

COMMISSION 1.1

SOIL MORPHOLOGY & MICROMORPHOLOGY

International Union of Soil Sciences

An aerial photograph of a field, possibly a vineyard or agricultural plot, with a grid overlay. The field is divided into rows and columns, with some areas appearing to be planted with crops. The grid is a light gray color and covers the entire field. The background is a soft, out-of-focus landscape with a mix of green and brown tones.

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Comm. 1.1. Soil Morphology and Micromorphology - IUSS
<http://loess.umcs.lublin.pl/micro.htm>

LETTER FROM THE CHAIR

Dear Colleagues,

Welcome to the April Newsletter!

Among other informations you will find reports about the exciting Meeting we had last November-December in Mexico, and also about the Soil Morphology Conference in Moscow (December 2016). I want to congratulate the organisers for these successful conferences.

I'm also pleased to announce a new Edition of the Intensive Soil Micromorphology Course next September-October in Tremp, which is taking place after 3 years of the last course.

So, enjoy Spring (those in the North Hemisphere) and take care!

Your sincerely,

Rosa M Poch
Chair, IUSS Commission Soil Morphology and Micromorphology
Lleida, April 2017

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PAST MEETINGS AND CONGRESSES

15TH INTERNATIONAL CONFERENCE ON SOIL MICROMORPHOLOGY

Mexico City, Mexico, November 21-December 4, 2016.

The 15th International Working Meeting on Soil Micromorphology, was held in Mexico City, with participants from Russia, Australia, Brazil, Israel, Germany, France, Italy, Mexico, Spain, Colombia, United Kingdom and USA. A total of 107 abstracts were published. During the meeting three invited lectures, 58 oral presentations and 49 posters there were presented.



The main institution-organizer of the conference was the Institute of Geology from the Universidad Nacional Autónoma de México (UNAM) and it was aided by Posgrado en Ciencias de la Tierra UNAM, Universidad Autónoma del Estado de México (UAEMEX) and Colegio de Posgraduados (COLPOS). Support for this meeting was obtained by the Posgrado en Ciencias de la Tierra, UNAM and Beta Analytics Inc.

The opening ceremony was organized in the Institute of Geology where the chair persons of this Institute (Dr. Elena Centeno), of the IUSS Commission 1.1 (Prof. Rosa M. Poch) and of the Organizing Committee (Prof. Sergey Sedov) welcomed the participants. During the first day of activities a tribute to Nicolas Fedoroff (1934-2013) was done, recognizing his great contribution to Soil Micromorphology and his effort to promote soil microscopic research in Mexico.

The 3rd Latin-American Micromorphology Workshop was organized before the conference (21-25 november). This workshop is the only course in Spanish language supported by the IUSS Commission 1.1. The instructors came from the Universidad de Lleida (Spain), Universidad Nacional de Colombia (Colombia), Institute of Geology UNAM (México), Colegio de Posgraduados (México) and Universidad Autónoma del Estado de México (México).

Meeting sessions were held in Mexico City. The lectures and posters were presented on all aspects of soil micromorphology. The oral presentations were divided in nine thematic sessions:

- 1) Soil ecosystem and agrosystem services (4 presentations).
- 2) Micromorphology of key pedogenetic processes (4 presentations).

- 3) Microscopic indicators of incipient pedogenesis on natural and artificial surfaces (5 presentations).
- 4) Soil biota interactions on microscale (4 presentations)
- 5) Micro-paleopedology (17 presentations)
- 6) Pedogenesis of anthropogenic soils and ecosystems (3 presentations)
- 7) Archaeological soil micromorphology (11 presentations)
- 8) Novel methods and techniques (7 presentations)
- 9) New fields on soil micromorphology (3 presentations)

The posters were available during every day sessions and were presented after the lunch.



Group photo of the conference taken during the mid-conference tour at the top of Cuicuilco. Image: Lukasz Uzarowicz.

The mid-conference fieldtrip was one-day trip to Cuicuilco and San Gregorio site (South of Basin of Mexico) archaeo-urban soils in archaeological sites. In these sites was observed: properties of the paleosols buried beneath the lava flow of Xitle volcano, first urban center in the south of Basin of Mexico and soil diversity and landscape evolution before and after the eruption of the Xitle volcano.

Post- conference three-day field trip was to Teotihuacan, including the visit to Teotihuacan archaeological zone. This excursion covered soil topo-chrono-climosequences, formed from different volcanic materials and the relation with archaeology.

The conference papers will be published in the Boletín de la Sociedad Geológica Mexicana (eds. Prof. Rosa M. Poch and Profr. Fabio Scarciglia) and Spanish Journal of Soil Science (eds. Dr. Héctor Cabadas and Dr. Peter Kühn).

The next 16th International Conference on Soil Micromorphology will be held in Poland in 2020, which was presented by Lukasz Uzarowicz during the Business Meeting of the Commission.

Héctor V. Cabadas Báez

Secretary 15th IWMSM 2016



Waiting for the profile during the post-meeting excursion. Image: Lukasz Uzarowicz.



Impressive main pyramid of Teotihuacan. Image: Lukasz Uzarowicz.



Exciting explanations by Sergey Sedov. Image: Lukasz Uzarowicz.



Sergey Sedov presenting a palaeosol sequence during the post-conference tour. Image: Lukasz Uzarowicz.



Conference hall. Image: Lukasz Uzarowicz.

ALL-RUSSIAN INTERNATIONAL CONFERENCE:
SOIL MORPHOLOGY: FROM MACRO- TO MICROSCALE
December 19-21, 2016
V.V. Dokuchaev Soil Science Institute, Moscow, Russia

About 65 scientists and young researchers represented more than 30 leading scientific and educational institutions from different parts of Russia (Moscow, St-Petersbourg, Puschino, Arkhangelsk, Irkutsk, Belgorod, Rostov, Tomsk, Krasnodar, Pensa, Tumen', Toliatti, Apatity, republics Altai, Buryatia and Komi) and some foreign countries (Mexico, Uzbekistan, Ukraine, France).

The opening ceremony started by the speech of Academician Andrey Ivanov, head of the Scientific committee of the Conference and head of the V.V. Dokuchaev Soil Science Institute. His talk was devoted to new challenges and new scope of soil morphology.

The major topics during the plenary session were:

- development of morphological soil description for classifying soils and interpreting their genesis;
- current trends in micromorphology;
- progress in soil tomography;
- history, objectives, possibilities and prospects of soil micromorphology in archaeology;
- application of soil color as a basis for proximal sensing of soil composition;
- role of cryogenic processes in soil organization on macro-, meso- and microlevels;
- achievements in studies of Chernozem, Solonetz and Vertisols, salt and gypsum pedofeatures, endolithic and hypolithic soil-like systems.

The electronic abstracts of the Conference in Russian are available at <http://www.esoil.ru/publications/books.html>. The text of the presentations of the plenary session were published in English in a special issue of the Bulletin of V.V. Dokuchaev Soil science Institute and are available at <http://www.esoil.ru/publications/bulletin/862016ns.html>. This Bulletin was also presented and distributed during the business meeting at the 15-th International conference on micromorphology in Mexico.

Two days scientific program of the Conference included 42 oral and poster presentations according to the following sections:

- Section 1: Macro- and mesomorphology for genesis, classification and application in natural and agrogenic soils (Conveners: Nikolay Khitrov and Stanislav Gubin).
- Section 2: Micro- and submicromorphology natural and agrogenic soils for diagnostics of soils and soil forming processes (Conveners: Marina Lebedeva and Maria Gerasimova).
- Section 3: Micromorphology of paleosols and archeological objects (Convener: Maria

Bronnikova and Marina Lebedeva).



Dr. Marina Lebedeva presenting the plenary lecture and Academician Andrey Ivanov, head of the V.V. Dokuchaev Soil Science Institute and Chairman of the Organizing committee

Four master-classes oriented to the young scientists, students and postgraduate students were organized during the last day of the conference: 1) Mikhail Lebedev introduced the modern technology of thin sections preparation on a base of the equipment available in the Laboratory of Soil Mineralogy and Micromorphology of V.V. Dokuchaev Soil Science Institute; 2) Dr. Marina Lebedeva and Dr. Maria Gerasimova demonstrated their systems for the description and interpretation of thin sections. The young participants of this master-class were encouraged to use their thin sections for training and discussion; 3) Dr. Vasiliy Shishkov demonstrated the options of scanning electron microscopy on a base of Laboratory of ¹⁴C-dating and electron microscopy (Institute of Geography) using Jeol JSM-66LV electron microscope equipped with EDS Oxford INCA Energy; 4) Dr. Alexandra Golyeva from the Institute of Geography gave the lecture “ Phytolith method: preparation of specimens and diagnostics”.



Master-class of Mikhail Lebedev on the modern technology of thin sections preparation

Additional talk was presented by Dr. Alexey Sorokin from Lomonosov Moscow State University who gave the sort speech to the Russian scientists about the key messages announced during the 15ICSM. Today, new application fields, beyond the "micropedology" give new impetus to micromorphology: environmental sciences, geoarchaeology, forensics, new materials research, among others. The 15th ICSM to be held in Mexico, intends to develop these opportunity fields together with traditional research themes. Alexey Sorokin told about the scientific program of the conference, the relevant ideas and summaries, which were presented by the keynote speakers - leading scientists from all over the world. He stressed that Russian scientists (archeologists, paleo soil scientists and others) made up to twenty presentations including the keynote speeches, and were actively developing new opportunity fields especially in archaeology and paleopedology, together with traditional researches.

The cultural program of the Conference in addition to the gala-dinner for the participants included a visit to the Ore and petrographic Museum of the Institute of geology of ore deposits, petrography, mineralogy and geochemistry of Russian Academy of Sciences.

The participants from the neighboring Institute of geology of ore deposits, petrography, mineralogy and geochemistry of Russian Academy of Sciences (IGEM) gave the presentation "Ore and Petrographic Museum of IGEM and the heritage of the Kunstkamera". After the presentation the head of the museum Dr. Alexander Dokuchaev and his colleagues Dr. Smolyaninov and Dr. Sukhanov invited to the excursion in the museum to show the historical exhibitions dedicated to the round-the-world travel during 1826-1829 on the military sloop "Senyavin" and other studies of the polar regions

of Siberia and Arctic ocean (on the Novosibirsk Islands, Northern Earth, Taimyr etc.) as well as to the special exhibitions "Extraterrestrial matter and meteorites" and "Systematic petrographic collection" including the specimens, thin sections and archive documents.

This conference continues the tradition of the national meetings on micromorphology, organized under the auspices of Micromorphology Subcommittee of Dokuchaev Soil Science Society.

Kovda I.V.
Lebedeva M.P.



The excursion with Dr. Sukhanov in the Ore and petrographic Museum of the Institute of geology of ore deposits, petrography, mineralogy and geochemistry of Russian Academy of Sciences



Organizers and participants of the Conference at the closing ceremony

FORTHCOMING MEETINGS

THE 21ST WORLD CONGRESS OF SOIL SCIENCE IN 2018 IN RIO DE JANEIRO

During the Mid-Congress Meeting in 2016, the sessions proposed by Commission 1.1. for the 21st World Congress of Soil Science that will take place in Rio de Janeiro during June 2018 were approved. Although the web site of the congress is not active yet, here you have a short description of the symposia so that you can plan your contributions in advance.

Commission 1.1. Symposia:

Using soil morphology and micromorphology as indicators of soil health

Soil health is defined as the continued capacity of soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain biological productivity, promote the quality of air and water environments, and maintain plant, animal, and human health. The diagnostic of soil health needs reliable morphological and micromorphological indicators, in order to assess the impact of land management practices on it.

The objective of this symposium is to show how soil morphology and micromorphology can effectively be used for the diagnosis of the soil quality status regarding its ability for performing multiple functions as e.g. crop production, biodiversity conservation or resilience in front of climate change and other impacts. We will welcome contributions dealing with soil morphology and micromorphology focused on any aspect of soil organic matter and soil carbon, soil biodiversity, rhizosphere, soil structure and soil water, that can be used as indicators of soil quality.

Structural Indicators of Soil Quality using X-ray Computed Tomography

The availability of x-ray computed tomography to study soil has become quite widespread. Advancements in CT image processing, especially segmentation, combined with the ongoing development of analytical algorithms, enables the extraction of diverse 3D morphometric parameters of soil phases. Various spatial analysis techniques (such as semivariance, multifractal and entropy) are also now being applied to both segmented and greyscale imagery. This capacity is increasingly being directed to furthering our understanding of the impact of human activities (especially agricultural land management systems) and environmental changes on soil structural properties. Appropriate structural indices would be relevant for the evaluation of strategies for the mitigation of soil degradation or the rehabilitation of degraded soils.

The main objective of this symposium is to bring together scientists who are working on various aspects of x-ray CT image processing and analysis (especially those involved in segmentation, morphometric and spatial analysis), with those working on soil quality (particularly structural aspects), to present and discuss recent advancements and tendencies, and identify current needs and opportunities. This Symposium will address issues of image segmentation, as well as morphometric and spatial analysis of 3D CT imagery, as they pertain to the characterization of soil structure, as quantitative indicators of soil quality.

Joint Symposium of Commissions 1,1 and 1,6 in Division 1:

How to use micromorphology to understand palaeosols and polygenetic soils?

Specific morphological and micromorphological properties observed in palaeosols and polygenetic soils may serve as valuable indicators of past environments. It is however essential that such observations are appropriately interpreted in order to obtain reliable reconstructions of palaeo-environments. Thus, this session focuses on the interpretation and use of palaeo-environmental indicators, in particular the micromorphological ones.

The objective of this session is to encourage colleagues to present examples that may teach us how to identify (micro)morphological properties of palaeosols and polygenetic soils that can be used as indicators of palaeo-environmental conditions.

Soil development and soil properties depend on environmental conditions in which soils have formed. Hence, palaeosols are archives of past environments. Morphological and micromorphological analyses are particularly valuable for identifying soil properties at different scales that are indicative for specific environmental conditions. In this session, we welcome especially contributions presenting such indicators for various types of environmental conditions. In addition, examples of palaeo-environmental reconstructions for various regions of the world based on such indicators may be presented.

THE 16TH INTERNATIONAL CONFERENCE ON SOIL MICROMORPHOLOGY IN 2020 IN POLAND

The 16th International Conference on Soil Micromorphology in 2020 will be held in Kraków, Poland. The decision about the organization of the conference in Poland was taken during the business meeting of the IUSS Commission 1.1. Soil Morphology and Micromorphology which took place on November 29, 2016 in Mexico City. The proposal was presented by Dr. Łukasz Uzarowicz, Warsaw University of Life Sciences – SGGW, Poland.

The conference will be organized by the Soil Science Society of Poland, the Jagiellonian University in Kraków, the University of Agriculture in Krakow, and the Warsaw University of Life Sciences – SGGW.

The conference venue will be Jagiellonian University in Kraków. It is the oldest university in Poland (founded in 1364) and one of the oldest in Europe. The conference will be held at the Institute of Geography and Spatial Management - part of the Faculty of Geography and Geology. The scientific sessions will take place in the The Campus of the 600th Anniversary of the Jagiellonian University Revival.

The conference will be held in the summer 2020. The exact date and more details regarding the conference will be presented successively in the next Soil Micromorphology Newsletters and at the website which is planned to be launch at the end of 2017 or in the beginning of 2018.

On behalf of the Organizing Committee:

Łukasz Uzarowicz, Marek Drewnik, Ryszard Mazurek, and Tomasz Zaleski

RESEARCH NOTES AND PUBLICATIONS

SOIL PARENT MATERIAL, TEXTURE AND OXIDE CONTENTS HAVE LITTLE EFFECT ON SOIL ORGANIC CARBON RETENTION IN TROPICAL HIGHLANDS

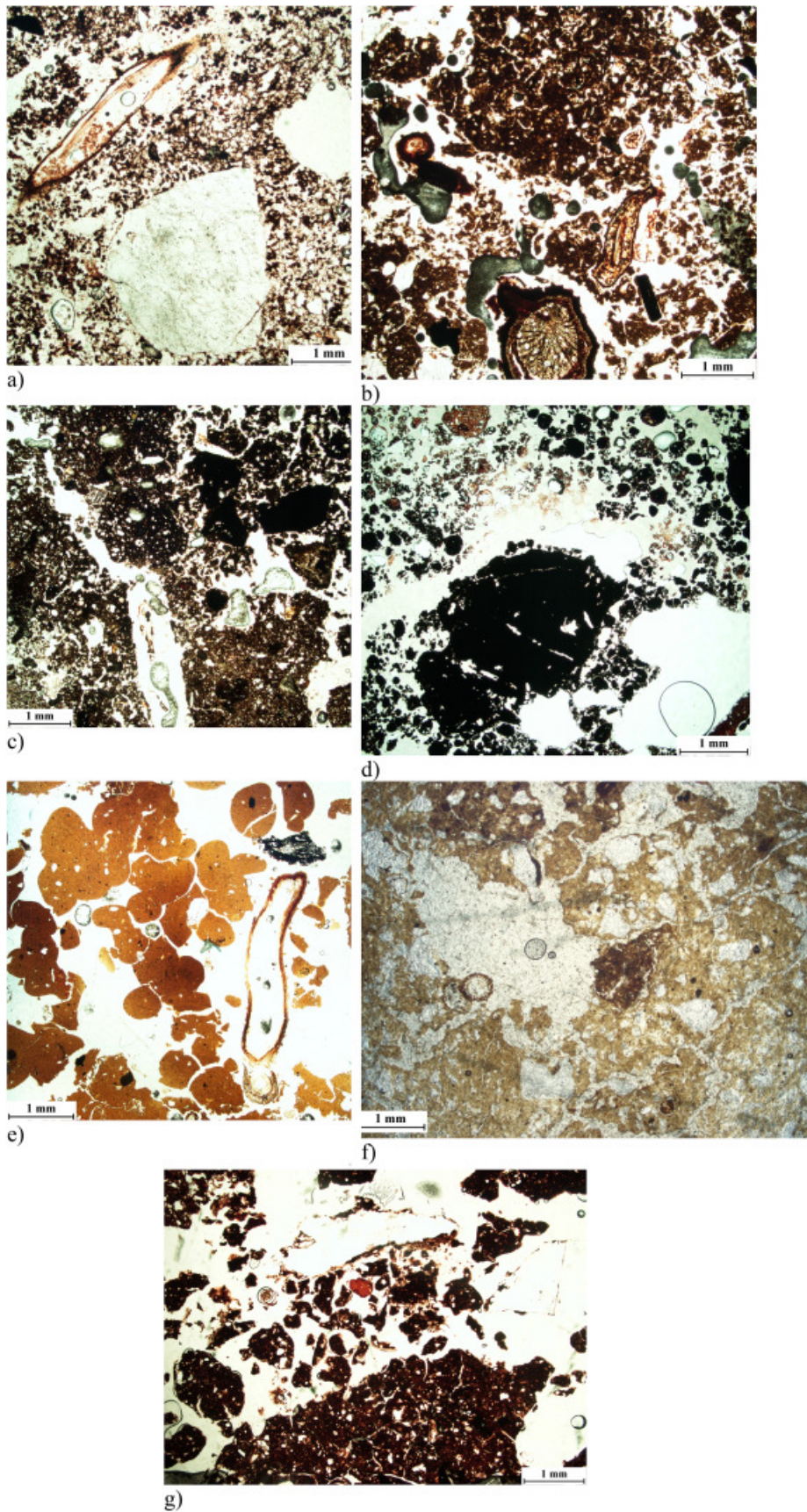
Marla A. Araujo^{a,c}, Yuri L. Zinn^b, Rattan Lal^c

^a Depto. de Agronomia, Centro de Ciências Agrárias, Universidade Estadual de Londrina, Brazil; ^b Depto. de Ciência do Solo, Universidade Federal de Lavras, Brazil; ^c Carbon Management and Sequestration Center, The Ohio State University, USA

Geoderma Volume 300, 15 August 2017, Pages 1–10
<http://doi.org/10.1016/j.geoderma.2017.04.006>

Abstract

In tropical humid conditions, soil organic carbon (SOC) concentrations have been reported to be proportional to clay, clay + silt and Fe/Al oxide contents. Typically, soil texture and mineralogy are strongly dependent on soil parent materials, but it is not known if SOC retention would also be affected by soil parent material. Such relationship, if established, could be useful to estimate regional SOC stocks, since geological maps are more numerous and often more accurate than soil maps. The objective of this study was to assess the effect of parent material, texture, and oxide content on SOC contents in tropical highlands. Thus, samples to 1-m depth were obtained for seven soils derived from quartzite, sericite-schist, itabirite, serpentinite, limestone, gneiss and phyllite. All soils formed under similar climate and native forest, and were located on the midslope position. Despite wide variations in soil texture and mineralogy, there were no valid correlations between SOC and clay, clay + silt or Fe/Al oxide concentrations. Similarly, SOC stocks did not differ significantly when computed for 0–20, 0–40 and 0–100 cm layers, and in all soils most SOC was associated with the clay fraction. We propose that such absence of effects of soil parent material, texture and oxide contents on SOC retention can be due to the overriding effect of altitudes of 900–1100 m a.s.l., which resulted in higher SOC stocks because of lower mean annual temperatures. These trends are in contrast to those reported for tropical lowlands where the textural and mineralogical controls of SOC retention were first described. Therefore, soils on tropical highlands (> 900 m) are likely to present similarly high SOC stocks, whereas soil parent material, by means of soil texture, mineralogy and oxide contents would affect SOC retention only at lower altitudes.



Thin sections of surface soils (all images under plane polarized light): a) soil on quartzite, note decayed root with excrements and coarse angular quartz; b) soil on schist, note living roots; c) soil on itabirite; d) soil on serpentinite, note Fe-oxide nodule in center; e) soil on limestone, note decomposed root and charcoal; f) soil on gneiss; and g) soil on phyllite.

FORTHCOMING COURSES

6th INTENSIVE TRAINING COURSE ON SOIL MICROMORPHOLOGY

Tremp, 25 september –6 october 2017

Organizers: Departament de Medi Ambient i Ciències del Sòl – Universitat de Lleida and Institut Cartogràfic i Geològic de Catalunya – Centre Territorial de Tremp

<http://www.ajuntamentdetremp.cat/en/coneixer-tremp/geologia/centre-de-suport-igc>

Contents: 4,2 ECTS. Principles of mineralogy and petrography, optical mineralogy – Sampling for micromorphology - Guidelines for the description of thin sections of soils and regoliths - Micromorphology of soil materials and identification of soil formation processes: carbonate-, gypsum-, and salt affected soils, volcanic soils, clay accumulation, hydromorphic soils, tropical soils, glacial and periglacial processes – Introduction to micromorphometry and image processing - Applications of micromorphology: Soil genesis and classification; Archaeology; Geomorphology and sedimentology; Optional weekend excursion around the Tremp basin: Geology, Mediterranean soils, soil genesis, archaeology (roman village of Isona).

Practical work: There will be a maximum of 2 people per microscope. The schedule foresees plenty of time for observation of the thin sections provided by the lecturers, as well for study of the own thin sections brought by the students.



Prof. Georges Stoops lecturing during the last Edition of this course in Tremp in 2014

Lecturers:

Prof. Àngels Canals (UB)

Dr. Carolina Mallol (ULL)

Dr. Vera M. de Melo Marcelino (UGent)

Prof. Rosa M. Poch (UdL)

Prof. Rafael Rodríguez (UdL)

Prof. Elvira Roquero (UPM)

Em. Prof. Georges Stoops (UGent)

Language: English

Fees: 400 €

Accommodation: Youth Hostels in and near Tremp, besides several budget hotels are available.

Diploma: Official diploma of the University of Lleida will be handled after completion of the course.

Website and registration: <http://www.cfc.udl.cat/fc/curso/1751>

Contact: rosa.poch@macs.udl.cat



Tremp basin. Images: RMPoch

INTERNATIONAL FIELD SCHOOL ON SITE FORMATION, STRATIGRAPHY, AND GEOARCHAEOLOGY IN ANCIENT CORINTH

Corinth, June 5 to 9, 2017



AMERICAN SCHOOL OF CLASSICAL STUDIES AT ATHENS

54 SOUIDIAS STREET, ATHENS GR 106-76. TEL: +30-210-000-2400.

The Malcolm H. Wiener Laboratory for Archaeological Science (ASCSA) in collaboration with the ASCSA Excavations at Ancient Corinth offers a week-long *Field School on Site Formation, Stratigraphy, and Geoarchaeology at Ancient Corinth*. Dr. Panagiotis (Takis) Karkanis, director of the Wiener Laboratory and Paul Goldberg, Professor emeritus of Boston University, will supervise the intensive field school. Registered students will participate in the Corinth excavation and will be involved in interdisciplinary research primarily in the field, focused on archaeological context, geoarchaeology, and material sciences. Through field observations, on-site laboratory analysis, and lectures the students will receive instruction in the study and analysis of archaeological sediments and deposits, as well as gain experience in the recording of stratigraphy, and the understanding site formation processes. A maximum of 10 students will be accepted for the course. Preference is given to advanced students and post-docs with a background in archaeology, and preferably some exposure to the natural sciences as well.

The cost for Room and Board is 250 euros for the entire week. Travel costs to Greece and to the site are not included.

The course will take place from June 5 to 9, 2017. Applications should be sent no later than 30th April to tkarkanis@ascsa.edu.gr. They should include one paragraph explaining why the candidate is interested in participating in the course, a CV, a list of grades, and names and email addresses of two referees. Participants who successfully complete the course of instruction will receive a certificate detailing the content of the field school.

Textbooks: *Practical and Theoretical Geoarchaeology* 2006 by Paul Goldberg and Richard I. Macphail (Blackwell) and *Microarchaeology* 2010 by Stephen Weiner (Cambridge University Press).

A syllabus will be emailed 3 weeks before the start of the field school.

TRAINING COURSE IN ARCHAEOLOGICAL SOIL MICROMORPHOLOGY

London, November 2017

Training Course in Archaeological Soil Micromorphology (4 days) and ad hoc Workshop (2 days) early November 2017 (exact dates not yet available from UCL).

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

Last year's (2016) information is located on:

<http://www.ucl.ac.uk/archaeology/studying/continuing/courses/micromorphology>

Contact: r.macphail@ucl.ac.uk

SHORT ANNOUNCEMENTS

Aiming at offering best quality analysis and thin sections for geoarchaeological and archaeometrical studies, the PACEA laboratory (University of Bordeaux, CNRS) develops its own service. After years of production limited to academic research, we now open our technical platform to services for other academic labs and commercial archaeology.

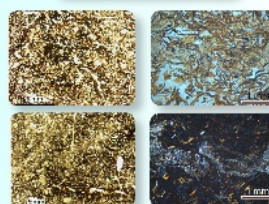


Micromorphological thin sections Petrographic thin sections

Large-format thin sections (70 x 140 mm) are made after impregnating sediment samples with polyester resin under vacuum (Guilloré protocol¹).

We also make standard format petrographic thin sections (35 x 60 mm).

Thin sections are covered with a glass slide unless the customer specifies otherwise. Our services do not include thin section analysis.

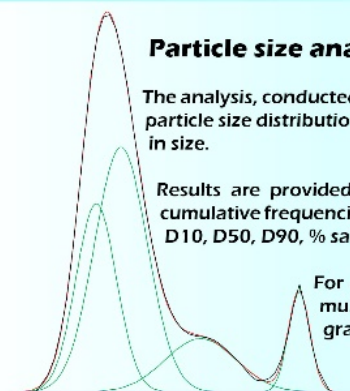


Particle size analysis

The analysis, conducted with a Horiba LA-950 laser scattering particle sizer, allows particle size distributions to be measured for particles between 0.01 µm and 3 mm in size.

Results are provided in a table containing the distribution of absolute and cumulative frequencies, as well as diverse parameters such as skewness, kurtosis, D10, D50, D90, % sand, % silt, % clay etc.). A ternary diagram is also furnished.

For each sample, cumulative and frequency curves, as well as multimodal decomposition curves, are presented as vector graphics.

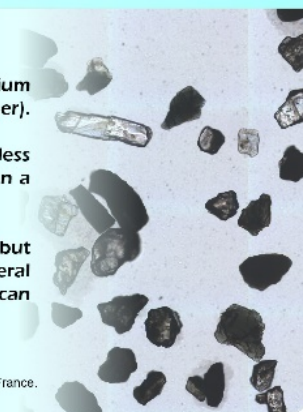


Heavy minerals preparation

Grains are separated by water sieving as well as dense liquid sodium polytungstate ($d = 2.90$ or other density specified by the customer).

Magnetic minerals are eliminated with use of a magnet (unless specified otherwise) and the remaining grains are mounted on a glass slide.

Analyzed fraction routinely ranges between 80 and 120 µm, but can be modified if requested. Our service does not include mineral identification or counting. Raman spectroscopic identification can also be performed upon request.



1. Guilloré, P. (1980). Méthode de fabrication mécanique et en série des lames minces. INA, Paris-Grignon, France.

The PACEA laboratory also hosts a fantastic on-line thin section library of geoarcheology:

<http://extranet.pacea.u-bordeaux1.fr/micromorphotheque/>

Besides thin section preparation, other services offered by this lab are:

Analysis	Unit price (€) private sector (including commercial archaeology)	Unit price (€) academic research
10% saving for 10+ samples		
Laser diffraction particle sizing	50	40
Laser diffraction particle sizing + coarse grains	60	48
Micromorphological thin section	120	96
Petrographic thin section	40	32
Flint petrographic thin section	80	64
Heavy minerals preparation	40	32
Powder X-ray analysis	110	88
Raman spectroscopy (1/2 day)	200	160
Raman spectroscopy (sample)	40	32
Magnetic susceptibility	30	24
X-ray fluorescence	Please contact us for feasibility and pricing	
Confocal microscopy / interferometry	Please contact us for feasibility and pricing	
Return of samples after analysis	20	

More information:

<http://www.pacea.u-bordeaux.fr/PACEA-Transfert-Sediment-Materials.html>

Contact:

pacea.sedimento@adera.fr

Archive information on archaeological experiments

Butser Ancient Farm (ethnoarchaeological experiments at an Iron Age to Romano-British Period settlement, constructed in the 1970's by Professor Peter Reynolds)

Archive is now available at: www.butser.org.uk

Some references:

Reynolds, P., 1979, Iron Age Farm. The Butser Experiment, London, British Museum Publications Ltd., 112 p

Reynolds, P., 1981, Deadstock and livestock, in Mercer, R., ed., Farming Practice in British Prehistory: Edinburgh, Edinburgh University Press, p. 97-122.

Reynolds, P., 1987, Ancient Farming, Aylesbury, Shire Publications Ltd, Shire Archaeology.

Reynolds, P., 1995, The life and death of a post-hole, in Shepherd, E., ed., Interpreting Stratigraphy 5: Bawdeswell, Interpreting Stratigraphy 5, p. 21-25.

Reynolds, P., and Shaw, C., 2000, Butser Ancient Farm. The Open Air Laboratory for Archaeology, Waterlooville, Butser Ancient Farm.

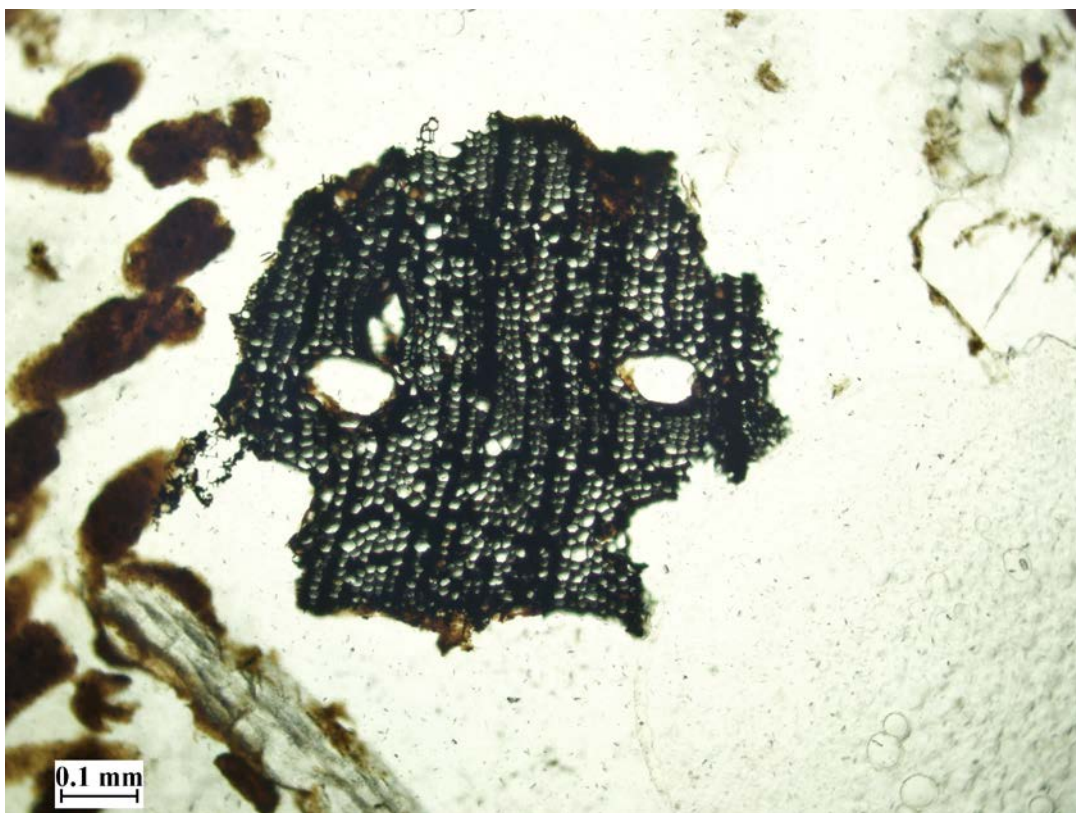
See also:

Macphail, R. I., Cruise, G. M., Allen, M. J., Linderholm, J., and Reynolds, P., 2004, Archaeological soil and pollen analysis of experimental floor deposits; with special reference to Butser Ancient Farm, Hampshire, UK: Journal of Archaeological Science, v. 31, p. 175-191.

The Hebrew translation of micromorphological terms has been added to the other translations on the ISRIC website:

<http://isric.org/content/multilingual-translation-micromorphology>

THE LAST PAGE



A rather dramatic image of wood charcoal in a montane Inceptisol under forest, in Brazil.
Taken by Eduane J. Pádua.

