



Alternative approaches to animal testing for ecotoxicity assessments

Chairs: Adam Lillicrap, Mark Lampi, Teresa Norberg-King

Within this session, new and novel approaches to the use of vertebrate species (e.g. fish amphibians and birds) for the assessment of ecotoxicity will be explored with a focus on understanding the role that animal alternatives have in supporting environmental hazard and risk assessments. Numerous technical and regulatory challenges need to be considered during future integration of the 3Rs (reduction, refinement, and replacement of animal tests) in environmental science. The need for alternative approaches has been primarily driven by legislation, including the EU Animal Protection Directive, the UK Animal Protection Act, the 7th Amendment to the EU Cosmetics Directive, selected legislation in Germany and the adopted European chemical legislation REACH which is fast approaching the 2018 registration deadline. The number of substances to be registered under the 2018 deadline is expected to be considerably higher than the 2013 deadline and the use of alternative methods is expected to see a tremendous rise. Since the primary goal of the REACH legislation is the protection of humans and the environment, it is imperative that only highly accurate, reliable predictions or robust alternative in vitro/in vivo approaches will gain regulatory acceptance. This session will explore new approaches towards developing and adopting efficient chemical (including effluents) assessments related to both acute and chronic ecotoxicity endpoints. Enhanced predictive models (e.g. QSARs) and new developments for in vitro and in vivo models to support environmental risk assessments will also be a focus. Additionally, progress relating to the generation of new bioaccumulation data using alternative approaches, particularly for PBT assessments, are also encouraged. Furthermore, it is recommended that abstracts have a focus on how any new approach could be accepted into a regulatory framework or integrated test strategy. This session is sponsored by the SETAC Animal Alternatives in Environmental Science Advisory Group (AAAG), a group that continues to explore the state of the science in method and strategy development.

Sponsored by: Animal Alternatives in Environmental Science Advisory Group (Global)

Preliminary session type: Platform and Poster

Amphipods as models to investigate toxicology of environmental contaminants at the land-sea interface

Chairs: Gisela de Aragao Umbuzeiro, Alex Ford, Theodore Henry

Amphipods frequently live in aquatic ecosystems that are vulnerable to contamination by toxic substances and occupy niches that link benthic habitats with higher trophic levels. Among these critical ecosystems are estuarine environments that combine complexity of the land sea-interface with fresh-estuarine-marine waters. Those ecosystems provide important services that include transport and transformation of toxic substances released from human activity, but the presence of these toxicants can negatively affect organisms in these environments. Despite the importance of estuarine environments and their vulnerability to environmental toxicants, there are relatively few organisms that have been developed for ecotoxicity testing. Amphipods are emerging as particularly good models for ecotoxicology and there have been substantial advancements made in understanding amphipod genomics, physiology and toxicology that will enhance the ability to establish them as standardized models. Being ubiquitous and hugely important to a variety of ecosystems and trophic interactions this diverse group has an added advantage of an enormous depth of ecological literature to assist connecting biomarkers to population level effects. Because they live in benthic habitats they become particularly interesting in nanotoxicology.

This session aims to:

- 1) explore recent developments of amphipods as models for ecotoxicology;
- 2) introduce new species with unique attributes that enhance ability to assess toxicology in critical habitats;
- 3) describe standardized methods for conducting ecotoxicity testing with amphipods including analysis of biomarkers.

Preliminary session type: Platform and Poster

Aquatic and terrestrial plant ecology, ecotoxicology, and risk assessment

Chairs: Stefania Loutseti, Gertie Arts, Noel Diepens

This session is organized by the SETAC Global Plants Advisory Group and welcomes scientific contributions that highlight topics within the fields of aquatic and terrestrial plant ecology, ecotoxicology, and risk assessment of chemicals. Abstracts may cover algae, periphyton, higher aquatic plants and terrestrial plants.

Plants are a diverse group of organisms with variability in growth forms and life histories, and they develop and grow over multiple compartments in the environment that include sediment/soil - pore water - water - air. As a result, they are key components in aquatic and terrestrial ecosystems with important structural and functional roles and perform essential ecosystem services. Plants interact with a broad range of chemicals in these different compartments. This raises the need for a better fundamental understanding of these plant-chemical interactions, so that better risk assessments can be performed with a focus on relevant exposure scenarios with realistic testing for effects. This has triggered the development of additional OECD tests with rooted aquatic plants (*Myriophyllum spicatum*; *Glyceria maxima* in development), but guidance for performing higher tier testing is still lacking, especially for terrestrial plants.

Abstracts are welcomed related to one of the following topics for aquatic and terrestrial plants:

1. Lower tier testing with focus on selecting species, endpoints and methods;
2. Sediment-exposure and effects on rooted, (aquatic) plants;
3. Higher-tier-testing with focus on plant Species Sensitivity Distributions and microcosm, mesocosm and field tests;
4. Ecological Modelling approaches as a higher tier tool in the risk assessment for plants;
5. Using recovery in plant testing and risk assessment;
- 6 Risk assessment schemes for plants under different regulations (PPPs, WFD, REACH, Biocides);
7. Invasive species: Constraints for lower and higher tier testing and risk assessment related to chemical stressors;
8. Plant ecology and trait based approaches in the context of the risk assessment of chemicals.

Sponsored by: Plants Advisory Group (Global)

Preliminary session type: Platform and Poster

Behavior Revised: Examining Behavioral Effects of Contaminants and Other Stressors in Aquatic Animals

Chairs: Gregory Pyle, Bryan Brooks, Alex Ford

Animal behavior integrates multiple levels of biological organization. Contaminant effects that occur at the molecular or physiological level can manifest at much higher levels of organization, often times leading to population, community, or even ecosystem level effects. Understanding such adverse outcomes is further challenged as the chemical "universe" continues to change through time as older compounds are phased out and newer substances enter commerce. Contaminant effects on behavior can be maladaptive to aquatic animals exposed to traditional contaminants (e.g., metals, pesticides) and those inhabiting municipal wastewater treatment receiving environments, where new and emerging contaminants of concern, such as pharmaceuticals and personal care products (PPCP) result in continued exposure scenarios. Of particular relevance to behavior, many of therapeutics are designed target specific neural receptors that result in modified behaviors (e.g., anti-anxiety drugs). In the aquatic environment, these drugs can accumulate in resident biota to concentrations that are equivalent to a human therapeutic dose, often with undesirable effects on behavior, which can potentially alter the normal functioning of the ecosystem. With other PPCPs and industrial chemicals, much less is known about their fate and/or potential to induce an adverse outcome in a natural receiving environment.

This session proposes to attract a wide range of researchers interested in understanding the potential for environmental contaminants and other stressors to modify aquatic animal behaviors and the resulting influence these behavioral modifications have on the structure and normal functioning of ecosystems. Links will be established between uptake pathways and target receptors as they relate to behavioral modifications. Expertise will be sought to ensure a broad coverage of aquatic animal behaviors representing multiple trophic levels among vertebrate and invertebrate species. The ultimate objective of the session is to consolidate the current state of knowledge on behavioral effects of environmental contaminants and other stressors to effectively inform future environmental assessment management in natural aquatic systems.

Preliminary session type: Platform and Poster

Biomonitoring of contaminants in the marine environment: integration of biological and chemical approaches

Chairs: Kari Lehtonen, Lucia Guilhermino, Ketil Hylland

The development of integrated biological-chemical monitoring and assessment of chemical pollution has been ongoing in European coastal and offshore areas for close to two decades. An integrated approach is widely seen as the most reliable way to get a holistic picture of the status of our seas with regard to contaminants. Despite the significant technological advances and a wealth of data currently available, however, the implementation of the methodologies in national and international monitoring has been limited to some countries and programmes. Some of the issues raised relate to the perceived lack of ecological relevance of the measured biological parameters, others to the high cost of some methods (e.g., -omics), while it is also conceptually challenging to combine the data in an easily interpretable form. In addition, different areas and habitats require amendments to general strategies: one size does not fit all.

The use of biological effects methods such as biomarkers can clearly contribute towards detecting and quantifying environmental impacts caused by chemical pollution, but there is still a need to develop links to population effects. Adverse outcome pathways (AOP) have recently been identified as a tool to link chemical properties of toxicants to specific molecular damage and responses at higher biological levels. Such contextual or probabilistic approaches based on known mechanisms of toxicity can provide useful modeling tools for the interpretation of the risk levels indicated by biomarker data and the levels of different chemicals measured in the environment.

Mixture toxicity and the effects of non-chemical factors (such as temperature, salinity, hypoxia and acidity) will in the future produce a matrix of interacting factors where realistic estimates of how any one factor affects the functioning of organisms and conceivably the ecosystem can only be reached by holistic assessment of the health of the individuals through applying a well-designed set of biological effect parameters.

The current session proposal invites researchers to present new data related to biological-chemical monitoring with respect to

- (1) new methodologies and parameter combinations,
- (2) application of integration methods on datasets,
- (3) tailoring of monitoring strategies for different types of needs,
- (4) modeling of linkages between observed concentrations of contaminants through damage on biomolecules and further up the biological level hierarchy, and, finally,
- (5) new approaches and strategies on how to implement the integrated methodologies in monitoring programmes on political and practical levels.

Preliminary session type: Platform and Poster

Cost effective and ecological relevant approaches in environmental toxicology using invertebrate species

Chairs: Bruno Campos, Susana Loureiro, Magnus Breitholtz, Carlos Barata

Invertebrate species are commonly used in ecotoxicity testing to investigate the impact of chemicals on the environment. A range of regulatory guidelines (OECD, ISO, EPA) are available, combining different invertebrate species and toxicological endpoints. However these guidelines and studies are limited to relatively few species, while invertebrates offer far greater range of interest for research, spanning from toxicological characterization to basic developmental biology, from endocrinology to immunology. The small size, ease of maintenance and short life cycles of invertebrate species commonly used in ecotoxicology make them also very suitable for several approaches at different levels of organization. From automated high throughput screening applications to guild related traits, and transposing to ecosystem functions make them good models for assessing toxic effects in the laboratory and the field using micro, mesocosms and transplant experiments. Emerging molecular-based technologies are allowing ever more complex research involving genome studies and tools such as gene editing, gene knockout and recombinant DNA, which are greatly facilitating our understanding of the molecular mechanisms of toxicology and its phenotypic translation. Omic technologies combined with system biology approaches offer the possibility to assess effects from the transcriptome, metabolome, organ or individual as well as the linkage to higher ecological levels, e.g. such as population level. Within this session we intend to show the latest breakthroughs and new directions in toxicological research using invertebrates, focusing on novel systems, endpoints, assays and testing strategies. We invite presentations focusing on lab and field studies addressing impacts across several levels of biological organization considering molecular, life-history, demographic and/or behavioural endpoints; studies focused on a mechanistic understanding of toxic effects and/or on risk assessment of chemical pollutants with, both human and environmental health importance. We also invite engineers and industry to show latest high throughput approaches using invertebrate species. The session is intended to be interdisciplinary and bring together researchers across a wide range of study areas with the ultimate goal of enhance our understanding of different approaches in ecotoxicity testing.

Preliminary session type: Platform and Poster

Ecological traps for wildlife driven by pollutants

Chairs: Rafael Mateo, Clémentine Fritsch, Richard Shore

Animals can select habitat according to cues of the environment that correlate with better survival and reproductive success after an evolutionary process. In rapidly changing environments, these natural preferences can become harmful decisions if the selected cues correlate with adverse environmental factors that affect individual fitness. These scenarios are known as ecological traps. Although these traps have been present in nature in an evolutionary context, it is in the fast changing world after human action, when multiple scenarios of ecological traps can occur and result in local or even massive extinction of diversity. Pollutants can be one of the important drivers of ecological traps nowadays because:

- (1) contaminants can accumulate in highly productive habitats attractive to animals (e.g. aquatic environments),
- (2) some pollutants can produce an attractive cue to the animals, facilitating their exposure (e.g. pesticides/rodenticides or other chemicals that impair survival or behaviour in prey such that become easier to catch), or
- (3) many other scenarios in which the preferred habitat or resource is intimately associated with the presence of a toxic chemical.

The way chemicals exert adverse effects can also hinder the negative cues of polluted environments; for instance, if compounds are present in concentrations that are acutely lethal, individuals are less likely to develop avoidance behaviours. The mechanisms by which wildlife can adapt to polluted environments, through behavioural or physiological changes, can be another factor to consider in the study of ecotoxicological traps. The outcomes of potential ecological traps driven by pollutants at local or global scales, and how these affect the evolution of the species, offer a new viewpoint within the field of ecotoxicology.

Sponsored by: Wildlife Toxicology Advisory Group (Global)

Preliminary session type: Platform and Poster

Fish model species in environmental toxicology

Chairs: Jessica Legradi, Juliette Legler, Ioanna Katsiadaki

Fish models are used commonly in ecotoxicity testing to investigate the impact of chemicals on the aquatic environment. A range of OECD guidelines are available, which use different fish species and target different toxicological endpoints. These studies however are limited to relatively few species, but fish offer far greater utility for research, spanning basic developmental biology, neurobiology, endocrinology to immunology. The small size of some available fish species including the zebrafish (*Danio rerio*) or medaka (*Oryzias latipes*) and their robust nature makes them ideally suited for application in automated high throughput screens. Furthermore, early life stages of these species offer all the key attributes of a complex in vivo system (e.g. including metabolism), as well as attributes of in vitro assays, as tests can be carried out in multiwell plates formats with small sample volumes and run in comparatively short periods of time. These attributes make them well suited for ecotox testing of environmental extracts and in effect directed analysis (EDA) to detect unknown contaminants in environmental samples. Research on fish over the last decade has been greatly facilitated by the availability of sequenced genomes, which are available for over twelve species with more pending. This facility together with advances in genetic and epigenetic studies, including gene knockout and transgenesis technologies, is greatly facilitating understanding of the molecular mechanisms of toxicology. Thereby helping to study and define adverse outcome pathways (AOPs). Within this session we intend to show recent developments in toxicological research using a variety of different fish model species, focusing on novel systems, endpoints, assays and testing strategies especially as applied to ecotoxicology. We will focus on molecular approaches that could lead to new AOPs. Results of toxicity studies of single compounds as well as complex environmental samples are of interest. Effects on individual fish, multigenerational exposure effects, and population level impacts will be considered. We especially welcome presentations highlighting new analytical methods and techniques for contaminants or their metabolites in exposure media or fish. The session will be interdisciplinary and bring together researchers across a wide range of research areas with the view to enhance approaches in ecotoxicity testing.

Preliminary session type: Platform and Poster

Interpreting Biological Effects of Metals and Their Mixtures

Chairs: Eric Van Genderen, Nicolas Bury

A mechanistic understanding of the physiological processes affected by pollutants provides robust scientific evidence that aids regulators in making informed environmental risk assessment. This scientific understanding will be essential to identify and prioritize those populations and environments that require protection in a multi-stressed world. The effects of metals and their mixtures has been well studied over the last 20 to 30 years and this research has contributed to the development of the biotic ligand models that are now incorporated into single metal risk assessments. There are, however, many challenges facing future metal risk assessments that will benefit from a better understanding of the physiological processes underpinning toxicity. For example, how to best regulate metals in the context of mixtures (with other metals and in combination with other pollutants), environmental change (changes in ocean pH and rising temperature, climatic fluctuations), long-term chronic exposure to via the water and diet, and adaptation. In addition, the field of metals research has advanced to the point where the principles of bioavailability can be applied to "real world" risk assessment scenarios where metal mixtures commonly occur. This session aims to provide a platform to present our current understanding for interpreting the mechanisms of metal toxicity that may aid future metal risk assessment.

Sponsored by: Metals Advisory Group (Global)

Preliminary session type: Platform and Poster

Metals in the Environment: Fate, Speciation and Bioavailability in Water, Soil and Sediment

Chairs: Erik Smolders, Rute Domingos, Karel De Schamphelaere, Yann Sivry

The knowledge about metal transport, distribution, speciation and bioavailability has considerably increased over the past two decades. Whereas this knowledge has begun to find its way into environmental regulation of metals, environmental science keeps progressing and novel scientific and regulatory questions arise. For instance, established equilibrium models are now accepted for risk assessment, however the equilibrium assumption is not always clearly related with the biouptake processes. The role of both metals dynamic speciation and colloidal fractions under natural conditions can be crucial on metal risk assessment. However, both aspects largely remains to be qualitatively and quantitatively described. The risk assessment of poorly soluble metal compounds in the environment needs pragmatic models to address the regulatory requirements for testing the myriad of products under natural conditions.

This session will welcome all novel contributions covering metal fate, speciation and bioavailability in water, soil and sediments. The contributions can address:

- 1) Chemical speciation and bioavailability of cationic metals, organometals or toxic oxyanions in the environment;
- 2) Development/improvement of analytical tools or models;
- 3) Fate modelling and observations;
- 4) Bioavailability of metals across different species and exposure routes.

Sponsored by: Metals Advisory Group (Global)

Preliminary session type: Platform and Poster

Polar ecotoxicology: hot issues in cold climates!

Chairs: Katrine Borga, Nico van den Brink

Assessment of environmental risks of chemicals and contaminants in Polar Regions has gained increased interest in recent years. In the Arctic region this is due to potential increase of human activities like oil and gas exploitation and shipping related to the fact that larger areas will become free of ice over summer as a consequence of climate change. In the Antarctic new and unexpected contaminants are emerging, related to long-range transport. In addition the Polar Regions are act as early warning of how climate change will affect the distribution, uptake and effects of contaminants, as the environmental response to climate change will occur here fastest and with highest amplitude. A major factor affecting the environmental fate and hazards of contaminants in Polar Regions is the extreme seasonality of environmental conditions due to the high latitude, and the ecosystem adaptation to these conditions. Sea ice dynamics govern the biological cycles, and as such impact both the fate of chemicals as well as their potential effects. This makes Polar Regions different from temperate and tropical regions, hampering the extrapolation of concepts and results between regions and studies. For instance, the adaptation of Polar organisms to seasonal food availability results in build-up of energy reserves (lipids) during the summer seasons that may make them vulnerable to chemical exposure and selected time windows of enhanced stress when contaminants are re-mobilised from the lipids. Hence the ecological constraints of Polar ecosystems and organismal adaptation to high seasonality may limit their resilience towards chemicals stress. To justify the need for specific risk assessment procedures and threshold levels, effects of different Polar specific factors on the vulnerability of local species to chemicals stress need to be quantified.

In this session we solicit for papers that assess environmental hazard and fate of chemicals with specific focus on factors that modulate Polar specific impacts. This may include exposure and accumulation studies as well as effect assessments. The aim of the session is to increase the knowledge of such factors, in order to increase the relevance of site specific ERA for Polar regions, but also to assess the potential risks of emerging chemicals to Polar environments even before their marketing.

Preliminary session type: Platform and Poster

Pollutant risks to amphibians and reptiles: how much we know and what we need

Chairs: Manuel Ortiz Santaliestra, Isabel Lopes, John Brausch

Amphibian and reptile toxicity data have not been traditionally taken into account when assessing risks of man-made chemicals that are released to the environment. Historically, amphibians and reptiles are considered to be protected by data retrieved from other vertebrate taxa. In consequence, no standardised guidelines for toxicity assessment in these groups exist and ecotoxicological information is still limited compared to other vertebrates. The recent inclusion of amphibians and reptiles in the terrestrial ecotoxicological risk assessment, required for the authorisation of plant protection products, according to the European legislation (Regulation 284/2013), has focused the spotlight on the scarcity of information about these animals, and in turn on the necessity of using the little available information and conducting studies to generate new, relevant data. The European Food and Safety Authority has announced the development of a Guidance Document on pesticide risk assessment for amphibians and reptiles for the upcoming years, and is already involved in a process to compile useful information with this purpose. This session aims to create the environment for scientist from all sectors, as well as for regulators, to share novel information and to raise issues related to the development of a new ecological risk assessment framework for European amphibians and reptiles. Some examples of major themes to be tackled in this session are: (i) effects of pesticides and emerging pollutants on different life stages of amphibians and reptiles; (ii) identifying and understanding the role of major exposure pathways in observed effects, (iii) establish possible associations between in vitro versus in vivo responses and among different life stages/biological organisational levels targeting the substitution of animal experimentation in these two taxa. The session is promoted by the SETAC Global Advisory Group of Ecotoxicology of Amphibians and Reptiles.

Sponsored by: Ecotoxicology of Amphibians and Reptiles Advisory Group (Global)

Preliminary session type: Platform and Poster

Prospective and retrospective soil risk assessment of chemical stressors

Chairs: Patrick Kabouw, Juliska Princz, Mark Maboeta, Silvia Pieper

Soils are a non-renewable resource that provides a habitat for an extremely diverse range of organisms, thereby delivering unique ecosystem services. However, soils should not be taken for granted. Soils need care, maintenance, protection, and in some cases, restoration, to ensure the sustainability and continued delivery of these unique ecosystem services. Although soils are important they are often described as "a black box".

Ecologists are slowly unraveling this complex "black box" with its interactions and dependencies. Although research is aided by novel innovations and more holistic approaches, there is still a long way to go in understanding how soils are able to sustainably deliver ecosystem services.

Soils need protection but how to protect and restore soils when the processes, species, and functions are so diverse and little understood? In this session, we aim at linking scientific innovations to regulatory developments. These developments include the recent scientific workshop¹ on soil risk assessment for chemical substances (i.e., industrial chemicals, pesticides and biocides), guidance on the characterisation of exposure of soil organisms to, e.g. pesticides², and ongoing work on risk assessment. In addition, the session addresses ongoing discussions on the use of NOEC vs. ECx values, the design of higher tier effect studies, statistical power of laboratory and field tests, appropriate soil test species, and how to address the protection of biodiversity and soil ecosystem services.

In this session, we welcome work related to current soil risk assessment schemes - both prospective and retrospective - for different chemical substances. This session aims to contribute to the protection of soil biodiversity and important related ecosystem services. Therefore we welcome presentations on innovative methods in effect assessment, new methodologies in the statistical evaluation of data, and theoretical and practical suggestions on how to improve soil risk assessments.

1) http://echa.europa.eu/view-article/-/journal_content/title/topical-scientific-workshop-on-soil-risk-assessment

2) EFSA (European Food Safety Authority), 2015. EFSA Guidance Document for predicting environmental concentrations of active substances of plant protection products and transformation products of these active substances in soil. EFSA Journal 2015;13(4):4093, 102 pp., doi:10.2903/j.efsa.2015.4093

Sponsored by: Soils Advisory Group (Global)

Preliminary session type: Platform and Poster

Soil and water contaminants' evaluation, monitoring and abatement

Chairs: Beatrice Opeolu, Matt Dodd

Poverty, corruption diseases, political and sectarian violence, natural disasters are some of the challenges of the 21st century world. Impacts of these are greater in the developing economies such as Africa and Asia. Population explosion also contributes to greater demands for goods and services. Consequently, needs for industrialization, urbanization, improved quality of life commensurate to population density continue to exert pressure on natural resources. Several studies have reported pollution of ecosystems with organic and inorganic contaminants including heavy metals, phenols, phthalates, PAHs, and emerging ones such as pharmaceuticals, perfluorooctane sulfonate (PFOS), perfluorooctane acid (PFOA) and microplastics as a result of industrial, transportation, domestic and agricultural activities in association with urbanization and industrialization. These contaminants impacts negatively on soil and water resources thereby limiting their usefulness for intended purposes. The high lipophilicity and persistence of most of these environmental contaminants also results in their bioaccumulation and transport through the food chain predisposing humans to their potential negative impacts.

Developing countries are the worst hit by the impacts of soil and water pollution due to unavailability of measurement, monitoring and remediation technologies coupled with ineffective policy enforcement. Such challenges usually, cannot be solved by a single event but by continuous processes that will ensure that pollution levels are assessed and controlled. Over-utilization of Asian and Africa's soil and water resources necessitates continuous studies on monitoring of use, pollutants levels and cheaper remediation technologies for sustainability. If 'balancing economic growth opportunities with environmental sustainability' is to be achieved, efforts should be made by researchers to provide adequate data for policy decisions. This session therefore aims at inviting papers on soil and water contaminants' assessment, monitoring and remediation innovations. It is hoped that the session will attract researchers from the African continent and beyond sharing their experiences in the field leading to methodologies that could be adapted for developing economies as well as data for policy framework in the sub-region. The session is also expected to generate a network of researchers that may possibly collaborate on regional surveys.

Preliminary session type: Platform and Poster

The influence of bio-based production on soil ecosystem services and the risk and fate of agricultural chemicals

Chairs: Marlea Wagelmans, Sabine Apitz

A socially relevant and persisting global trend is the transition towards bio-based production processes: using renewable resources based on biomass in order to produce energy, fibers, chemicals and other materials.

Soil ecosystems and their services play an important role in bio-based production processes. Maintaining a healthy soil ecosystem becomes an ever-increasing challenge. In the traditional agro-cycle, soil quality is maintained by plant residues that maintain the soil organic matter. This is essential because organic matter plays an important role in many soil ecosystem services such as provision of nutrients, maintenance of soil structure and pest and disease control. In bio-based production processes, these plant residues are harvested and thus often do not re-enter the soil system.

Maximum removal of plant residues can have negative effects on soil quality and ecosystem functioning, but the specific effects of maximum removal on soil fertility and thus productivity of soils, as well as their influence on the fate and effects of pesticides and other agrochemicals introduced into fields are not known. Can the soil function without the recurring introduction of organic matter, or is it possible to remove all such organic carbon (in the form of plant residues) and to recycle products from other bio-based production processes (for instance refined manure, digestate) in their place? Residues and waste streams resulting from bio-based production may also contain chemicals produced during these bio-based production processes. In fact, the residues/wastes may contain a complex mixture of (natural and xenobiotic) chemicals, which require ecotoxicological assessment for their potential risks to soil function. What are the effects of residues from these processes on nutrient dispersal and cycling in soil, and on soil structure, pest and disease control? Can we measure the effects with the currently available tests and techniques or do we need to develop new tools to measure them? Given that pesticides and other agrochemicals are and will continue to be used, how do these products interact with the source materials and residues of bio-based production? Do the fate and ecotoxicological effects of agricultural chemicals differ in such a production approach, and how does this affect non-target organisms, as well as soil-based ecosystem services such as nutrient cycling? Are the currently available assessment techniques sufficient to measure these effects or are new developments needed?

This session will provide an overview of current knowledge on the effects (either positive or negative) of bio-based production processes and the recycling of products on soil ecosystems and their services, as well as their effect on the risks and fate of associated xenobiotics and intentionally used agrochemicals in soil. Is it possible to safely close nutrient and carbon cycles to support a sustainable Bio-based Economy?

Sponsored by: Soils Advisory Group (Global)

Preliminary session type: Platform and Poster

Toxicity Testing in Sediments - Bioassays As Link Between Chemistry and Complex Benthic Community Testing for Sediment Quality Assessment

Chairs: Sebastian Höss, Ute Feiler

Sediments represent both, a major sink and a potential source of persistent toxic substances in the aquatic environment. At the same time, sediments play a key role for the ecological status of aquatic ecosystems, as they are a habitat of diverse communities and a compartment of important biochemical transformations. Therefore, sediment studies are very suitable for highlighting the extent, the history and the trend of water pollution. Among others, toxicity criteria are used to decide on the acceptability of dredged material relocation within the waters or the need for other disposal options, which may be considerably higher in their costs. Therefore, thorough sediment characterization is essential.

At present, weight-of-evidence approaches, such as the sediment quality triad, are widely accepted to assess the ecological risk of sediment-bound contaminants. Besides chemical analysis and in-situ benthic community assessment, toxicity testing with single species represents one line of evidence (LoE), which allows to assess cause-effect relationships. Whole-sediment exposure protocols representing realistic scenarios simulating in situ exposure conditions as well as aquatic bioassays for testing aqueous extracts or pore water that were obtained from the sediments are currently part of the international guidelines for the assessment of sediment and dredged material. Other LoEs, linking chemical and ecological status of benthic habitats, are effect-based sediment quality guidelines (SQG) that are derived from toxicity and biotic data, as well as pollution sensitive biotic indices (e.g. SPEAR[%] index; NemaSPEAR[%]-index).

In this session we would like to get an overview on the pros and cons of the different approaches and the benefits of WoE approaches using various LoEs for assessing sediment toxicity. Abstracts relating sediment toxicity testing with other LoEs for sediment quality assessment are welcome.

Preliminary session type: Platform and Poster