

Mechanistic effect modeling - beyond concentration response and constant environments

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Effects caused by the exposure of organisms to toxicants can to a great extent depend on environmental conditions as well on the state and behavior of the organism with consequences for individual life history, population responses and community dynamics. In the past, these aspects have often been ignored in ecotoxicology which classically focuses on toxicant concentration responses while keeping the environmental conditions as constant as possible. Therefore, calls for more ecological realism in ecotoxicology reached the scientific community more than a decade ago. As we cannot test the effects of all toxic compounds on all species in all possible environments, we need predictive modeling approaches for ecological risk assessment. Descriptive approaches based on summary statistics such as effect concentrations may be useful to quantify effects of a single compound on a single species in a standardized environment but lack predictive power. In contrast, process-based mechanistic models that take underlying mechanisms into account need to be incorporated in a more informed risk assessment.

In this session we invited presentations on all types of individual, population and community models that address theoretical aspects of ecotoxicology or applied approaches applicable in a risk assessment context, with special emphasis on the translation of effects between different levels of biological organization. The topic of the session is twofold. First, recent developments in quantitative toxicokinetic-toxicodynamic models, adverse outcome pathways (AOPs), and systems toxicology models are presented. Related papers are expected to focus on models predicting organism level endpoints and to include measurements of toxic effects on life-history traits. Second, the session addresses questions on how ecological aspects are represented in mechanistic effect models, how the consideration of ecological mechanisms in effect models may impact future effect assessment, and how to implement the 'eco' in ecotoxicological effect models.

SESSION TYPE: Platform and Poster