H58 The "Next Utility" in Field Recovery of Scattered Human Remains

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The goals of this presentation are to discuss and illustrate the technology and applicability of GPS and GIS in forensic anthropology for research and field recovery of scattered human remains.

Field recovery of human remains is an essential role of the anthropologist in forensic investigation. Sites are often mapped and photographed to create a scaled depiction of the remains for study or medico-legal purposes. In situations where remains are widely scattered through animal activity or other processes, or where the landscape is topographically varied, hand drawn maps, even with the help of total stations, can be difficult to complete. In such instances, the Global Positioning System (GPS) can be a useful tool.

In the U.S., the GPS was first developed by the Department of Defense (DoD) to enable accurate navigation and positioning across the globe. Though available to the general public in 1983, GPS was declared fully operational by the DoD in 1995. Since then, its applications have proven useful in a wide variety of professions, including anthropology, for locating and mapping archaeological sites. Recently, anthropologists at the Louisiana State University Forensic Anthropology and Computer Enhancement Services (FACES) Laboratory have begun to use GPS and Geographic Information Systems (GIS) for research and to assist with mapping forensic cases recovered in the field.

As a powerful data collection tool, GPS in combination with GIS, offers benefits to field recovery, such as creating accurate site maps, particularly in cases where remains are widely distributed. Also, each site can be provided with a unique global address, enabling law enforcement

to navigate back to the scene should further search be necessary. Additionally, GPS data collected in the field can be used for research purposes. Using GIS techniques and software, analyses of data may elucidate patterns of distribution when variables such as time since death, topography, environment, and seasonality are considered.

Despite the benefits of GPS for data collection, inherent within the system are certain limitations to its practicality for field recovery that should be considered. Such drawbacks include the inability to receive data from the satellites in certain environments (*e.g.*, inside structures/buildings or beneath heavy tree cover), and the "peak time" to use the system (*i.e.,* when satellite positioning is ideal) may not coincide with the time of retrieval.

Advances in GPS technology allow the collection of both codeand carrier-phase data with relatively inexpensive hand-held units. Such data can further be differentially corrected either in real-time (using a beacon) and/or through post-processing in order to increase the positional accuracy of the data. The most accurate positions can be recorded, if carrier-phase data are corrected in both real-time and through post-processing. But, such accuracy may not be sufficiently high for cases where remains do not move far from the site of original deposition. In such circumstances, the exact position of some individual skeletal elements may not be distinguishable.

A clear trade off exists between accuracy and the price of GPS receivers. Because law enforcement agencies and anthropologists involved in the field recovery of human remains have limited financial resources, they cannot purchase and use highly accurate, surveying-grade GPS receivers with a price tag of tens of thousands of dollars. For this reason, the discussion presented in this poster focuses on GPS technology that is reasonably priced and can be acquired and used by any law enforcement agency or anthropologist involved in the field recovery of human remains.

In conclusion, the use of GPS does not preclude the necessity for hand drawn site maps, especially in cases where remains have not been widely scattered. However, GPS is a valuable tool in providing a fast and effective means of pinpointing site locations, and in combination with GIS, creating accurate and reliable maps where remains are widely distributed.

Field Recovery, GPS, Anthropology

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