



1. From the Chair

Dear Pedometricians!

This issue of Pedometron is for a large part dedicated to the successful Pedometrics '05 Meeting that we had in Naples, Florida, last September. Sabine looks back and presents some nice pictures (it was hot – I can still remember my sunburn!), Brenton presents a student perspective and Tomislav shares his reflections with us in a way that only he can do.

We should not only look back but also look forward. In July there will be the second Digital Soil Mapping workshop, this time in Rio de Janeiro. It will be immediately followed by the 16th World Congress of Soil Science in Philadelphia. At the WCSS, we have two oral symposia, one poster theatre symposium and two regular poster symposia. In Philadelphia, also the new chair and vice-chair of our commission will be installed. At this point in time it is not yet clear who this will be. The IUSS elections are under way, I guess that you know about this from your national soil science society. Unfortunately, a mistake (not ours!) was made in listing the candidates for our commission. The names of candidates were mixed up, and two candidates were omitted from the list altogether. When we noticed this it was too late to be repaired, and so in agreement with the IUSS it was decided that the election would be run as is, next let all chosen candidates for our commission resign, and start a new

election, this time only for our commission. This will all take place in the next couple of months, so please pay attention and cast your vote (again!) when the time is there (we will send out a message).

Behind the scenes Achim Dobermann has been very busy with taking the initiative to organise a Pedometrics meeting in China. We have always felt and still feel that Pedometrics deserves more attention in Asia. Achim has contacted several key scientists from China and they already prepared a solid conference proposal. I am very confident that we will have our first Asian Pedometrics meeting in 2007. Of course in 2007 we will also have our regular Pedometrics Symposium in Tuebingen, Germany, organised by Thorsten Behrens. In order not to have the two meetings interfere too much we aim to have these organised in different parts of the year. Also, the Asia meeting will be more focussed on introducing Pedometrics by means of examples and tutorials, whereas the regular Pedometrics meeting aims at cutting-edge pedometrics research (with applications!).

There is much more that we are working on. The new pedometrics website will soon be launched, providing many interactive facilities, among others a discussion list. One other development is that we wish to establish yet another Pedometrics prize, to be presented at each World Congress (starting in Philadelphia). But I should not say more about this now, because it is a very fresh idea, the details of which are currently being worked out.

I hope to see you in Rio or Philadelphia!
Gerard

2. Pedometrics 2005 Meeting

2.a Summary

The Biannual Meeting of Commission 1.5 Pedometrics - the Pedometrics 2005 Meeting - took place September 12-14, 2005 in Naples, Florida, USA.

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The Senior Vice President for Agriculture and Natural Resources at the University of Florida, Jimmy Cheek, opened the meeting with a talk on land resource and water quality problems in Florida and elsewhere emphasizing the need for development and implementation of innovative digital soil mapping techniques.

The keynote speakers Harold van Es, Professor in the Department of Crop and Soil Sciences at Cornell University, USA; Marc Van Meirvenne, Professor in the Dept. Soil Management and Soil Care, Faculty of Bioscience Engineering, Ghent University, Belgium; and Jay Bell, Professor in the Department of Soil, Water, and Climate at the University of Minnesota, USA gave talks on "Spatially-Balanced Experimental Designs for Field Experiments", "Pedometrics in Transition: From too few to too many Data?", and "Dynamic Soil Mapping: Adding the Temporal Dimension". All keynote talks stimulated discussion on critical topics related to pedometrics.

A total of 36 oral and 16 poster papers were presented on topics as diverse as digital soil mapping, geostatistics, visible/near/mid-infrared diffuse reflectance spectroscopy, and soil and remote sensor applications. A complete list of paper abstracts is available at: <http://conference.ifas.ufl.edu/pedometrics/Abstract%20Book.pdf>

I like to thank Sharon Borneman, Office of Conferences & Institutes University of Florida / IFAS and support team for her professional organization of the meeting as well as David Brown (Montana State University, Bozeman) and Fred McClure (North Carolina State University, Raleigh, NC) to teach the pre-conference workshop on "Quantitative Visible and Near-Infrared Diffuse Reflectance Spectroscopy for Soil Characterization".

The post-conference tour into the Greater Everglades was lead by Mark Clark, Soil and Water Science Department, University of Florida. Tour stops included the Fakahatchee Strand State Preserve, an airboat tour, and Shark Valley Everglades National Park. Besides mosquito, participants enjoyed the pleasant Florida September heat and sun.

Thanks to all participants that attended the conference. I had a wonderful time with all of you.

Sabine



Fig. 1. Pre-conference workshop participants.



Fig. 2. Participants - Pedometrics 2005 meeting in Naples, Florida.



Fig. 3. Farewell to Jaap - a long, successful career in pedometrics.



Fig. 4. Pedometrics conference, Naples, Florida, 2005.



Fig. 5. Poster session - Pedometrics 2005 meeting.



Fig. 6. Brent Myers ranked first in the student award competition.



Fig. 7. Mapping of wetland soils - post-conference tour, Greater Everglades.



Fig. 8. On tour in the Florida Everglades.

2. Pedometrics 2005 Meeting

2.b by Brent Myers - a Student's Perspective

Sometime, somehow, in 2003 I came across the Pedometrics website and read a copy of this newsletter. As I looked through the content of the website, well summarized by the Venn diagram foremost on the home page, I saw the natural intersection of GIS science, statistics, and soil science that is Pedometrics. I said to myself, "Wow! I'm right there in the middle, where everything intersects! This is the group for me!" I began planning for my trip to the Naples conference in 2005.

So, I submitted my abstract and was delighted to receive acceptance for an oral presentation. As part of this process I received the advance list of presenters, along with their abstracts. I investigated this list of who's-who in Pedometrics, reading papers and

examining their research interests. It was at this point that I realized who I had signed on with – a remarkably accomplished and technically masterful group of scientists and professionals. I read the abstracts and realized that the bar was to be set very high. I worked hard in the months prior to attending in order to increase the quality and utility of the work I brought to the conference.

Conferences fulfill many roles for the academician or the professional, among them are communication, networking, and education. The primary educational role of this conference was, for me, the pre-conference workshop on VNIR diffuse reflectance spectroscopy. It was a great opportunity to study with some of the leading scientists in the field (including some of the students). The material was a very good balance of basic theory and state of the art methodology. One of the greatest benefits of attending was the extended time to interact with colleagues and develop personal relationships. My advisors allowed me to include this workshop, with the addition of some analysis and presentation, into my degree program and so it has provided twice the educational opportunity it was designed for.

Smaller conferences such as this one are more effective for communication and networking. In the first place, the subject matter is more focused and communication via oral and poster papers is concentrated. Nearly every paper captured my interest or related important facts about the work and goals of the wider pedometrics community - the speakers, their colleagues, and their institutes. The networking role of this conference was also enhanced by its size. At a large conference there may be only one opportunity to interact with another person with shared interests. This conference, where everyone was present at every session, allowed many more opportunities to talk, ask questions, and even to develop friendships.

The balance of theoretical and applied Pedometrics research was excellent. To be honest, much of the theoretical work was very challenging to understand, but offered clear perspective on where I need to improve. The applied works inspired many ideas for my own research. All three keynote addresses were critical for my conference experience. They brought important theoretical ideas forward in an understandable and practical format. The addresses by Marc Van Meirvenne and Harold Van Es make me feel right at home with their focus on agriculture, and the geomorphology aspects of Jay Bell's address were directly applicable to my own research. The straightforward approachability of these talks placed theory in context and put me in the right frame of mind to handle some of the more challenging theoretical works that were presented by others.

In closing, this conference exceeded all others I have attended in fulfilling my needs for education, communication, and networking. It also went beyond these in providing me a vision for the future, based on the excellent group of people and work it assembled. Personal and professional development requires ever higher expectations of performance, contribution, and effectiveness. From this student's perspective, the Naples conference was a clear opportunity for resetting expectations of personal achievement.

2. Pedometrics 2005 Meeting

2.c by Tomislav Hengl "Reflections on Pedometrics 2005" - a Scientist's Perspective



Pedometrics 2005 was the third (pure) pedometrics meeting that I attended in the past six years. Looking back to 2001, many things have changed. Here, I primarily think about the promotion of Pedometrics within the big pool of soil sciences and its recognition among other geo- and environmental sciences. It seems that our research group is one of the most ambitious and most productive research groups within the IUSS, but we are obviously not objective enough to judge that. The meeting in Florida also showed that Pedometrics has much to offer and that it gathers some of the finest (geo)statisticians, soil scientists and researchers in general.



Photo: The discussion is warming up.

This brings me to the hottest topics of Pedometrics 2005. Although it is not easy to group and sort various conference presentations and topics, I think that there were (at least three) groups of topics in Naples that seem to be especially hot. These are:

- **Using new field-gadgets to automate soil profile description/sampling.** This includes use of proximal VNIR reflectometers and EM conductivity meters. Raphael Viscarra-Rossel investigated the prediction of various chemical and physical soil properties without doing any laboratory analyses. Fouad and colleagues reported about their spectral reflectance results to map soil organic carbon. Use of advance soil scanners has been a prominent research topic especially in the USA, as was shown by Brown, Morgan and others. We can certainly expect a revolution of soil scanning applications in the near future, as soon as the price of the equipment goes down.
- **Developing smart and operational techniques to organize soil sampling**, such that also information on correlated environmental variables is included in the development of sampling designs. Brus and colleagues suggested use of simulated annealing to minimize the Universal Kriging variance. McBratney and Minasny suggested random catena sampling, where multiple lines are placed over a landscape in the direction of steepest descent. Zhu talked about challenges for purposive soil sampling. Marchant and Lark tested use of adaptive sampling techniques where the sampling is optimized in several steps.
- **Developing methods to deal with (analyze, simulate, interpolate) categorical soil variables.** Lark demonstrated how to apply wavelet analysis to categorical variables. Heuvelink and Brus tested the use of Markov Random Fields to simulate uncertainty in

categorical maps. Use of Markov chains was further elaborated by Li and Zhang. Hengl and colleagues compared methods to interpolate categorical variables from an existing soil survey. I should also mention the work of MacMillan, who was one of the rear participants that actually makes a (financial) profit of combining pedometrical tools (terrain parameterization) with traditional knowledge of soils.

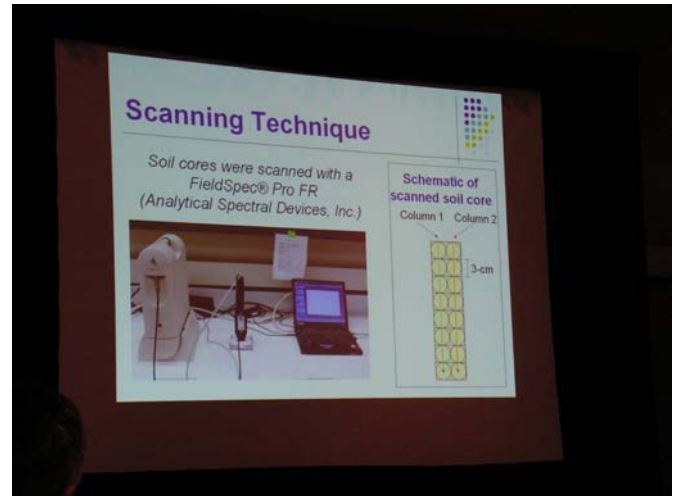


Photo: Soil profile scanners – who needs soil laboratories any more?

I was especially surprised with the interest of pedometricians in conventional soil survey data, which after all is based on subjective interpretations. However, when I think about it, doing texture by feel analysis can be very cheap, fast and in many practical cases it will be sufficiently accurate. So why waste money on expensive laboratory analyses? The only (technical) issue is how to manipulate such data statistically, so that we can get the best out of it and interpret the data adequately. The problem of combining pedometric techniques and traditional knowledge will be addressed more and more in future it seems, and the conflict that is sometimes felt between the traditional (soil survey) and new (pedometric) approaches will hopefully fade away.

For me personally, the five most interesting talks, considering the amount of creativity, were those by Jay Bell (Dynamic soil mapping: adding the temporal dimension), Alex McBratney (Random catena sampling), Heuvelink (Modelling uncertain categorical soil maps using Markov Random Fields), MacMillan (Automated mapping of landforms) and Van Meirvenne (Pedometrics in transition). These covered definitively materials that we should dig into more deeply. Of course, everybody is biased towards their own personal preference, so it is really hard to say which talk is the one that we will all remember. I am sure that I will definitively remember the last talk of the second

day on Digital Agroecosystem Mapping by Chevalier, which was for practical reasons given by Alex McBratney, but the discussion continued in French. Sometimes the most amusing talks can happen when you least expect it.

At every meeting that I attend, I usually also try to make a list of the most remarkable sentences (usually formed completely spontaneously). It would be a real pity if these would be forgotten. These are my top five quotations of Pedometrics 2005:

- "Soil science always has to borrow things from other big scientific fields, which is good. But we should really hope that other fields will one day learn something from soil science. This would be a great day for soil science." Harold van Es when talking about the future of soil science.
- "This talk I should have given 10 years ago, but somehow it got lost." Alex McBratney when introducing his talk on optimizing soil spatial prediction models and implementing them in practice.
- "I'm very excited." Gerard Heuvelink when speaking about the possibilities of using Markov random fields to simulate uncertainty in categorical soil maps.
- "Downscaling? Whatever that is." Alex McBratney when suggesting to avoid use of term "downscaling" and to instead use "disaggregation".
- "DSM has already exceeded its parents." Alex McBratney when addressing the rapid development of the Digital Soil Mapping Working Group.



Photo: C. Walter, R. Viscarra-Rossel and A. McBratney receive the best PM paper award for the year 2003.

Pedometrics – Quo vadis?

Apart from changes in the formal status of Pedometrics (upgrade from a Working Group to a IUSS Commission in 2004), I also asked myself during the Naples meeting – how much did the content of the Pedometrics meetings change in its essence? Am I seeing the same old people and same old presentations (old wine in new bottles) or is there real development? Is pedometrics maybe in a crisis and do we need some restructuring or redesign? I dug into some old materials and entered titles of presentations of the last three PM conferences for a limited number of prominent pedometricians (I hope nobody will get offended if he/she does not find him/herself on the list. I based it on the best PM paper award nominations in the recent past), to see how much PM evolved and in which direction it is developing. The comparison is available in the table down-below:

	Ghent 2001	Reading 2003	Naples 2005
Brus	-	Uncertain soil quality standards for heavy metals in soil	Optimization of sample locations for Universal Kriging of environmental variables
Goovaerts	Assessment of the production and economic risks of site-specific liming using geostatistical uncertainty modelling	Selective remediation of contaminated sites using a two-level multiphase strategy and geostatistics	Exploring the Spatial Non-stationarity of Relationships among Soil Properties Using Geographically-weighted Regression
Grunwald	-	Spatial methods for assessing the distribution of and impact of soil phosphorous	Independent Validation of Soil Predictions - The Act of Testing the Truth?
Heuvelink	Is there anything wrong with the ordinary kriging variance?	Spatio-temporal prediction of soil redistribution using the Kalman smoother	Modeling Uncertain Categorical Soil Maps Using a Markov Random Field Approach
Lark	Analysing complex variation of soil using an adapted maximal overlap	Using the wavelet transform to analyse spatial variation of gaseous	Wavelet Analysis of Categorical Soil Variables, Some Approaches Based on

	discrete wavelet transform	fluxes	Indicators
McBratney	-	(1) Multivariate indices of soil heterogeneity estimated from topsoil reflectance spectra (2) Modelling global soil variation	Random Catena Sampling: for Establishing Soil-landscape Rules for Digital Soil Mapping
Minasny	(1) Pedogenetic systematics (2) FuzME A computer program for fuzzy k means analysis	(1) On the stability of the fuzzy k-means solution (2) Modelling soil profile evolution (3) Uncertainty analysis of digital terrain modelling	Spatial Prediction Using BLUP with Matérn Covariance Function
Odeh	On soil carbon stock and its dynamics in the lower Namoi cotton-growing region of NSW, Australia	(1) Modelling the risk of soil degradation: multiple indicator approach to mapping the potential for soil sodification (2) Spatio-temporal modelling: application to potential acidification	-
Van Meirvenne	Kriging soil texture under different forms of non-stationarity	-	Pedometrics in Transition: From Too Few to Too Many Data?
Zhu	-	Assisting the development of a soil-landscape model for predictive mapping using fuzzy c-means classification	Purposive Sampling for Soil Mapping: Successes and Challenges

maybe a decade or even more (apart from Budiman Minasny, who always has at least two new topics for every meeting!). Are we slowly repeating ourselves? I think that PM has still a lot to offer but we should really think of some redesigning, especially of the organization of the meetings.

This brings me to the organizational issues of the PM meeting in Naples. To make an objective evaluation of how well the conference was organized is not an easy task, especially if you have a paper submitted to the special issue of the conference (!). But for some reason, Gerard thinks that I can do a good job as long as I am constructive and give enough technical details, and that such reports can really help organizers of future meetings and events. So I will do the unpopular job now and give some pluses (smileys) and minuses to the meeting in pedometrics 2005 conference organizers (P.S.: I will never be 100% happy with any conference; that is for sure):

☺	☹
All facilities were excellent. Organizers provided internet access, room for meetings, special room for poster presentations and all other facilities important to get successful presentations.	The discussion during the conference was too unorganized and too unstructured. The conference organizers or session chairs could have prepared points to be discussed or engage participants to lead the discussions and report on the summary points.
There was a large number of assistant staff around that always provided useful information and help when needed.	The conference was rather selective considering the costs of accommodation and conference fees (pedometricians are not lawyers or businessmen). Definitely the pricing was much above the previous two conferences in Reading and in Ghent.
Organizers made an excellent choice of keynote speakers. Although there was a domination by speakers from the host country, the presentations were well prepared and very interesting.	The conference room was somewhat less functional and fairly claustrophobic. I personally prefer the amphitheatre-type of conference rooms because of better acoustics and shorter distance between the presenters and participants.
There were several pre- and post-conference events including a guided field tour to the Everglades national park.	The conference was dislocated from the University. It was unfortunate to participate in a conference organized by such a respected university and not have a good chance to visit it.

Certainly, PM has a constant group of 'fans' and many of them have been struggling with similar topics for



Photo: The Everglades tour.

Following up some of my points above, I will try to give some suggestions to the organizers of future pedometrics-related conferences (Germany, China):

1. **The price for registration/accommodation should be more affordable** to all, and especially to PhD students. Pedometrics 2005 offered a 100 USD discount to PhD students. I think that the discount should be higher. In the ideal case, PhD students and junior researchers should occupy at least one third of the chairs in the conference room. We need to attract more new members and motivate them to follow our meetings.
2. **The conference needs to become more interactive and more focused**, with more discussions and longer presentations. You might not agree with me, but I feel that we could all profit if the conference would be split into two parts: (a) in the first part, each oral presenter would give a quick 10-minutes overview of her/his work, without questions or discussion; (b) in the second part, the participants would split in 4-5 thematic groups where a limited number of presenters would give extensive presentations of 45-60 minutes. The participants can select a thematic group prior to the conference. In fact, I think that anybody registered should be able to suggest a session. Eventually, the program would be formed on the most voted sessions. The ones that do not attract enough participants would be cancelled or merged. Splitting the conference into parallel sessions would have many benefits. First, we would have much more time for interactive presentation. Second, the presenters would get a chance to actually demonstrate data processing in detail and provide some quick training to the use of software and tools. I would also expect that

sessions of 10-20 people would encourage closer and more in-depth communication between participants.

3. The organizers should definitely also consider **engaging a limited number of volunteers to report on the activities within each session** – *Nulla dies sine linea* (the famous motto of the Greek painter Apeles). I often feel sorry that there are not many written records on the interesting discussions and suggestions that were posed by various participants. The compiled report could be distributed to all participants and published in a research journal or at least in our newsletter (pedometron). In that sense, pedometrics can really learn from the organizers of the digital soil mapping workshop in Montpellier.
4. We might also consider doing some **social activity such as slide shows** (field works, previous conferences, other meetings etc), **a quiz or similar type of social game** in the evening hours of the conference. This would strengthen the feeling of participants to be part of a group.

You are welcome to contribute to these ideas. The new interactive Pedometrics.org website that should be launched somewhere in March/April (we are working on it!), should provide an excellent platform for such discussion.

Tomislav Hengl

3. Student Awards

Congratulations to the following students winning awards for their papers presented at the Pedometrics 2005 meeting:

D. Brenton Myers, Newell R. Kitchen, Kenneth A. Sudduth, and E. John Sadler "Landscape Models of Claypan Soil Profile Properties as a Function of Divergence from Clay-Maximum Depth".

Sanjay Lamsal, Sabine Grunwald, Greg L. Bruland, Christine M. Bliss and Nicholas B. Comerford "Modeling of Regional Soil Nitrate-Nitrogen Patterns Using a Mixed Geospatial Modeling Approach".

Rosanna G. Rivero, Sabine Grunwald, Susan Newman, Todd Z. Osborne and K. Ramesh Reddy "Incorporation of ASTER Satellite Imagery into Multi-Variate Geostatistical Models to Predict Soil Phosphorus".

4. Best Paper Awards

During the Pedometrics meeting in Naples, participants were asked to vote for the best paper awards of 2003 and 2004. The five nominated papers for 2003 had been nominated by Peter Finke, those for 2004 by Neil McKenzie. After counting the votes, the winners were:

Award 2003

Walter, C., R.A. Viscarra Rossel and A.B. McBratney, 2003. Spatio-temporal simulation of the field-scale evolution of organic carbon over the landscape. *Soil Sci. Soc. Am. J.* 67, 1477–1486.

Award 2004

Finke, P.A., D.J. Brus, M.F.P. Bierkens, T. Hoogland, M. Knotters and F. de Vries, 2004. Mapping groundwater dynamics using multiple sources of exhaustive high resolution data. *Geoderma* 123, 23–39.

Congratulations to the authors for winning such a prestigious prize!

5. Open Letter - Digital Soil Mapping (DSM) Working Group

by Ronald Vargas Rojas – Aerospace Survey Centre (CLAS) San Simon University, Bolivia

The proposal of the Digital Soil Mapping Working Group inspired me to share with you information about soil mapping and training programs in Bolivia. For a long time conventional soil surveying methods have been used in Bolivia to generate soil data; most of them are still qualitative. Few changes were adopted including the use of geographic information systems (GIS), remote sensing and global positioning systems (GPS). But still the concept of soils being a discrete body is predominant.

In Bolivia there are public Agricultural Faculties where soil science is taught in traditional fashion focused on pedological field training. Only few students have the opportunity to learn about GIS and modern digital soil mapping techniques. Most soil science instructors are less inclined to change existing curricula and training.

At the postgraduate level, there is only one university who deals with soils, especially soil geo-information systems. This program is offered at the CLAS centre of the San Simon University formerly developed by ITC as regional centre for Latin America. The one year program is focused on the use of geo-

information tools like GIS, remote sensing, and GPS for studying and developing soil information systems. But still, the main focus is on training in conventional soil mapping techniques established at ITC.

Since 2004, young soil scientists working at CLAS have taken on the challenge to include Pedometrics into the curricula. This has been very difficult for us, because of instructor's lack of expertise in pedometrics. Thus, Internet-based training material and resources along with reading material are utilized in a learning environment that is focused on self-studying. The incorporation of digital soil mapping tools and techniques into thesis projects is a good start to gain more knowledge on digital soil mapping techniques. Since the application of advanced pedometrics methods require familiarity with basic, state-of-the-art quantitative methods this undertaking has been challenging.

The DSM working group pointed out that "it is timely to develop and implement methodologies for the provision of quantitative spatial information". Numerous articles around the world have been published that focused on specialized and a variety of pedometrics tools and applications. But I think that it is time to focus on the development of standard methodologies and tools for the most common applications (e.g. precision agriculture, land use planning), with the goal to produce high-quality products at low cost within a short amount of time (a really difficult task).

I like to encourage the Pedometrics Commission and associated working groups to foster the distribution of DSM technologies and share knowledge around the world; in particular at places where the training and research capacity in DSM is weak. One suggestion is to offer low-cost online/distance education courses on pedometrics and digital soil mapping techniques. One other suggestion would be to select landscapes in various developing countries and team-up with northern universities and pedometricians to jointly employ pedometrics tools and techniques. There is much interesting terrain, dense forests, and landscapes to discover in developing countries such as Bolivia. At the same time individual and institutional capacity building in those countries would facilitate to become integral part of the pedometrics community.

Perhaps I'm very ambitious in writing this or only a young dreaming soil scientist. However this is my way of looking at such a challenging discipline. Your comments are welcome!

Ronald

Response by Sabine:

The University of Florida (UF) offers a Distance Education Graduate Track (M.S.) in Environmental Science that includes courses in GIS in Land Resource Management; Environmental Pedology; Environmental Soil, Water and Landuse; and many more. Information about the program can be found at:

<http://soils.ifas.ufl.edu/distance/>

Contact: Sabine Grunwald, Assistant Professor and Distance Education Coordinator
<sgrunwald@ifas.ufl.edu>

Details about international training and capacity building programs facilitated by the International Programs Office, Institute of Food and Agriculture Science (IFAS), UF can be found at:

<http://international.ifas.ufl.edu/>

Contact: Lisette Staal, Assistant Director, UF/IFAS International Programs <lms@ifas.ufl.edu> and

international distance education programs at:

<http://international.ifas.ufl.edu/distanceeducation.html>

Information about a pilot project "Strengthening Agricultural and Environmental Capacity through Distance Education" - a partnership between the University of Florida with African Universities and CGIAR Centers is available at:

<http://international.ifas.ufl.edu/distanceducation/SAECDEpilot.htm>. Cross-cultural collaborative programs at UF are also available for Latin American countries.

I encourage you to share any other international programs, activities, contacts, etc. that aim at bridging knowledge gaps in DSM to be included in the next pedometron newsletter.

6. Courses

Short Course "Geostatistical Analysis of Environmental Data"

When: March 13-17, 2006

Location: University of Florida, Gainesville, USA

Instructor: Dr. Pierre Goovaerts Courtesy Associate Professor Soil and Water Science Department, University of Florida; Chief Scientist for the R&D Company Biomedware, Inc, and runs his own consulting company, PGeostat, LLC.

Information about the Short Course and Registration is available at:

<http://conference.ifas.ufl.edu/soils/geostats/index.html>

Short Course "Introduction to the Bayesian Maximum Entropy Approach" that will take place at the Université de Liège, Belgium, on September 8-9, 2006, just after the IAMG'06 conference.

Details are available for the IAMG'06 conference web site at <http://www.geomac.ulg.ac.be/iamg06/> or the course web site at

<http://www.enge.ucl.ac.be/BMEcourse/>

Bayesian Maximum Entropy (BME) methods

The Bayesian Maximum Entropy (BME) methods are a set of statistical techniques which can rigorously and efficiently handle space/time mapping applications of considerable practical importance. BME, which belongs to the field of quantitative environmental applications, can integrate and process two major physical knowledge bases: general knowledge (i.e., obtained from general principles and laws, summary statistics, and background information) and specific knowledge (i.e., obtained through experience with the specific situation). BME allows considerable flexibility regarding the choice of an appropriate spatiotemporal map, offers a complete assessment of the mapping uncertainty, and contributes to the scientific understanding of the underlying natural phenomenon. Traditional geostatistical results are obtained as special cases of the BME approach. In addition, a more accurate and informative analysis is possible by incorporating various sources of physical knowledge that cannot be processed by traditional geostatistical methods.

7. Upcoming Meetings

2nd Global Workshop on Digital Soil Mapping DSM for Regions and Countries with Sparse Spatial Data Infrastructures

To be held by Embrapa Solos, Rio de Janeiro, Brazil, 4-7 July 2006 under the auspices of IUSS.

A workshop to review and discuss the state-of-the-art in spatial data infrastructures as well as the use and availability of soil data for digital soil mapping.

Contact: Dr. Maria de Lourdes Mendonça Santos:
loumendonca@cnpq.embrapa.br

http://www.digitalsoilmapping.org/DSM_2006_Brazil.html

World Congress of Soil Science (WCSS)

<http://www.18wcoss.org>

Philadelphia, Pennsylvania, USA, July 9-15, 2006.

Symposia (co)organized by the Pedometrics Commission:

- (1) Diffuse Reflectance Spectroscopy, Soil Sensing, Remote Sensing and Image Analysis
- (2) Soil Sampling in Space and Time
- (3) Interdependency of Soils and Soilscapes

IAMG "Quantitative Geology from Multiple Sources"

<http://www.geomac.ulg.ac.be/iamg06/>

in Liège, Belgium, September 3-8, 2006.

Abstracts due: February 1, 2006

Spatial Data Methods for Environmental and Ecological Processes

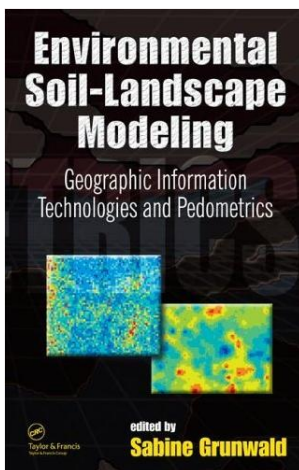
The Workshop is an interdisciplinary conference (with statisticians, agronomists, biologists, ecologists etc.) fostering the exchange of experience among researchers working on spatial problems and the use of spatial statistics in real world problems.

Foggia and Baia delle Zagare Hotel (FG), Puglia, Italy, on September 14-15, 2006

<http://www.unifg.it/spatial/>

8. Books

A new book "Environmental Soil-Landscape Modeling - Geographic Information Technologies and Pedometrics" (2005) edited by S. Grunwald (CRC Press) is available from CRC Press, New York (ISBN 0-8247-2389-9). It features 16 chapters on topics related to pedometrics including:



SECTION I

History and Trends in Soil-Landscape Modeling

Chapter 1

What Do We Really Know About the Space-Time Continuum of Soil Landscapes? by *Sabine Grunwald*

Chapter 2

Soil Survey and Soil Classification by *Richard W. Arnold*

Chapter 3

A Historical Perspective on Soil-Landscape Modeling by *David J. Brown*

Chapter 4

A Perspective on the Historical Development of Soil-Landscape Models by *Carolyn G. Olson*

SECTION II

Collection of Soil-Landscape Datasets

Chapter 5

The Impact of Emerging Geographic Information Technology on Soil-Landscape Modeling by *Sabine Grunwald and Sanjay Lamsal*

Chapter 6

Topographic Mapping by *Scot Smith*

SECTION III

Pedometrics

Chapter 7

Digital Soil-Terrain Modeling: The Predictive Potential and Uncertainty by *Thomas F.A. Bishop and Budiman Minasny*

Chapter 8

Fuzzy Logic Models by *A.-Xing Zhu*

Chapter 9

Modeling Spatial Variation of Soil as Random Functions by *Richard Webster and Margaret .A. Oliver*

Chapter 10

Stochastic Simulation of Soil Variations by *Jean-Paul Chilès and Denis Allard*

Chapter 11

Pedometrical Techniques for Soil Texture Mapping at Different Scales by *Marc van Meirvenne and Ingrid van Cleemput*

Chapter 12

Analysis of Complex Soil Variation Using Wavelets by *R.Murray Lark*

Chapter 13

Three-Dimensional Reconstruction and Scientific Visualization of Soil Landscapes by *Sabine Grunwald*

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On Spatial Lattice Modeling of Soil Properties by *Jun Zhu, Richard P. Wolkowski, Wei Yue, and Ruifeng Xu*

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Multiscale Soil-Landscape Process Modeling by *Jeroen M. Schoorl and A. Veldkamp*

Chapter 16

Space-Time Geostatistics by *Gerard B.M. Heuvelink and Judith J.J.C. Snepvangers*

Soil Atlas of Europe, by European Soil Bureau Network of the European Commission, 2005. Principal editors: A. Jones, L. Montanarella, and R. Jones. Office for Official Publications of the European Communities, Luxembourg. Hardbound, 128 pp. ISBN 92 894 8120. €25.¹

The first soil maps in Europe started to appear in the 1800s, and such maps were mostly produced for agricultural purposes or the taxation of rural lands and emphasized surface geology, the degree of weathering of the regolith (Stremme, 1997). The first generation maps produced by Stremme have a strong agro-geological base and were based on limited soil survey work (Table 1). The first soil maps stimulated soil survey and research in most European countries of which the fruits were harvested for the second generation of European soil maps (1965-1985). These developed in the heydays of soil survey and were based on hundreds of detailed national and regional maps. The second generation is now being replaced by a third generation of maps – digital soil maps in which full use is made of existing soil information with advancements in GIS, remote sensing and quick and accurate soil observations using a range of sensors. This first Soil Atlas of Europe has interesting sections on those third generation types of soil maps but is largely based on the second generation of maps.

The primary aim is to provide comprehensive information about the soils of Europe and raising awareness of issues affecting soils; it is part of the European Soil Thematic Strategy that was adopted by the European Union in 2002. Another goal of this atlas

¹ This is an abridged and altered version of a review that will appear in a forthcoming issue of the *Journal of Environmental Quality*

is to educate people about the important role of soils in a non-technical manner.

Table 1. Soil maps of Europe, their scale, number of legend units and map sheets

Year of publication	Map scale	Number of map units	Number of map sheets	Reference
1928	1:10 million	27	1	(Stremme, 1928)
1937	1:2.5 million	43	12	(Stremme, 1937)
1965	1:2.5 million	34	6	(FAO, 1965)
1981	1:5 million	>700	2	(FAO-Unesco, 1981)
1985	1:1 million	312	7	(Commission of the European Communities, 1985)
2005	1:1 to 1:6.5 million	163	17	This Soil Atlas of Europe (2005)

The atlas has 7 sections. In the introduction, some of the main soil properties, processes and land uses are described. Sections are devoted to the soil profile, horizon classification, soil variation, and soil forming processes. Two pages deal with “The soil in your garden” attempting to explain soils to non-soil specialists. There are also paragraphs on soils and agriculture, forestry, soils as a source of raw material, and soils and cultural heritage.

In the second section, the soil types of Europe are described following the World Reference Base (WRB) for soil resources. A brief introduction is given on soil classification and the WRB, followed by descriptions of the major soil types and their distribution across Europe. Seven of the 30 WRB soil types (reference groups) do not occur in Europe, like Ferralsols, Alisols and Lixisols. The soils with the largest extent are Albeluvisols that cover 15% of the European land mass; Podzols cover 14%, and Cambisols cover 12%. There are two pages on soil mapping and there is a paragraph on digital soil mapping. Two overview maps show the availability of soil maps at scales of 1:50,000 or 1:250,000 in Europe. It seems that large countries with large economies and populations (France, Germany, UK) not necessarily have good coverage of detailed soil maps. In fact, smaller and more densely populated countries have more detailed soil maps, or in other words: the smaller the country, the better the availability of detailed soil maps (with the exception of Denmark and Switzerland). There is an array of reasons, but in densely populated places there may have been a historical need to know the land as population pressure was higher. In bigger countries, the need for detailed spatial information about soil

resources might have been less pressing as land was amply available.

The third section provides 17 regional maps for the whole of Europe. It starts with an overview map at 1:11.25 million showing the soils in Europe including Turkey and Russia up to the Ural Mountains. The 17 regional maps (Lambert Azimuthal projection) are at scales ranging from 1:1.75 to 1:6.5 million; most maps are at a scale of 1:2 million. There is a nice text introduction to each regional map but the legend (suborder level) is given only once on pages 40 and 41. Major cities and highways are included which makes orientation easy. The soils and their distribution are based on early work; little new boundaries are present as compared to the 1985 map. Classification has been adjusted from the FAO-Unesco system to WRB.

In the next chapter, the soil types and distribution in Europe are compared to soils in other part of the world. According to this atlas, Europe covers about 5% of the global soils and an overview is given how soil distribution differs between different parts of the world. For example, Leptosols are the most dominant soils in the world, whereas they cover 9% of the European land mass. Ferralsols are dominant in South America whereas Arenosols are the most widespread in Africa. The 1:22 million soil map of Europe and Eurasia shows that the Ural Mountains act as a clear divide in soil distribution. Albeluvisols are dominant on the eastern part, and Histosols, Cryosols and Podzols occur at the same latitude east of the Ural. That is nice about maps - if you look longer you see more. There is a separate section on soils of the Mediterranean regions and soils in the Northern latitudes (with a little bit on global warming).

The next chapter deals with the European soil database and explains what GIS is and how the soil geographical database of Europe is constructed. The database consists of a soil geographical database, soil profile database, hydraulic properties database and the pedotransfer rule knowledge base. These are linked and the first step in the development of an integrated European soil information system. Using this integrated database, small maps are presented showing, for example, clay content in the topsoil, base saturation, or depth to bedrock. Soil erosion and potential N₂O maps as well as organic matter maps are shown and these are valuable for formulating policy at the EU level.

After that a section is devoted to the seven key threats to soils in Europe: soil sealing, erosion, loss of organic matter, decline in biodiversity, contamination, hydro-geological risks and salinisation. Except for the decline in biodiversity, contamination and salinisation, the other four threats have been fairly well mapped. The last chapter is called Additional Information and contains maps on rainfall, temperature, land cover, population density and a tiny section on soil education.

The atlas has no index; an atlas without an index is like the internet without a search engine. Somehow this atlas could have resembled the beautiful book "Australian Soils and Landscapes - An Illustrated Compendium" (McKenzie et al., 2004), but it doesn't. It lacks rigor (too many authors perhaps) and image and map quality are not quite comparable. Some subjects in relation to the soils of Europe are lacking or treated very briefly; for example there is nothing on the manure problem which occurs in some regions, on climate change that will affect the Mediterranean countries and that will also influence change land use in other parts of Europe. There is also nothing on soils and health, or soils and socio-economics. If this atlas were to live up its promises (raise awareness, didactic etc.) the section on soil education should have been larger.

In the coming decade, there will be considerable changes in the European landscape. Such changes will perhaps directly result from global warming, but more importantly: many farmers will retire or go out of business due to decreasing farm subsidies and increasing farm output in other parts of the world. Future soil maps of Europe will have to focus on changing land use whereby recreation, nature conservation and urbanization may become more extensive than agricultural land use. Despite some points of critique, I enjoyed reading this atlas and learned much about soil distribution in Europe. There is much information that should be read by pedometricians - the price (€25) is also very affordable, that always helps.

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9. Vacant Positions

Research in Modelling Soil Formation

Research work is available for a PhD graduate in Soil Science (pedometrics or related subject) in Modelling Soil formation in the Landscape at the University of Sydney. This will provide great research experience in Australia for up to 12 months. This project aims to develop a mechanistic model to simulate soil profile development in the landscape. Most quantitative pedogenesis model treat the soil as a profile with the processes of leaching, addition, and transformation of its constituents via chemical mass-balance at a short time scale (years to decades). Meanwhile models in geomorphology only consider the evolution of regolith as a whole from processes of erosion. This project attempts to link the soil forming processes spatially in a landscape.

Skills in soil science, modelling, computer programming, and pedometrics are essential. For more information, e-mail Prof. Alex McBratney (Alex.McBratney@acss.usyd.edu.au).

PhD Scholarships in Pedometrics – Sunny Sydney

Would you like to study for a PhD in beautiful Sydney? We are looking for highly-qualified and well-motivated individuals to do cutting-edge research projects in aspects of digital soil mapping or quantitative pedogenesis or other pedometric topics. The Scholarships are competitive. If you're interested email Alex. McBratney (Alex.Mcbratney@acss.usyd.edu.au) AND Budiman Minasny (budiman@acss.usyd.edu.au) [In case one of us is away]. We look forward to hearing from you. Let's grow pedometrics together!