



## 1. From the Chair

Dear Pedometricians!

It is five months since you last received a Pedometron. Let me assure you that a lot has happened in the meantime. It is high time that we brought you up to date.

To begin with, we have a new chair and secretary. At the World Soil Congress in Bangkok (September 2003) Pierre Goovaerts and I were elected as the new chair and secretary. Thus the Congress followed the recommendation by the Pedometrics Community, as expressed at the September 2002 Pedometrics Conference in Ghent. However, recently Pierre left the University of Michigan and took on a job in industry. Pierre felt

that in this new position it was not wise to stay chairman and so he decided to step down. With the help of former chair Marc van Meirvenne a solution was found: I would take over from Pierre and luckily Marc found Sabine Grunwald willing to become the new secretary. The procedure followed by Marc and its outcome was approved by the secretary general of the IUSS and the chairman of Division 1 (Soils in Space and Time). Given the circumstances, this was the most sensible way to operate. We do hope that you can accept it and are not too disappointed with the new chair.

Sabine presents herself elsewhere in this newsletter (please also visit her personal webpage: <http://grunwald.ifas.ufl.edu/>, it is exemplary and contains a lot of information, mine can be found at: <http://www.frw.uva.nl/soil/Welcome.html>).

I am sure that I speak on behalf of all of you when I express sincere thanks to Marc and Pierre for their important contribution to the Pedometrics Working Group. These are no empty words. These past years when they were in charge have been good. We have had many activities, many publications have come out, our members are active and enthusiastic, and what's more the IUSS appreciates it. Pedometrics as a discipline within Soil Science is prospering and maturing (one need only take a look at Figure 16 in Hartemink et al. (2001), *Geoderma* 100, pp. 217-268). Marc and Pierre did their work with great dedication and this reflected on all of us. Thank you!

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One of the activities that took the former chair a lot of time and that required tactful operation was our upgrade from a Working Group to a Commission. D-day in Bangkok! Elsewhere in this newsletter you will find a detailed report by Marc. Where are we now? We have made a lot of progress but are not there yet. The coming years will be important. Sabine and I will, with your help, develop and carry out a strategy that brings us to our goal.

There is much more that we want to take on the coming years. We need to update the list of members, let the soil science community know that we exist and what we stand for. We need to become more active in North and South America and in Asia. We need a central website (in fact we almost have it: page 7). We need to continue our recurring activities such as the selection of the Best Pedometrics Paper Award, the organisation of meetings and the publication of newsletters. These activities cannot be done by a few people only, we all need to contribute.

In my application letter to the Bangkok World Soil Congress I wrote “If elected I will dedicate myself to the job and do my best to not shed the confidence that is placed in me.” I am sure Sabine thinks the same way. Please remind us of it when necessary!

Gerard Heuvelink, Chairman

## 2 From the Previous Chair

Dear Pedometricians,

The past months have reshaped our Working Group on Pedometrics in such a way that I felt that it would be good to inform you personally, despite my previous good-bye in the last *Pedometer*.

First, the World Soil Congress of the IUSS in Bangkok, Thailand. A more detailed report on the events taking place at this congress is included elsewhere in this newsletter, but two important



The chairman takes the opportunity to make his son world-famous.



Pedometrics in Asia

points deserve our attention:

1. Our Working Group has changed to become a “Provisional Commission On Pedometrics”. Hopefully in two years time we can evolve further along this line into a Commission on Pedometrics.

At the business meeting of the Working Group on Pedometrics a new chair was elected: Pierre Goovaerts (The University of Michigan, USA) as chairman and Gerard Heuvelink (University of Amsterdam, The Netherlands) as secretary. However, more recently Pierre Goovaerts left the University of Michigan and is now working as a consultant. As Gerard already mentioned, Pierre decided that it would be better for somebody else to lead Pedometrics. I feel deep respect for his decision.

In November, at the Annual Meeting of the SSSA in Indianapolis, I contacted the newly elected secretary general of the IUSS, Stephen Northcliff, and consulted also with the chairman of Division 1, Ahmet Mermut. Both indicated the importance to have a new and well established chair quickly, given the transition status we are currently in. Consequently we were not in a position to call for candidates and organize a new vote, as in Bangkok. Therefore we proposed to Gerard Heuvelink to become chairman, as he was the only elected chairperson left. He agreed. Given the importance to have a US-based chairperson, we then asked Sabine Grunwald (The University of Florida, USA) to become Secretary. She also accepted this duty.

I am confident that with this change in chair the Provisional Commission on Pedometrics has a competent leadership ready to lead our group into the status of a Commission and stimulate good pedometrical research. I therefore congratulate Gerard and Sabine with their new function and I wish them all the best. They can count on my support whenever needed.

Kind regards,  
Marc Van Meirvenne,  
Former chairman of the WG-PM

### **3. The 17<sup>th</sup> World Soil Congress, Bangkok, Thailand - A ‘Provisional Commission on Pedometrics’!**

As reported before, the Working Group on Pedometrics (WG-PM) of the International Union of Soil Sciences (IUSS) aims at becoming a Commission on Pedometrics. Prior to the congress a formal request for this upgrading was mailed to the Secretary General of the IUSS, W. Blum (see Pedometron no. 12). At the Bangkok World Soil Congress, 14-21 August 2002, the council meeting of the IUSS discussed this point together with three more proposals for new commissions. It was decided that three of them, including the WG-PM, would be granted the status of a “provisional” commission to *‘smooth the transition towards a commission’* (quoted from the report on the council decisions by W. Blum during the closing session). However for the time being, we will continue operating under the by-laws of a working group. At the mid-congress council meeting of 2004 in Philadelphia, USA, our proposal will be considered again and based on a report of our past and planned activities, a final decision will be taken. Needless to indicate the importance of the coming years for the future Pedometrics within the IUSS.

So as from now we can call ourselves members of the “Provisional Commission on Pedometrics” under Division 1 ‘Soils in Space and Time’. The newly elected chairman of Division 1 is Ahmet Mermut of the University of Saskatchewan, Canada, who is the hierarchical supervisor of our provisional commission.

At the Bangkok congress, the Working Group on Pedometrics organized symposium 48: “Developments in soil data processing”. This included an oral session with 7 speakers and a poster session with 13 posters. The oral session was attended by some 85 to 100 people and the overall quality was of a high standard. The talks were diverse and the speakers came from a variety of geographical origins. A “best poster of

symposium 48” was selected by Chairatna Nilnond and myself. The winning poster was by Manfred Kaufmann & Tobias Silvia (Swiss Federal Institute of Technology) entitled “Soil quality evaluation with a fuzzy logic expert system”. The best posters of all symposia went into a second competition and the best poster of symposium 48 came out as one of the few ‘outstanding posters’ of the entire congress.

As required by the by-laws of the IUSS, a business meeting of the WG-PM was organized. At this meeting a report of the past activities of our working group was given, together with an overview of our plans for the near future. A formal vote (by a show of hands) of the new chair was held and Pierre Goovaerts (University of Michigan, USA) was elected as chairman and Gerard Heuvelink (University of Amsterdam, The Netherlands) as secretary.

Bangkok was hot, wet and extremely busy. Traffic was complete chaos with walking being a sweaty alternative. Nevertheless, the congress was perfectly organized and the venue offered everything such a huge congress requires. But most importantly, I returned home with the stimulating feeling that Pedometrics is receiving an increasing recognition within the IUSS and the Soil Science community in general.

Finally, I want to express a sincere “Thank you!” to all who supported Pedometrics in Bangkok. Up to Philadelphia in 2006!

Marc Van Meirvenne,  
Former chairman of the WG-PM

#### **4. Soil Landscape Modeling Symposium SSSA, Indianapolis, U.S.**

At this years Annual ASA-CSSA-SSSA (American Society of Agronomy – Crop Science Society of America – Soil Science Society of America) Meeting in Indianapolis, Indiana Nov. 10-14, 2002 the Soil Landscape Modeling

Symposium featured 24 oral and 10 poster presentations. The Symposium organized by Sabine Grunwald included a variety of different methods used to address the spatial variability of soil and landscape properties ranging from statistical and geostatistical methods, pedo-transfer functions, to wavelet analysis. One special session “3D Soils Unplugged” focused on emerging geographic information technology and 3D soil landscape applications. The Symposium was very well attended and provided a platform to discuss issues related to pedometrics, soil classification, and soil landscape modeling.

Thanks to all participants of this Symposium – You made it successful!

Sabine Grunwald, secretary

#### **5. The Dilemma of Pedometrics in the U.S.**

Discrepancies between spatial resolutions of below ground (soils) and above ground (topography, land cover, land use) properties are increasing at a rapid rate. This is true for Florida but also for many other U.S. states. A comparison between above-ground properties and below-ground properties in Florida reveals the current discrepancies:

- Hyperspectral images e.g. IKONOS scenes - pixel resolution of 1-m
- Landsat ETM7+ and U.S. Geological Survey National Elevation Dataset (NED) - pixel resolution 30-m (900 m<sup>2</sup>)

*which contrast readily available soil data*

- Average polygon size: 605,176 m<sup>2</sup> (SSURGO data Florida; currently available for 59 Counties in Florida).

The spatial variation of soil properties within these polygons is unknown. Since the demand for high-resolution and high-quality geographic data is increasing for land-use management, assessment of soil and water quality, precision farming, transportation planning, etc. we would



Sabine, secretary



Tomislav, webmaster

expect that predictive high-resolution soil-landscape modeling would be booming. However, this is not the case in the U.S. To the contrary, the acceptance of statistical and geostatistical techniques for soil-landscape modeling has been hampered in the past by the strong belief in the superiority of U.S. Soil Taxonomy.

U.S. Soil Taxonomy has reached a level of sophistication never seen before and was adopted by the Natural Resource Conservation Service (NRCS) United States Department of Agriculture (USDA) which has the responsibility of providing end-users with soil survey products. NRCS soil data are stored in the Soil Survey Geographic Database (SSURGO 1:24,000 scale) and State Soil Geographic Database (STATSGO 1:250,000). SSURGO is still incomplete and in some states (e.g. Ohio) it might take 20+ years to complete the digitization of SSURGO polygons and to populate all attribute fields. GIS users are faced with the problem that these soil data are stored in separate attribute tables and have to be related via common fields to create soil maps. Due to non-unique values in common field attributes this is a challenging (in most cases an impossible) task. NRCS relies heavily on tacit knowledge to map soils. Though NRCS acknowledges the lack in quantifying this tacit

knowledge (e.g. committee report by the Chair of the Documentation Standards Review Team to revise the National Soil Survey Handbook - Field Description Standards, Chair: Al Giенcke, NRCS-USDA) there have been only minor efforts to quantify it. Soil Taxonomy also dominates most U.S. soil science curricula whereas relatively few courses in pedometrics / geostatistics are offered.

Historically, the term soil-landscape modeling has been used in the U.S. instead of pedometrics. The goals of both, soil-landscape modeling and pedometrics, are similar, i.e., to analyze the spatial distribution of soil properties and their behavior. Soil-landscape modeling embraces qualitative and quantitative methods ranging from soil classification, statistical and geostatistical methods to advanced space-time pedodynamic modeling of soil-landscapes. Based on earlier work of factorial soil-landscape modeling by Jenny (1941) who developed the cl, o, r, p, t model, Kevin McSweeney et. al (1994) outlined a vision for soil-landscape modeling, i.e., true three-dimensional (3D) continuous modeling of soil properties. It is encouraging that there is an increasing number of U.S. scientists employing (geo)statistical techniques and fuzzy-logic based concepts to soil-landscape modeling. For example, Grunwald et al. (2000) used 3D ordinary kriging and scientific

geographic visualization to reconstruct soil-landscapes. Such exotic applications are far from being accepted by the soil science community in the U.S. which is most familiar with U.S. Soil Taxonomy. Traditional pedologists who use tacit knowledge and field morphological properties still have reservations towards such computerized quantitative applications. One major question emerges: Can we reconcile these two different paradigms (quantitative/mathematical vs. classification)? It is a challenging task to promote pedometrics in the U.S. considering that most U.S. soil scientists are familiar with the term “soil-landscape modeling” and their narrow focus on U.S. Soil Taxonomy. Additionally, a new term “hydropedology”, a buzz word for soil physical applications, is competing with the term “soil landscape modeling”. Much groundwork needs to be done to promote pedometrics in the U.S. With the acceptance of the Secretary position I committed myself to promote pedometrics in the U.S. and elsewhere. But to be successful we need your support and participation. Please, if you would like to become actively involved in the work of the WG of Pedometrics contact Sabine [S.Grunwald@mail.ifas.ufl.edu](mailto:S.Grunwald@mail.ifas.ufl.edu) or Gerard [g.b.m.heuvelink@science.uva.nl](mailto:g.b.m.heuvelink@science.uva.nl).

Sabine Grunwald, secretary

#### References:

Jenny H. 1941. Factors of Soil Formation. A System of Quantitative Pedology. McGraw-Hill, New York, N.Y.

McSweeney K., P.E. Gessler, B.K. Slater, G.W. Petersen, R.D. Hammer, and J.C. Bell. 1994. Towards a New Framework for Modeling the Soil-Landscape Continuum. SSSA Special Publ. 33: 127-144.

Grunwald S., P. Barak, K. McSweeney, and B. Lowery. 2000. Soil landscape models at different scales portrayed in Virtual Reality Modeling Language (VRML). Soil Sci. 165(8): 598-615

## 6. What is Pedometrics?

Is it really necessary to pose this question? Don't we all know what it is? Well, in a sense this may be true but when asked to define it in one single line many of us will find this difficult. We may even disagree with one another. So it seems that we do not have the perfect definition yet.

You may think that this is not that much of a problem because we can do our work without it, but surely you will agree that for communication to the outside world (including other groups within the IUSS) it is important to have a clear definition of what Pedometrics is.

So, let us start a discussion that will hopefully result in THE definition of Pedometrics.

Let us look at some existing definitions.

Our homepage (<http://www.itc.nl/personal/hengl/PM/>) says:

**1 Pedometrics** = the application of mathematical and statistical methods for the quantitative modelling of soils, with the purpose of analysing its distribution, properties and behaviour

A shorter alternative is:

**2 Pedometrics** = the application of mathematical and statistical methods for the description of soils

If we sort of copy the definition of Biometrics (<http://stat.tamu.edu/Biometrics/>), we get:

**3 Pedometrics** = the development and application of statistical and mathematical methods applicable to data analysis problems in soil science

Quite a different one that was also suggested once is:

**4 Pedometrics** = soil science under uncertainty

Now a call to all of you. Which of the definitions above do you like best? Or do you have another alternative, possibly a slight modification of one of the definitions above, that you think is even better?

Please send your reactions to me ([g.b.m.heuvelink@science.uva.nl](mailto:g.b.m.heuvelink@science.uva.nl)).

I will compile them and provide feedback in the next newsletter as well as on the Pedometrics homepage. Once we have the definition, we will also want to illustrate it with a list of important topics covered by Pedometrics, examples of pedometric applications and articles, etcetera.

Don't postpone sending in your reaction, take 15 minutes and do it now!

Gerard

## 7. Pedometrics Homepage

Since the early years of Pedometrics we have had multiple 'competing' homepages describing what pedometrics is and announcing activities of the Pedometrics Working Group. We now think it is time that we establish a central pedometrics homepage. How lucky we are that an angry young pedometrician had already done much of the work! Tomislav Hengl from ITC (Enschede, The Netherlands) built a thorough Pedometrics website on his own initiative. We had a look at it and gave some comments which Tomislav processed. We would like to use this site (now at <http://www.itc.nl/personal/hengl/PM/>, soon at <http://www.iuss.org/PM/>) as a starting point for the official Pedometrics website. Tomislav has agreed to become the webmaster of the site.

Now what do we ask of you:

- 1) Provide Tomislav with new input to the site
- 2) Provide Tomislav with comments and suggestions for improvement of the site
- 3) Create links from your sites to the PM site

## 8. Pedometrical Curriculum Vitae Sabine Grunwald

(the official CV is available at:

<http://grunwald.ifas.ufl.edu/Resume/resume.htm>)

(1) Born in south-west Germany, in the mountainous Black Forest area. Soils are diverse due to parent material and highly influenced by erosion and deposition processes. I had no understanding of soil variability, concepts of soil landscape modeling or any quantitative techniques. What a wonderful naïve time; I simply enjoyed the beautiful landscape.

(2) Graduated from the Justus-von-Liebig University Giessen, Germany with a M.S. and Ph.D. in Environmental Science. I was fascinated by the power of GIS to integrate soil, topographic, land cover, land use, and climate data to simulate transport and transformation processes to assess water quality. First encounter with variograms. Wauuuu - soil variability is important to assess environmental quality. Ahhh and I learned to love GIS and programming.

(3) Post-Doc at the University of Wisconsin-Madison, USA. I survived a 3-day snow storm and learned how to drive on icy roads. During summer time I worked in the gently undulating loess landscape in southern Wisconsin. It is a fascinating and intriguing landscape with high soils spatial variability. During icy winters in Wisconsin I emerged into the virtual 3D reconstructed soil-landscapes which I developed.

(4) Space-time soil landscape modeling in Florida: Assistant Professor, Soil and Water Science Department, University of Florida, Gainesville, Sunshine State Florida. Ill prepared for flat(!), karst terrain, marine derived sand mixed with clay-rich phosphatic material, wetlands and swamps everywhere, full of mosquitoes and alligators – a fascinating new playground for statistical and geostatistical techniques.

## 9. Pedometric Polemics

In order to get some discussion going in Pedometron, and with the hope of making us think a little about discipline, I make the following assertions in the spirit of a constructive polemic. (I don't necessarily believe them.)

1. Computers are much better classifiers than humans.
2. Disaggregation of soil class maps is generally more interesting and useful than aggregation.
3. Discrete representation of natural objects are more readily understood than continuous ones.
4. General-purpose soil maps are a waste of money
5. Geographic Information Systems are a relatively empty toolbox.
6. Geostatistics tells us little about the nature of soil.
7. Given geology and topography the need for a soil map is hardly necessary.
8. Les méthodes sont ce qui caractérise l'état de la science à chaque époque et qui détermine le plus ses progrès. AUGUSTIN PYRAME DE CANDOLLE (1778 - 1841)
9. Most observations of soil properties are subjective.
10. Prettier maps are better spatial predictors
11. Relationships between soil properties and environmental factors are not pedotransfer functions.
12. Soil variation (pedodiversity) is the natural soil's protection from humanity.

Alex. McBratney

## 10. Upcoming Meetings

### Pedometrics 2003

This is the second announcement of Pedometrics 2003, the biennial meeting of the Pedometrics working group of the IUSS, which will be sponsored and supported by the British Society of Soil Science.

Date: 10th to 12th September 2003

Venue: The University of Reading, Reading, United Kingdom.

Organiser: Dr M. A. Oliver, e-mail

[m.a.oliver@reading.ac.uk](mailto:m.a.oliver@reading.ac.uk)

Administrator: Dr J. Gauld, e-mail

[j.gauld@macaulay.ac.uk](mailto:j.gauld@macaulay.ac.uk)

Organising committee: Professor P. Goovaerts, Dr G. B. M. Heuvelink, Dr. R. M. Lark, Professor A. B. McBratney, Professor M. Van Meirvenne, Professor R. Webster, Dr M. Voltz.

The theme of the meeting will be the role of Pedometrics at the interface of soil, agriculture and the environment.

The first day of the meeting will take the form of a workshop on wavelet analysis. This will include both lectures and practical sessions. The first day will be limited to 20 participants on a 'first come first served' basis.

The main meeting will take place on 11th and 12th September when there will be two keynote speakers, four oral and two poster sessions.

Sessions:

- 1) New developments and applications in pedometrics.
- 2) Multivariate methods, including space/time applications.
- 3) What can pedometricians offer in the field of contaminated land?
- 4) Methods that span the soil, water, agriculture interface.



To register an interest or to submit an abstract please contact Dr Margaret A. Oliver or Dr Jim Gauld by e-mail. Abstracts should be submitted by January 31st 2003.

Web:

<http://www.rdg.ac.uk/AcaDepts/as/Pedometrics.html>

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June 15-18, 2003. **4<sup>th</sup> European Conference on Precision Agriculture**, Berlin, Germany.

Sept 8-10, 2003. **GeoComputation 2003** including one session “Spatially Distributed Modelling of Land Surface Processes”; Southampton, UK.

<http://www.geog.soton.ac.uk/users/geocomp/default.asp>

Nov. 2-6, 2003. **ASA-CSSA-SSSA Annual Meeting** in Denver, Colorado, USA (<http://www.soils.org/>). Session “**Advances in Thematic Soil Mapping**”. Joint activity with the Working Group on Pedometrics. Deadlines to submit a title is March 27, 2003; abstract July 23, 2003. Contact: Achim Doberman [adoberma@unlnotes.unl.edu](mailto:adoberma@unlnotes.unl.edu) or Sabine Grunwald [SGrunwald@mail.ifas.ufl.edu](mailto:SGrunwald@mail.ifas.ufl.edu)

March, 2004. **Geospatial Information & Technology (GITA) Annual Conference**. <http://www.gita.org/events/annual/26/intro.html>.

September 2004. **International Workshop on Digital Soil Mapping**. INRA, Montpellier, France, for more info contact Dr. Philippe Lagacherie ([lagacherie@ensam.inra.fr](mailto:lagacherie@ensam.inra.fr)).

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The number of members on our Pedometrics mailing list is currently 301. If you would like to be added to the list, please, contact Sabine Grunwald ([SGrunwald@mail.ifas.ufl.edu](mailto:SGrunwald@mail.ifas.ufl.edu)).

## 11. Job Advertisements

### Ph.D Assistantship

**Topics: Soil Landscape Modeling/Pedometrics GIS, Nutrient Management**

Project area: North-central Florida, Santa Fe River Watershed

Value of the assistantship: tuition plus annual salary of \$15,000

Available : summer / Sept. 2003

Contact: Sabine Grunwald, Soil and Water Science Department, University of Florida, USA.

Email: [SGrunwald@mail.ifas.ufl.edu](mailto:SGrunwald@mail.ifas.ufl.edu)

(Applications of international students are welcome; applicants with geostatistical and GIS skills and soil science / environmental science background are preferred).