# RIFCON EasyGUTS: User-friendly and freely available software for TK/TD modelling of survival

Dirk Nickisch[1*)] & Alexey Mediancev[1)] & Oliver Jakoby[1)]

[1)] RIFCON GmbH, Goldbeckstraße 13, 69493 Hirschberg, Germany
[*)] Email: dirk.nickisch@rifcon.de

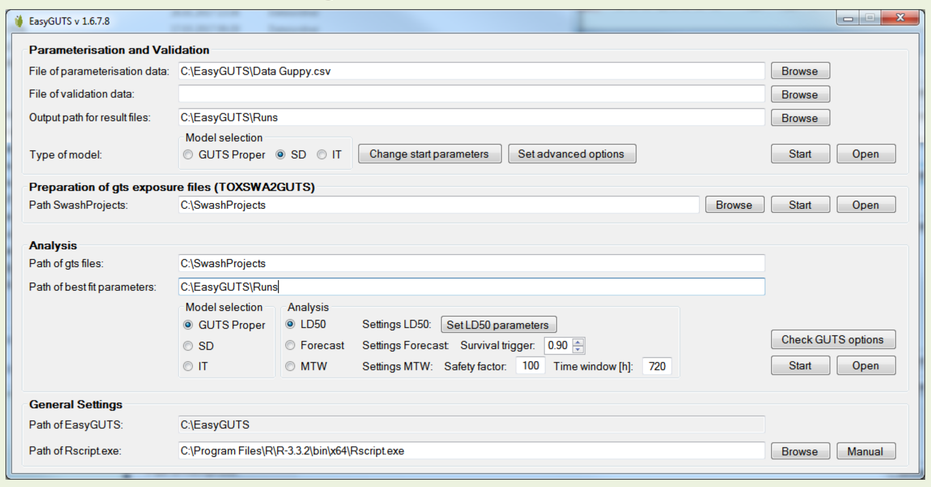
SETAC EUROPE 28th ANNUAL MEETING
13–17 MAY 2018 I ROME, ITALY

## Summary

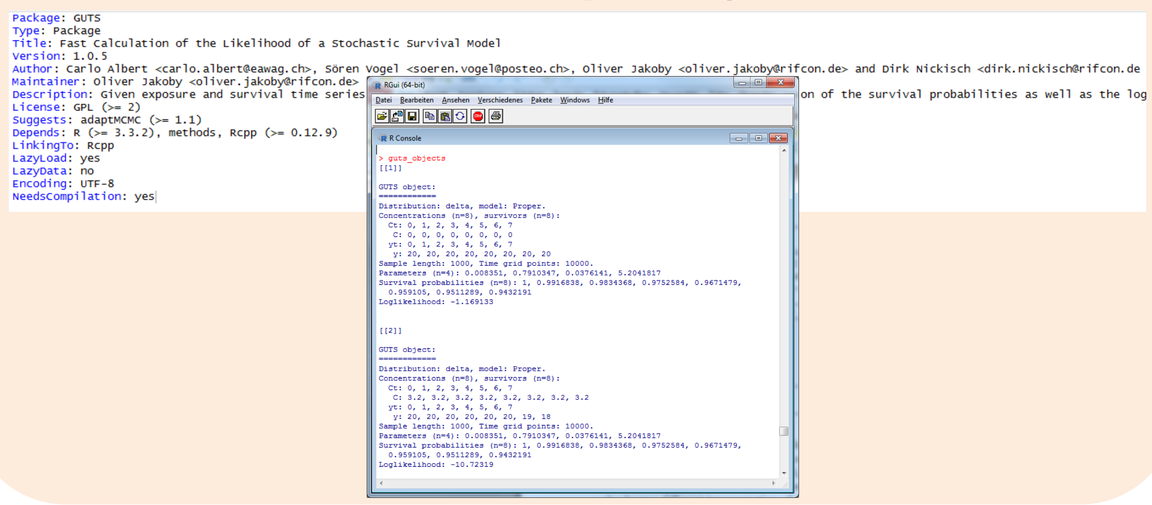
GUTS (General Unified Threshold model of Survival) is one of the most commonly used models for toxicokinetic and toxicodynamic evaluations of aquatic experiments in the context of the European registration of plant protection products at lower tiers in the ecotoxicological risk assessment. One user-friendly implementation of this model is the Windows-based program EasyGUTS. This implementation and its functionalities were recently tested and verified using published data [2]. Results obtained with EasyGUTS are in good agreement with results obtained from various other publications and model implementations. The GUTS R package to which EasyGUTS is linked, used the log-normal distribution as the only option. We extended the distribution options of the R GUTS package and consequently the selection possibilities in EasyGUTS. The implementation of EasyGUTS was tested using the aforementioned data. A verification of the model implementation using additional, recently published data, in line with the EFSA 'Scientific Opinion on Good Modeling Practice', is in process. Moreover, EasyGUTS as a functional tool was used in internal and external modelling workshops. The software was acknowledged by the participants as user-friendly and the calibration algorithm was concluded to be robust. Generally, all the users could produce similar results and hence reach similar conclusions. Since EasyGUTS is verified and harmonized with its associated R GUTS package, it is ready to use and will be soon available as a cost-free download on the RIFCON homepage.

## Software

### EasyGUTS Main GUI




### GUTS R package




## Validation Example

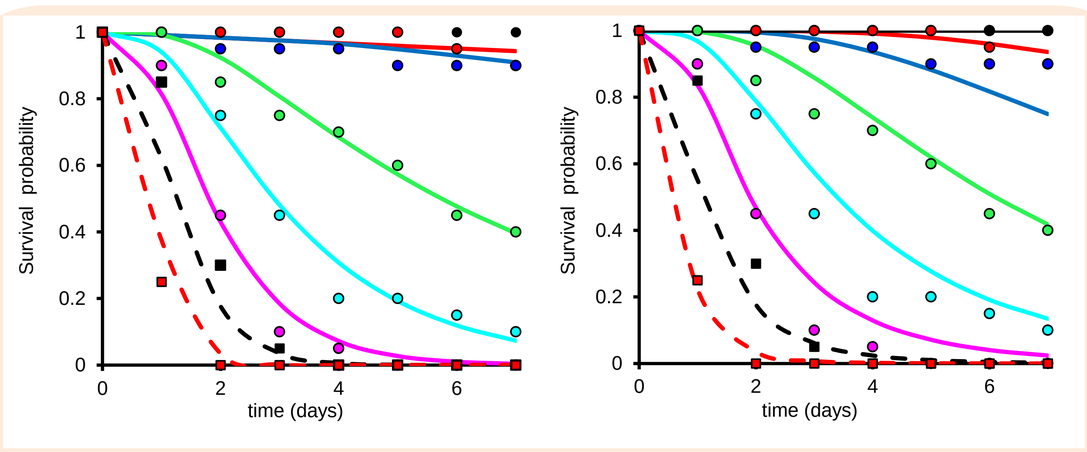



**Figure 1: Evaluation of toxicological data for dieldrin in guppy [1] with EasyGUTS; 8 concentration levels (0 – 100 µg/L); Left: reduced GUTS SD approach; Right: reduced GUTS IT approach**

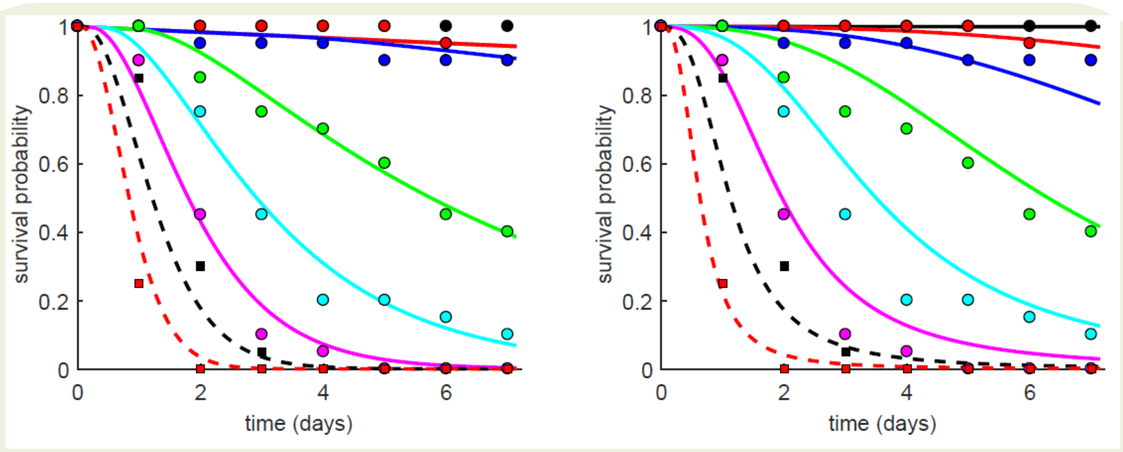
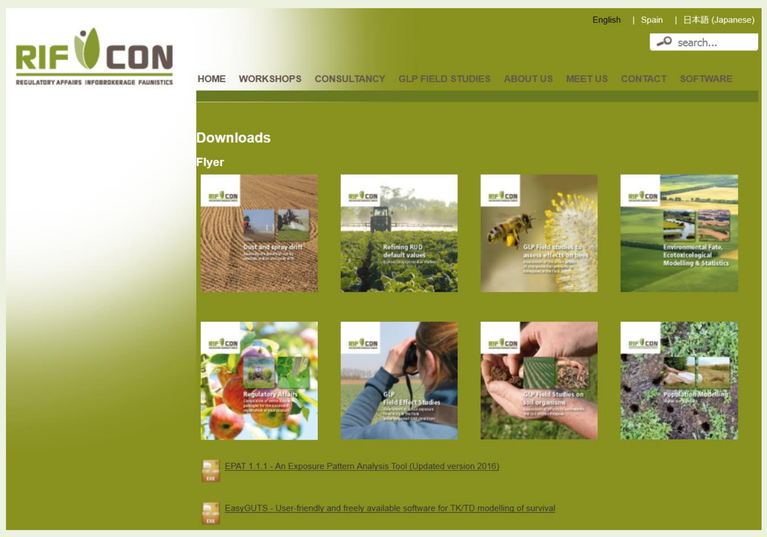



**Figure 2: Evaluation of dieldrin in guppy data (see Figure 1) performed by Jager & Ashauer 2018 [2]; 8 concentration levels (0 – 100 µg/L); Left: reduced GUTS SD approach; Right: reduced GUTS IT approach**

## Availability




### Download

- EasyGUTS will soon be available as a free download at: www.rifcon.de/en/downloads
- R and package GUTS can be freely downloaded from: https://cran.r-project.org/bin/windows/base/
- R and GUTS as a package is licensed under GPL-2 and GPL-3

**Meet us at booth 41**

**References:** [1] J. J. M. Bedaux and S. A. L. M. Kooijman. Statistical analysis of bioassays based on hazard modelling. Environmental and Ecological Statistics, 1:303314, 1994.
[2] Tjalling Jager & Roman Ashauer, Modelling survival under chemical stress – A comprehensive guide to the GUTS framework, https://leanpub.com/guts_book., January 2018