ΠΕΔΟΜΕΤΡΟΝ

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Pedometrics (PM) is a Working Group of the International Union of Soil Sciences

Pedometrics chair: Marc Van Meirvenne **Secretary & Editor: Pierre Goovaerts**

From the Chair

Dear Pedometricians,

This is the first Pedometron of the 21st century and at the same time we celebrate the 10th anniversary of our Working Group on Pedometrics. Despite this, the WG has not been very active in organizing scientific activities this year, mainly because there were already so many interesting conferences and workshops being organized, about some of them you will find reports in this issue.

But, as this issue of Pedometron will show, there was quite some less-visible activity. The kick-off for Pedometrics 2001 has been given and registrations are coming in daily (despite some growing pains). The visibility of Pedometrics on the upcoming World Congress of Soil Science in Thailand in 2002 is assured. An excellent selection for the award "Best Paper in Pedometrics 1999" has been made by Dr. Margaret Oliver, and you will be invited to vote. On all these topics you will find more to read in this issue.

Furthermore, Geoderma published a special issue on Pedometrics (97:3-4) with very interesting contributions presented in Montpellier (both before and during the world congress). And Pierre reports on the increasing number of registered members on our mailing list. We are now with more than 200, although I would like to suggest that, during your membership registration for the IUSS, you indicate your interest in (among others) the WG-PM. In this way the IUSS will get a better impression of the support of our WG, since officially it appears that only a few IUSS members have expressed their interest in our activities.

Nevertheless, the IUSS is clearly aware of the diverse nature of our actions. In this issue I report on my recent correspondence with the Secretary-General of the IUSS, Prof. W. Blum. Important decisions concerning the status of our working group have to be made and therefore we introduced a Pedometrics discussion list. I sincerely hope that this might evolve into an active forum of discussion concerning Pedometrics related issues.

In short, I feel confident that Pedometrics is here to stay for some more years (centuries ?).

Enjoy Pedometron !

Marc Van Meirvenne
Chairman WG-PM

INSIDE THIS ISSUE

From the Newsletter Editor

This issue has had an exceptionally long gestation period since it has been almost 10 months since our previous newsletter was published. I am glad that our worst fears about Y2K didn't materialise and that we are still on line to inform you about our working group and its forthcoming activities!

We have now about 215 members on the e-mail list, with new subscriptions every month due to the increasing visibility acquired through the development of three websites (refer to Pedometron No. 10) and the public-relation work of Marc. Don't hesitate to let others know about our group! In the previous issue, I mentioned the intention of creating a 'members' section on one of the websites and it would be great to have your feedback on that matter.

In the last issues, I have complained about the lack of involvement of our members in the preparation of the newsletter. Shortly after the publication of Pedometron 10, I received two contributions: an invitation by Sabine Grunwald to visit a gallery of 3-D soil landscape models available on the web, and a brief account of a paper by Larke and Webster on the application of wavelets to the description of soil variation. I must apologize to these individuals and our readers for the delay in publishing these contributions, and I hope it won't discourage others to submit their work.

I now invite you to read this newsletter and to contact me with your votes for the best paper in Pedometrics for 1999, as well as your suggestions, comments and contributions to our newsletter and websites.

Pierre Goovaerts

New scientific structure of the IUSS and the WG-PM

In February I contacted all members of the Pedometrics mailing list to inquire about their opinion on how the Working Group on Pedometrics (WG-PM) would best fit in the newly proposed structure of the International Union of Soil Sciences (IUSS). At that time this structure had just been published in the Bulletin of the IUSS (no. 96) and it was to be refined during the mid-term meeting in Bangkok in April. Through the help of Prof. R. Dudal who planned to represent the Belgian Soil Science Society in Bangkok but who could finally not be present, a summary of our discussion was presented to Prof. W. Blum, the Secretary-General of the IUSS. The outcome of that meeting was recently published in the next Bulletin. Generally the new structure was accepted, with 4 Divisions each subdivided into Commissions. There were quite some modifications compared to the previously proposed structure, therefore I present the revised scientific structure :

D1: Soil in Space and Time
Cl.l Soil morphology
Cl.2 Soil geography
Cl.3 Soil genesis
C1.4 Soil classification

D2: Soil properties and processes
C2.1 Soil physics
C2.2 Soil chemistry
C2.3 Soil biology
C2.4 Soil mineralogy

D3: Soil use and management
C3.1 Soil evaluation and land use planning
C3.2 Soil and water conservation
C3.3 Soil fertility and plant nutrition
C3.4 Soil engineering and technology
C3.5 Soil degradation control, remediation and reclamation

D4: The role of soils in sustaining society and the environment
C4.1 Soils and the environment
C4.2 Soils, food security and human health
C4.3 Soils and land use change
C4.4 Soil education and public awareness
C4.5 History, philosophy and sociology of soil science

Since the report on this meeting does not mention how Working Groups would fit into this new structure and since Pedometrics was nowhere mentioned, I recently contacted Prof W. Blum, summarizing the reactions I received in February-March (about 40% of the members reacted). Here is my mail :

Dear Sir,

I am contacting you concerning the Working Group on Pedometrics (PM) of the IUSS. This WG was established 10 years ago under commission I, Soil Physics of the ISSS. However the new structure of the IUSS, as approved during the mid-term meeting in Bangkok (Bulletin no. 97), makes me wonder how working groups fit into this structure. Is it a hierarchical structure and need WG's belong to a division and a commission, or can working groups be independent organisms which are not necessarily related to one division/commission ?

A questionnaire among our members indicated that the majority does not prefer to be linked to only one commission/division since Pedometrics is not restricted to one particular subfield of soil science. So our first option would be to become an independent WG within the IUSS.

However, if we need to belong to a division, then most of us would prefer D1 "Soil in Space and Time". Within this Division the majority would prefer a new Commision on "Soil Informatics" (C1.5). Within this commission several related topics (represented by co-existing WG's) could be brought together, like soil databases (WG-DM), GIS (WG-LI), remote sensing (WG-RS), modelling and Pedometrics (WG-PM).

If no separate commission C1.5 can be created, most members of our WG feel that PM should become a part of commission C1.2 "Soil Geography".

I would very much like to hear your opinion on this because we want to report to our working group members through our newsletter Pedometron.

Yours sincerely,

Marc Van Meirvenne
Chairman WG-PM

The prompt answer was (printed with permission) :

Dear Marc,

Thank you for your E-mail and your proposals relating to the positioning of Pedometrics within the new IUSS scientific structure.

First of all, I should like to inform you and the members of your Working Group that I am not happy with the actual situation. I tried to create a new Commission in Division 2: "Soil Properties and Processes", entitled C 2.5 "Pedometrics and Geostatistics". This proposal was not accepted by the Council in Bangkok in April 2000, as several arguments were brought forward against it, which I do not remember in detail. However, I am still strongly in favour of creating a new Commission for your group, as you are one of the most active units within IUSS, and "Pedometrics and Geostatistics", or as you call it "Soil Informatics" is a very important topic within soil science.

Therefore, at the next Council Meeting in Bangkok, in August 2002, I will propose to create a Commission on "Soil Informatics", and you can choose in which Division you would like to be positioned. From your E-mail I learn that you should like to have a Commission on "Soil Informatics" within Division 1: "Soil in Space and Time".

For this procedure, I would need a one-page rationale, in order to convince the Council Members about this new proposal. Therefore, I would be pleased if you could send me such a rationale, based on a discussion within your Working Group.

In conclusion, my proposition would be that we first aim at creating a Commission, and if this fails, we can still position you within Commission C 1.2: "Soil Geography", which is certainly not a very convincing solution.

Looking forward to your answer and congratulating you and your Working Group on your excellent work within IUSS, I remain for today, with my best regards and wishes,

Yours sincerely,
Winfried E.H. Blum
Secretary-General of the IUSS

Unnecessary to describe my enthusiasm when I received this message. In order to react to his message and request for a rationale, I would very much like to activate a discussion among the members of WG-PM. Therefore we opened a discussion list based on our mailing list. Some initial points of discussion could be :

- Do we want to become a Commission, or do we prefer to stay a Working Group?

- What should be the name of such a Commission : "Pedometrics", "Soil Informatics", …?
- If we prefer to stay a WG, should this be an independent WG (if this is possible), or with which division/commission should we be associated (given that some new commissions were created after our first questionnaire)?
- What arguments can we use to propose to "upgrade" our WG to a Commission ?

Once we have reached a consensus about how to fit our WG into the new structure of the IUSS I will report the conclusions to Prof. Blum and eventually, if the majority of the members are in favour of proposing a Commission on Pedometrics, write the requested rationale.

Discussion list on Pedometrics

Members of the WG-PM are invited to post items open for discussion at : **pedomet@soilman.rug.ac.be** and their mail will be forwarded to more than 200 pedometricians around the world. However, please note the following :

1. Start the Subject field with "**PM:**" followed by a description of your topic. In this way all receivers will be able to identify your message as a contribution to our discussion list.
2. The list is restricted to discussion related to Pedometrics. It is not allowed to use it for e.g. commercial purposes. We keep the right to close the list if it is being misused.
3. It is possible to remain on the Pedometrics mailing list but not on the discussion list. We used the mailing list as a start, but if somebody wants to be removed from the discussion list, please contact me.

I am looking forward to what you have to say.

Marc Van Meirvenne
Marc.Vanmeirvenne@rug.ac.be

17th World Congress of Soil Science

Bangkok, Thailand, 14-20 August 2002

The Vice president of the IUSS, Prof. Irb Kheoruenromne, informed us that at the mid-term meeting in Bangkok, the organisers of the 17th World Congress of Soil Science have accepted to include a symposium dedicated to Pedometrics. I am pleased that in this way the visibility of our WG will be improved compared to the previous World Congress of Soil Science in Montpellier where Alex McBratney, as chairman of our WG and despite his offer to help, was not consulted. Consequently most of our members felt that the WG-PM was not well represented by the symposia which were organised. Pierre Goovaerts and I have set up the following (general) description of the symposium which should portray the activities of our WG :

Symposium 48 : Developments in soil data processing
This symposium will focus on ongoing research results within the framework of pedometrics aiming at presenting the state-of-the-art in soil data processing. Topics include analysis of spatial and temporal variability of soil properties; development of decision support systems; assessment of error propagation; quantification of uncertainty and fuzziness of information and evaluation criteria; soil process simulation modelling; design and evaluation of sampling schemes and incorporation of exhaustively sampled information.

Key words: soil data processing, decision support systems, error propagation, evaluation criteria, soil process, spatial variability, temporal variability

More details about this congress can be found at : http://www.17wcss.ku.ac.th/.

Marc Van Meirvenne

Best Paper Award 1999

In continuation of nomination and selection of the yearly best paper in Pedometrics, published in the leading international Journals, it is now time to elect the best paper for 1999. This year, **Dr. M. Oliver** recommended five papers which are listed below, with their abstract. Readers should read through the abstracts (or preferably the full papers) and e-mail their votes to the editor (goovaert@engin.umich.edu). A detailed account of the procedure followed for the election and the list of award-winning papers since 1992 is available at **http://soilman.rug.ac.be/~mvm/WG-PM.html.** In brief, the election will proceed as follows:

1. Only pedometricians on the mailing list are considered as eligible voters.
2. Each vote must consist of a ranking of all five papers, with 5 for the highest preference to 1 for the lowest.
3. The votes must be received by December 1, 2000.

The nominated papers are:

R.R. Filgueira, Y.A. Pachepsky, L.L. Fournier, G.O. Sarli & A. Aragon 1999. Comparison of fractal dimensions estimated from aggregate mass-size distribution and water retention scaling. Soil Science 164: 217-223.

Abstract

Relating soil structure to soil hydraulic properties is an important issue for understanding and managing soil functioning. Fractal models were applied to relate soil water retention and soil structure. One such model developed by Rieu and Sposito (1991a) predicts an equality of (i) soil matrix fractal dimensions derived from 'aggregate bulk density- aggregate size data' and (ii) soil fractal dimensions derived from water retention. The objective of this work was to test the statistical hypothesis of such equality for model soil systems of packed soil aggregates. Typic Argiudol and Typic Argiaquol soils were sampled at eight locations that differed in long-term management practices. Soil water retention was measured at 12 levels of soil matric potential ranging from -1200 to -20 kPa. The 'aggregate bulk density-aggregate size' data were obtained for seven ranges of aggregate sizes from 0.25 to 16 mm. The statistical hypothesis about the equality of mass fractal dimension as derived from the aggregate bulk density data and the scaling dimension of water retention could not be rejected in our study.

G.B.M. Heuvelink & E.J. Pebesma 1999. Spatial aggregation and soil process modelling. Geoderma 89: 47-65.

Abstract

Nonlinear soil process models that are defined and calibrated at the point support cannot at the same time be valid at the block support. This means that in the situation where model input is available at point support and where model output is required at block support, spatial aggregation should take place after the model is run. Although block kriging does both in one pass, it is sensible to separate spatial aggregation from spatial interpolation. Contrary to aggregation, interpolation should better take place before the model is run because this enables a more efficient use of the spatial distribution characteristics of individual inputs. When a model is run with interpolated inputs, it is important not to ignore the interpolation error. Substituting conditional expectations in place of probability distributions into a nonlinear model leads to bias, essentially for the same reason that aggregating inputs prior to running a model is not the same as aggregating the output after the model is run. Running a model with inputs that are probability distributions will usually call for a Monte Carlo simulation approach. This causes a substantial increase in the numerical load, but apart from eliminating bias, an important advantage is that it shows how uncertainties in model inputs propagate to the model output. Many models used in soil science suffer not only from input error but also from model error, which is support- and case-dependent. Case dependency implies that model error can only be assessed realistically through validation. A major problem in validation is that the validation data are often collected at a much smaller support than the aggregated model predictions.

V.J. Kollias, D.P. Kalivas & N.J. Yassoglou 1999. Mapping the soil resources of a recent alluvial plain in Greece using fuzzy sets in a GIS environment. European Journal of Soil Science 50: 261-273.

Abstract

Collecting soil data is time-consuming and costly, often exceeding practical possibilities. A methodology for the delineation of soil mapping units in an alluvial plain of Western Peloponnese, Greece, was investigated. A detailed soil survey of an area of 300ha was used to obtain the basic soil data for evaluating the performance of the proposed methodology. The methodology consists of the following steps: (a) data collection from borings and representative soil profiles, (b) definition of the soil mapping units in the study area, (c) determination of the range of the diagnostic variables for each mapping unit from field observations and statistical analysis of the analytical data from representative soil profiles, (d) determination of the class of each diagnostic variable by observation at a network of boring points, (e) subjective assignment of numerical values to soil variables at the bore points, (f) estimation of the values of each soil variable at the points of a regular grid using the interpolation methods kriging and inverse squared distance, (g) application of the fuzzy set theory to the interpolated data and the production of thematic fuzzy maps, and (h) validation of the results through a number of independent test borings. The results obtained show that the proposed methodology can produce soil maps of recent alluvial plains with acceptable accuracy and cost.

R.M. Lark & R. Webster 1999. Analysis and elucidation of soil variation using wavelets. European Journal of Soil Science 50: 185-206.

Abstract

A wavelet is a compact analysing kernel that can be moved over a sequence of data to measure variation locally. There are several families of wavelet, and within any one family wavelets of different lengths and therefore smoothness and their corresponding scaling functions can be assembled into a collection of orthogonal functions. Such an assemblage can then be applied to filter spatial data into a series of independent components at varying scales in a single coherent analysis. The application requires no assumptions other than that of finite variance. The methods have been developed for processing signals and remote imagery in which data are abundant, and they need modification for data from field sampling.

The paper describes the theory of wavelets. It introduces the pyramid algorithm for multiresolution analysis and shows how it can be adapted for fairly small sets of transect data such as one might obtain in soil survey. It then illustrates the application using Daubechies's wavelets to two soil transects, one of gilgai on plain land in Australia and the other across a sedimentary sequence in England. In both examples the technique revealed strongly contrasting local features of the variation that had been lost by averaging in previous analyses and expressed them quantitatively in combinations of both scale and magnitude. Further, the results could be explained as the spatial effects of change in topography or geology underlying the variation in the soil.

B. Minasny, A.B. McBratney & K.L. Bristow 1999. Comparison of different approaches to the development of pedotransfer functions for water-retention curves. Geoderma 93: 225-253.

Abstract

Pedotransfer functions (PTFs) for estimating water-retention from particle-size and bulk density are presented for Australian soil. The water-retention data sets contain 733 samples for prediction and 109 samples for validation. We present both parametric and point estimation PTFs using different approaches: multiple linear regression (MLR), extended nonlinear regression (ENR) and artificial neural network (ANN). ENR was found to be the most adequate for parametric PTF's. Multiple linear regression cannot be used to predict van Genuchten parameters as no linear relationship was found between soil properties and the curve shape parameters. Using the prediction set, ANN performance was similar to the ENR performance for the prediction dataset but ENR performed better on the validation set. Since ANN is still considered as a black-box approach, the ENR approach which has a more physical basis is preferred. Point estimation PTFs were estimated for water contents at - 10, - 33, and - 1500 kPa. Multiple linear regression performed better for point estimation. An exponential increase trend was found between particles < 2 μm and water contents held at –10, - 33 and - 1500 kPa. The point estimation ANN did not improve prediction compared to MLR. Increasing the number of functions and parameters in developing PTF's does not necessarily improve the prediction. The effect of parameter uncertainty, differences in texture determination and spatial variability on the error in prediction is also discussed.

Gallery of Three-dimensional Soil Landscape Models

S. Grunwald, K. McSweeney, P. Barak, B. Lowery, D.J. Rooney, and P.J. Fagan

There is need for high quality three-dimensional (3-D) earth data for environmental assessment studies, precision agriculture and water quality simulation modeling. The objective of our study was to investigate the use of Virtual Reality Modeling Language (VRML), a 3-D graphics language suitable for stand-alone or browser-based interactive viewing, to create 3-D soil landscape models at different scales. Four different locations in southern Wisconsin were selected to represent pedon, catena, catchment, and soil region scale. Soil data, including texture, cone index, and depth of soil layers, were used in conjunction with topographic attributes to create 3-D soil landscape models. Spatial modeling techniques comprised 2-D and 3-D ordinary kriging. We used Environmental Visualization Software (EVS) to export the geometry of 3-D objects, which were enhanced to include: (i) viewpoints, (ii) Munsell colors, (iii) texture maps, (iv) animations such as zooming, rotation, and (v) primitive shapes to highlight areas of interest. Virtual Reality Modeling Language is capable of describing and visualizing extremely complex shapes, such as erratic soil layers or terrain. Visualization of Munsell soil colors was difficult to implement because there is no hardware and software independent color-management system available in VRML. The accessibility of interactive VRML models via the World Wide Web and the portability of these models across platforms allow soil science to enter the virtual world of cyberspace.

The galery is accessible via the WWW at:
http://www.soils.wisc.edu/soils/3D_SL_models/3Dsoils.html

Describing Soil Variation Using Wavelets

R.M. Lark & R. Webster

Silsoe Research Institute, Wrest Park, Silsoe, Bedford MK45 4HS & Rothamsted Experimental Station, Harpenden, Herts AL5 2JQ.

Soil scientists have had great success in applying geostatistics to analyse spatial variation in soil by treating its properties as realisations of intrinsic random functions. Indeed, readers of Pedometron might be forgiven for thinking that this is all the subject is about.

However, even the weak assumptions of stationarity necessary for the proper pursuit of geostatistics can be untenable where the land surface crosses parent materials of different origin and geomorphic history. Where rock or physiography contrast strongly variances appear not to be intrinsic, but to vary in both magnitude and spatial scale, with locally transient features.

These are situations for which wavelet analysis is ideally suited.

We have been exploring the application of wavelets to describe soil variation. In particular, we have found the discrete wavelet transform, using Daubechies's wavelets, to be well suited, and below we show two examples in which data were recorded at close-spaced intervals on transects, one over gilgai terrain in Australia, the other on Jurassic sediments in England.

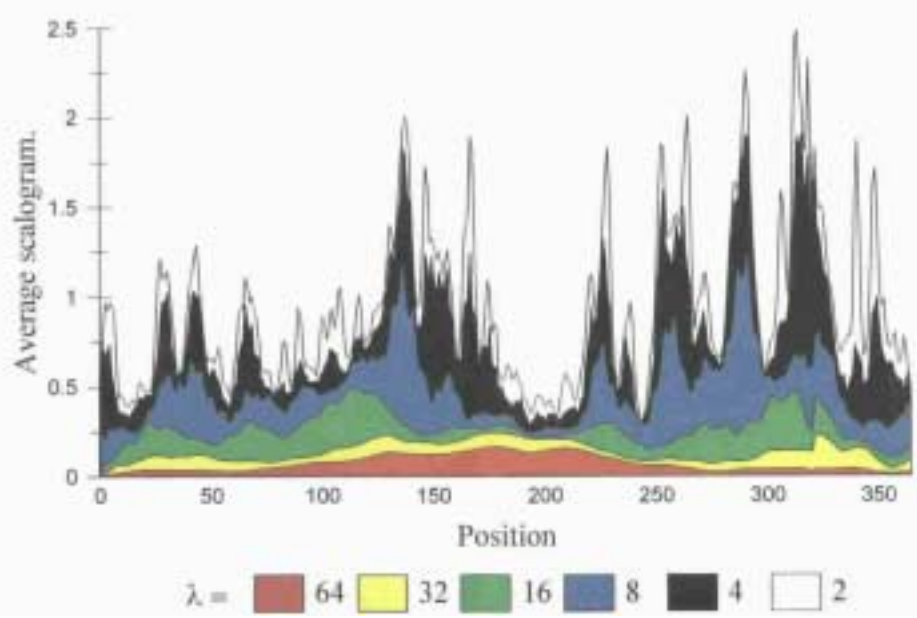
We analysed the data with Daubechies's wavelet, with two vanishing moments, adapted to the finite interval. We averaged several wavelet transforms from shifted tilings of the data. This allowed us to apply the transform to all the data and to avoid artefacts (such as the Gibbs effect in signal processing). This gave us average smooth and detail components for each scale and location. We also derived average squared wavelet coefficients, i.e. scalogram components, which are contributions from each scale and position to the sum of squares.

Electrical Conductivity of soil on a Gilgai landscape

Gilgais, which are small depressions (up to 50cm deep), occur in apparently regular patterns in flat plains in eastern Australia. We sampled a plain at 4-m intervals over 1200m. The soil is alkaline and locally saline, and the microrelief appears to control some of the variation in electrical conductivity, which we measured.

Figure 1 shows the average scalogram values. The scale parameters λ are in sampling intervals. The dominant components are λ = 4 and 8; the latter corresponds to a peak in the spectrum. Near position 200 components with larger scale parameters dominate.

Figure 1.



In this part of the transect the depressions are clustered. Elsewhere they alternate more regularly with the sandy plain.

Clay content of the soil in central England

In Oxfordshire a transect 3.2km long was sampled at 10-m intervals. The country rock consists of Jurassic limestones, sandstones, silts and shales, which outcrop in contrasting bands. The shales give rise to clay soils.

Figure 2 accumulates the smooth and detail components of the subsoil data, from λ = 64 to 2, such that the upper graph (λ = 2) corresponds to the original data.

Figures 3 and **4** show the average scalogram values for both topsoil and subsoil. The variance of clay content changes markedly along the transect, as shown by the wavelet analysis, and the relative importance of contributions from different spatial scales also varies.

Figure 2.

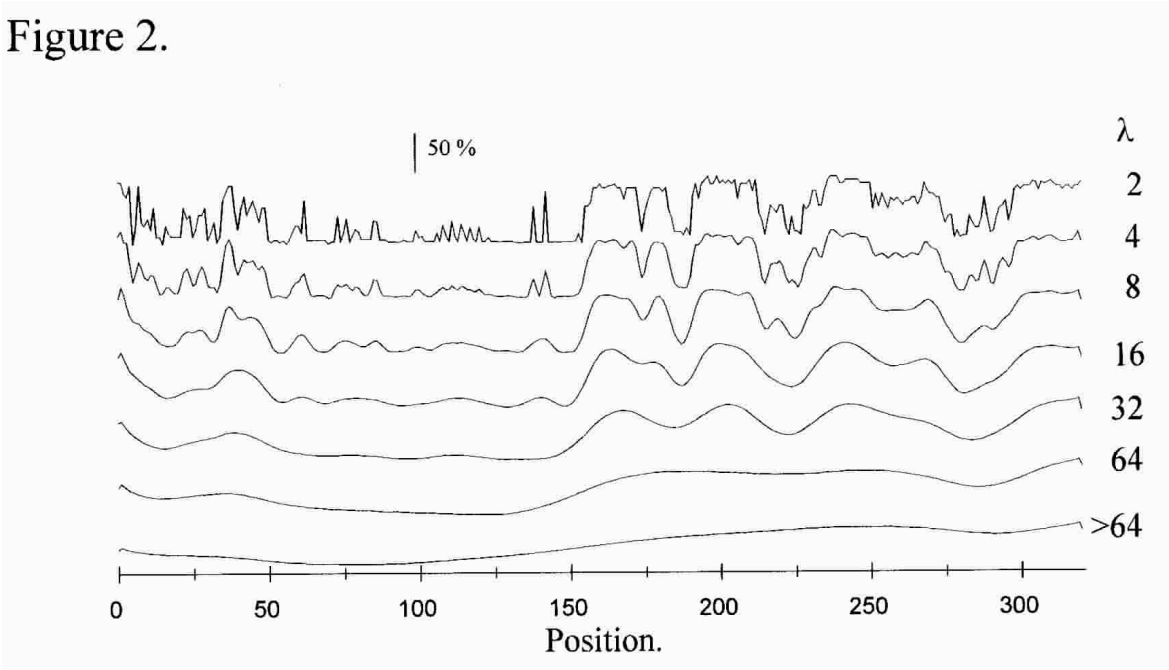


Figure 3.

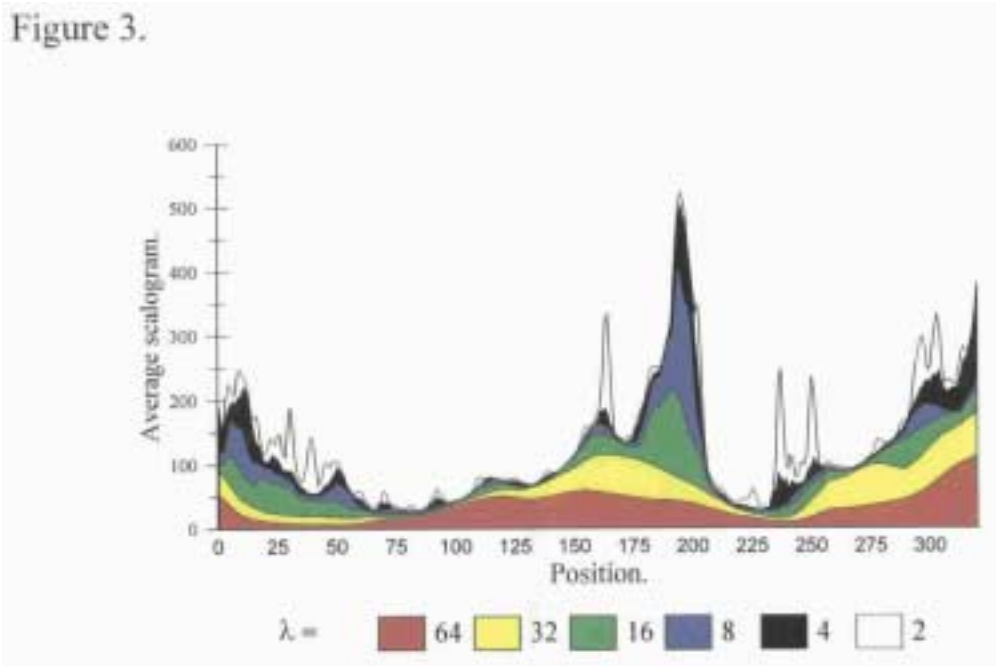
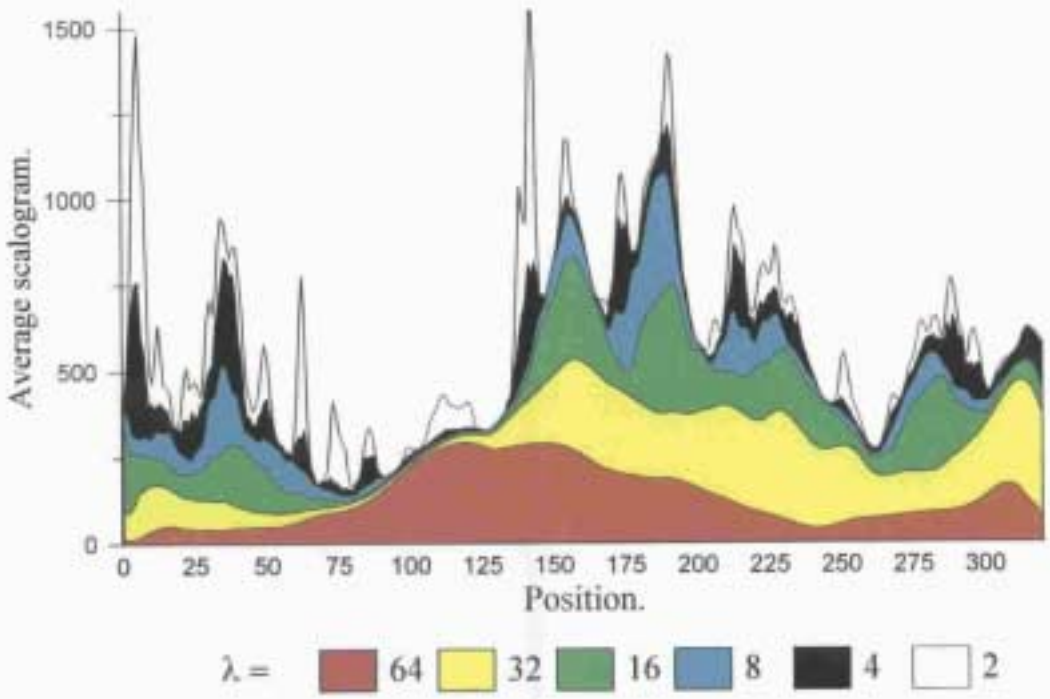


Figure 4.



From around position 150 there are alternately clay and sandy soils. Before that there is little variation in clay content. This is seen in the change in the contribution to variance of subsoil clay at $\lambda = 32$. The marked feature of the average scalogram, near position 200, for scale parameters $\lambda \leq 8$ corresponds to alluvial deposits of mixed clay and silt. This deposit contrasts with its neighbours in clay content, but is also internally variable. Such a transient feature can be analysed only using wavelets.

The full details of the analysis are in our paper:

R.M. Lark & R. Webster 1998. Analysis and elucidation of soil variation using wavelets. *European Journal of Soil Science* 50: 185-206.

Forthcoming Conferences

In the next two months two conferences, which are of interest to pedometricians, will be held in Europe and the United States.

The first meeting is the *Kirkham Conference 2000* that will take place at Iowa State University, November 2 and 3. Kirkham Conferences are topical meetings where an off-the-record forum encourages scientists to make organized, in-depth explorations of disciplinary and interdisciplinary subjects of soil physics in ways seldom possible at national or international meetings. These conferences are held every four years and can be held almost anywhere in the world, preferably in coordination with a related national or international meeting. Each conference focuses on a special topic and provides timely development of newly emerging research ideas and inquiries. The theme for this year is *Characterization of Properties and Processes in Soils Across Different Scales.* Two of the participants will be Alex McBratney and Pierre Goovaerts. The complete schedule and further information on the conference can be found at **http://www.agron.iastate.edu/kirkham/theme.html.**

The other meeting is The Third European Conference on Geostatistics for Environmental Applications, *geoENV2000*, that will be held in Avignon, France, November 22-24, 2000. Like two years ago (see 8th issue of Pedometron), several sessions will be devoted to applications of geostatistics to soil science. The website for the conference is **http://www.avignon.inra.fr/biometrie/geoenv2000**.

Pierre Goovaerts

Accuracy 2000: Conference Report

The "Fourth International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences" (Accuracy 2000) was held from 12 to 14 July in Amsterdam. The meeting brought together more than 170 experts from the Earth and Environmental Sciences, from Geographic Information Science and from Spatial Statistics. This multidisciplinary group of people was remarkably able to overcome (scientific) language barriers and exchange ideas on the development and application of methods for handling spatial uncertainty in the environmental sciences.

Each day started with a plenary session featuring a keynote speaker. These were Giles Foody (University of Southampton), Keith Loague (Stanford University) and Arnold Heemink (Delft University of Technology). The parallel sessions had diverse themes such as 'Development of error-sensitive GIS', 'Handling spatial and temporal variation in the soil', 'Sampling theory', 'Uncertainty analysis in distributed modelling', 'Data quality and uncertainty propagation', 'Remote sensing', 'Assessing the validity of physically-based models', 'Kriging', 'Object-related uncertainty', 'Scale issues in environmental modelling' and 'Change detection'. There were also two well-visited poster sessions and a (how else in Amsterdam!) enjoyable as well as enlightening canal boat tour, see photo below. The detailed symposium programme including abstracts may still be viewed on the symposium website **(http://www.gis.wau.nl/Accuracy2000).**

At the meeting, each participant was asked to locate his or her position inside (or outside!) a triangle that had the three main disciplines (Earth and Environmental Sciences, Geographic Information Science and Spatial Statistics) as its corners. The resulting dot map, that will soon be placed on the symposium website, had a fairly uniform distribution with a slight under-representation in the Spatial Statistics corner.

The next meeting in 2002 will take place in Melbourne, Australia.

The proceedings of Accuracy 2000 (116 papers in 772 pages) can still be bought for 40 EURO per copy (this includes handling and postage). When interested please send an email to Gerard Heuvelink (g.b.m.heuvelink@frw.uva.nl).

Gerard Heuvelink

WG-PM IUSS

First announcement – call for papers

Pedometrics 2001

4th Conference of the Working Group on Pedometrics
of the International Union of Soil Sciences

"Applications of Pedometrics"

September 19-21, 2001
Gent, Belgium

More info and to pre-register please consult :

http://soilman.rug.ac.be/pedometrics2001