International Union of Soil Sciences

Commission 1.1 Soil Morphology & Micromorphology *Newsletter*
June 2010, vol. 6, p.1-16

Letter from the Chair

Dear Members,

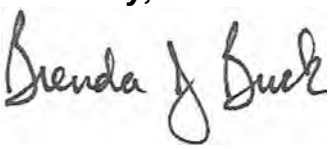
Welcome to vol. 6 of the Commission 1.1 Newsletter! It has been my pleasure serving you the past 8 years, first as second vice-chair and later as chair of our Commission. However, this is the last newsletter that I will produce, as in August, I will be passing this responsibility on to our newly elected Chair, Dr. Rosa Poch and vice-chair Dr. Martine Gerard. Under their leadership and with your support, I'm sure that our Commission will continue to be one of the most active in the IUSS!

I also want to sincerely thank Przemyslaw Mroczek for his continued excellent service to our Commission – the development and upkeep of our webpage:

http://loess.umcs.lublin.pl/micro.htm

Thank you & I hope to see you at the upcoming 19th World Congress of Soil Science in Brisbane, Australia!

Sincerely,



Brenda J. Buck
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SEM image of halite and bloedite, Las Vegas Wash NV (from Buck et al., 2006)

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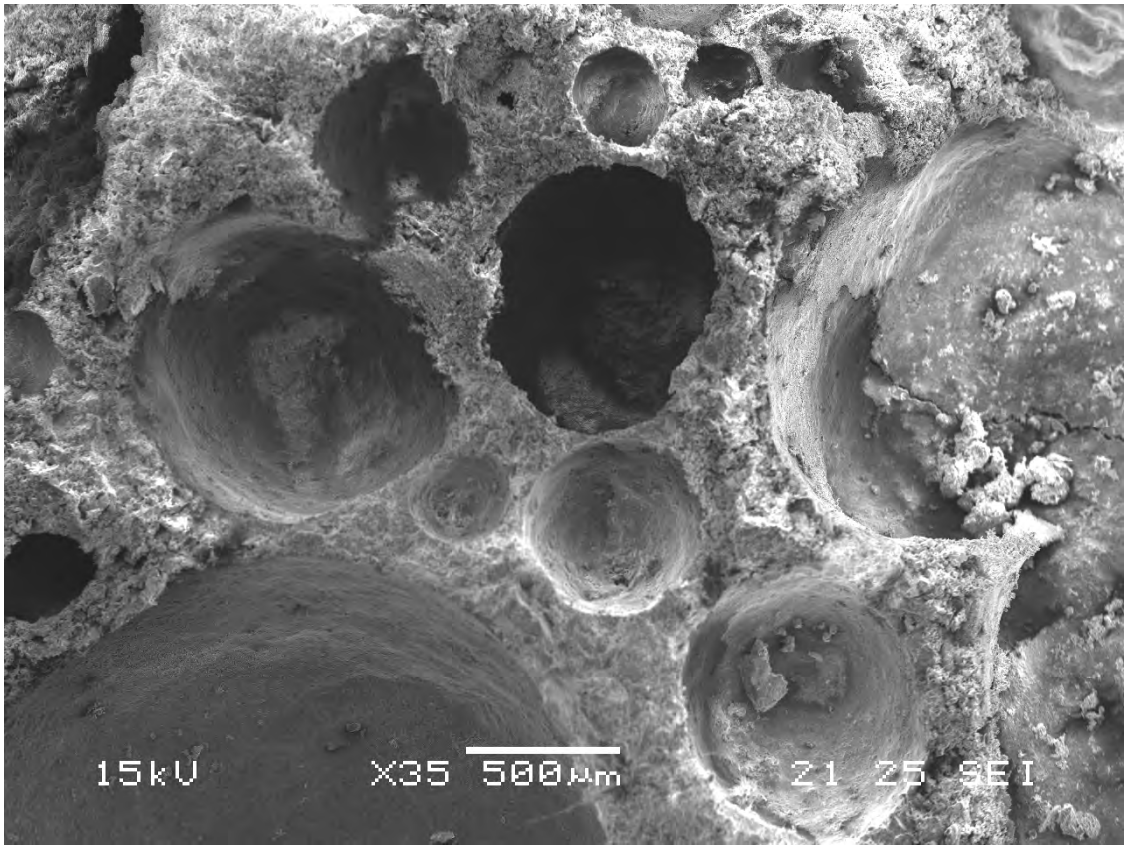


SEM image of vesicular pores in an Av horizon (i.e. McFadden et al., 1998) beneath a desert pavement in Death Valley, CA, USA (unpublished, Brenda Buck).

McFadden, L.D., McDonald, E.V., Wells, S., Anderson, K., Quade, J., and Forman, S., 1998, The vesicular layer and carbonate collars of desert soils and pavements: formation, age and relation to climate change. Geomorphology 24:101:145.

2010 Young Micromorphologist's Publication Award

The Award Committee is pleased to report that this year's applications for the Young Micromorphologist's Publication Award were many, and excellent! After carefully reviewing all of the applications, the committee is pleased to report that the 2010 Young Micromorphologist's Publication Award will be awarded to 2 scientists:

Thilo N.H. Eickhorst

"Detection of Microorganisms in Undisturbed Soil by Combining Fluorescence In Situ Hybridization (FISH) and Micropedological Methods", by Thilo Eickhorst and Rolf Tippkötter, published in Soil Biology & Biochemistry 40 (2008) 1284–1293

and

"Management-induced Structural Dynamics in Paddy Soils of South East China Simulated in Microcosms" by Thilo Eickhorst and Rolf Tippkötter, published in Soil & Tillage Research 102 (2009) 168–178

Shih-Hao Jien

"Hydropedological Implications of Ferromanganiferous Nod ules in Rice-Growing Plinthitic Ultisols under Different Moisture Regimes", by Shih-Hao Jien, Zeng-Yei Hseu, and Zueng-Sang Chen, published in Soil Science Society of America Journal, 74:3 (2010) 880-891

and

"Geochemical Characterization of Placic Horizons in Subtropical Montane Forest Soils, northeastern Taiwan" by Shih-Hao Jien, Zeng-Yei Hseu, Y.Iizuka, T.-H.Chen, and C.-Y. Chiu, published in European Journal of Soil Science 61:3 (2010) 319-332.

The awards will be presented at the Commission 1.1 Soil Morphology and Micromorphology Business Meeting at the 19th World Congress of Soil Science, Brisbane Australia, August 1-6, 2010

Happy 70th Birthday to Professor Dr. Maria Gerasimova !!

Maria Gerasimova: Thinking about the purple soil in the tea house in China, 2008

I can hardly believe that Professor Dr. Maria Gerasimova is going to celebrate her 70th anniversary! I became familiar with Dr.Gerasimova in 1980 when I entered the Faculty of Geography of Moscow State University and have had my very first exam on Soil Science. Since that time (now over 30 years!) I have been very fortunate to remain active in soil science and interacting with her. I strongly appreciate all the professional and personal contacts with Dr.Gerasimova. She is an extraordinary woman and scientist.

Maria Gerasimova is a professor of Moscow State University. All of her professional career has been related to the Faculty Geography of MSU. She was born September 10, 1940 in a family of two internationally recognized scientific authorities – academician I.P.Gerasimov (geography, soil science, geomorphology) and Dr. E.V. Lobova (soil science). Maria had a deep interest in the natural sciences and graduated from the Faculty of Geography in 1963. She defended her Thesis on Genesis and Geography of Soils of the East PreCarpathian in 1967, and since that time she was strongly involved in teaching in Moscow State University. She also pursued research activities with colleagues from the Institute of

Geography, V.V.Dokuchaev Soil Institute and other institutions. Several generations of students were taught by her courses on Soil Geography of with the summer field training of students including the large scale soil cartography, training in soil morphology and the most exotic training – three weeks of so called "zonal" or "meridian" practice consisting of approximately 1000 km trip across the Russian Plain digging soil pits corresponding to the every bioclimatic zone of the European part of Russia!! I was lucky to attend her course on Soil Geography of the USSR in 1984.

Maria has broad scientific interests including soil geography, genesis, classification, cartography, geochemistry, technogenic soils, and of course, micromorphology. Her Ph.D. dissertation summarized all her voluminous micromorphological experience. In 1993 she received her Ph.D. presenting the concept of the "central image" of the soil horizons based upon the combination of their micromorphic features. The dissertation was entitled "Micromorphological Diagnostics and Soil Micromorphotypes".

Her excellent skills in foreign languages came form the childhood, when every day she was obliged to speak in alternating English, French and Spanish languages with her family. After such training she effortlessly became a simultaneous interpreter of several international meetings in the USSR and Russia. She became famous by her translation into Russian of the basic pedological textbooks such as Duchaufour's Précis de Pédologie from French in 1970, and Soil Genesis and Classification by Buol, Hole, and McCracken from English in 1977. Later she initiated and guided the translation into Russian of a number of other fundamental literatures. Just few examples are – Opportunities in basic Soil Science Research in 1992, Référentiel pédologique by C.Mathieu in 2000, World Reference Base in 2007. These translations were very helpful for Russian scientists to keep up to date with the trends in modern international soil science and pedology. I try to imagine how she combines her personal scientific research with the many students she guided, the many grants she was involved with, and the translations, editing and reviewing in the Russian soil magazine Pochvovedeniye, to name just a few of her achievements. It seems her day consists of more than the usual 24-hours!

I list here the titles of her main books to give you an idea about her broad interests: Micromorphology and Diagnostics of Pedogenesis, 1982; Soil Geography of the USSR, 1987; Micromorphological Features of the USSR Zonal Soils, 1992; Anthropogenic Soils, 2003; Classification and Diagnostics of Soils of Russia, 2004; Soil Geography of Russia, 2007. To complete this picture we should add to this list the work on the Soil Map of Russia and surrounding states (i.e. Former USSR) edited in 1996.

In addition to being a highly qualified and respected specialist in Soil Science and Geography, she is an extremely nice person – simple, modest, open, and well disposed, which makes all personal contacts especially pleasant and desirable. She is full of ideas about what could be useful and important for you personally. I can share my own experience: all my private talks with Maria were completed by her advice, wishes or suggestions directed to the possible improvement of my current research or career. I wish that I could call her my teacher, although, formally she is not. When I was a student, my father,

Victor Kovda (who was also a soil scientist), strongly advised me to learn the micromorphology from Maria Gerasimova. She planned to be my supervisor and to guide my research work on the 4th grade. But circumstances happened so that I did not participate in the expected field trip, which resulted in a change of a supervisor. I still regret that I lost her supervision. However, I have been fortunate to receive her informal guidance and supervision throughout the most important periods of my life, including her recommendation inviting me to the Institute of Geography.

This letter does not aim to describe the full detailed biography of Maria Gerasimova. Rather, I would like the young micromorphologists, who know Maria only by her publications, to discover a little about her personality and to feel her charm, which is an important part of her high professionalism. Feel free to contact Maria Gerasimova and take the advantage of her generous nature to share with you not only her scientific expertise but also her benevolence.

Irina Kovda

Institute of Geography, Moscow, Russia

Dr.Maria Gerasimova (in the center of the photo) with some participants of the micromorphological conference in Chengdu, 2008

Intensive Training Course on Soil Micromorphology
First Announcement

Tübingen (Germany), 28 March – 8 April 2011

In the same way, in which the Intensive Training Course on Soil Micromorphology has been organized in previous years in Spain by Prof. Dr. Rosa Poch and colleagues, it will be organized in spring 2011 in Germany by:

Dr. Daniela Sauer and Prof. Dr. Karl Stahr (Hohenheim, Germany), Dr. Peter Kühn (Tübingen, Germany), Prof. Dr. Rosa M. Poch (Lleida, Spain) and Prof. Dr. Georges Stoops (Ghent, Belgium)

In the first week the basics of optical mineralogy and thin section description (identification of components, microstructure, pedofeatures etc.) will be introduced and practized.
The second week will include various topics: we will study soil thin sections from different climates and from paleosols and learn about other possible applications of thin section analysis besides soils.

There will be also the possibility for the participants to bring their own thin sections to be examined and discussed in the second week.

During the weekend within the two-week course, there will be the option to join a field trip to get to know the landscape and characteristic soils in the Black Forest and cuesta landscape of southern Germany.

This is just a first announcement; the exact schedule of the course is still under construction; more information will be provided in the next months.

Town hall (building on the left) and market place of Tübingen.
Three times per week, fresh fruits, vegetables and flowers are sold on the traditional market.

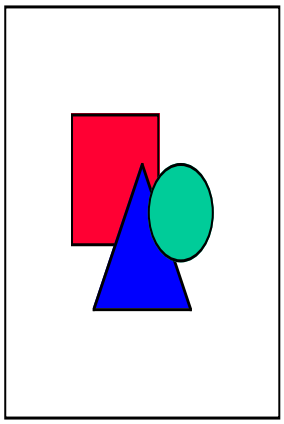
The course will be held in Tübingen, a small town close to Stuttgart (and connected to Stuttgart airport by bus). The history of Tübingen reaches back to the 6th/7th century, when Alemanni people settled there. The town has been mentioned in written form for the first time in the year 1078. The university was founded in the 1477. Many medieval buildings are still preserved in the heart of the town.

Contact: Daniela Sauer (d-sauer@uni-hohenheim.de)

New Book:

Interpretation of Micromorphological Features of Soils and Regoliths

- Covers the microscopic study of undisturbed soil and regolith samples, making use especially of thin sections and petrographic techniques
- Incorporates more than 2,600 different references
- Features contributions from 46 experts in the field



Description:
Soil micromorphology has existed as a discipline for nearly 70 years. Micromorphology is used by pedologists, quaternary geologists, and sedimentologists, and (since two decennia) most intensively by archaeologists. This book provides the state of art in the field of genetic interpretation of micromorphological features, with coverage extending to processes of soil material formation and weathering, as well as the results of human activities and regoliths in a wider sense.

Audience:
Postgraduate students and researchers in the fields of pedogenesis, soil classification, quaternary geology, sedimentology and archaeology

Contents:
1 Micromorphology as a tool in soil and regolith studies. 2 Micromorphological features and their relation to processes and classification: general guidelines and keys. 3 Colluvial and mass wasting deposits. 4 Saprolites. 5 Pedoplasmation: formation of soil material. 6 Frost action. 7 Vertic features. 8 Redoximorphic features. 9 Calcium carbonate features. 10 Gypsic features. 11 Textural pedofeatures and related horizons. 12 Spodic materials. 13 Regoliths and soils on volcanic ash. 14 Oxic and related materials. 15 Lateritic and bauxitic materials. 16 Topsoils - mollic, takyric and yermic horizons. 17 Soil organic matter. 18 Features related to faunal activity. 19 Physical and biological surface crusts and seals. 20 Salt minerals in saline soils and salt crusts. 21 Pedogenic and biogenic siliceous features. 22 Authigenic silicate minerals – sepiolite-palygorskite, zeolites and sodium silicates. 23 Phosphatic features. 24 Sulphidic and sulphuric materials. 25 Anthropogenic features. 26 Archaeological materials. 27 Palaeosoils and relict soils.

Edited by Georges Stoops, Vera Marcelino, and Florias Mees

University of Ghent, Belgium
Royal Museum of Central Africa

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August 2010

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Price:

USD	$245.00
GBP	£120.00
EUR	€170.00
JPY	¥120.00

For more information, visit:

http://www.elsevierdirect.com/9780444531568

New Book:

Atlas for Archaeological Soil and Sediment Micromorphology

If anyone has reference collections or unpublished material, *especially images*, please contact the editors for more information:

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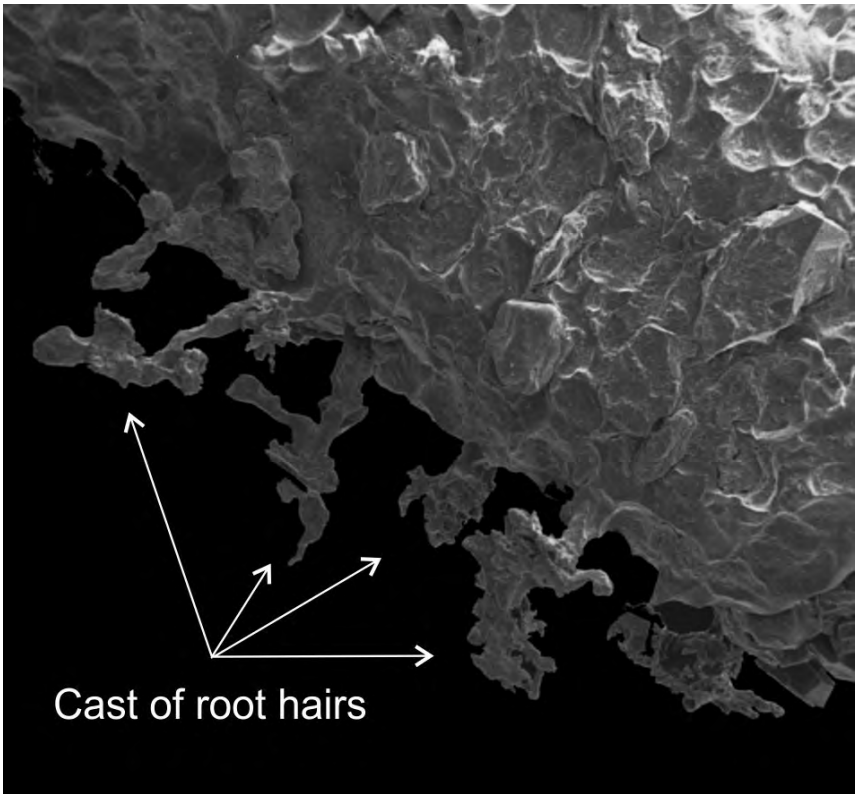
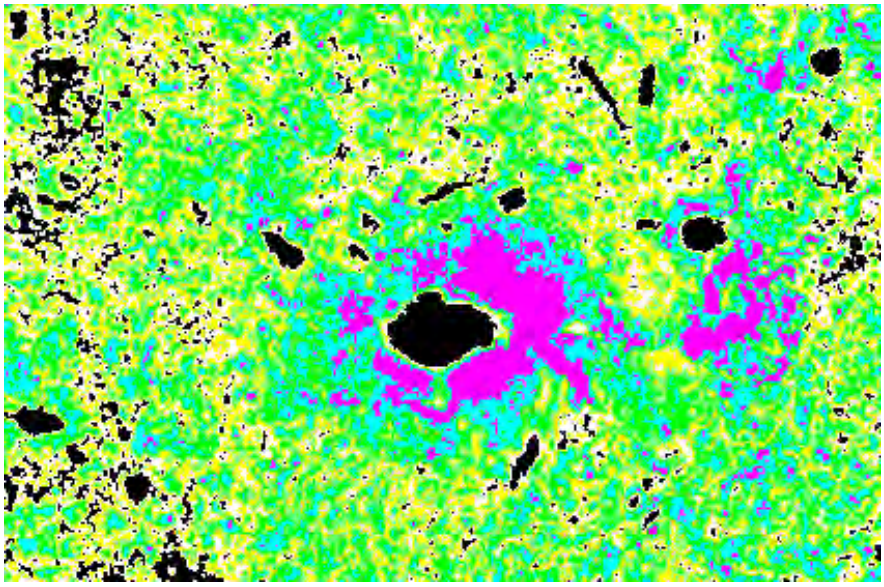
Soil Micromorphology Images

The images below were kindly provided by Prof. Dr. Rolf Tippkötter, Institut für Bodenkunde, Leobener Straße UFT, Universität Bremen, 28359 Bremen, Germany



SEM image of soil pore from 6,000 to 8,000 years old loess by a grass root with casts of root hairs. Field of view 300 microns

Soil Micromorphology Images (cont.)



This picture shows the compaction of an undisturbed silty loam in the surrounding of pores caused by grassroots. Pores = Black; Dense areas are represented by darker colours (pink). Field of view: 3.5 mm.

A single mineral of muscovite between two grains of quartz in soil, Field of view: 500 µm

Report on Workshop:

Soil Micromorphology in Archaeology

Dr. Rosa Poch recently attended a workshop:

"SOIL MICROMORPHOLOGY IN ARCHAEOLOGY", 17th – 21th of May 2010 in Masaryk University, Czech Republic.

Rosa reports that she had a wonderful time and that during the workshop, they had ample time to look at thin sections and discuss issues. There were numerous research papers presented on topics of using micromorphology for archaeology. To see the program and learn more go to:

http://www.gli.cas.cz/kvarter/micromorph/PROGRAM_MAW_BRNO_2010.pdf

http://www.gli.cas.cz/kvarter/micromorph/micromorph.html

Report on Workshop:

Site Formation and Postdepositional Processes in Archaeology

Dr. Rosa Poch recently attended this workshop:

"SITE FORMATION AND POSTDEPOSITIONAL PROCESSES IN ARCHAELOGY", Barcelona 2-4, June 2010

There were many papers presented using micromorphology. The results of the workshop will be published in a special issue of Quaternary International with the Volume Title: *Site Formation and Post-Depositional Processes in Archaeology* and the Short Title: *Archaeology: Site fm and Post-Deposition*. For more information, contact the organizers:

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Research Report

A simple autoradiography method for assessing natural distribution of Uranium in soils: a preliminary internal report (partly presented to ESBN in Budapest , September 2009)

Donatello Magaldi, University of Firenze, Italy,
e-mail : donatello.magaldi

The uranium concentration in carbonate rocks is of the same order of magnitude as the lithospheric content (2.2 ppm). Uranium can replace calcium in the lattice of calcite or be adsorbed by the principal phosphate minerals. The Uranium ionic radium (1.05 A°) is almost similar to one of Calcium (1.06 A°). The large uranyl ions are adsorbed easily and can form the soluble complex UO_2 $(CO3)2^{4+}$ (Daniel et al., 1996; Ford and Williams, 1996). Uranium is assumed to move freely in the water of soil profile after the processes of dissolution and precipitation of carbonate parent material occurred. It is claimed that its mobility is favoured by acid conditions, whereas in an alkaline pH the adsorption of its oxide would be increased (Buck et al., 2004; Johnson et al., 2004). Moreover, as stated by Echevarria et al. (2001), the pH of the soil strongly conditions the formation of ionic Uranium complexes and the adsorbing capacity of the soil itself. Until now very few papers studied natural Uranium in soils (Rosholt et al., 1966; Short et al., 1989; Morton et al., 2002). Recently the concentration of naturally occurring radionuclides (^{238}U, ^{232}Th, K^{nat}) was measured in some Red Mediterranean soils from carbonate rocks in Spain,Italy and Turkey using gamma-ray spectrometry at the Gran Sasso National Laboratory of INFN (Italy) by Laubenstein & Magaldi (2008). The Uranium content ranges 1 to 5 ppm, the content for Thorium ranges 3 ppm up to 30 ppm, whereas for Potassium it goes 0.13% up to 1.3%. The results indicated that soils characterised by absence or scarcity of 2:1 clay minerals are poor in uranium whereas soils with illite–smectite as the dominant minerals in clay fraction are noticeably richer. Radioactivity of " terra rossa" soils was also claimed some time ago by Tadolini & Spizzico,1998 in Apulia (Italy) and by Vaupotic et al., 2007, in south-west Slovenia and west Croatia. Natural Uranium and Thorium occurrence is not unusual in soils derived from acid magmatic rocks (Morton et al., 2002).

Some studies of natural radioactivity of soils are still in progress to identify where Uranium and Thorium can occur other than in clay minerals and organic matter. To perform this question we are using a methodology firstly proposed by Ochmann & Solecki (2005) only for rock : thin section autoradiography. B horizons thin sections from some Red Soils occurring on carbonate plateaux of Murgia (Bari, Southern Italy) and on calcareous mounts and on fluvio-marine terraces in the neighbourhoods of Campiglia Marittima, (Livorno Province, Italy) were used as test samples. Transparent plates of CR 39 poly carbonate were placed for exposition on

polished sections during more than 360 days. After a chemical etching (Na OH solution) of detectors to show alpha tracks damage , their location on thin section features by overlapping of CR 39 transparent plates and the corresponding density (proportional to % of U (and Th) was performed by an image analysis software (Image J) . The calculation of Uranium content excluding Th and others alpha emitters was carried out as follows:

Microscope view- field at magnification 100 x = **3** mm ^{2} (photographed area)

Full section area = 25 * 40 mm = **1000** mm ^{2}

P = alpha tracks on photo

S= CR 39 exposure in seconds

Alpha density in thin section = P * 8 * 2 ***1000** / S = D

Alpha activity in Beq / kg = D/ 0,0039

Uranium activity in ppm = D / 12,67

The relationships constants were obtained after the paper of Ochmann & Solecki (2005).

The photographs revealed 3 typologies of images:

a) a random tracks distribution on the soil "red" clay matrix ("groundmass");
b) some round cluster of tracks produced by Fe/Mn nodules and concretions;
c) some very compacted concentration of tracks produced by small radioactive minerals included in greater not radioactive minerals of the soil parent material (e.g. vesuvianite).

Then Uranium is showing a strong affinity for Fe/Mn nodules and concretions. Moreover after Short et al(1989), indurated concretions of Fe/Mn oxides/ox-hydroxides could irreversibly adsorb Uranium despite acid leaching. As is well know, it is not surprising such result because Fe/Mn nodules and concretions are formed by main minerals of elements as goethite, hematite, lepidocrocite, ferrihidrite, maghemite ecc.for Fe, and birnessite, vernadite, psilomelano, lithiophorite ecc. , for Mn .Moreover the main minerals are commonly including several elements as Al, Ca, Mg, Ba, Li , K, Na, Zn, Li, Cu, Co, Pb, Ni, Cr, (Gallaher et al., 1973;Ross et al., 1976; Uzochkwu & Dixon,1986;Gilkes & McKenzie, 1988; D'Amore, 2004; Liu et al., 2002; Negra, 2005;) nd finally Th and U (Short et al., 1989) .
We concluded that a detailed study of Uranium content of glaebules could be very interesting in order to asses both the Radon potential emission of soil and derived material and the hazard of plant uptake of radionuclides as one of main vector for introduction of radioactive elements into the human food chain(Morton et al., 2002).

The method is not particularly relevant for assessing total content of natural radioactivity **but it appears very promising and not expensive** to individuate where U (Th ?) concentrate and eventually their movement along soil profile as a response to soil process changing in relation to environmental or human influence . **The research is being carried out by myself in Italy but interested Colleagues are invited to participate.**

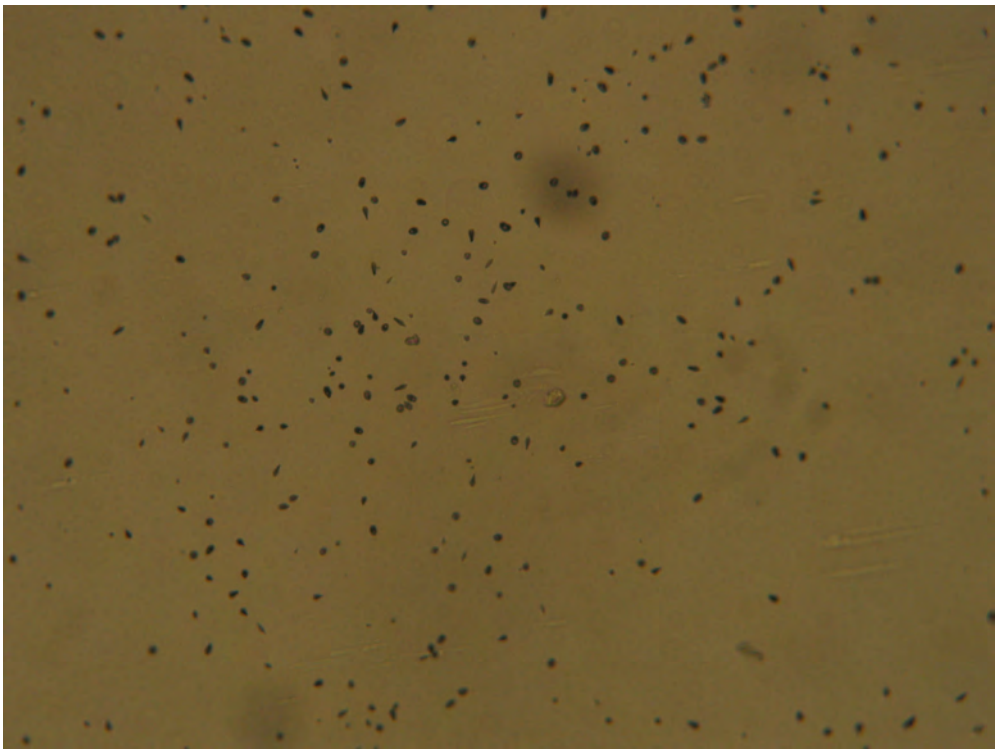

Fig 1 – Alpha track distribution in the clay matrix of a soil with 2-2,5 ppm of Uranium from Campiglia Marittima , Livorno ,Italy

Fig. 2 - Alpha cluster of a soil concretion of the Terra Rossa near Conversano, Murge plateau , Bari, Italy. The approximate Uranium content of the whole concretion is 0,22 Bq /kg

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19th World Congress of Soil Science

Reminder: 19th World Congress of Soil Science in Brisbane, Australia August 1-6, 2010

http://www.19wcss.org.au/

Commission 1.1 Business Meeting will be held during the congress. The date, time, and location will be published in the program. All are welcome – Please attend!!

Our Commission has two special symposia:

(1) *Changes in Soil Morphology in Response to Global Climate Change,*
Co-Convenor – Irina Kovda (Russia) and Co-Convenor Inakwu Odeh (Australia)

(2) *Soil Morphology and Micromorphology to Predict and Manage Environmental Hazards,*
Co-Convenor – Brenda Buck (USA) and Co-Convenor John Crawford (Australia)

In addition, there are *numerous* other symposia hosted by other commissions in which micromorphology will play a major role.

I look forward to seeing everyone there!

International Union of Soil Sciences