contaminated with PAHs, oxy-PAHs and N-PACs were obtained from 6 locations in three countries: a) a former gasworks plant in Karlstad, Sweden (5 samples); b) a former wood tar production site outside Stockholm (Riksten), Sweden (10 samples); c) a coke oven plant in France (3 samples); d) a coke oven and metallurgy site in France (1 mixed sample); e) a gasworks site in France (1 mixed sample); f) a gasworks site in Belgium (1 mixed sample), g) and a wood preservation site, Holmsund, Sweden (1 mixed sample). In addition, with these soils we determined the total soil concentrations, enabling an analysis of the partitioning behaviour, and conducted worm bioaccumulation bioassays (with E. crypticus according to ISO 16387), enabling an analysis of biouptake and bioavailability. Porewater concentrations, in combination with total soil concentrations and worm concentrations (Enchytraeus crypticus) agreed with expectations from independent partitioning and bioaccumulation models. However, they disagreed with recommendations of risk assessments in Europe and the United States, are these are based on reference soils, and the soils on this study, coming from contaminated areas, are quite unique in their sorption properties compared to reference soils. For instance, the organic carbon in contaminated areas sorbs similarly to coal tar, but in reference soils sorbs similarly to humic acids. The results call into question the conservative nature of existing soil risk guidelines.

TU419
Bioelectrochemical systems for sustainable bioremediation
J. Monier, O. Sibourg, ENOVEO
The recent discovery of microorganisms that can directly use electrodes as a sink or as a source of electrons has led to the development of innovative approaches for the remediation of polluted environments. Bioelectrochemical systems are emerging technologies which use microorganisms to catalyze oxidation reactions at an anode and/or reduction reactions at a cathode where pollutants serve as electron donors or electron acceptors. Accelerating remediation processes using such technologies has been demonstrated for several pollutants including reduction of toxic metals and chlorinated compounds, oxidation of aromatic hydrocarbons, phenol and potentially for any contaminants that microbes have been shown to anaerobically oxidize. This presentation will describe, through different case studies, how such systems work, their advantages and how they can be implemented in order to optimize or design new remediation strategies. Electrode-based strategies used to monitor microbial activity in real time will also be addressed.

Adverse outcome pathway concept in research and risk assessment (P)

TU421
Towards animal free human safety assessment - Adverse Outcome Pathway descriptions as a backbone for integrated testing strategies
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SEURAT-1 is a major European research consortium that was established to develop the science needed to evaluate the safety of chemicals for repeated exposure in humans without using animals. Inspired by the fundamental considerations published in the report of the U.S. National Research Council (NRC) entitled 'Toxicity Testing in the 21st century: A Vision and a Strategy', SEURAT-1 aims to use the mechanistic understanding of toxicological effects for the development of innovative testing methods and, ultimately, improved safety assessment. A research strategy was formulated based on the guiding principle to adopt a toxicological mode-of-action framework to describe how any substance may adversely affect human health. The proof of the initiative will be in demonstrating the applicability of the concepts on which SEURAT-1 is built. This is done on three levels: (i) theoretical prototypes for adverse outcome pathways were formulated based on knowledge already available in the scientific literature on investigating the toxicological mode-of-actions leading to adverse outcomes (addressing mainly liver toxicity); (ii) adverse outcome pathway descriptions are used as a guide for the formulation of case studies to develop integrated testing strategies for the prediction of certain toxicological effects, which also as a consequence might further elucidate the theoretical model; (iii) further case studies targeting the application of knowledge gained within SEURAT-1 in the context of safety assessment. The ultimate goal would be to perform safety assessment based on *ab initio* predictions grounded on a sufficient understanding of toxicological mechanisms. In the near-term, it is more realistic that data from innovative testing methods will support in strengthening read-across arguments.

Midpoint or single score for decision making? (P)

TU422
How to communicate environmental impacts? Approaching LCA results to consumers for urban food products
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Labeling schemes provide consumers with data to include environment as a decision-making criterion in purchasing, such as energy consumption or carbon emissions. Notwithstanding the easier communication through single indicators, the use of them can cover up other environmental impacts. In Life Cycle Assessment (LCA), impact assessment methods vary from single endpoint indicators to methods with a set of almost 20 midpoint indicators. But, what is the equilibrium between consumers' understanding and the reliability of LCA results? Urban food production in new Rooftop Greenhouses (RTGs) is used as case study to test the comprehension of different LCIA indicators among consumers. The study aims to compare consumers' preferences with LCA results for multiple indicators (both midpoint and endpoint). First, surveys will be done to consumers of the university community that will participate and consume local lettuces from the RTG-Lab (Universitat Autònoma de Barcelona, in Bellaterra, Spain), during the community harvesting day. Surveys aim to identify the environmental indicators that consumers perceived as preferable. Second, lettuce production will be assessed from a cradle-to-farm gate perspective through different LCIA methods. Consumers' preferences will be contrasted to LCIA results to observe whether significant environmental impacts of products are hidden through certain indicators.

Alternative approaches for ecotoxicity assessments (P)

WE001
Combined ecotoxicological and hydrological methods for on-line contamination event detection in water distribution systems
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Drinking water quality and availability are key elements of water security and may be compromised by instances of accidental or deliberate contamination. Hence, it is required to detect, identify and manage any negative, unforeseen and sudden change in drinking water quality to ensure urban water security and management. The collaborative project W^3-Hyrdo combines ecotoxicological and hydrological methods and aims to (i) detect, understand and finally numerically simulate the governing physical, chemical and biological processes underlying a peak contamination and (ii) to set-up a risk based management framework for event detection. Within the project two risk scenarios are investigated, in order to simulate scenarios in water basins, remobilization scenarios of contaminated sediments were conducted and for event dection in water distribution systems two on-line bio-units were developed. Native sediment spiked with permethrin, cadmium and quinolone, respectively, in environmental concentrations was monitored using a water sediment system in an annular flume. The hydrotoxicological experiments provided data about bed shear stress, temperature, dissolved oxygen, pH value, conductivity and redox potential and suspended particulate matter. This enabled the detection of interactions of relevant parameters in the system after the remobilization of contaminants from the sediment. In order to detect contamination events in water distribution systems two on-line bio-units with high sensitivity and accuracy were developed. The combination of two biological monitors allows for the verification of alarm signals from the first instrument with the signal of the second, thereby reducing false alarm rates. Both bio-units were developed to use *Danio rerio* (zebrafish) embryos and larvae until the age of 120 hours post fertilization (hpf) as an alternative to animal testing. The first bio-unit is a custom designed flow-through well plate in which 72 hpf to 120 hpf zebrafish larvae are exposed to a continues water flow. Swimming activity is continuously monitored and analyzed in comparison to a negative control. The second bio-unit is a custom made pipetting robot which is equipped with a multi-pipette that automatically exposed zebrafish embryos aged 8 hpf to 48 hpf in a multi well plate. First experiments were conducted aiming to test both tools regarding their functionality and sensitivity.

WE002
Using a low cost pipetting robot to investigate the influence of the medium exchange frequency on the toxicity of substances in the fish embryo toxicity assay (FET)
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