

**United States  
Department of  
Agriculture**

**Natural  
Resources  
Conservation  
Service**

**c/o USDA Forest Service  
11 Campus Boulevard  
Suite 200  
Newtown Square, PA 19073  
(610) 557-4233; FAX: (610) 557-4200**

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**Subject:** Soils – RADAN for Windows training

**Date:** 20 December 2007

**To:** Niles Glasgow  
State Conservationist  
USDA-Natural Resources Conservation Service  
2614 NW 43RD ST.  
Gainesville, FL 32606-6611

**Purpose:**

Training was provided on basic procedures used to process ground-penetrating radar (GPR) data through the RADAN for Windows software program.

**Participants:**

Jim Doolittle, Research Soil Scientist, USDA-NRCS-NSSC, Newtown Square, PA  
Martin Figueroa, Soil Scientist, USDA-NRCS, Quincy, FL  
Doug Lewis, Resource Soil Scientist, USDA-NRCS, Sebring FL  
Andrew Williams, Soil Scientist, USDA-NRCS, Milton, FL

**Activities:**

All activities were completed on 4 and 5 December 2007.

**Background:**

Previously, in Florida, ground-penetrating radar (GPR) data could only be displayed and interpreted by soil scientists on the screens of SIR-2000 control units or printed on inferior and obsolete printers, which were purchased in the late 1990s. Florida recently modified their two SIR-2000 GPR units to accept flash cards for data transfer. Radar data can now be transferred from the SIR-2000 system via a flash card reader into field office computers for data processing, interpretation, and visualization through the RADAN for Windows software program. This program was purchased by the Florida Soil Staff in 1998 and upgrade to version 5.0 in 2002, but was never installed or used.<sup>1</sup>

During this visit, GPR data were collected in the field and successfully transferred to a field computer in which the RADAN for Windows (version 5.0) software program had been installed. Training was provided on the field operation of the SIR-2000 radar system, and processing and display techniques available on the RADAN program.

**Summary:**

1. Designated radar operator in Florida received basic training on the RADAN for Windows program. Training covered the basic processing procedures contained in the RADAN for Windows program (version 5.0). These processing procedures can be used to prepare, edit, display, and print radar data. During training, proper file management and storage were stressed. Procedures covered included color table and transformation options, display gain functions, surface position adjustments, and horizontal

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<sup>1</sup> Although RADAN does not meet all CCE standards, a conditional waiver has been granted by the USDA-NRCS-ITC Software Test Laboratory (Fort Collins, Colorado) for the use of RADAN on CCE computers used by USDA-NRCS radar operators.

distance normalization. Each designated radar operator successfully copied radar files into the *Paint* utility where they were made into Bitmap images for inclusion in reports.

2. Florida has an outdated, but still functional RADAN software program (version 5.0). Currently, this software has been installed on only one computer that is operated by Andrew Williams. During this field visit, three soil scientists were trained on the use of this software. This software has been licensed to the USDA-NRCS staff in Florida and can be installed (up to four more times) on additional computers that are operated by the other radar operators (Doug Lewis and Martin Figueroa). Unfortunately there is only one USB security key (needed to open this program), which must be shared among the three soil scientists. This seems impractical and severely restricts the use of this software by the three soil scientists. A sales representative (Brian Jones) from Geophysical Survey Systems, Inc. (GSSI) informed me that additional USB security keys can be purchased for \$750 each. However, no keys are available for older versions of RADAN for Windows. Available USB security keys are intended for use on only the current RADAN for Windows program (version 6.0). My recommendation is that Florida upgrades its present RADAN for Windows (version 5) to RADAN for Windows (version 6.0) for \$750 and purchase two additional site licenses and USB security keys for \$750 each.
3. The proper handling of GPR and the subsequent processing of radar data are formidable tasks. Florida has two SIR-2000 radar units. Doug Lewis is a highly experienced and most knowledgeable GPR operator, but is nearing retirement. Andrew Williams and Martin Figueroa are attempting to learn this technology, and will rely on Doug's skills and experiences. GPR technology is not easily mastered and requires sustained field studies and experiences. However, because of more critical requirements and responsibilities, opportunities for the use of GPR by these soil scientists are limited. I encourage any activity that will require the use of GPR by these designated operators, so that skills can be retained, honed, and perfected. These activities will afford opportunities to master GPR field settings and calibrations, and to develop interpretive skills.
4. As a result of recent technological improvements, which include the use of advanced signal processing procedures, GPR is being successfully applied to a wider spectrum of applications. This has fostered the growth of this technology within USDA-NRCS. Besides the two radar units and three operators in Florida, there are nine additional radar units and operators on soil staffs within USDA-NRCS. These units and operators are stationed on national (2 assigned to NSSC), state (3: CA, NH, RI), and field office (3: MA, NY, WI) staffs. The NRCS Soil Staff in Georgia has recently purchased a state-of-the-art SIR3000 radar unit and will expand the use of this technology in the Southeast Coastal Plain Soil Survey Region. Radar operators are presently assignment to a wide variety of structural entities. In the aforementioned states, GPR operator are assigned different primary responsibilities, which include resource soil scientists, soil scientists, soil project leaders, and soil data quality specialists. I believe that the use of GPR will increase as soil scientists are reorganized into MLRA offices, and investigative strategies based on MLRA concepts are developed. I foresee an expanded "quality control" role for GPR within the MLRAs.

It was my pleasure to work in Florida and with members of your fine staff. The National Soil Survey Center promises its continued support to you and your GPR staff.

With kind regards,

James A. Doolittle  
Research Soil Scientist  
National Soil Survey Center

cc:

D. Anderson, State Soil Scientist, USDA-NRCS, 2614 NW 43RD St., Gainesville, FL 32606-6611

- B. Ahrens, Director, National Soil Survey Center, USDA-NRCS, Federal Building, Room 152, 100 Centennial Mall North, Lincoln, NE 68508-3866
- M. Golden, Director, Soil Survey Division, USDA-NRCS, Room 4250 South Building, 14th & Independence Ave. SW, Washington, DC 20250
- D. Lewis, Resource Soil Scientist, USDA-NRCS, 4505/4507 George Blvd., Sebring, FL 33872
- C. Love, MLRA Office Leader, USDA-NRCS, 3381 Skyway Drive, P.O. Box 311, Auburn, AL 36830
- M. Martinez, MLRA Project Leader, USDA-NRCS, 2140 W. Jefferson St. Quincy, FL 32351-1905
- W. Tuttle, Soil Scientist (Geophysical), USDA-NRCS-NSSC, P.O. Box 974, Federal Building, Room 206, 207 West Main Street, Wilkesboro, NC 28697
- A. Williams, Resource Soil Scientist, USDA-NRCS, 5230 Willing St., Milton, FL 32570