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A Soil and Water Science Department Publication

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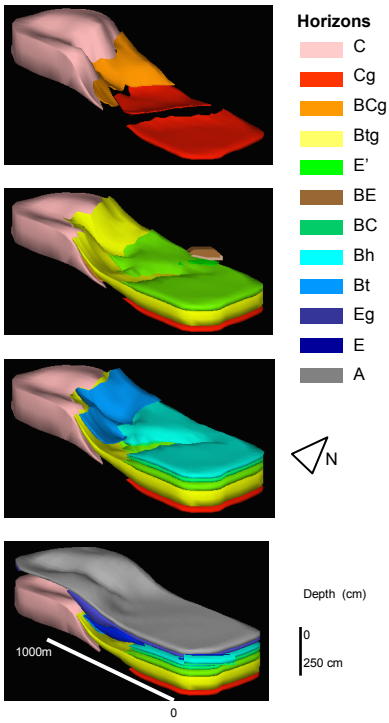
Featuring SWSD Thrust Area:

Soil Landscape Analysis



Models show the spatial distribution of soil horizons in the 3D geographic domain for a site in Alachua County, Florida

Editors:

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http://soils.ifas.ufl.edu

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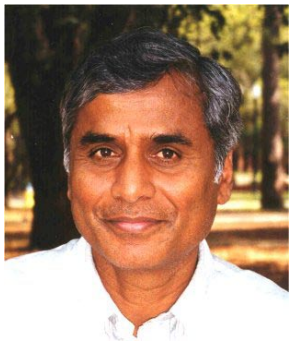

From the Chair...

The Soil and Water Science Department (SWSD) along with other UF-IFAS departments and centers is going through tough times as a result of severe budget cuts during the fiscal year 2001-02 with more expected during the next fiscal year. This requires all of us to conserve our resources and find alternate ways to strengthen our programs. In spite of the current statewide budget shortfall, the need to address soil and water quality issues is at an all-time high. This places us in a responsible situation to meet the statewide needs and demands. The SWSD faculty continue to explore new opportunities by expanding their programs and developing scientific knowledge that will help to address statewide needs to protect soil and water quality. To address these critical needs, we have been actively developing strategies to enhance our teaching, research, and extension/outreach activities. Here are a few recent examples:

- Our undergraduate programs are now modified to address the needs of our diverse students. We now offer three tracks: **Environmental Soil Science**, **Environmental Water Science**, and **Environmental Management and Policy.**
- Our graduate student enrollment is strong and interest in our programs is increasing. We have redefined our graduate tracks: **Soil Science**, **Environmental Science** and **Water Science**.
- We have initiated a new distance education graduate program. We plan to offer an M.S. degree with emphasis in **Environmental Science** at select UF-IFAS research and education centers.
- We have initiated several new undergraduate and graduate courses to meet current needs in our teaching program.
- Our grant activity is at an all-time high. We have a number of recently funded projects from state and federal agencies.
- Our first Soil and Water Institute outreach activity entitled "**Principles of Arsenic Behavior in Florida Soils**" is scheduled for March 4-5, 2002, Gainesville, Florida.
- **Lena Ma's** fern research program won the Discovery 2001 Award from Discovery Networks Europe and Royal Geographical Society.
- **P.S.C. Rao**, emeritus graduate research professor was recognized as highly-cited researcher by the Institute for Scientific Information.
- **Mary Collins**, professor in environmental pedology, was appointed as Division 1 Secretary of the International Union of Soil Science.

In this newsletter we feature one of our thrust areas: **Soil-Landscape Analysis**. The goals of this thrust area are to (1) improve the understanding of soils as natural bodies within landscape, and (2) develop techniques for landscape-scale modeling and risk assessment that can be applied to both rural and urban settings. This program also involves the maintenance of expertise in geographic applications (e.g., GIS, geostatistics, etc.), and a departmental commitment to multi-disciplinary research at environmentally relevant scales. Our new faculty member **Sabine Grunwald,** assistant professor, has established a GIS laboratory to coordinate teaching and research activities in this thrust area.

We will be going through some tough times in the next few years, but in spite of budget limitations, we are committed to maintain excellence in our programs by redirecting and conserving our resources. To meet these challenges, we need the support and help of our emeritus faculty, alumni, friends, and our clientele. Please send me your ideas and suggestions.

Dr. K. Ramesh Reddy, Chair, Soil and Water Science Department, 106 Newell Hall, Box 110510, University of Florida, Gainesville, Florida 32611. Telephone: 352-392-1803; Fax: 352-392-3399. E-mail: krr@ufl.edu

Teaching

NEW GRADUATE STUDENTS FALL 2001

Myrlene Chrysostome, *Ph.D., Advisor, V.D. Nair*
Abioye Fayiga, *Ph.D., Advisor, L.Q. Ma*
Matt Fisher, *Ph.D., Advisor, K.R. Reddy*
Kevin Grace, *M.S., Advisor, J.R. White*
Wonsook Ha, *Ph.D., Advisor, R.S. Mansell*
Daniel Herrara, *M.S., Advisor, R.S. Mylavarapu*
David Hornsby, *Ph.D., Advisor, D.A. Graetz*
Chris Lewis, *M.S., Advisor, M.W. Clark*
Fernando Munoz, *Ph.D., Advisor, R.S. Mylavarapu*
Arne Olsen, *Ph.D., Advisor, R.S. Mansell*
Irene Poyer, *M.S., Advisor, W.F. DeBusk*
Ravindra Ramnarine, *M.S., Advisor, W.G. Harris*
Travis Shaddox, *Ph.D., Advisor, J.B. Sartain*
Susan Simon, *M.S., Advisor, J.R. White*
Leighton Walker, *M.S., Advisor, D.A. Graetz*

GRADUATES FALL 2001

Alan Wright, *Ph.D., Advisor: K.R. Reddy*
Wei Wei Chen, *M.S., Advisor, A.V. Ogram*
Iuri Herzfeld, *M.S., Advisor, W.F. DeBusk*

UNDERGRADUATE STUDENTS FALL 2001

Robert McMillan, *EMA-ECO*

GRADUATES FALL 2001

Ashley Harn
Gerald Green, *SLS*

Student Awards

Weiwei Chen's thesis has been selected to be the departmental nominee in the M.S. division of the IFAS Award of Excellence Program.

Christopher Appel's dissertation has been selected as the departmental nominee in the Ph.D. division of the IFAS Award of Excellence Program.

Larry "Rex" Ellis, M.S. Student, won first prize in oral presentation, **Viji Ramakrishnan**, M.S. student, and **Ron Corstanje**, Ph.D. Student, won first prize in the poster competition, at the SWSD Graduate Student Forum, September 2001. This is Viji's second consecutive first prize; she also won first place in the university graduate student competition earlier in the year.

Several fellowships have been awarded to outstanding students in the department: **Robertson Fellowship** awarded to **Christopher S. Appel** ($500), **Carlisle Fellowship** awarded to **Larry "Rex" Ellis** ($1,000), **Smith Scholarship** awarded to **Gerald Green** ($500), **Polston Scholarship** awarded to **Weiwei Chen** ($1,000).

The department has revised its current teaching programs including courses, degree tracks, and specializations. These modifications better reflect the specializations we offer at undergraduate and graduate levels.

UNDERGRADUATE PROGRAMS

Our undergraduate teaching programs now consist of the following tracks:

- Environmental Soil Science
- Environmental Water Science
- Environmental Management and Policy

All three tracks are designed to give the student a strong background in Soil, Water, and Environmental Sciences with excellent employment opportunities with state, federal, and private industry.

For additional information, contact our Undergraduate Coordinator: D. A. Graetz (dag@mail.ifas.ufl.edu).

GRADUATE PROGRAMS

Graduate programs are designed for students seeking careers in soil, water and environmental sciences science related to agriculture and natural resource management. Our graduate teaching programs now consist of the following tracks:

Soil Science: Graduate students in this track can formulate their course work to focus on sustainable production of agronomic, turf, silviculture, and ornamental crops, with a good background in traditional soil science. This program is designed for students with a strong interest in agricultural sciences, as related to sustainable productivity and water quality.

Environmental Science: Graduate students in this track can formulate their course work to focus on environmental science. This program is designed for students with strong interest in non-traditional soil science, as related to surface and groundwater quality.

Water Science: Graduate students in this track can formulate their course work to focus on water science, with an emphasis on wetlands and aquatic systems. This program is designed for students with a strong interest in water science.

For additional information, contact our Graduate Coordinator: N. B. Comerford (nbc@mail.ifas.ufl.edu)

ANNOUNCING New Distance Education Graduate Program

The SWSD now offers a Master of Science (non-thesis or thesis option) degree with ***Environmental Science*** track via distance education to accommodate students interested in environmental issues related to soil and water quality of agricultural lands, forested lands, range lands, urban lands, or wetlands. The program is open to all prospective students, and is specially designed for place-bound students who are currently employed full-time by state and federal agencies and private industry. **This new program is scheduled to begin in Fall 2002.**

For additional information, contact our Distance Education Coordinator: D. M. Sylvia (dmsylvia@ufl.edu)

Interdisciplinary Concentration in Geographic Information Systems (ICGIS)

The Soil and Water Science Department now participates in the **Interdisciplinary Concentration in Geographic Information Systems (ICGIS)**. Assistant Professor **S. Grunwald** is appointed as the SWSD representative to ICGIS. The goal of ICGIS is to integrate existing GIS resources on campus, through establishment of a standard set of courses and activities that will allow graduate students to obtain standardized training on the use of geographic information systems (GIS). Graduate students interested in developing this specialization as a part of their MS and PhD programs can obtain additional information at http://web.uflib.ufle.du/ icgis/ or contact S. Grunwald (sgrunwald@mail.ifas.ufl.edu).

Research

3D Reconstruction and Visualization of Soil-Landscapes

Commonly, crisp 2D soil polygon maps and associated attribute tables utilizing geographic information systems (GIS) are used to describe the spatial distribution of soils (e.g. SSURGO and STATSGO). Other soil-landscape representations use a 2½-D design, where soil or land use data are draped over a digital elevation model (DEM) to produce a 3D view. Since this technique describes patterns on 2D landscape surfaces rather than the spatial distribution of subsurface attributes (e.g., soil texture, soil horizons) it fails to address three-dimensional soil-landscape reality.

In the recently formed research program 'GIS and Land Resources' at the Soil and Water Science Department led by Assistant Professor **Sabine Grunwald** we integrate soil observations with emerging technologies to create holistic, object-oriented, multi-dimensional soil landscape models. We employ geostatistics to create continuous 3D soil-landscape models and scientific visualization to render and display models at a variety of different scales. These models enable us to comprehend soil-landscapes intuitively and gain insight into complex environmental systems. Spatial pattern analysis facilitates to quantify and analyze soil and landscape patterns.

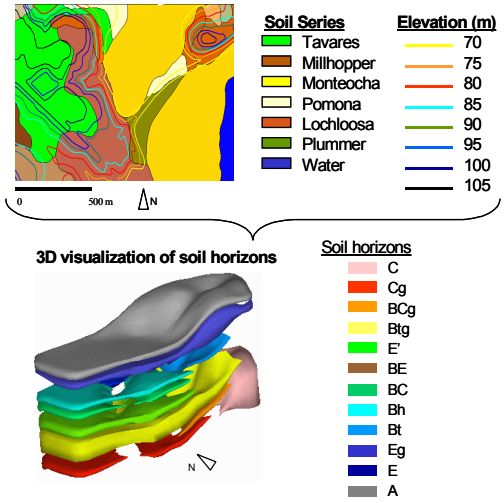

Fig. 1 3D soil-landscape model showing the spatial distribution of soil horizons for a study site in Alachua County, Florida. SSURGO data 5-foot topographic contour lines were used to create models.

In the thrust area 'soil-landscape analysis' we address such questions as: Are soil patterns related to geographic position (x, y) and depth (z)? What is the spatial orientation and arrangement of soil patterns in 3D geographic space? Do patterns change across scales? Are patterns related to each other or other factors (e.g. topography)? Which are the underlying processes forming these patterns? For additional information contact S. Grunwald (sgrunwald@mail.ifas.ufl.edu).

3D Soil Modeling using Ground-Penetrating Radar, Global Positioning Systems, and Geographic Information Systems

Ground-Penetrating Radar (GPR) has proven to be an efficient, non-invasive, timesaving tool used to identify subsurface features. Within the state of Florida, GPR has been used to accurately identify sinkholes, solution pipes, Ocala limestone, and Hawthorn Clay. In addition, spodic and argillic horizons are also easily identified with GPR. Recently, georeferenced soil and geologic information, an example of Geographic Information Systems (GIS) data, has been in high demand, and proved incredibly useful. **Michael Tischler**, **Mary Collins**, **Sabine Grunwald**, and **Michael Binford** are producing a 3-dimensional soil model that can be combined with previous GIS data to allow for more powerful analysis of subsurface activity. The soil information is being gathered using GPR at the IFAS Plant Science Research and Education Unit at Pine Acres in Marion County, FL. The Hawthorn formation is very evident at this location, and is providing a dynamic soil model. An accurate 3-D model will be created using current interpolation and geostatistical techniques. This model is also being geographically referenced using a Global Positioning System (GPS) capable of recording a point on the earth within 1 meter. This project is the first time GPR, GPS, and GIS technologies will be used in combination to allow analysis of a site without penetrating the soil surface. Furthermore, making such a model compatible with previous GIS data allows for comparative analysis regarding a number of issues. By making use of the 3-D model, several disciplines including Agronomy, Agricultural Engineering, Animal Science, and Horticulture and Education will benefit by having the opportunity to make wiser experimental design decisions. For additional information contact M. Collins (mec@gnv.ifas.ufl.edu).

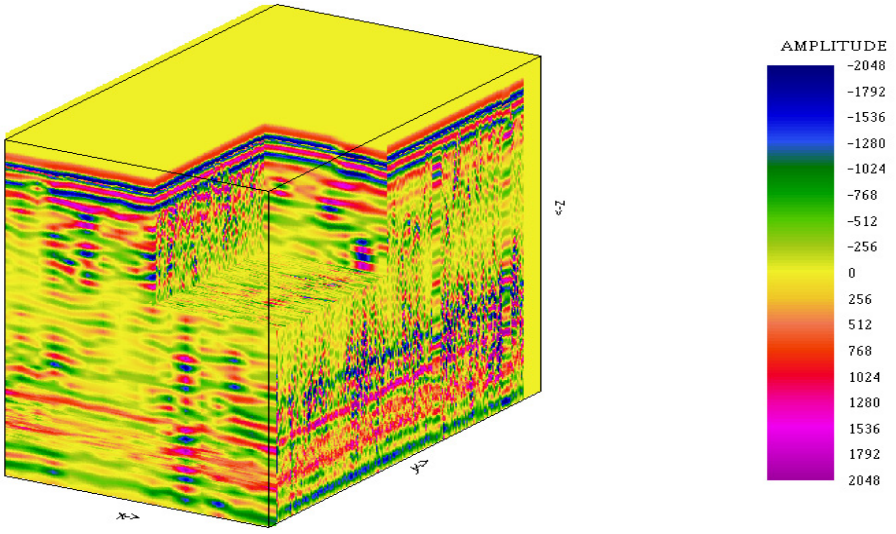

Figure 1 - 3D Model of 17 GPR transects collected at Manatee Springs State Park

Extension

The First Annual Soil and Water Science Institute: PRINCIPLES OF ARSENIC BEHAVIOR IN FLORIDA'S SOILS
March 4 - 5, 2002, Gainesville, Florida
University of Florida – Double Tree Hotel and Conference Center

For Details contact: **Randy Brown** -- Institute Organizer, SWSD, University of Florida, Box 110510, Gainesville, FL 32611, Ph: 352-392-1803 x344; Fax 352-392-3399 Email: rbb@mail.ifas.ufl.edu

Registration Information: http://soils.ifas.ufl.edu/institute

International Activities

The Soil and Water Science Department hosted five trainees from the Indian Council of Forestry Research and Education for two weeks in October 2001. The scientists had the opportunity to familiarize themselves with the various thrust areas within the department. Their training was primarily on the environmental impacts of nutrient additions to agricultural soils, and included soil analytical procedures and instrumental analyses.

Upcoming Conference

The Soil & Water Science Department will be hosting the "**2002 Southern Soil Fertility Conference**" to be held in Memphis, Tennessee in October. Rao Mylavarapu has been nominated to be Chair of the program committee that will organize sessions and coordinate publication of the proceedings. This is an annual event attended by 14 southern states, agriculture and fertilizer industry, and crop professionals. This conference is also sponsored by the Samuel Roberts Noble Foundation, Oklahoma.

FACULTY and STAFF

Mary Collins, professor in environmental pedology, was appointed as Division 1 (Soil in Space and Time) Secretary of the International Union of Soil Science.

Samira Daroub, assistant professor at the Everglades Research and Education Center, has assumed the responsibilities of project leader for the Water Resources Group. She now coordinates the project which develops and implements Best Management Practices (BMPs) for the Everglades Agricultural Area (EAA). Funding for this project is provided by the EAA Everglades Protection District (EPD) and the State of Florida Department of Environmental Protection (FDEP).

Lena Ma, associate professor, received the Discovery 2001 Award from Discovery Networks Europe and Royal Geographical for discovering *the first known* arsenic hyperaccumulating plant. The discovery was recently published in *Nature* (Ma et al., 409:579) and has received much publicity worldwide. Dr. Ma won this award in the 'Discovery of the Year' category, recognizing new scientific discoveries relating to our environment, culture and society. The award confers not only prestige but also £5000 towards her research program.

P.S.C. Rao, emeritus graduate research professor (currently Lee A. Rieth Distinguished Professor of Environmental Engineering at Purdue University) was recognized as highly cited researcher (one of the 500 out of 5 million researchers) by the Institute for the Scientific Information. His highly cited research was conducted during his tenure at the University of Florida.

K. Ramesh Reddy was elected as 2002 Fellow of the American Association for the Advancement of Science.

Bill Reve, Chemist, has been selected to receive the 2001 SWS Superior Accomplishment Award.

Donor Gifts

Financial support provided by friends, alumni, and clientele are critical to maintain excellence in our programs. Many thanks to the following who made financial contributions to SWSD unrestricted fund and faculty research programs: **Randy and Pia Brown; Luther Hammond; Ralph Smalley; John Nicholaides III; Blasland, Bouck, & Lee Inc.; DB Environmental Labs; Fertilizer Institute;** and **anonymous monthly donor dept. USPS**