

GPR as a practical tool in archeology: The case of the Byzantine church of Ashdod-Yam

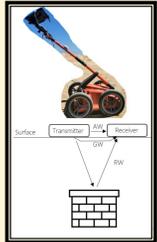


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1. Introduction

Ashdod-Yam, which is located in the southern coastal area of Ashdod (Fig. 1), was one of the most important cities on the Israeli coast during the Byzantine period. We tested the GPR method on the backfilled archaeological site, after the first excavation season revealed remains of chapels, related to a Byzantine church. We extended the survey to adjacent area to locate additional anomalies which may point to a continuation of the archeological complex.



The GPR Method

Ground Penetrating Radar (GPR) (Fig. 2) is a non-destructive electromagnetic geophysical technology for mapping the shallow subsurface. The GPR can image buried archaeological features such as walls and strata. Being inexpensive and featuring high-resolution imaging of relatively large-scale areas, it is becoming a standard tool in archaeology.

Figure 2: A scheme of the GPR method.



Figure 1: Location map.

2. Data Acquisition & Processing & Results

About 1300 m of GPR scans were acquired over 1370 square meter (Fig. 3B). We processed these dense GPR scans with the GPR-SLICE software through the basic GPR workflow processing and, finally generated depth slices (Fig. 3C,D).

The GPR depth slices implied the existence of the central nave with an apsis and two flanking aisles.

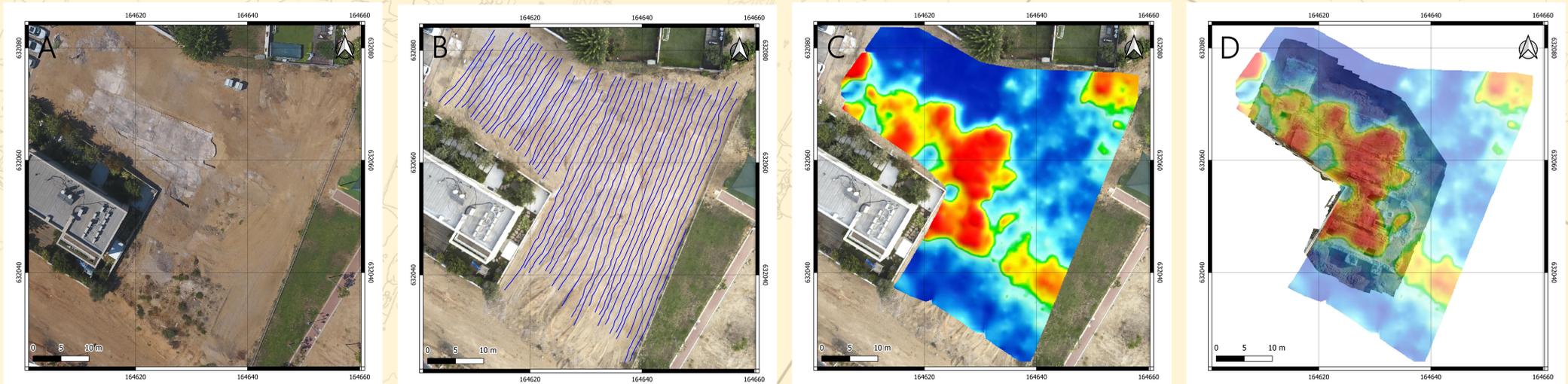


Figure 3: A. An orthophoto after the first excavation season. B. GPR lines after the excavation was backfilled. C. The GPR results where yellow-red indicates anomalies (depth slice at a depth of ~0.7 m). D. Depth slice over an orthophoto taken after the second excavation season.

3. Archeological Findings

The remains of a spectacular three-aisled basilica style church (Fig 4A) with decorated mosaic floors (Fig 4 B,C,D) were found, together with elaborate chapels and additional structures by its northern and western sides (Fid 4A). An unusual number of dated inscriptions, incorporated into the mosaic floors along with coins, suggest that the complex was used between ca. 400 - 600 CE. Devastation, with roof tiles directly impacting mosaic floors (Fig 4B), testify that the rather feeble structure withstood the 419 CE event in Palaestina Prima.

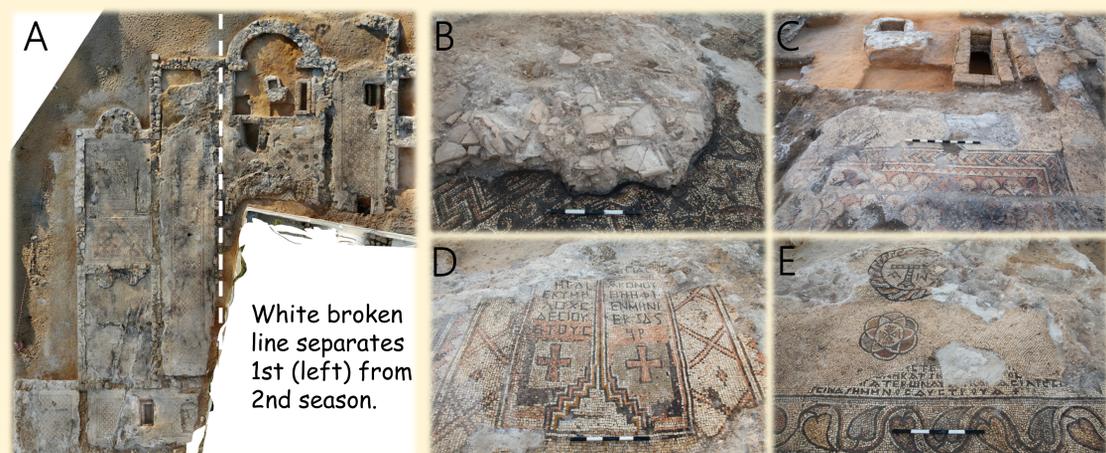


Figure 4: Archeological findings: A. The church. B. Roof tiles directly impacting mosaic floors. C, D & E. Decorated mosaic floors.

4. Conclusions

In this case study, we scanned with GPR the Byzantine church at Ashdod-Yam. The GPR prediction was strikingly verified in the recent excavation season. This case study is a striking example of how the GPR technology can assist before and during an archeological excavation.