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Environmental Quality Through Transdisciplinary Collaboration

ABSTRACT BOOK

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Society of Environmental Toxicology and Chemistry Europe (SETAC Europe)

ABSTRACT BOOK
SETAC Europe 27th Annual Meeting

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This book compiles the abstracts from the platform and poster session presentations at the 27th Annual Meeting of the Society of Environmental Toxicology and Chemistry Europe (SETAC Europe), held at Square conference centre, Brussels, Belgium, from 7–11 May 2017. The abstracts are reproduced as submitted by the author and accepted by the Scientific Committee. They appear in order of abstract code and alphabetical order per presentation type. The poster spotlight abstracts are included in the list of poster abstracts. The presenting author of each abstract is underlined.

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SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY
In the 1970s, no forum existed for interdisciplinary communication among environmental scientists, biologists, chemists, toxicologists, managers, engineers or others interested in environmental issues. The Society of Environmental Toxicology and Chemistry (SETAC) was founded in North America in 1979 to fill the void, and quickly saw dynamic growth in the Society's membership, meeting attendance and publications.

A unique strength of SETAC is its commitment to balance the scientific interests of government, academia and business. The Society by-laws mandate equal representation from these three sectors for officers of the World Council and Geographic Unit Boards of Directors and Councils, and in the composition of committees and other society activities. The proportion of members from each of the three sectors has remained nearly equal over the years.

The Society is concerned about global environmental issues. Its members are committed to Environmental Quality Through Science®, to timely and effective communication of research, and to interactions among professionals so that enhanced knowledge and increased personal exchanges occur. Therefore, SETAC publishes two globally esteemed scientific journals and convenes annual meetings around the world, showcasing cutting-edge science in poster and platform presentations. Because of its multidisciplinary approach, the scope of the science of SETAC is broader in concept and application than that of many other societies.

SETAC's growth is reflected in the founding of geographic units around the world. SETAC Europe was established in 1989 as an independent organisation, followed by SETAC Asia-Pacific in 1997 and SETAC Latin America in 1999. In 2002, the four existing organisations joined together under the governance of the SETAC World Council. SETAC Africa is the most recent geographic unit, which was adopted in 2012. As evidence of international acceptance of the SETAC model and of the great interest at the local level, regional chapters and branches have emerged in a number of countries.

SETAC publishes two journals: Environmental Toxicology and Chemistry (ET&C) and Integrated Environmental Assessment and Management (IEAM). Environmental Toxicology and Chemistry is dedicated to furthering scientific knowledge and disseminating information on environmental toxicology and chemistry, including the application of these sciences to risk assessment. Integrated Environmental Assessment and Management focuses on the application of science in environmental decision-making, regulation, and management, including aspects of policy and law, and the development of scientifically sound approaches to environmental problem solving. Together, these journals provide a forum for professionals in academia, business, government, and other segments of society involved in the use, protection, and management of the environment for the enhancement of ecological health and human welfare.

SETAC books provide timely in-depth reviews and critical appraisals on scientific subjects relevant to understanding a wide range of contemporary topics pertaining to the environment. These include any aspect of environmental chemistry, toxicology, risk assessment, risk management, or environmental policy.

SETAC has two administrative offices, in Pensacola, Florida, USA, established in 1992, and in Brussels, Belgium, established in 1993.

Marine Research Centre; H. Hollert, RWTH Aachen University / Department of Ecosystem Analysis
The EU H2020-funded project GRACE addresses oil spills in cold climate and ice-infested areas of the Baltic Sea and the northern Atlantic Ocean. Within a consortium of comprehensive expertise, the overall objectives are the improvement of marine oil spill detection, monitoring and oil spill response technologies. The work package introduced here (WP3) focuses on the particular environmental impacts of oil spills and response actions (in collaboration with WP4) on biota in these extreme environmental conditions. This will be achieved by examining ecologically relevant target species at a regional scale (bivalves, crustacean, fish) and the zebrafish as a well-characterized model organism in ecotoxicology. Regional specimen will be sampled from representative locations in the Baltic Sea and northern Atlantic. Bivalves will furthermore be sampled with respect to seasonal and longitudinal variation to establish biomarker baselines. Selected model oil types and commonly used dispersants as representatives for the study region and samples from oil biodegradation and remediation experiments (provided by WP2) will be investigated using bioassay batteries with sensitive biomarker endpoints. Based on the toxicity data species-specific direct links between molecular events and effects on an organism level (adverse outcome links; AOL) for the test organisms will be established. This approach is a useful tool to develop risk assessment strategies covering future concepts for oil spill response. Using the PETROTOX model and a data gap analysis, threshold values will be derived and trophic levels as well as test species revealed that are currently missing from the available regulations. This will feed in the experimental planning of the other tasks in the WP. Together with WP1, zebrafish-based on-line oil detection biosensors will be developed and analysed, which serve for background information to biodetection. The whole GRACE project contributes to the challenge of the prediction, the measurement and the assessment of the evolution of oil pollution.

WE163

Migration of polycyclic aromatic hydrocarbons in vertical profile of alluvial sediments of the Sava River, Serbia

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The plants for district heating in Belgrade (Capital of Serbia) have been using petroleum products as fuel for decades. The heating plant in New Belgrade is one of the largest heating plants in Belgrade Balcan. Due to its location in New Belgrade-alluvial plains of the Sava River, this heating plant represents potential source of the oil pollution for the whole alluvial area. Our previous research confirmed presence of different oil pollutants in these sediments (Miletic et al, 2015). The aim of our present research was to investigate the extent of vertical migration of polycyclic aromatic hydrocarbons hydrocarbons in vertical profile of alluvial sediments of the Sava River at this locality. In spring 2015, during an extensive analysis of the ground waters from the existing system of 10 piezometers, within the area of the heating plant in New Belgrade, three new wells were drilled down to the depth of 15 m. From these three new boreholes the soil and sediment samples were taken from several depths: 0-0.30 m; 0.50 m; 1.00 m; 1.50; 2.00 m; 5.00 m; 7.00 m, 10.00 m 12.5 m and 15.00 m. Pedologic analysis revealed that lithologic profile was represented by alternating layers of sand and clay. Moreover, most of the layers in the soil profile were characterized by low content of organic matter which results in a reduced adsorption capacity and reduced retention of oil pollutants (Delle Site, 2001). The soil and sediment samples were extracted for petroleum hydrocarbons with dichloromethane in a Soxhlet apparatus. The extracts were fractionated using column chromatography into fractions of: saturated hydrocarbons (Fraction I), aromatic hydrocarbons (Fraction II), and polar compounds (alcohols and keto compounds - Fraction III; Jovancicevic et al, 2005.). The aromatic fractions were analyzed by GC-MS techniques and comprised polycyclic aromatic compounds (PAHs) typical for crude oils and their derivatives. The results showed that low amounts of petroleum PAHs investigated were present in the whole profile investigated, down to the depth of 15 m. It can be concluded that in these alluvial sediments PAHs can migrate down to the depth of 15 m. Considering characteristics of the surrounding soil profile with low adsorption capacity and reduced retention of oil pollutants, it is necessary to raise awareness that these environmental pollutants can easily be remobilized and migrate to the surrounding soil, sediments and, probably ground water.

WE164

Vertical migration of oil pollutant in profile of alluvial sediments of the Sava River, Serbia

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One of the largest heating plants in the Balkans is located in Belgrade, the Capital of Serbia. Being located in the New Belgrade-alluvial plains of the Sava River, it represents potential source of oil pollution for the whole alluvial area. Presence of different oil pollutants in the soils and sediments in this area has already been confirmed (Miletic et al, 2015). The aim of our present research was to investigate compositional changes of oil pollutant during migration in vertical profile of the soil in this area. In spring 2015 an extensive investigation of this soil was conducted. The soil was sampled from 20 micro locations and at 5 different depths (down to the depth of 2 m) making in total 100 of samples. A manual Eijkelkamp auger soil sampling device was used, with the appropriate augers. The sampled material was arranged in layers and for each micro location a lithologic profile was made. Most of the layers in the soil profile were characterized by high content of sand and low content of organic matter. From these soil samples extractable petroleum hydrocarbons were isolated with dichloromethane in a Soxhlet apparatus. The extracts were fractionated using column chromatography into fractions of: saturated hydrocarbons (Fraction I), aromatic hydrocarbons (Fraction II), and polar compounds (alcohols and keto compounds - Fraction III; Jovancicevic et al, 2005.) In order to investigate compositional changes of oil pollutant during vertical migration, but also to examine the relationship between these changes and the composition of the surrounding soil environment, for each borehole investigated the group composition determined was plotted against the corresponding lithologic profile in each borehole. The results showed that in most of the extracts isolated polar compounds (Fraction III) were most abundant while saturated hydrocarbons (Fraction I) were least represented. This ratio between the fractions remained almost unaltered in different soil profiles in this area and at different depts. It can be concluded that in these alluvial sediments oil pollutants can migrate almost unaltered to the depth of 2 m. Additionally, it can be presumed that penetration of unaltered oil pollutants in deeper layers of soil at this location is the result of characteristics of the surrounding soil environment.

Environmental risk assessment in time and space - To boldly go where no man has gone before (P)

WE165

LIVING LAB: A NOVEL RESEARCH FACILITY TO CONNECT ECOTOXICOLOGICAL AND ECOLOGICAL RESEARCH

H. Barmentlo, M. Schrama, CML Leiden University / Conservation Biology; E. Hunting, CML Leiden University; M.G. Vijver, CML Leiden University / Conservation Biology

Obtaining realistic predictions and measurements of how existing and emerging chemical stressors affect our natural environment is essential to provide the necessary tools to assess and mitigate ecosystem threats. While the basic idea is straightforward, attaining reliable estimates on the effects of chemicals on ecosystems has proved to be notoriously challenging. Historically, studies have focused on single ecosystems compartments. Recently, there has been an increasing recognition that anthropogenic pressures can resonate beyond the boundaries of single ecosystems, as exposure to emitted chemicals used at target sites may propagate to connected ecosystems. In addition, chemical impacts on an ecosystem level become more complicated through interspecific interactions throughout complex interconnected food webs. For instance, terrestrial consumers and predators can accumulate toxicants from adjacent water bodies with inherent implications for both bottom up and top-down effects within green and brown food webs. As a result, relatively little information is available on how chemical contaminants affects linkages between terrestrial and aquatic compartments, and hence novel experimental approaches are required. To facilitate answering pressing questions within this emerging field of research, a new research facility, called the 'Living Lab' has been constructed. This facility is composed of 36 ditches that are highly connected to a natural environment, thereby allowing natural processes (e.g. dispersal) to occur and to perform controlled experiments under naturally relevant, fluctuating conditions. We welcome research initiatives and collaboration within this novel research setting.

WE166

Traits-based analysis of macroinvertebrate community responses to insecticides using mesocosm data

A. Rico, IMDEA Water Institute / Aquatic Ecotoxicology; P. van den Brink, Alterra and Wageningen University

The high-tier effect assessment of pesticides is generally based on model ecosystem experiments in which worst-case exposure patterns are evaluated using species assemblages representative of freshwater ecosystems. The results of these experiments are generally interpreted using taxonomy-based approaches to derive threshold concentrations protective of effects on population abundances and community structure. An evaluation of these datasets based on physiological (e.g. respiration type) and ecological traits (e.g. voltinism, feeding type) would allow some advantages such as (1) the comparison and extrapolation of community effects across different geographic regions, (2) the elucidation of toxicity mechanisms leading to adverse effects, and (3) the linking between ecological effects and the functional diversity of ecosystems, elucidating impacts on the services/functions they provide. In this study we developed a methodological

Vertical migration of oil pollutant in profile of alluvial sediments of the Sava River, Serbia

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Introduction

One of the largest central heating plants in Belgrade, the Capitol of Serbia, is a heating plant in New Belgrade. Being located in the alluvial plains of the Sava River, it represents potential source of oil pollution for the whole alluvial area (Fig.1.)

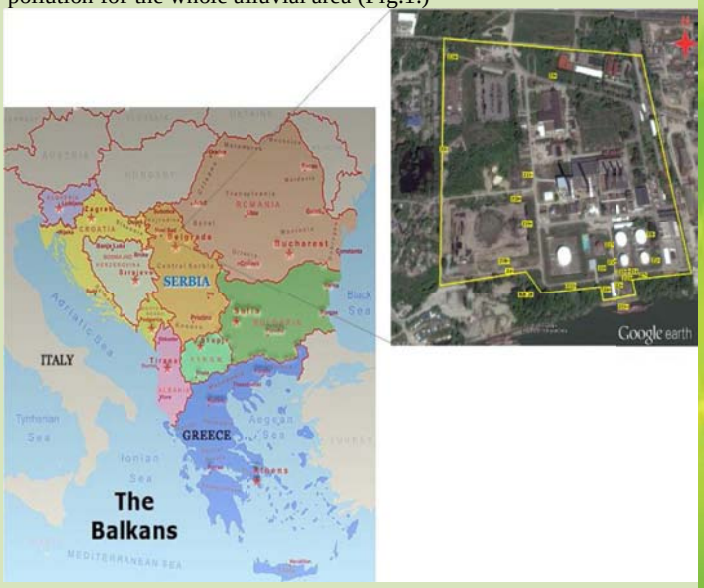

Fig.1. Maps of Belgrade (Capitol of Serbia) and microlocations of the alluvial plains of the Sava River.

Presence of different oil pollutants in the soils and sediments in this area has already been confirmed (Miletić et al, 2015). The aim of this work was to investigate compositional changes of oil pollutant during migration in vertical profile of the soil in this area.

In spring 2015 an extensive investigation of this soil was conducted. The soil was sampled from 20 micro locations and at 5 different depths (down to the depth of 2 m) making in total 100 of samples. A manual Eijkelkamp auger soil sampling device was used, with the appropriate augers. The sampled material was arranged in layers and for each micro location a lithologic profile was made. Most of the layers in the soil profile were characterized by high content of sand and low content of organic matter.

Materials & methods

From these soil samples extractable petroleum hydrocarbons were isolated with dichloromethane in a Soxhlet apparatus. The extracts were fractionated using column chromatography into fractions of: saturated hydrocarbons (Fraction I), aromatic hydrocarbons (Fraction II), and polar compounds (alcohols and keto compounds - Fraction III; Jovančićević et al, 2005.

Results & discussions

The results showed that in most of the extracts isolated polar compounds (Fraction III) were most abundant while saturated hydrocarbons (Fraction I) were least represented. This ratio between the fractions remained almost unaltered in different soil profiles in this area and at different depts (Fig.2.).

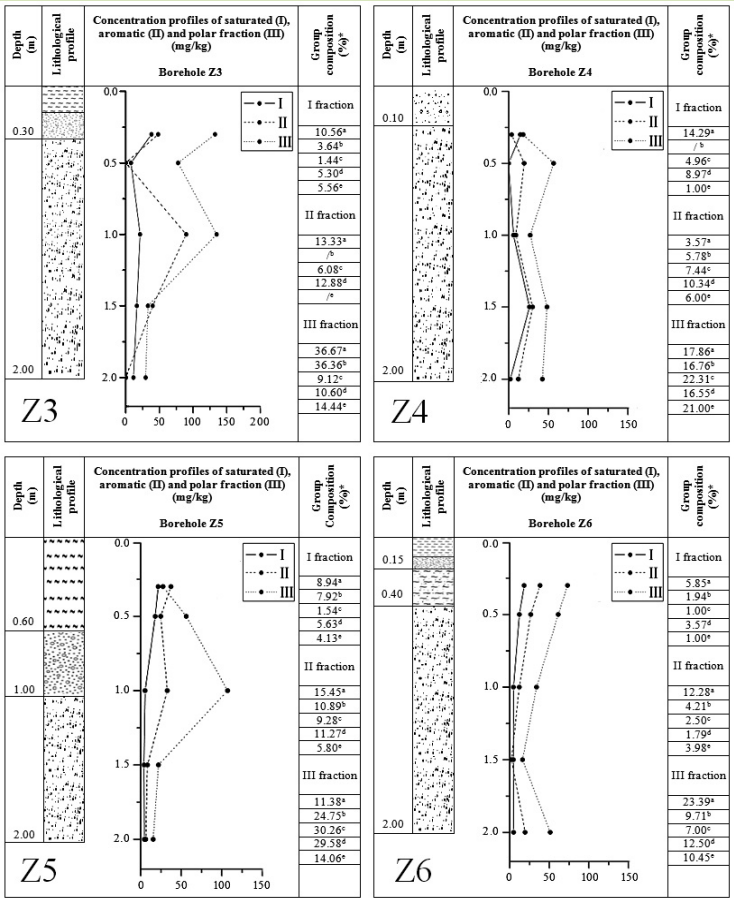

Fig.2. Vertical migration profiles of different organic fractions from samples Z3, Z4, Z5 and Z6.

Conclusions

It can be concluded that in these alluvial sediments oil pollutants can migrate almost unaltered to the depth of 2 m. Additionally, it can be presumed that penetration of unaltered oil pollutants in deeper layers of soil at this location is the result of characteristics of the surrounding soil environment.

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