

Application of Geophysics to Identify Cultural Resources for Environmental Permitting of Highway Projects

Keith C. Seramur, P.G.
Seramur & Associates, PC
Boone, North Carolina



DeIDot US 301 Project

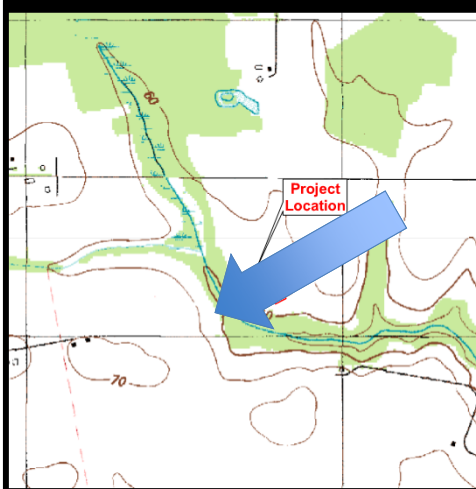


- Historic Cart Road within US 301 ROW
- Pre-revolutionary smuggling route

Goal

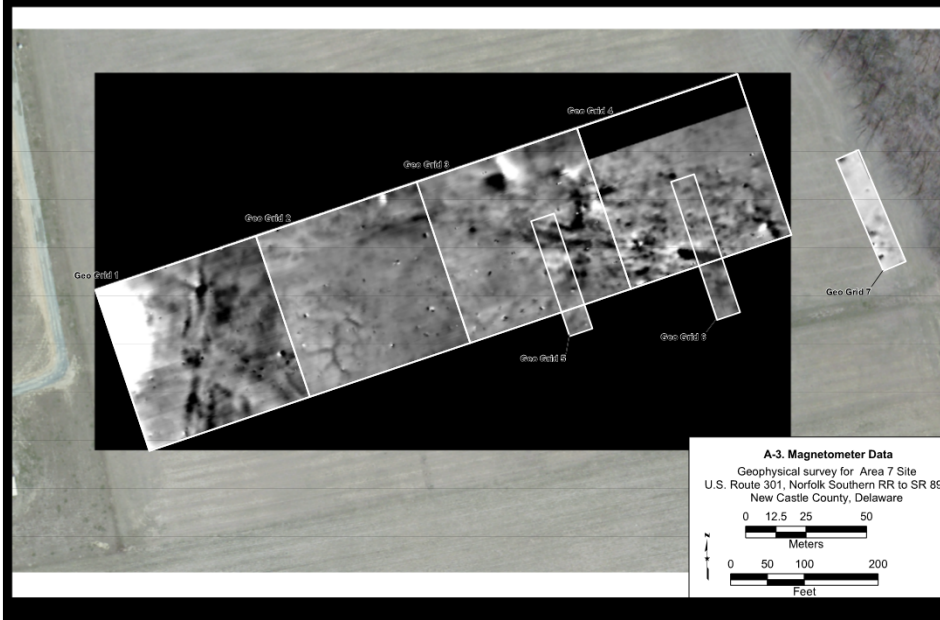
Assist archaeologist in locating Cart Road
Within US 301 ROW

Gradiometer & GPR Survey

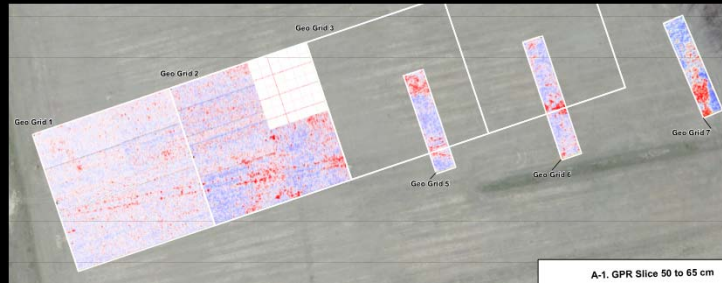


- ~4 Acres of Survey
- 0.5 m Transect Spacing
- 24 km or 18 miles of Transects

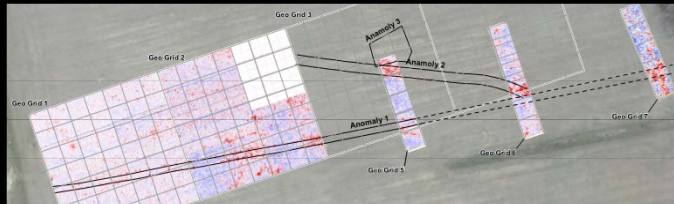
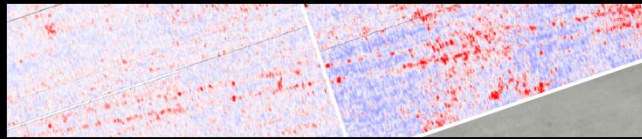
Gradiometer Data



GPR Data Horizontal Slice through a 3-D Model of the GPR Data



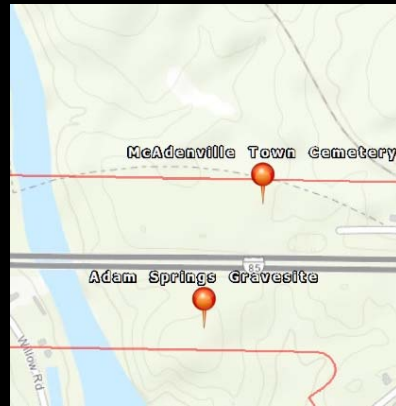
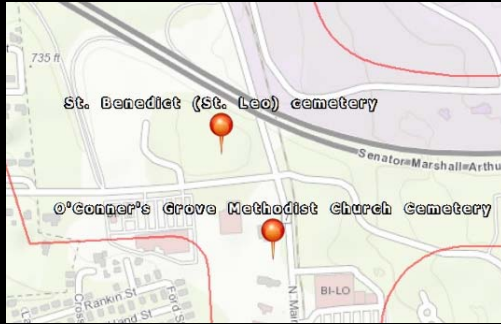
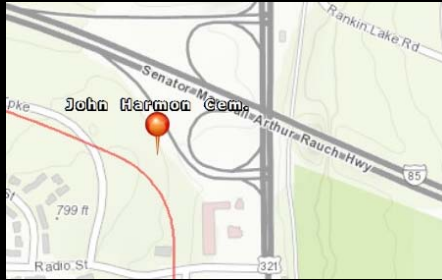
Radan Depth Slices



Archaeologists exposed this section of a road that was part of the 1760s cart road through which goods were smuggled between the Chesapeake and Delaware bays

NCDOT: I-85 Widening and Improvements

Geophysical surveys to assess cemetery boundaries at five cemeteries in Gaston County, NC



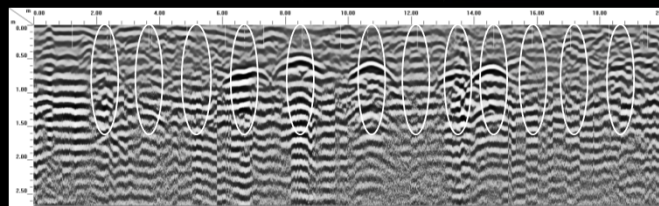
St. Benedicts cemetery

10 Grids of GPR Data

ER survey used to ground truth GPR data

Primarily (20th century) recent burials

Footprint of former church building delineated

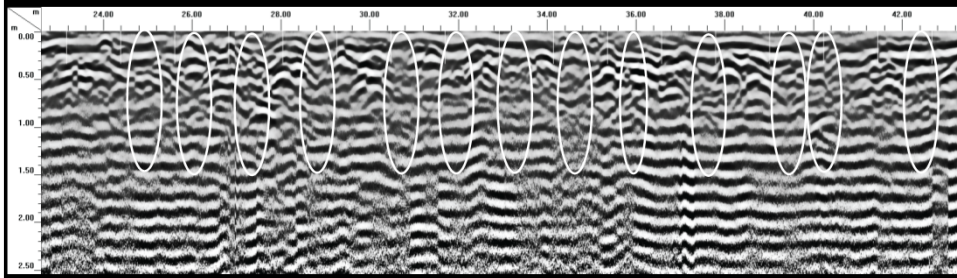


O'Connor's Grove Methodist Church Cemetery

GPR Data collected in transects

ER survey used to ground-truth GPR results

Older burials, few intact coffins

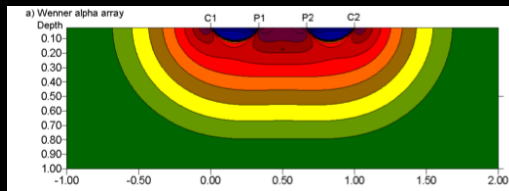
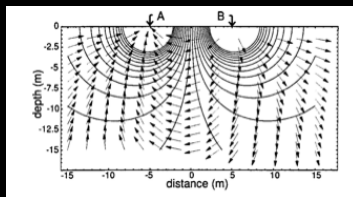


Electrical Resistivity Surveys

Four Electrode Werner Array

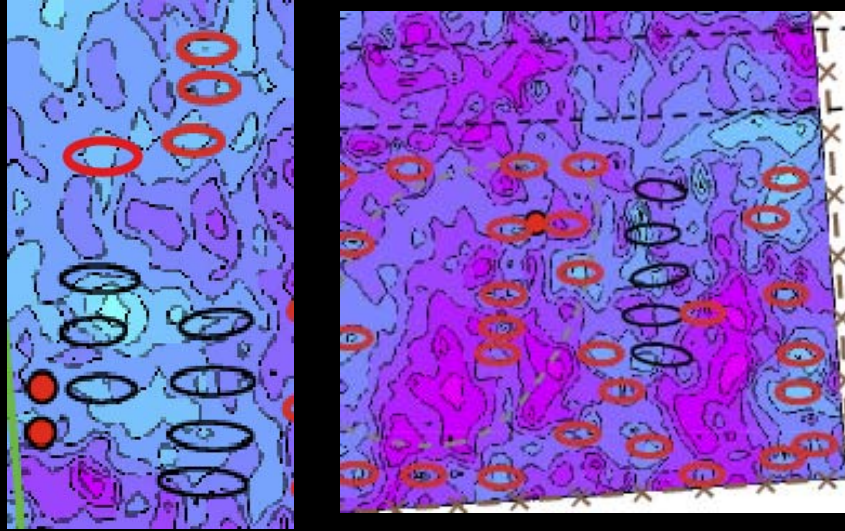
Disturbed soil absorbs rain water

Moist soil = Low Resistivity



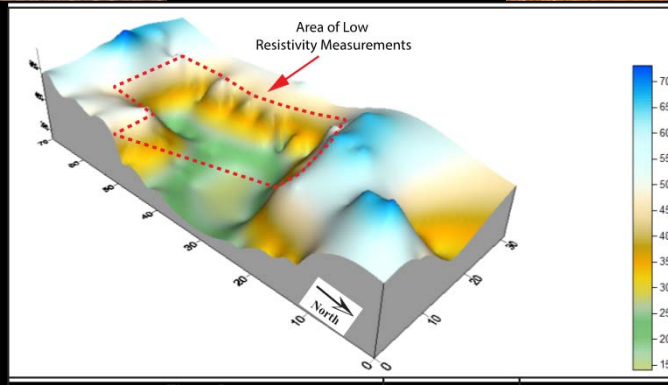
Electrical Resistivity Survey at the West Chapel Hill Cemetery

Survey Grids with 2-foot spacing



Example from Greenville SC

Color contoured ER data shows outline of unmarked burials at family cemetery

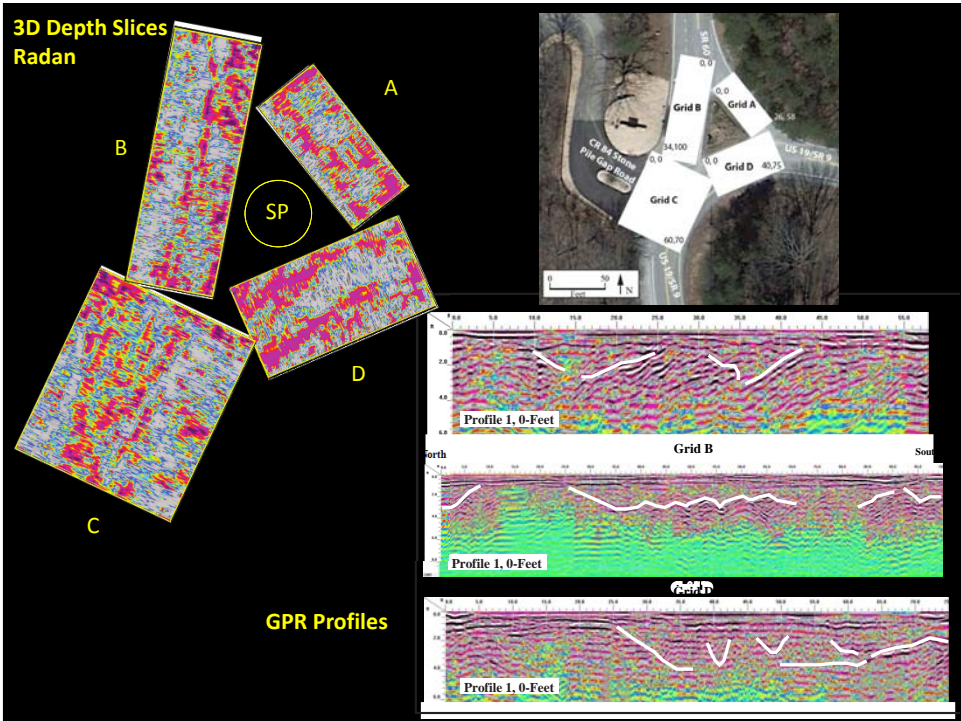


GDOT
Proposed Improvements to the
US 19/SR 9 and SR 60 Intersection, Lumpkin County, GA

Feature FS 1 consists of a piled rock on a median in the middle of the existing highway intersection The local folklore is that the rock pile is the burial of the Indian Princess "Trahlyta"



Research and discussions with tribal representatives indicate that this folklore probably originated in 1870 to promote a nearby hot spring resort



3-D Graphical Representation of GPR Data

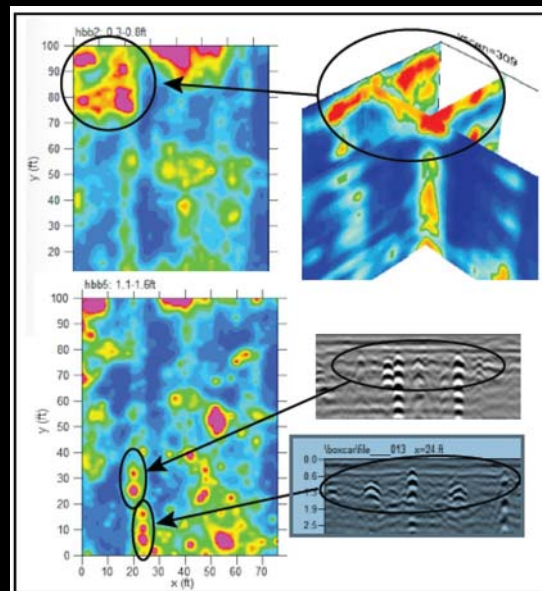
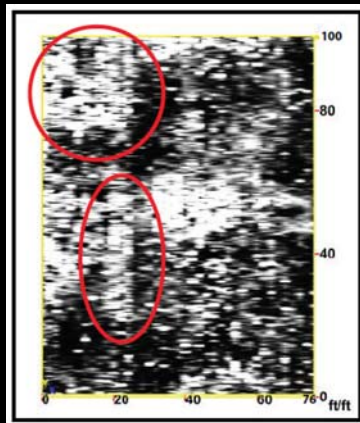


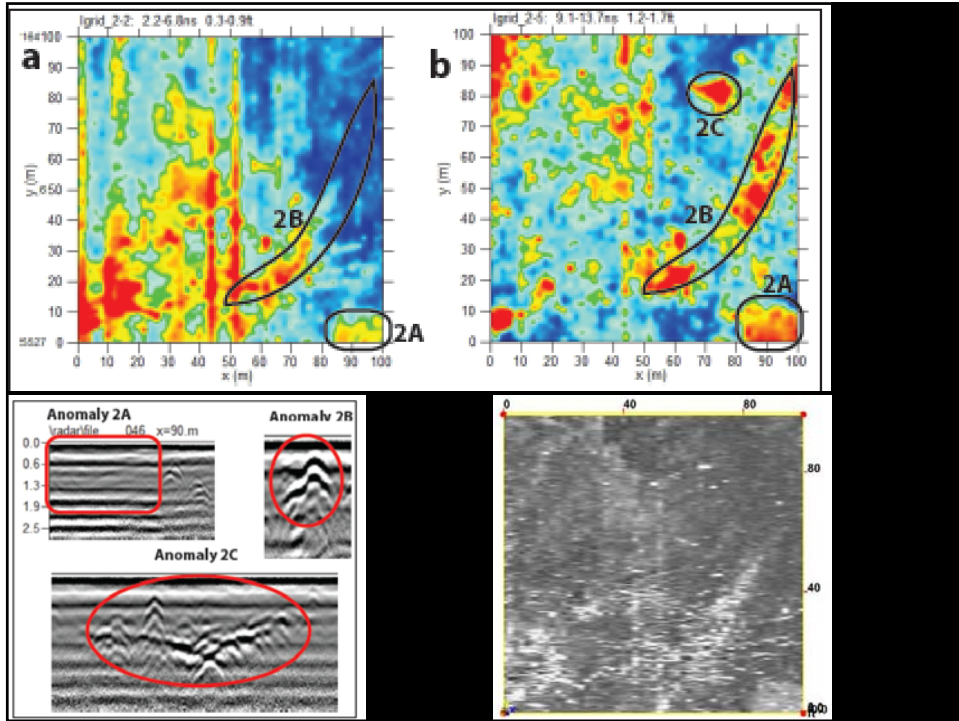
Pre-Civil War Barnsfield Plantation
Sympathized with Confederate Forces
Destroyed during the Civil War

GPR Survey to map foundations and
remnant infrastructure of the
plantation

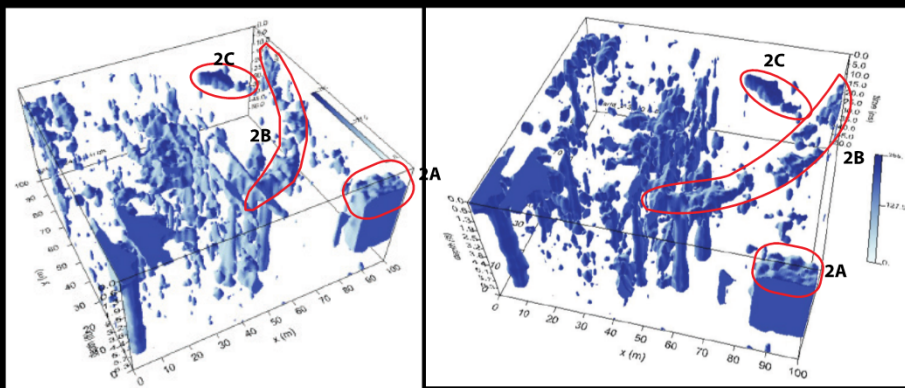


GPR Slice



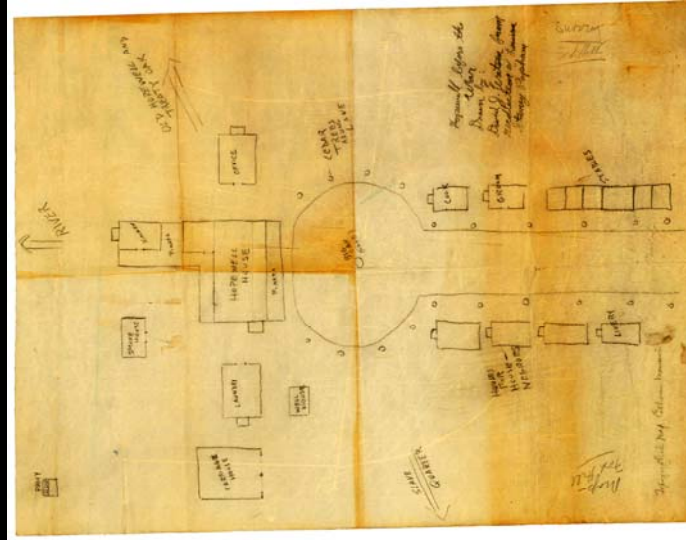


Isosurface 3D Graphics

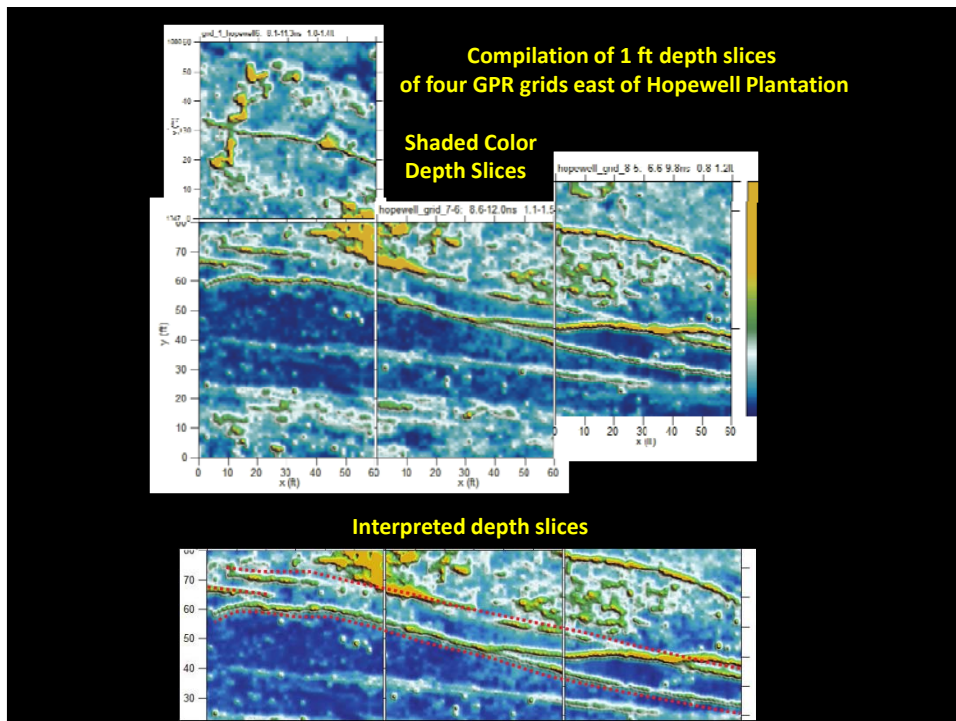


Hopewell Plantation, Clemson University

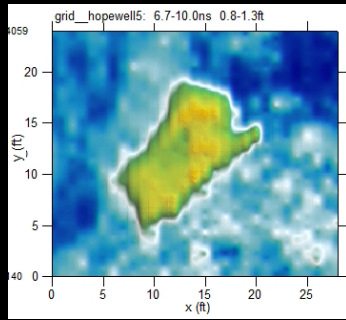
18th century home of Revolutionary War hero Gen. Andrew Pickens



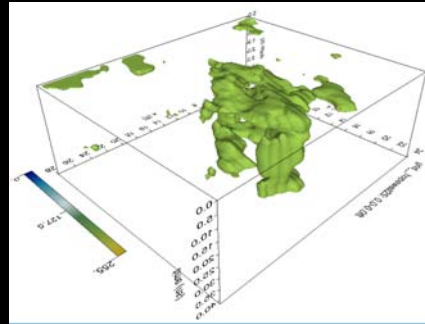
Map of Plantation before the Civil War



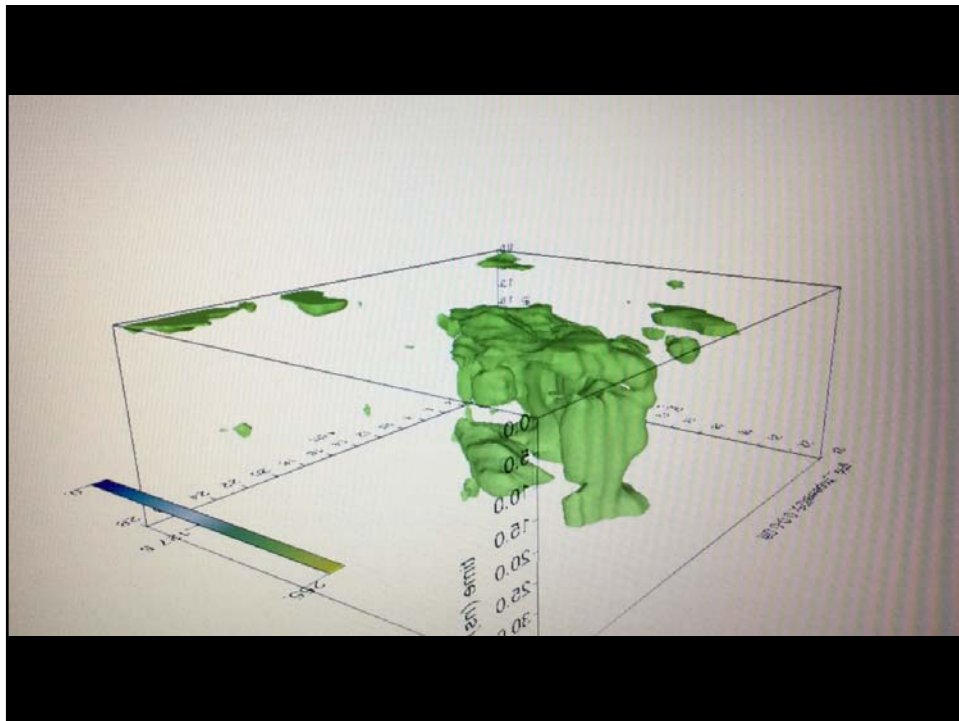
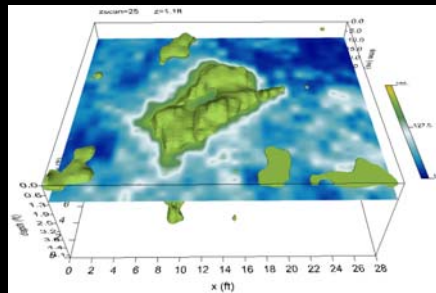
Shaded Color Depth Slice

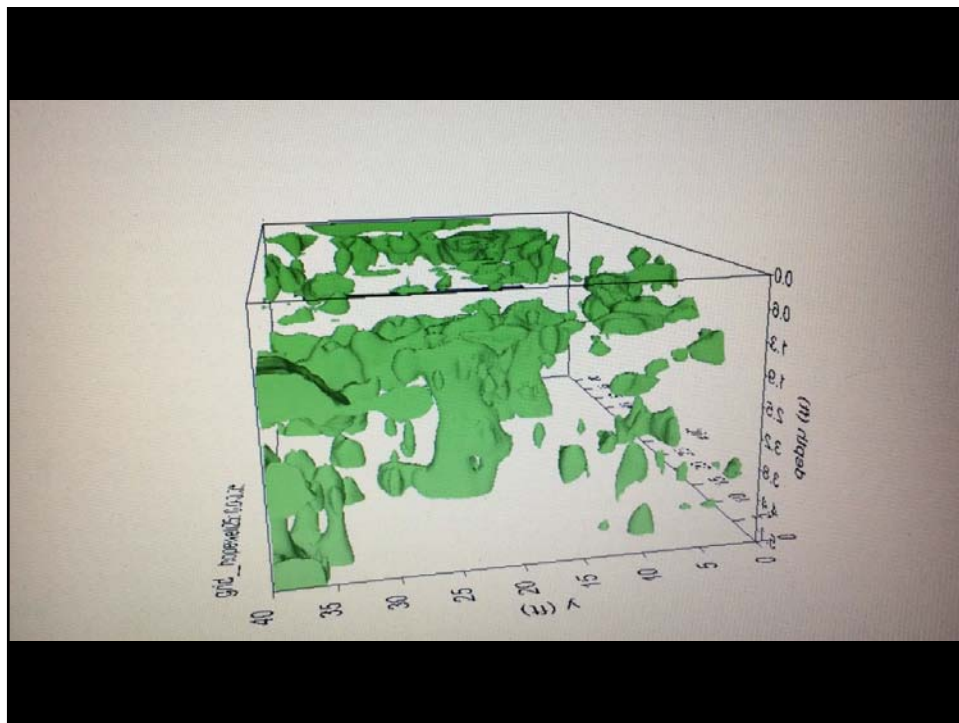
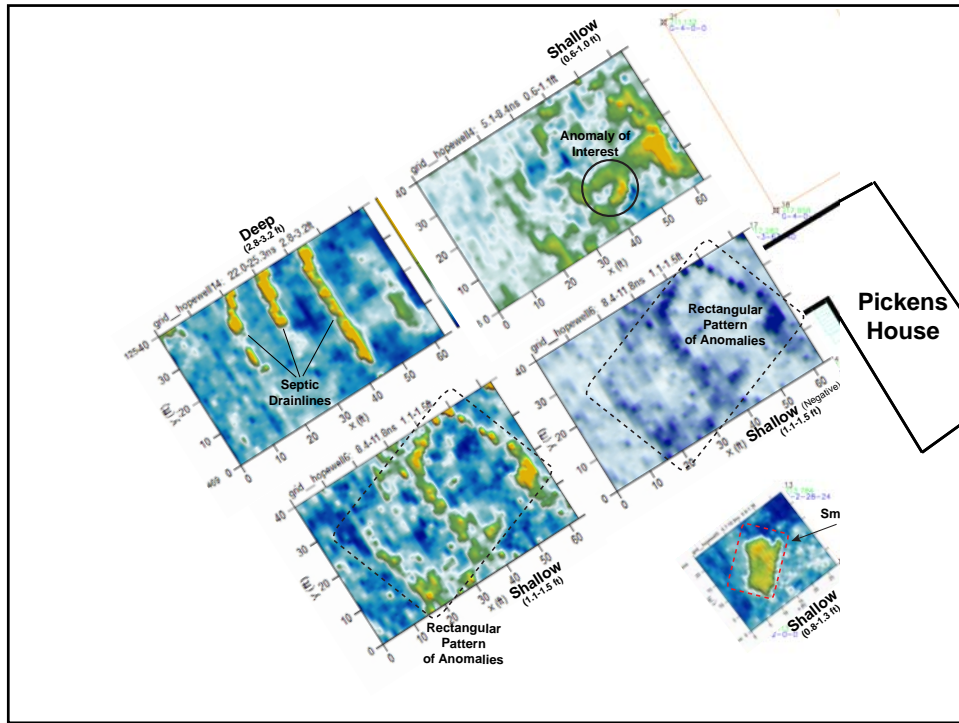


Isosurface 3D Graphic



Isosurface 3D Graphic w/ Depth Slice





**It's Time to Raise the Bar
on the Presentation of
Geophysical Data**



**3-D Computer Graphics
to Image Subsurface
Anomalies and Targets**