

INTERNATIONAL HUMIC SUBSTANCES SOCIETY



NEWSLETTER

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Dear Colleagues in IHSS,

Let me begin by expressing my thanks to our Board members, who have continued their efforts on your behalf. Our new website will soon be available for your use. It will be a dramatic improvement and a modernization of our 20-year presence on the Internet. The efforts of Teddy Miano (Past-President) and Claudio Zaccone (Webmaster) are greatly appreciated. I just spent several days in the field with Ray Hozalski (Treasurer) who, together with Paul Bloom (Chairman, Samples Collection), is leading the effort to replenish our supply of fulvic acid and humic acid from the Suwannee River in southeastern Georgia, USA. It is an odd feeling for me to NOT be heavily involved, because I have led the past three sampling trips to the Suwannee River for IHSS (1999, 2003, and 2012). The current sampling trip is off to a good start and should substantially replenish our supply of these important standards.

While on this subject, I wish to acknowledge the long-term assistance of Norbert Hertkorn in the collection of samples for IHSS. Many of you may not realize that Norbert assisted with isolation of Suwannee River samples in 2003 and 2012, with isolation of our new sample from the Upper Mississippi River in 2013, and he is already in the field helping us again this year at the Suwannee River. Now that I am not actively involved, Norbert is our

most experienced field sampler of aquatic organic matter. So Norbert, a very public and official "Thank You!" from your friend, colleague, and current President of IHSS!

To provide relevant chemical data for our samples, IHSS has contracted with Prof. Karl Kaiser at Texas A&M University to quantify hydrolysable amino acids, hydrolysable neutral sugars, lignin and cutins/suberins, acidic sugars, and benzenecarboxylic acids for all samples in the IHSS Standard and Reference Collection. Prof. Kaiser has already provided analytical results for hydrolysable amino acids, hydrolysable neutral sugars, and lignin-derived phenols. Once he has published this work in the peer-reviewed literature, the results will be posted on our website.

If you can provide a chemical or spectroscopic analysis that is not currently on the website for all samples in the IHSS Standard and Reference Collection, please contact me to initiate a discussion. If the membership of IHSS would benefit significantly from having easy access to your data, we will try to facilitate your measurements.

At the recent EGU meeting in Vienna, Heike Knicker (Secretary) received the Philippe Duchafour Award, and, in a related session, Patrick Hatcher and I gave invited lectures refuting the recent speculation that humic substances do not exist in nature but are instead artifacts of the extraction process. I was able to utilize data from the 2003 IHSS sampling trip to the Suwannee River to demonstrate that the majority of peaks in FTICR mass spectra of Suwannee River NOM are also found in the corresponding fulvic acid, humic acid, and/or hydrophilic organic matter. I was also able to demonstrate that the acidic functional groups of fulvic acid, humic acids, and NOM are internally consistent, thus refuting speculation that extraction imparts unusual reactivity to these materials. I am sure that some of you have other data that could be used to refute any effort to deny the existence of humic substances in nature. I'd love to hear from you.

Heike Knicker (Secretary) and Gudrun Abbt-Braun (Vice-President) have continued to work with Prof. Seiya Nagao to offer a stimulating scientific experience to our Society at the 18th IHSS meeting in Kanazawa, Japan in September, 2016. I very strongly encourage you and your students to participate in this conference. The Board has authorized our past presidents and honorary members to invite younger colleagues and students to join them for small social events (meals, drinks, etc.) during the upcoming meeting. If you are a young scientist or student, please introduce yourself to our distinguished colleagues and

help them “pass the torch” to you as we continue our efforts to support and empower younger colleagues. I hope to see all of you in Kanazawa.

I want to repeat my challenge to the young scientists who have already benefited from the support of IHSS. Contribute all that you can to insure the future of this small, specialized scientific society, so that students who follow in your footsteps can enjoy the same level of support. Whenever you give talks or publish papers on work that IHSS has helped to facilitate, or if you simply have used our standard and reference samples in your research, please be sure to give acknowledgement to IHSS. This small recognition of the impact of IHSS in your professional development will be noted by other scientists who should be members of IHSS.

Best regards,

E. Michael Perdue
President of IHSS

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Attached to this Newsletter: Second Circular of the IHSS 18

REPORT ON THE ELECTIONS IN 2016

The Nomination Committee has announced the results of the elections. On-line balloting was used to elect the new officers, as has been done in previous years. Balloting was open until March 31, 2016. 560 members were eligible to vote, 265 members took part in the balloting.

Positions to be filled were: Vice-President, Secretary, and Board Member.

Results:

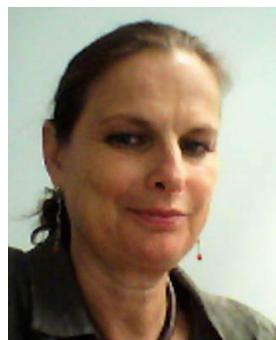
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The Board thanks the Nomination Committee members, Claudio Ciavatta (chair), Italy, Etelvino H. Novotny, Brazil, Fernando Rosario-Ortiz, USA, and Olga Yakimenko, Russia for their work in finding outstanding candidates for the elections and supervising the election process. The Board would also like to thank all of the candidates for running for a position and congratulate the three candidates that were elected (or re-elected) for a position on the Board.

Gudrun Abbt-Braun

Designated officer from the Board

Karlsruher Institut für Technologie, Germany

IHSS TRAVEL SUPPORT AWARD 2016

The call for the IHSS Travel Support Awards 2016 to attend the meeting in Japan was announced in October, 2015. The committee consisted of three board members: Vice-President Gudrun Abbt-Braun (chair), and two Board Members Deborah Dick and Irina Perminova.

The committee received 29 applications (27 PhD-students, and 2 Master-students) before the final deadline of January 31st, 2016. The applications submitted were from 14 countries and six continents: Brazil. 8, Canada 1, China 1, Czech Republic 3, Germany 3, Greece 1, India 1, Israel 1, Italy 2, Nigeria 2, Poland 1, Russia 3, Uzbekistan 1, USA 1).

The applications were evaluated based on their CV (0-30 points; personal data, education (including a summary of courses taken), awards, publications, conferences attended, oral communications, poster contributions), letter of the supervisor (0-10 points), and the manuscript (abstract for the conference, 0-60 points).

The overall quality of submissions was excellent. Considering the final scores, 19 students were selected for a travel award.

The IHSS Travel Support Awards will cover the conference fee (including excursion and banquet) and reimbursement for airfare and other significant travel costs (train, bus). In addition, the award recipients will receive a fixed stipend to cover the costs of accommodations, meals not provided by the conference, and other incidental expenses,

Alexander Zhrebker from Russia, as the top applicant, was selected as the winner of the Malcolm Award.

The list of awardees is as follows.

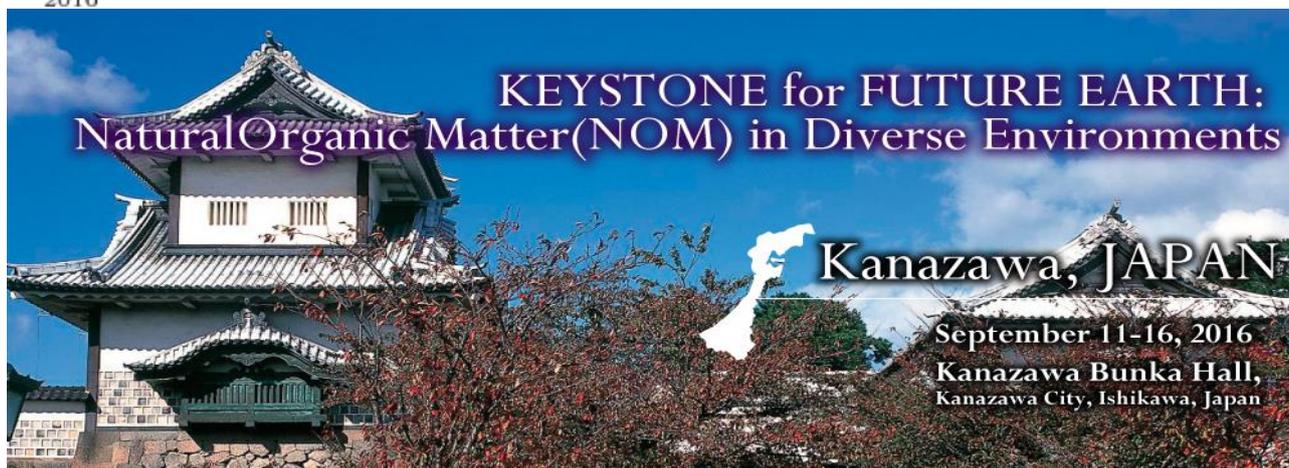
Family Name	First Name	Institution	Supervisor	Country
Adebola	Samuel Idowu	Obafemi Awolowo University, Institute of Ecology and Environmental Studies, Faculty of Science, Ile-Ife	Olusegun O. Awotoye	Nigeria
Avneri	Shani	The Hebrew University of Jerusalem, Department of Soil and Water Science, Rehovot	Benny Chefetz	Israel
Bletsa	Eleni	University of Ioannina, Laboratory of Physical Chemistry of Materials & Environment, Ioannina	Yiannis Deligiannakis	Greece
Cavallo	Ornella	University of Bari, Department of Plant, Soil and Food Sciences, Bari	Maria Rosaria Provenzano	Italy
Driver	Shamus	Ball State University, Department of Chemistry, Muncie	Mike Perdue	USA
Garcia	Anuska Conde Fagundes Soares	Federal University of Sergipe, Chemistry Department, Sao Cristovao	Luciane Pimenta Cruz Romao	Brazil
Hanke	Daniel	Federal University of Rio Grande do Sul, Porto Alegre	Deborah Pinheiro Dick	Brazil
Lastuvkova	Marcela	Brno University of Technology, Faculty of Chemistry, Brno	Martina Klucakova	Czech Republic
Martino	Giulia	University of Foggia, Department of the Science of Agriculture, Food and Environment, Foggia	Claudio Zaccone	Italy
Millour	Mathieu	Université du Québec à Rimouski, Institut des Sciences de la Mer de Rimouski, Quebec	Jean-Pierre Gagné	Canada
Polyakov	Alexander	Lomonosov Moscow State University, Department of Materials Science, Moscow	Eugene A. Goodilin	Russia
Simon	Carsten	Max Planck-Institute for Biogeochemistry, Jena	Gerd Gleixner	Germany
Skripkina	Tatyana	Institute of Solid State Chemistry and Mechanochemistry SB RAS, Novosibirsk	Bychkov Aleksey Leonidovich	Russia
Subdiaga	Edisson	University of Tübingen, Center for Applied Geoscience, Tübingen	Stefan Haderlein	Venezuela, PhD-studies in Germany
Ukalska-Jaruga	Aleksandra	Institute of Soil Science and Plant Cultivation-State Research Institute, Pulawy	Bożena Smreczak, Barbara Maliszewska-Kordybach	Poland
Valle das Neves	Juliana	Helmholtz Zentrum München, Deutsches Forschungszentrum für Gesundheit und Umwelt, Research Unit Analytical BioGeoChemistry, Neuherberg	Norbert Hertkorn	Brazil, PhD-studies in Germany
Wang	Longfei	University of Science and Technology of China, Department of Chemistry, Hefei	Han-Qing Yu	China
Watanabe	Claudia	Sao Paulo State University (UNESP), Campus Sorocaba, Sao Paulo	André Henrique Rosa	Brazil
Zhrebker	Alexander	Lomonosov Moscow State University, Chemistry Department, Moscow	Irina Perminova	Russia

Gudrun Abbt-Braun

Chair of IHSS Travel Award 2016 Committee



IHSS 18: 18th International Conference of the International Humic Substances Society



As indicated in the attached second Circular, the deadline for abstract submission and “early bird”-registration for the IHSS 18 has been extended to June 30, 2016. The organizers and the IHSS Board are looking forward to seeing you in Kanazawa on September 11-16 in 2016. For more information please consult the IHSS homepage and:

<http://www.ihss2016.com/index.html>

*Seiya Nagao
Kanazawa University, Japan*

PAST MEETINGS

Czech Chapter (inter)national meeting

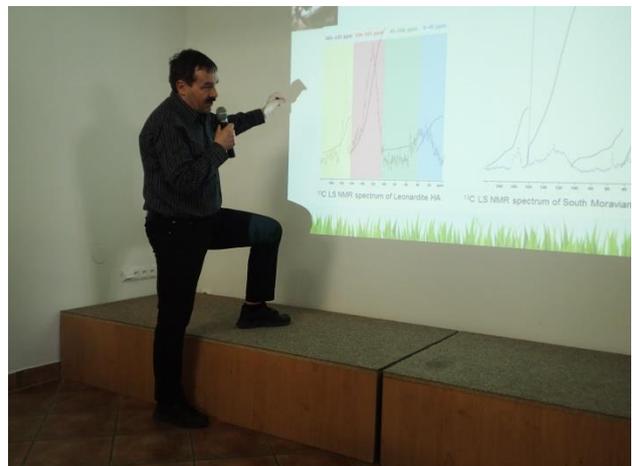
The meeting of the Czech chapter took part March 18, 2016 in Hustopeče, a small town close to Brno in the South Moravian region of the Czech Republic. Among the about 50 participants were also members of the Slovak chapter, representatives of humic-related companies or distributors and of state authorities, and guests from Germany and Austria.

The meeting was supported by Amagro and Humatex companies and was divided into three discussion blocks:

1. Soil-organics-humics.
2. Advances in applications.
3. Progress in standardization.

The first block included lectures on the questions of biochar applications, humeomics approach, and on relationships between the content of organic carbon and humic acids in soils. Discussion focused on current debate about the very existence of humic substances and directions of humic research. Among others, the difference between the young organic matter in soil and aged organic matter in peat or coal was stressed.

The second block informed on experiments with foliar applications of humic acids isolated from oxyhumolite, on news on experimental study of the penetration of humic substances through leaf cuticles, on field experience with lignohumates, and on applications of humic acids in animal feeding.



In the third block the state with standards for humic products in Czech Republic was discussed. Representatives of agricultural authorities informed on attempts to introduce more appropriate methods like those recently developed in USA. Distributors also discussed the possibility of awarding some IHSS quality certificate to products with well-defined origin and analyzed content. Two lectures on practical aspects of the principles of standardization and appropriate methods closed this block.



The discussion continued in the evening during the get-together in a wine cellar which was accompanied by traditional folk cymbalo band.

*Miloslav Pekař
Coordinator of the Czech Chapter
Faculty of Chemistry, Brno University of Technology, Czech Republic*

Biannual Meeting of the French Chapter

“ORGANIC MATTER, HUMIC SUBSTANCE AND CONTAMINANTS”.

The IHSS Day of the French chapter occurred on April, 26 2016 in Toulon, France. It was supported by the University of Toulon during its 10th Scientific Journey (<http://js2016.univ-tln.fr/matieres-organiques-substances-humiques%E2%80%89caracterisation-contaminants-interactions/>). The topics of the day were organic matter characterization and interactions with pollutants. Three invited conferences exposed researches on “Pyrolysis assisted by microwave of organic matter and characterization by NMR” by S. Derenne (University Pierre et Marie Curie, Paris), “Dissolved organic matter (DOM) what is inside the black box”, by Christos Panagiotopoulos (University of Marseille) and “What revealed solid-state NMR spectroscopy about the nature of humic substances?”, by Heike Knicker from Spanish National Research Council. Several talks were presented on the organic matter / humic substance (OM-HS) during compost maturation, the use of FT-ICR-MS spectroscopy and the impact of anthropogenic organic matter on coastal fluorescent organic matter. The role of OM-HS on speciation of inorganic and organic pollutants studied by fluorescence quenching and time life fluorescence methods was also discussed. The IHSS day was fruitful and pleasant for the 16 researchers and students present at the event.

After this day, the French chapter decided to organize the next French chapter IHSS day in Perpignan (France) in 2017. For this it was also decided

- 1) to reinforce the research network on OM-HU by contacting other French associations that deal with, and to ask them to join us to organize a more massive event
- 2) to encourage students to ask for IHSS training awards to perform research on OM-HS in French laboratories
- 3) to interact with the European chapters and
- 4) to increase the South-North interaction and French speaking chapters to increase the OM-HS network.

The French chapter desk invites you to join future events and welcomes every help or offers of research training.

*Stéphane Mounier
Coordinator of the French Chapter
Laboratoire PROTEE, Université de Toulon, France*

Special session on humic substances and organic matter at the EGU

2016

In the frame of the General Assembly of the European Geosciences Union (EGU) 2016, which took place from April 17th to 22nd in the Austria Center Vienna (Vienna, Austria), a special session entitled “Natural and pyrogenic organic C and N in soils; function, fate, analytical challenges and how this relates to the concept of humic substances was organized by Teodoro M. Miano, Claudio Zaccone, José-Maria de la Rosa and Heike Knicker with the help of three former IHSS Travel Awardees, Maria López-Martín, Marta Velasco-Molina and Nicasio T. Jiménez-Morillo. The session comprised two oral blocks with 11 presentations, two of which were given as invited contributions by Prof. Patrick G. Hatcher and Prof. E. Michael Perdue, the president of the IHSS.

Two further blocks were organized with 29 so-called PICOs. The latter are a new form of showing results within a 2-minutes-madness, where all authors present the essence of

their work in 2 minutes each. Afterwards, the audience was able to approach the authors next to an interactive PICO screen, where he/she was able to show their findings in more detail and to provide the background information for fruitful discussions. Both, the oral and PICO contributions reported results from a broad spectrum of various fields in the area of natural organic matter (NOM) research in soils (Stability and formation of NOM; fate and distribution of pyrogenic organic matter in the environment; the importance of organic N in soils, the role of humic substances for sorption processes and new developments of analytical tools). With approximately 50 to 100 participants in each block, the session was very well attended and appreciated. As intended, it served as a platform bringing together researchers with different conceptual backgrounds with respect to what humic substances are and which function they have. This was in particular helpful to initiate the discussions if humic substances can be seen as important components of organic matter in soil, sediments and waters or if they represent an out-of-date concept. We are thanking all of the participants who shared their results and turned this session into an interesting and successful event and the IHSS for their co-sponsorship.



Audience during the oral block of the special session with a very interested IHSS president



Patrick G. Hatcher presenting a PICO



PhD student (Marco A. Jiménez-González) presenting a PICO

*Heike Knicker, Co-convener
IRNAS-CSIC, Sevilla, Spain*

IHSS SPONSORSHIP FOR SCIENTIFIC MEETINGS

All members are encouraged to apply for IHSS sponsorship of scientific meetings. The guidelines are published on the webpage.

ACTIVITIES OF IHSS MEMBERS

New Blog for young members of the IHSS

A new Blog was created after the IHSS meeting of the Italian Chapter in Bologna, September 16-18, 2015 (see NL 50) which also may be of interest for other young IHSS members. Please find the respective website:

<http://www.yppard.net/news/occasional-grants-ambitious-young-scientists-without-funds>

*Eren Taskin
IHSS member of the Italian Chapter*

Recently defended PhD thesis

In January, 2016 two of our young members successfully defended their thesis. The Board of the IHSS likes to congratulate them for their achievements and wishes them all the best for their future.

Spectrometric Methods for Research of Humic Substances

Author: Vojtěch Enev

Affiliation: Brno University of Technology, Faculty of Chemistry, Materials Research Centre, Purkynova 464/118, 612 00 Brno, Czech Republic

Supervisor: Prof. Martina Klučáková

Abstract: The main aim of doctoral thesis is the study on physicochemical properties of humic substances (HS) by modern instrumental techniques. The subject of the study were HS isolated from South Moravian lignite, South Bohemian peat, forest soil *Humic Podzol* and finally extract from brown sea algae *Ascophyllum nodosum*. With respect on determination of structure and reactivity of these unique “biocolloids”, standard samples (*Leonardite* HA, *Elliott Soil* HS and *Pahokee Peat* HS) were also studied. These samples were obtained from International Humic Substances Society (IHSS). All mentioned substances were characterized by elemental analysis (EA), molecular absorption spectroscopy in ultraviolet and visible region (UV/Vis), infrared spectroscopy with Fourier transformation (FTIR), nuclear magnetic resonance spectroscopy of carbon isotope ^{13}C (LS ^{13}C NMR), steady-state and time resolved fluorescence spectroscopy. Obtained fluorescence, UV/Vis and ^{13}C NMR spectra were used for calculation of fluorescence and absorption indexes, values of specific absorbance and structural parameters respectively, which were used for fundamental characterization of these “biocolloidal” compounds. Infrared spectroscopy with Fourier transformation was utilized for the identification of functional groups and structural units of HS. Evaluation of infrared spectra is quiet complicated by overlapping of absorption bands especially in fingerprint region. This problem was overcome by Fourier self-deconvolution (FSD). Steady-state fluorescence spectroscopy was used for deeper characterization of HS with respect to origin, structural units, amount of substituents with electron-donor and electron-acceptor effects, content of

reactive functional groups, “molecular” heterogeneity, the degree of humification, etc. Parameters of complexation of samples *Elliott Soil* with heavy metal ions (Cu^{2+} , Pb^{2+} and Hg^{2+}) were obtained by using modified Stern-Volmer equation. These ions were chosen purposefully, because the interaction of HS with these ions is one of the fundamental criteria for the assessment of the reactivity of HS. Key part of the whole doctoral thesis is time-resolved fluorescence spectroscopy. It is able to determine the origin of emission of HS by method Time-Resolved Area Normalized Emission Spectra (TRANES). The viscosity of micro medium about excited fluorophores of HS was determined by Time-Resolved Emission Spectra (TRES).

Publications related to the thesis:

- ENEV, V., POSPÍŠILOVÁ, L., KLUČÁKOVÁ, M., LIPTAJ, T., DOSKOČIL, L. Spectral characterization of selected humic substances. *Soil and Water Research*. 2014, vol. 9, no. 1, p. 9–17. ISSN: 1805–9384.
- DOSKOČIL, L., GRASSET, L., ENEV, V., KALINA, L., PEKAŘ, M. Study of water-extractable fractions from South Moravian lignite. *Environmental Earth Sciences*. 2015, vol. 73, no. 7, p. 3873–3885. ISSN: 1866–6299.
- DOSKOČIL, L., ENEV, V., PEKAŘ, M., WASSERBAUER, J. The spectrometric characterization of lipids extracted from lignite samples from various coal basins. *Organic Geochemistry*. 2016, vol.95, p. 34–40. ISSN: 0146–6380.

New Methods of Study of Reactivity and Transport Properties of Biocolloids

Author: Jiří Smilek

Affiliation: Brno University of Technology, Faculty of Chemistry, Materials Research Centre, Purkynova 464/118, 612 00 Brno, Czech Republic

Supervisor: Prof. Martina Klučáková

Abstract: The main aim of doctoral thesis was the study on reactivity, transport and barrier properties of biocolloidal and synthetic polymeric substances by simple diffusion techniques. It was studied mainly the influence of basic physic-chemical parameters (temperature, concentration, pH and modification of material) on the reactivity and barrier ability of chosen compounds. Further substances were chosen as a model compounds: biocolloids (humic acids, alginate, chitosan, hyaluronate) and synthetic polymer (polystyrenesulfonate). Reactivity, barrier and transport properties of chosen substances were studied by interactions with oppositely charged basic organic dyes (methylene blue, rhodamine 6G, amido black 10B respectively) in hydrogels medium based on linear polysaccharide (agarose). The attention was also paid to basic physic-chemical characterisation (infrared spectroscopy, rheology, elemental analysis, thermogravimetry and scanning electron microscopy) of chosen materials and also hydrogels. Key part of the whole doctoral thesis was the optimization of selected diffusion techniques (diffusion cell technique and non-stationary diffusion in cuvettes) designated for the study on reactivity and barrier properties of wide range compounds (optimized method should be used as an universal method for simple and fast determination of reactivity of different compounds at given or changing conditions). The rate of reactivity, transport and barrier properties was determined based on fundamental diffusion parameters such as diffusion coefficients, break-through time so called lag time, interfacial concentration of chosen organic dye, apparent equilibrium constant, tortuosity factor, partition coefficient.

Publications related to the thesis:

- Jiri Smilek, Petr Sedlacek, Michal Kalina, Martina Klucakova: On the role of humic acids' carboxyl groups in the binding of charged organic compounds. *Chemosphere*. 2015, vol. 138, no. 11, pp. 503-510. ISSN 0045-6535. DOI: 10.1016/j.chemosphere.2015.06.093
- Petr Sedlacek, Jiri Smilek, Martina Klucakova: How the interactions with humic acids affect the mobility of ionic dyes in hydrogels – 2. Non-stationary diffusion experiments. *Reactive and Functional Polymers*. 2014, vol. 75, no. 1, pp. 41-50. ISSN 1381-5148. DOI: 10.1016/j.reactfunctpolym.2013.12.002
- Petr Sedlacek, Jiri Smilek, Martina Klucakova: How the interactions with humic acids affect the mobility of ionic dyes in hydrogel – Results from diffusion cells.

Miloslav Pekař

Brno University of Technology, Czech Republic

Philippe Duchaufour Medal 2016 Ceremony in Vienna

At the General Assembly of the European Geosciences Union (EGU) 2016 in Vienna our Secretary, Prof. Heike Knicker, was awarded with the Philippe Duchaufour Medal 2016 for her outstanding research in the field of soil organic matter research, in particular for increasing the knowledge about the impact of fire on humic material and the structure, properties and functions of pyrogenic organic carbon and nitrogen in soil. She received the prize during a special award ceremony organized by the Soil Sciences Division of the EGU after Dr. Claudio Zaccone (Univ. of Foggia, Italy), the nominator, and Prof. Hans-Dietrich Lüdemann (Univ. of Regensburg, Germany), her former PhD supervisor, highlighted her scientific merits.

Prof. Knicker gave a very interesting lecture entitled “*NMR doesn't lie! or: how solid-state NMR spectroscopy contributed to a better understanding of the nature and function of soil organic matter*”. She presented NMR data collected during her scientific career which questioned not only formerly well-accepted ideas about the humification process, but also recently published concepts of soil organic matter stabilization. Based on her results, she concluded that there is not “one” unique humification/stabilization mechanism. Which pathway(s) will finally occur depends largely on the microbial activity in the respective environment, as well as their chemical and physical conditions. She further underlined that the role of peptides and black nitrogen in soils and sediments needs more attention if a complete picture of the C cycle is wanted. With respect to the biochemical recalcitrance of pyrogenic organic matter in soils, she clearly demonstrated that this depends not only on its chemistry but also on the conditions of the environment in which it accumulates.



Prof. C. Zaccone giving the laudation



Prof. H.-D. Lüdemann reporting about the time Heike was a PhD student in his laboratory

Saskia Keestra (Right), the President of the EGU Soil System Science Division and the Awardee Heike Knicker (Left).



*Prof. Caudio Zaccone
University of Foggia, Italy*

IMPRESSUM

Editor: INTERNATIONAL HUMIC SUBSTANCES SOCIETY
NEWSLETTER 52

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