and archaeology, and the concept of Arche geophysics has developed. It is practiced all over the world as a very common solution to examine archaeological sites without damaging them and to use the findings in excavation planning. In our country, generally positive results have been obtained in geophysical studies applied in archaeological areas and findings have been reached in the targeted areas. The archaeological wealth of our country dates back to ancient times. In this sense, in the studies carried out in Anatolian lands, which give a laboratory image, findings belonging to different archaeological periods have been reached. As a result of the archaeogeophysical studies carried out in Çanakkale Assos Ancient City, the existence of many building remains was determined and archaeological excavation areas were determined (Kaya et al., 2004). During the geophysical studies carried out in the Harmanören Necropolis in Göndürle, Isparta, pithos tombs dating back to 2500 BC were found and the pitos obtained after the excavations started to be exhibited in the Isparta Museum (Büyüksaraç et al., 2006). After magnetic measurements made in Dedemezari Necropolis in Bayat, Afyon, different types of tombs dated to the 2nd millennium BC were identified (Arısoy et al., 2007; Büyüksaraç et al., 2008). As a result of the geophysical studies carried out in Sivas Divrigi Castle, traces of settlement were found in the castle (Büyüksaraç et al., 2011). After the studies carried out in the ancient city of Parion in the Biga District of Çanakkale province, many grave remains were unearthed in the suggested places in the necropolis area (Ekinci and Kaya, 2007; Ekinci, Kaya, and Demirci, 2007; Ekinci et al., 2012). As a result of different geophysical methods applied in the ancient settlement of Nif Mountain (Olympos), where different cultures were settled in Western Anatolia, rock tombs and pithos tombs were obtained and information about burial customs was obtained (Büyüksaraç et al., 2013). The graves of the soldiers who were martyred in the 1915 Çanakkale War on the Gallipoli Peninsula of Çanakkale between 2011 and 2013 were conducted with geophysical methods consisting of ground penetrating radar (GPR), magnetic and electrical resistivity methods (Büyüksaraç et al., 2014). Different geophysical methods were applied in the ancient city of Amorium in Afyon Emirdag and the locations of possible ancient ruins were mapped (Kaya et al., 2007; Ekinci et al., 2014). Keber Tepe, City Hill of Doliche, Commagene (Gaziantep, SE Turkey) was surveyed using ground penetrating radar (GPR) and electric resistivity tomography (ERT) by Balkaya et al. (2021). Widespread areal battle traces, trenches and martyr graves of the Sakarya Pitched Battle were uncovered and mapped by archaeogeophysical studies, and necessary studies were initiated to protect these areas (Koşaroğlu et al., 2022).

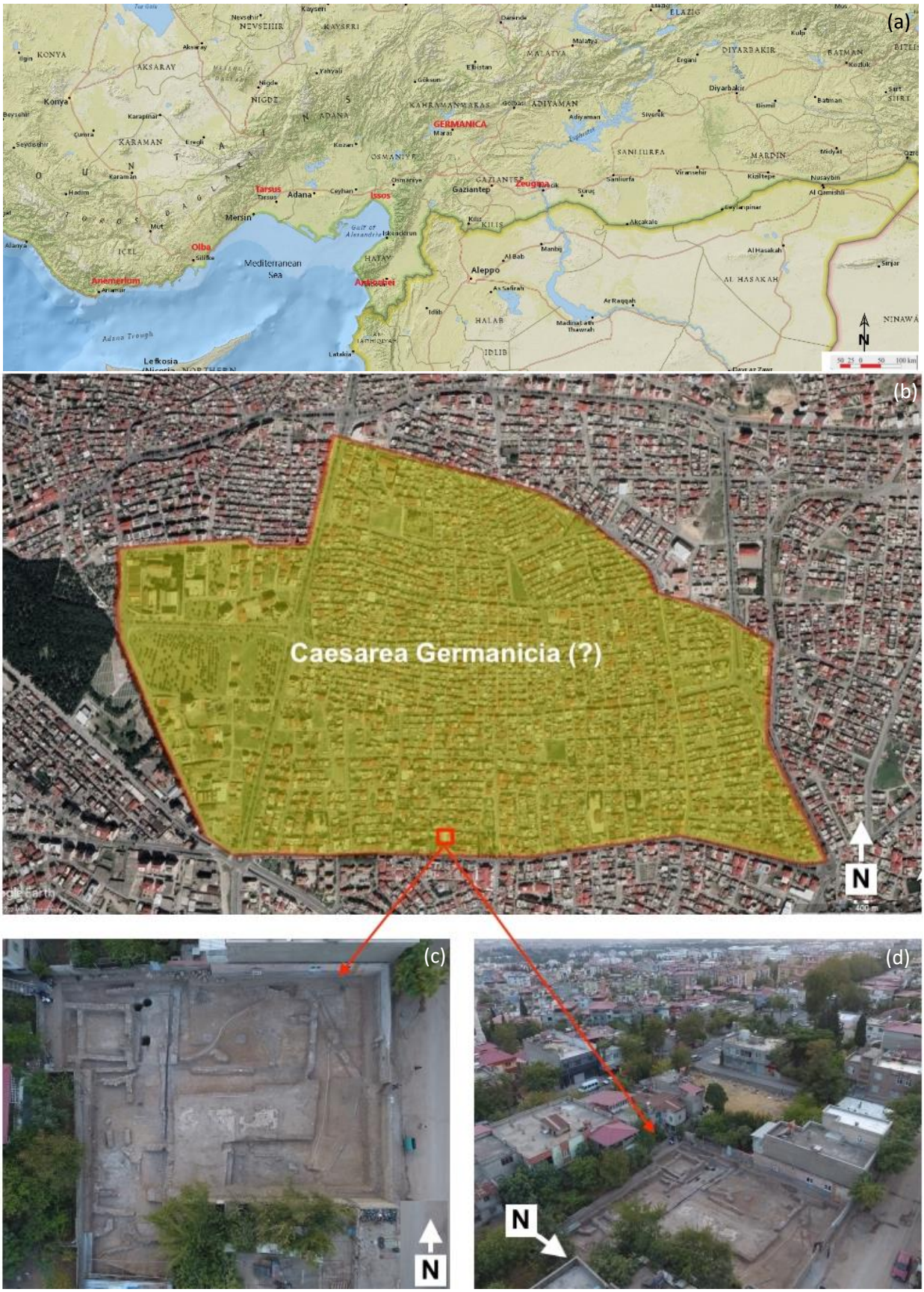


**Figure 1.** (a) Caesarea Germanicia (?)'s Location in the Eastern Mediterranean, (b) Caesarea Germanicia (?) 3rd Degree Archaeological Site Boundary, (c) and (d) Detail Photos from the Roman Bath (modified from Ok and Dumankaya, 2022).

Archaeogeophysical studies carried out in the above-mentioned various ancient cities and settlements have made significant contributions to the determination of archaeological cultures before archaeological excavations and have enabled significant savings in both time and excavation costs. In the same direction, this study was carried out in order to investigate the possible presence of remains in the study area, which is thought to be the remains of the ancient city of Caesarea Germanicia, and thus to decide whether to carry out excavations before the long and costly excavations.


**Figure 2.** Area of Ground Penetration Radar Study.

## MATERIAL AND METHOD

Ground Penetrating Radar (GPR) method is a high-frequency electromagnetic method consisting of transmitter and receiver units propagating at a certain frequency. The GPR method is based on the principle of recording electromagnetic waves of different frequencies sent underground through the transmitting antenna by reflecting from different structures in the ground by the receiving antenna on the surface and measuring the total time elapsed during this propagation, and the traces are recorded as a function of time (Van der Kruk and Slob, 2000). GPR method can be performed with fixed frequency antennas as well as new generation antenna systems using wide band frequency range. In this study, Mala Easy Locator Pro Wide Range (80-950 MHz) wide band system was used. The data processing steps and parameter values applied to the data set with wide band gap are given in Table 1.

**Table 1.** Data Processing Parameters Applied to Raw GPR Data.

| Data processing parameters | Values |
|---|---|
| Antenna Base Frequency | 625 MHz HDR (80-950 MHz) |
| Beginning cut-off time | 7.0 ns |
| Time cut-off | 50 ns |
| Dewow | 8/1ns |
| Energy Delay | 0.512 |
| Average Subtraction | 51/1 |
| Band pass filtering | 250/500/750/1000 MHz |
| Migration | 7/0.1ns |

GPR measurements were carried out to determine the nature of the mosaic-based structure on block-445, which were previously unearthed through illegal excavations, and the parcels it extends to (Figure 3). GPR measurements were performed along 6 profiles with 1 m interval. The measurements taken were evaluated in the reflexw software and made ready for interpretation by applying the data processing steps including dewow, time-zero correction, bandpass filtering, average substruction, and f-k-migration given in Table 1.

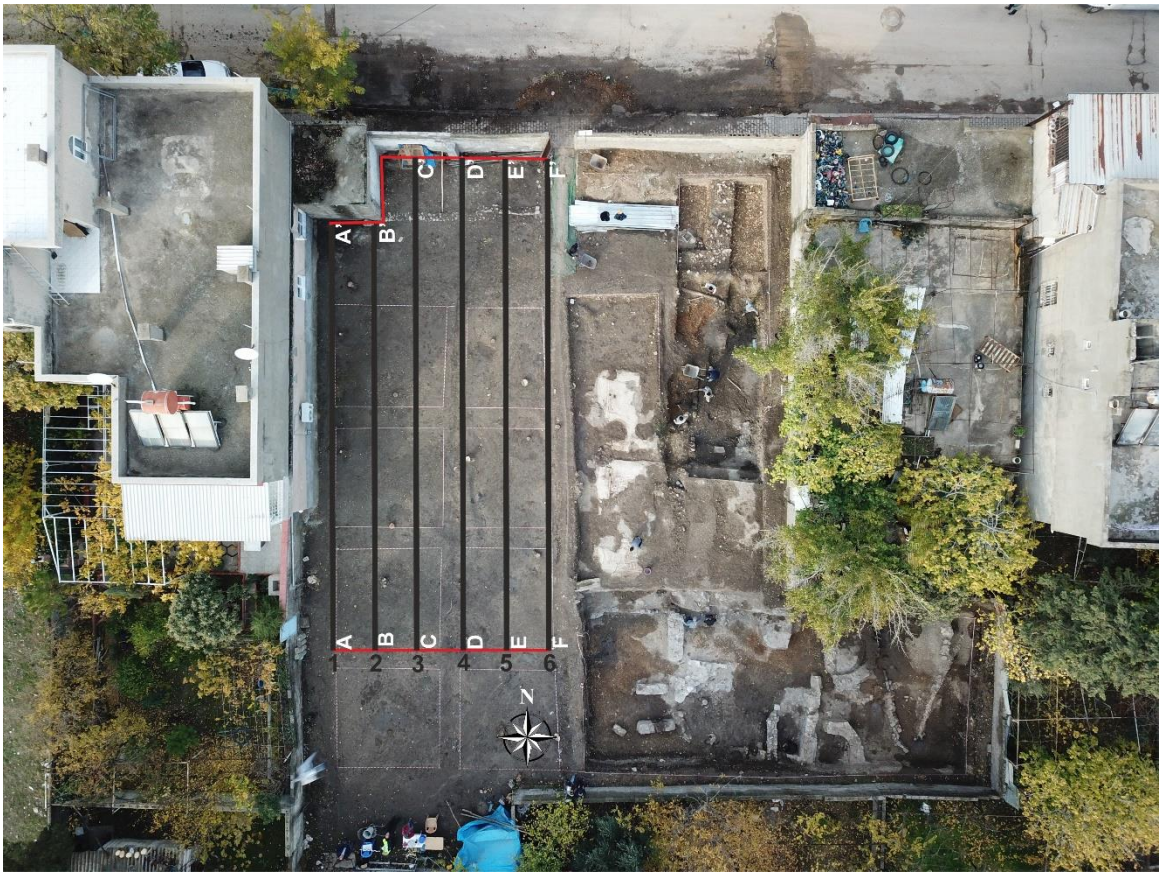


**Figure 3.** Survey Plan of GPR Profiles.

## RESULTS

GPR sections obtained from measurements along 6 profiles are given in Figure 3. When the GPR sections given in Figure 4 were examined, 4 important reflections belonging to the archaeological remains and one important reflection thought to belong to the current underground reinforcement were found and these reflections are given by numbering. In addition, 3D depth sections were created by combining the Ground radar profiles taken along 6 profiles, and structures thought to belong to archaeological remains were marked in these sections.

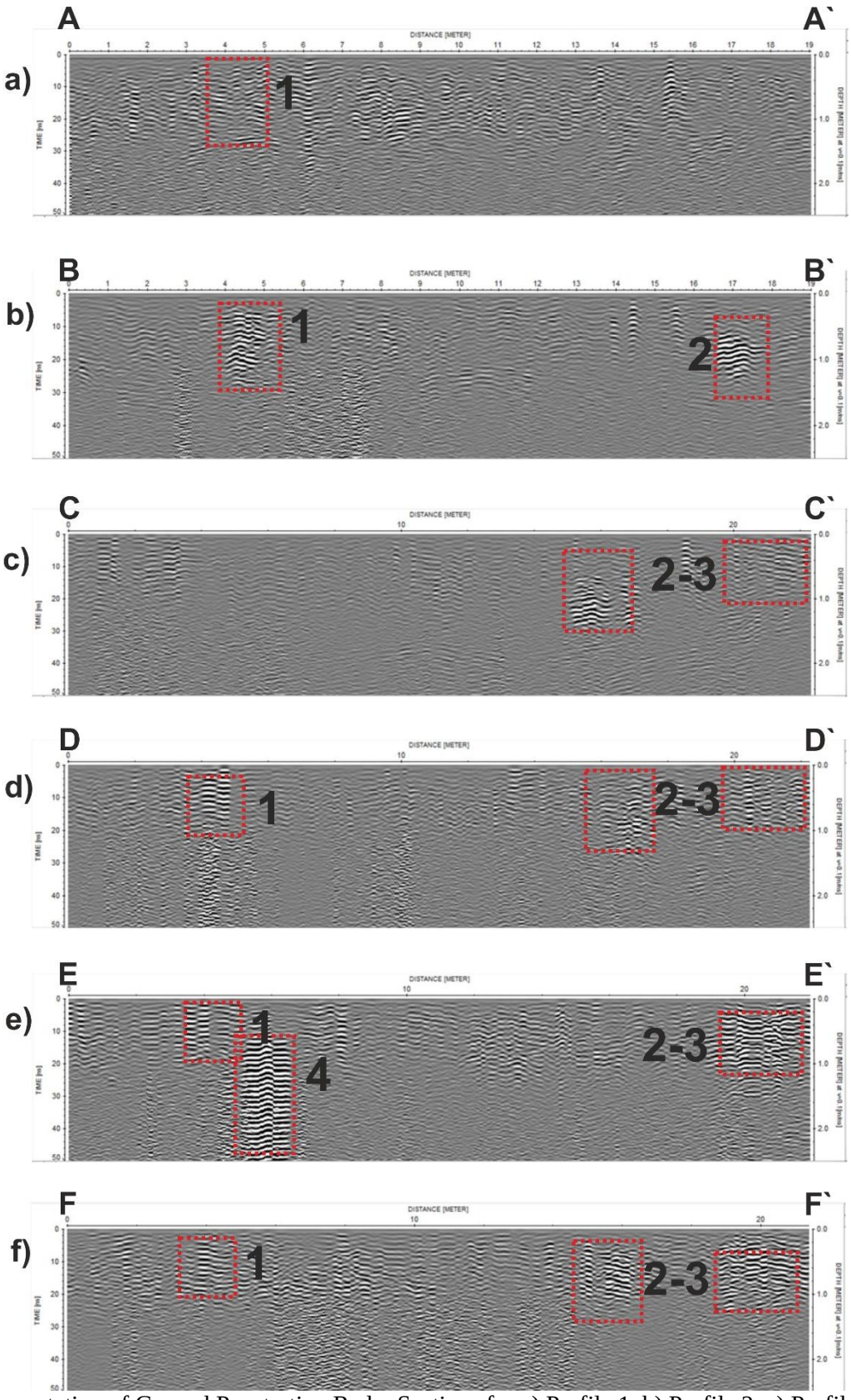


**Figure 4.** Interpretation of Ground Penetrating Radar Sections for a) Profile 1, b) Profile 2, c) Profile 3, d) Profile 4, e) Profile 5, f) Profile 6.

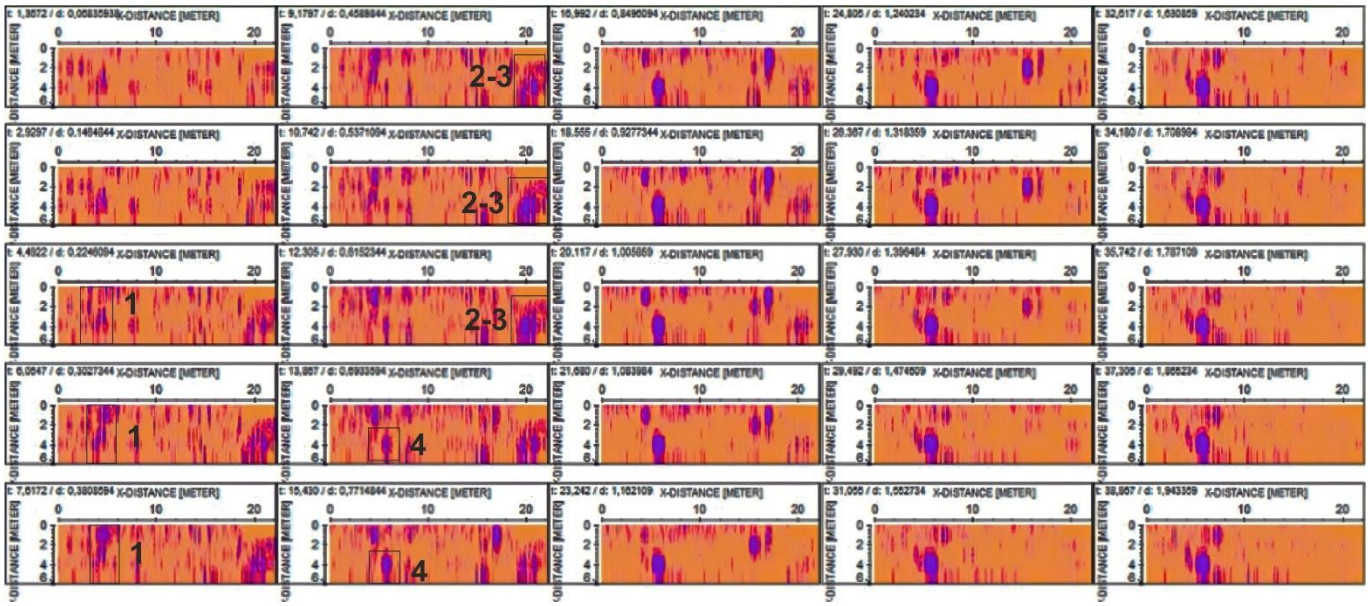


**Figure 5.** 3D GPR Depth Slices. d Which Shown on Every Slice is Depth Values.

## DISCUSSION AND CONCLUSIONS

In this study, Measurements of Ground Penetrating Radar (GPR) were performed along 6 profiles. The obtained results were compared both each other and the existing surface conditions, and GPR depth maps were created. When the 2 and 3 dimensional GPR depth sections given in Figures 4 and 5 were examined, 4 important reflections were found. It was interpreted that three of reflections belong to the remains of archaeological structures and one of them originated from metal material (probably pipe) and excavation was suggested. The remains identified because of the archaeological excavations are given in Figure 6. The reflections, which were considered as archaeological remains determined because of GPR measurements, were found to be compatible with the findings obtained as a result of the excavation.

As a result of the 2019-2020 archaeological excavations, it was seen that the reflections determined in the GPR sections belong to the Early Byzantine Period Villa Rustica, which we date to the 5-6$^{th}$ century AD, or to the wall remains of a Roman Bath (Anomaly-1) and a metal pipe (Anomaly-4). Another important data detected in GPR measurements is the remains of other walls (Anomalies 2 and 3) that cut parallel to the building walls and extend in different directions (Figure 6). As a result of the excavations, these walls are from 5-6$^{th}$ century AD. It was understood that it belonged to another structure with mud-tempered rubble stone walls, different from the Early Byzantine Period structure that we dated to the 5-6$^{th}$ century. The ceramic pieces found during the excavations and dated to the 11$^{th}$-13$^{th}$ centuries indicate that this structure was reused in the Middle Byzantine Period (Dumankaya, 2019; Akyol et al., 2021; Ok and Dumankaya, 2022; Dumankaya, Akdağ, and Yıldırım, 2022).

In the GPR reflections, it was determined that the east-west oriented walls extend out of the block-445 20$^{th}$ and 3$^{rd}$ parcels where archaeological excavations were carried out. However, the fact that the buildings that have not been expropriated are located on these parcels prevents the exact determination of the spread area of the building remains. In addition, a crucial point that draws attention here is that the metal pipe passes through the middle of the ancient building remains. Because considering the elevation of the metal pipe, it is not possible to pass the pipe without destroying the mosaic floor. In this case, it is thought that the ancient period building remains were ignored in the determination of the water line through which the metal pipe will pass, and it may have been deliberately destroyed by the Kahramanmaraş Municipality teams of the period. The indifference of both the people living in the region and the state institutions has led to the increasing destruction of cultural remains. On the one hand, scientists and the Ministry of Culture and Tourism carry out studies with the sensitivity of protection and transfer to future generations, on the other hand, Vandalism and indifferent approaches of local people and local governments are an ironic situation. GPR studies continue on different blocks and parcels within the borders of the ancient city. The fact that the study area is located in a dense residential pattern cannot be understood whether the reflections belong to ancient ruins or today's structures, and it needs to be confirmed by excavations. For this reason, it is not possible to reach a definitive judgment before the excavations are completed in the study areas. It is aimed to

determine the borders and structures of the ancient city Caesarea Germanicia exactly with the archaeological excavations.


**Figure 6.** Archaeological Remains Unearthed as A Result of Excavation.

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**Conflict of Interest**

No conflict of interest was declared by the authors.

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