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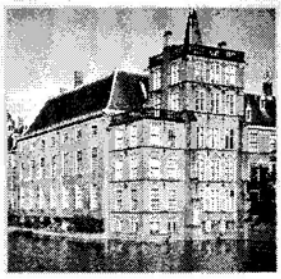
Controversies and Solutions in Environmental Sciences

Abstracts



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ABSTRACT BOOK
SETAC EUROPE 16TH ANNUAL MEETING
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This book is comprised of the abstracts of the presentations for the platform and poster sessions of the SETAC Europe 16th Annual Meeting of the Society of Environmental Toxicology an Chemistry (SETAC), held at the World Forum Convention Centre in The Hague, The Netherlands. The abstracts are reproduced as accepted by the Scientific Committee of the 16th Annual Meeting and appear in order of abstract code.

This book contains an Author Index that cross-references the corresponding abstract code(s).
A Key Word Index (in alphabetical order) to all the presentations is also included.

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The concentration of POPs in abiotic environment and a range of terrestrial and aquatic media from the Baltic environment were collected into a database and analysed using the equilibrium lipid partitioning approach (ELP). As part of this program an assessment of the time trends of 5 PCB congeners was undertaken. Linear regression analysis showed a decline in ELPs between 1987-2001 in air, water, guillemots and four fish species. A steady state food web model was developed to describe the bioaccumulation of PCBs in a large Baltic food web comprising 17 organisms including pelagic and benthic aquatic organisms as well as marine mammals and sea birds. Predicted lipid-normalized concentrations showed an increase from organisms at lower trophic positions to organisms at higher trophic positions. The overall estimated model bias (for 6 species and 5 PCB congeners) was 0.38, thus an average model underestimation of less than a factor of 3. Sensitivity analysis identified the octanol-water partitioning coefficient, the input concentration in water and sediment and the organic carbon fraction of sediment particulates as the most sensitive parameters.

TU1/AM/P08
QSAR Models of PCDD/Fs and PCBs Biomagnification in Atlantic salmon (Salmo salar)
E Papa[1], L. Grasso[1], M.H.G. Berntssen[2], P. Gramatica[1]
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Biomagnification factors (BMFs) as well as assimilation and elimination parameters (K1,K2,alpha,T1/2) were established for 29 differently chlorinated PCDD/Fs and 'dioxin like' PCBs derived from a long-term (5 months) exposure/depuration study on an adult cold-water fish species (Atlantic salmon, Salmo salar). Statistically externally validated MLR QSAR models, based on theoretical molecular descriptors, were developed for alpha and T1/2 as well as for three differently calculated BMFs, and applied to predict these data for all the PCDD/Fs and PCB congeners. A multivariate approach based on Principal Component Analysis was then applied on the experimental BMF data: the PC1 score from PCA can be considered a general BMF-tendency index, independent of the method used to derive this parameter. This score was finally modelled by QSAR approach to provide a useful tool for the prediction of the BMF-tendency of 'dioxin-like' compounds in Atlantic salmon, starting from the molecular structure.

TU1/AM/P09
Development of a dynamic bioaccumulation model 'Single Organism': application to a food web.
A. Infantino[1], R. Bettinetti[1], S. Galassi[2], A. Di Guardo[1]
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[2]Biology Department, University of Milan, MILAN, Italy
Many of the aquatic bioaccumulation models were developed in steady state version, assuming that the uptake and loss processes of a chemical were constant during the simulation time. A dynamic bioaccumulation model 'Single Organism' was written in unsteady state terms to evaluate bioaccumulation during the life cycle of an organism, in which many parameters could change with time. This model considers not only physiological parameter variations, such as lipid fraction, growth rate, diet composition, but also different environmental exposure conditions (e.g. episodic emission, resuspension). The model was further expanded to represent a preliminary dynamic food web in unsteady state version, made by three trophic levels, utilizing available data for some species of Lake Ontario. The main objective was to illustrate the model responses in different DDT exposure scenarios, and to show the extent of biomagnification at different trophic levels in a dynamic scenario. The results indicated how diet and lipid seasonal variations during organism life cycle can influence bioaccumulation at each trophic level indicating the need for further investigations.

TU1/AM/P10
Estimating the potential biomagnification of chemicals using a dynamic toxicokinetic model.
E. Alonso, JV Tarazona
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The bioaccumulation and biomagnification of chemicals are complex processes which depend on a large amount of factors. In contrast, for comparative and regulatory assessment, simplified methods, e.g. based on equilibrium partitioning approaches, are frequently employed. The lack of enough scientific support of these methods for covering the biomagnification process could represent a clear problem. As an alternative, a toxicokinetic model for estimating the potential biomagnification in a generic food chain has been developed. The food-chain biomagnification model was derived as a combination of independent dynamic toxicokinetic models representing each species within the food chain. The model was mathematically implemented and transformed into a probabilistic system for covering variability and uncertainty. Estimated concentrations by the model were compared to laboratory data s and to field data. The results show the model as a versatile tool for assessing the bioaccumulation and their time evolution under experimental and field situations. This work has been supported by the CEFIC LRI initiative project ECO1A-INIA-1100.

TU1/AM/P11
Food web modeling of PBDEs in field ecosystems; importance of biotransformation
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[2]National Fisheries Institute (WUR), IJMUIDEN, The Netherlands
[3]NTNU, TRONDHEIM, Norway
The food web model Simpleweb, previously validated on organochlorine compounds resistant to biodegradation, was used to predict PBDE levels in temperate and arctic food webs. It was found that two main characteristics influenced the predictability of the model. First, model fit improved (within an order of magnitude) if reduced bioavailability of liphophilic compounds due to sorption to black carbon in the sediment was taken into account. Second, addition of biotransformation rate of PBDEs as found in the literature was essential to improve fit (up to two orders of magnitude) to measured PBDE concentrations in fish and top predators. However, additional factors were taken into account such as formation of less lipophilic biotransformation products. Lower-brominated PBDE congeners 'enter' the food chain as a result of biotransformation and partly explain high levels of lower-brominated PBDEs in fish of temperate marine food webs. Attention will be given to model-derived estimation of biotransformation rates vs literature derived values.

TU1/AM/P12
Bioaccumulation of microcystin-LR in fish tissue
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Aquatic animals could bioaccumulate microcystins and so the ingestion of contaminated food represents a human health risk. World health organization (WHO) recommended a maximum concentration of microcystins in drinking water and established the tolerable daily intake (TDI) for consumption of MC-LR (0,04 µg. kg-1 .day-1).
Fish, which were used in our experiment (common carp- Cyprinus carpio and silver carp- Hypophthalmichthys molitrix), were kept in two tanks for two months. One of the tanks contained bloom of cyanobacteria. Fish were collected every month and microcystin-LR was analyzed in fish liver and muscle by ELISA. Our findings demonstrate that microcystins can accumulate in fish liver and muscle tissue. The maximum concentrations of microcystin-LR in the carp and silver carp muscle were 18.8 respectively 29.3 ng.g-1 of tissue, however in the liver tissue we found higher concentration of 217.5 respectively 226.3 ng.g-1 of tissue. The analyse of the muscle, after one month showed that 57% of carp and 40% of silver carp had the concentration of MC-LR in the tissue above the limit recommended by WHO.