



## Physical Anthropology Section – 2006

### H9 Forensic GPR: Using Ground-Penetrating Radar to Search for Buried Bodies

*Johh J. Schultz, PhD\**, University of Central Florida, Department of Sociology and Anthropology, Orlando, FL 32816-1360

After attending this presentation, attendees will learn how GPR is used to search for buried bodies in a forensic context and how to find a GPR consultant.

This presentation will impact the forensic community and/or humanity by providing a better understanding of how GPR can be used to search for buried bodies.

The use of ground-penetrating radar (GPR) as a search tool for buried bodies and evidence has become a valuable search option for forensic investigators. This equipment is not only important to locate forensic targets, but it is just as important to clear suspected areas where a body is thought to have been buried so investigations can be directed elsewhere. Ground-penetrating radar is a non-invasive or non-destructive search method that preserves the site during a survey. The equipment is used prior to excavating to identify target areas for invasive testing. Ground-penetrating radar is now routinely used in conjunction with other forensic search methods because the cost of the equipment has decreased and the equipment has become easier to operate. The purpose of this paper is to discuss GPR methodology while emphasizing how this equipment can be used to search for buried bodies by drawing from forensic case examples and research by the author.

Standard GPR systems consist of a control unit, an antenna containing a transmitter and a receiver, and a display monitor that can also be a laptop. Antenna frequencies ranging from 400 to 500-MHz are appropriate for most forensic and archeological applications because they provide an excellent compromise between depth of penetration and resolution of subsurface features. The equipment can be configured a number of ways such as hand pulling the antenna with the monitor secured to the body via a harness, or the monitor can be placed at a fixed location while the antenna is hand pulled. In addition, the newest option integrates all of the components into a cart that can be pushed while performing a survey.

When the equipment is used during a survey, the antenna is emitting electromagnetic waves into the ground as it is being pulled or pushed. As the waves encounter areas of contrasting properties, such as a grave or metallic object, the imagery is captured by the equipment as an anomaly; this is not an exact picture of the buried object in the ground but an indication that something is buried. Depending on the soil type and the burial scenario (e.g., wrapping the body and adding non-biologic items to the grave) an anomaly for a grave or buried body may appear as a distinct and localized hyperbolic shape or a localized soil disturbance. Once target areas are identified, invasive testing will be required to determine the identity of most features that produce anomalies.

The two most limiting factors of GPR surveys that are conducted for forensic contexts are site conditions and operator experience. The best conditions for GPR surveys include open areas that are comprised of dry and sandy soils that are relatively free of large pieces of debris and stone cobbles. False anomalies can be a problem in soil containing debris and stone cobbles and in areas that contain trees or brush. The roots and stumps can be detected as anomalies that are similar in size to anomalies produced by buried bodies. Before, a GPR operator is consulted for a forensic survey, it is important to inquire about their experience. They should have experience searching in forensic and archaeological contexts so they would be familiar with detecting and interpreting anomalies produced by small features such as a buried body or grave and not large geologic features. In addition, GPR can be the most valuable search option in a forensic context when a survey for a body needs to be conducted over a hard-packed surface such as cement or blacktop. For example, if the search for a body needed to be conducted over the cement slab of a residential home, the GPR survey could first be performed to identify the location of target areas that required further testing. There would then be limited damage to the concrete because invasive testing would only be limited to target areas.

**Ground-Penetrating Radar (GPR), Search Methods, Forensic Anthropology**