



## From the Chair

Dear Pedometricians,

With the end of this year, century and millennium approaching, we look back to a fruitful Pedometrics year.

The highlight was undoubtedly the Pedometrics '99 conference in Sydney. For this we thank Alex McBratney and his crew very sincerely. They did a splendid job both scientifically and practically. Those of us who were able to join the post-conference tour had an additional opportunity to experience the outback of Australia and its people/nature/soils and landscapes. Reports and photo's on the conference and the tour are included in this newsletter.

Next we became in phase with the award on "Best Paper in Pedometrics". The awards for 1997 and 1998 were granted during the Pedometrics conference. Pierre reports on these elsewhere in this issue.

Pedometrics also made an appearance on the Web. Jointly, Alex, Pierre and I created an interconnected web of information on the WG-PM. We invite you all to include these URL's in your list of bookmarks since we plan to keep them updated with news about the

WG. More information can be found in this edition of Pedometron as well.

I am also pleased to announce that our working group has been invited by the organising committee of the next World Soil Congress, which will be held in Bangkok, Thailand, in 2002, to organise a symposium on Pedometrics. In this way our working group receives the recognition it deserves.

But before that activity takes place, we plan a fourth Pedometrics conference in 2001 in Gent, Belgium. Preparations for this conference have just started, further information will be provided through Pedometron.

Finally, I wish to thank all who contributed to our activities and I hope we can continue to work for the best of the WG-PM in the same spirit of friendship as this year.

Merry Christmas and a Happy New Year to all of you !

*Marc Van Meirvenne*  
Chairman WG-PM  
14 December 1999

## INSIDE THIS ISSUE

- 1 From the chair and the newsletter editor
- 2 Pedometrics '99
- 3 Best paper awards 1997 & 1998
- 4 Pedometrics logo
- 4 The roadburner
- 6 Post-conference tour
- 8 Pedometrics' 01 - announcement

## From the Newsletter Editor

This issue is the third one since Pedometron went electronic exactly one year ago. Marc and myself have hurried to send this newsletter out before the Y2K bugs turn all our computers into stones or podzols... So, waste no time to print out this newsletter or read it before December 31, midnight.

During the rejoinder session at Sydney, we mentioned that a good way to enhance the visibility of our working group would be to have a website specifically dedicated to Pedometrics. This Fall a first step has been taken in the right direction through the joint development and linking of three websites located on three(!) different continents and hosted, respectively,

on the webpages of Alex McBratney (<http://www.usyd.edu.au/su/agric/acpa/people/pedometrics.htm>), Marc VanMeirvenne (<http://soilman.rug.ac.be/~mvm/WG-PM.html>) and Pierre Goovaerts (<http://www-personal.engin.umich.edu/~goovaert/pedometrics.html>). These three sites provide complementary information on the topics of Pedometrics. Beside the definition of Pedometrics that Alex coined in 1992 the downunder site presents a summary of Alex and his collaborators' work on Pedometrics until 1997 as well as valuable information on fuzzy sets and geostatistics. The European site gives a detailed account of the procedure followed for the election of the best paper in Pedometrics and you will find the list of award-winning papers since 1992. The US site is the electronic repository of all the previous issues of Pedometron (except the first one!) that you can download in pdf format. Please, visit these sites and let us know your comments. Also, by linking these sites to your homepage, you will contribute to the further

development of our working group. Conversely, we plan to have a 'members' section where your homepage could be linked to the Pedometrics website.

One year ago, when I stepped in my new function of editor, I mentioned that the success of a newsletter depends very much on the contributions of his readers, and so I invited you to contribute items for inclusion in Pedometron issue, such as: a short review of a Pedometrics topic, an abstract of a recent publication or thesis, announcements or minutes of a meeting or a conference. I am still waiting for the first contribution. I am sure however that most of you have in the back of their mind question or issues that they would like to be addressed in what could become a great forum for discussion, our newsletter. Thus, please send me your contributions in Word or text format. Comments to improve the presentation or content of the Newsletter are also welcome.

*Pierre Goovaerts*

## Pedometrics '99

### **3<sup>rd</sup> international conference of the Working Group on Pedometrics Sydney, Australia, 27-29 September 1999**

The third international conference on Pedometrics took place at the University of Sydney, Australia and was locally organised by Prof. A. McBratney and his collaborators. Some 70 participants from most continents (but mainly Australia and Europe) participated actively (photo 1).



Photo 1: Participants at the Pedometrics '99 conference

*Continued on page 3*

The central theme of the conference was "**Estimating Uncertainty in Soil Models**". It opened with a plenary lecture by Prof. R. Webster who reflected on "Pedometrics in the new millennium".

The conference was subdivided into six sessions, each with a keynote speaker and 2 to 6 oral contributions. The titles of these sessions were :

- Quantifying uncertainty in spatial models of soil
- Land resource monitoring
- Soil spatial models using environmental correlation
- Aggregation and disaggregation in spatial dimensions
- Modelling spatio-temporal variability in soil
- Deterministic/mechanistic and stochastic/empirical models in soil science.

Two poster sessions were organized at which each poster was individually presented during 10 min. followed by a discussion.

The scientific quality of the contributions was very high. New methods and models were presented, and a tendency towards a broadening of the application fields of Pedometrics could be observed. Whereas the major accent of the previous Pedometrics conferences was mainly on soil mapping and inventory techniques, new domains like Precision Agriculture, Remote Sensing, GIS-analysis, Error management in modelling have now found their way to Pedometrics.

The will to participate was most definitively illustrated by Dr. G. Heuvelink who had to cancel his participation at the last minute due the birth of his daughter (congratulations !) but he provided the organisers with a video with his talk recorded on it.

During the conference dinner, the "Best Paper in Pedometrics" for 1997 and 1998 were awarded by the secretary of the WG-PM, Dr. P. Goovaerts.

A post-conference tour of 5 days allowed the participants to explore the soils, landscapes and land uses between Sydney and Brisbane. One of the scientific highlights was a visit to the Cotton Research Institute at Narrabri where, under the supervision of Prof. A. McBratney, pioneering research in precision agriculture is being conducted.

We all look back on a well organised conference with scientifically high standing contributions and an interesting post-conference tour. Our deep gratitude

goes to all members of the local organising committee for their efforts to make this conference a success.

*Marc Van Meirvenne*

## **Best Paper Awards 1997 & 1998**

There is no question in my mind that one of the highlights of the Pedometrics '99 conference was the Congress dinner held at the Novotel. Beside a wonderful view on the lights of Sydney, the dinner has featured complimentary beer and wine until midnight as well as a charming String Quartet (Jen Hoy Strings) that played a selection of classical music. For those who missed it, there were a variety of dishes to choose from: veal tortellini with sundried capsicum and crispy prosciutto, rack of lamb with haricot bean casserole, grilled baby eggplant and roma tomato confit with rosemary jus! Just before dessert (poached pear toska or hazelnut praline and cinnamon ice cream), Stephen Cattle, who acted as treasurer for the conference, entertained us with a humorous presentation of the rules of cricket, while Andrew Huckel introduced us to Australian bush poetry. Then, Ms Tamara Shatar presented to Richard Webster a small token of our appreciation (book on Australian nature's habitat and landscape) for his contribution to the development of Pedometrics and for agreeing to come to deliver the plenary paper at the Pedometrics '99, in spite of his busy schedule.

Between two glasses of wine I have had the pleasure to announce officially the winners of the 1997 and 1998 best paper awards, and to hand over the certificates.

As announced in the 9<sup>th</sup> issue of Pedometron (March 99), the best Pedometrics paper award for 1997 has been won by **J.J. De Gruijter**, **D.J.J. Walvoort** and **P.F.M. van Gaans** for a paper entitled "*Continuous soil maps - a fuzzy set approach to bridge the gap between aggregation levels of process and distribution models*", published in Geoderma, Volume 77, pages 169-195.

From 1997 to 1998, the award just crossed the border to fall to a team of Belgian researchers: **G. Boucneau**, **M. Van Meirvenne**, **O. Thas** & **G. Hofman**. Their paper, entitled "*Integrating properties of soil map delineations into ordinary kriging*" was published in European Journal of Soil Science, Volume 49, pages 213-229. Our sincere congratulations for an excellent paper that addresses the important issue of incorporating soil map information into the mapping of continuous attributes.

The abstract of the winning paper is given below.

#### **Abstract**

*Stratification of a region based on soil map delineations followed by within-stratum interpolation is sometimes used to combine soil maps and spatial interpolation. However, not all delineations are equally suitable to subdivide an area into precisely located mutually exclusive strata. This paper proposes a flow-path to characterize the nature of soil map delineations and a methodology to integrate the properties of map delineations into ordinary kriging.*

*Four types of delineations were distinguished based on three criteria: the nature of transition (discontinuous or gradual), the mapping accuracy, and the structure of the within-unit spatial variation. For each type of delineation the ordinary kriging algorithm was modified to integrate its properties in the interpolation.*

*As a test case, the sand content of the topsoil in the province of West-Flanders (Belgium) was mapped, using independent test data for validation. Inside the mapping units and at delineations identified as gradual transitions, our procedure, termed ordinary kriging integrating properties of map delineations (OKPD), performed similarly to stratified ordinary kriging (SOK). However, close to the delineations identified as inaccurately mapped discontinuities the mean square prediction error of OKPD was 0.64 times that of SOK. Moreover, near these delineations, the prediction variance was largely underestimated by SOK (relative variance = 5.1), whereas OKPD produced a more realistic value (relative variance = 1.5).*

*Pierre Goovaerts*

## **Pedometrics logo**

To celebrate the 10<sup>th</sup> anniversary of the WG-PM in 2000, it would be good to have a logo to identify the WG as a unit. Therefore, I want to call upon the creative minds among us to design a Pedometrics logo. We will publish all the designs in Pedometron and ask the mailing list to vote for the best logo. Since the WG-PM has no financial means, we can offer the winner only a modest present, but of course, she/he will have the ever-lasting honor of being the designer of the Pedometrics logo.

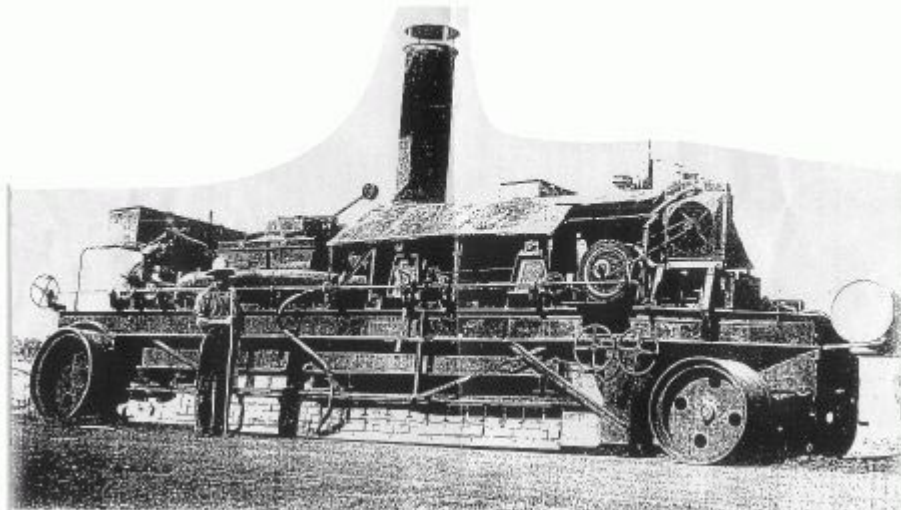
There are a few considerations that have to be taken into account when designing a logo :

1. The association with the WG-PM must be obvious.
2. The logo should be simple rather than complex.
3. It must allow reduction.
4. The logo can be in color, but black/white printing and copying must be possible without loss of detail.

Logo's are welcome at (preferentially before April 2000) : Marc.Vanmeirvenne@rug.ac.be or Marc Van Meirvenne, Dept. Soil Management and Soil Care, University of Gent, Coupure 653, 9000 Gent, Belgium.

*Marc Van Meirvenne*

## **The ROADBURNER**



*Continued on page 5*

During the post-conference tour of the Pedometrics '99 conference in Australia we visited the Jondaryan Woolshed in the Darling Downs (west of Brisbane). There we saw the remains of a peculiar machine which eventually could be of interest to soil scientists : the ROADBURNER. What was it ? Hereafter follows an extract of the documentation we received.

"The ROADBURNER literally burnt the black soil to create a ceramic surface about five inches thick and was used for road making in the Eastern Darling Downs. Prior to the advent of four wheel drive vehicles, the black soil was virtually impossible to travel on in the wet season. The ROADBURNER created an all weather surface that actually proved successful until excessively heavy vehicles eventually cracked the surface by driving over it in the wet conditions. As you may know black soil moves, so those small cracks let in water, until the surface finally broke into large chunks, making the road dangerous and impassable.

Locals who remember the roads built by the Burner report the surface as being a "beautiful smooth finish that was a joy to drive on". One section between Brookstead and Cecil Plains (South Eastern Darling Downs) was known for many years as the Red Road. Herein lies a clue to the process of burning the black soil. When extreme heat of a specific temperature is applied to this soil type, the texture changes to take on a ceramic appearance similar in structure to pottery. In fact it changes the colour to a reddy pink, hence the name "Red Road".

In the mid 20's, there was worldwide interest in developing a system of soil modification that would solve road building problems, particularly in black soil regions. The Americans, Russians and even New Zealanders were actively 'competing' to patent the ultimate mechanism. The Americans had developed a static furnace that burnt the soil which was then laid out on logs placed on the road surface. A bituminous

material was applied over the soil. The logs then ignited and aided by the added fuel, temperatures were achieved to transform the soil. Mr. Irvine from Sydney University took this process to the next stage when he patented the IRVINE TRAVELLING FURNACE in 1927. Production began on what were to become the only two ROADBURNERS ever to be made in the world.

This machine was transported by ship to Brisbane in 1932, did trials between Grantham and Gatton and then moved into the Darling Downs. It finished work before WW II and was never fired up again. We believe the real story lies behind the fact that there were no models, no prototypes and few drawings. Production of the two machines began immediately the patent was registered. And who paid for the manufacture is unknown.

Some statistics of the ROADBURNER :

Built in Sydney in 1927

Powered by a 16 HP Petrol motor,  
later by a 18 HP diesel

Weight : 37 tons

Length : 10.67 m

Speed : 7.3 m an hour

Operation : 24 hours/day in 3 shifts,  
6 days/week

Work crew : 23

Fuel burned : anything and lots of it

Generated heat : 1350 °C "

...or, how the problem of traversing Vertisols in the wet seasons was solved between the two World Wars,....

*Marc Van Meirvenne*

## Some photographic impressions of the Pedometrics '99 post conference tour



Photo 2 : Coonamble, after lunch at the "Sons of the Soil". (Stephen Cattle)



Photo 3 : Inspection of a road cut at Dunedoo. (Stephen Cattle)



Photo 4 : Jaap de Gruijter proudly presents his new dug soil profile, in dimensions we like to study in Pedometrics (Rainbow beach north of Noosa). (Marc Van Meirvenne)



Photo 5 : The roadburner as we found it on October 3<sup>rd</sup> in the Jonderyan Wool Shed at Toowoomba. (Siegfried Depuydt)



Photo 6 : The "black-cotton" soils of the Australian Cotton Cooperative Research Centre at Myall Vale. For these soils the roadburner was designed and at present they call for precision farming. (Siegfried Depuydt)



WG-PM IUSS

# *Pedometrics '01*

International conference of the  
Working Group on Pedometrics  
of the International Union of Soil Sciences

19-21 September 2001, Gent, Belgium

**General theme :**

## **Applications of Pedometrics**

Soil-related applications of numerical and statistical methods and analyses in :

- Environmental investigations
- Precision agriculture
- Remote sensing and GIS
- Error management and decision support
- Soil classification, soil survey and land evaluation
- Modeling of dynamic soil properties

**Contact :**

Dr. Marc Van Meirvenne

Dept. Soil Management, University Gent, Coupure 653, 9000 Gent, Belgium

e-mail : [marc.vanmeirvenne@rug.ac.be](mailto:marc.vanmeirvenne@rug.ac.be)