Introduction to mechanistic effect modelling for ecological risk assessment

Abstract

Population and other mechanistic effect models hold great potential for supporting ecological risk assessment of chemicals, in particular pesticides. They allow extrapolation from organism-level effects to populations and ecosystems and from one environment to other ones. TK/TD models predict effects on individual organisms and can help extrapolating from laboratory exposure patterns to more complex exposure patterns (e.g. FOCUS SW). Over the last five years, awareness of the potential and need of mechanistic effect models has increased rapidly. However, still most scientists involved in risk assessment in industry, authorities, and academia are not familiar with the scope and methods of mechanistic effect modelling. This short course provides an introduction. The rationale of modelling will be explained and the diversity of relevant model types introduced, including ecological and organism-level effect models. In exercises using the software platform NetLogo, participants will first get familiar with basic principles of programming and modelling. Then, an existing population model designed for ecological risk assessment will be used to run simulation experiments in order to explore how individual-level effects affect various population-level endpoints and how risk for the population is affected by behavioural patterns and exposure regimes. Principles of good modelling practice will be explained, including the documentation framework TRACE. Finally, it will be discussed, and demonstrated in exercises, how results of population models could fit into current risk assessment schemes.

Course objectives

- Introduce into the scope and methods of population and organism-level effect models
- Demonstrate principles of programming and modelling using computer exercises
- Explain in detail an existing example population model
- Demonstrate how population models are used and analysed
- Introduce the rationale of the TRACE documentation framework
- Demonstrate how results of population models can fit into current risk assessment schemes
- Discuss new challenges for ecological risk assessment and the future role of mechanistic effect models.

Course level

Introductory