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UNIVERSITY GHENT
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PEDON

ITC

N° 3 February 1993

Newsletter for Alumni and Staff from the International Training Centre for Post-Graduate Soil Scientists, State University of Ghent. All correspondence should be addressed to the ITC-Secretariat, Geological Institute, Krijgslaan 281/S8, B-9000 Gent, Belgium

EDITORIAL

Since the last issue of Pedon appeared last year, many changes have taken place at the University of Ghent, and especially at the ITC. In August 1991 a new law on the organization of higher education in Flanders was published, urging a serious restructuration of the universities, which had to be finalized before october 1st, 1992. No wonder that the academic year 1991-1992 has been for all staff members a period of numerous meetings.

A first important change was the promotion of most senior assistants (former "werkleiders") to professor, implying that they got now more involved in teaching. Related to this, Departments have been created, grouping the staff of former laboratories, which however will partially subsist as research units. In the Faculty of Science, a "Geology and Soil Science Department" and a Department of Geography was created, in the Faculty of Agriculture (now called Faculty of Agricultural and Applied Biological Sciences), soil scientists are spread over three Departments, namely the Department of Applied Analytical and Physical Chemistry, the Soil Management and Hygiene Department, and the Department of Biochemical and Microbial Technology. Even the name of the university has changed : it is no longer "State" university, but simply "Ghent University". Whereas formerly courses were appointed to professors practically for life time, this is no longer the case in the new system, where the Departments decide which of its members will teach a given course the next year, leading to a much higher flexibility.

As announced in the previous Pedon, the ITC programme has changed considerably. Basic courses are taught in the first semester of the first year; already in the second semester, students have to make a choice between four orientations : (i) soil genesis, (ii) soil survey and land use planning, (iii) geo- and archaeopedology, and (iv) soil fertility and ecopedology. With geo- and archaeopedology (including paleopedology) a new field of study has been officially introduced in the curriculum. This field of research is getting more and more interest from scientists working on global change studies.

Whereas the first year comprises only obligatory courses, space is left in the second year for optional courses and specialization courses. In both years considerable attention is given to seminars during which students will have to produce small research reports and present them. It includes also lectures of visiting professors, staff members and PhD-students, and some interdisciplinary excursions. In the second year students will have to prepare and defend a thesis. Also the organization of the studies has changed : a semester system has been adopted, implying that courses are given in blocks during the first or the second semester, and exams take place end of January and June for the first session, September for the second session. Elsewhere in this issue, a copy of our new folder is reprinted, giving more detailed information. We

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would appreciate very much receiving from all alumni their reflections on this new programme, both positive and negative ! This would be of a great help to us for future adaptations.

In the frame of the EC-program "Human Capital and Mobility" the ITC has been selected as a centre of excellence and host-institute for post-doctoral fellows (only two centres in Europe were selected for soil science). ITC is also involved in the ERASMUS-programme Agricola (ERASMUS stands for EuRopean community Action Scheme for the Mobility of University Students), promoting the exchange of (European) students and lecturers between the Universities of Ghent (coordinator), Cagliari (Italy), Granada (Spain), Kiel (Germany) and in future also Salzburg and Vienna (Austria) and Thessaloniki (Greece).

Not only the programmes of ITC have changed, but also in the composition of the staff some changes are noticed. Several Professors retired after an active life of research and teaching : Prof. Dr. J. Amerijckx, Prof. Dr. M. De Boodt, Prof. Dr. F. De Coninck and Prof. Dr. R. Maréchal. More about their curriculum can be found elsewhere in this Pedon. In most cases their lecture-charge has been taken over by their former coworkers.

On november 20, 1992, ITC lost its Founder and first Director, Prof. Dr. R. Tavernier. Until the last day of his life he was present at the Geological Institute. It is sure that the international soil science community lost with him one of its most prominent members. The next issue of Pedon will be devoted to the memory of Prof. Tavernier.

In 1992, two evaluation commissions visited the ITC. The first one evaluated the programme in the frame of the global earth-science education at the Universities of Flanders and the Netherlands, the second had to evaluate the programme in the frame of the BADC aims. In both cases the result was a very positive and favorable advise. These visits prompted our staff to prepare a detailed report on the evolution of the ITC, parts of which will be published in a next issue of Pedon.

The first Refresher Course will take place in Yogyakarta, Indonesia, this summer (August 2 till August 12, 1993). A next is planned for autumn 1994 in Harare, Zimbabwe. Later on we hope to organize a similar meeting in one of the countries of Northern Africa or the Near East.

As a response to the former Editorial, one local Alumni association was started, namely in Malaysia, under the responsibility of Dr. J. Shamshuddin, Pertania Universiti Malaysia. Dispatching of information, local sale of ITC-publications etc. for Malaysia will be centralized in the future by him.

This year, and also the next one, will still be a period of changes and adaptation to new rules and situations, but we are all persuaded this will lead to a better ITC.

Prof. Dr. G. STOOPS
Director of the ITC

■

UNESCO. As Doctor honoris causa of the Faculty of Sciences of the University of Ghent he was associated with our soil science departments.

■

WHO VISITED ITC DURING THE ACADEMIC YEAR 1991-92 ?
(list may be not exhaustive)

06.08.1991 : Dr. Tharwat Ghabour (N.R.C., Cairo, Egypt)
26.11.1991 : Dr. Maurice Doube (E.N.S.A., Cameroon)
07.01.1992 : Dr. Todor Boyadgiev (Sofia, Bulgaria)
05.02.1992 : Dr. Carlos O. Scoppa (I.N.T.A.-C.I.R.N., Buenos Aires, Argentina)
23.03.1992 : Dr. Mohammad Hassan Banaei (Soil and Water Research Institute, Tehran, Iran)
01.04.1992 : Prof. Dr. H.M. Mushala (University of Swaziland)
18.06.1992 : Prof. Dr. K. Aloni (Université de Lubumbashi, Zaire)
17.08.1992 : Prof. Dr. Vo-Tong Xuan (University of Cantho, Vietnam)
17.08.1992 : Dr. Frank Vanasse (University of Pretoria, South-Africa)
25.09.1992 : Dr. Juan Herrero (Soil and Irrigation Dept. Zaragoza, Spain) (as a member of a Ph.D.-jury)
25.09.1992 : Prof. Dr. J. Porta (E.T.S. Engenyeria Agraria, Lleida, Spain) (as a member of a Ph.D.-jury)

LAUDATIO

Professor Dr. Ir. Jean-Baptiste Ameryckx retired at the end of the academic year 1990-1991. In 1948 he was promoted as Agricultural Chemistry Engineer and in 1953 he obtained the Aggregate for Higher Technical Education in Ghent. In 1955 he presented his Ph.D in Bonn (Germany) on soil survey data of the Belgian polder area; he also became Bachelor in Geology and Mineralogy at the University of Ghent. Until 1961 he was active in the Belgian Soil Survey, mainly in the coastal dune and polder areas and in the sandy area of Flanders. In 1961 he became "associated docent" at the University of Ghent.
He is Honorary Secretary General of the Belgian Soil Science Society where he was in charge during many years for the redaction of the journal "Pedologie".

Ameryckx was among the first teaching staff members when Prof. Tavernier founded the International Training Centre for Post-graduate Soil Scientists in 1963. Till his retirement he was in charge of the courses in General Pedology and in Soil Classification and Morphology.

All 700 ITC fellows that passed through ITC until 1990 know him very well as the friendly humorous professor of General Pedology when lectures started in the beginning of the academic year.

Thanks to his many years in the Belgian Soil Survey, to some missions abroad and to his close collaboration in the final redaction of World Soil Map (Europe - FAO) and the Soil Map of the European Communities (EC), he was able to bring a lot of personal experience in his teaching in General Pedology and in Soil Classification.
The activities of Prof. Ameryckx in ITC can be split up in two periods.
In the first period, that lasted until the end of the seventies, he was, besides his teaching task, very active in a series of social events with the purpose to make the foreign fellows feel more "at home". In this period he was also secretary of the ITC board and a close collaborator of Prof. Tavernier. We could call this period also the "cigar era" and students of those years will not remember him without one of those big cigars which he kept smoking while lecturing, or even when he sank in a quick-mud in one of the excursions.

From the end of the seventies on Prof. Ameryckx had serious health problems and restricted his activities to part of his lectures. Fellows of this period know him as the head of a Department where smoking was not allowed from the beginning of the corridor on.

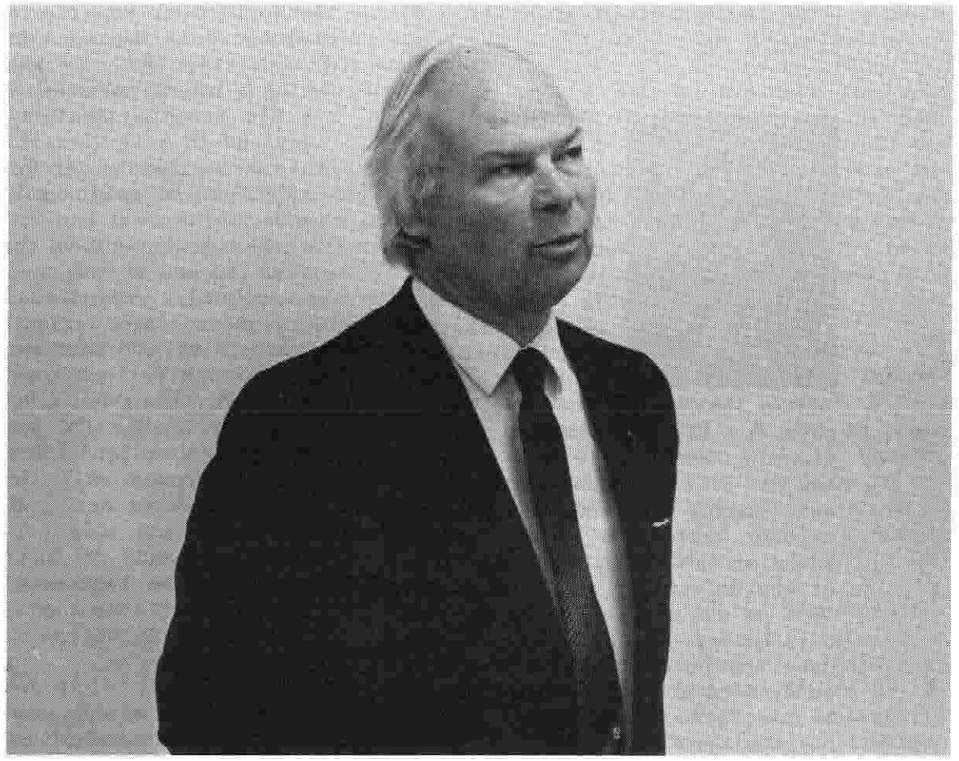
We all hope that his health may improve now that he has retired.

Prof. Dr. R. LANGOHR

■

There is a time for everything ! There is no escape possible from this reality, not even for a world-wide famous man as Prof. De Boodt.

After more than forty years of academic career, Prof. De Boodt retired on October 1, 1991, as Director of the Laboratory of Soil Physics, Soil Conditioning and Horticultural Soil Science and as



the President-founder of the International Center for Eremology.

Marcel, Florent De Boodt, was born in St.-Truiden on March 10, 1926. In 1948, he graduated from the University of Ghent as an engineer for the chemistry and agricultural industries. He got his basic training in soil physics under the guidance of Prof. Dr. Don Kirkham at the Iowa State University in the U.S.A. where he studied as a Fullbright Fellow from 1950 till 1951, and where he obtained the degree of Master of Science in Soil Physics. He received his doctoral degree at the University of Ghent in June 1957 under the supervision of Prof. Dr. L. De Leenheer.

In January 1965, he was appointed Professor and Director of the Laboratory of Soil Physics of the Faculty of Agricultural Sciences, where he was in charge of lectures in soil physics and soil pollution.

Contribution in the field of Soil Physics

During his study period in the U.S.A. the importance of the energy flux at the soil-atmosphere interface and in particular the role of soil structure already became a familiar concept for him.

On the one hand he witnessed the development of modern agriculture making use of ever increasing heavy machinery to get better outputs, but forgetting that care should be taken of the soil structure. At the same time the classical way to maintain good

ON A COLD WINTER DAY IN THE EGYPTIAN DESERT ... . Monday February 24, 1992. Along the Western Desert Road, near Horeia. Noon ... + 8°C, strong wind, heavy rains and hail. ITC-Alumni & -Staff, working on Telsat Project "Waterlogging and Soil Salinity Monitoring in Egypt", seek some comfort in a cup of hot tea and the waterpipe.

From the left to the right : Lic. Trees ONGENA, Dr. Mhd. M. BADAWI, Dr. Abd Alla ABD ALLA GAD (standing), Dr. Rudi GOOSSENS, Dr. Tharwat K. GHABOUR, Prof. Dr. M. DE DAPPER

■

AWARDS, HONOURS

The International Soil Science Award of the Soil Science Society of America was given in 1991 to **Dr. H. Eswaran**, national leader for World Soil Resources at USDA-SCS for his outstanding contributions.

The "Kubiëna Award" of the International Soil Science Society was handed to **Prof. Dr. G. Stoops** during the closing ceremony of the 9th International Working Meeting on Soil Micromorphology in Townsville (Australia) in August 1992 for his contributions in the field of soil micromorphology.

■

NECROLOGY

ITC deplores the death of **Prof. Dr. V.A. Kovda** (°29.12.1904; † 23.10.1991), member of the Academy of Science of the U.S.S.R. and Professor of General Soil Science of the Moscow State University. As a top official of UNESCO, he was one of the persons stimulating the creation of the ITC at the Ghent University, under the auspices of

ALUMNI MOVES

Dr. Mir Muhammad Hassan (M.Sc.-ITC 1968), informed us that since July 1, 1992, he is the Director of the Bangladesh Forest Research Institute, P.O. Box 273, Chittagong, Bangladesh. Before that (1989-1991), he has been working in Qatar as a UNDP-soil scientist.

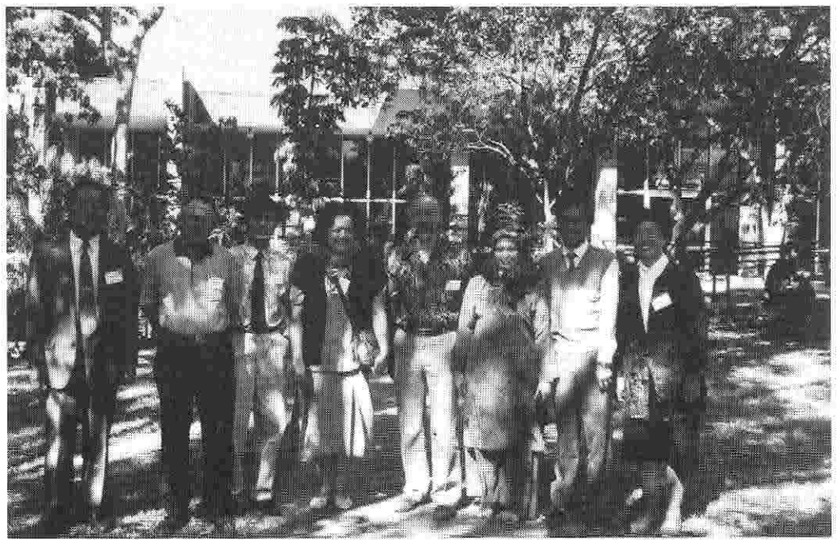
He also let us know that Mr. **Md. Nurul Islam** (M.Sc.-ITC 1982) is presently working as a teacher in the Department of Soil Science Agriculture Institute, P.O. Tejgaon, Sher-e-Bangla Nagar, Dhaka, Bangladesh. Mr. Md. Nurul Islam is at the same time conducting research for a Ph.D. from the Department of Soil Science, University of Dhaka.

Dr. Mir Muhammad Hassan also asked us if we could communicate to him the addresses of some former colleagues and friends at the ITC. Unfortunately the ITC does not have two of the addresses he asked for, namely that of Ms. Anne Van Der Linden (Belgium) and Mr. Bhatt Harish (India). Is there anyone who can help us out ?

■

WHEN ITC-GHENT ALUMNI MEET

The picture below was taken during the 9th International Working Meeting on Soil Micromorphology in Townsville (Australia) in August 1992. Notwithstanding the shadows, one should recognize, from left to right : Dr. H. Yagi (University of Tokyo, Japan), Dr. M. Wieder (Bar-Ilan University, Israel), Dr. J. Arocena (University of Alberta, Canada), Ms. Morakot Dabbakula (Department of Land Development, Bangkok, Thailand), Prof. Dr. G. Stoops (Ghent University, Belgium), Dr. Siti Zauyah (Universiti Pertanian Malaysia) and Dr. Azwar Maas (Universitas Gajah Mada, Yogyakarta, Indonesia).



stable soil aggregates at the toplayer using organic matter and lime started to be neglected and this on a world wide scale.

To cope with that situation profound research was needed in order to prove that a good structure was necessary, Prof. De Boodt participated very actively in the development of chemical polymers known as soil conditioners by which soil structurization and stabilization could be promoted almost instantaneously.

Through his continuous research and that of his scientific staff over the past twentyfive years successful achievements could be scored. Special attention was spent to the changes which can be brought about in the hydrophilicity and hydrophobicity ratio especially on sandy soils by using soil conditioners.

If the first applications were very useful to improve the agricultural production of soils in the temperate regions and in the wet tropics to fight against water erosion, the last applications were mainly dealing with water efficiency in the irrigation systems in semi-arid and arid zones. Prof. De Boodt introduced the concept of "activating neutral surfaces in soil conditioning". It served mainly the desert reclamation and this in an economically justified way. From now on it became possible to treat seedling lines or plantpits for fruittrees and bushes which conserved the water in the rootzone and prohibits evaporation at the soil surface. The method which was tried out in Egypt, gained a widespread interest in the other countries of North-Africa, the Near-East and in China.

Contribution to human welfare in the developing countries

One of the characteristic features of Prof. De Boodt was his love to bring the message of soil conservation and increased soil production through better soil physical treatment to the people of all nations.

In 1963 his first two important missions on the demand of the Joint-Division FAO-IAEA brought him to the Ivory Coast for soil conservation and to Tunisia for desert reclamation. Very soon the Belgian Technical Assistance sent him abroad especially to the Far East, Indonesia, Malaysia, Thailand, the Philippines and China and to Latin America in Peru.

The European market Commission also often calls on him to set up important projects of which the desert reclamation in particular should be like the one tried out in Egypt. He often went on mission in Latin America, especially in Peru, Ecuador and Panama, with as topic the erosion repair of new developments for the desert and in Saudi Arabia and the United Emirates for water use efficiency studies.

Throughout all these activities Prof. De Boodt became convinced that the most lasting effect of scientific collaboration consists in the transfer of knowledge and know-how. Under his guidance more than 100 people were trained and more than 80 obtained an M.Sc. or Ph.D. in soil science. In addition, he was visiting professor in 20 different universities around the world.

Scientific awards and Honorary positions

At the University he often has been the president or a member of scientific advisory boards on a national and international level. Here could be mentioned : the

scientific board of the National Science Foundation, the Commission for Agriculture and the Consultative Council for Scientific Research to the Minister of Agriculture, the Ghent University Scientific Council and Bureau.

He was president of the Belgian Soil Science Society from 1970-1971, and president of the International Soil Science Society, Commission on Soil Physics from 1974-1978.

In 1980, Prof. De Boodt was the Belgian National Delegate to the UNESCO project "MAB" : Man and Biosphere.

He was president of the Belgian branch of the American Society for the Advancement of Science from 1982 onwards; starting from 1985, president of the Scientific Council of the World Foundation for the Quality of Life; and from 1986 onwards president of the International Soil Science Society, Commission for the Study of the Nature and Properties of the Soil Colloidal Surfaces.

Scientific awards and honours which marked his career, were his nomination as an Associate Member of the Belgian Academy for Overseas Sciences (from 1987 onwards). In 1972-1973 he occupied the Franqui Chair at the Catholic University Leuven (Belgium).

In addition he received awards and medals of merit and recognition from universities and government institutions in Iraq (Silver Plate of Merit, State Organisations for Soil and Land Reclamation, Baghdad, 1979), Thailand (Medal of Appreciation, Mayo Institute of Agricultural Technology, Chiangmai, 1983), Egypt (Award of Recognition and Appreciation, Faculty of Agricultural Sciences, Ain Shams University, Cairo, 1987) and Poland (Oczapowski Commemorative Medal, Academy of Science, Warszawa, 1990).

In 1989, he founded the International Institute for Eremology (Desert Science) at the University of Ghent, and was its first Director.

In that position, his main achievement at the University of Ghent was the design and construction of the Building for Eremology at the University Campus with a large scale controlled-environment wind tunnel for experimental studies.

Prof. De Boodt reached the pinnacle of his academic career in 1986 when he was awarded a doctorate honoris causa by the Agricultural University in Lublin, Poland. This title of Doctor Honoris Causa was the recognition of his great scientific merits.

Although Prof. De Boodt's primary concern was with the physics of water in soils, he continually sought to join scientific principles with practical problems. This was his unique genius, the bridging of gaps between theory and practice.

Marcel De Boodt was a vigorous, dedicated man. He gave fully of himself in all his endeavors. He was a sympathetic Professor and Director, with a great sense of fair play. He was a quiet and friendly person, whose consuming interests were his academic work and his family. He was an excellent companion and colleague, above all a very civilised man who had a civilising influence on all who came into contact with him.

Since his retirement at the University, Prof. De Boodt still is very restless and he is almost daily very active at the International Centre for Eremology. We hope to spend still many hours

In the first place, the selection was based on the geographical knowledge from the region, built up from the fieldwork and the literature.

Secondly, a computer programme was written to analyse the reflectance information from the measured features on the field, giving as output a combination and selection of data layers to distinguish the features of interest, based on reflectance data.

Thirdly, another computer programme was written to select features based on non-radiometric datalayers, to see if they were possible to distinguish, and with what kind of datalayer combinations.

CONCLUSIONS

It could be shown that certain features do have a characteristic spectral signature and that they can be selected based on that characteristic signature. Field radiometry is a useful and direct tool, to see if it is possible to distinguish features based on their spectral characteristics or not.

Because the field radiometry shows that it is sometimes very difficult to distinguish features based on their spectral signature, or because the spectral signature is not a characteristic variable for the answer you want to get, other geographical data is needed.

The availability of these data in many cases is very limited or can not be created in an automised way. Before one can decide if a data layer is useful or not, the data layer should first be available.

A lot of research has still to be done on the creation of data layers so that they can be produced in a non-time consuming way, and in the selection of the data layers, to get the answers one likes to receive.

■

MICROMORPHOLOGICAL CHARACTERIZATION AND INTERPRETATION OF PALEOSOLS IN THE LOESS PLAIN OF EUROPE, AS A CONTRIBUTION TO THE KNOWLEDGE OF THE EVOLUTION OF THE ENVIRONMENT AND CLIMATE SINCE THE LAST 100.000 YEARS

Laboratory for Mineralogy, Petrography and Micropedology
Director : Prof. Dr. G. Stoops

This four years project started in November 1992, in collaboration with specialists of Quaternary geology of the Royal National Museum of Natural Sciences, Departments of archaeology of the universities of Leuven and Liege, and specialists in thermo-luminescence of the university of Mons. It is sponsored by the Belgian Ministry of Research.

The task of the team of Ghent, under the supervision of Prof. Dr. G. Stoops and Prof. Dr. R. Langohr is to obtain information on paleosols, depositional conditions and human influences using micromorphological techniques. The aim of this interdisciplinary project is to reconstruct the paleoenvironment of the loess plains during the last 100,000 years. The study area covers west and central Europe, from the Atlantic Ocean till the Russian plains. Samples will be collected in stratigraphical and archaeological type localities, in collaboration with local scientists.

■

ALMERIA HUERCAL OVERO PROJECT

Laboratory for Regional Geography and Landscape Studies, Centre for Remote Sensing
Director : Prof. Dr. L. Daels

PURPOSE

Study of the use of remotely sensed data and other spatial data to integrate in a GIS as a tool for soil erosion studies, applied on an area in the Almanzone basin, SE of Spain.

The project tries to give answers to three main questions :

1) Can we use the radiometric reflectances, obtained from the field measurements using a field radiometer in the first place and from the satellite images (TM images) in the second place, to extract data.

2) How can we create in an automised way, new data layers which seem relevant for the study of soil erosion.

3) How can we combine the data which are obtained from the results of the first two questions to map features or characteristics we are interested in.

To work out the three main questions, the project was split up in three stages.

The first stage which could be mainly described as the fieldwork stage had a few purposes such as :

- obtaining radiometric values from characteristic units (using a field radiometer).

- collecting ground truth of the area which was not available from maps or other documents.

- trying to find main structures in the landscape and distinguishing their relationship with soil erosion.

- looking for relevant factors influencing the soil erosion in the area.

The second stage was the data processing stage. The radiometric data obtained from the field were processed and had to give an answer to the question if features of interest could be distinguished from their spectral signature, and what kind of variable of the spectral signature could be used to distinguish them.

The radiometric data, obtained from satellite images had to be processed, to make a link with the field radiometric data.

Other processing techniques were used and developed to create data from the satellite images and to extract information.

Based on the fieldwork, a lot of factors which seemed to play an important role in the mapping of erosion processes in the study area, were not available as digital layers. Therefore, new data layers had to be created, and algorithms had to be developed, because they are not available on standard GIS software, upstream-drainage-area maps, concavity-convexity maps, slopelength maps, thalweg maps, watershed maps, distance to thalweg maps, ...).

The last stage of the project was dealing with the combination of the date which had been created.

Because the number of data layers which were created, could be combined in several ways, it was important to make a selection according to the answers which had to be given.

with him in "his" Centre for Eremology.

Prof. Dr. ir. H. VERPLANCKE

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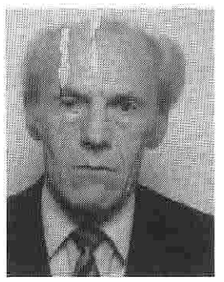

Jan Frans De Coninck retired from the University of Ghent on September 30, 1991 after 23 years of teaching and research in soil genesis and soil mineralogy in the International Training Centre for Post-Graduate Soil Scientists, where he also served as Head of the Laboratory for Soil Analyses.

Prof. De Coninck was born in 1926 and grew up on a farm in the neighbourhood of Brussels as the youngest of a family with 7 children. He had always the idea to become a "scientific" farmer. But at the Catholic University of Leuven he was so attracted by chemistry and soil science that the scientific activities became more important than the real farmer activities. He prepared a thesis in soil science and was awarded the degree of Agricultural Chemistry Engineer in 1948.

After his military service and a short time as a Chemistry Engineer in a factory in Vilvoorde, he joined in 1951 the Belgian Centre for Soil Survey, and this was the beginning of a brilliant career in soil science. He was chief cartographer and soil correlator in the Antwerp Campine.

When soil survey became too much routine for him, he started in 1959 to study soils, mostly sandy and glauconiferous soils of his survey area, under the microscope in collaboration with Dr. J. Laruelle. Because the microscopic research left many questions on composition and mineralogy of these soils unanswered, Prof. Dr. R. Tavernier, Director of the Soil Survey Centre, proposed him in 1963 to carry out a thorough fundamental study on the mineralogy of the soils of the Antwerp Campine, as a part-time research scientist in the Laboratory of Mineral Chemistry of the Catholic University of Leuven. In this laboratory he joined a world-famous research team under the coordination of Prof. Dr. J.J. Fripiat and he got acquainted with a series of new analytical techniques in soil chemistry and mineralogy. He earned his Ph.D. in Agronomy in 1967 from the Catholic University of Leuven and was appointed Head of the Laboratory at the Department of Regional Pedology of the same University.

In 1968, Dr. De Coninck joined the University of Ghent and became Head of the Laboratory for Soil Analysis of the Department of Regional Pedology and Physical Geography; a position he held until his retirement. He was responsible for the courses in general soil chemistry and soil genesis, which provided ITC-students with a thorough background in these areas. His research interests included the investigation of soil forming processes and mineralogy of soils from all over the world and he took part in many international conferences. He was co-ordinator of several research projects sponsored by FKFO (Collective Basic Research Fund).

Dr. De Coninck was active in several professional societies. He was vice-President of Commission VII (Soil Mineralogy) of the International Society of Soil Science and European co-ordinator of the ICOMOD-Commission (Spodosols) of the Soil Conservation Service of the USA.

Dr. De Coninck has been author and co-author of over 120 articles, many of them published in books, international journals and proceedings of international conferences and symposia. He established an international reputation for his research on the genesis and properties of Spodosols. These research findings on podzolisation were compiled in a book "Genesis of Podzols" with which he obtained in 1981 the Aggregate for Higher Education. With the same work he became in 1982 the Laureate of the Belgian Royal Academy of Sciences, Lettres and Fine Arts.

In 1989, Dr. De Coninck was appointed Associate-Professor at the Laboratory for Regional Pedology and Land Evaluation of the University of Ghent and was active as the Secretary of ITC just before his retirement. After his retirement at the University, Prof. Dr. Ir. F. De Coninck is still active as the chairman of the Soil Experts Group of an International co-operative programme on assessment and monitoring of air pollution effects on forests in the ECE region, sponsored by UNEP-UNECE.

Prof. Dr. E. VAN RANST

■

After a long academic career at the State University of Ghent, Prof. Dr. R. Maréchal retired as Director of the Laboratory for Geology on October 1, 1991.

Robert Maréchal was born in Ghent. He graduated in 1948 from the local university with a licence degree in geology, submitted his Ph.D. memoir in 1951 and became aggrégé Higher Education in 1959. He was Laureate of the Inter-University Competition 1947-1949 and was awarded the Wetrems prize by the Belgian Royal Academy in 1960.

R. Maréchal's professional career at the State University of Ghent started a few years after the end of the Second World War, when he was appointed assistant at the Soil Survey Centre (1948). In the following decade he passed through all ranks of the scientific career before being nominated associate professor at the very end of the fifties. In 1964, he became full professor and shouldered the responsibility of setting up and keeping things going in the Laboratory for Geology for practically thirty years.

During his career of service, Prof. Dr. R. Maréchal was in charge of many courses in the field of general geology and physical geography, structural and stratigraphic geology, petrography and water prospection. In his capacity of teacher, he inspired two generations of students in geology, geography, biology, engineering, agronomy and archeology through his enthusiastic devotion to the study of soils and maps, and his broad interest in the

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J.M. Pauwels, E. Van Ranst, M. Verloo, A. Mvondo Ze

MANUEL DE LABORATOIRE DE PEDOLOGIE

Méthodes d'Analyses de Sols et de Plantes, Equipment, Gestion de Stocks de Verrerie et de Produits Chimiques

Agricultural Publications, 1992, n° 28, 265 pp., General Administration for Development Cooperation, Brussels

This manual has been written with the aim to serve as a practical guide for soil science laboratories. It is ment particularly for students, laboratory technicians, soil scientists and agronomists who have to deal either with soil and plant analyses, or with the results of the analyses for a better understanding of soils, soil fertility and plant nutrition.

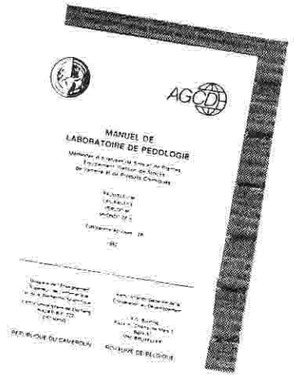
The choice of the analyses has been guided by the practical interest of the analyses, while care has been taken to look for a favourable relation between quality and cost.

The first part is devoted to soil analysis, including soil sampling methods, routine analyses for the chemical and physical characterization of soils, analyses typical for tropical and sahel soils and soils in Cameroun, analysis to determine chemical soil fertility and polluting heavy metals.

All descriptions include the principle of the analyses, materials and method, and the calculation of the results.

The second part describes plant analyses, as this has become indispensable for soil fertility studies. First, some general guidelines for sampling are given. Then the analysis for the characterization of the mineral status of plants are described, and this in a similar way as for soils.

In annex the management of laboratory material is given, including lists of chemicals, apparatus, glassware and other equipment.



This book has been written in French, and can be obtained free of charge at : Publications Division, General Administration for Development Cooperation, Place du Champ de Mars 5, bte 57, B-1050 Brussels, Belgium.

ITC-Ghent Publication n° 90/039

H. Tang, E. Van Ranst and C. Sys

Laboratory for Regional Pedology and Land Evaluation, Faculty of Sciences, University of Ghent

AN APPROACH TO PREDICT LAND PRODUCTION POTENTIAL FOR IRRIGATED AND RAINFED WINTER WHEAT IN PINAN COUNTY, CHINA

In : Soil Technology (1992) 5:213-214

ABSTRACT

The methodology described in this paper provides land evaluators and land use planners with a tool to predict the land production potential for irrigated and rainfed winter wheat in Pinan County (China), taking into account environmental conditions and management practices of the local farmers.
The correlation between predicted yields and actual reported yields by local farmers suggests a close resemblance between the simulated production environment and the situation in which the farmers operate.
Incorporation in the model of quantified effects of limiting factors on crop performance allows estimation of inputs necessary to improve the actual yield level.

BOOKS

C. Sys, E. Van Ranst and J. Debaveye

LAND EVALUATION

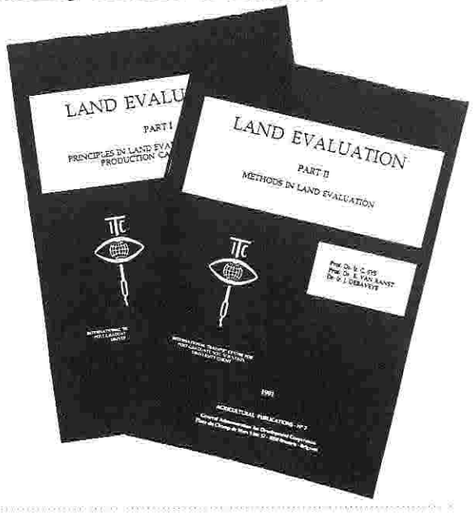
Part I : Principles in Land Evaluation and Crop Production calculations (1991)
Part II : Methods in Land Evaluation (1991)
Part III : Crop Requirements (1993)

Agricultural Publications, 1991, n° 7, part I : 274 pp, part II : 247 pp, part III : in press, General Administration for Development Cooperation, Brussels

This is a completely revised edition. This publication has to be considered as a practical manual on land evaluation for agricultural purposes. Besides the explanation of the principles in land evaluation, it provides the necessary guidelines for crop production calculations and for the most important practical methods in land evaluation useful to anyone engaged in assessing the suitability of land for agricultural development.

It was the authors' aim to comment particularly on the soil science and the land-use aspect of land evaluation, based on the fairly stable physical resources (soil, topography and climate).

The socio-economic aspects, including farm size, management level, availability of manpower, market position and other human activities, are variable and dependent on social and political decisions. Though not dealt with in detail, they are mentioned wherever they are important for taking certain decisions.



earth as a whole. For obvious reasons his scientific interest was kindled first in quaternary geology, cartography and soil survey, and then in stratigraphy and hydrogeology.

When the International Training Centre for Post-Graduate Soil Scientists was set up in October 1963, he became also a member of the teaching staff. His lectures on geology of parent materials were appreciated by all ITC-Ghent students and many vividly recall how the geologic past of Belgium was graphically presented by skillful drawings.

Prof. Dr. R. Maréchal deserves all the credit to have pulled up and stimulated so selflessly soil survey and classification, and hydrogeologic research in Belgium. As a member, vice-president and/or president of many national committees, commissions and scientific societies he encouraged, advised and assisted throughout his professional career many colleagues, collaborators and young scientists.

He was a particularly modest and understanding director, that we prize and respect as a man, and honour as a scientist.

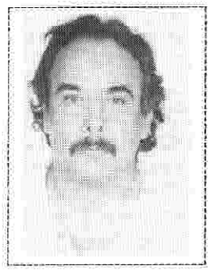
Prof. Dr. P. DE PAEPE

■

Goodbye also to Mr. Theo De Cock, who retired in May 1992. From 1980 till his retirement he took care of the students' files and registration and, not the least, of the students themselves. At all times, they could drop in for a chat and talk about any problems they might have, administrative and other. Mr. De Cock was always ready to listen and help, and indeed was infatigable in seeing to it that things were settled for "his" students as well as possible. In the name of all these students and of the ITC, a warm thank you !

ACADEMIC YEAR 1991-92

1st year M.Sc.



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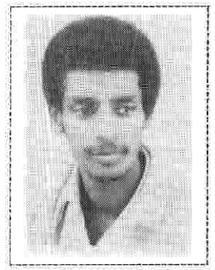

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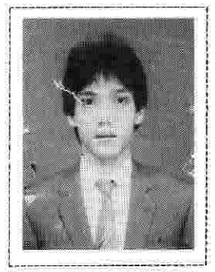

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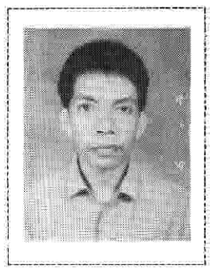

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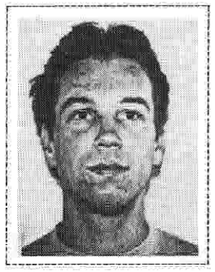

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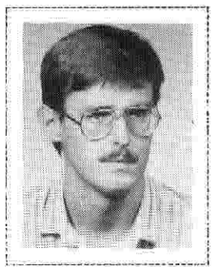

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the application of urea. However, environmental conditions might have an important influence on the effectiveness of these inhibitors.

ITC-Ghent Publication n° 90/037

R. Langohr and B. Baes

Laboratory of General Pedology, Faculty of Sciences, University of Ghent

DONNEES ET INTERPRETATIONS PEDOLOGIQUES CONCERNANT LE SITE ARCHEOLOGIQUE DE SAINT-SAUVEUR "VERTES-FEUILLES" (Frasnes-lez-Anvaing, Ht)

In : Vie Archéologique (1990-1991) 35:24-29

ABSTRACT

Lors des fouilles du site de Saint-Sauveur "Vertes-Feuilles", nous avons pu effectuer une série de relevés pédologiques. Ces prospections et les quelques observations de laboratoire effectuées sur les échantillons prélevés sur le site avaient pour but principal de répondre aux questions suivantes : 1) quel était la raison du creusement des grandes fosses au cours des Ages des Métaux; 2) le remplissage de ces fosses s'est-il fait en une, ou en plusieurs phases et 3) d'où provient le matériau de remplissage de ces fosses.

Nous résumons ici les données de terrain et de laboratoire qui permettent d'aborder ces sujets de recherche. Pous les données précises concernant le site et les structures archéologiques nous renvoyons le lecteur à l'article de Ph. CROMBÉ publié dans ce même volume.

ITC-Ghent Publication n° 90/038

Tang Huajun[1], J. Debaveye[1], Ruan Da[2] and E. Van Ranst[1]

[1] Laboratory for Regional Pedology and Land Evaluation, Faculty of Sciences, University of Ghent
[2] S.C.K. Reactor Physics Section, Boeretang 200, B-2400 Mol, Belgium

LAND SUITABILITY CLASSIFICATION BASED ON FUZZY SET THEORY

In : Pedologie (1990) XLI-3 : 277-290

ABSTRACT

In this study, the fuzzy set theory is applied to the field of land evaluation. The result of the land suitability classification for a defined land utilization type applied to a land unit, is no more a single land suitability class, as in the traditional set theory, but an expression of the degree of belonging of the land unit to each of the discerned suitability classes. This principle is applied to a land assessment for grain maize in Hahen County, China. The classification results obtained with the fuzzy set method show a closer relationship with observed yields than previously proposed suitability classification methods.

I T C

ARTICLES

ITC-Ghent Publication n° 90/026

A.A. Soaud[1], G. Hofman[2] and O. Van Cleemput[2]

[1] Soil Department, Faculty of Agriculture, Cairo University, Giza, Egypt
[2] Faculty of Agricultural Sciences, University of Ghent

NITROGEN FERTILIZATION AND POTATO GROWTH

In : Pedologie (1990), XL-3:257-271

ABSTRACT

A study on mineral N in clayey soils and on potato growth related to nitrogen fertilization was carried out on a farm in the Polder area of northern East-Flanders (Belgium) during two consecutive years. Three N rates (zero, recommended and excess) were tested. Soil and plant samples were collected every two weeks throughout the growing season. The soil profile was sampled in four equal layers from 0-120 cm. Potato plants were divided up into leaves, stems above-ground, stems under-ground, roots and tubers. The results showed that the excess rate of fertilizer-N did not significantly contribute to higher yields but negatively affected some tuber qualities. Excess N presented a threat to the environment by increasing the residual nitrate level in the soil profile. The recommended rate of fertilizer N sufficiently met the plant demand for nitrogen in both growing seasons.

ITC-Ghent Publication n° 90/030

Wang Zhengping, O. Van Cleemput, P. Demeyer and L. Baert

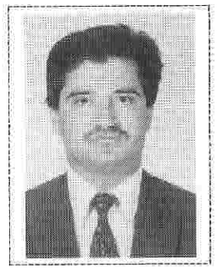
Laboratory of Physical and Radiobiological Chemistry, Faculty of Agricultural Sciences, University of Ghent

EFFECT OF UREASE INHIBITORS ON UREA HYDROLYSIS AND AMMONIA VOLATILIZATION

In : Biol. Fertil. Soils (1991) 11:43-47

ABSTRACT

Two laboratory incubation experiments were conducted to study the effects of the urease inhibitors hydroquinone (HQ), phenyl phosphorodiamidate (PPDA), and N-(n-butyl) thiophosphoric triamide (NBPT) in retarding the hydrolysis of urea, in the evolution of mineral N, and in reducing NH_3 loss through volatilization, under aerobic and waterlogged conditions, both at 25°C. NBPT generally exceeded PPDA and HQ in the ability to delay urea hydrolysis and NH_4^+ accumulation under aerobic conditions, whereas PPDA retarded these activities more effectively under anaerobic conditions. HQ was less effective than the other two urease inhibitors. Under aerobic conditions, 20% of the applied urea was lost through NH_3 volatilization after 5 days in the system without an inhibitor. With the addition of HQ and PPDA, the volatilization was delayed by 1 day but not eliminated. NBPT effectively decreased the NH_3 loss, from 20 to 3% of the applied urea. A more severe N loss (40%) occured in the waterlogged system. HQ had little effect on NH_3 volatilization. PPDA decreased the NH_3 loss from 40 to less than 20% of the applied urea. The effectiveness of NBPT decreased under anaerobic conditions. It was concluded that urease inhibitors can reduce NH_3 volatilization following



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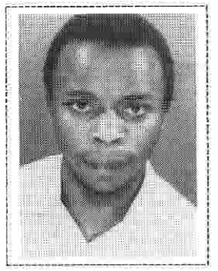

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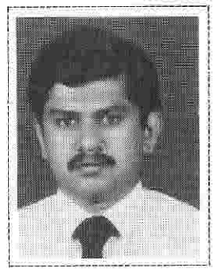

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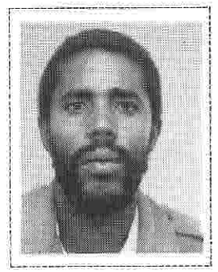

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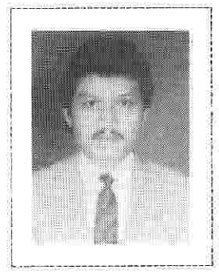

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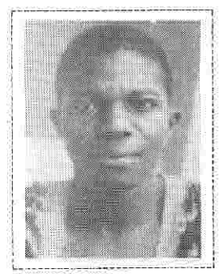

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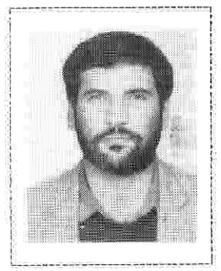

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Why soil science

Soils are one of the most important pillars of support for human life of a country and determine to a large extent the agricultural production capacity. In big parts of the world, the soil surface that can be used for agricultural purposes is already largely under cultivation. An efficient management and use of this natural resource therefore is essential and often even crucial. This requires a thorough knowledge of the medium soil: the answer to the questions what is and what makes a soil, which are the factors determining its liability to erosion, destruction and pollution hazards, and how to determine and manage the actual and potential suitability of a soil for certain purpose. It is in this context that the education of specialists in the field of soil science is warranted.

ITC-Ghent, 30 year of tradition

The International Training Centre for Post-Graduate Soil Scientists at the University of Ghent has a long-standing reputation in the academic formation, and training of soil scientists. Founded in 1963 with the support of UNESCO, in answer to a large number of requests from abroad, the Institute has trained over 800 students from about 90 different nations from all over the globe. The ITC-Ghent has been selected as a host institute for post-doctoral research fellows in the frame of the Human Capital and Mobility Programme of the EC and is an active participant in ERASMUS and TEMPUS programmes.

Post-graduate training programmes

The M.Sc. degree courses at the ITC-Ghent cover two Academic Years and are given entirely in English. The first year programme provides a general but comprehensive basis in soil science with the option to major in Soil Genesis, Soil survey and Land Use Planning, Geo- and archaeopedology, or Soil Fertility and Ecopedology. The second year programme offers more specialized courses and research in one of the disciplines of soil science named above. The students have to follow a few courses compulsory for the disciplines they subscribe for, but can complete their study programme with a number of courses of their own choice. They also have to prepare a dissertation.

The Advanced Studies in Soil Science cover one Academic Year. To some extent, the programme can be designed individually, by selecting courses from the M.Sc. curricula, but has to be approved by the Academic Board. Successful students are awarded a certificate of Advanced Studies.

The Institute is fully integrated in the University of Ghent: laboratories born from the Geological Institute of the Faculty of Sciences and from the Faculty of Agriculture and Applied Biological Sciences are part of it. Apart from the theoretical and practical training provided by the staff of these laboratories, there are regularly invited lectures by guest speakers from other universities in and outside of Belgium.

Outline of the course curricula

M. Sc. Soil Science

1st year	theory	hours training	SP[1]
BASIC COURSES			
- General Pedology	30	45	7
- Introduction to Geology	15	30	4
- Introduction to Mineralogy	15	30	4
- Concepts of Micropedology	15	15	3
- General Climatology	15	15	3
- General Geomorphology	15	15	3
- Introduction to Soil Chemistry	15	30	4
- Statistics and Informatics	22.5	30	5
SEMINARS : 90 hours, 11 SP			
MAJOR COURSES			
1 SOIL GENESIS			
Clay Mineralogy	30	30	6
Micropedology	30	30	6
Soil Site and Morphology	15	30	4
2 SOIL SURVEY AND LAND USE PLANNING:			
Soil Survey	15	60	6
Soil Site and Morphology	15	30	4
Regional and Quaternary Geomorphology	30	30	6
3 GEO- AND ARCHAEOPEDOLOGY			
Geo- and Archaeopedology	30	30	6
Soil Site and Morphology	15	30	4
Micropedology	30	30	6
4 SOIL FERTILITY AND ECOPEDOLOGY			
Soil Chemistry, Fertilizer Chemistry and Soil Pollution	30	45	7
Soil Physical-Chemistry	15	30	4
Microbial Ecology	30	15	5

2nd year	theory	hours training	SP[1]
MAJOR COURSES			
1 SOIL GENESIS			
Soil Genesis	30	30	6
Soil Mineralogy	15	15	4
Petrography	15	30	4
2 SOIL SURVEY AND LAND USE PLANNING:			
Remote Sensing	30	45	7
Soil Classification	15	30	4
Land Evaluation and Land Use Planning	30	30	6
3 GEO- AND ARCHAEOPEDOLOGY			
Soil Genesis	30	30	6
Regional and Quaternary Geomorphology	30	30	6
Regional Pedology: temperate and tropical regions	15	30	4
4 SOIL FERTILITY AND ECOPEDOLOGY			
Soil Physics, Soil Erosion and Soil Conservation	45	45	9
Fertilizer Management	30	30	4

MINOR COURSES (have to be approved of by the Academic Board) Regional Climatology; Irrigation and Drainage; Crop Husbandry; Land Information Systems; Soil Biology; and all major courses

SEMINARS: 90 hours, 11 SP

DISSERTATION : 20 SP

Advanced Studies

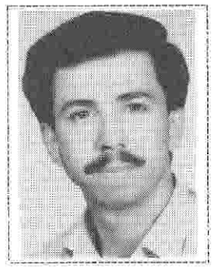
Study programme covering 1 Academic Year

BASIC AND MAJOR COURSES: 49 SP

SEMINARS: 11 SP

[1] Study points: per year: a total of 60 SP has to be obtained

Advanced Course



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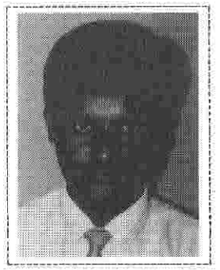

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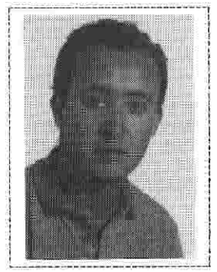

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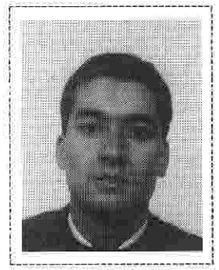

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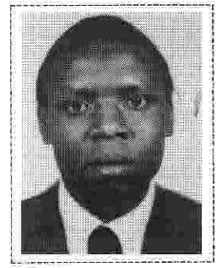

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The course timetable

The Academic Year at the ITC-Ghent lasts from the beginning of October till the end of May, with two fortnight's breaks: one around Christmas and New Year and another around Easter. There is a first examination session with a first part during the first two weeks of February, and a second part during the second half of June. In case of failure, students can try again in a second examination session held in September.

Entry requirements

Applicants for the Advanced Studies must be holder of a degree in exact or applied sciences equivalent to at least four years of university studies e.g. B.Sc. (Hons.) in geology, geography, chemistry, botany, biology, agriculture, environmental sciences ...; B.A. (Hons.) in archaeology: subject to approval by the Academic Board. As all lectures are given in English, a good command of this language is required.

Application for course admission

An application form for course admission (that can be obtained upon request from the ITC-secretariat) has to be duly completed and returned to the Institute, accompanied by the following documents:

- a certified (by the Belgian diplomatic office or by default by the national authorities) copy (or translation) of the required university degree;
- a certified transcript of the academic records;
- a document proving English proficiency (TOEFL-test with a mark of 550-600) for applicants who do not have English as their mother tongue. NOTE: if the applicant cannot forward such a document upon registration at the University he or she has to complete an English test at the Language Centre of the University. In case of failure, an intensive course in English has to be followed;
- applicants without a scholarship, should provide a document proving that they have sufficient means to cover their living and study costs in Belgium. This document has to be signed by the Belgian Embassy or Consulate of the student's country who can check up the students' solvency.

Scholarships

The registration fee is BEF 20,000,-. In addition, a research fee of BEF 100,000,- is requested. Annual living costs (including board and lodging, study material, medical insurance) are about BEF 340,000,-

For students of developing countries the Belgian government yearly awards a number of scholarships through the Belgian Administration for Development Cooperation of the Ministry of Foreign Affairs. In addition to the basic admission requirements of the ITC-Ghent, applicants should have at least two years of working experience. Students from all countries can apply for scholarships from the Ministry of the Flemish Community for Education and Cultural Affairs. For more information and applications for these scholarships, the Belgian Embassy should be contacted. Study grants are also given by several international organizations, e.g. the European Commission's Development Fund, FAO, UNDP, UNESCO, NATO, WB, ADB (for students of member countries) etc.. Applications for such scholar- or fellowships should be directed to the representatives of the organisations concerned in the student's country. More information on these and other grants can be found in a number of publications, e.g. "Study Abroad", a UNESCO publication (Paris), "Advanced Training in the EEC", (EEC, Brussels), "The Grants Register" of C.A. Lenner (ed.) (London, MacMillan).

Short term training, research degree (Ph.D) and research fellow programmes

This type of training (3-6 months) in one particular field of soil science. This type of training is also open to technicians (persons who do not have a B.Sc. degree). Candidates for Ph.D. studies should follow the same procedure for application as the candidates for Advanced and M.Sc. studies. Their candidatures are put to the Academic Board, who decides upon the terms of admission. Post-doctoral research programmes can be arranged upon request. The ITC-Ghent also welcomes professors on sabbatical leave.

Enquiries

Prof. Dr. G. Stoops, Director ITC. Geological Institute, University of Ghent, Krijgslaan 281/S8, B-9000 Gent, Belgium.

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UNIVERSITEIT GENT

MASTER'S and ADVANCED COURSE in SOIL SCIENCE

organised by the University of Ghent, with the support of the Belgian Administration for Development Cooperation

ITC

International Training Centre for Post-Graduate Soil Scientists
Ghent, Belgium

M.Sc. Theses 1991

MICROMORPHOLOGY AND MINERALOGY OF SOILS ON GRANITE IN THE LOWER ZAIRE
by **Abayneh Esayas Atengo** (Ethiopia)
Promoter : Prof. Dr. G. Stoops

KINETICS OF FE^{3+}-ADSORPTION ON PEAT SOIL
by **Abdul Hamid** (Indonesia)
Promoter : Prof. ir. L. Baert

FIELD AND LABORATORY CHARACTERIZATION OF SOME VERTISOL PROFILES OF THE LOWER SHABELLE (SOMALIA) AND KAPTHURIN (KENYA) AREAS
by **Abdullahi Hussein Samater** (Somalia)
Promoter : Prof. Dr. R. Langohr

EFFECT OF PIG SLURRY ON THE NUTRIENT UPTAKE PATTERN OF BLANCHING CELERY
by **Boadi Samuel** (Ghana)
Promoter : Prof. Dr. ir. M. Verloo

CRITICAL COMPARISON OF THE BULGARIAN AND THE F.A.O. LAND EVALUATION SYSTEM FOR MAIZE
by **Bojidar Krounov Gueorguiev** (Bulgaria)
Promoter : Prof. Dr. E. Van Ranst

ASSESSMENT OF SOIL FERTILITY REQUIREMENTS USED IN LAND EVALUATION METHODS AND FERTILIZER RECOMMENDATIONS FOR COCOA AND BANANAS
by **Duadze Stephen Edem Korbla** (Ghana)
Promoter : Prof. Dr. E. Van Ranst

THE EFFECT OF UREA APPLICATION ON THE NUTRIENT BEHAVIOUR IN SOILS OF KENYA
by **Edward Mworia Irambu** (Kenya)
Promoter : Prof. Dr. ir. M. Verloo

PARENT ROCK/SOIL MANTLE RELATIONSHIP IN SELANGOR, MALAYSIA
by **Eswaran Padmanabhan** (Malaysia)
Promoter : Prof. Dr. G. Stoops

SOIL CHARACTERISTICS DUE TO WATER IN ARCHAEOLOGICAL CONTEXTS IN THE SANDY TO SANDY LOAM AREA OF NORTHERN BELGIUM. A CONTRIBUTION TO PALEOENVIRONMENT RECONSTRUCTION
by **Fechner Kai** (Germany)
Promoter : Prof. Dr. R. Langohr

EVALUATION OF CLIMATE AND SOIL DATA FOR GROUNDNUTS (ARACHIS HYPOGAEA) AND SOYABEANS (GLYCINE MAX) IN CENTRAL SHOWA (ETHIOPIA)
by **Gidey Kahsay Abera** (Ethiopia)
Promoter : Prof. Dr. E. Van Ranst

DEVELOPMENT OF A G.I.S. AND THE USE OF REMOTE SENSING FOR THE CEIL NDIA REGION FOR SOIL AND LAND MANAGEMENT
by **Janete Odria Rodrigues** (Brazil)
Promoter : Prof. Dr. L. Daels

NITROUS OXIDE FORMATION IN DIFFERENT SOILS
by **Joel C. Bandibas** (The Philippines)
Promoter : Prof. Dr. ir. O. Van Cleemput

SOLUBILITY AND TRANSFORMATION OF VARIOUS PHOSPHATE FERTILIZERS APPLIED TO DIFFERENT SOILS
by **Kanyanjua Shem Maina** (Kenya)
Promoter : Prof. Dr. ir. M. Verloo

CONTRIBUTION TO A SOIL SURVEY INTERPRETATION FOR RICE (ORYZA SATIVA) IN CENTRAL LIBERIA
by **Lincoln Emmanuel Saymour** (Liberia)
Promoter : Prof. Dr. E. Van Ranst

EVALUATION OF CLIMATIC AND SOIL DATA FOR MAIZE (ZEA MAYS) AND SORGHUM (SORGHUM BICOLOR) IN BOBONONG AND MAHALAPYE (CENTRAL BOTSWANA)
by **Maembolwa Josephine Seanokeng** (Botswana)
Promoter : Prof. Dr. E. Van Ranst

IMPACT OF THE EDAPHIC FACTOR ON THE PLANT ECOLOGY IN THE WESTHOEK COASTAL DUNE NATURE RESERVE, BELGIUM
by **Maseki Nzuankende Godwin Mkumbo** (Tanzania)
Promoter : Prof. Dr. R. Langohr

EVALUATION FOR SURFACE IRRIGATION OF REPRESENTATIVE VOLCANIC SOILS ON THE LOWER PART OF MOUNT KILIMANJARO (TANZANIA)
by **Mbogoni Joseph David John** (Tanzania)
Promoter : Prof. Dr. E. Van Ranst

nel + rainfall simulator)will enable to carry out the following projects :

- effect of rainfall on wind speed profiles
- wind erodibility (deflation) of sands and soils
- combined effect of rain and wind on the slaking of soil surfaces
- testing of instrumentation to measure transport by wind of solid particles
- dust movement under different climatic conditions
- effect of plant cover on sand movement
- control of wind erosion with soil conditioners.

For further information take contact with Prof. Dr. ir. H. Verplancke or Dr. ir. D. Gabriels, Faculty of Agricultural and Applied Biological Sciences, Department of Soil Conservation and Soil Care, Laboratory of Soil Physics, Coupure links, 653, 9000 Gent (Fax : +32-91/64.62.47).

Communicated by H. Verplancke

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Point Counting Programme

Point counting still remains one of the most used methods for quantitative analyses of mineral components in soil thin sections. Automatic point counters (e.g. Swift) generally accept only small (petrographic size) thin sections. For the micromorphometry of larger sections (e.g. mammoth sections) the use of a point count ocular is the most suitable method. This means however that countings have to be registered manually on a sheet of paper. In order to simplify this procedure, a special software was developed by ing. Julien De Weirdt (Laboratory of Mineralogy, Petrography and Micropedology). Although the programme is basically developed for point counting in microscopy, it can be used for any elementary point counting collection.
Features :

- Point counting is registered by means of the numerical keyboard of a personal computer (therefore only 9 variables are allowed);
- The input data and the results are directly screened : on the upper part of the screen numerical data appear, whereas on the lower part the results are visualized in block diagrams;
- Most logic error inputs are detected, rejected and explained to the user;
- A "help" function key is available;
- Data can be saved on a floppy disk, and printed. Files can be updated or changed.

The flowsheet of the programme can be obtained from ing. J. De Weirdt upon request, provided that necessary specifications are given on the type of computer used.

Communicated by G. Stoops

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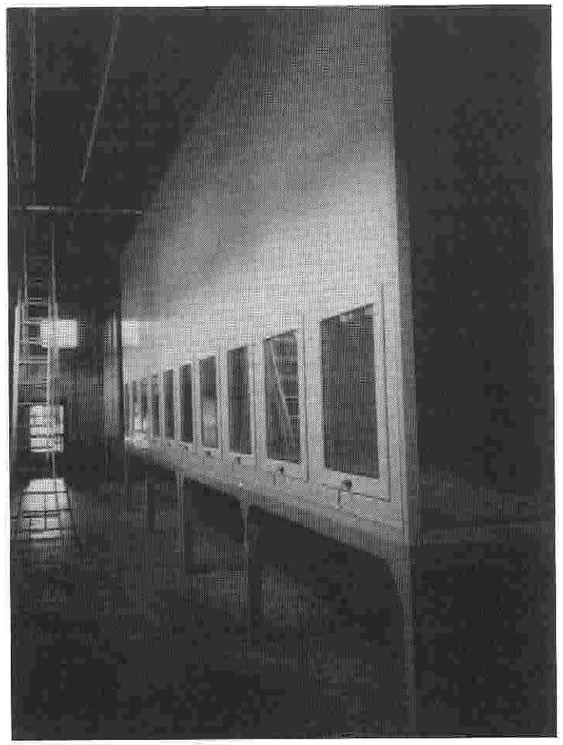

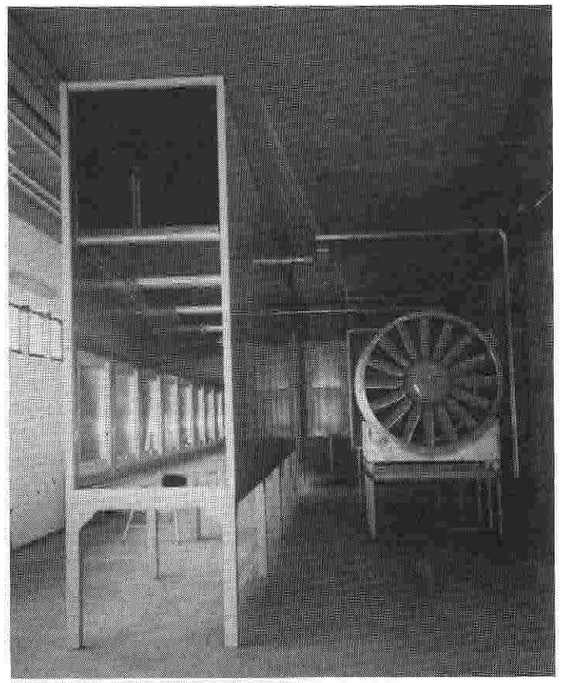

rainfall simulator and erosionfield plots to assess the different parameters involved in the erosion process. One of the parameters, being the rainerosivity, was evaluated by determining the kinetic energy of the falling raindrops, as the combination of the mass and the fall velocity of the drops.

It is a fact that the fall velocity of the raindrops, and hence the kinetic energy, is influenced by wind which not only adds a supplementary vector to the energy, but also results in an oblique impact of raindrops on the soil surface.

In this context it was decided to direct further research on climatic parameters of the erosion process i.e. rainerosivity, by assessing the combined effect or interaction of wind and rain.

A large scale windtunnel in combination with rainfall simulation can approximate different climatological conditions with regard to rainfall intensity, wind speed, temperature, radiation and humidity.

The windtunnel under construction is a type with a closed circuit in which air is driven in a continuous path by a large fan into a test-section of 12 m length, 3 m height and 1.25 m wide.

Photo's 1 and 2 illustrate the test section of the windtunnel and the fan.

In a later stage a rainfall simulator will be attached on top of the test-chamber.

The proto-type unit (windtun-

THE EFFECTS OF DIFFERENT ZN-FERTILIZERS ON THE CHEMISTRY OF NUTRIENTS IN SOIL AND PLANT
by **Md. Zahangir Kabir** (Bangladesh)
Promoter : Prof. Dr. ir. M. Verloo

COMPARATIVE STUDY OF MEASURED AND PREDICTED EROSION IN TOBACCO-CULTIVATION SYSTEMS OF CUBA
by **Pena Valenti Fermin Jose** (Cuba)
Promoter : Dr. ir. D. Gabriels

SOIL PHYSICAL EVALUATION OF THE DRAINAGE FLUX IN THE WATER BALANCE EQUATION
by **Phiri Elijah Benes** (Zambia)
Promoter : Prof. Dr. ir. H. Verplancke

SOIL CHARACTERISTICS AND VEGETATION COMPOSITION ALONG A TOPOTRANSECT IN THE GUNUNG GEDE PANGRANGO NATIONAL PARK, WEST JAVA, INDONESIA
by **Pratiwi** (Indonesia)
Promoter : Prof. Dr. R. Langohr

MINERALOGY AND GENESIS OF A SOIL TOPOSEQUENCE ON DOLOMITE IN SW SARDINIA, ITALY
by **Vanmechelen Luc** (Belgium)
Promoter : Prof. Dr. ir. F. De Coninck

CHARGE PROPERTIES OF SOME SOILS ON VOLCANIC MATERIAL FROM RWANDA
by **Yazew Teferi** (Ethiopia)
Promoter : Prof. Dr. ir. F. De Coninck

Ph.D. Theses 1990-1991 ABSTRACTS

EFFECTS OF UREASE INHIBITORS ON NITROGEN TRANSFORMATIONS IN SOILS

by **WANG ZHENGPING**
Promoter : Prof. Dr. ir. O. Van Cleemput
Present function and address : Research Associate, Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge La 70803, USA

The use of urease inhibitors has been considered as a promising way to reduce the N loss after application of urea. Many investigations on the effect of urease inhibitors on urea hydrolysis, on reduction of urea-N loss through ammonia volatilization and on urea-N efficiency have been carried out. However, the involvement of these inhibitors on other soil N transformations are rarely studied.
Eight individual but interrelated incubation experiments were conducted to study the effects of some selected urease inhibitors on the most important N transformations in soils. Hydroquinone (HQ), phenyl phosphorodiamite (PPDA) and N-(n-butyl) phosphorothioic triamide (NBPT), were investigated for their effects on soil pH, on urea hydrolysis, on ammonia volatilization, on nitrification and denitrification, on urea-N immobilization, on vertical movement of urea-N as well as on urea-N efficiency to ryegrass.
The results show that NBPT is the most effective urease inhibitor on retardation of urea hydrolysis as well as on decreasing urea-N efficiency under alkaline and aerobic conditions. Under waterlogged and acid soil conditions, PPDA is the strongest urease inhibitor due to prevention of its degradation by the lower soil pH. The inhibitor HQ, however, is not as effective as the other two compounds on urea hydrolysis. Its inhibition on nitrification may result in both positive as well as negative consequences.

OCCURRENCE AND ECOCHEMICAL BEHAVIOUR OF ARSENIC IN A GOLD-SMELTER - IMPACTED AREA IN GHANA

by **George Anthony Manful**
Promoter : Prof. Dr. ir. M. Verloo
Present function and address : Ghana Environmental Protection Agency

Due to the daily discharge of over 20 t of arsenic (As) from a gold smelter at Obuasi, Ghana, the local environment has been heavily contaminated with As.
Total As contents in excess of 62,000 mg/kg were detected in top soils near the smelter stack, but these levels declined rapidly with distance and soil depth. Abnormally high levels of As were also found in food and foliage samples. The degree of As uptake by plants varies widely from species to species with ferns showing high As tolerance and uptake. Elevated As levels were detected in hair and nail samples of people working or living within 12 km of smelter.
Chemical fractionation studies revealed that As in the soils is associated mainly with Fe and Al. The levels of reductant soluble As reflected the importance of oxidationreduction phenomena in the soils. The ability of H_2EDTA^{2-} and $H_2PO_4^-$ to extract more As than Cl^- and H_2O emphasizes the importance of ligand exchange and complex ion formation processes in As release from soils. Modelling of kinetic data was useful in confirming the influence of exchangeable Al, clay and organic matter in the retention of As in soils. Solubility studies revealed that almost all soils were undersatured with respect to $AlAsO_4$ and $FeAsO_4$. Arsenic leaching is therefore a distinct possibility, although migration may be severely restricted by sorption onto reactive sites on the surfaces of hydrous oxides of Al and Fe. The potential of As mobility in these highly polluted soils has also been modelled, and a decrease or increase of pH would lead to increased mobility. Hence no attempt should be made to alter the pH of the soils except for the purposes of soil sanitation. For clean-up purposes, acidification of contaminated soils to pH values of 1.0 to 1.5

would be essential. The sequestering ability of soils with elevated contents of reactive Fe and Al to reduce water soluble As levels of highly polluted soils was illustrated. This phenomenon could be employed in soil sanitation.

STUDY OF THE ACTUAL ENVIRONMENTAL DEGRADATION IN SOUTHERN EUBOIA (GREECE) USING REMOTE SENSING AND GIS

by Beata Maria De Vliegher
Promoter : Prof. Dr. L. Daels
Present function and address : Scientific researcher, University Gent, Department of Geography, Section Regional Geography and Landscape Science, Krijgslaan 281 (S8-A1), B-9000 Gent, Belgium

In the southern part of the island of Euboia (Central Greece) severe degradation problems occur due to the annual plague of wood fires, the uncontrolled practice of pastoralism, as well as the depopulation of the area and the excessive irrigation.
The environmental degradation is investigated based upon a combined and integrated research, using different techniques : multi temporal field work, remote sensing and a geographical information system (ILWIS : Integrated Land and Water Information System, ITC-Enschede, The Netherlands). For this study a multi source data set is used consisting of satellite imagery of different kind (Landsat Thematic Mapper, Marine Observation Satellite-MESSR), aerial photographs, topographical and geological maps, statistical data of agriculture and population and field data.
At first a thematic study of the different influencing factors is made.

1. **Topography**. Information concerning the topography is obtained by digitizing the contour lines as indicated on the topographical maps every 100 m. A linear interpolation allowed the production of a digital elevation model. The DEM is the basic document for derivation of other topographical data : slope and aspect.

2. **Vegetation.** An operational use of remote sensing techniques is elaborated for the mapping of the land cover using the Landsat TM image. This is done using a supervised image classification for which a detailed and multi temporal field survey is executed.
Based upon the terrain knowledge and taking into account the high complexity of the landscape, the splitting up of different sampling classes is proposed and the optimal classification algorithm is searched for.
The mapping of the land cover is obtained using the maximum likelihood algorithm. 9 main land cover classes are distinguished.
The degradation of the vegetation is studied by means of a multi temporal data set consisting of three MOS-MESSR images. It is based upon the calculation of the normalized vegetation index (NVIR) which reflects the amount of photosynthetic active material.

3. **Soils.** An analogue procedure is proposed for the mapping of the parent material and for the mapping of the depth of the soil. 5 classes of soil parent material are distinguished.
Information concerning the depth of the soil is obtained by taking into account the type of vegetation present and the topographical characteristics.

4. **Accessibility of the area.** In general, the accessibility of the area can be described through the distance to the roads. Therefore, roads are digitized as they appear on the topographical maps and afterwards the distance is calculated.

5. **Population.** A study of the demographical evolution for the area is made out of the statistics for the period 1848-1981. These data are combined with an administrative map indicating the boundaries of the communities.
Two migration movements are described : firstly a horizontal migration resulting in a rural exodus towards the capital and other important cities and secondly a vertical migration leading to the depopulation of mountainous areas.

6. **Localization of wood fires.** A study is made concerning the landscape characteristics of the areas previously subjected to wood fires. This is done using the statistical information of fires for the period 1981-1989. A digitalization of the localization map has been performed.
The different thematic maps in combination with ancillary information are incorporated into the GIS. Out of the relationship between the occurrence of environmental degradation and the characteristics of the influencing factors, the degradation risk is calculated.
(1) Environmental degradation caused by wood fires. This is mainly influenced by the type of land cover, the topography (altitude, slope and aspect) and the accessibility of the area.
The integration of the influencing factors is based upon a hierarchical system, due to the fact that some of the factors have a greater impact upon the risk. According to the place in the system, a weight is given. The higher the weight the higher is the place in the system. Each factor is also subdivided into different risk classes (no, moderate and high) risk) each of them labelled with a score.
The risk for environmental degradation caused by wood fires is calculated based upon a simple formula in which the sum is made of the respective risk for each of the factor. The final map distinguishes four risk classes : no till high risk.
(2) Environmental degradation caused by pastoralism, depopulation and excessive irrigation
The procedure followed for the risk mapping caused by above mentioned phenomena is analogous. First the influencing factors are determined. Each class of the different influencing factors are put into a different category corresponding with a specific grade of risk and each of them labelled with a score. Because of the interaction between the different factors, the respective scores are multiplied and the result is ranked into four classes : no risk till high risk.
The resulting risk maps can be used by the local authorities for decision making and taking measures.
It can be concluded that the integration of the different techniques allows the modelling of the environmental degradation in a relative simple way. The research will be expanded in the near future by taking into account other influencing factors and by extrapolating to other regions.

NEW EQUIPMENT

Intergraph System

At the Laboratory for Regional Geography an Intergraph system was installed. This system is a powerful and flexible geographical information system, installed on a UNIX workstation (interpro 2020).

This geographical information system is constructed out of different environments and is therefore called a modular GIS. The different slotable software products are represented in figure 1.

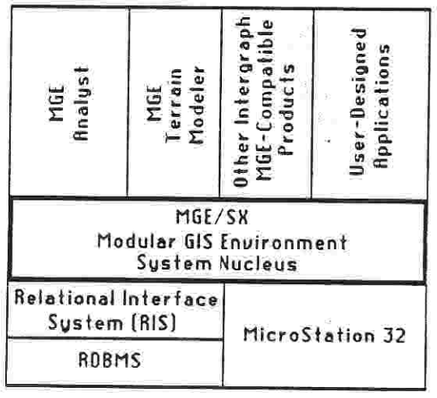

Figure 1 : Overview of the different Intergraph software products

The software products mainly used by the operator are the following :

MicroStation 32 is a powerful CAD product which can be used for storing and manipulating the graphic data.

mge/analyst creates topological-structured files based upon simple geometrical elements from design files which are created in MicroStation 32. Each element (point, line, curve, arc, ellipse, polygon) is stored in a graphic record that describes its geometry, location symbology properties and informational links to the non-graphic database. The graphic elements in a file are automatically distributed into layers or overlays of common symbology, theme or feature type, as specified by the users. The graphic elements represents the geographic features of an area and can be manipulated from the workstation.

RDBMS : The relational database management system for use here in the system is the informix database.

The Intergraph system can be involved for any study dealing with land information systems such as surveying, photogrammetry, cartography, engineering design, utilities, terrain modelling or spatial analysis.

Any person who is interested in the system can contact the lab and we will be glad to give you the necessary information.

Communicated by T. Ongenae

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A Windtunnel at the International Center of Eremology

Some history and background

Several months of discussions, calculations and drawings resulted in the construction of a prototype windtunnel to serve multiple purposes.

The basic idea behind it originates already several years ago when intensive soil erosion research was carried out at the Laboratory of Soil Physics of the University of Gent. Use was then made of a