Getting started with RLumCarlo

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Scope

RLumCarlo is collection of energ-band models to simulate luminescence signal production using Monte-Carlo (MC) methods. This document aims at providing an overview and a brief introduction to RLumCarlo and on how to use the models. The first section, will, however, provide a brief introduction into RLumCarlo and how plot and extracts its data.

A simple exlample

TODO

The models in RLumCarlo

MODEL_NAME	R_CALL	R_FILE	MODE_CORE
MC_CW_IRSL_DELOC	run_MC_CW_IRSL_DELOC()	R/run_MC_CW_IRSL_DELOC.R	src/MC_C_MC_C
MC_CW_IRSL_LOC	run_MC_CW_IRSL_LOC()	R/run_MC_CW_IRSL_LOC.R	src/MC_C_MC_C
MC_CW_IRSL	run_MC_CW_IRSL()	R/run_MC_CW_IRSL.R	src/MC_C_MC_C
MC_ISO_DELOC	run_MC_ISO_DELOC()	R/run_MC_ISO_DELOC.R	src/MC_C_MC_IS
MC_ISO_LOC	run_MC_ISO_LOC()	R/run_MC_ISO_LOC.R	src/MC_C_MC_IS
MC_ISO	run_MC_ISO()	R/run_MC_ISO.R	src/MC_C_MC_IS
MC_LM_OSL_DELOC	run_MC_LM_OSL_DELOC()	R/run_MC_LM_OSL_DELOC.R	src/MC_C_MC_L
MC_LM_OSL_LOC	run_MC_LM_OSL_LOC()	R/run_MC_LM_OSL_LOC.R	src/MC_C_MC_L
MC_LM_OSL	run_MC_LM_OSL()	R/run_MC_LM_OSL.R	src/MC_C_MC_L
MC_TL_DELOC	run_MC_TL_DELOC()	R/run_MC_TL_DELOC.R	src/MC_C_MC_T
MC_TL_LOC	run_MC_TL_LOC()	R/run_MC_TL_LOC.R	src/MC_C_MC_T
MC_TL	run_MC_TL()	R/run_MC_TL.R	src/MC_C_MC_T

Figure 1

```
library(RLumCarlo)

times <- seq(0, 5000)

## Run MC simulation

run_MC_ISO(E = 1.2,
```

```
          s = 1e10,
          T = 200,
          rho = 0.007,
          times = times) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(norm = T, legend = T)
```

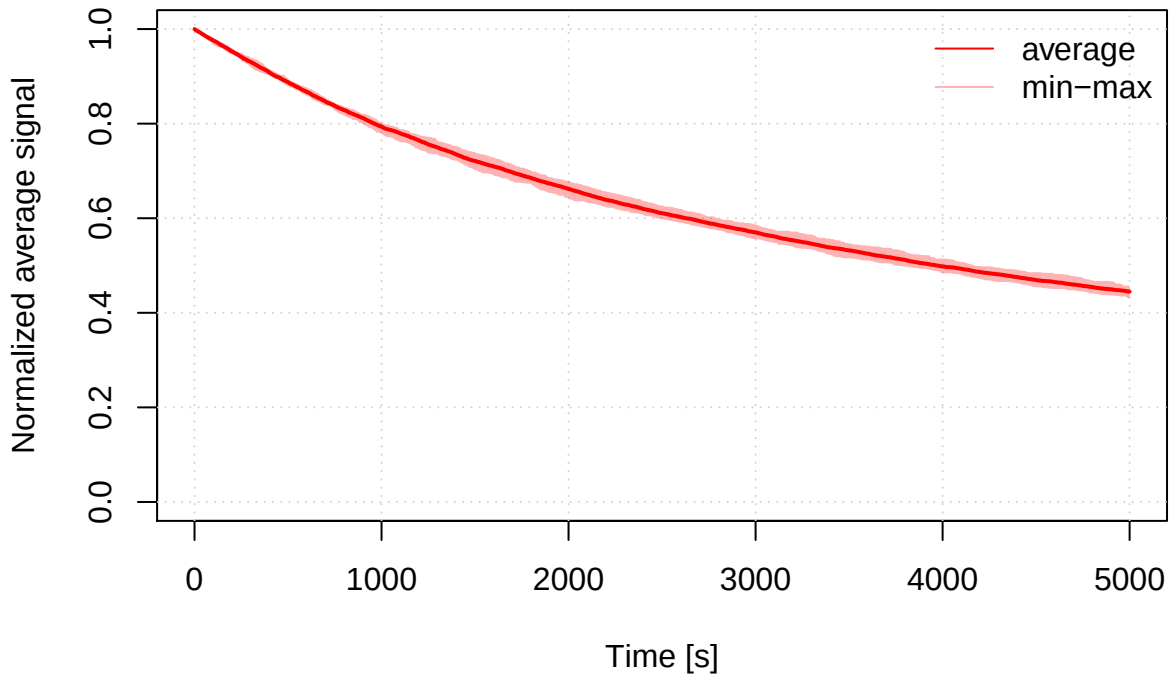


Figure 2

```
times <- seq(0, 1000)

## Run MC simulation

run_MC_CW_IRSL(A = 0.12, rho = 0.003, times = times) %>%
calc_RLumCarlo() %>% plot_RLumCarlo(norm = T, legend = T)

run_MC_CW_IRSL(A = 0.21, rho = 0.003, times = times) %>%
calc_RLumCarlo() %>% plot_RLumCarlo(norm = T, add = T)
```

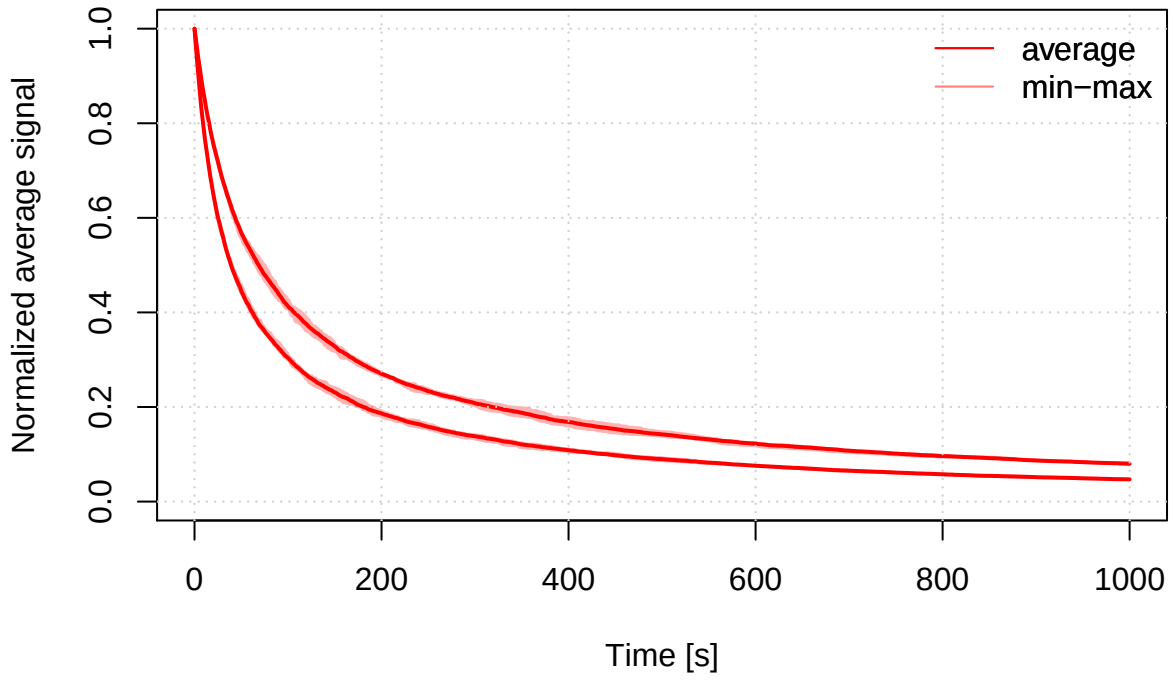


Figure 3

```
s <- 3.5e12
rho <- 0.015
E <- 1.45

times <- seq(100, 450) # time = temperature

results_rc0 <- run_MC_TL(s=s, E = E, rho = rho, r_c = 0, times = times) %>%
  calc_RLumCarlo()

results_rc07 <- run_MC_TL(s=s, E = E, rho = rho, r_c = 0.7, times = times) %>%
  calc_RLumCarlo()

results_rc077 <- run_MC_TL(s=s, E = E, rho = rho, r_c = 0.77, times = times) %>%
  calc_RLumCarlo()

results_rc086 <- run_MC_TL(s=s, E = E, rho = rho, r_c = 0.86, times = times) %>%
  calc_RLumCarlo()
```

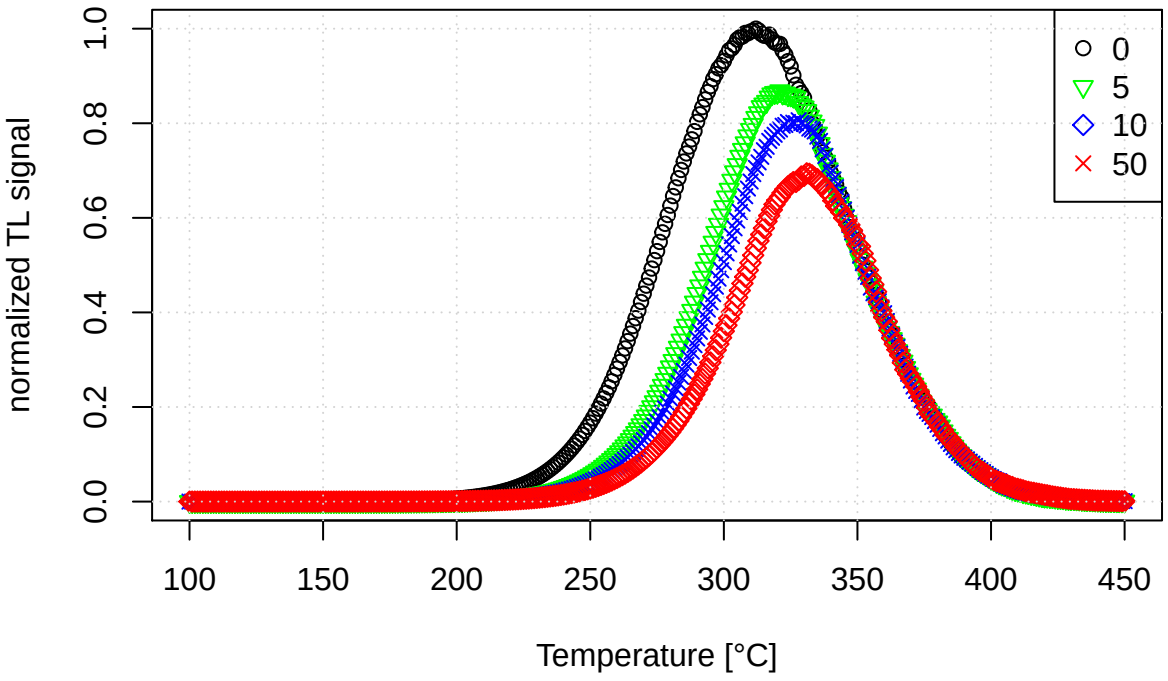
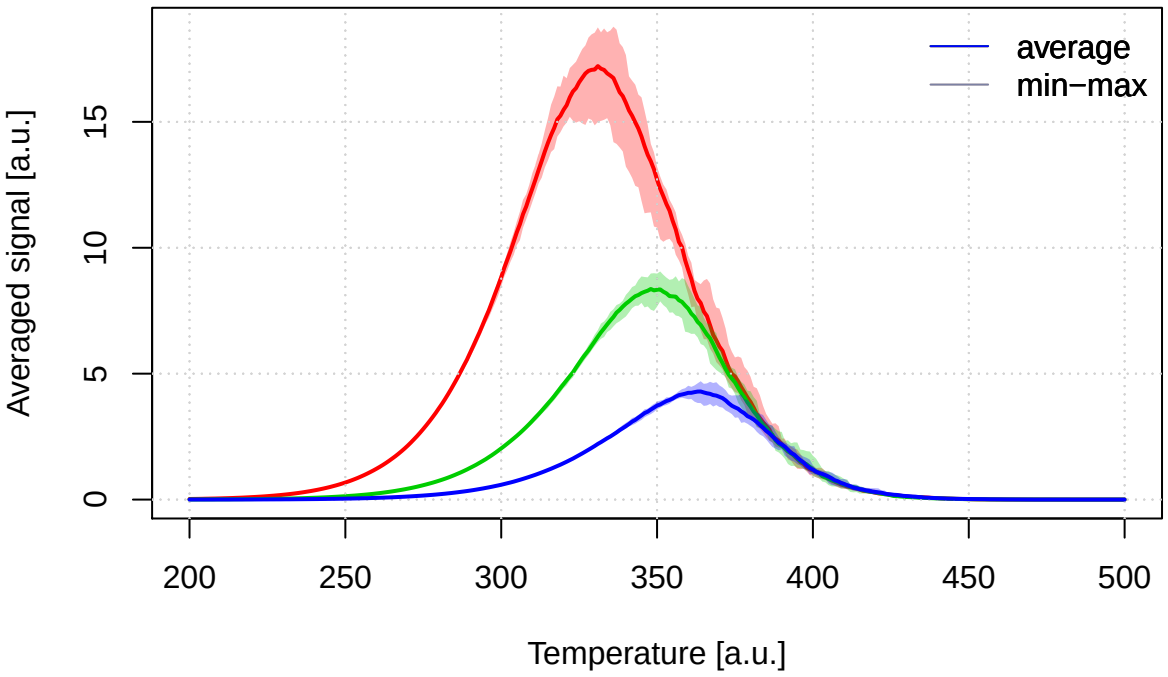


Figure 4

```
## set parameters
s <- 3.5e12
rho <- 0.015
E <- 1.45
times <- seq(200, 500) # time = temperature
r_c <- c(0.85, 1.13, 1.3)

for(i in 1:length(r_c)){
  run_MC_TL(
    s = s,
    E = E,
    rho = rho,
    r_c = r_c[i],
    times = times
  ) %>%
  calc_RLumCarlo() %>%
  plot_RLumCarlo(legend = T, add = TRUE, col = i + 1)

}
```


average
min−max
Averaged signal [a.u.]
0
5
10
15
200
250
300
350
400
450
500
Temperature [a.u.]