ContaSed2015

Contaminated Sediments:
Environmental Chemistry, Ecotoxicology and Engineering

8-13 March, 2015
Congressi Stefano Franscini, Monte Verità, Ascona, Switzerland

Program and Abstract Book

Conference Organizers and Speakers

Organizing Committee

Walter Giger, EuCheMS, Division of Chemistry and the Environment, Switzerland
Bernhard Wehrli, Eawag/ETH Zurich, Switzerland
Christian Bogdal, ETH Zurich, Switzerland
Thilo Hofmann, Vienna University, Austria
Paolo Demaria, Demaria Event Management, Switzerland

Scientific Committee

Flavio Anselmetti, University of Bern, Switzerland
Thomas Bucheli, AGROSCOPE, Switzerland
Lee Ferguson, Duke University, USA
Benoit Ferrari, Centre Ecotox, Switzerland
Philippe Garrigues, University of Bordeaux, France
Hans-Peter Kohler, Eawag, Switzerland
Jean-Luc Loizeau, University of Geneva, Switzerland
Richard Luthy, Stanford University, USA
Laura Sigg, Eawag, Switzerland
Thomas Ternes, Federal Institute of Hydrology, Germany
Eddie Zeng, Chinese Academy of Sciences, China

Invited Speakers

Flavio Anselmetti, University of Bern, Switzerland
Marijan Ahel, Rudjer Boskovic Institute and University of Zagreb, Croatia
Marc Babut, IRSTEA, France
Helmut Bürgmann, Eawag, Switzerland
Gerard Cornelissen, Norwegian Geotechnical Institute, Norway
Juliane Hollender, Eawag, Switzerland
Martin Jones, Newcastle University, UK
Bart Koelmans, Wageningen University,The Netherlands
Derek Muir, Environment Canada, Canada
Martin Reinhard, National University, Singapore
Peter Santschi, Texas A&M University, USA
Anna Sobek, Stockholm University, Sweden
Jeroen Sonke, Geosciences Environment Toulouse, France

21. Soil and sediment testing of very hydrophobic, low solubility organic substances
Miriam Leon Paumen, G. E. Bragin, L. K. Low, A. D. Redman, J. D. Butler, D. J. Letinski, C. A. Sutherland, B. A. Kelley and T. F. Parkerton

22. Hormones and sterols in sediments of the Danube River and its tributaries in Serbia
Ivana Matić, S. Grujić, Z. Jauković and M. Laušević

23. Assessment of anthropogenic pressures on the pristine karst lakes in two Croatian National Parks using multi-parametric sedimentary records
Iva Mikac, N. Bacic, V. Hodak Kobasic, Z. Fiket, S. Terzic, N. Mikac and M. Ahel

24. Determining the release of hydrophobic organic contaminants from sediment by *in-situ* benthic flow-through chambers
Lukas Mustajärvi, E. Eek, G. Cornelissen, A.-K. Wiklund-Eriksson, and A. Sobek

25. Dynamics of heavy metals level in bottom sediments of the River Prut (Republic of Moldova)
Larisa Postolachi, V. Rusu, T. Lupascu and T. Mitina

26. Biomass from organic waste materials for sustainable remediation
Gabriel Sigmund, M. Kah, H. Sun and T. Hofman

27. Removal of polycyclic aromatic hydrocarbons and their alkyl homologues during *ex situ* stimulated bioremediation of contaminated soil
Tatjana Šolević Knudsen, V. Beškoski, G. Gojgić-Cvijović, B. Jovančićević and M. M. Vrvić

28. Evaluation of the effect of PCB-containing architectural coatings on sediment quality
Philip Spadaro, S. Bowerman, J. Dittman, C. Moody, D. Profusek and K. Maitland

29. Adsorption of chlorophenols on pristine and functionally modified multiwalled carbon nanotubes
Jelena Tričković, M. Kragulj, S. Maletić, S. Rončević, Á. Kukovecz, Z. Kónya and B. Dalmacija

Removal of polycyclic aromatic hydrocarbons and their alkyl homologues during *ex situ* stimulated bioremediation of contaminated soil

Tatjana Šolević Knudsen [a], V. Beškoski [b], G. Gojgić-Cvijović [a], B. Jovančićević [b] and M. M. Vrvić [b]

[a]***Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Serbia***
[b]***Faculty of Chemistry, University of Belgrade, Serbia***

Polycyclic aromatic hydrocarbons (PAH) keep attracting great concern due to their environmental persistence but also due to their toxicity and carcinogenicity. Their alkyl homologues are more abundant and persist longer than parent compounds, and some of them are considered more toxic. Nevertheless, many environmental studies are dealing with parent PAH molecules only, while the reports on their alkyl homologues are still scarce and usually limited on selected isomers.

The aim of this research was to investigate the changes in the distribution of two-, three-, and four- ring PAH and their alkyl homologues during ex situ stimulated bioremediation of a soil contaminated with heavy residual fuel oil. The results of this experiment were compared with the results of natural biodegradation of the same soil that was not subjected to the processes of stimulation.

In the soil investigated in this research, the following analytes were detected and monitored: C1-C3 alkyl homologues of naphthalene; C0-C3 phenanthrenes; C0-C1 fluoranthene/pyrenes; C0-C1 benz(a)anthracene/chrysenes and triaromatic steroids.

During the period of six months, benz(a)anthracene/chrysenes were ony slightly affected while no changes were noticed in the distribution and abundance of triaromatic steroids. However, the biodegradation process resulted in a gradual removal of all other monitored PAH and their alkyl homologues.

In the set of naturally biodegraded samples, parent PAH molecules were more degraded than their alkyl homologues, while the lower alkyl homologues were more affected than the higher ones. According to the current knowledge, these changes during the natural biodegradation might be characterized as expected, although, to the best of our knowledge, such a detailed analysis of all of these compounds, treated and analyzed under the same conditions, has not been reported yet.

In the set of samples exposed to the stimulated bioremediation, the opposite trend was observed. Within the homologue series of naphthalenes, phenanthrenes and fluoranthene/pyrenes, higher alkylated homologues were more degradable than the lower ones, while the lower alkylated homologues were more degradable than their parent molecules.

Based on these results, a general conclusion can be drawn that the conditions applied during this stimulated bioremediation process of contaminated soil result in more pronounced reduction in the concentrations of alkyl PAH homologues comparing to their parent molecules. Moreover, under the conditions applied, higher alkyl PAH homologues were more degradable than the lower ones. However, the extent and the applicability of this process, as well as the further fate of these persistent pollutants, still remain to be investigated.