Dear Colleagues,

Welcome to this October Newsletter!

First of all, I want to congratulate our 2016 Young Micromorphology Paper Awardees: Vincent Felde for a paper on soil structure analysis of desert crusts and Mareike Stahlschmidt for a geoarchaeological paper questioning fire control by humans during the Paleolithic in N Europe. I encourage you to read these excellent papers. I also congratulate the rest of candidates for the quality of their research.

The preparations of the International Congress of Soil Micromorphology next December are going well, the scientific programme is ready and the excursions and other events as the 3rd Latin American Micromorphology Course are well planned. Thanks to all the organisers! I’m sure it will be a fantastic meeting.

Finally, besides our regular contribution by El Canonge de la Seu for the last page (that’s wonderful, thanks!), Danny Itkin is sending us the lyrics for a song dedicated to Calcrete. Thanks Danny! Who dares to set it to music?

Your sincerely,

Rosa M Poch

Chair, IUSS Commission Soil Morphology and Micromorphology
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2016 YOUNG MICROMORPHOLOGIST PUBLICATION AWARD

Awardees 2016

On behalf of IUSS Commission 1.1: Soil Morphology and Micromorphology, the Jury composed by: Rienk Miedema, Herman Mucher, Georges Stoops and Larry Wilding (Kubiëna Medal Awardees) and Richard Heck (Vice-Chair of IUSS Commission 1.1), is awarding ex-aequo the Young Micromorphologists Vincent Felde and Mareike Stahlschmidt for their publications:


Both awards will be delivered during the 15th International Conference On Soil Micromorphology in Mexico.

Congratulations to both of them!
FORTHCOMING MEETINGS AND CONGRESSES

15th INTERNATIONAL CONFERENCE ON SOIL MICROMORPHOLOGY
Universidad Nacional Autónoma de México (UNAM). Colegio de Postgraduados.
Mexico city, November 27-December 5 2016

The preparations for the Conference are going very well. Finally, the organizers received 106 contributions (58 oral and 48 posters) distributed within 9 sessions:

Session 1: Soil ecosystem and agrosystem services
Session 2: Micromorphology of key pedogenetic processes
Session 3: Microscopic indicators of incipient pedogenesis on natural and artificial surfaces
Session 4: Soil-biota interactions on microscale
Session 5: Archaeological soil micromorphology (I and II)
Session 6: Novel methods and techniques
Session 7: New fields on soil micromorphology
Session 8: Micro-paleopedology (I and II)
Session 9: Pedogenesis of anthropogenic soils and ecosystems

The Conference will be dedicated to Nicolas Fedoroff, who left us in 2013 and who attended the last Micromorphology Meeting in Lleida. A tribute will be paid to him on the first day.

The web site and facebook page are available:
http://www.icsm.igeologia.unam.mx/index.html
XANTHIC- AND RHODIC-ACRUDOXES UNDER CERRADO VEGETATION: DIFFERENTIAL INTERNAL DRAINAGE AND COVARYING MICROMORPHOLOGICAL PROPERTIES

Alba Lucia Araujo Skorupa¹, Diego Tassinari¹, Sérgio Henrique Godinho Silva², Giovana Clarice Poggere¹, Yuri Lopes Zinn¹, Nilton Curi¹

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Abstract

Soil internal drainage plays a major role in soil genesis, and it is mostly dependent on topography. However, the existence of sedimentary and meta-sedimentary rock strata with variable dip angle allows for strong differences in internal drainage for identical topographies, which result in a marked differentiation in the properties of overlain soils. This work aimed to investigate the micromorphology of soils formed from different dip angles of rock strata and their relationships to internal drainage, in Minas Gerais, Brazil. Over horizontal strata, a Xanthic Acrudox lacking hematite and with blocky structure has developed. Over strata with 45° dip angle, strong drainage has resulted in intense desilication, forming a Rhodic Acrudox having hematite and with strong fine granular structure. Micromorphological analyses showed that both soils contain relict nodules which are probably being dissolved in the current environment, whereas only the Xanthic Acrudox has nodules in current processes of formation due to slower drainage. The Cr horizon of both soils, but mainly the Xanthic Acrudox, presented a much slower saturated hydraulic conductivity than the respective overlying horizons, which was associated with a pattern of poorly connected fissural pores as seen in thin sections. The Cr horizon of the Rhodic Acrudox showed a matrix impregnated by Mn and Fe oxides in an unusual pattern of microlamination and hypocoatings that appear to be unstable, dissolving in the current, strongly drained environment. The soil color is a reliable indicator of such differential pedogenesis in these conditions.
Thin sections of A, B and Cr horizons of the studied Oxisols. Note the massive microstructure of the Cr horizon, contrasting with the granular or blocky pattern of the B horizon. Note also the different b-fabric of the mottle zones in the Cr horizon of the Xanthic Acrudox. Images are 2-3 mm wide. q: quartz; r: root; ch: channel void; v: void; n: nodule.
PEDOGENTIC AND LITHOGENIC GRAVELS AS INDICATORS OF SOIL POLYGENESIS IN THE BRAZILIAN CERRADO

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Soil Research 54(4) 440-450
http://dx.doi.org/10.1071/SR15142

Abstract

Although particles >2 mm are not considered soil material, gravels composed of resistant secondary minerals can be useful records of past soil environments. We investigated gravels (2–8 mm) from a Plinthic Haplustox in central Brazil in order to assess their composition, fabric and genesis. Gravels were initially grouped into six macromorphological types, and investigated by mineralogical, micromorphological and microprobe analyses. The results suggest that gravels can be classified as pedogenic or lithopedogenic. Pedogenic gravels comprise indurated soil materials and include black magnetic gravels, black non-magnetic gravels and red earthy gravels. Magnetic gravels contained mostly quartz, hematite and magnetite–maghemite and were poor in kaolinite, gibbsite and goethite, whereas non-magnetic and red earthy gravels had the same minerals as in the surrounding soil. Lithopedogenic gravels are fragments of resistant rocks impregnated by iron (Fe), aluminium (Al) and manganese (Mn) oxides, including platy shales, quartzites and coarse quartz. The latter two showed oxide impregnations around internal pores, whereas the shale fragments included considerable mica, which contributed illite and potassium to the soil clays and, thus, the pedogenic gravels. These results point to multiple cycles of formation and incorporation of cemented materials into the soil, as well as their later impregnation by Fe, Mn and Al oxides. Thus, the conventional classification of all such gravels as ‘ironstone’ is questionable, and their potential role as indicators of past and present soil environments is demonstrated, which deserves further investigation.
White nodule comprising cryptocrystalline quartz (fine quartzite) with large voids, impregnation by Mn oxides (dark, H2O2-effervescent) and Fe–Al oxides (0–5 cm depth, plane polar light), and the corresponding SEM-EMPA spectra for Si, Al and Mn.
MICROMORPHOLOGICAL AND PHYSICO-CHEMICAL ANALYSES OF CULTURAL LAYERS IN THE URBAN SOIL OF A MEDIEVAL CITY — A CASE STUDY FROM KRAKOW, POLAND

Ryszard Mazurek, Joanna Kowalska, Michał Gąsiorek, Marcin Setlak
University of Agriculture in Krakow, Kraków, Poland

Catena 141 (2016) 73–84
http://dx.doi.org/10.1016/j.catena.2016.02.026

Abstract

This study assessed the impact of human activity on the properties of urban soils and the formation of cultural layers (CLs) over several hundred years by examining the micromorphological, physical and chemical features of those soils. The study relied on a soil profile exposed during archaeological excavations carried out in the Main Market Square (MMS) of Krakow, Poland, in 2007. Two parts of the profile were distinguished. The upper section of the soil profile was composed of 13 cultural layers, while the base layer was composed of macroscopically unchanged natural soil. CLs with similar soil textures clearly differed from the natural horizons (NHs), exhibiting higher organic carbon (Corg), total nitrogen (Nt), CaCO₃ and available phosphorus (PO₄) levels. The ranges of CL Corg, Nt, CaCO₃ and PO₄ levels are 14.3–118 g·kg⁻¹, 1.1–10.6 g·kg⁻¹, 10.5–79.0 g·kg⁻¹ and 163–510 mg·kg⁻¹, respectively, while NH levels are 0.39–5.5 g·kg⁻¹, 0.13–0.54 g·kg⁻¹, 1.2–2.5 g·kg⁻¹ and 50.1–214 mg·kg⁻¹, respectively. CLs were characterised by lower pH values compared to NHs. An A horizon Development Index (ADI) was used to assess the degree of advancement of pedogenesis in the different layers. Additionally, correlation coefficients between ADI and the PO₄ content, as well as between ADI and the Corg content, were calculated. A micromorphological assessment revealed differences between the structural makeups, voids and c/f5 μm-related distributions of CLs and NHs. A greater number of artefacts were found in CLs compared to NHs, including fragments of bones, ash and black carbon (BC). The presence of artefacts decreased gradually in the buried soil horizons, giving way to BC, which is the most stable organic compound found in soil. The study also demonstrated the role of CL in the storage of organic carbon stocks in urban soils.
Microphotographs of thin soil sections from cultural layers and natural horizons studied: VIa, VIb — Au11, sandstone (SD) and black carbon (BC); VIIa, VIIb — Bw, granular microstructure, sandstone (SD), poorly decomposed organic matter (OM); VIIIa, VIIIb — Au12, bones (B) and brick fragments (BF); IXa, IXb — Au9, bones (B), black carbon (BC) and plant tissues (PT); Xa, Xb — Au13, black carbon (BC). Bar length= 2 mm, right: PPL, left: XPL.
THE SHARPSHOOTER’S REVENGE, OR BEGINNERS LUCK?

David Hopkins and Tom DeSutter
North Dakota State University

Of approximately 8,000 thin sections prepared and stored at the Natural Resources Conservation Service (NRCS) Kellogg Soil Survey Laboratory (KSSL) in Lincoln, Nebraska, USA, only 16 were from North Dakota and the majority of those are missing. The only published information on micromorphology of North Dakota soils is the study of till derived soils in eastern North Dakota by Redmond and Whiteside (1967), which is nearly a half-century old. These authors utilized a Californian company to make the thin sections and were not able to verify optically oriented clay in argillic horizons widely recognized by field pedologists. There has not been any soil micromorphologic research in the ensuing decades at North Dakota State University (NDSU).

To remedy this situation, micromorphologic techniques were initiated at NDSU in late 2014 to investigate a sodium affected soil, the Exline series, (Fine, smectitic, frigid Leptic Natrudolls) that developed on off-shore deposits of Glacial Lake Agassiz. The Exline pedon natric horizon showed a particularly interesting distribution of gypsum within the centers of the very coarse strong columns (Fig. 1). An initial aim of this research was to investigate the distribution of soluble salts vertically and horizontally in these columns.

Initial impregnation with polyester resin and polishing steps by hand lapping were developed in-house while cutting was accomplished using equipment at the USDA Red River Valley Agricultural Research Center located on campus. In spring of 2015 the NDSU team learned that Federal Surplus lot #86 consisting of a late 1970s vintage Buehler Petro-thin and Whirlimet polishing unit were available and about to be relinquished to federal surplus. Thanks to the foresight of the NRCS State Soil Scientist, Mr. Wade Bott, the equipment was transferred to North Dakota NRCS ownership and has been put to use in the Department of Soil Science at NDSU. During the summer of 2015 a geoscience student intern was hired to

Figure 1. Horizontal section of the Exline Btny horizon highlighting gypsum distribution patterns in the lower half of a column.
help transfer the equipment from Lincoln to Fargo, to assist with sampling the Exline pedon, to create thin sections from this pedon, and to gain experience with the “new” Buehler instrumentation.

Gypsum nests from the Btny horizon were apparent in several thin sections, but the clearest expression is shown in Fig. 2. The Btny horizon had a saturation extract electrical conductivity of 14.5 dS/m, so there are clearly other more soluble crystallites present in this horizon.

Figure 2. Loose continuous infillings of silt sized euhedral gypsum in the Btny horizon.

In the summer of 2016 another NDSU undergraduate geoscience student was employed and charged to prepare replicates from impregnated blocks made the previous summer. Microstructures appearing to be fungal hyphae were observed in some of the first thin sections so the student was charged to investigate any features that might be biotic. A surprising object from the eluvial horizon of the Exline pedon was discovered in early August, 2016. The student suggested it was perhaps a spore, and a colleague in Plant Pathology suggested it might be an “ornamented spore”. A contact in Iowa, who had done her doctorate using micromorphology suggested it looked like a pollen grain, and while she had seen many whole grains in thin sections, she had never seen one sliced in two (Fig. 3). An expert in Quaternary palynology stated in an email soon thereafter that the grain was “almost certainly in the thistle family, the Asteraceae, but that it could not be identified below family level.”
So what about the sharpshooter? In the Northern Great Plains, pedologists in the soil mapping trade refer to their shovels as “sharpshooters.” Often in mapping, if your shovel is sharp, it is not uncommon to strike at large weeds, especially thistles, thus doing a little favor for the farmer or rancher on the way back to your vehicle. The senior author has done this more than scores of times. Apparently, in our new adventures in micromorphology at NDSU, we have not only killed a few thistles sampling the Exline pedon, we have cleaved the genetic thread of this invasive weed! Now that is beginners luck!

![Bisected pollen grain from the eluvial horizon of the Exline pedon. The grain in about 0.33 mm in diameter and was located 25 cm below the soil surface.](image)

**Figure 3.** Bisected pollen grain from the eluvial horizon of the Exline pedon. The grain in about 0.33 mm in diameter and was located 25 cm below the soil surface.

**References**


**Acknowledgement**

Thanks to Ms. Sukhwinder Bali for the first Exline thin sections, and to Ms. Jackie Wrage, Ms. Kaleigh Alme, and Ms. Melissa Maertens, NDSU undergrads in Geosciences who contributed to this research. Special thanks are due to Rodney Utter, Research Specialist, Dept. of Soil Science for help in bringing the Buehler “back to life”, to Dr. Lydia Tackett (NDSU Dept. of Geosciences) for the use of her “state of the art” Zeiss microscope and enthusiasm, and lastly to Jack and Larry Hoffman for permission to investigate the Exline soil map unit on their land.
MULTILINGUAL TRANSLATION OF MICROMORPHOLOGICAL TERMS

Georges Stoops
Em. Prof.- Universiteit Gent

The website where this multilingual translation can be found is now in the ISRIC micromorphology page:
http://isric.org/content/micromorphological-collections

and can be found at:
http://isric.org/content/multilangual-translation-micromorphology

It is possible to download translations of the terms used in the “Guidelines for Analysis and Description of Soil and Regolith Thin Sections” (Stoops, 2003) into Arabic, Czech, French, Spanish, German, Galician, Catalan, English, Italian, Hungarian, Dutch, Norwegian, Persian, Polish, Portuguese, Romanian, Russian, Slovak and Ukrainian.

Further information:
Stephan Mantel <stephan.mantel@wur.nl>
APPLIED SOILS AND MICROMORPHOLOGY IN ARCHAEOLOGY

Macphail, R. I., and Goldberg, P., In Press

This forthcoming book is composed of 13 chapters and will be soon available:

1. Applied principles from geology and soil science
2. Complementary analyses
3. Systematic soil micromorphology description
4. Soils and burial (horizon types and effects of burial in the Temperate and Boreal regions)
5. Soil-sediments
6. Inundated freshwater and coastal marine sites
7. Archaeological materials and deposits
8. First records of human activity
9. Clearance and cultivation
10. Occupation surfaces and use of space
11. Settlement morphology
12. Site transformation

With on-line appendices and additional illustrations.
FORTHCOMING COURSES

Archaeological Soil Micromorphology Training Course and Ad Hoc Workshop (7th-12th November 2016)

At

Institute of Archaeology, University College London, 31-34, Gordon Sq., LONDON, WC1H 0PY, UK

Location: Room 412, Institute of Archaeology, UCL

Archaeological Soil Micromorphology Training Course

Monday 7th November: 9.00 AM – 5.00 PM

Tuesday 8th November – Wednesday 9th November: 9.00 AM – 5.00 PM

Thursday 10th November: 9.00 AM – 5.00 PM

Practice days and Ad Hoc Archaeological Soil Micromorphology Workshop

Friday 11th November: 9.00 AM – 5.00 PM

Saturday 12th November: 11.00 AM – 6.00 PM

Contact: Dr Richard I Macphail – r.macphail@ucl.ac.uk

Costs: Monday to Thursday @ 60 Euros per day (total 240 Euros); Friday to Saturday @ 30 Euros per day

A chance to access the full reference collection as employed in Goldberg and Macphail (2006) and Macphail and Goldberg (In Press). There are ~27 boxes of thin sections for the Training Days. Please let me know, well in advance, any specific reference thin sections/case study thin sections that can be used for training and the workshop, in case these are not already selected.


Macphail, R. I., and Goldberg, P., in Press, Applied Soils and Micromorphology in Archaeology, Cambridge, Cambridge University Press. (Online support to include site appendices, reference images, videos)
3rd Latin-American Intensive Course on Soil Micromorphology

III CURSO LATINOAMERICANO DE MICROMORFOLOGÍA DE SUELOS

Instituto de Geología - Universidad Nacional Autónoma de México

Ciudad de México, 21-25 November 2016

- Course given in Spanish
- Contents: Sampling and thin section preparation, soil thin section description, applications in geoarchaeology, volcanic soils, anthrosols and soil physics. Field excursion to an archaeological site in Cuicuilco.
- Lecturers:
  Héctor Cabadas Báez (Universidad Autónoma del Estado de México)
  Jaime Díaz Ortega (Universidad Nacional Autónoma de México)
  Carmen Gutiérrez Castorena (Colegio de Posgraduados, México)
  Juan Carlos Loaiza (Universidad Nacional de Colombia)
  Rosa M. Poch i Claret (Universitat de Lleida)
  Blanca Prado Pano (Universidad Nacional Autónoma de México)
  Sergey Sedov (Universidad Nacional Autónoma de México)
- Course fee: 185 US$ (including spanish handbook)
- Maximum 12 participants.

More information (contents, location): Héctor Cabadas hvcabadasb@uaemex.mx
The 16th edition of the course on Soil Mineralogy and Micromorphology, given every two years since 1985 by Prof. Dr. Héctor Morrás at the Postgraduate School of the Faculty of Agronomy of the University of Buenos Aires in cooperation with the National Institute of Agricultural Technology (INTA), took place last August.

This course is taken by students enrolled in the Master's degree and PhD programs of the Faculty of Agronomy of the University of Buenos Aires, as well as by researchers and postgraduate students of other universities of the country and from abroad. Seven students with different professional training were enrolled in this occasion: one of them coming from Chile, another one from Paraguay and a third one from El Salvador.

The lectures took place at the Postgraduate School of the Faculty of Agronomy, whereas the practical classes took place in the Soils Institute of INTA located in Castelar (Buenos Aires metropolitan area). Dr. Lucas Moretti, Dr. Eduardo Favret, and MS Emiliano Bressan -researchers from INTA- as well as Dr. Filipe Behrends and MS Mario Castiglioni -members of the Faculty of Agronomy- collaborated during the development of the course by lecturing on various applications of mineralogical and micromorphological techniques to the study of soils. Miss Joana Laghi and Mr. Javier Delgado, technicians from INTA, also collaborated by explaining the procedures to carry mineralogical analyses and to prepare soil thin sections.

The course provides the basis for a more detailed knowledge of the inorganic fractions and the processes of formation and organization of soils. The first part was an introduction to rocks, minerals and factors of soil formation, and on concepts of mineral weathering and pedogenetic processes. The course then focused on the crystallochemistry, properties, genesis and evolution of clays and iron minerals in relation to environmental conditions, their role in the physical and chemical behavior of soils and on various analytical techniques.

The second part of the course was devoted to the micromorphology of soils, including concepts, terminology and various chapters of the descriptive system, and the theoretical principles both of optical and electronic microscopy. The course also included applications and examples of use of
qualitative and quantitative micromorphological procedures for the study the genesis of soils and paleosols, as well as for the study of soil structure and porosity and its application to problems of biology, physics and soil management.

In this occasion, teachers and students have counted with the new “Manual de Micromorfología de Suelos y Técnicas Complementarias” (JC Loaiza, G Stoops, R Poch and M Casamitjana, Eds. Fondo Editorial Pascual Bravo, Medellin, Colombia, 2015, 384 p.), the first comprehensive handbook in Spanish on soil micromorphology.

During the practical part of the course developed at the Soils Institute of INTA, participants visited the laboratory of preparation of thin sections and devoted some time to micromorphological analysis including recognition of some distinctive pedological features and description of soil thin sections. Students also had an introduction to the procedures of mineralogical analyses using X-ray diffractometry and the magnetic susceptibility of soils.

Similarly to other occasions, the course was intense and there was an interested and enthusiastic participation of students. Although the variety of issues addressed in this two-week course prevents studying the contents in more depth, the participants can acquire a brief knowledge of the concepts, methodologies and applications of Soil Mineralogy and Micromorphology, which awakens their interest and offers them tools to be used in their own research projects.

Prof. Dr. Héctor J. M. Morrás
INTA-CIRN, Instituto de Suelos
Castelar, Argentina
SHORT ANNOUNCEMENTS

Prof. P. Van den haute, who was in charge of the management of the thin section workshop of the Department of Geology of the Ghent University, retired last year. His successor, Prof. De Grave has taken over the management. For information on conditions and/or prices of soil thin section preparation contact:

Prof. Dr. J. De Grave
Universiteit Gent
Faculteit Wetenschappen
Vakgroep Geologie, WE13
Onderzoeksgroep Mineralogie en Petrologie,
Campus Sterre, S8
Krijgslaan 281,
B9000 Gent
België
e-mail: johan.DeGrave@Ugent.be

The Sociedad Latinoamericana de la Ciencia del Suelo has awarded the “Premio Andrés Aguilar Santelices In Memoriam” (2016) to the book presented by the Sociedad Colombiana de Ciencia del Suelo.

JC Loaiza, G Stoops, RM Poch, M Casamitjana (Eds.) 2015
Micromorfología de suelos y técnicas complementarias.
Fondo Editorial Pascual Bravo, Colombia

This award will be presented during the XXI Congreso Latinoamericano de Ciencia del Suelo in Quito, Ecuador (24-28 Oct 2016).
CALCRETE IS A SHE - Tribute to G.W. Lamplugh* / Danny Itkin

Calcrete must be a she,
Still awaits to be revealed
Always surprising
Keeping truth concealed

What do plants do?
What is the dust?
Living under an open system
Often wears a thin crust

Ambivalent with lichens
Devoted to her host
Embedded with remnants
Some of which are ‘ghosts’

Calcrete has much patience
She forms in a multi-fashioned way
So could you really date her?
Could you really say?

* The term ‘calcrete’ was introduced in 1902 by the British geologist, George William Lamplugh (1859–1926).
(1) Nari (pedogenic calcrete) capping the hills 1.5 km northwest of Tzora, Israel, showing the hardpan (hpn) and the transition zone (trz; ‘lower nari’).

(2) Sinusoidal massive microstructure (greyish-brownish) superimposed on an angular blocky microstructure (greyish). The two microstructures are weakly separated by a planar void (v). Voids show discontinuous cementation by needle-fibre calcite (nf), micritic coatings and infillings, calcified biogenic filaments (bf) and Fe-stained clay in groundmass with calcitic crystallitic b-fabric. Silt quartz grains in the sinusoidal microstructure are derived from aeolian origin, indicating a ‘subaerial phase’ in the formation of the calcrete. XPL.
... AND FOR DESERT, MAY I SUGGEST OUR CREPE OF WELL HUMIFIED, VERY SHITTY PÂTE AUX FINES HERBES, POLYPHENOL-RICH AND COMPOSTED RESIDUES.

WITH THE APPROPRIATE COMPANY OF OUR SPECIAL FULVIC ACID LIQUEUR!