3D Modeling and Visualization of Soil Features Using GPR Data. (S05-tischler125437-Oral)

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Abstract:

Three-dimensional (3D) modeling of subsurface soil features using ground-penetrating radar (GPR) is becoming more popular. Combining the efficiency and practicality of GPR data with the visual and interpretive powers of Geographic Information Systems (GIS) is the next step in the logical progression of advances for both technologies. But, integrating GPR data into a GIS has not been explored in Florida. Thus, the objectives of this research were to (i) identify subsurface soil layers using GPR and their geographic position with a differential global positioning system (GPS), (ii) create a 3D subsurface model based on the imported GPR data, and (iii) develop a procedure to import GPR data into a GIS. The research site is located at the Plant Science Research and Education Center in Marion County, Florida. The soils are characterized by Recent-Pleistocene-age sands over the clayey, marine deposited Plio-Miocene-age Hawthorn Formation which drapes the Eocene-age Ocala Limestone. Consequently, soils in the research area vary from deep quartz sands (Typic Quartzipsamments) to shallow outcrops of the Hawthorn Formation (Arenic Hapludalfs). GPR transects were performed on a 320m x 160m grid and the data processed to create a 3D subsurface model. GPR and GPS information was incorporated into a GIS program to provide quantitative spatial analysis through a visual environment. The soil information generated with GPS, GIS, and GPR may assist the research station personnel to determine best management practices including experimental plot placement, irrigation management, fertilizer treatments, and pesticide applications.

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