PREDITOX School
January 30th-February 3rd 2023

ECOTOXICOLOGY AND PREDICTIVE MODELLING

January 30th-February 3rd 2023
Lyon, France

European guidelines for risk assessment of chemicals have recently been modified (REACH, directives for pesticides and biocides) in particular to improve their ecological realism while limiting the use of laboratory animal testing. In addition, the OECD undertook a revision of guidance documents for laboratory bioassays in order to strengthen the relevance of data analysis methods (e.g., OECD guideline 243, July 2016).

These new official texts all recommend the use of appropriate mathematical and statistical modelling tools, for cognitive and predictive purposes.

They promote the optimization of data analysis (e.g., interpolation between the concentrations tested in bioassays) and the use of modelling as a basis for predicting effects under different environmental conditions (e.g., extrapolation between different scenarios and different exposure times, extrapolation from the individual to the population level, or extrapolation from one species to another).

This school aims at helping ecotoxicologists to improve their skills in modelling and statistical inference for, among other things, a better analysis of their bioassay experimental data.

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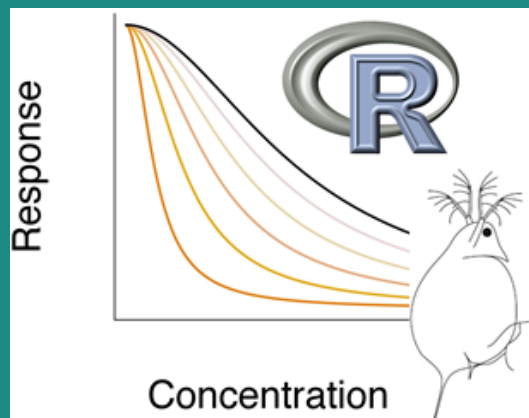
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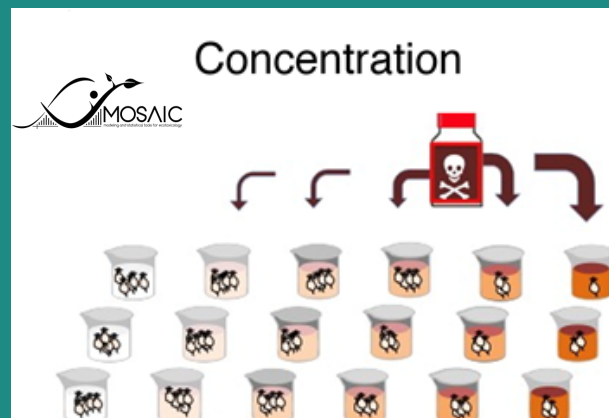UNIVERSITÉ DE LYON
Université Claude Bernard Lyon 1

LBBE
LABORATOIRE DE BIOMÉTRIE ET BIOLOGIE ÉVOLUTIVE

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Topics

Introduction to R software

Participants will be introduced to R programming and to basic statistics in R, based on concrete toxicity test data. R is a language and environment for statistical computing and graphics (http://cran.r-project.org/). It provides a wide variety of statistical and graphical techniques. It is highly extensible through a great number of packages dedicated to specific topics. Participants will explore the most useful ones for ecotoxicity data analysis.

Dose-response modelling

There is today a large consensus recognizing ECx as an appropriate index of toxicity as far as data are sufficient and properly fitted with suitable models. Nevertheless, the choice of the appropriate model is not straightforward: both the deterministic and the stochastic parts must be appropriately chosen in accordance with the type of experimental data (quantal data e.g. for survival, continuous data e.g. for growth or count data e.g. for reproduction). Participants will be introduced to up-to-date methods, especially generalized non-linear models and TKTD models such as GUTS models.

Bayesian inference

Bayesian inference has showed its usefulness in ecotoxicology as a relevant alternative when estimating parameters of models, simultaneously fitted to different types of data. Within the Bayesian framework, parameter estimation requires three steps: (i) model building, defining logical and stochastic links between parameters and variables; (ii) prior distributions of all parameters reflecting the state of knowledge available before analysing the data; (iii) posterior distributions of all parameters computed using the Bayes' theorem, combining priors and observations. Bayesian inference is very flexible and makes the use of generalized non-linear and TKTD models very easy. Participants will be trained step-by-step with the JAGS software (http://mcmc-jags.sourceforge.net/).

https://mosaic.univ-lyon1.fr/

The web platform MOSAIC is a turnkey decision-making tool to which participants will be introduced. Without wasting time on extensive mathematical and statistical technicalities, users are given advanced and innovative methods for a valuable quantitative environmental risk assessment.

Registration fees on site

- 2 100 € (full academia, including post-docs)
- 2 000 € (academia SETAC members)
- 2 500 € (full business and government)
- 2 400 € (business and government SETAC members)
- 1 500 € (students, master or PhD)

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