



# Air Force Civil Engineer Center

## Restoration Technology Transfer Speakers Series May 2025

### Near-Surface and Borehole Geophysics Techniques Available for High-Resolution Site Characterization Part 1 of 2

**Presenters:** Jaime Hincapie, Ph.D. – Noblis

Near surface geophysical (NSG) methods are minimally invasive, non-destructive technologies that use the physical properties subsurface materials to aid in understanding complex geologic and hydrogeologic settings. The methods include:

- Transmission of mechanical vibrations – seismic methods
- Detection of atomic-level particle physics – quantum physics methods
- Resistance to the flow of electricity– electrical methods
- Transmission of electromagnetic signals – EM and ground-penetrating radar methods
- Variations of Earth's magnetic field - magnetometry
- Variations of Earth's gravitational pull – gravimetry

While NSG can be implemented as standalone technologies, they are often used in tandem with other ancillary methods. These geophysical methods help identify optimal locations for drilling to confirm and further extrapolate the initial findings. They are decision-making tools widely used in geotechnical engineering and environmental investigations among others. NSG covers large areas quickly and provides valuable information at a fraction of the cost of invasive exploration techniques. Preliminary results from some methods are available in the field and provide timely information that can be used to optimize available resources and reduce costs and time in the field.

The screenshot shows a Zoom meeting interface. The top bar includes the Zoom logo, 'Meeting', a participant list with 'M32047's screen', and controls for 'Sign in', 'Recording', 'GOV', 'View', and window management. The main content area displays a presentation slide titled 'Ground Penetrating Radar' with the AFCEC logo in the top left. The slide content includes a definition of GPR, a list of environmental applications, and a 3D diagram of a subsurface scan. The diagram shows a rectangular volume with dimensions 35m by 15m by 7m. It contains several vertical boreholes labeled B30, B31, B62, B61, B41, and B22. A red arrow labeled 'Tracer Injection' points into borehole B22. A legend on the right identifies three soil types: Sand (light brown), Gravel (dark brown), and Sandy gravel (blue). The slide footer indicates 'Source: EOS' and the slide number '29'. The bottom Zoom bar shows controls for Audio, Video, Participants (95), Chat, React, Share, Apps, Record, More, and a Leave button. A small video feed of the presenter, M32047, is visible on the right side of the screen.

**Ground Penetrating Radar**

**Ground penetrating radar (GPR)**  
Uses radar pulses to image the subsurface.

**Environmental Applications**

- Locating pipes, tanks, and other utilities
- Locating the groundwater surface
- Identifying and mapping the extent of groundwater contamination
- Identifying karst features, voids, and burrows
- Mapping bedrock configuration, structure and depth
- Detecting unexploded ordinance and unmarked graves
- Delineating soil horizons and soil stratigraphy
- Determining ice thickness (e.g., permafrost)
- Determining water depth in lakes

Source: EOS

Dr. Jaime Hincapie presents details on several NSG technologies.

If you are unable to attend the broadcast, a recording as well as the presentation slides, will be posted on eDASH:

<https://usaf.dps.mil/teams/eDASH/WPP/Speaker%20Series/Speaker%20Series.aspx>

This event and future events are updated and posted on the AFIT website at: <https://www.afit.edu/CE/index.cfm>.