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Transparent 3D Visualization of Archaeological Remains in Roman Site in Ankara-Turkey with Ground Penetrating Radar Method

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Anatolia has always been more the point of transit, a bridge between West and East. Anatolia has been a home for ideas moving from all directions. So it is that in the Roman and post-Roman periods the role of Anatolia in general and of Ancyra (the Roman name of Ankara) in particular was of the greatest importance. Now, the visible archaeological remains of Roman period in Ankara are Roman Bath, Gymnasium, the Temple of Augustus of Rome, Street, Theatre, City Defence-Wall. The Caesar Augustus, the first Roman Emperor, conquered Asia Minor in 25 BC. Then a marble temple was built in Ancyra, the administrative capital of province, today the capital of Turkish Republic, Ankara. This monument was consecrated to the Empreror and to the Goddess Rome. This temple is supposed to have built over an earlier temple dedicated to Kybele and Men between 25 -20 BC. After the death of the Augustus in 14AD, a copy of the text of "Res Gestae Divi Augusti" was inscribed on the interior of the pronaos in Latin, whereas a Greek translation is also present on an exterior wall of the cella. In the 5th century, it was converted in to a church by the Byzantines.

The aim of this study is to determine old buried archaeological remains in the Augustus temple, Roman Bath and in the governorship agora in Ulus district. These remains were imaged with transparent three dimensional (3D) visualization of the ground penetrating radar (GPR) data. Parallel two dimensional (2D) GPR profile data were acquired in the study areas, and then a 3D data volume were built using parallel 2D GPR data. A simplified amplitude-colour range and appropriate opacity function were constructed and transparent 3D image were obtained to activate buried remains. Interactive interpretation was done by using sub-blocks of the transparent 3D volume. The opacity function coefficients were increased while deep sub-blocks were visualized. Therefore amplitudes of electromagnetic wave field were controlled by changing opacity coefficients with depth. The transparent 3D visualization provided to identify the archaeological remains on native locations with depth in a 3D volume. According to the visualization results, in the governorship agora, the broken Roman Street was identified under the remnants of Ottoman, Seljuk's and Byzantine periods respectively at 4m depths and a colonnaded portico was determined in the governorship garden. Diggings encouraged the 3D image results. In the Augustus temple, very complex remnant structures including cubbies were determined in front of the east wall of the temple. The remnant walls very near to the surface were continued so deep in the 3D image. The transparent 3D visualization results overlapped with the digging results of the Augustus temple.