

$L_n, L_x$  curves

ALQ Pos. 1

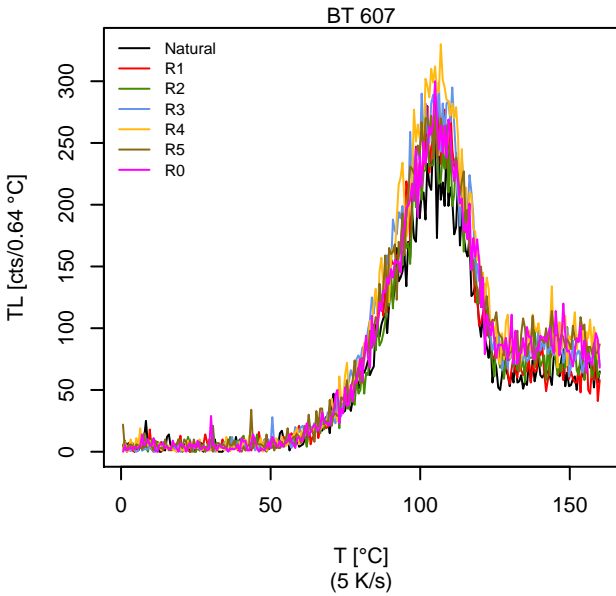
$T_n, T_x$  curves



help("Analyse\_SAR OSLdata")

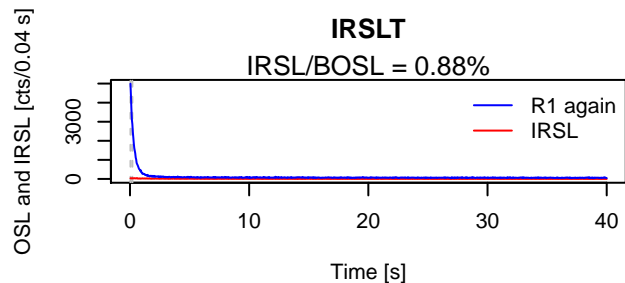
unknown measurement

Cutheat – TL curves



IRSLT

IRSL/BOSL = 0.88%



IRSL curve (10 s)







**Fig. 4 – Bos & Wallinga (2012)**





`help("CW2pLM")`



**Fig. 4 – Bos & Wallinga (2012)**







**Fig. 4 – Bos & Wallinga (2012)**



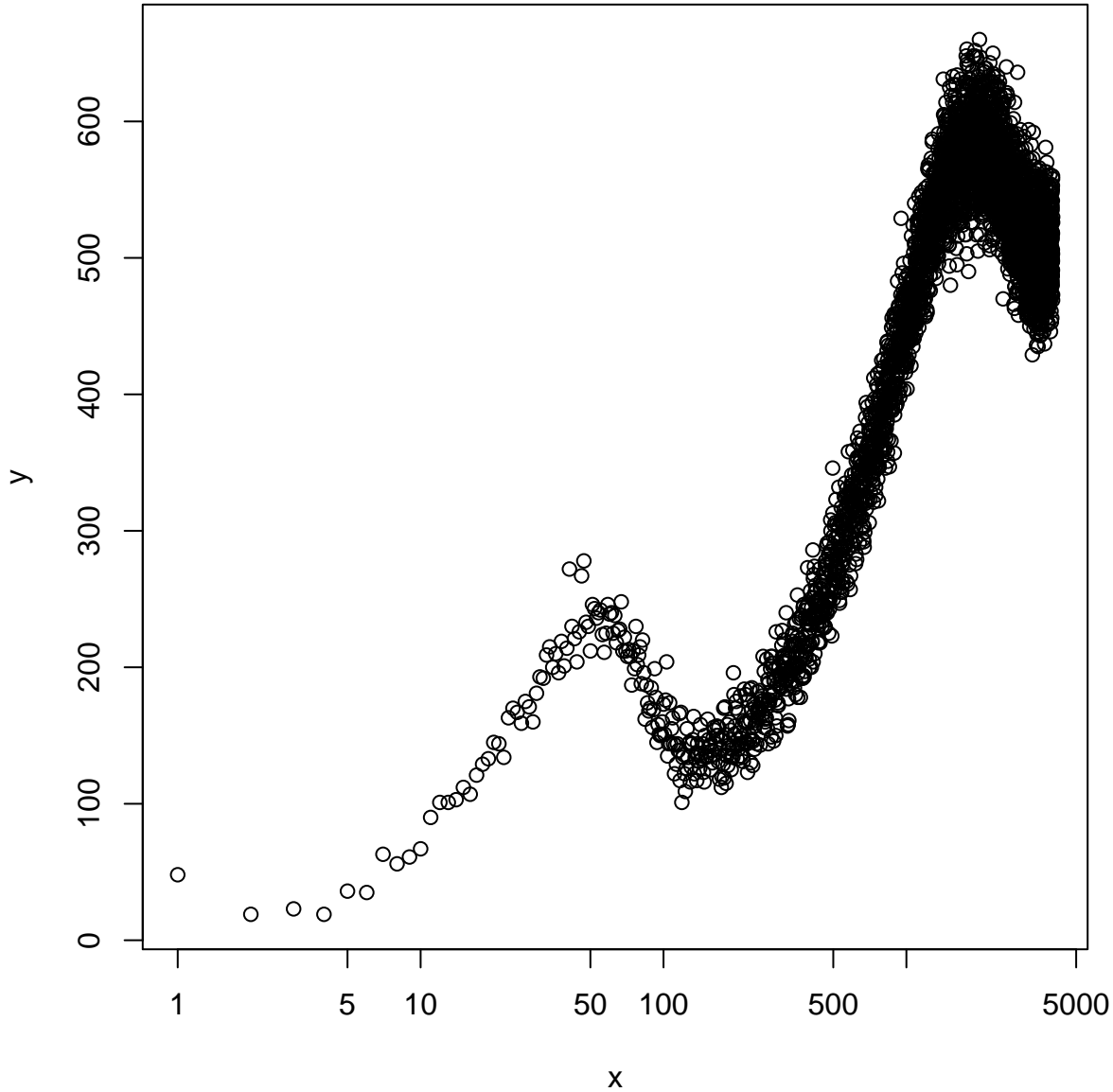


# Histogram



# Histogram





`help("ExampleData.FittingLM")`



`help("ExampleData.LxTxData")`



`help("ExampleData.LxTxOSLData")`



`help("ExampleData.LxTxOSLData")`



**RF**

**#1**



**RF**

**#2**



help("ExampleData.RLum.Analysis")

# RLum.Data.Image



# OSL (UVVIS)



help("ExampleData.XSYG")

**RLum.Data.Spectrum**



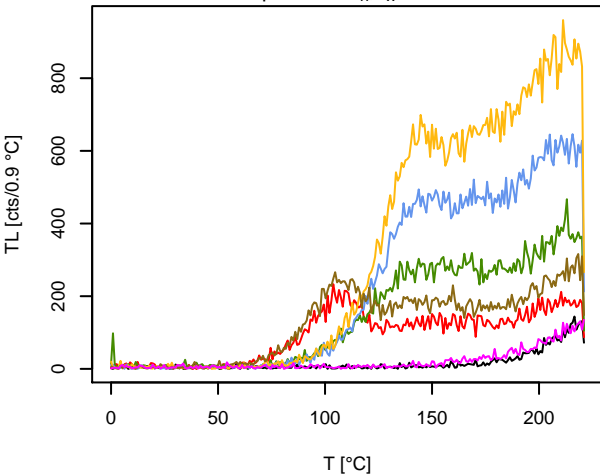
[help\("ExampleData.XSYG"\)](#)

# IR-RF

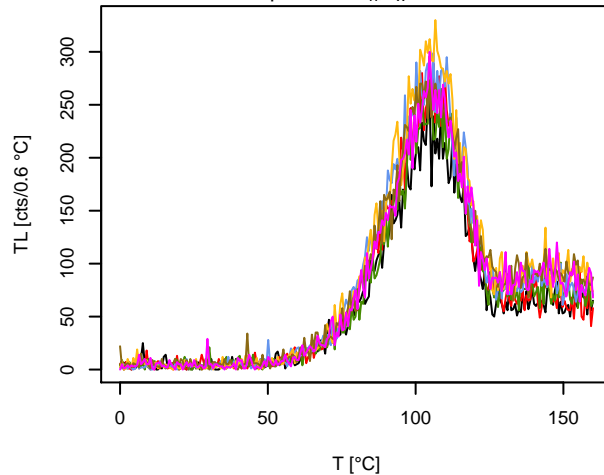
$D_e = 623.25$  [600.63 ; 635.8]



TL previous  $L_n, L_x$  curves



TL previous  $T_n, T_x$  curves



$L_n, L_x$  curves



$T_n, T_x$  curves



●  
Natural  
(0)

●  
R1  
(450)

●  
R2  
(1050)

●  
R3  
(2000)

●  
R4  
(2550)

●  
R5  
(450)

●  
R0  
(0)

Growth curve

$D_e = 1668.25 \pm 46.11$  | fit: EXP



$D_e$  from MC simulation

$D_{eMC} = 1664.49 \pm 46.11$  | quality = 99.8 %



Test dose response



## Rejection criteria

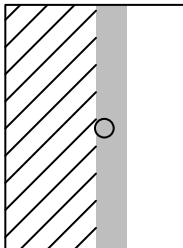
Recycling ratio



Recuperation rate



Palaeodose error



- 0.2      + 0.2

## IRSL



`help("analyse_SAR.CWOSL")`



$L_n, L_x$  curves



$T_n, T_x$  curves



Plateau test  $L_n, L_x$  curves



plateau Test  $T_n, T_x$  curves



■ Natural  
(0)

■ Natural  
(136)

■ Natural  
(317)

■ Natural  
(544)

■ Natural  
(815)

■ Natural  
(0)

■ Natural  
(317)

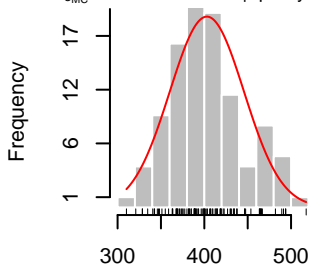
# Growth curve

$D_e = 406.85 \pm 42.81$  | fit: LIN



## $D_e$ from MC simulation

$D_{eMC} = 402.95 \pm 42.81$  | quality = 99 %



## Test dose response



## Pseudo pIRIR data set based on quartz OSL

TL  
pseudolRSL1  
pseudolRSL2

help("analyse\_pIRIRSequence")

# Pseudo pIRIR data set based on quartz OSL



# Pseudo pIRIR data set based on quartz OSL



# Pseudo pIRIR data set based on quartz OSL



# Pseudo pIRIR data set based on quartz OSL



# Pseudo pIRIR data set based on quartz OSL

$D_e = 1668.25 \pm 46.11$  | fit: EXP





# D<sub>e</sub> from MC simulation

D<sub>MC</sub> = 1664.49 ± 46.11 | quality = 99.8 %



help("analyse\_pIRIRSequence")

Test dose response



# Pseudo pIRIR data set based on quartz OSL



# Pseudo pIRIR data set based on quartz OSL





Pseudo pIRIR data set based on quartz OSL

$D_e = 1668.25 \pm 48.13$  | fit: EXP



help("analyse\_pIRIRSequence")

# D<sub>e</sub> from MC simulation

D<sub>e,MC</sub> = 1663.13 ± 48.13 | quality = 99.7 %



n = 100 , valid fits = 100

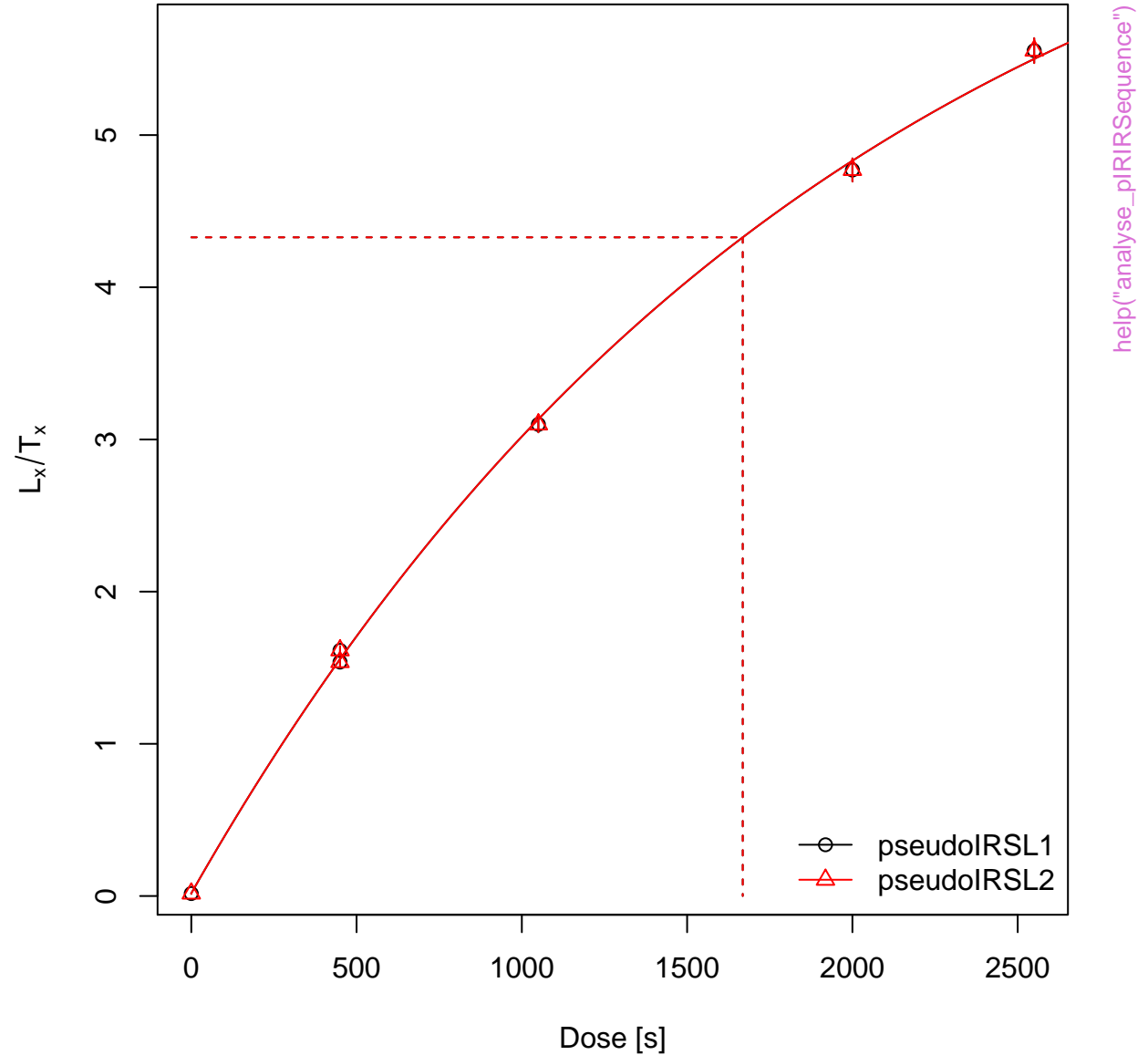
help("analyse\_pIRSequence")

# Test dose response





## Summarised growth curves



# Sensitivity change



## Rejection criteria

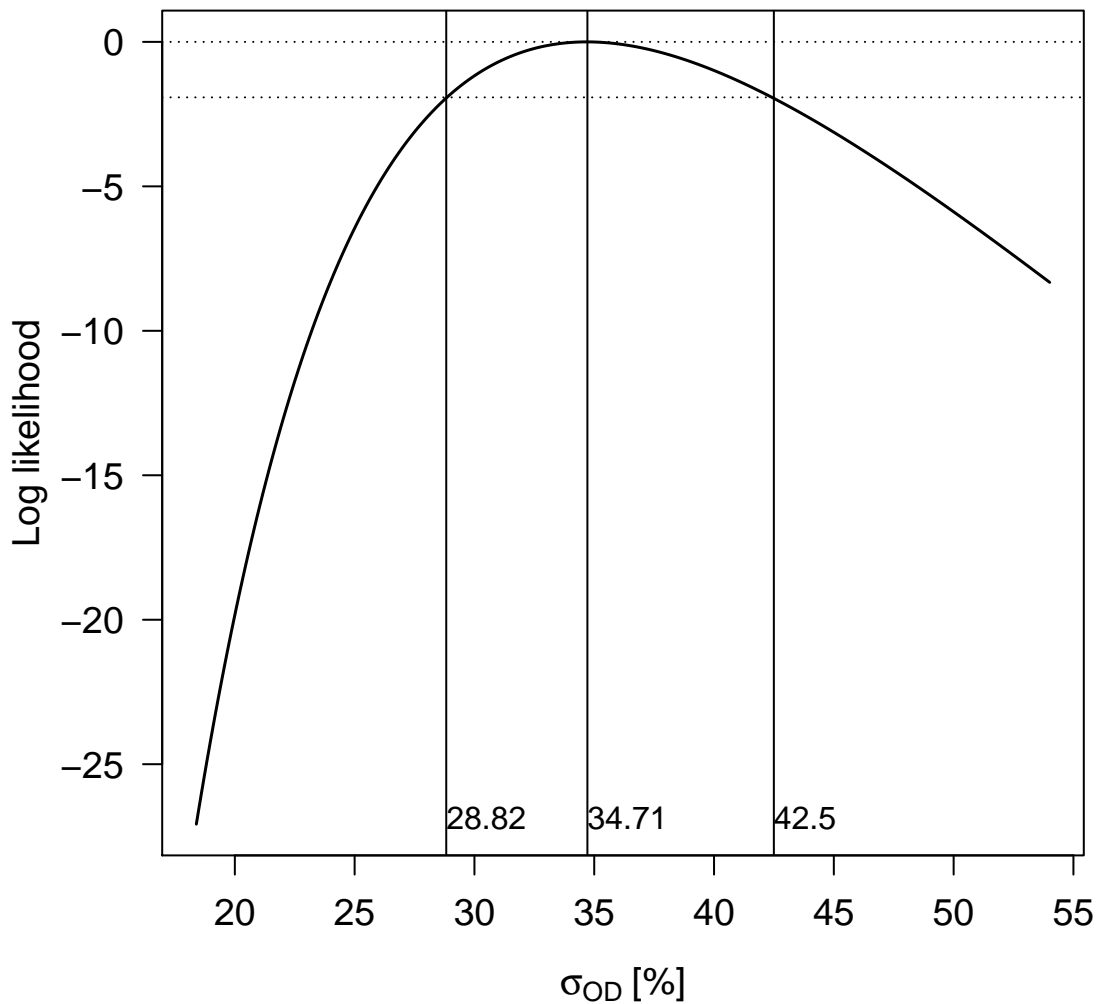


# Monte Carlo Simulation

$n = 10000 \mid \hat{\mu} = 42 \mid \hat{\sigma} = 20 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 0 \mid v = 0.89$



Profile log likelihood for  $\sigma_{OD}$



# Finite Mixture Model

$\sigma_b = 0.2 \mid n = 62$

## Normal distributions



## Proportion of components



## Statistical criteria



help("calc\_FiniteMixture")

# Fuchs & Lang (2001)









help("calc\_I EU")

**Likelihood profile: gamma**



**Likelihood profile: sigma**



help("calc\_MaxDose")

**Likelihood profile: p0**



**Likelihood profile: gamma**



**Likelihood profile: sigma**



help("calc\_MinDose")

**Likelihood profile: p0**



**Likelihood profile: gamma**



**Likelihood profile: sigma**



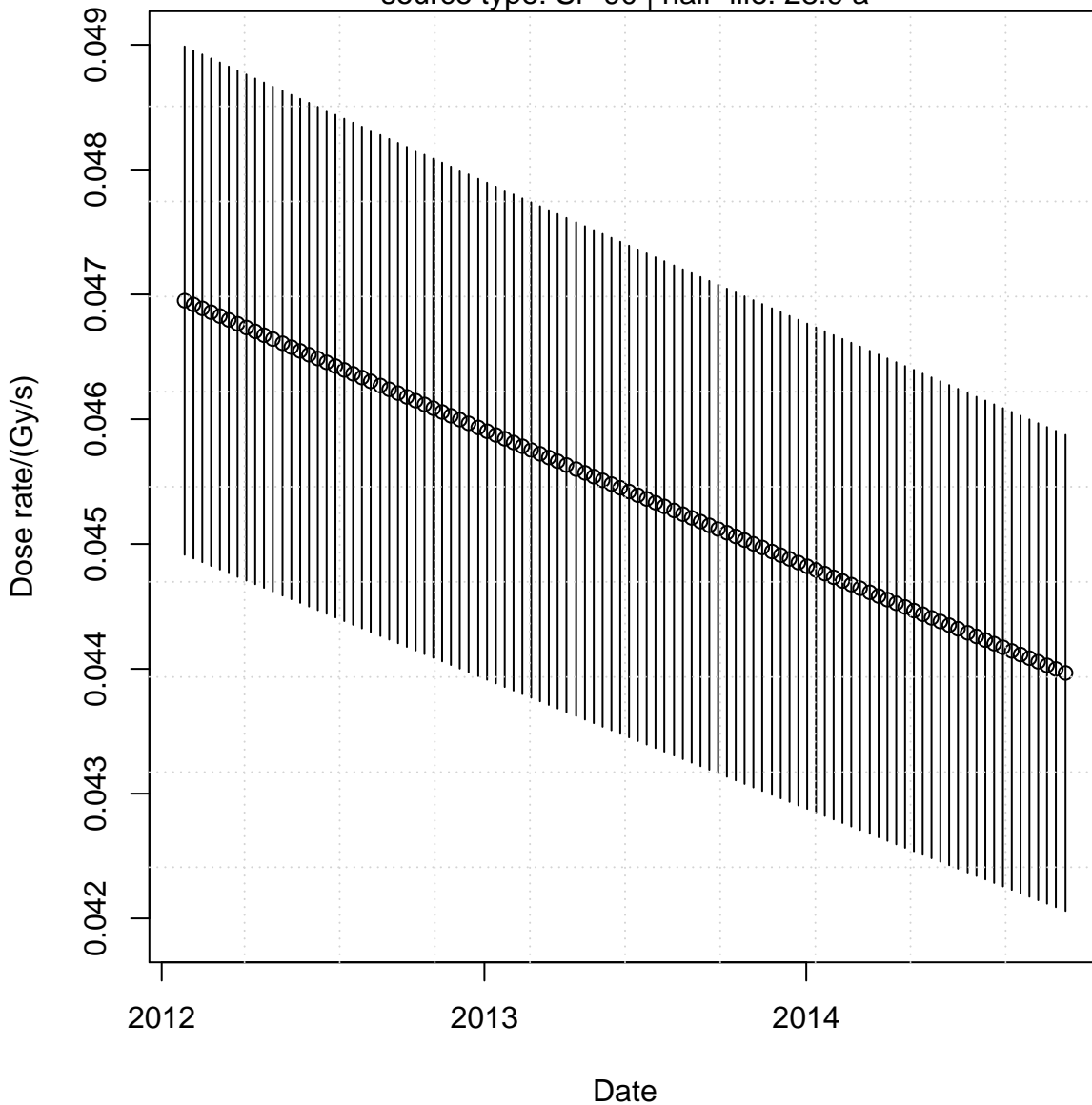
help("calc\_MinDose")

**Likelihood profile: p0**



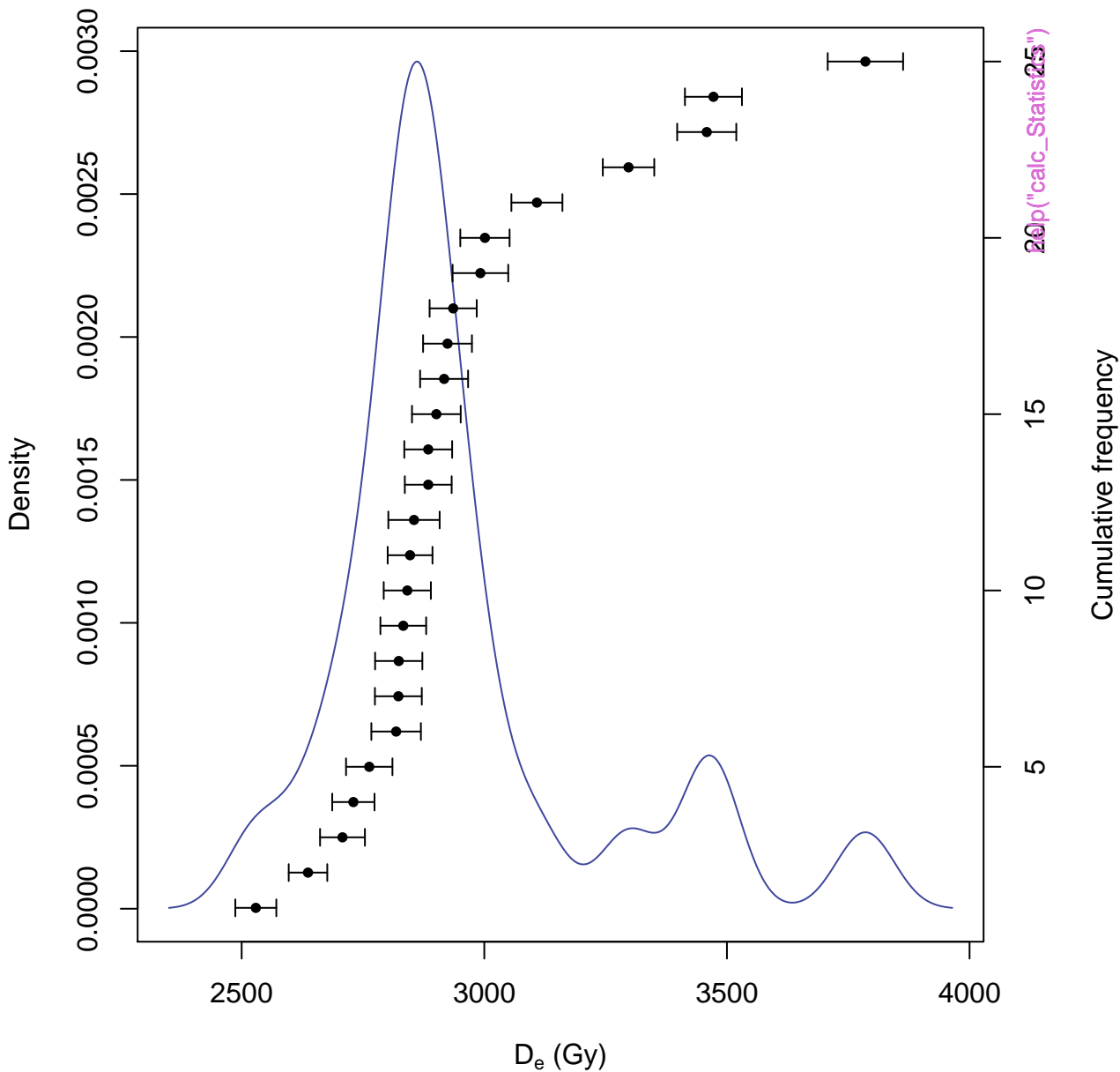
# Source Dose Rate Prediction

source type: Sr-90 | half-life: 28.9 a

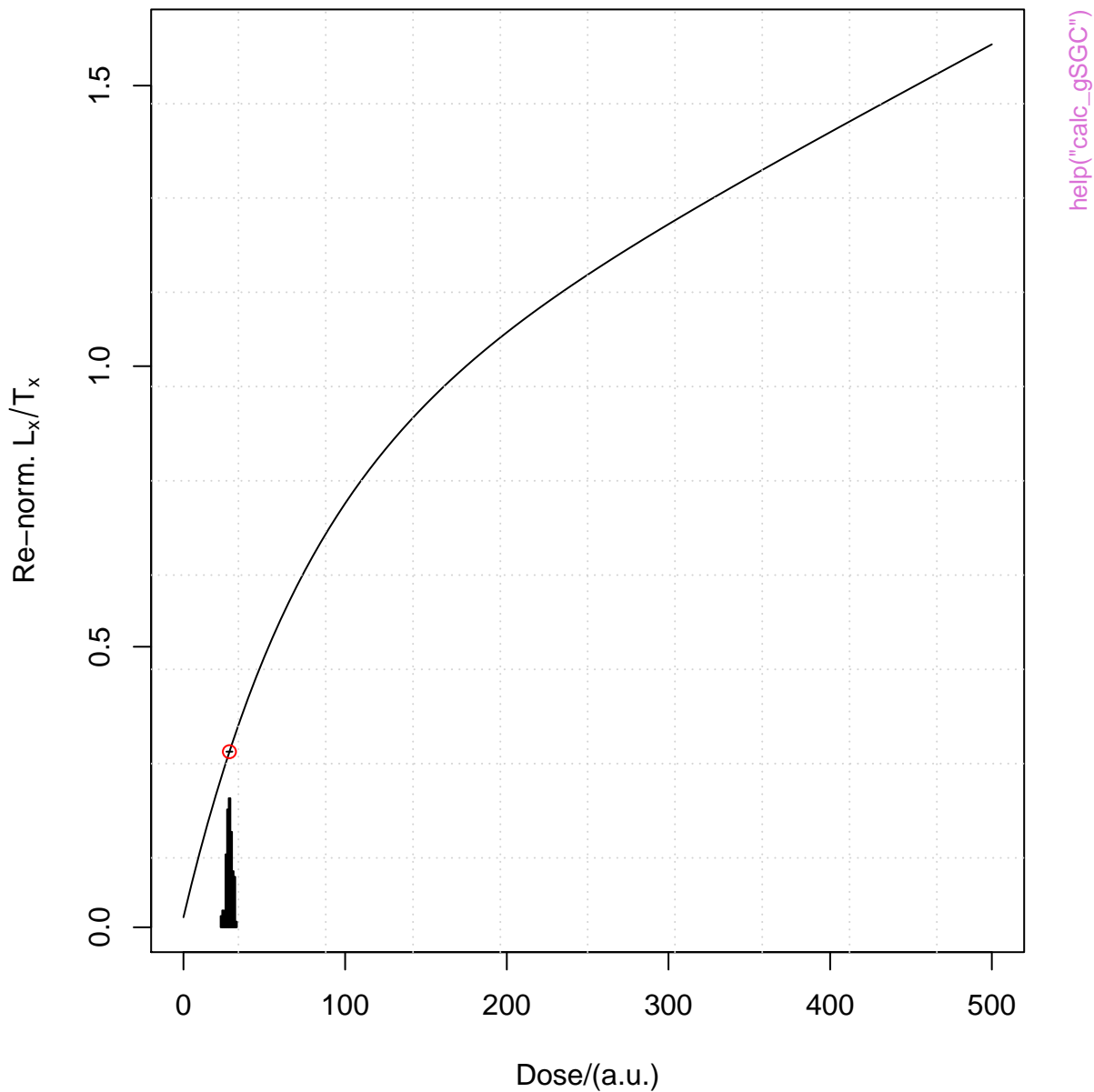


help("calc\_SourceDoseRate")

**D<sub>e</sub> distribution**



# gSGC and resulting De

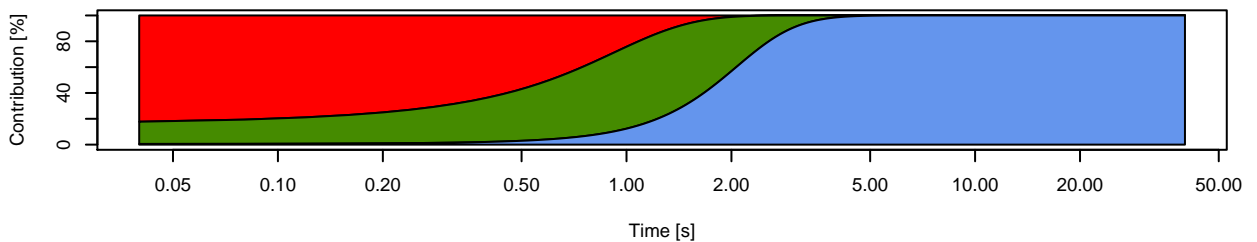


# CW Curve Fit

Default



## Component contribution to sum curve





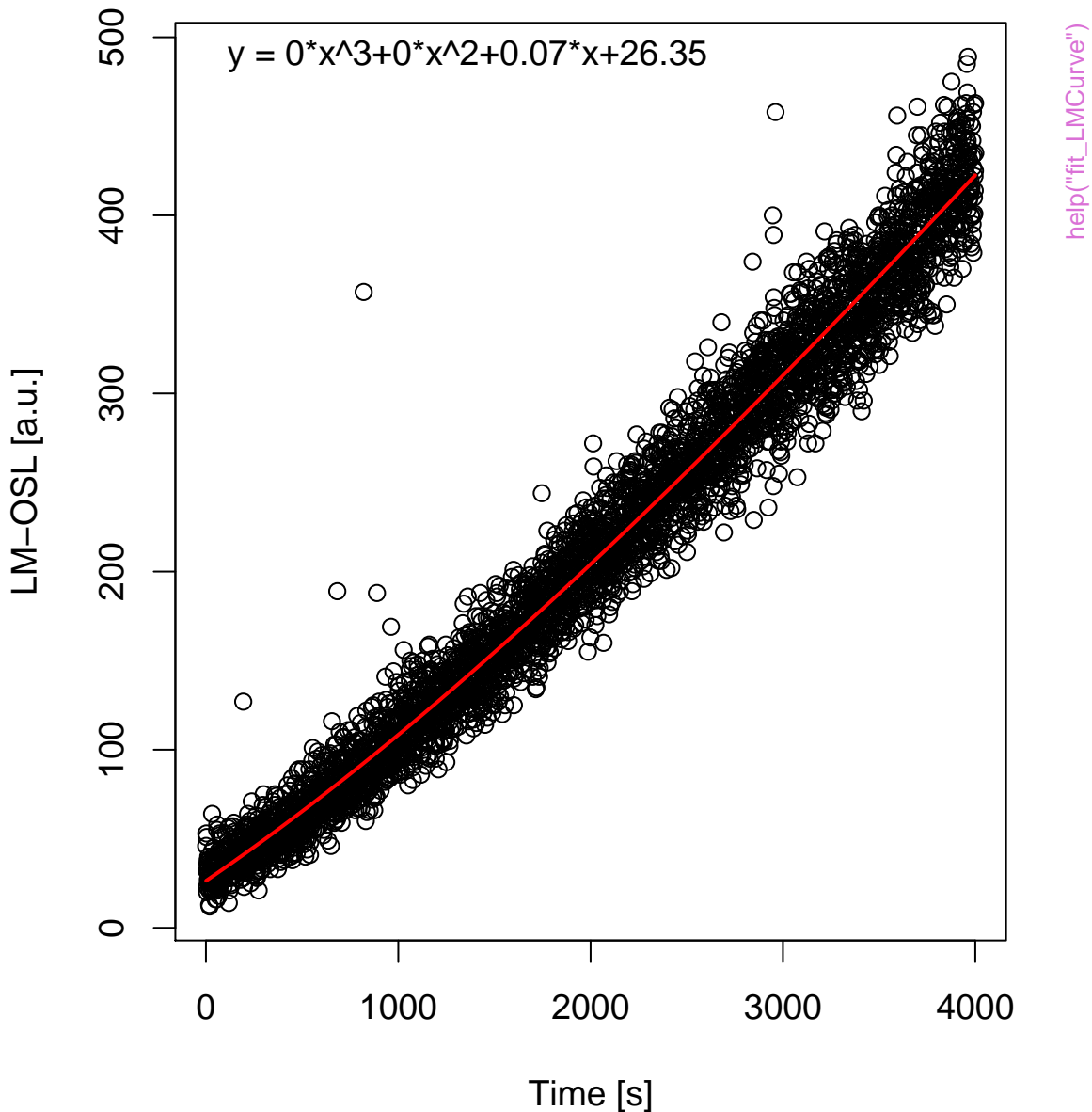
## Default



## Component contribution to sum curve



# Background



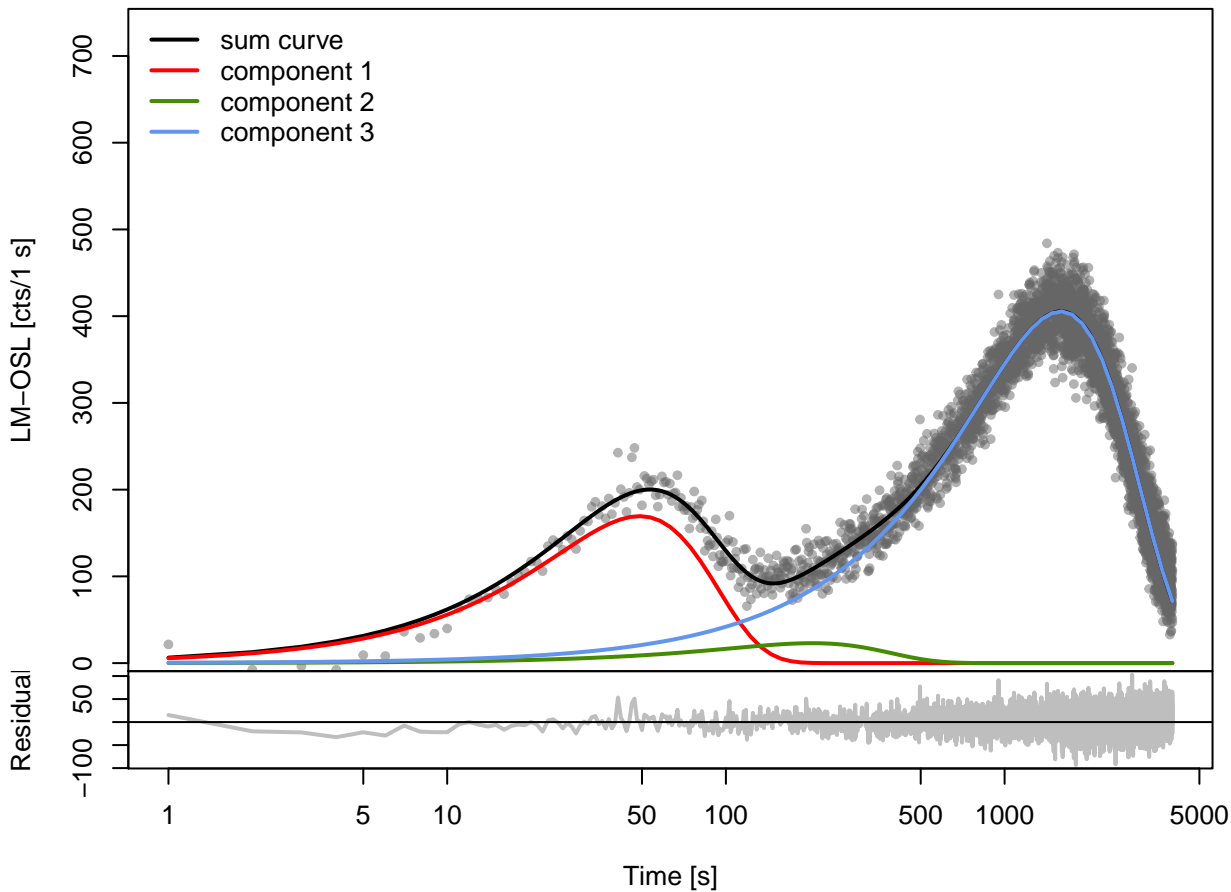
## Default



## Component contribution to sum curve



## Default



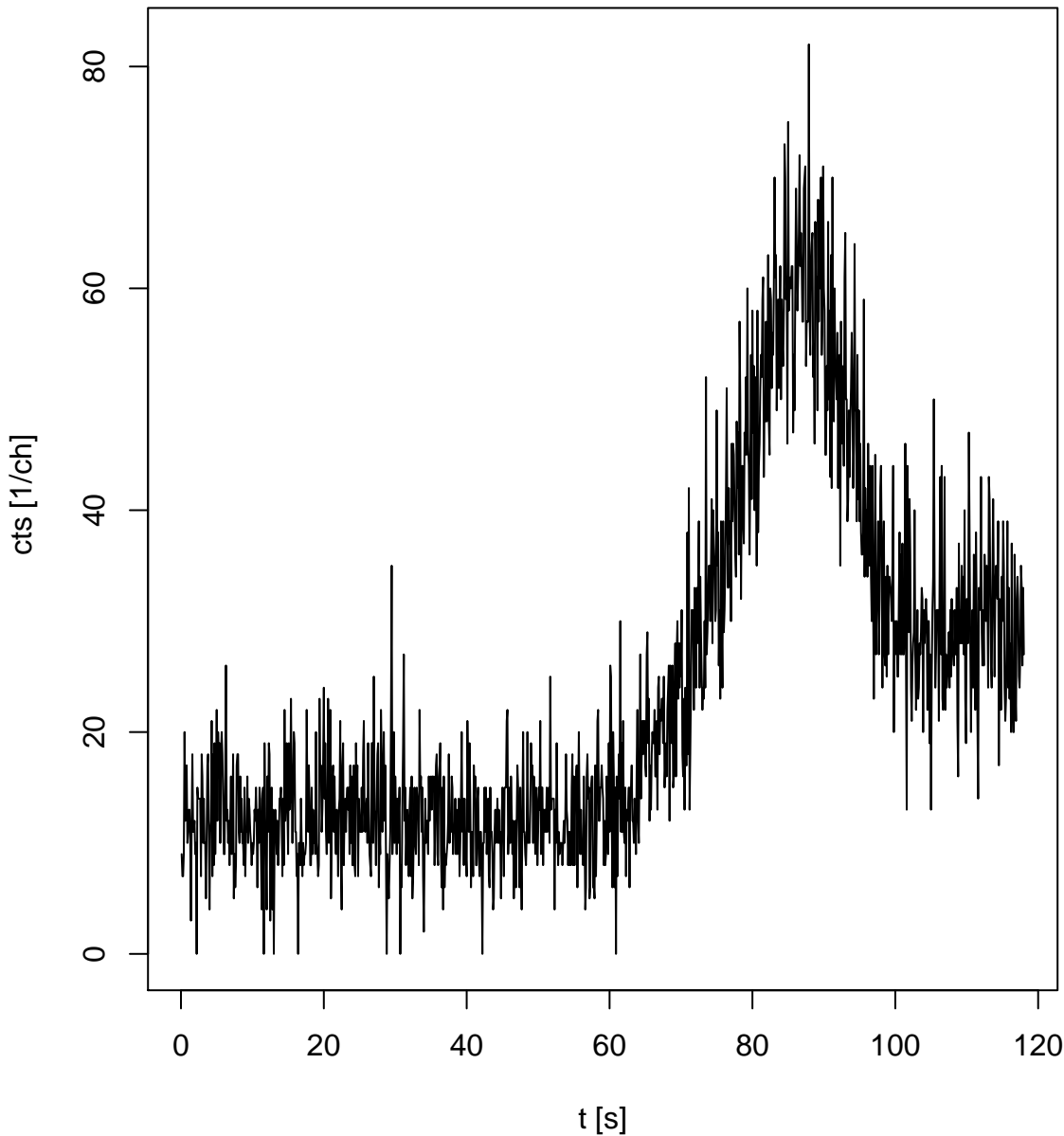
## Component contribution to sum curve



Profile log likelihood for  $\sigma_{OD}$

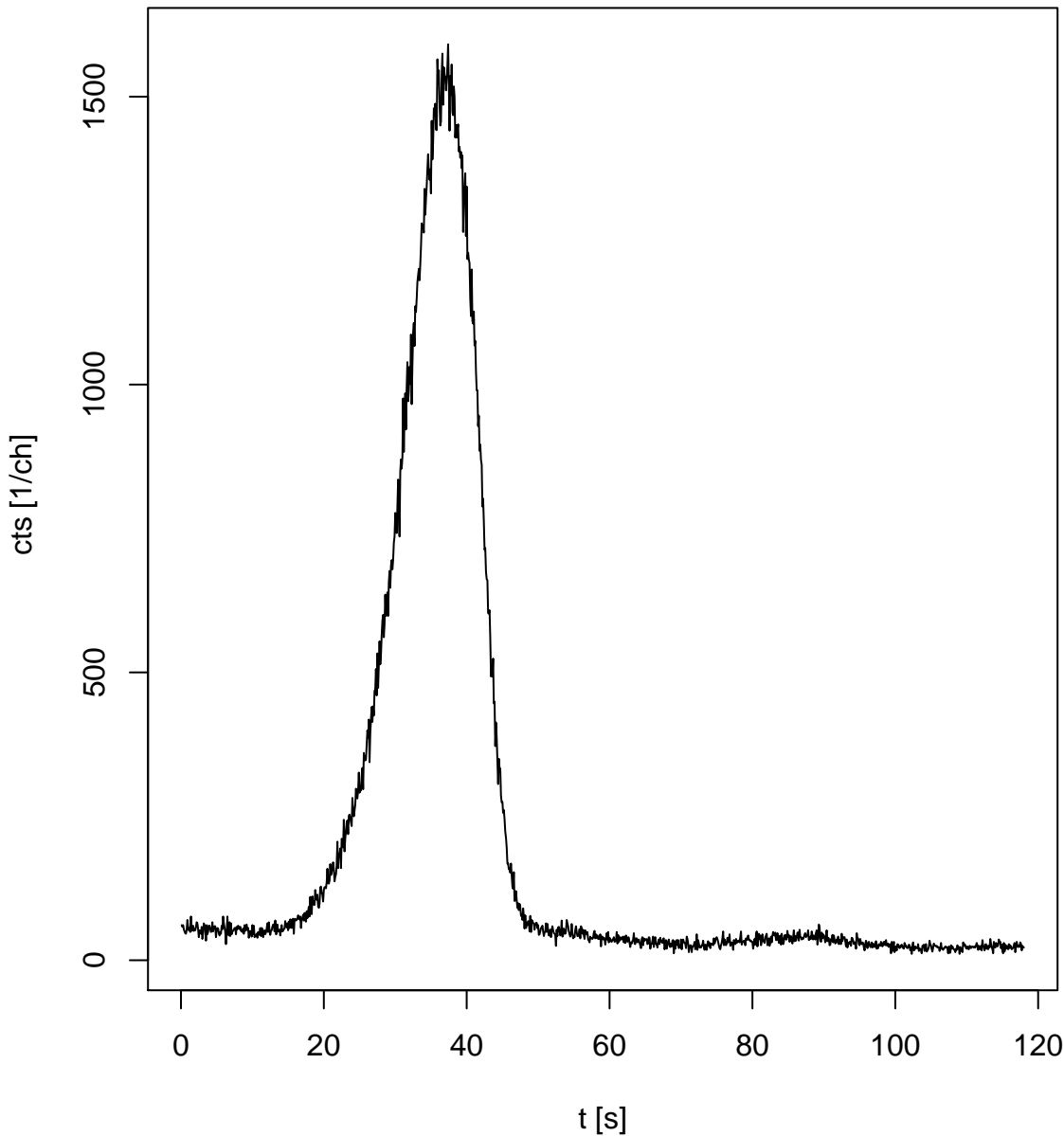


# TL (UVVIS)



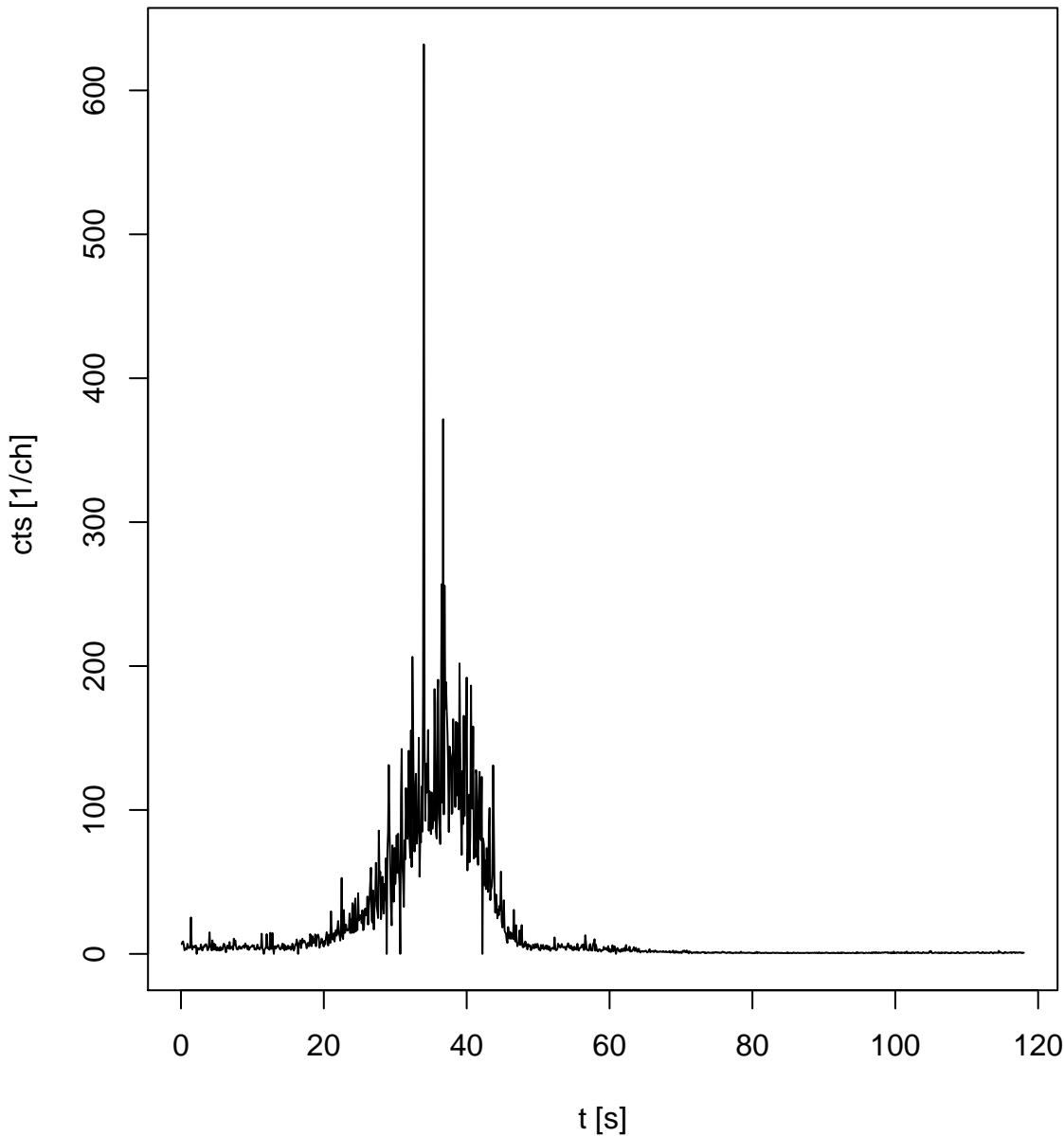
help("merge\_RLum.Data.Curve")

# TL (UVVIS)



help("merge\_RLum.Data.Curve")

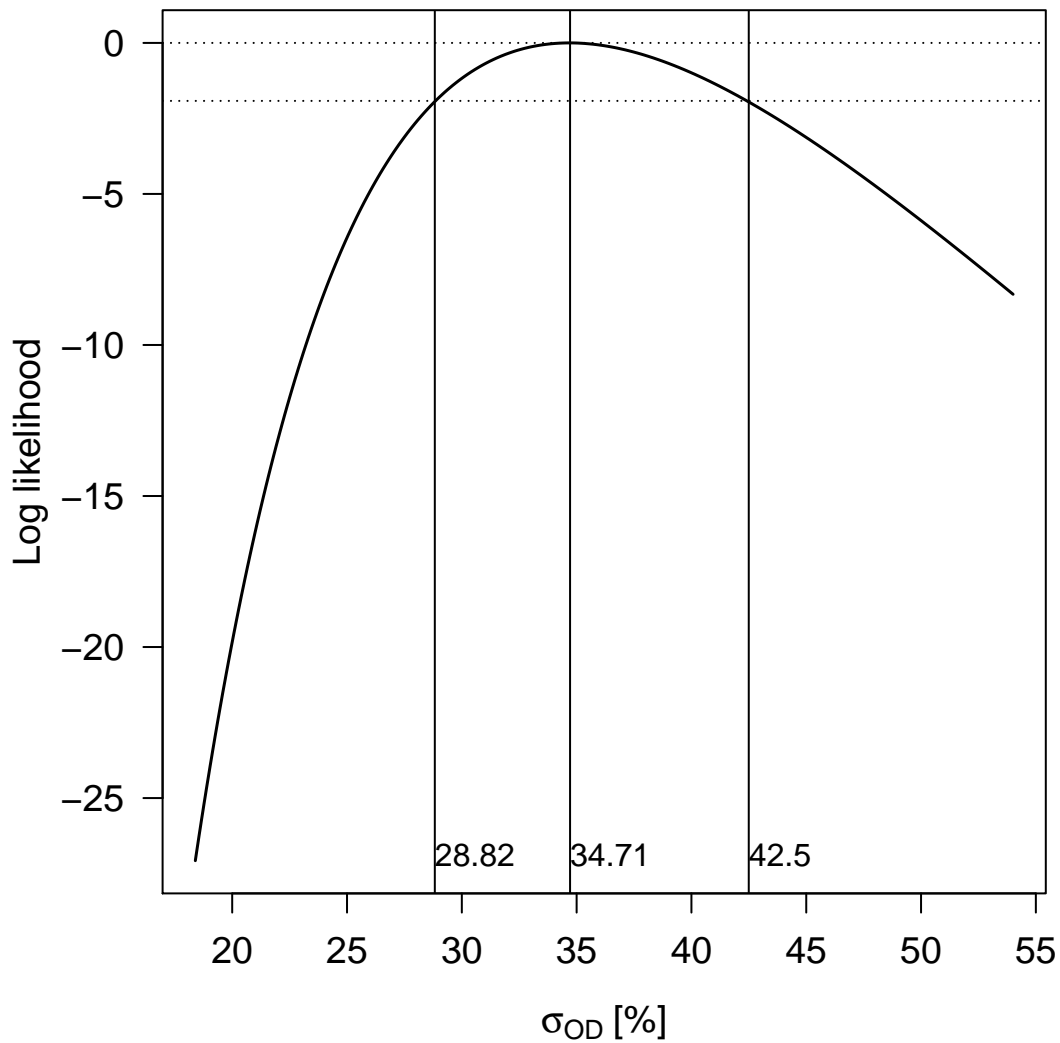
# TL (UVVIS)



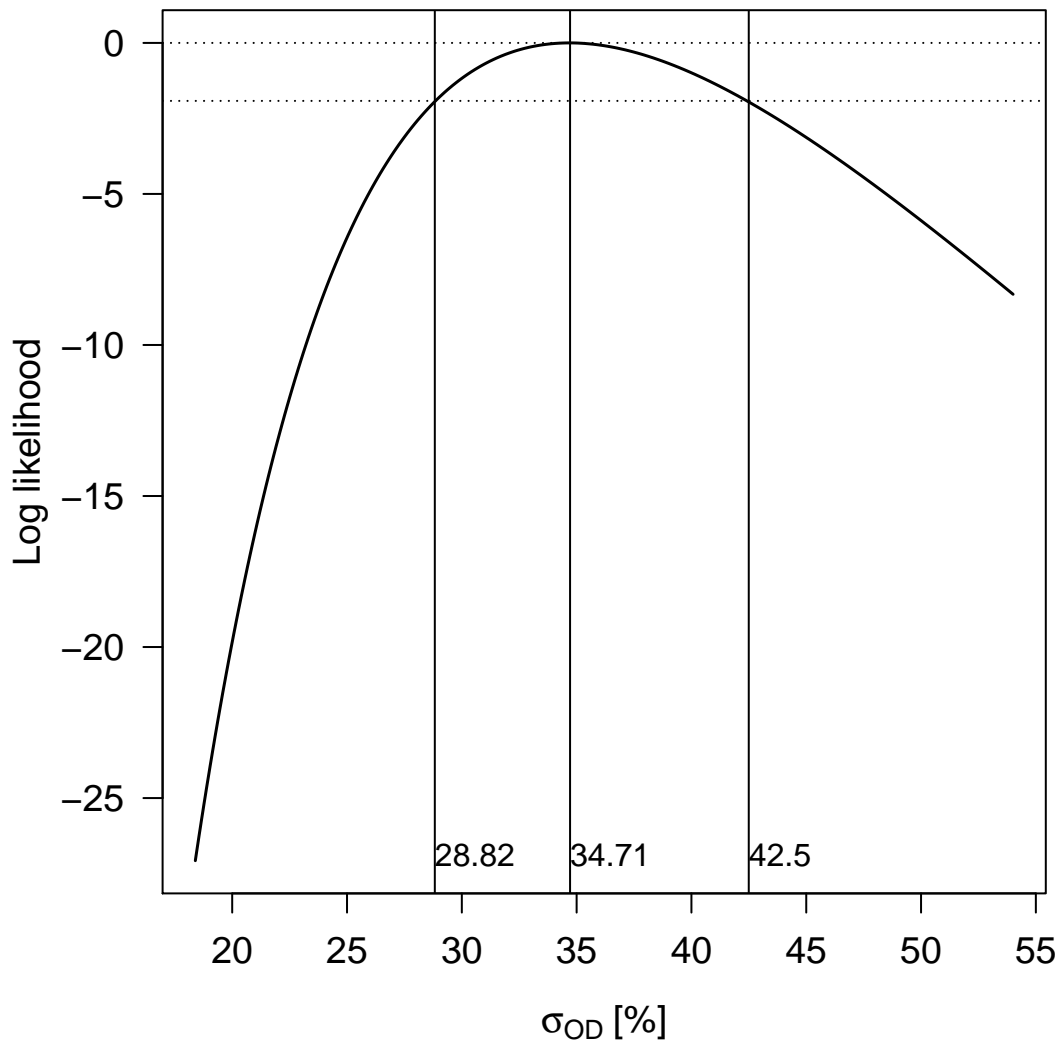
help("merge\_RLum.Data.Curve")



Profile log likelihood for  $\sigma_{OD}$



Profile log likelihood for  $\sigma_{OD}$



# Dose recovery test

Example data



# Dose recovery test



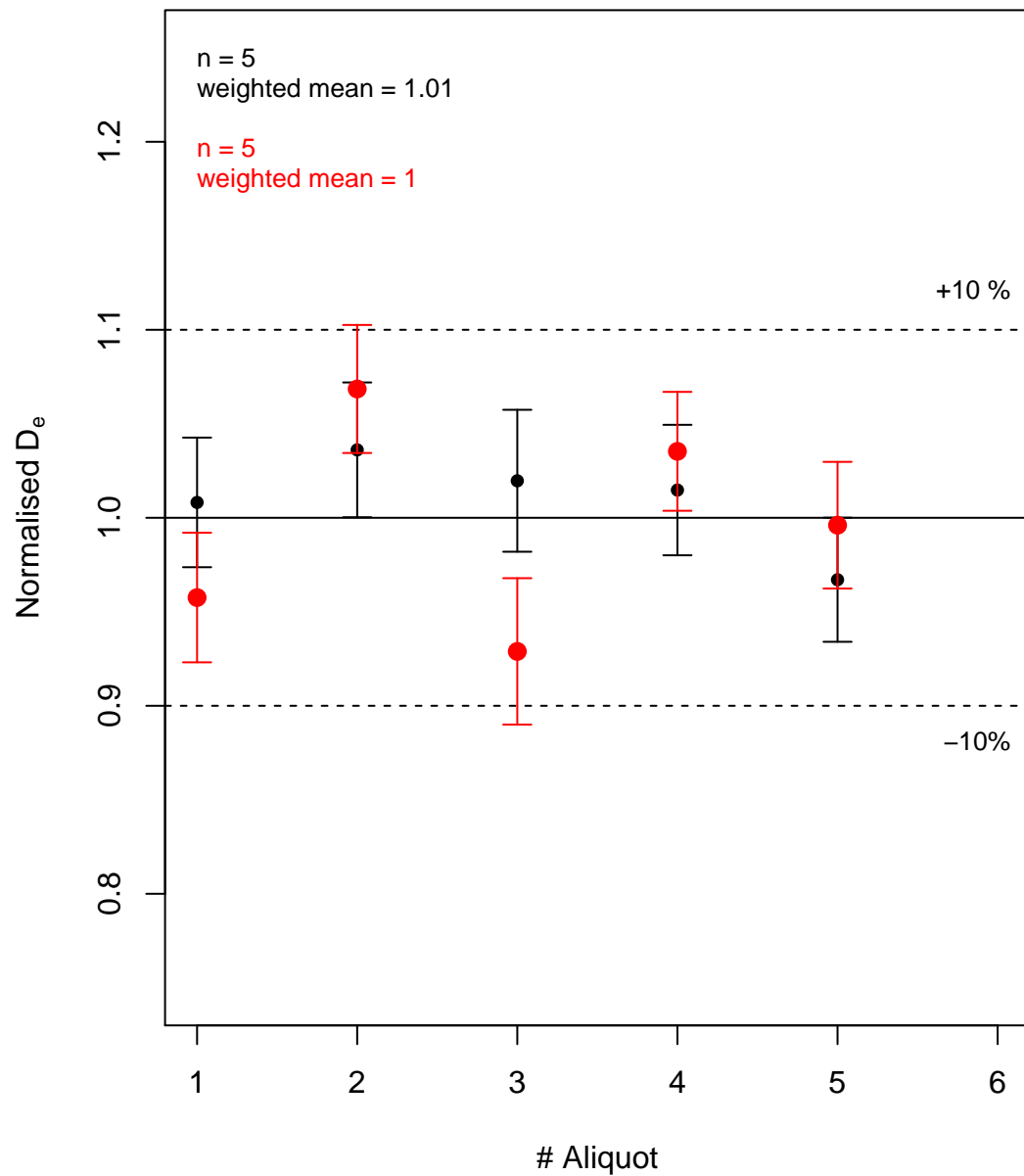
# Dose recovery test



# Dose recovery test



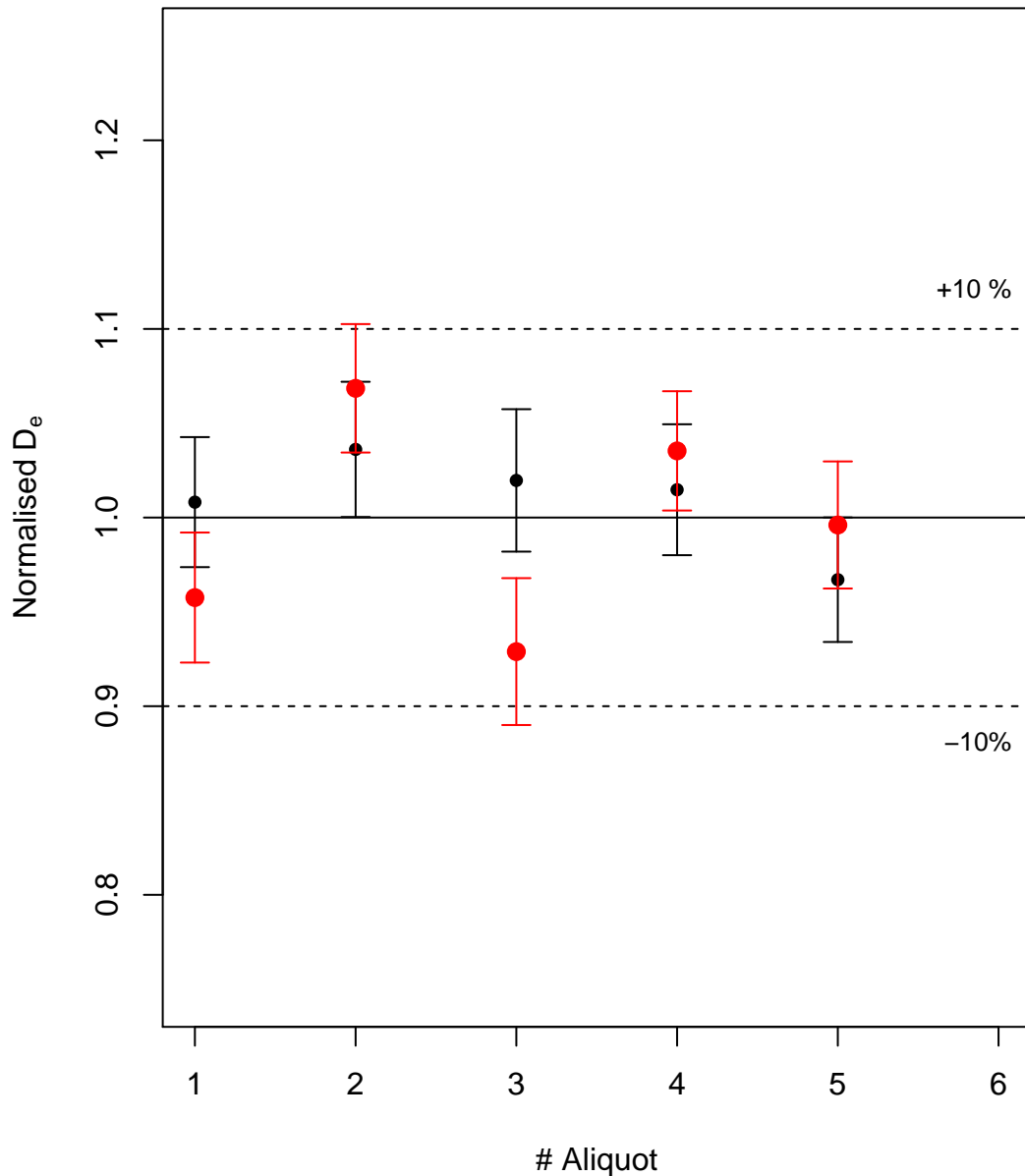
# Dose recovery test



# Dose recovery test

| n = 5 | weighted mean = 1.01 |

| n = 5 | weighted mean = 1 |





# Dose recovery test



# Dose recovery test

Example data



# Dose recovery test

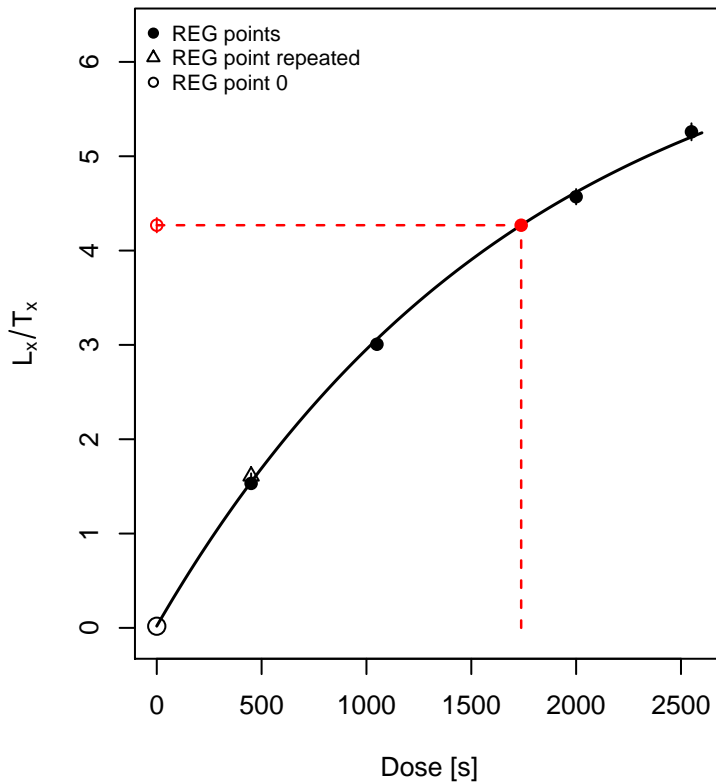


# Dose recovery test



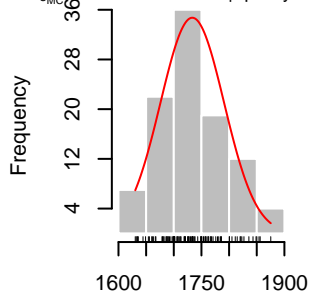
# Growth curve

$D_e = 1737.88 \pm 57.45$  | fit: EXP

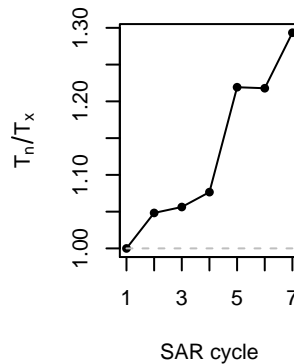


$D_e$  from MC simulation

$D_{eMC} = 1733.43 \pm 57.45$  | quality = 99.7 %

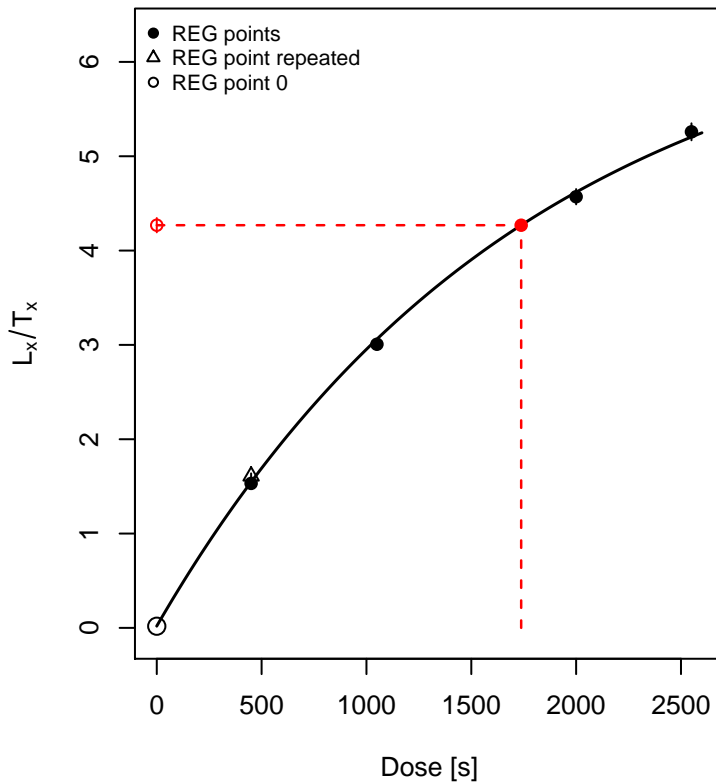


Test dose response



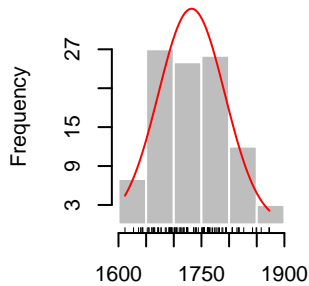
# Growth curve

$D_e = 1737.88 \pm 59.97$  | fit: EXP

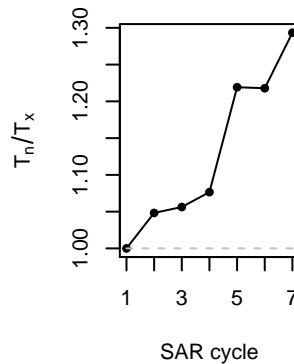


$D_e$  from MC simulation

$D_{eMC} = 1732.18 \pm 59.97$  | quality = 99.7 %

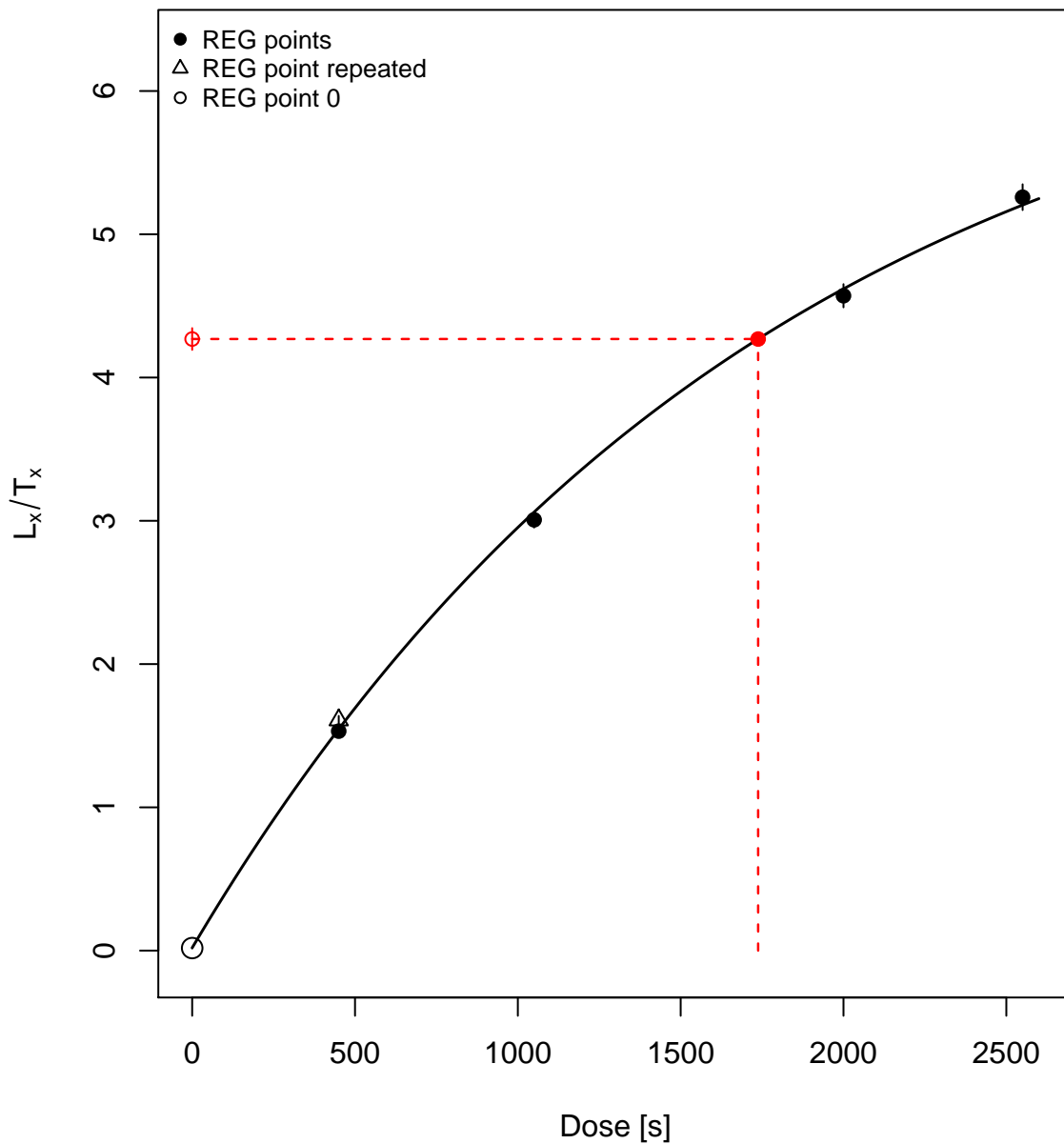


**Test dose response**



# Growth curve

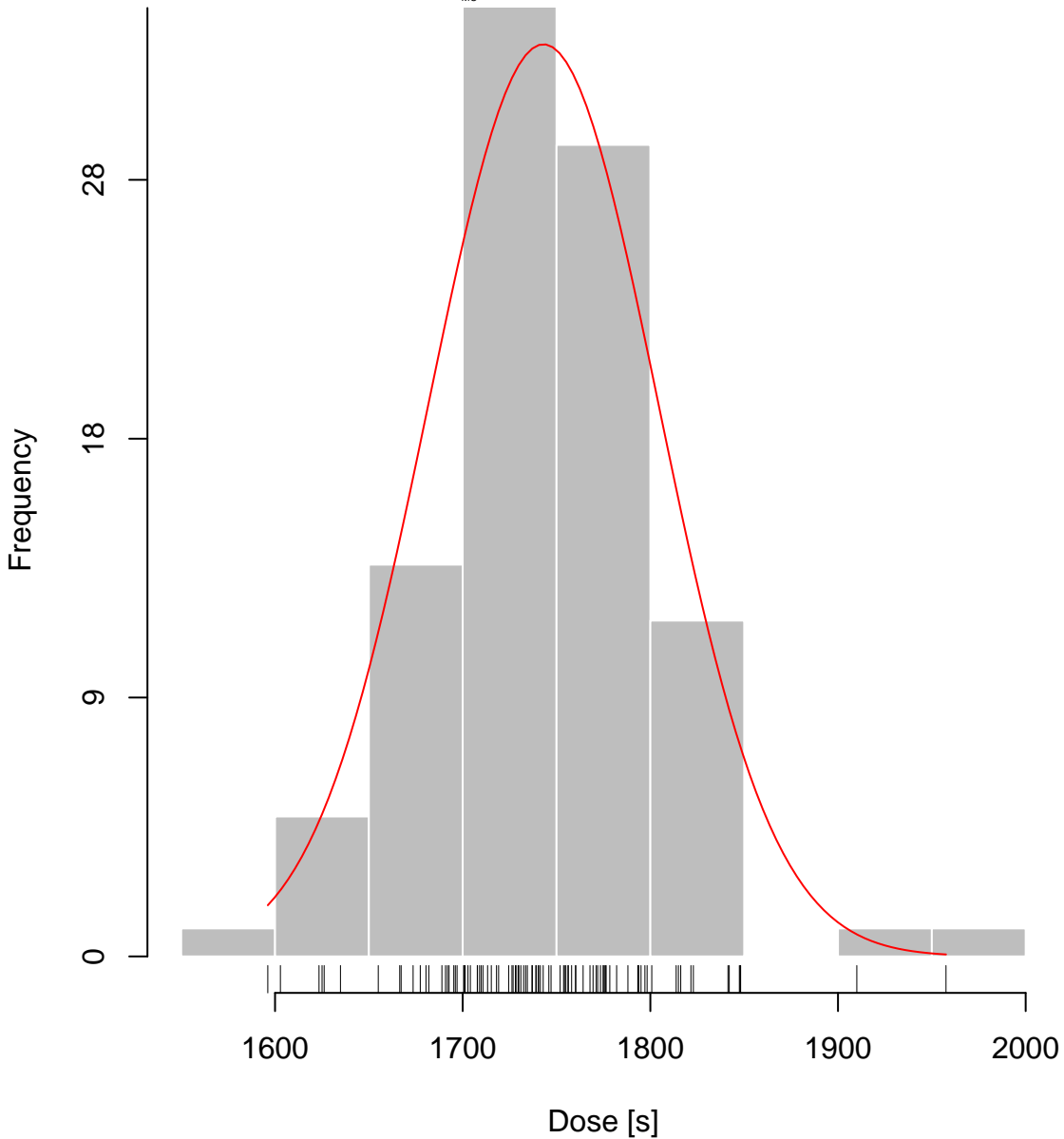
$D_e = 1737.88 \pm 61.2$  | fit: EXP



[help\("plot\\_GrowthCurve"\)](#)

# D<sub>e</sub> from MC simulation

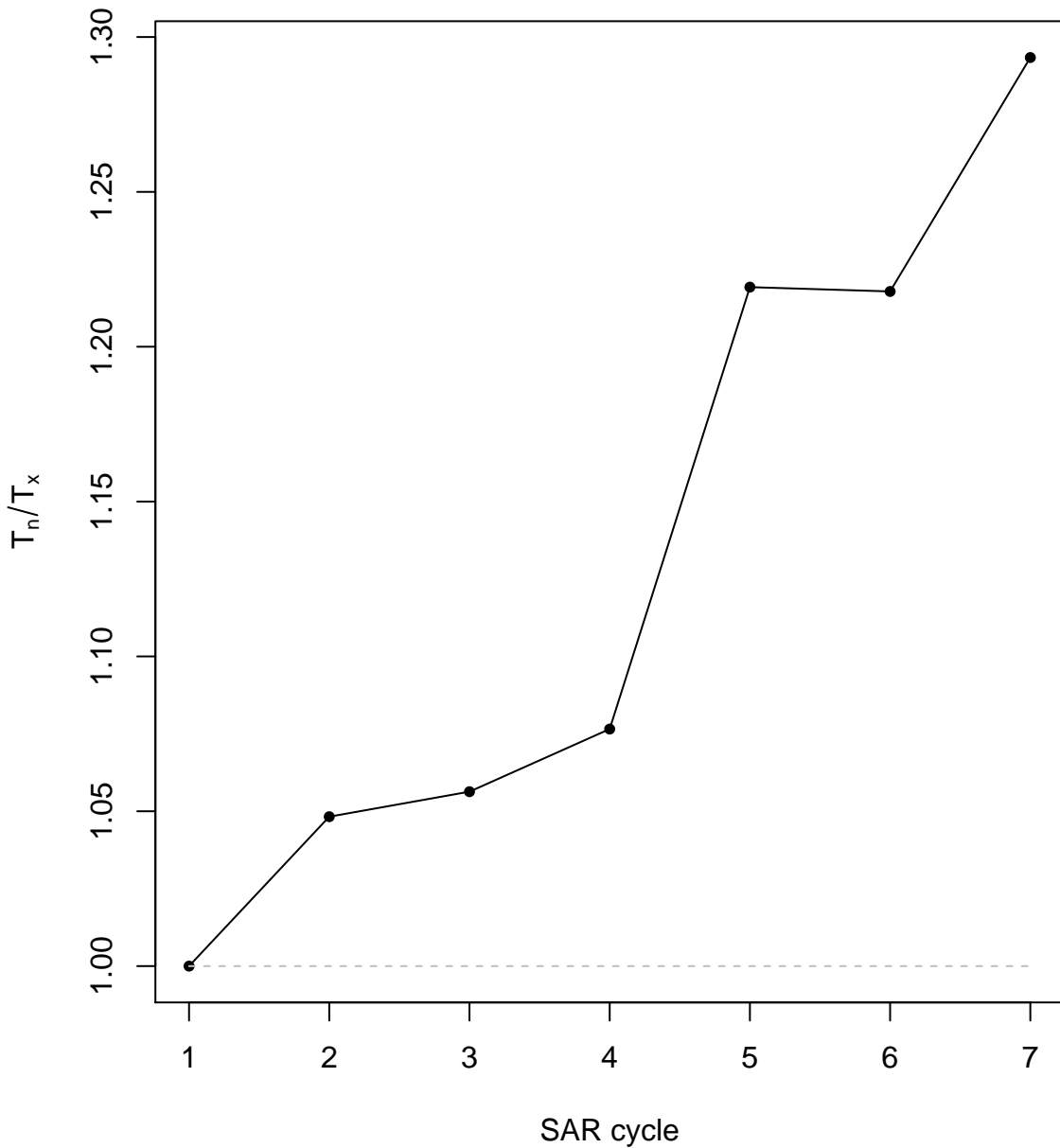
D<sub>MC</sub> = 1743.04 ± 61.2 | quality = 99.7 %



help("plot\_GrowthCurve")

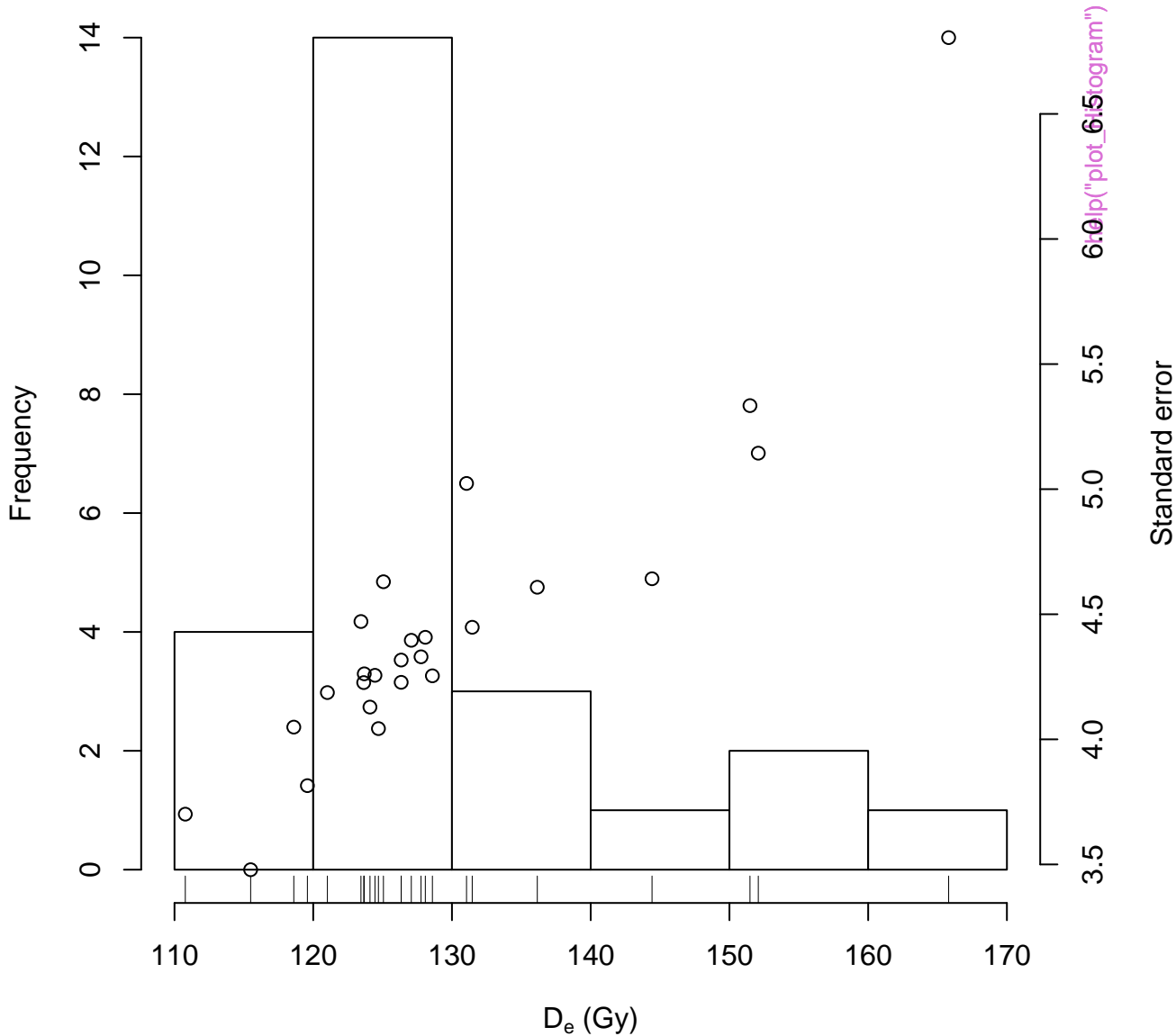


# Test dose response



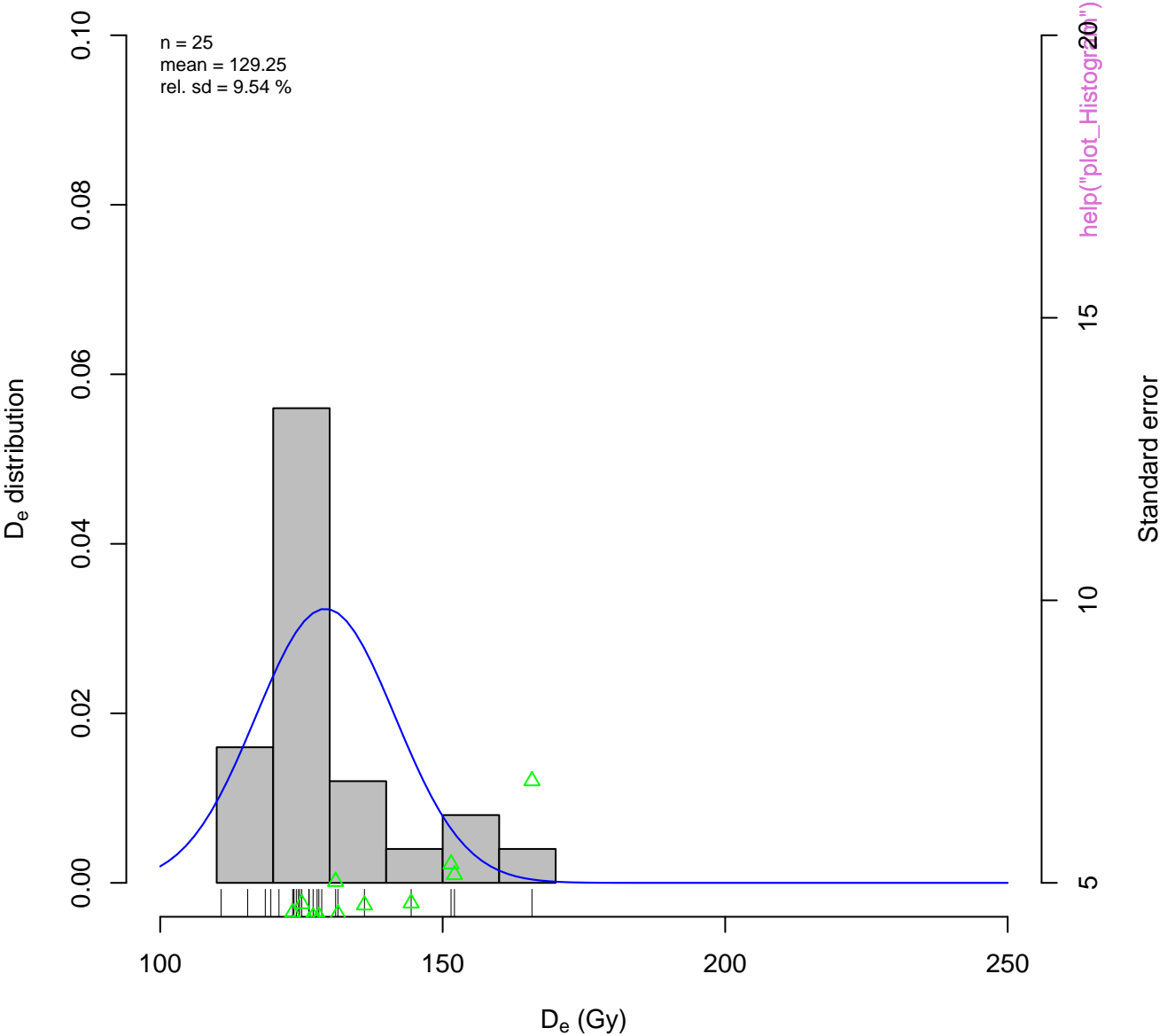
help("plot\_GrowthCurve")

# Histogram



# Histogram of De-values

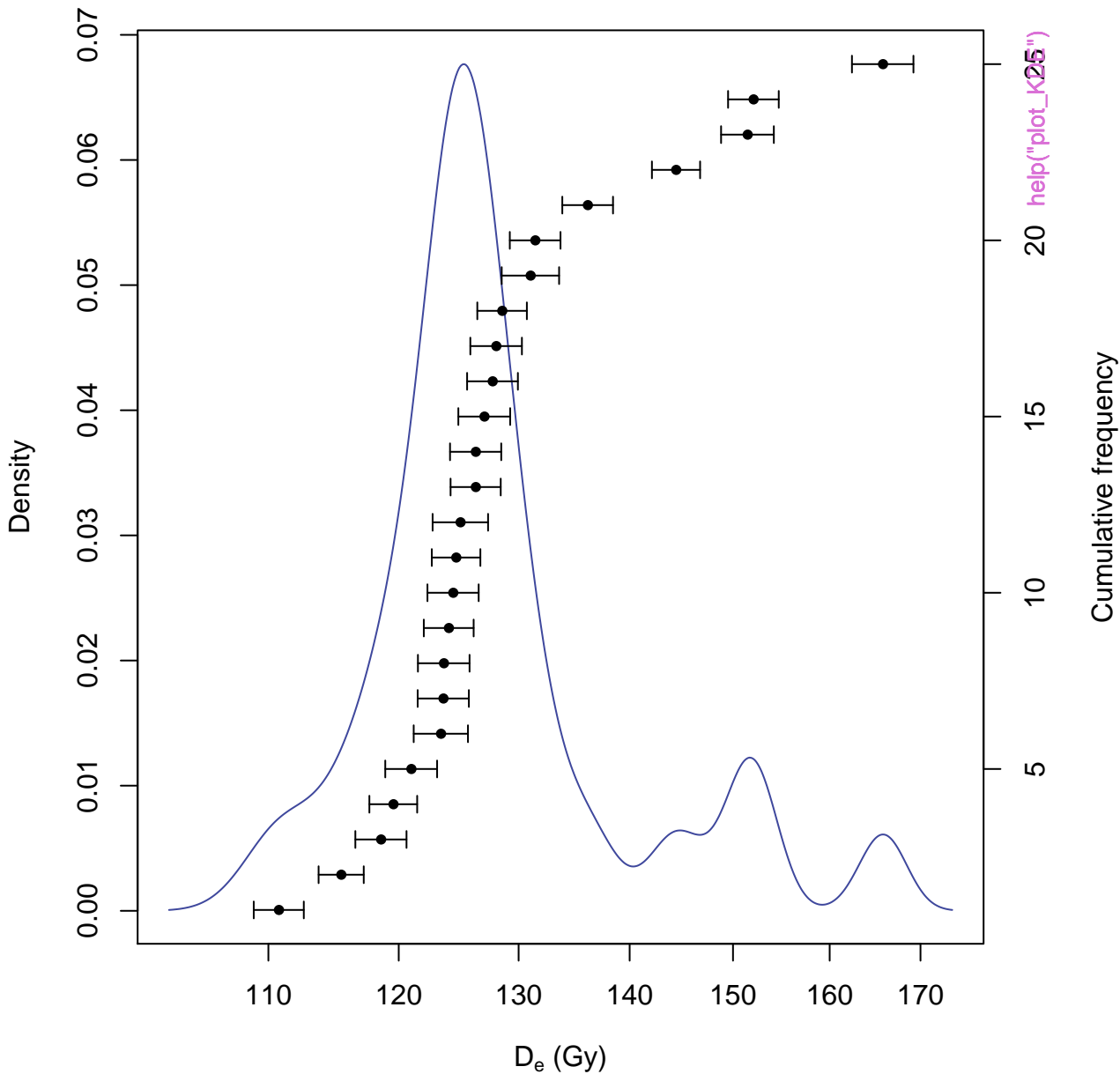
Example data set



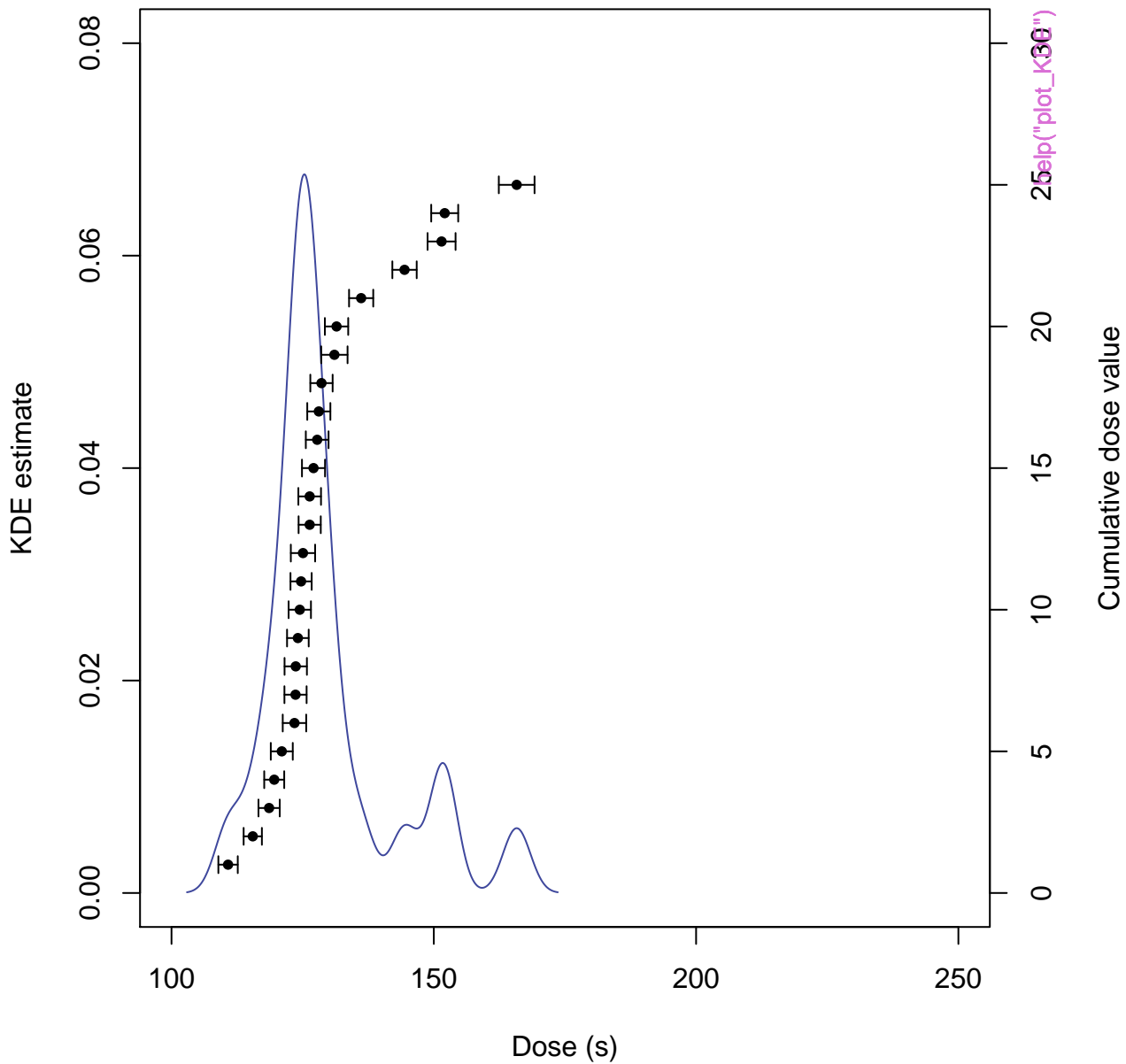
# D<sub>e</sub> distribution



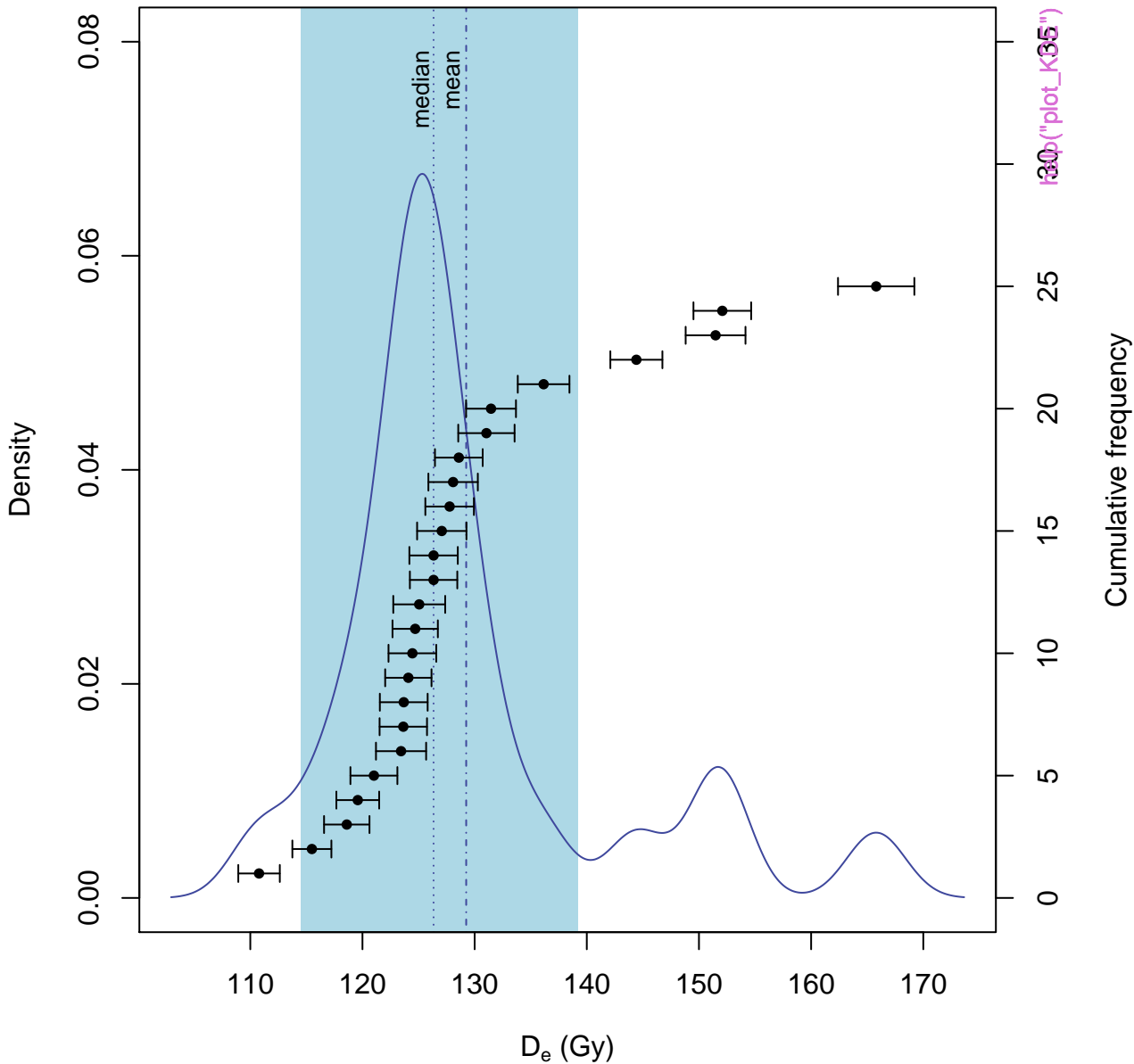
# D<sub>e</sub> distribution



# Dose distribution

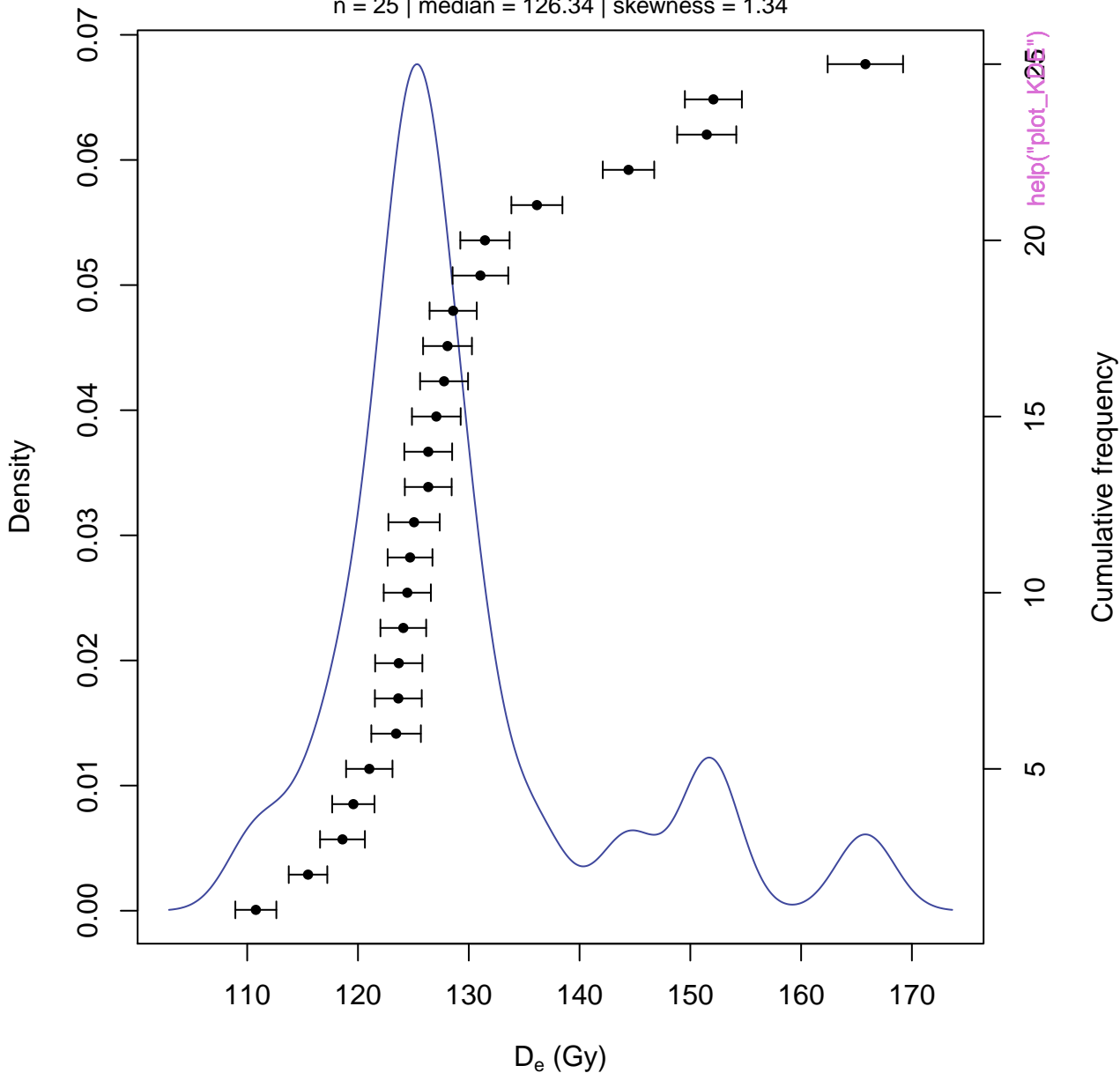


**D<sub>e</sub> distribution**



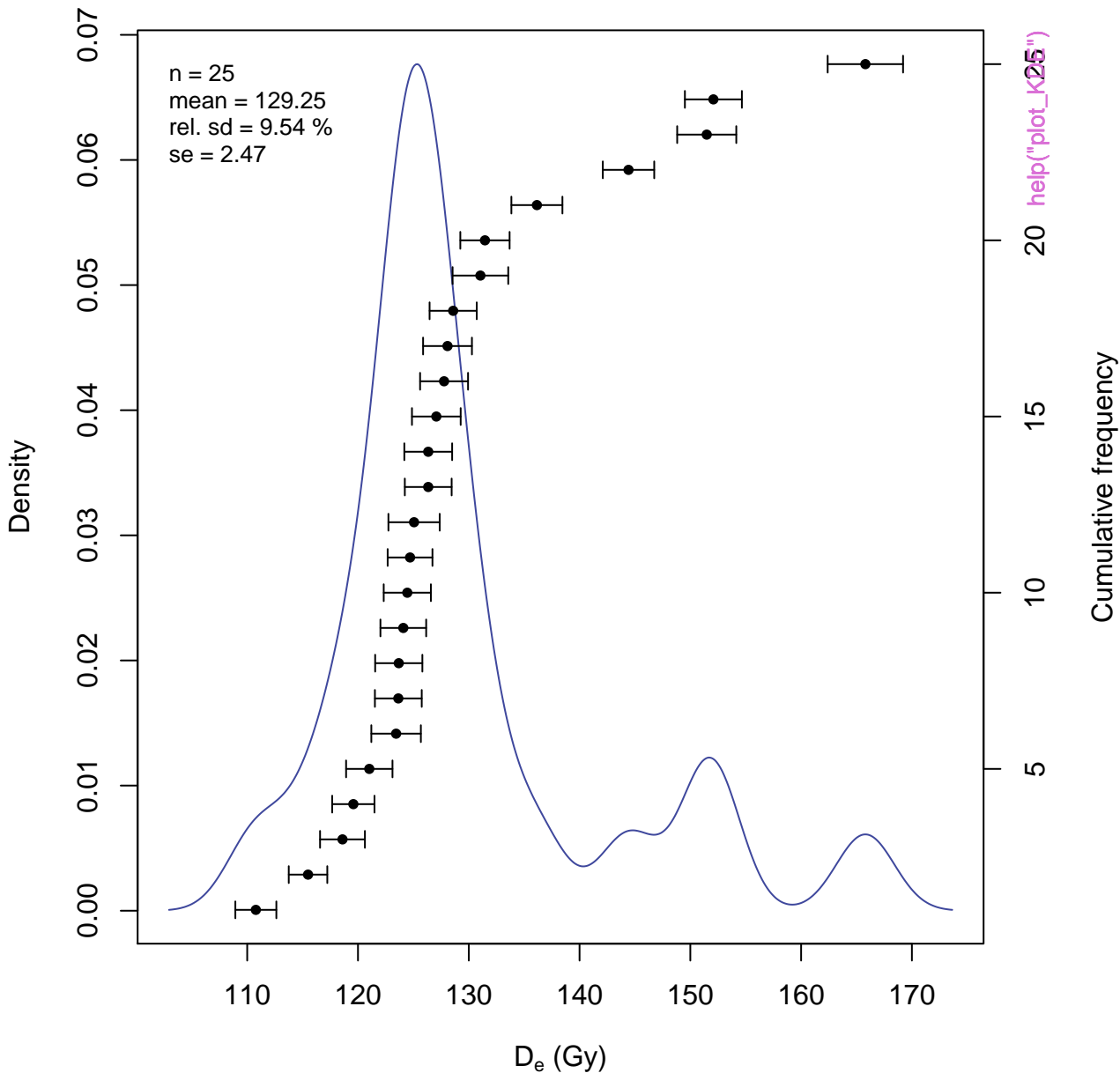
# D<sub>e</sub> distribution

n = 25 | median = 126.34 | skewness = 1.34

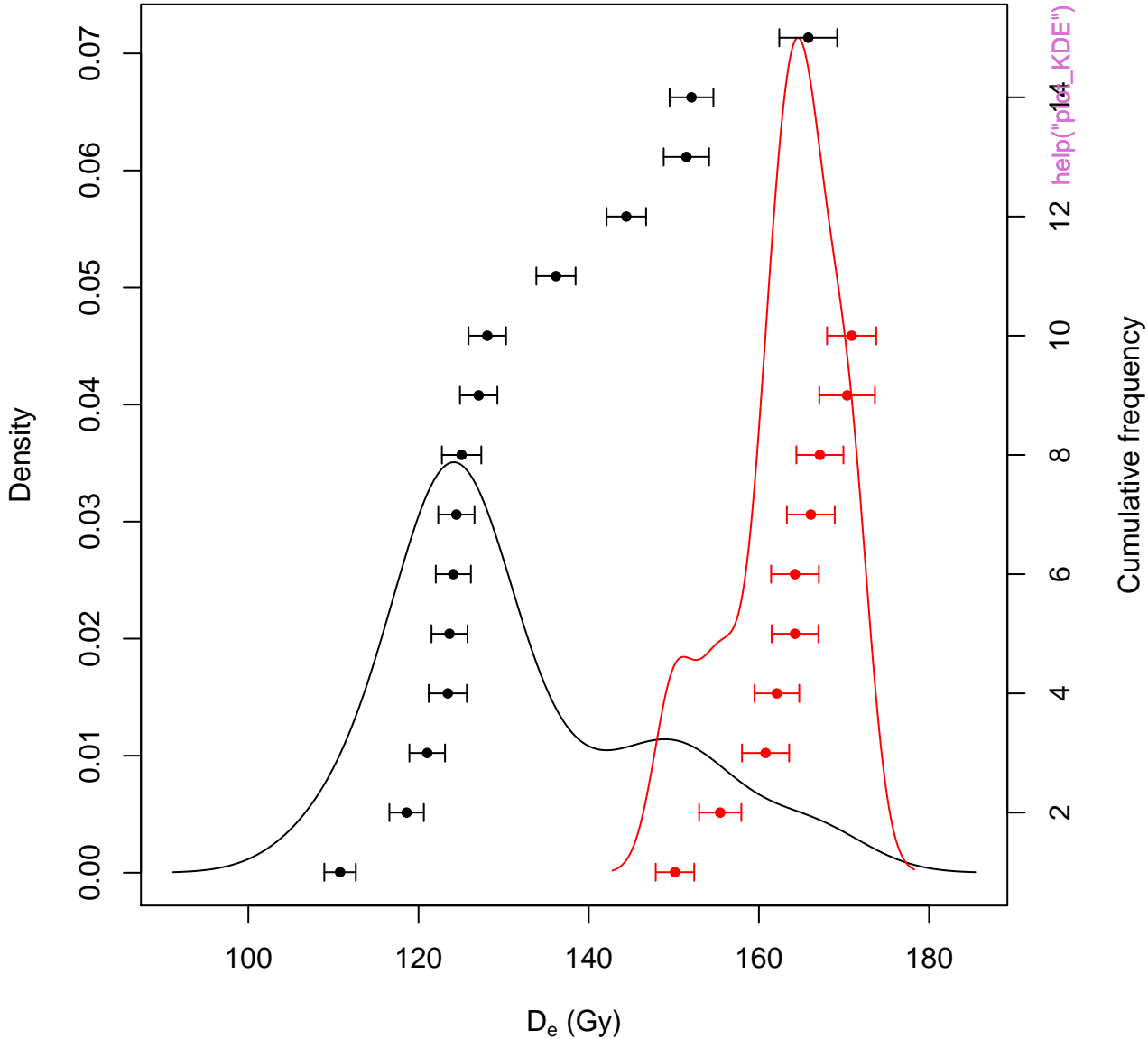




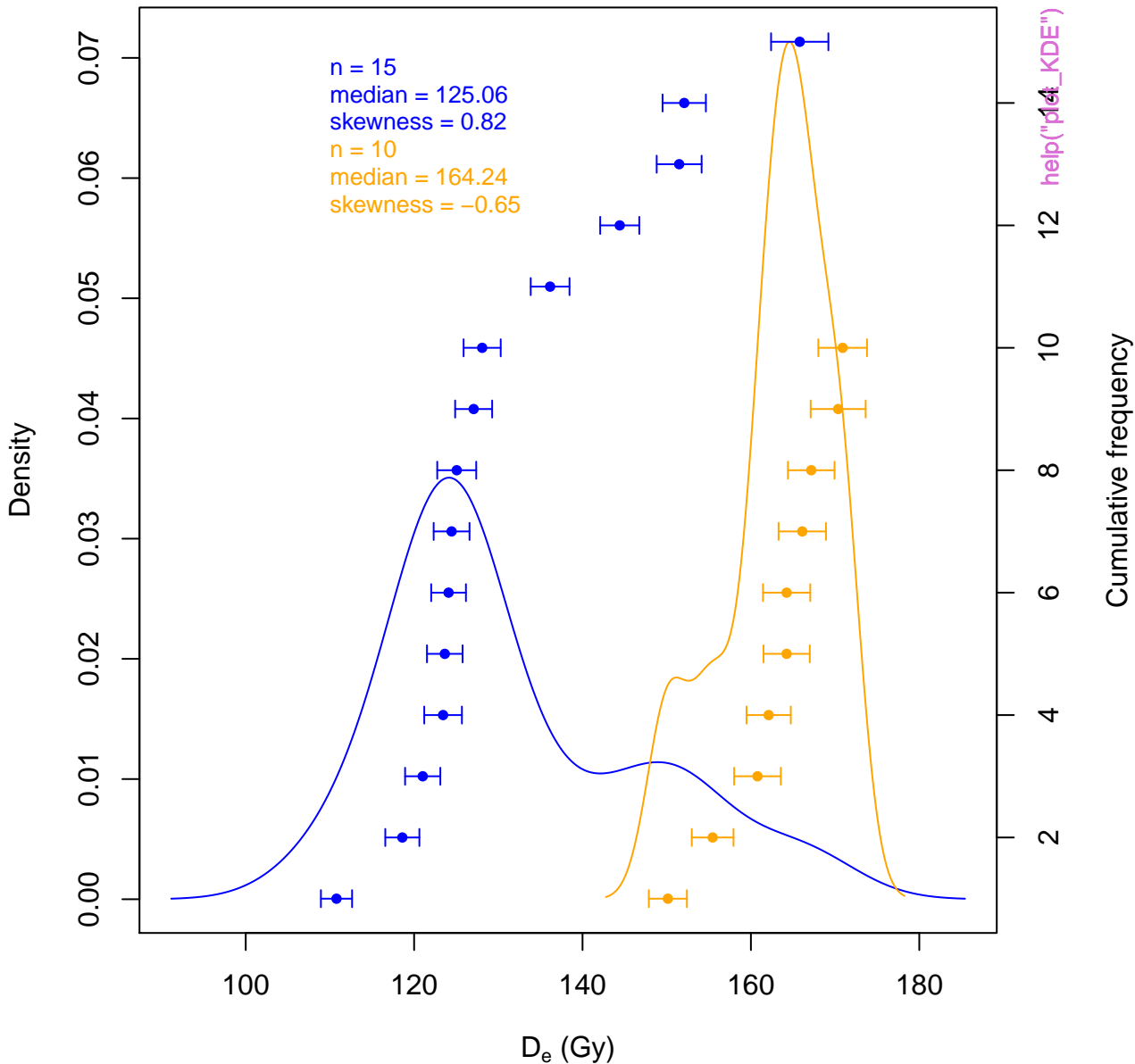
# D<sub>e</sub> distribution



**D<sub>e</sub> distribution**



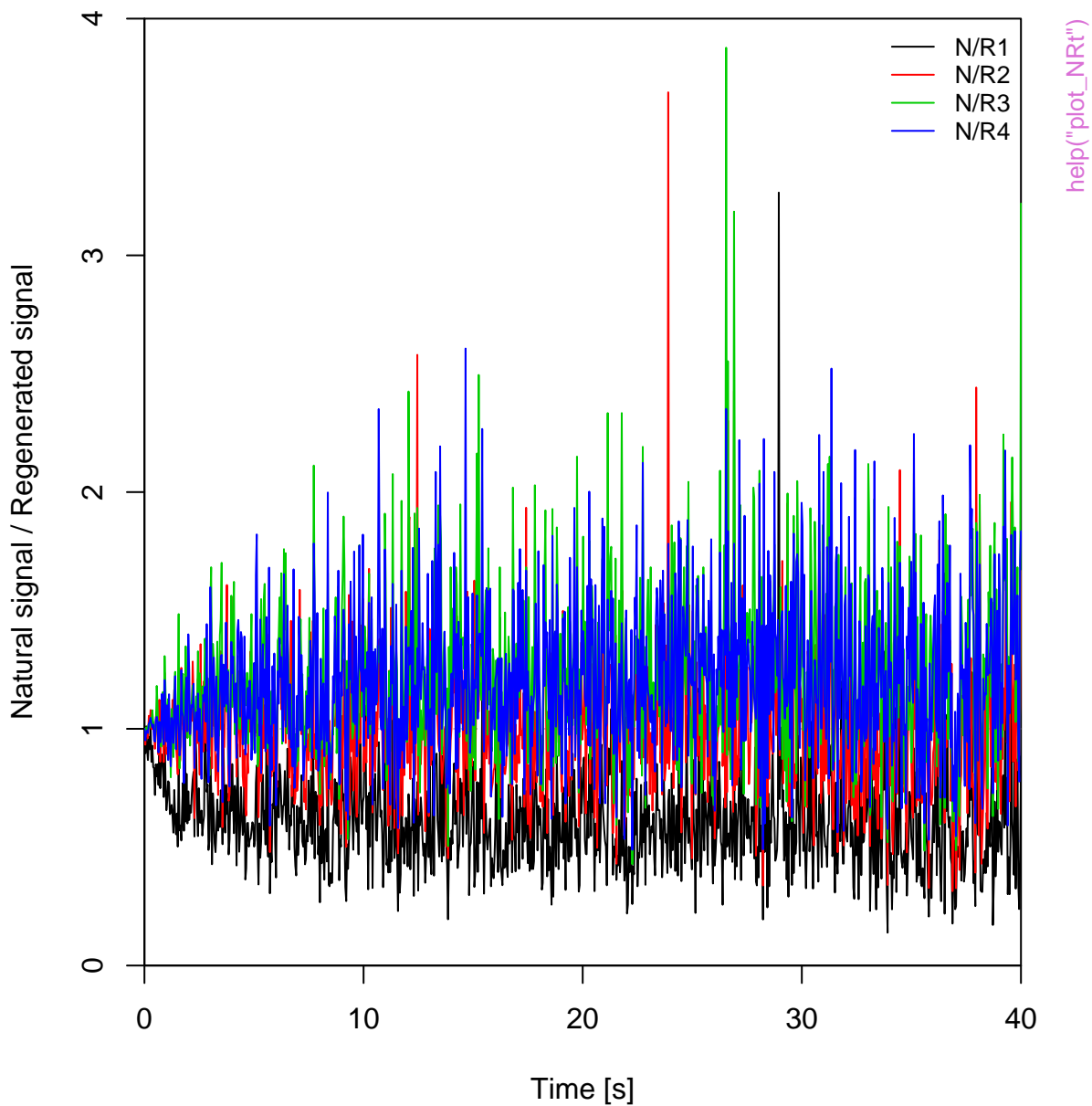
# D<sub>e</sub> distribution



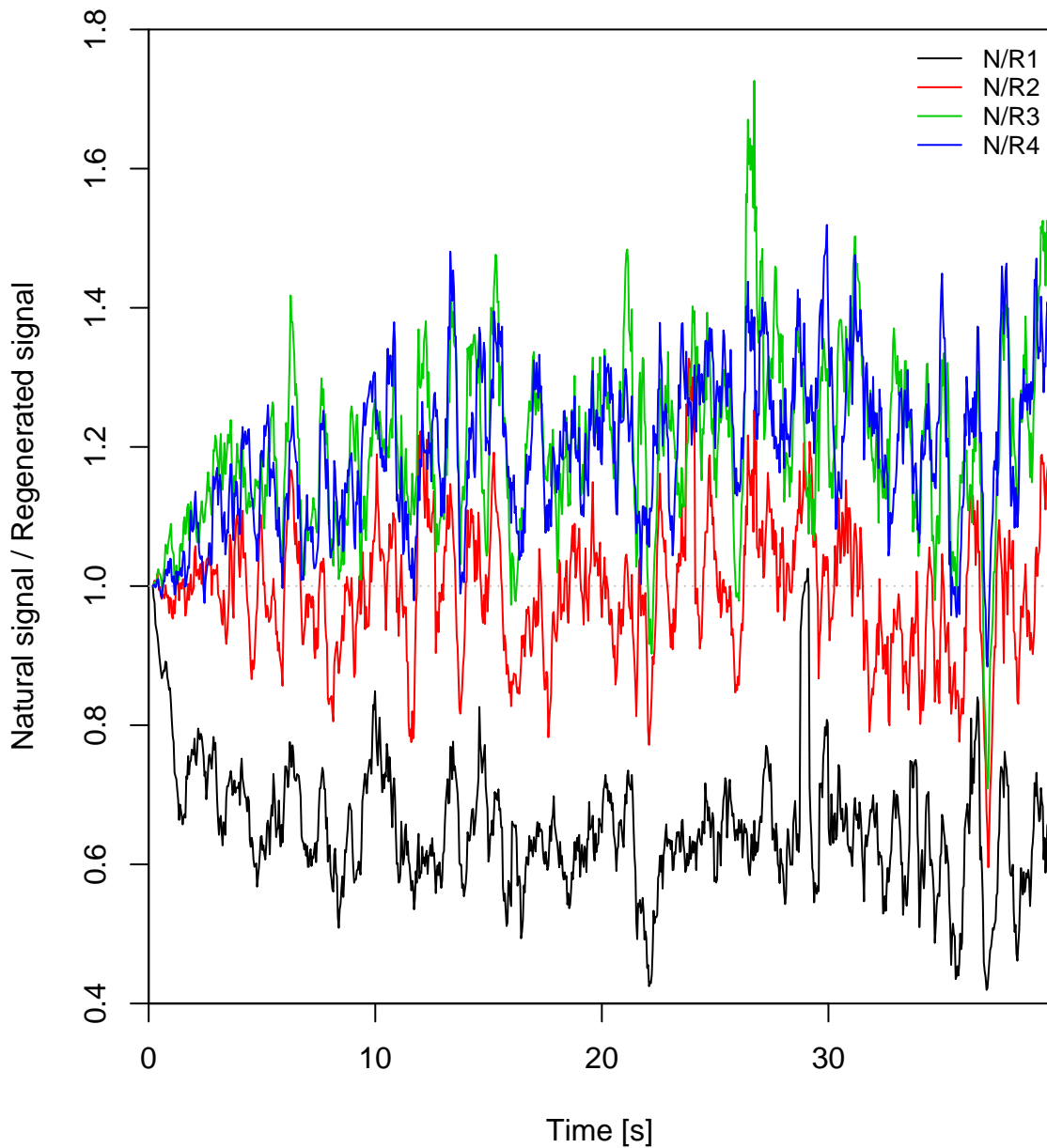
# $D_e$ distribution



NR(t) Plot

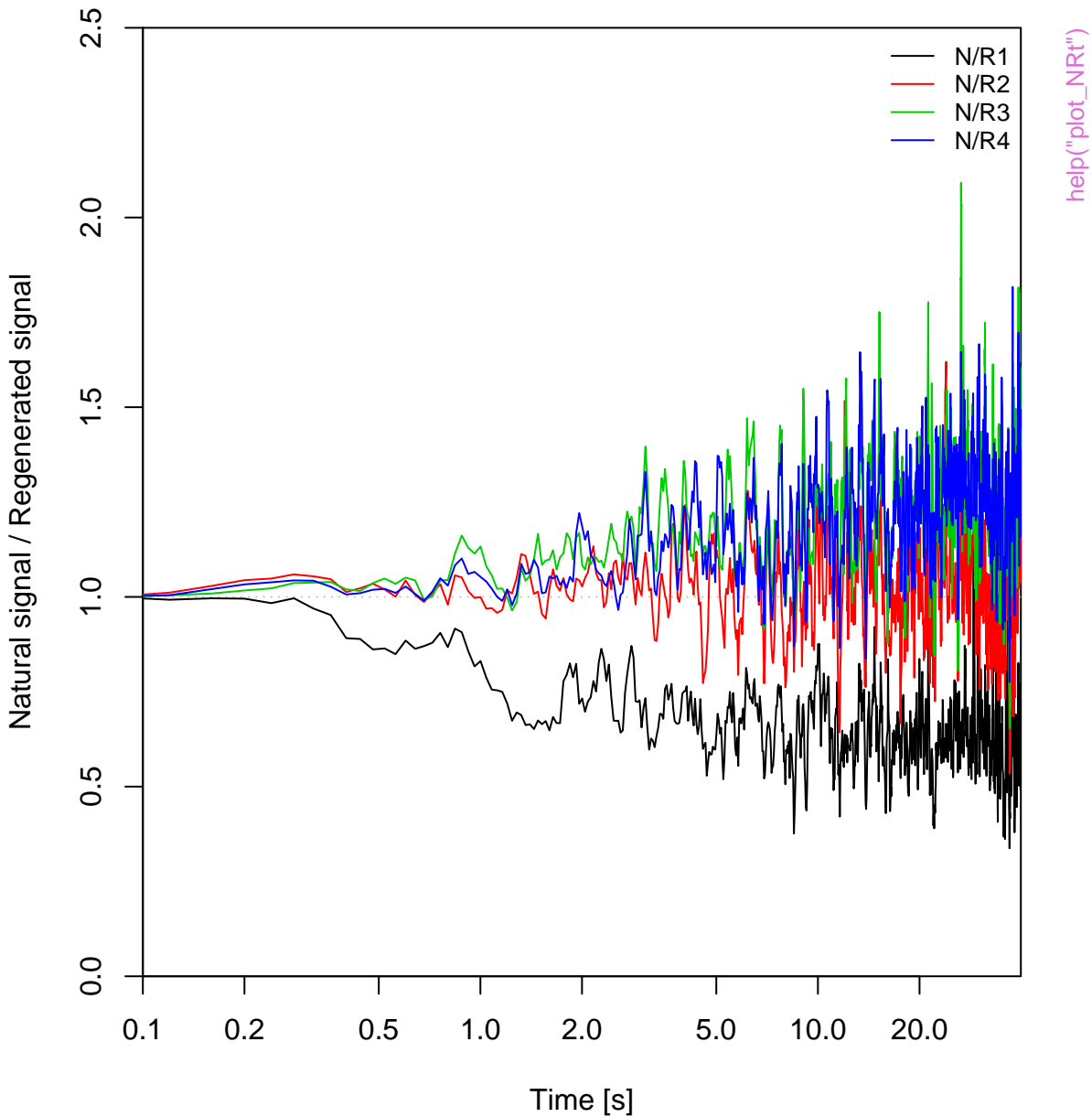


NR(t) Plot

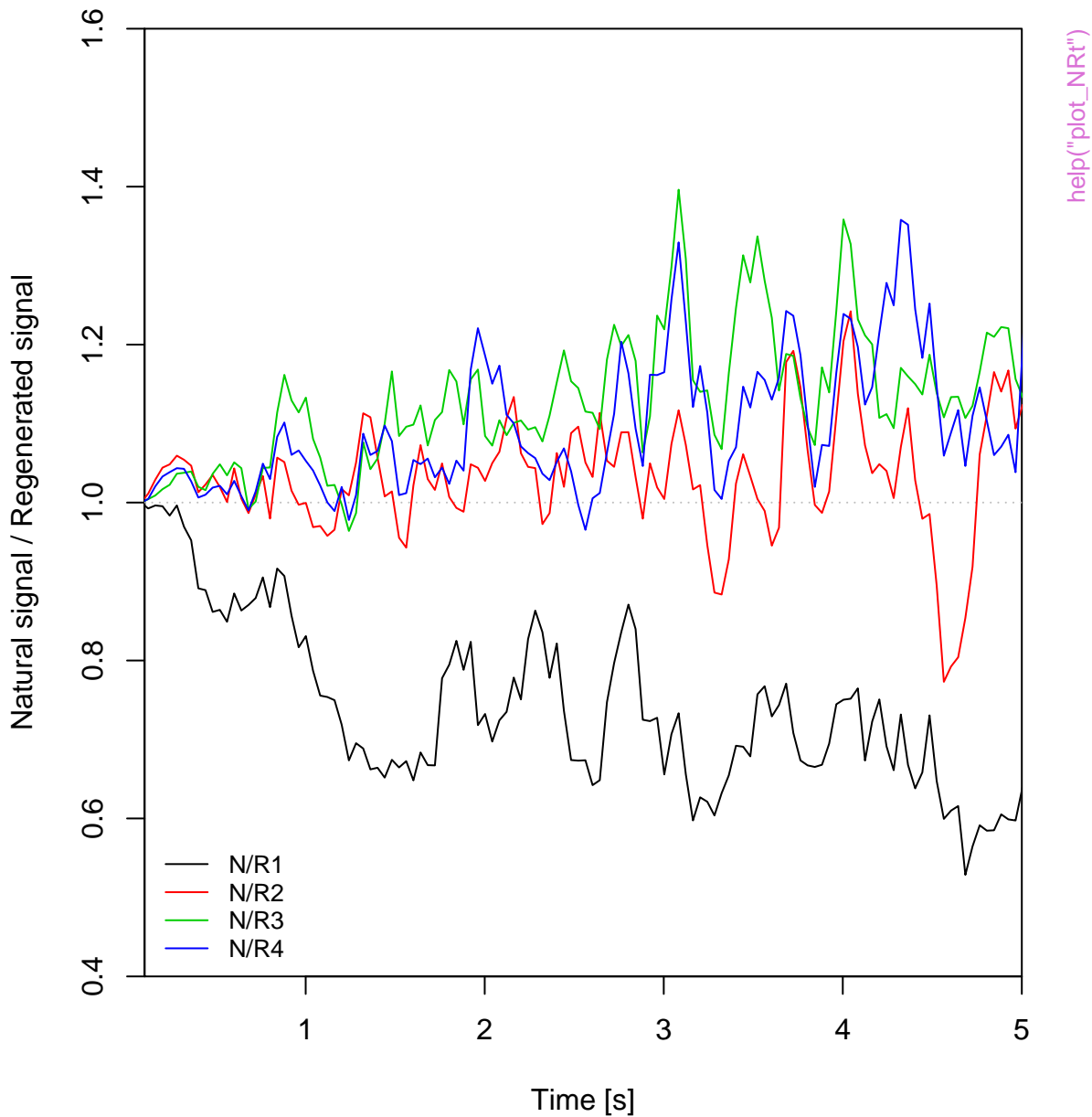


help("plot\_NRt")

NR(t) Plot

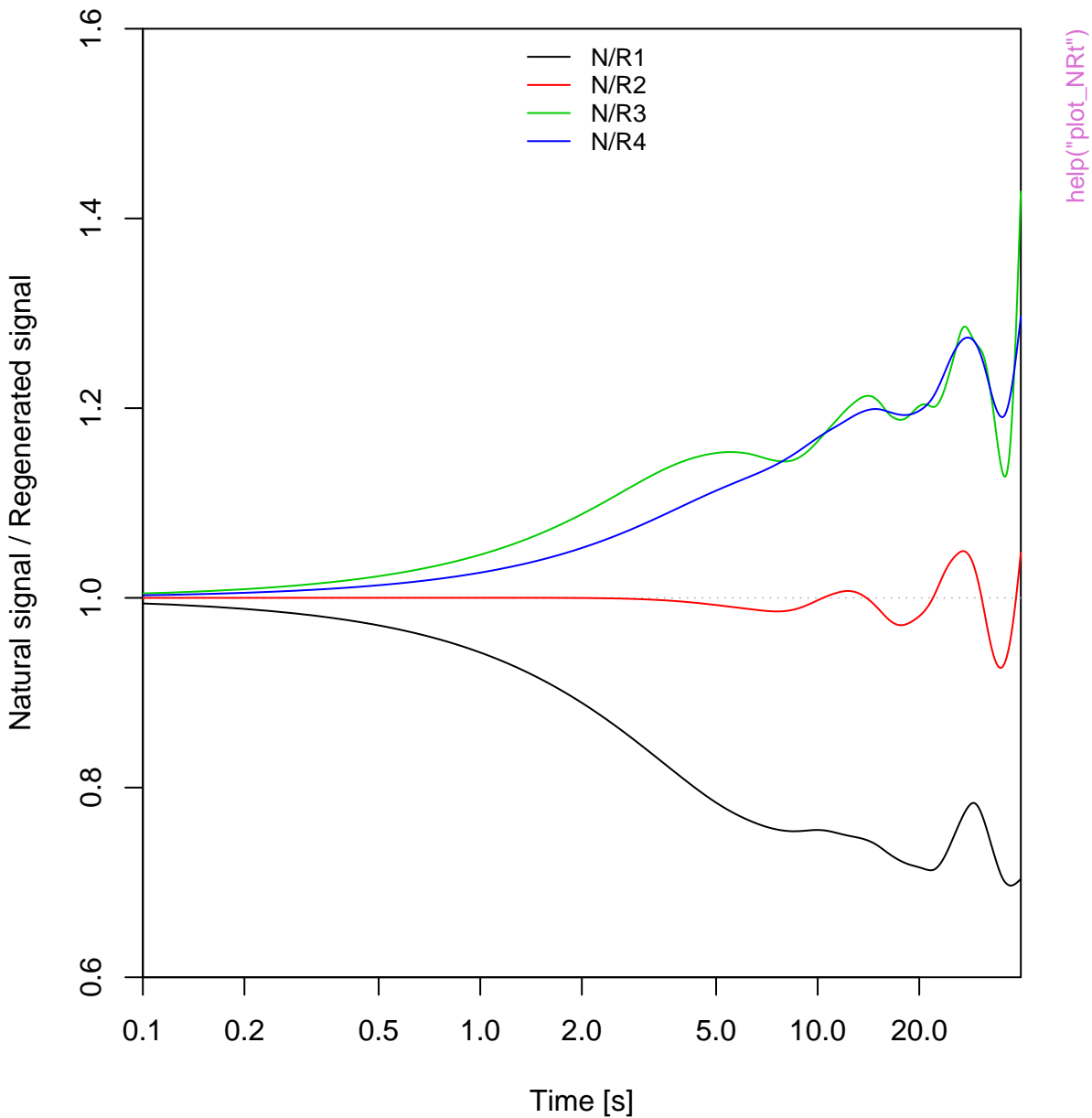


NR(t) Plot

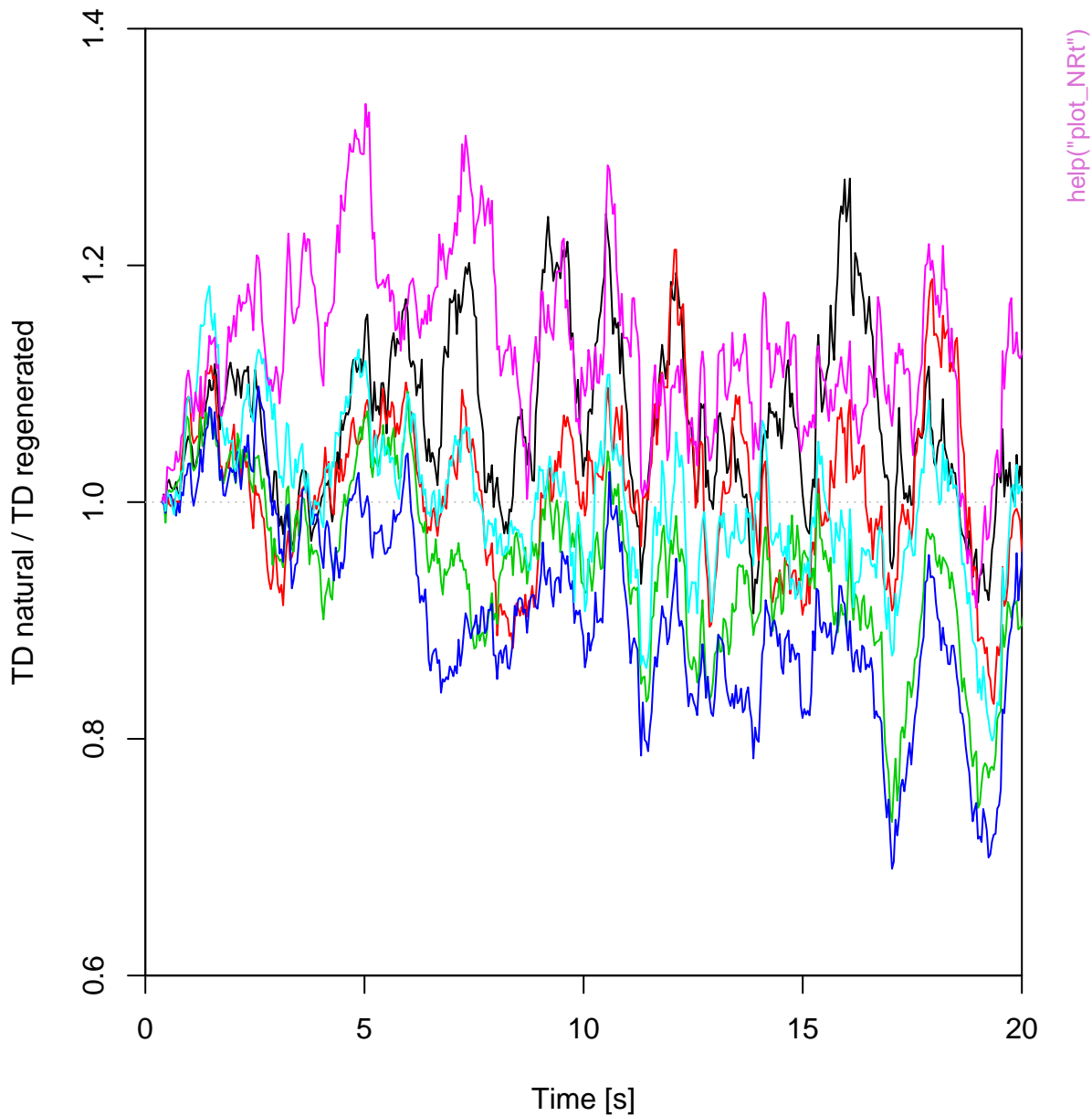


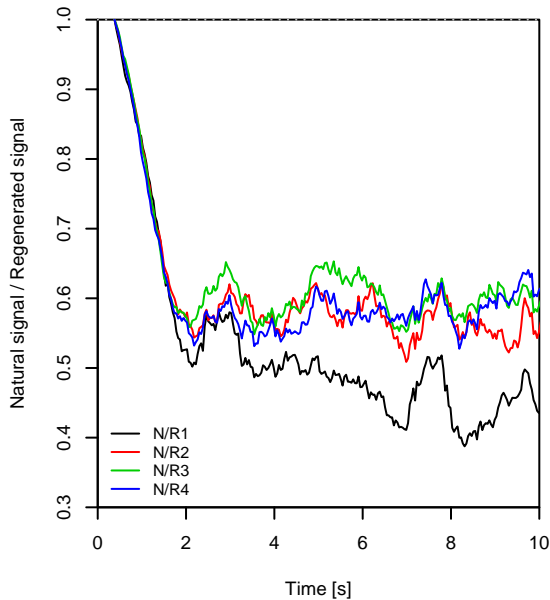
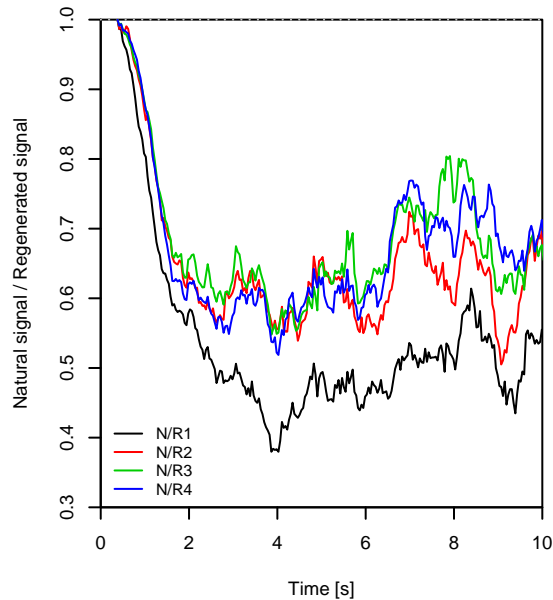


# NR(t) Plot

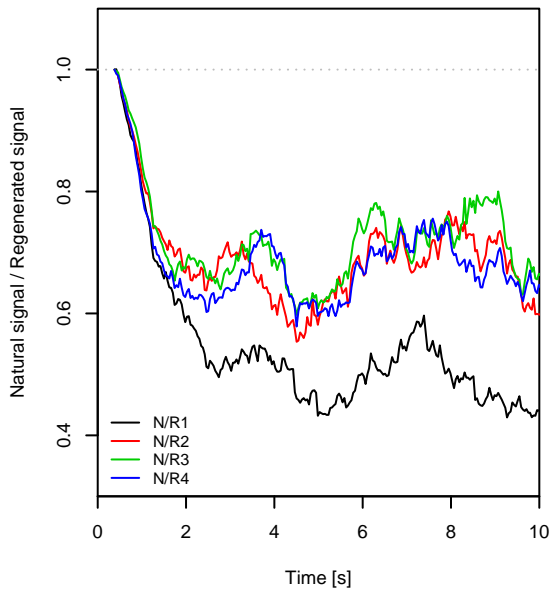
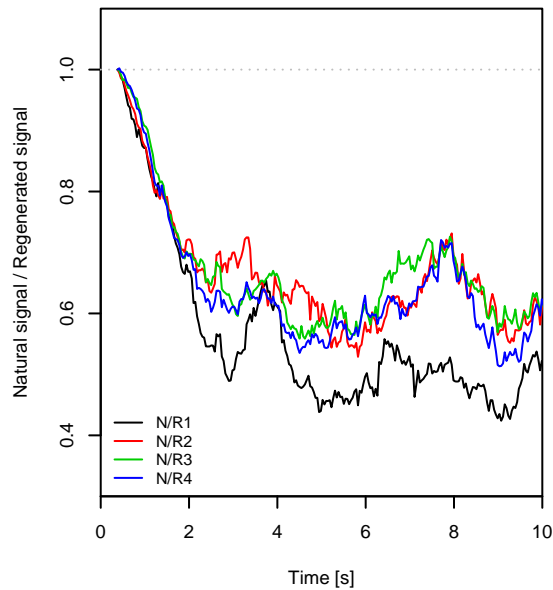


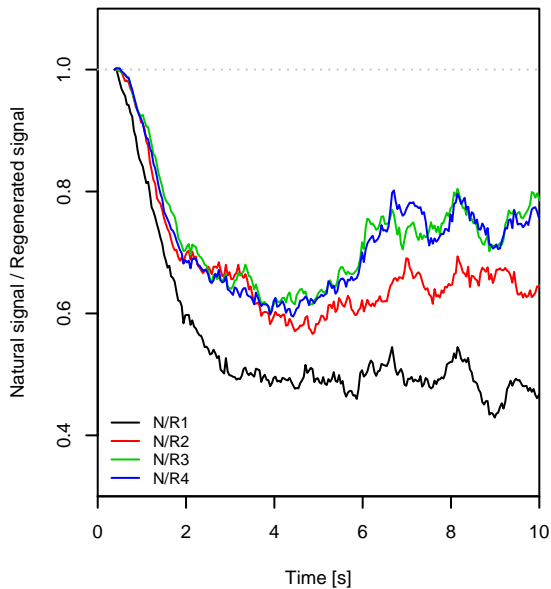
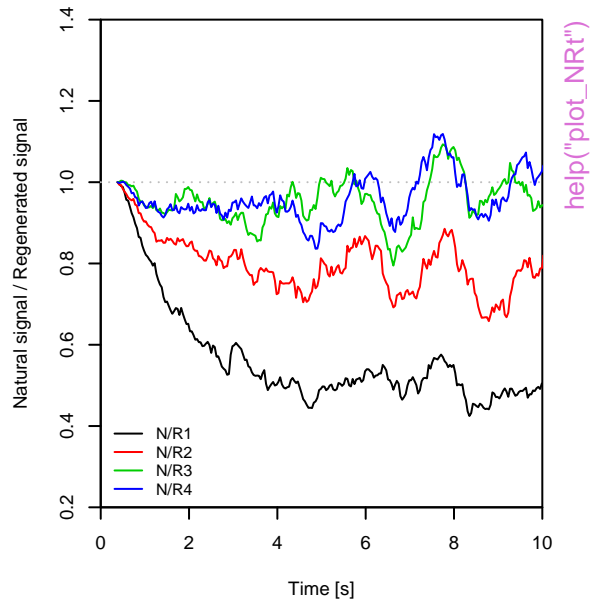
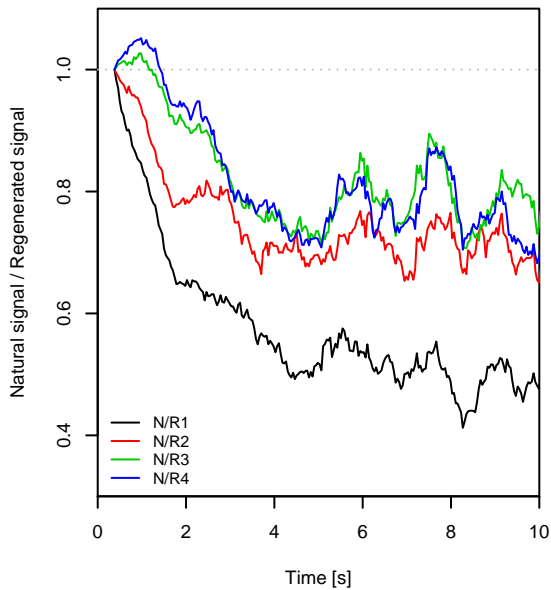
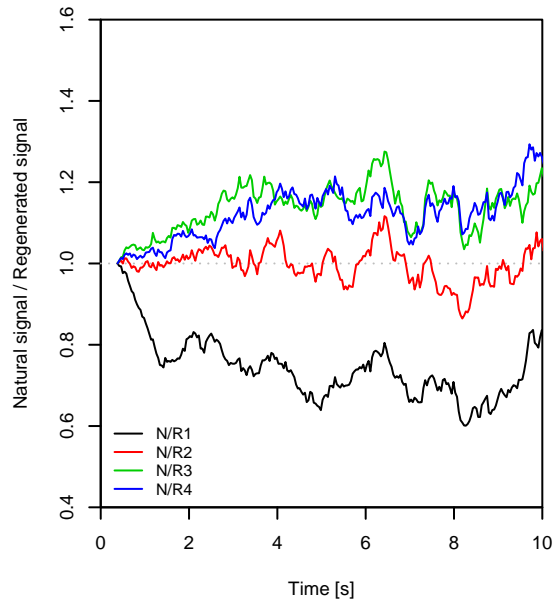
**TnTx(t) Plot**

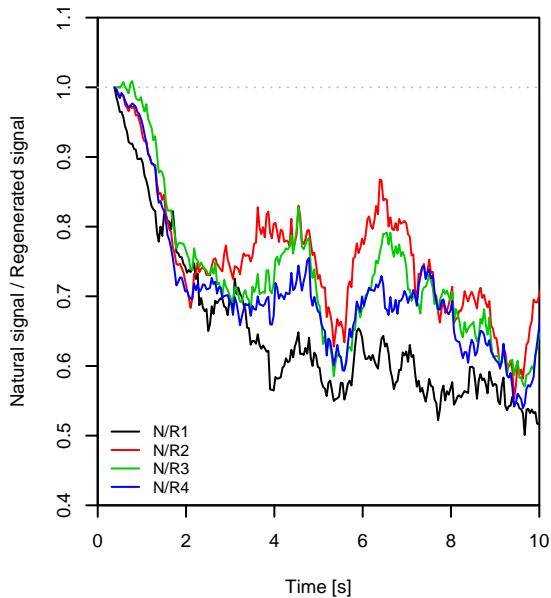
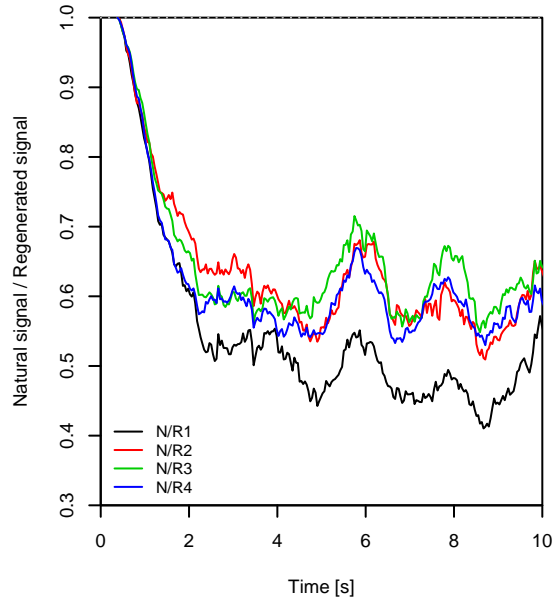


**Aliquot #1****Aliquot #2**

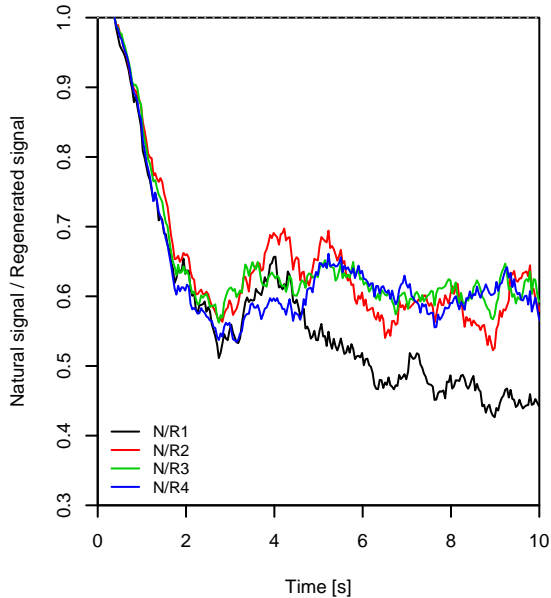
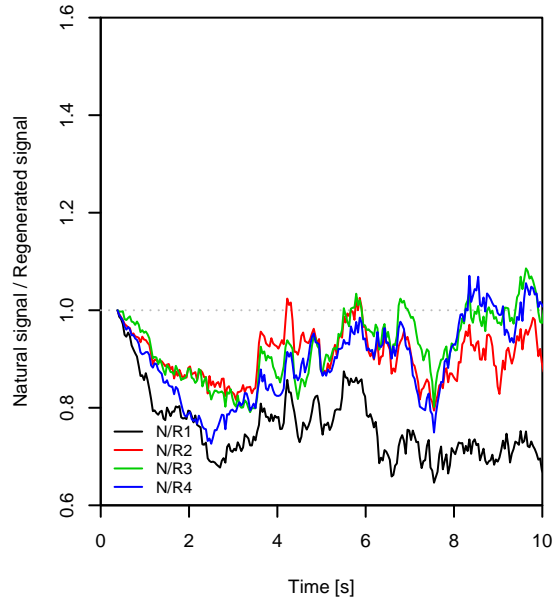
help("plot\_NRt")

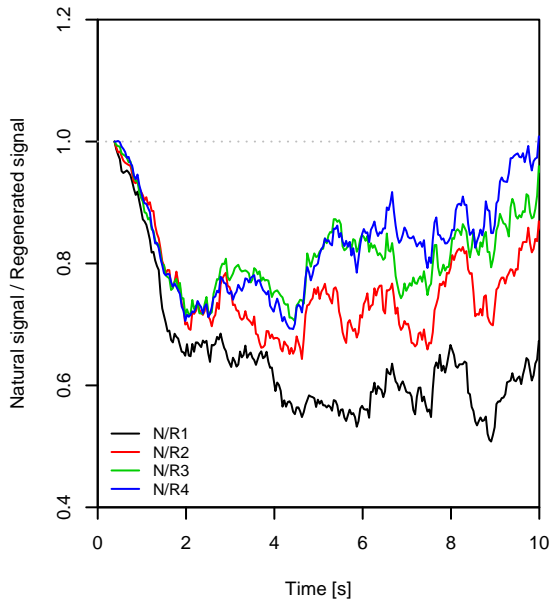
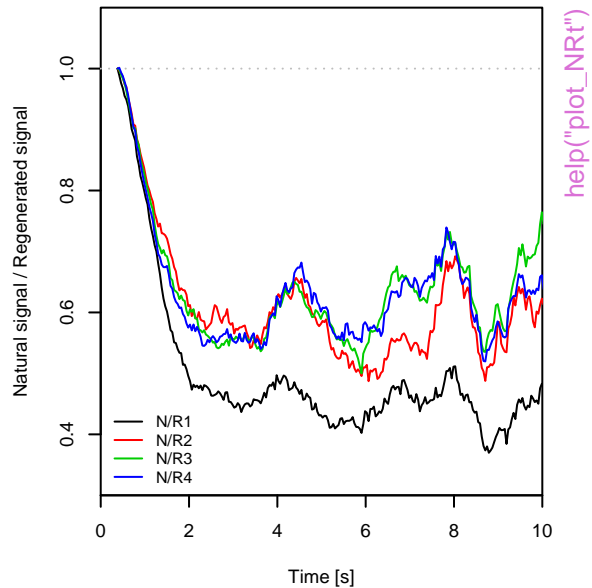
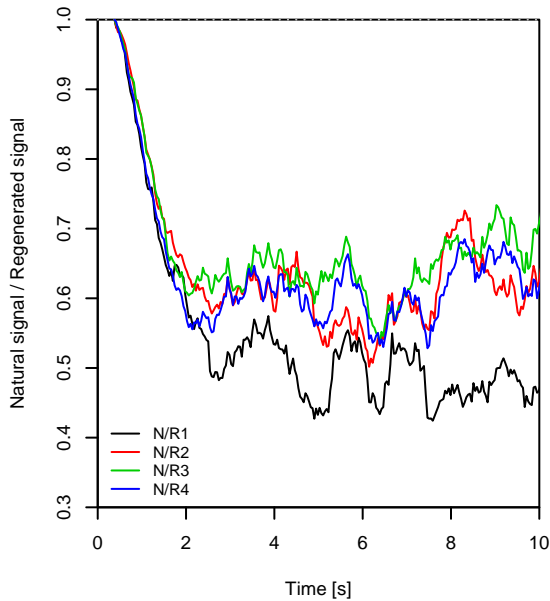
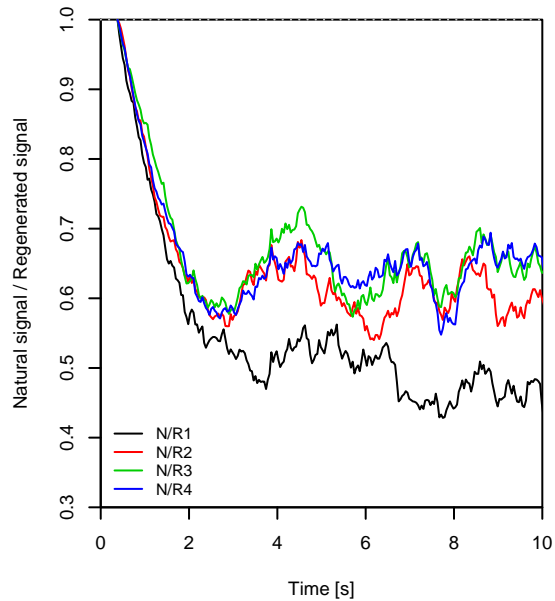
**Aliquot #3****Aliquot #4**

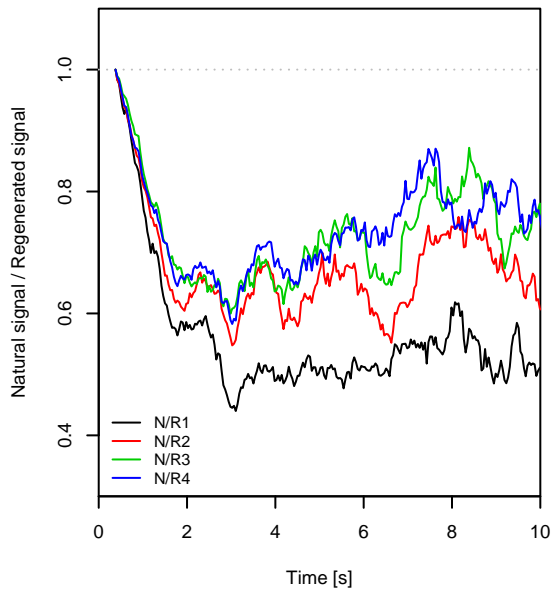
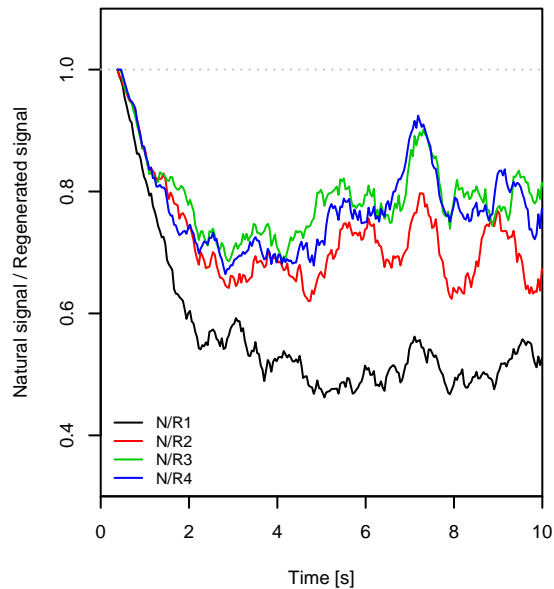
**Aliquot #5****Aliquot #6****Aliquot #7****Aliquot #8**

**Aliquot #9****Aliquot #10**

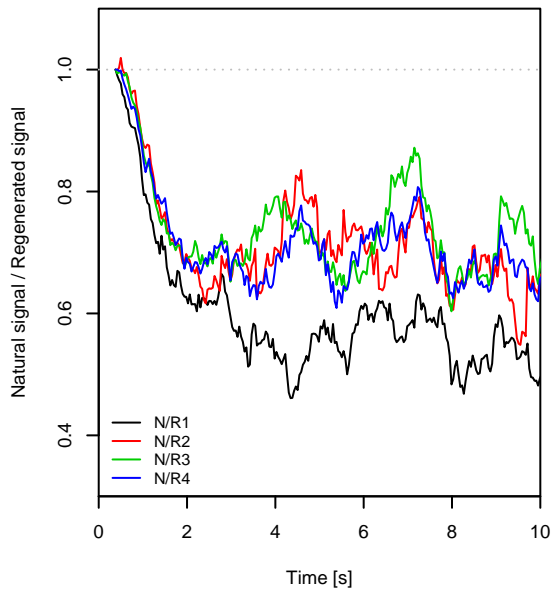
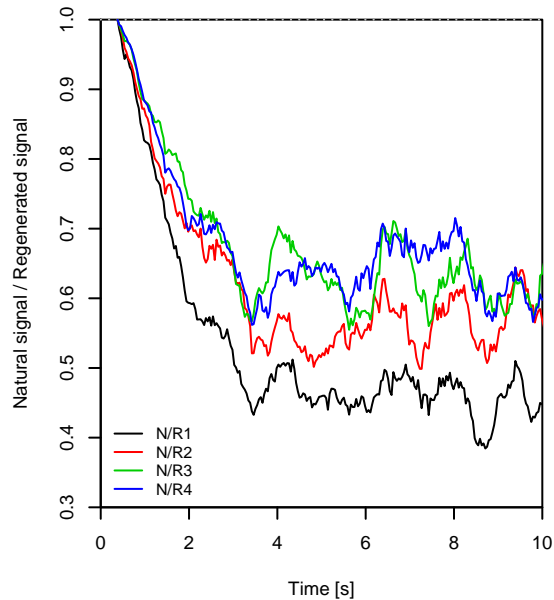
help("plot\_NRt")

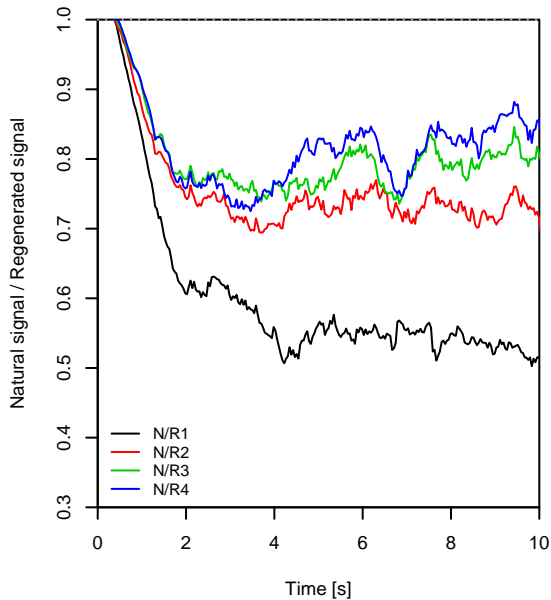
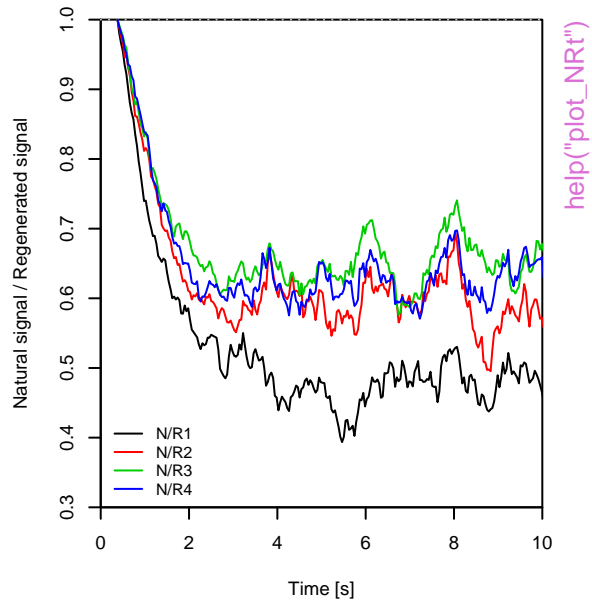
**Aliquot #11****Aliquot #12**

**Aliquot #13****Aliquot #14****Aliquot #15****Aliquot #16**

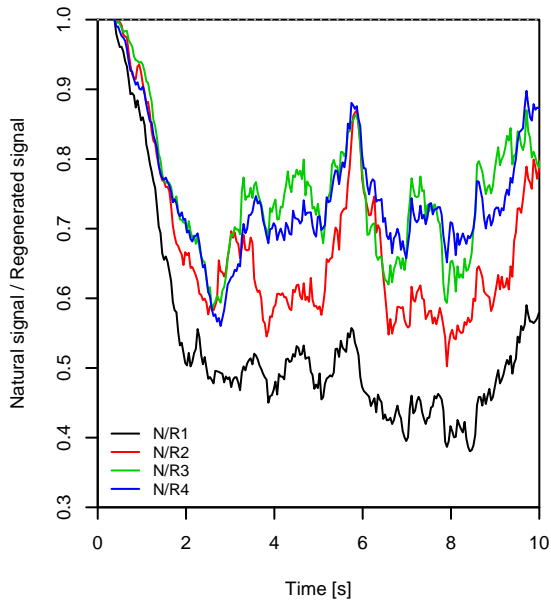
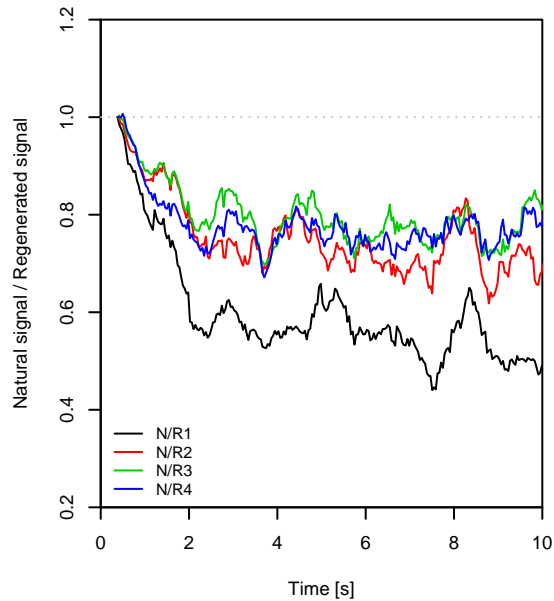
**Aliquot #17****Aliquot #18**

help("plot\_NRt")

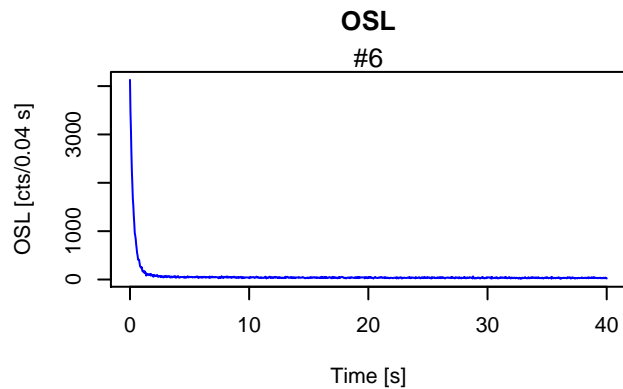
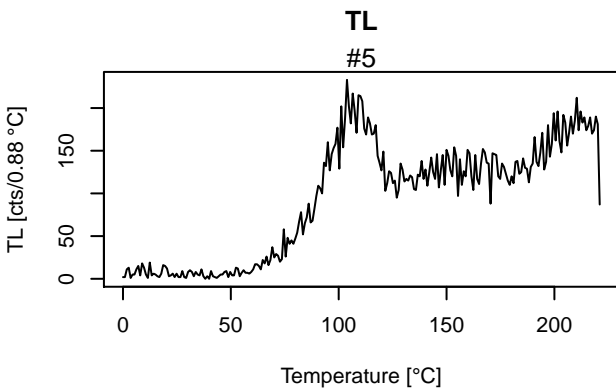
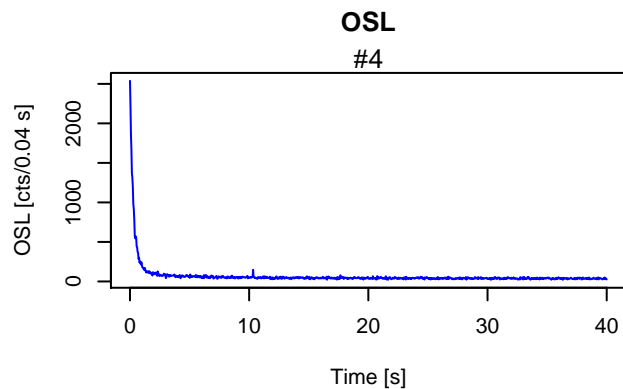
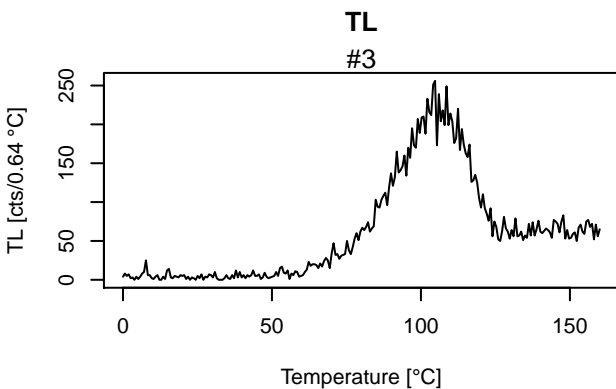
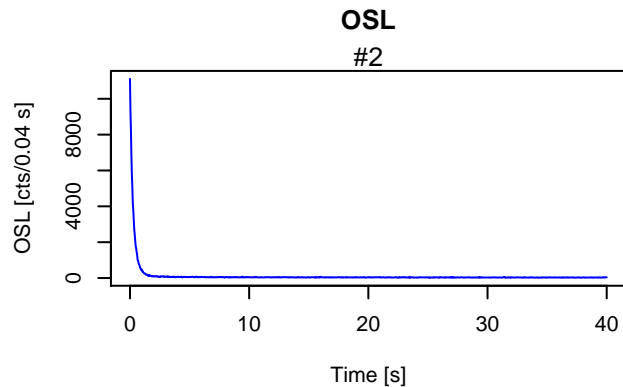
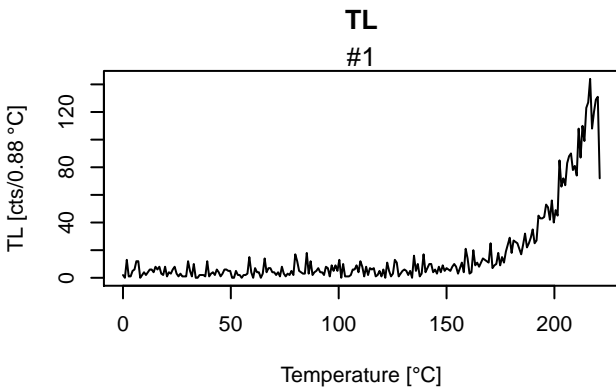
**Aliquot #19****Aliquot #20**

**Aliquot #21****Aliquot #22**

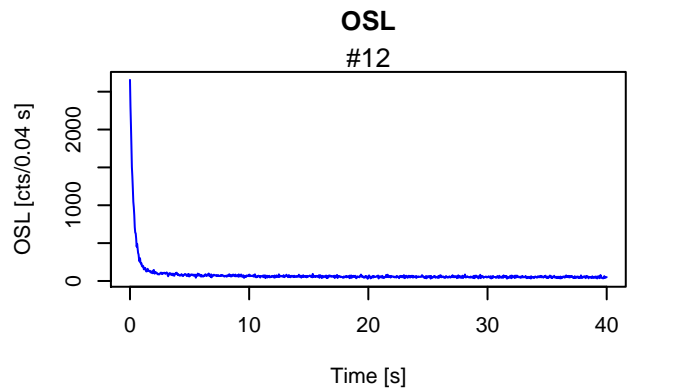
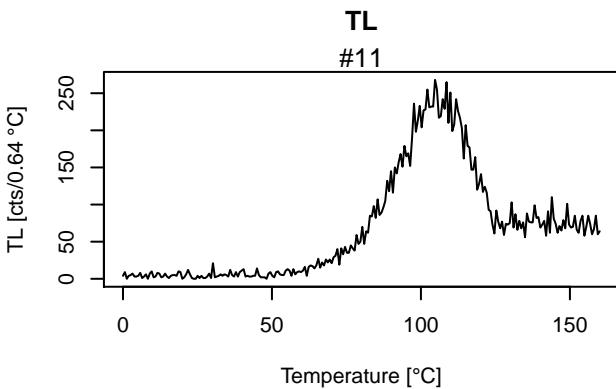
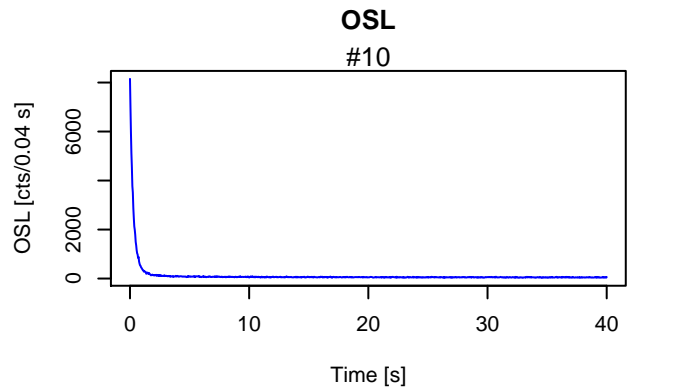
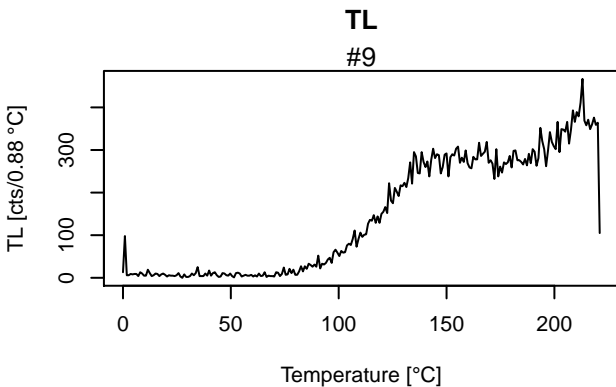
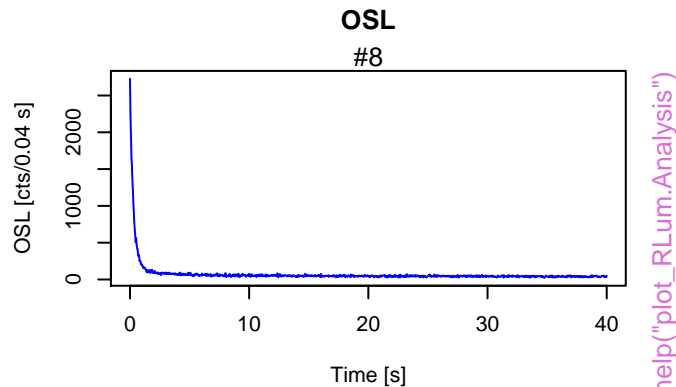
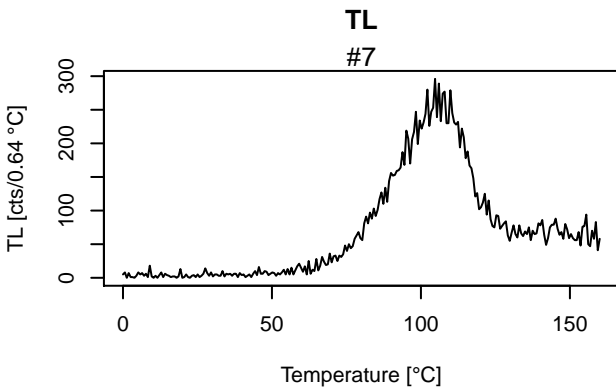
help("plot\_NRt")

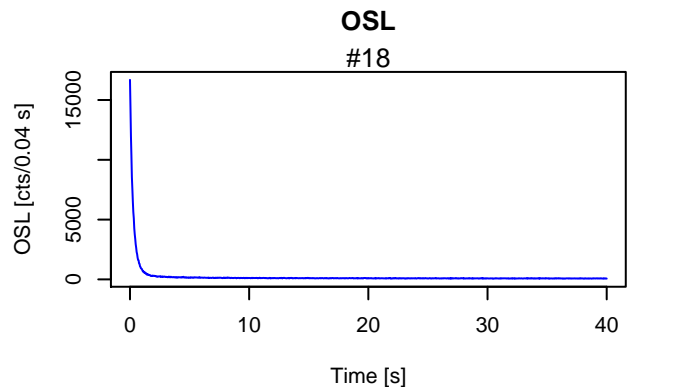
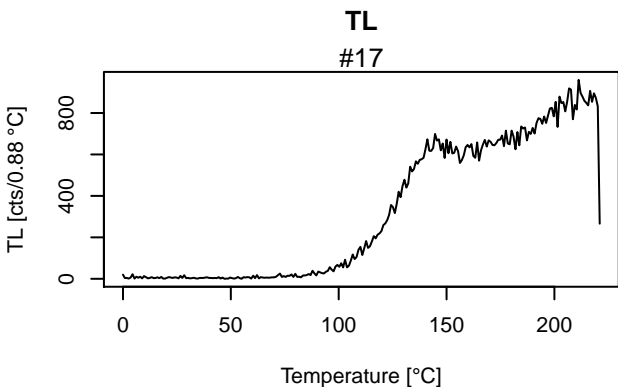
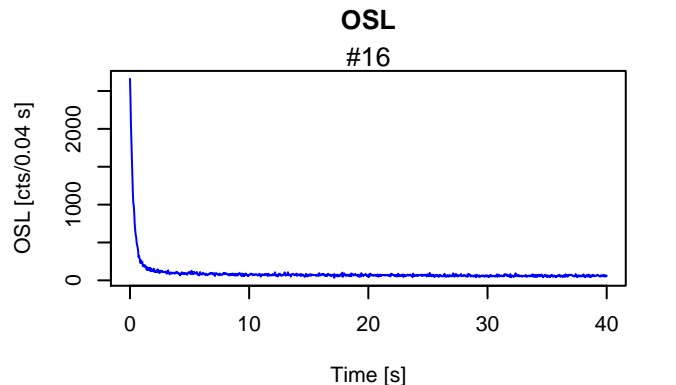
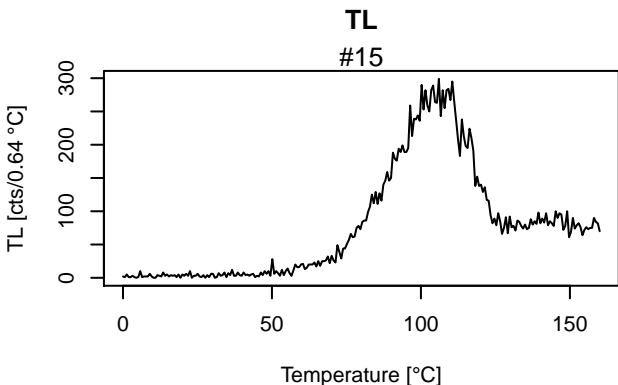
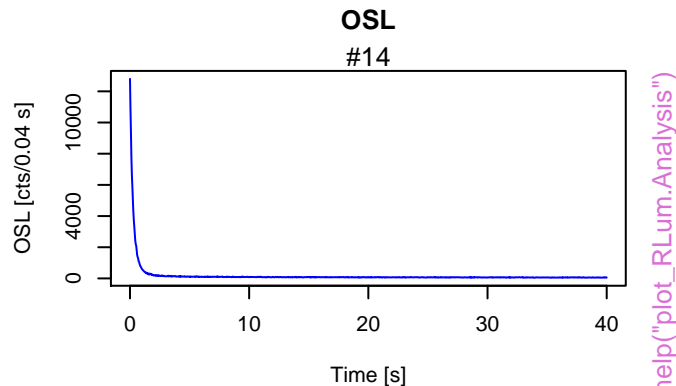
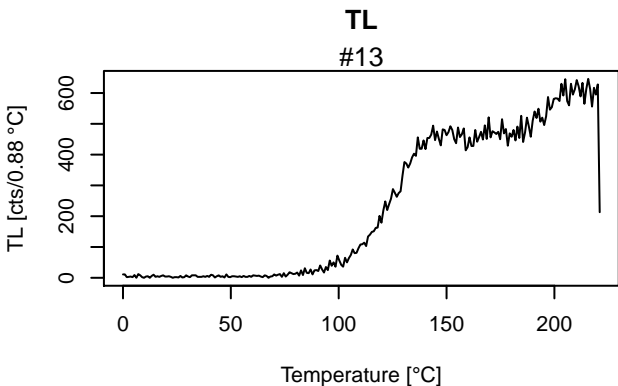
**Aliquot #23****Aliquot #24**

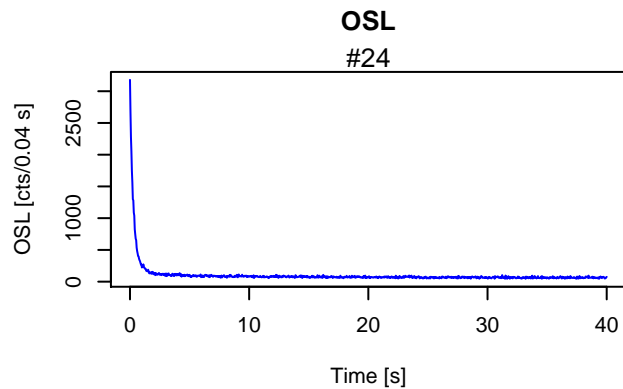
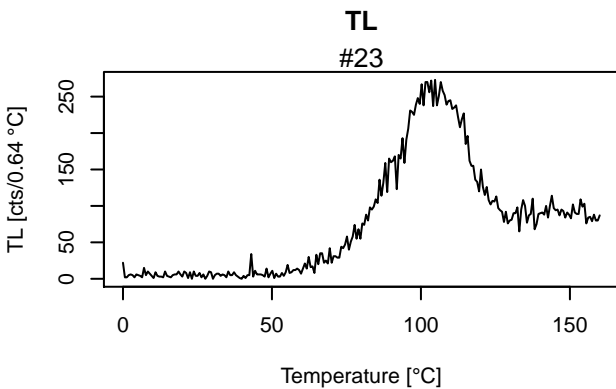
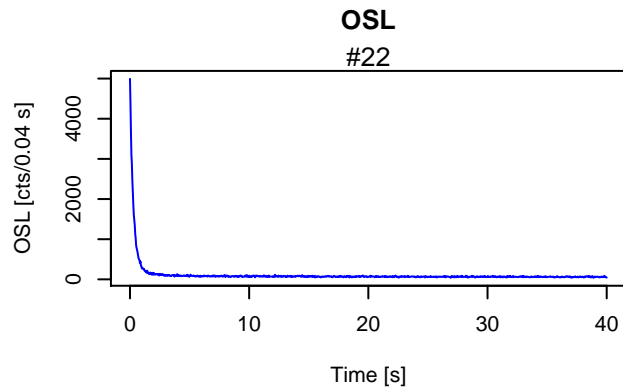
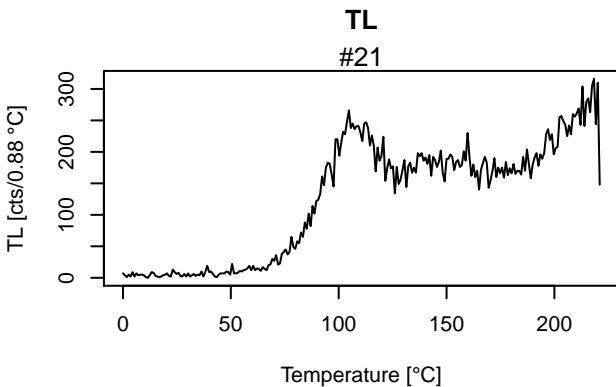
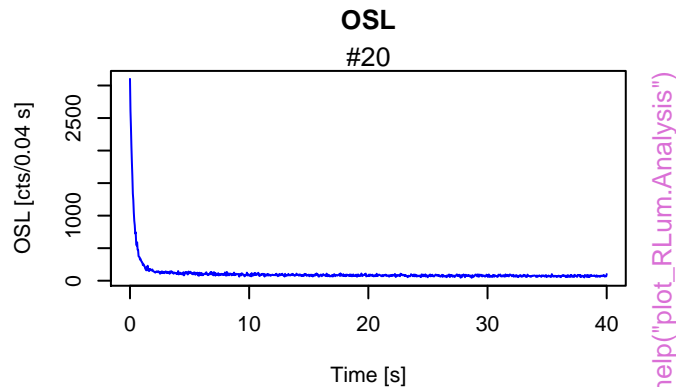
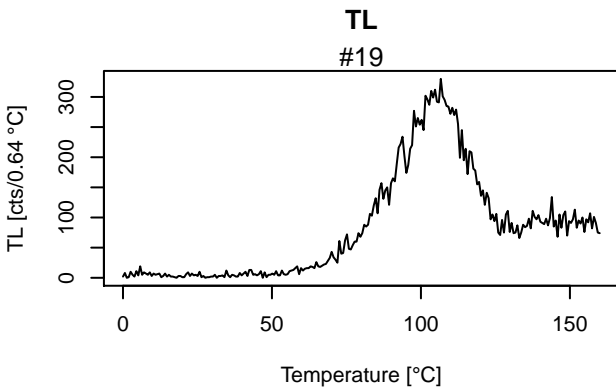


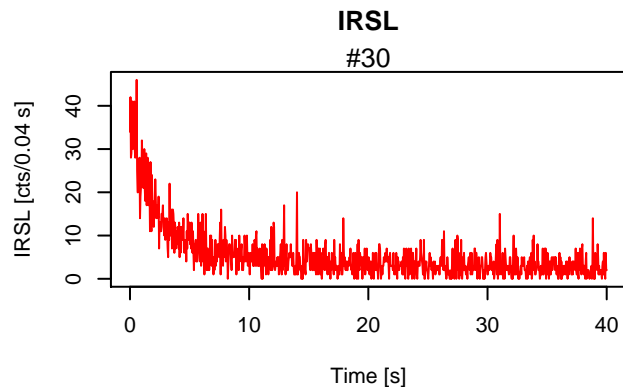
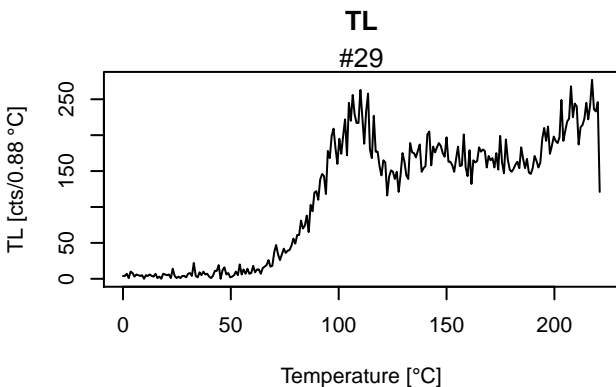
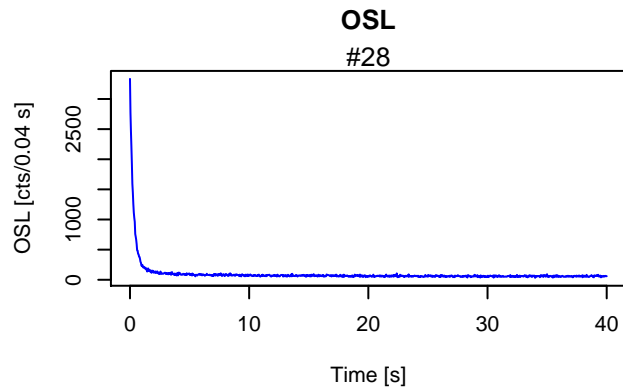
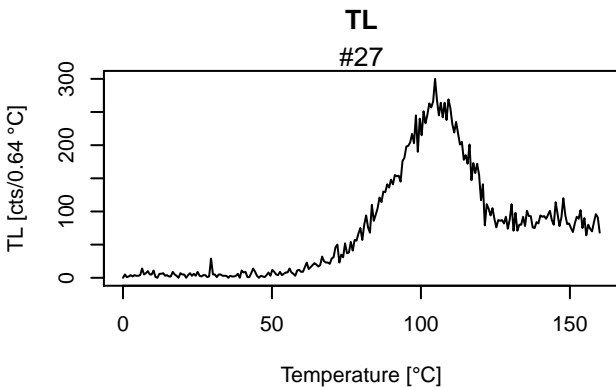
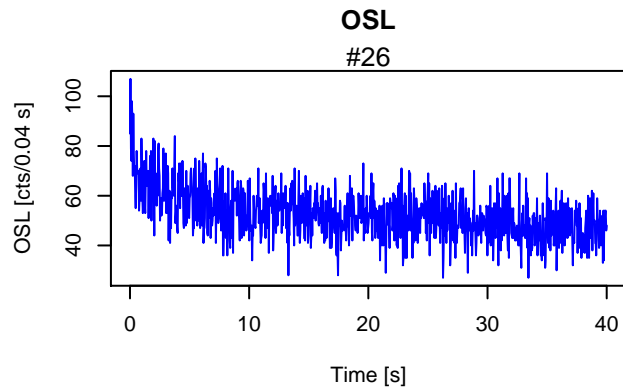
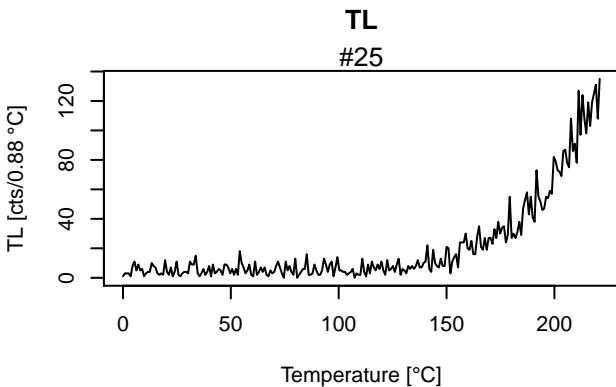


help("plot\_RLumAnalysis")



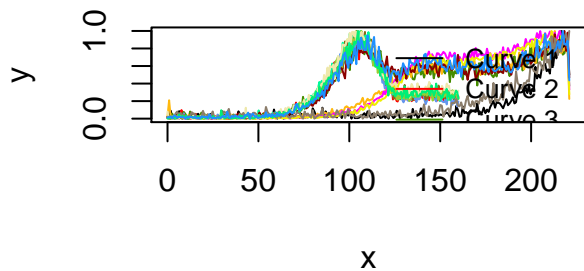






help("plot\_RLumAnalysis")

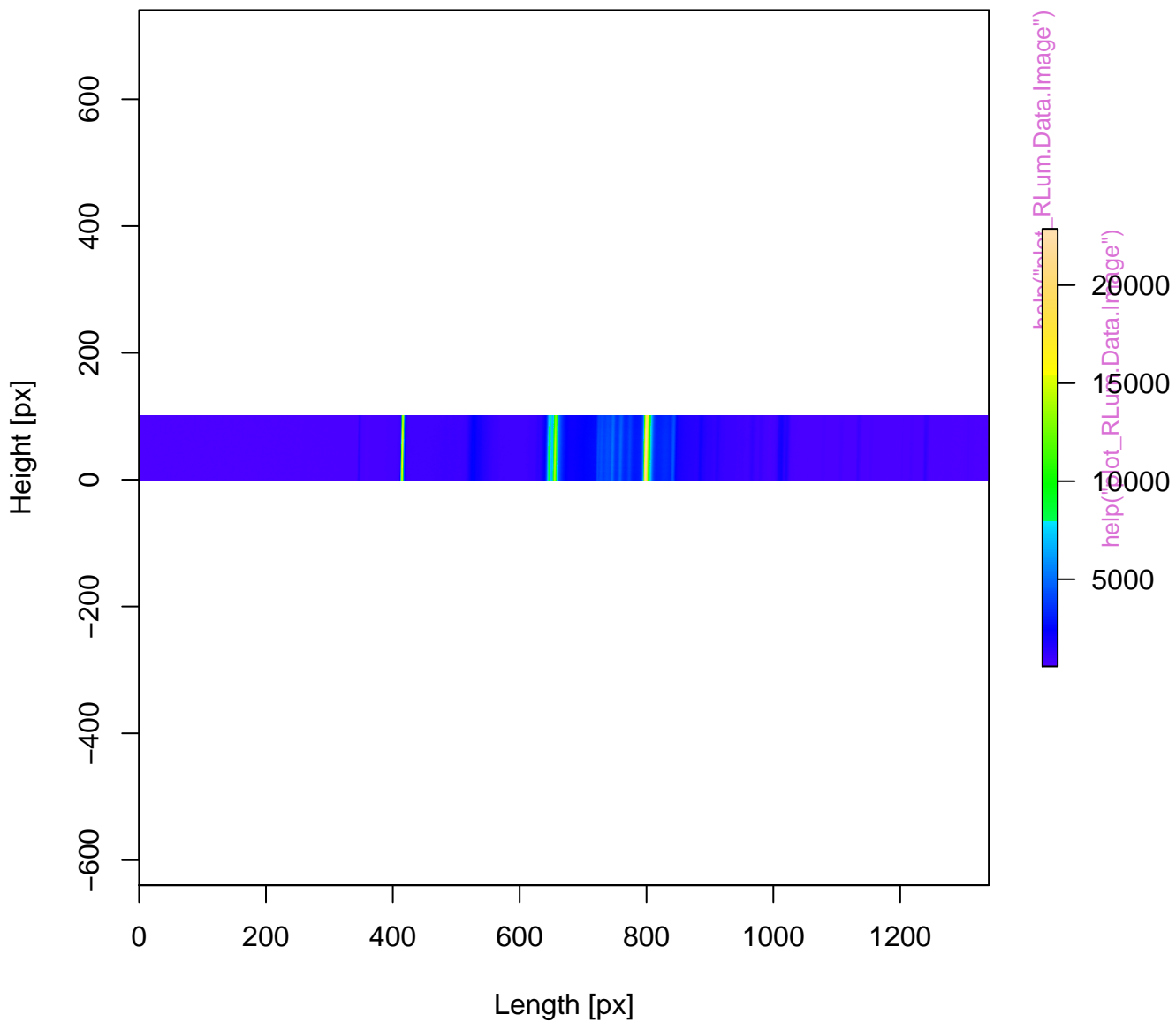
# TL combined



## unkown curve type

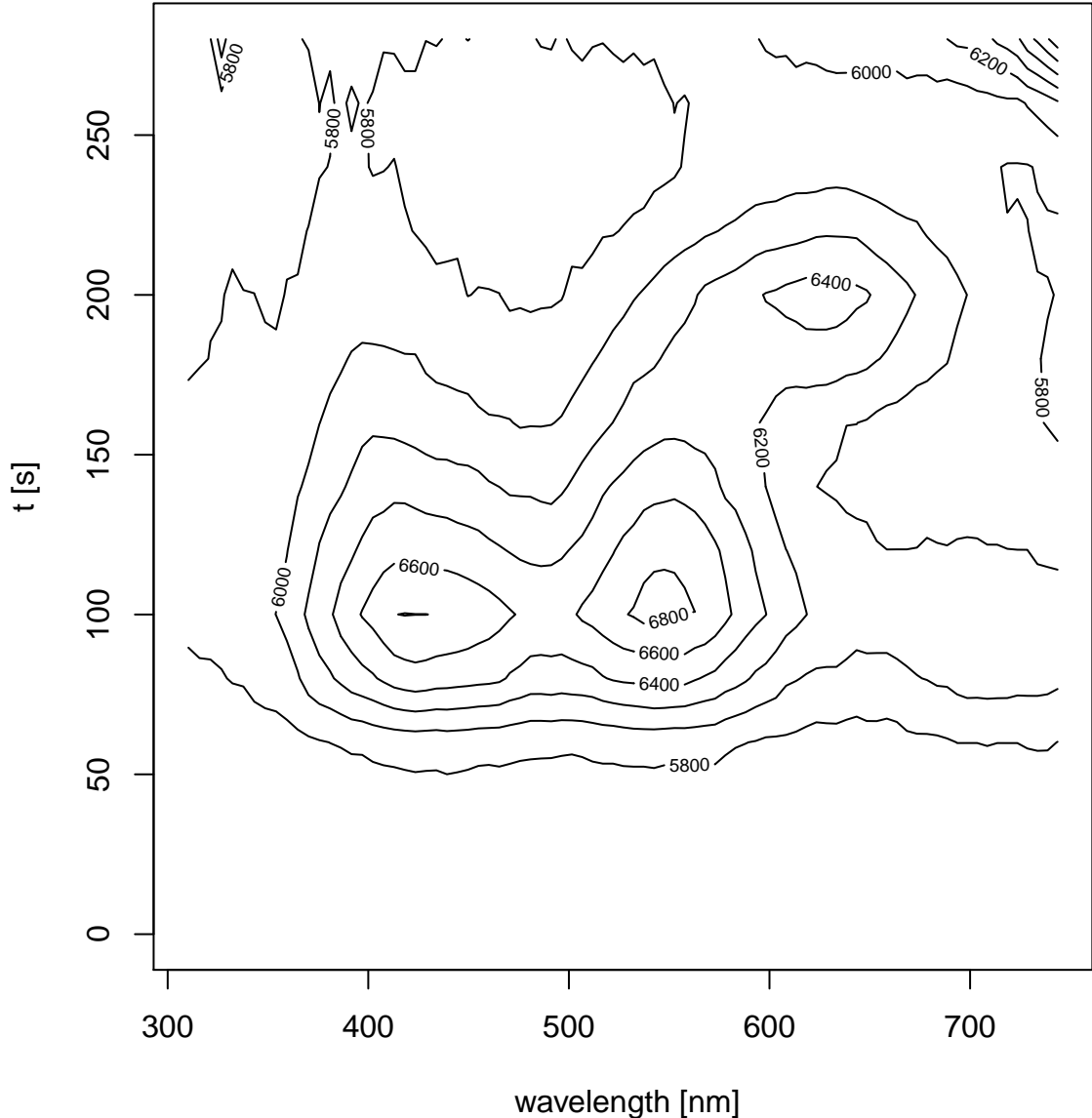


# RLum.Data.Image



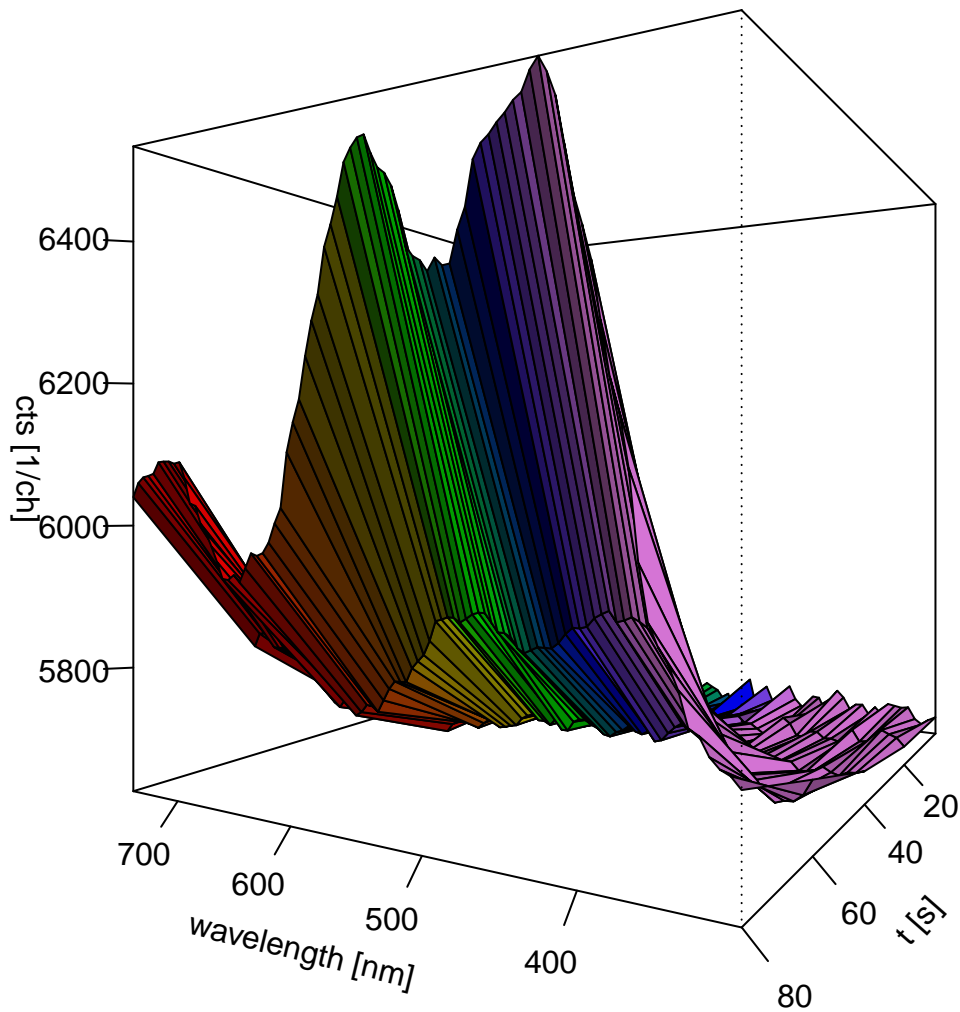


**RLum.Data.Spectrum**



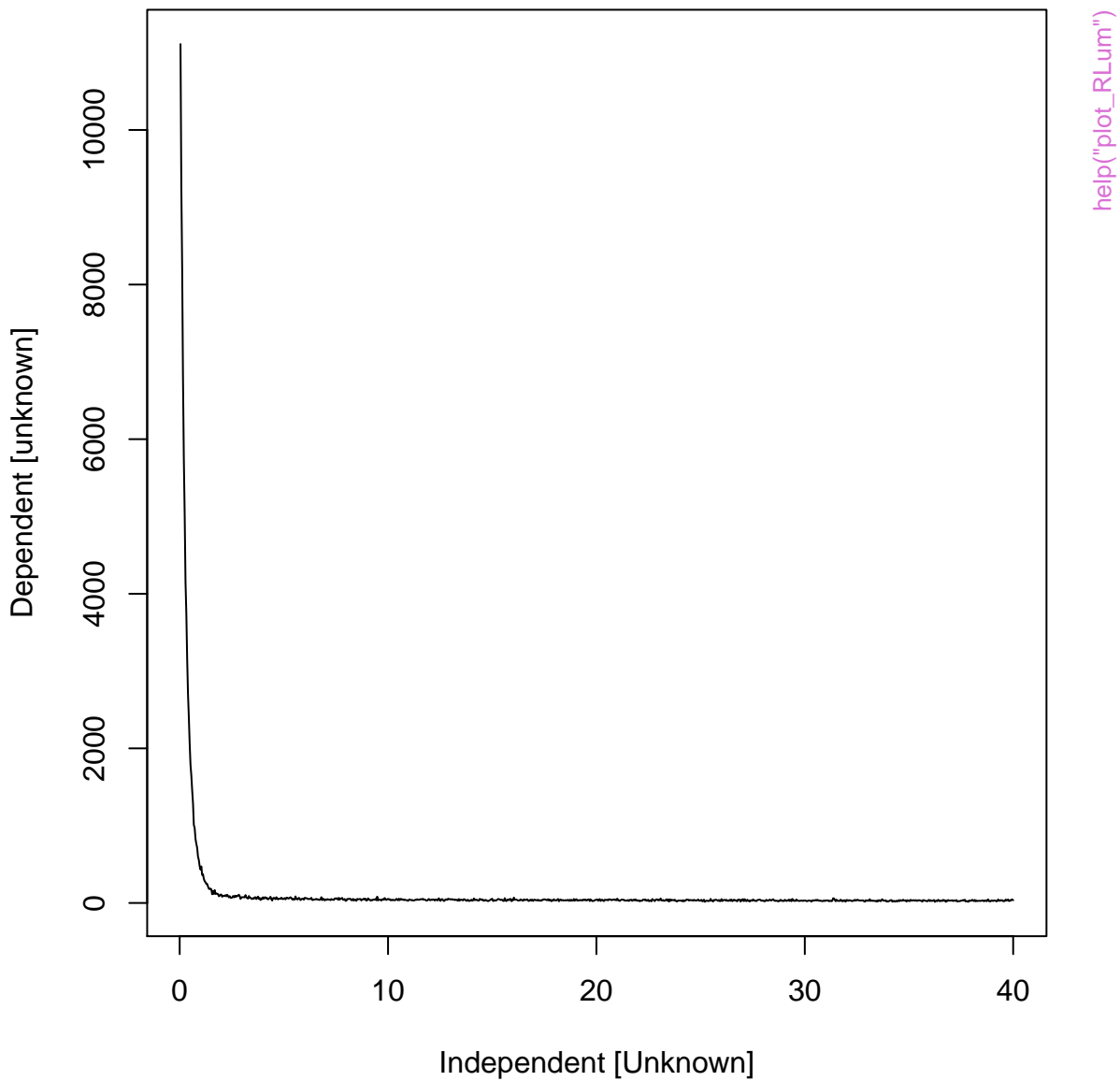
[help\("plot\\_RLum.Data.Spectrum"\)](#)

# RLum.Data.Spectrum

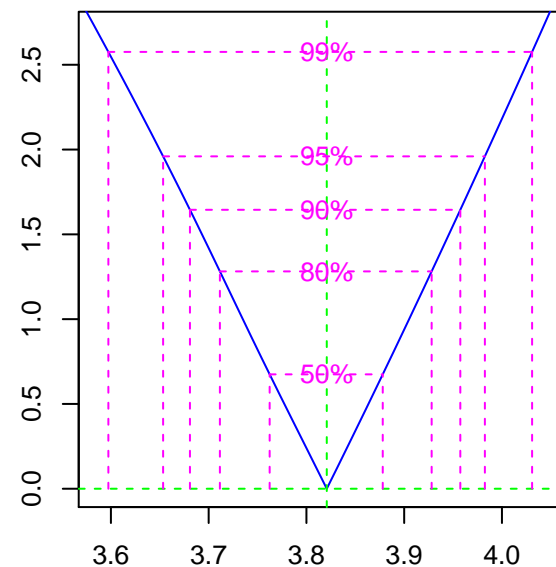


[help\("plot\\_RLum.Data.Spectrum"\)](#)

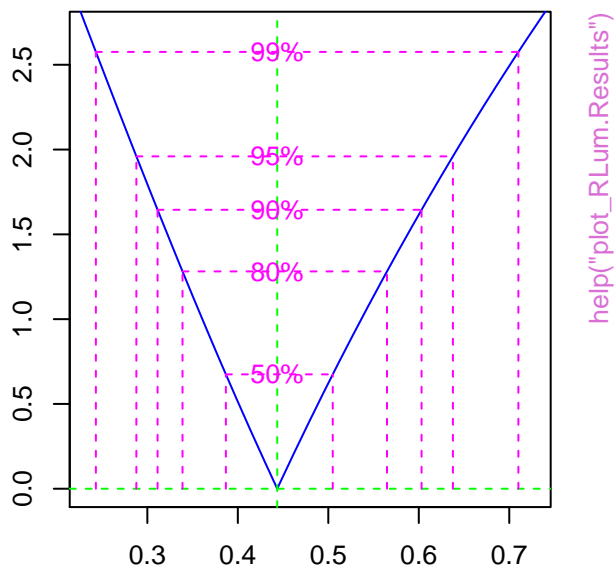
## unkown curve type



**Likelihood profile: gamma**

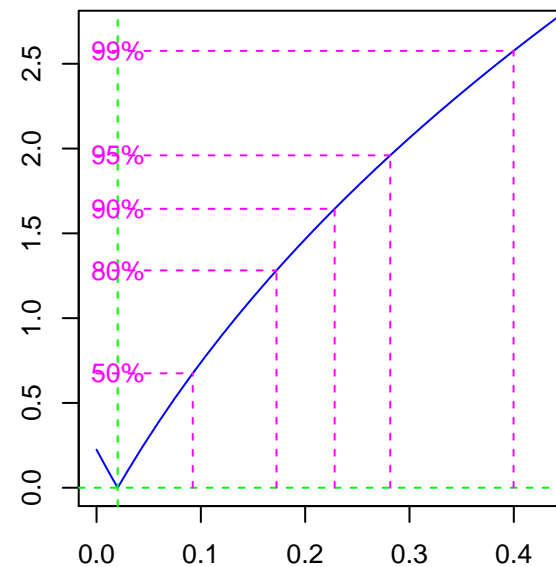


**Likelihood profile: sigma**



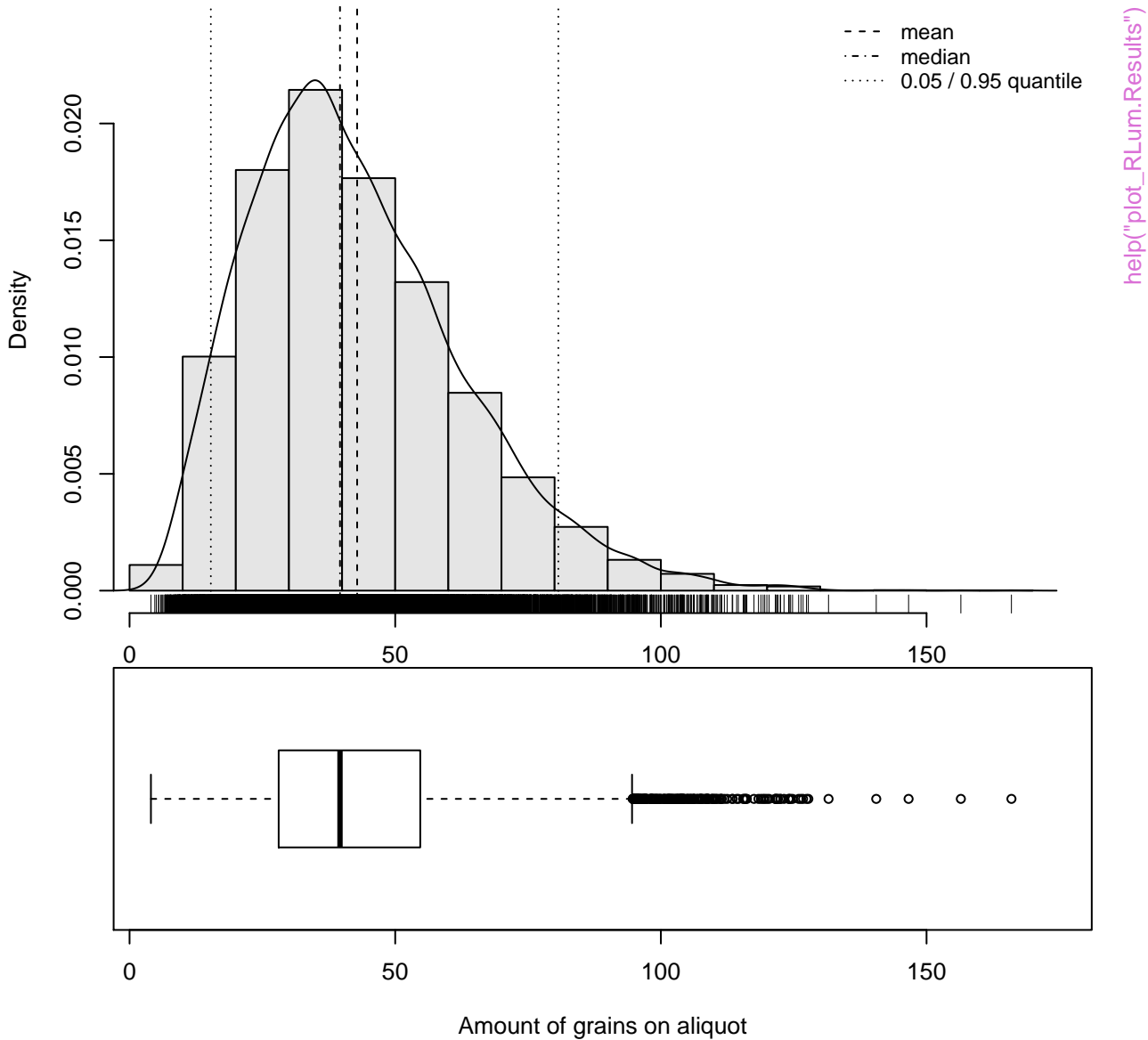
help("plot\_RLum.Results")

**Likelihood profile: p0**



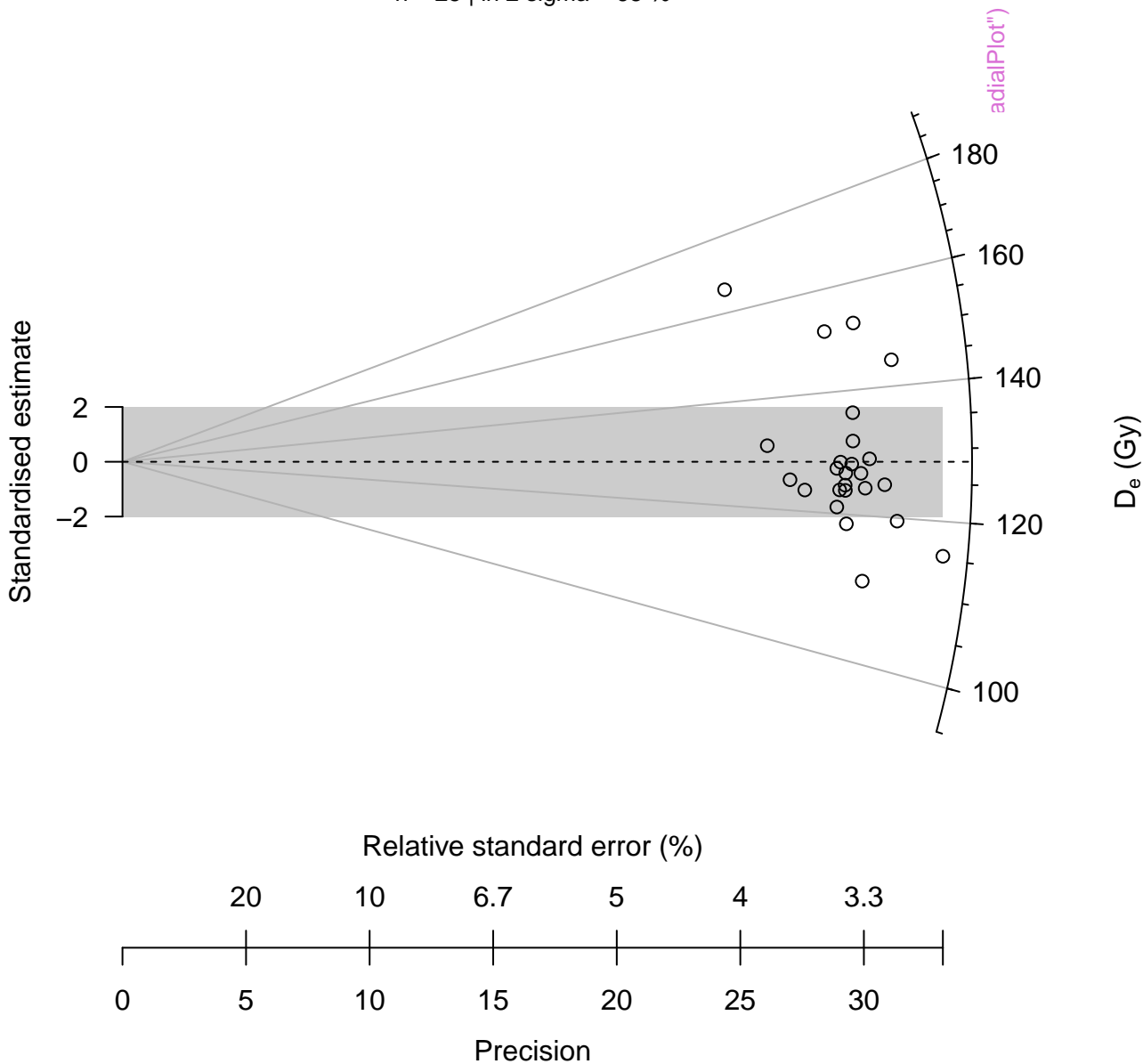
# Monte Carlo Simulation

$n = 10000 \mid \hat{\mu} = 43 \mid \hat{\sigma} = 20 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 0 \mid v = 0.85$



# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %



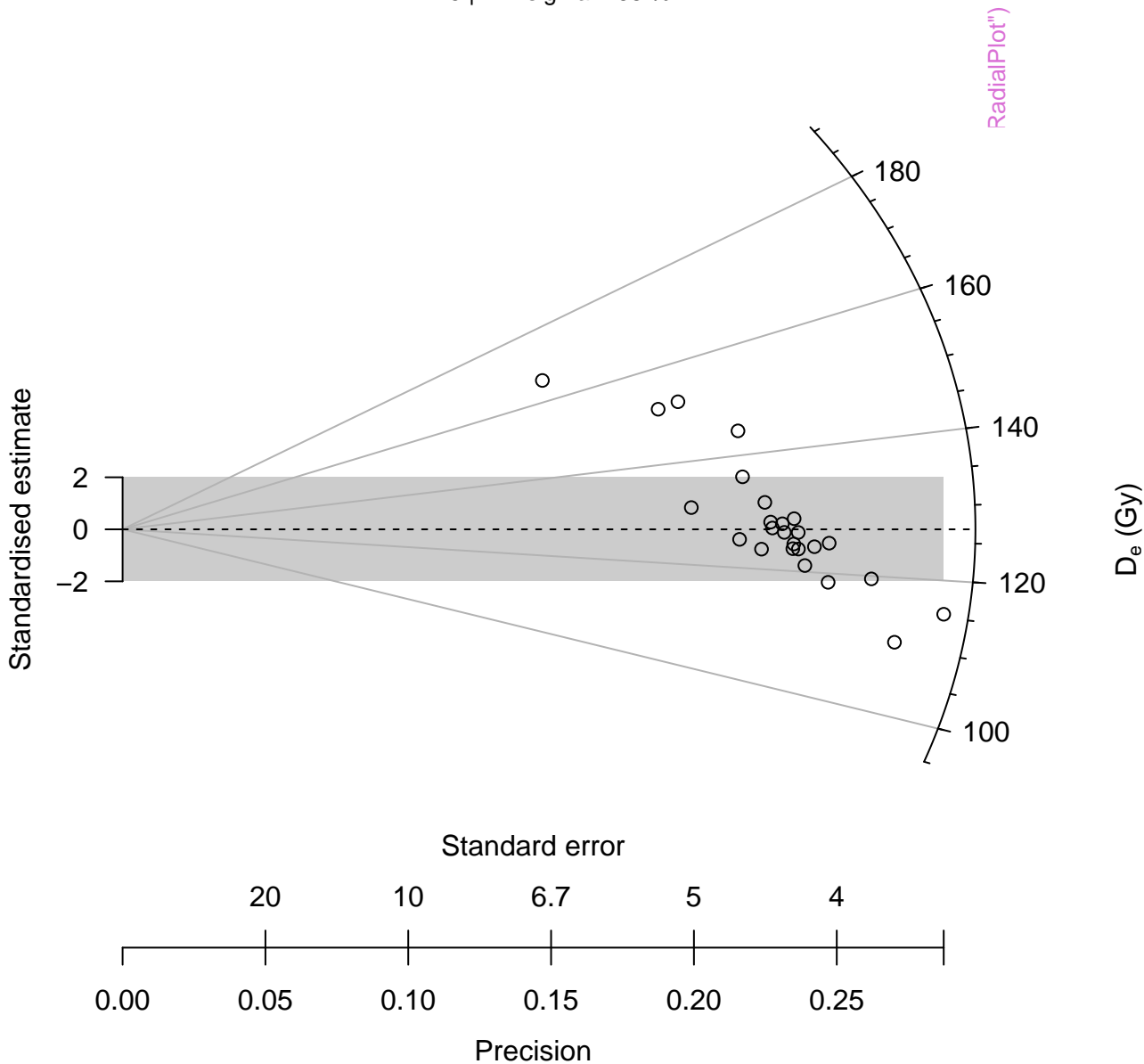
# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %



# D<sub>e</sub> distribution

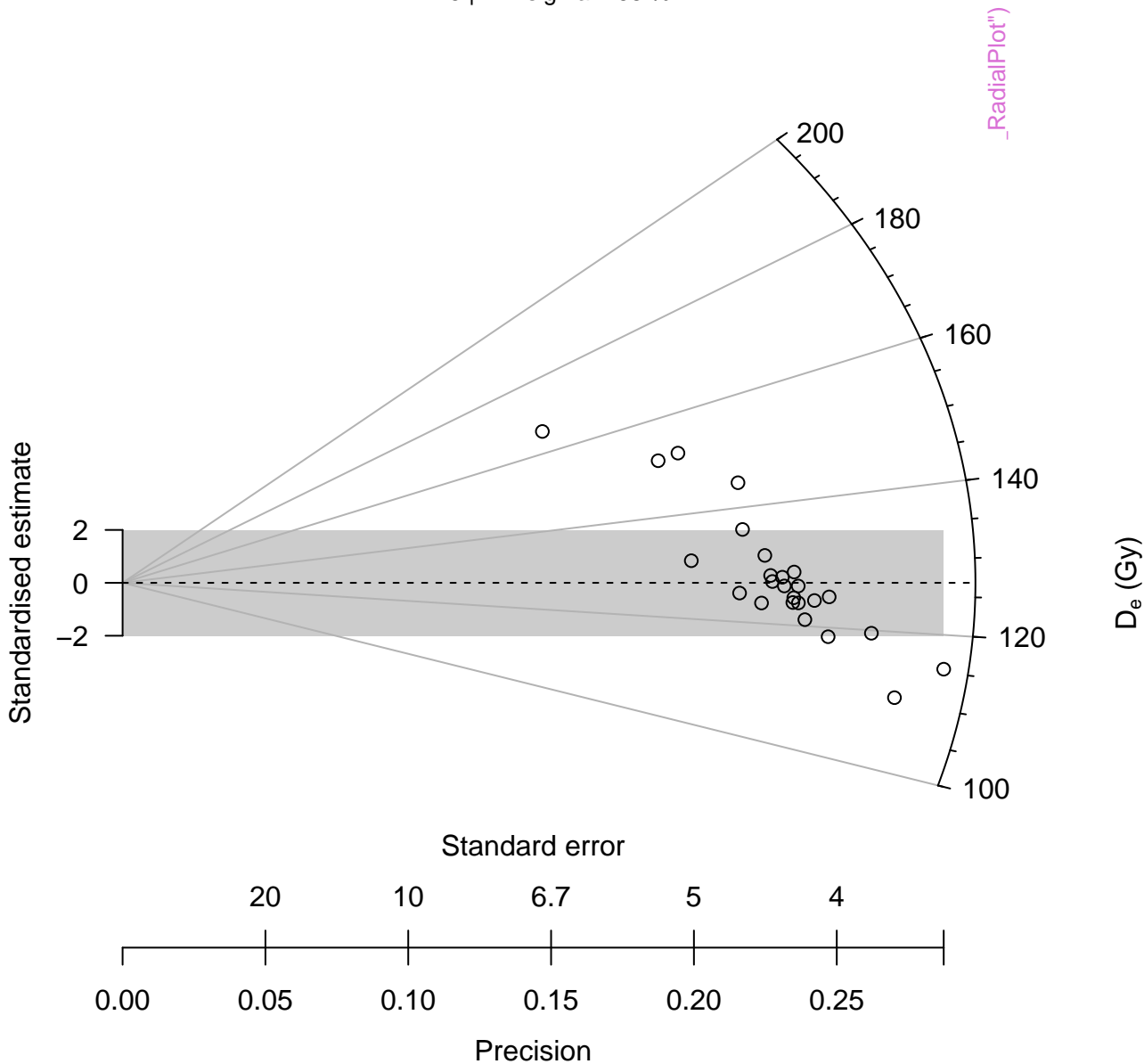
n = 25 | in 2 sigma = 68 %





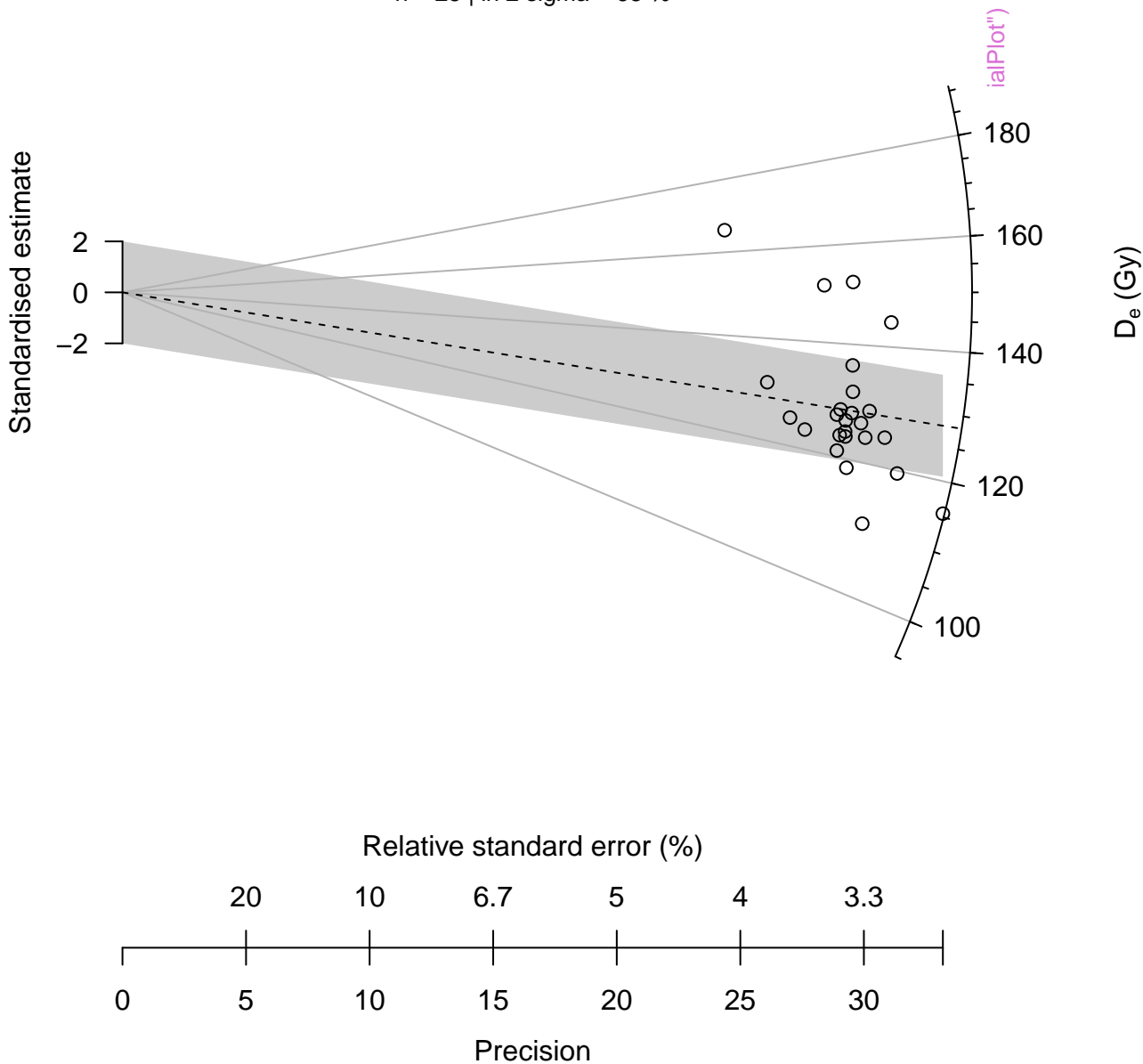
# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %



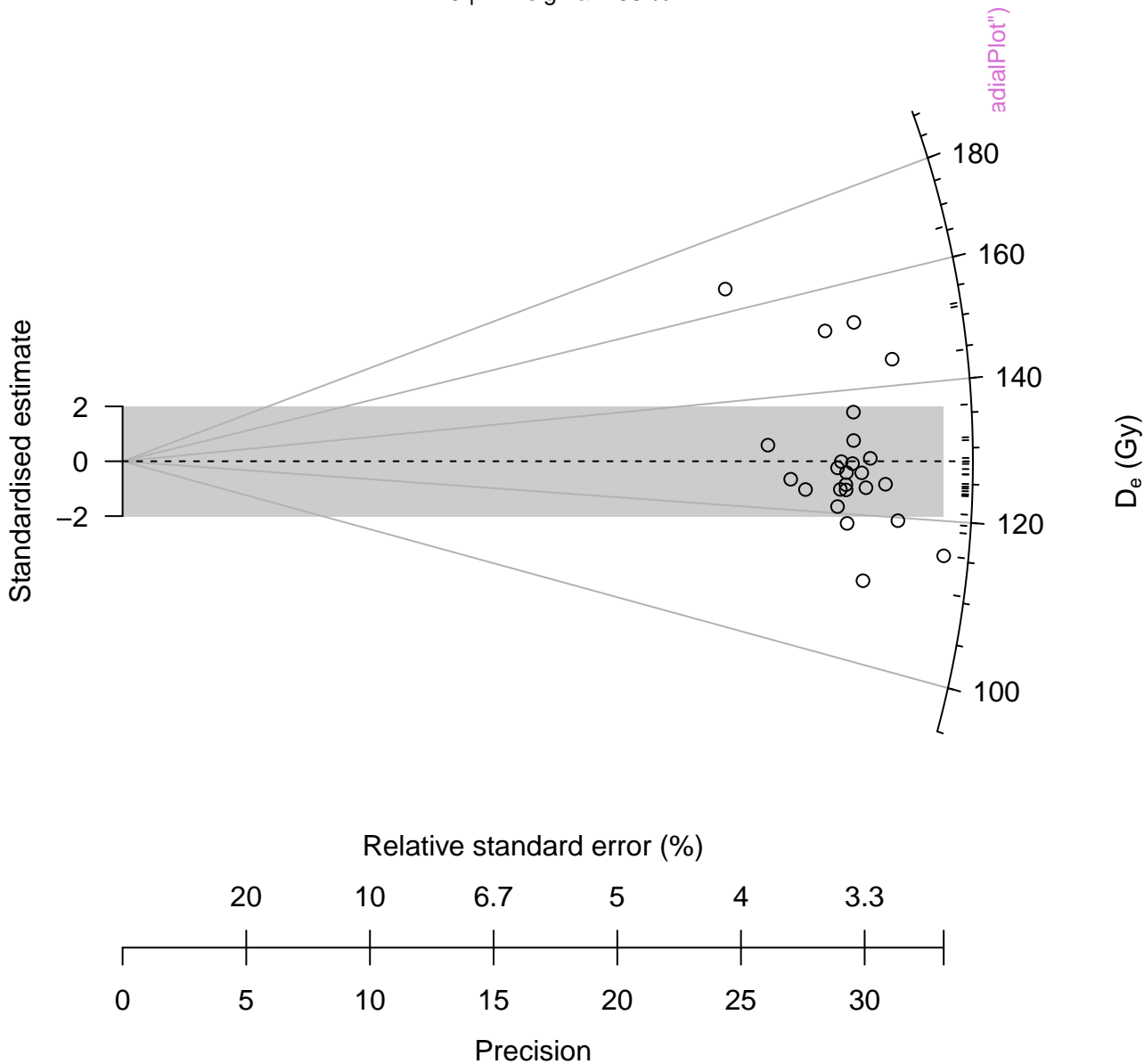
# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %



# D<sub>e</sub> distribution

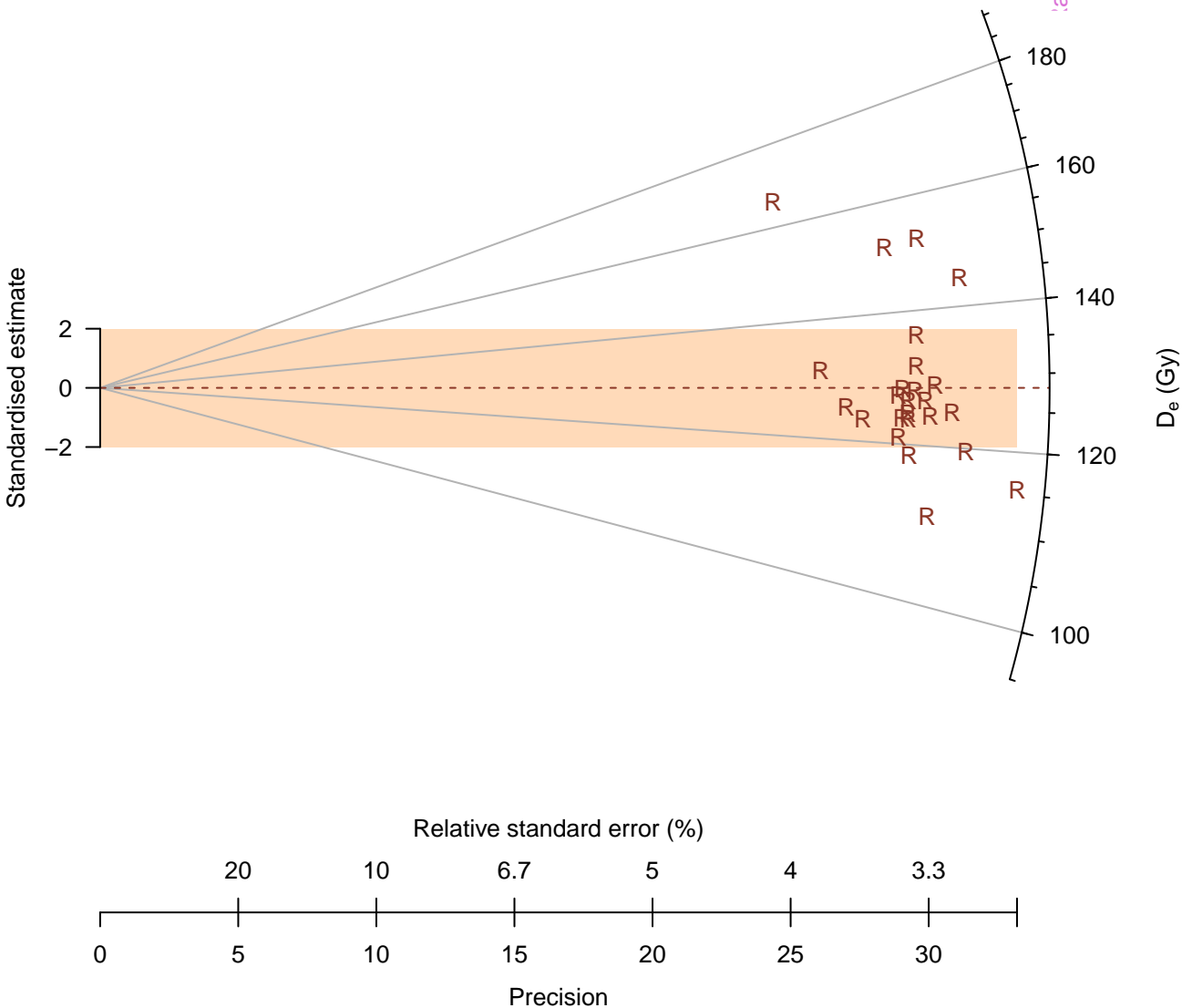
n = 25 | in 2 sigma = 68 %



# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %

radialPlot()



# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %

Standardised estimate

0

0

20

5

10

10

6.7

15

5

20

4

25

3.3

30

Precision

Relative standard error (%)

adialPlot")

D<sub>e</sub> (Gy)

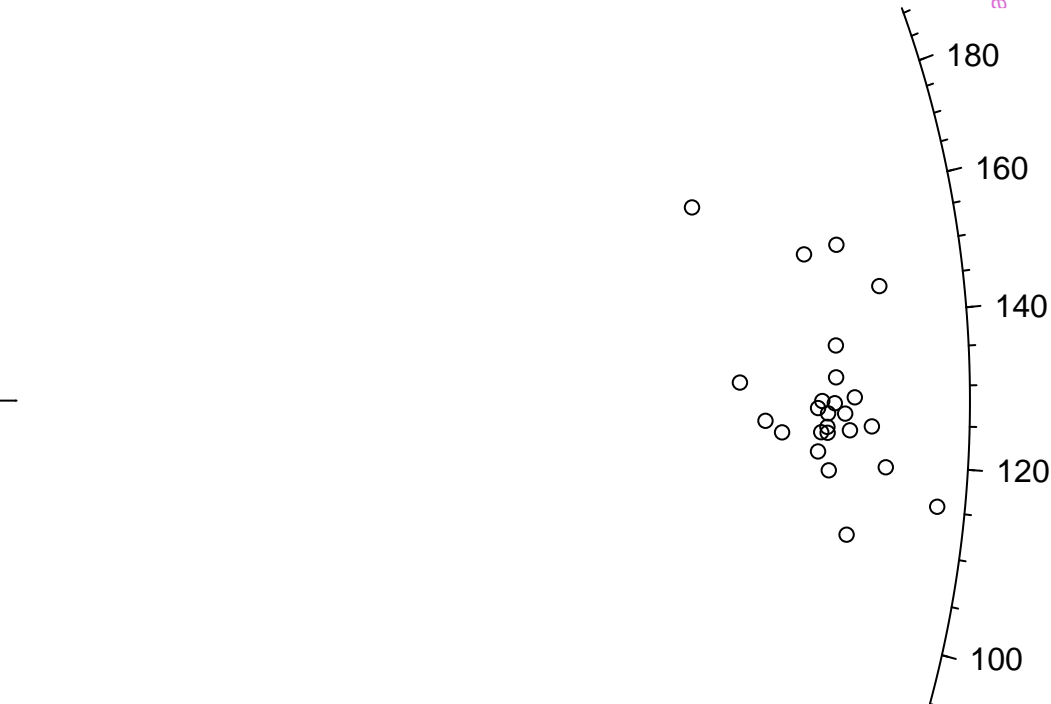
180

160

140

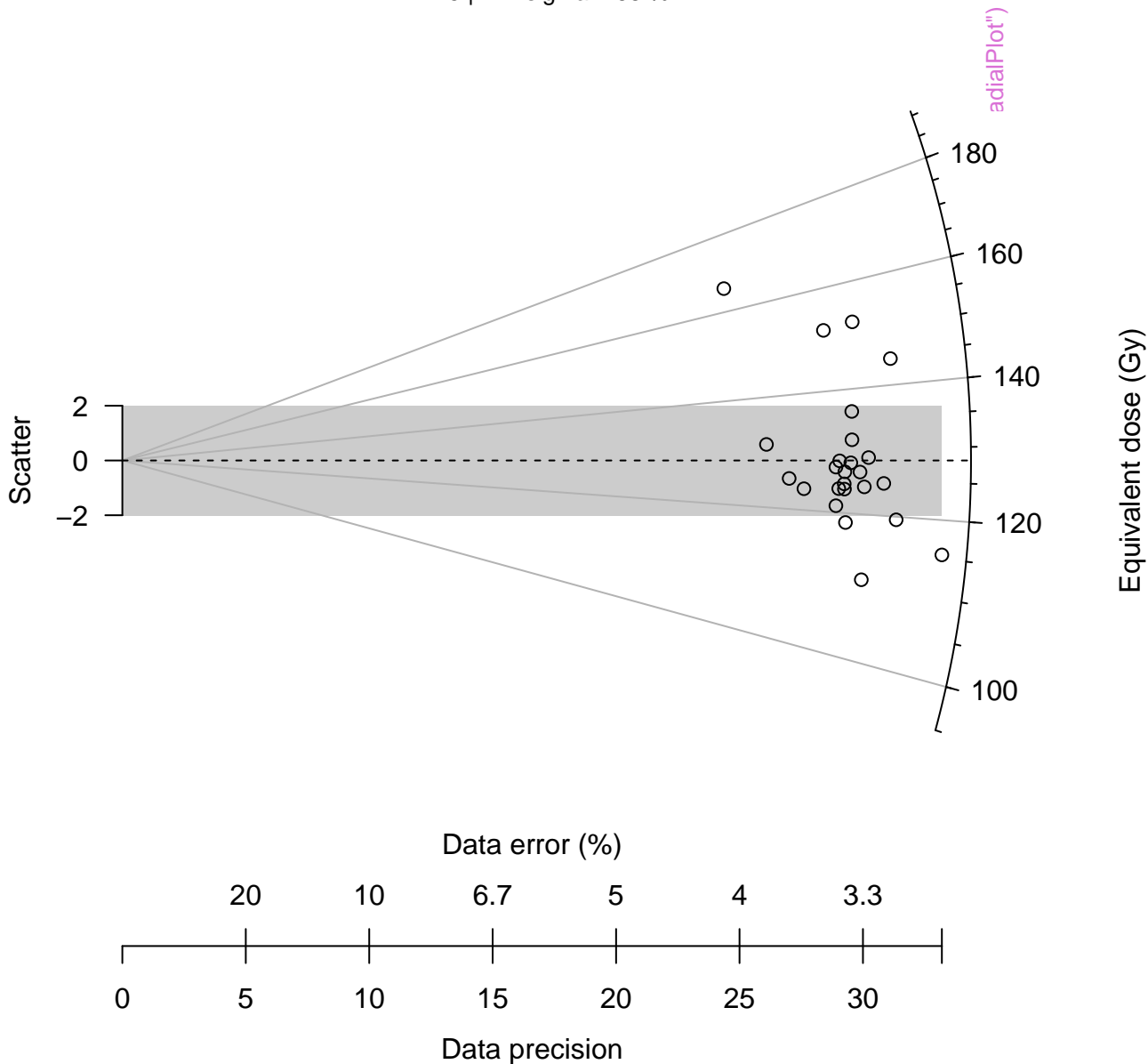
120

100



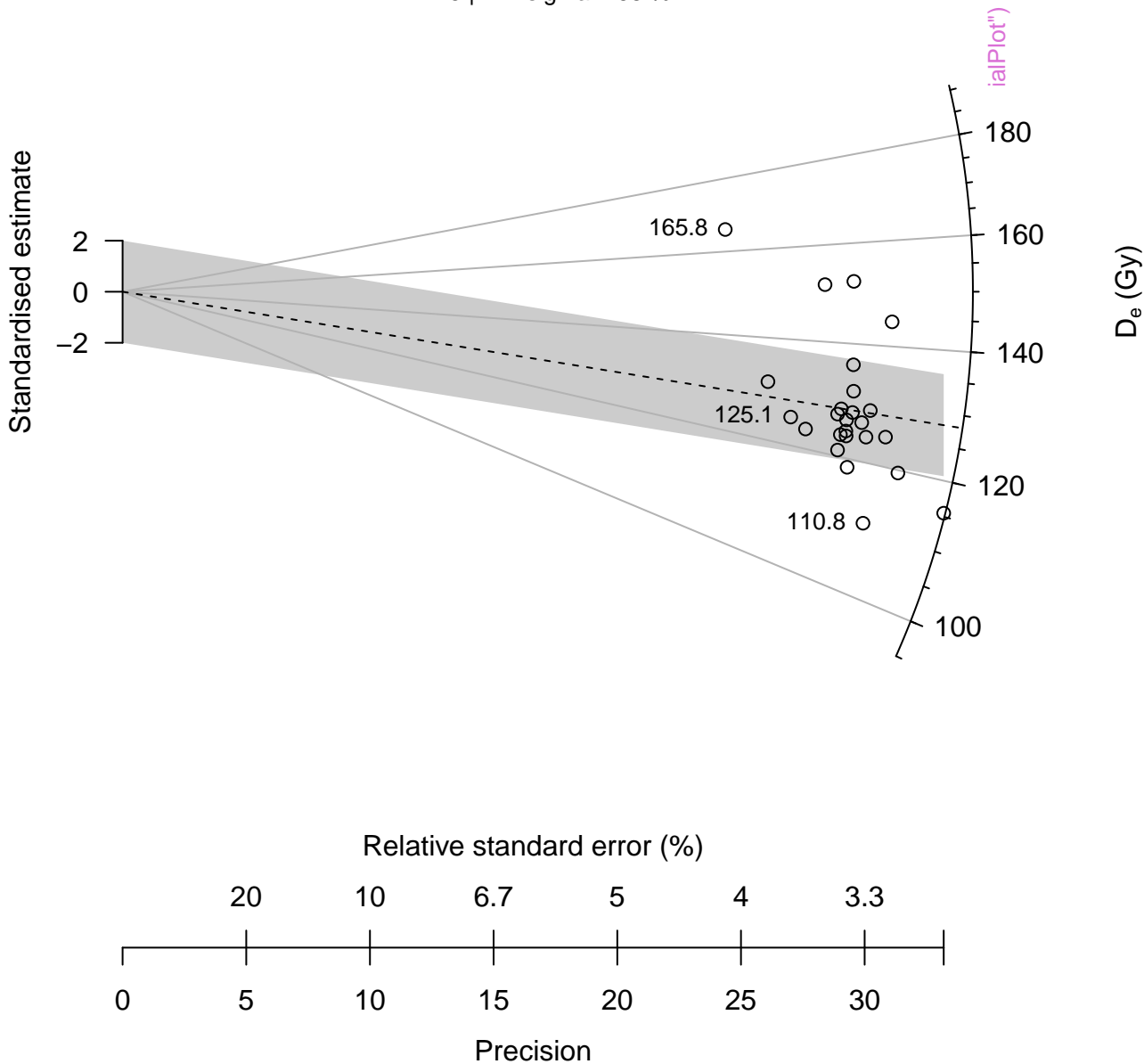
# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %



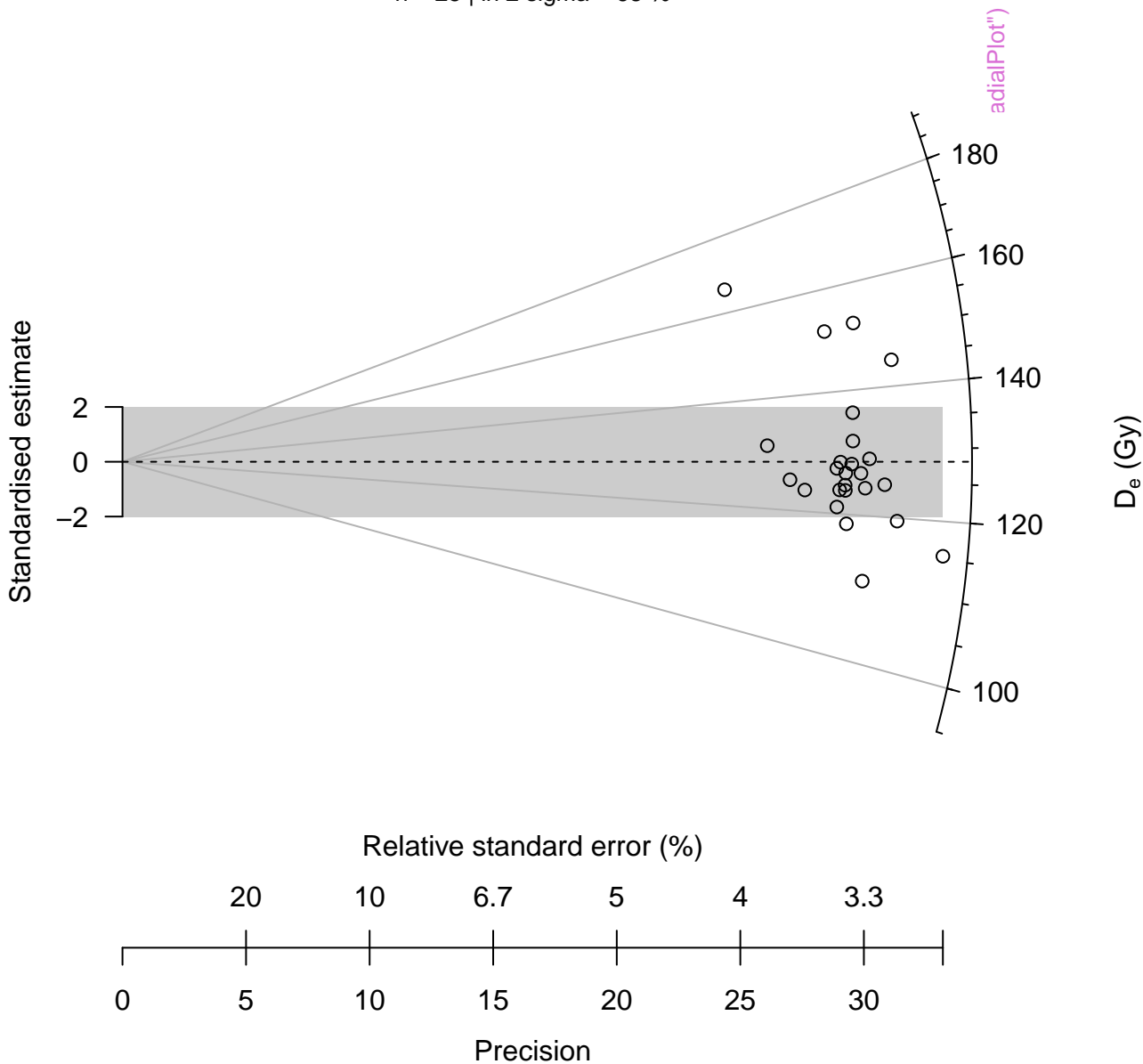
# D<sub>e</sub> distribution

n = 25 | in 2 sigma = 68 %



# D<sub>e</sub> distribution

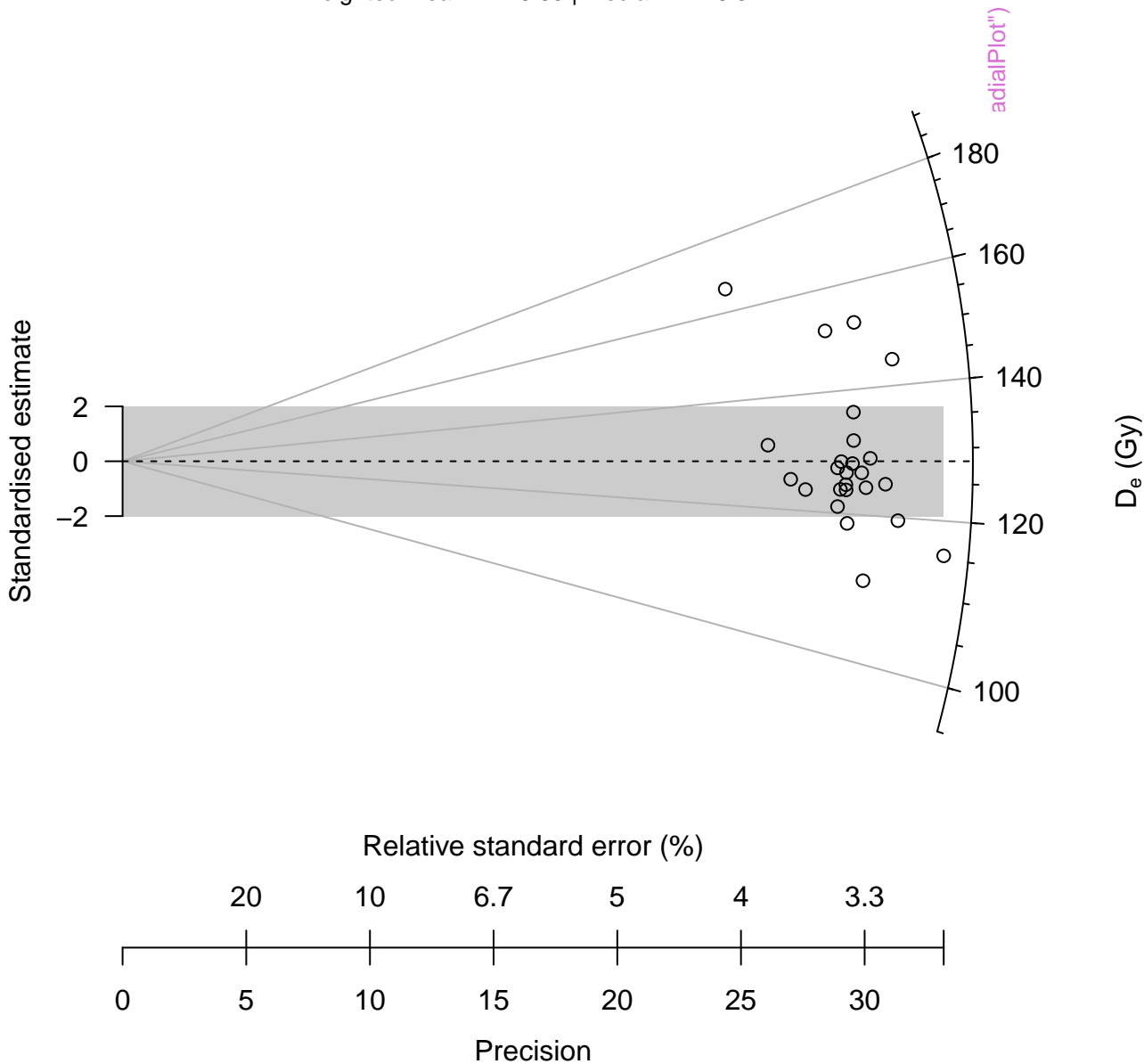
n = 25 | in 2 sigma = 68 %





# D<sub>e</sub> distribution

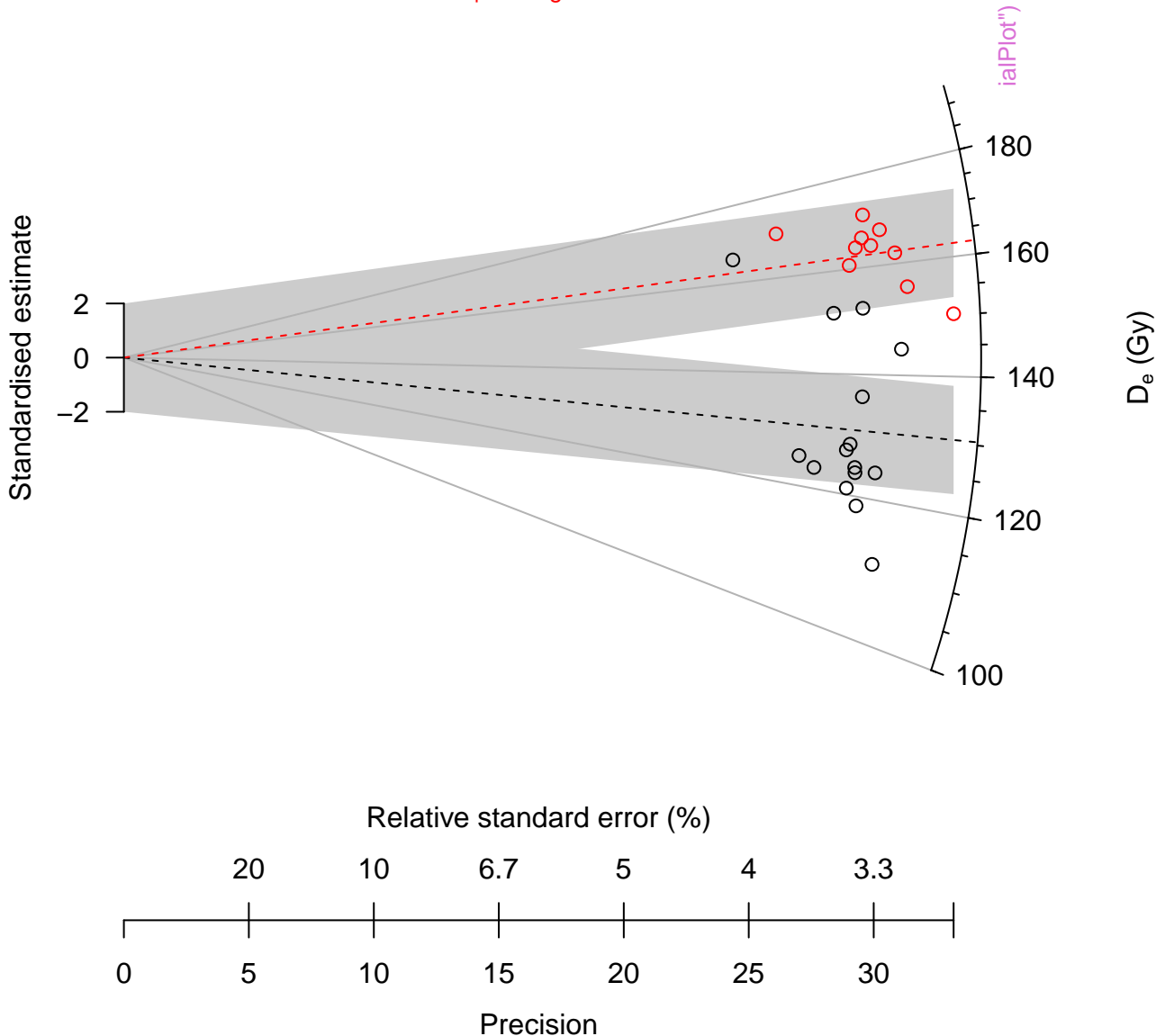
weighted mean = 126.85 | median = 126.34



# D<sub>e</sub> distribution

n = 15 | in 2 sigma = 53.3 %

n = 10 | in 2 sigma = 90 %



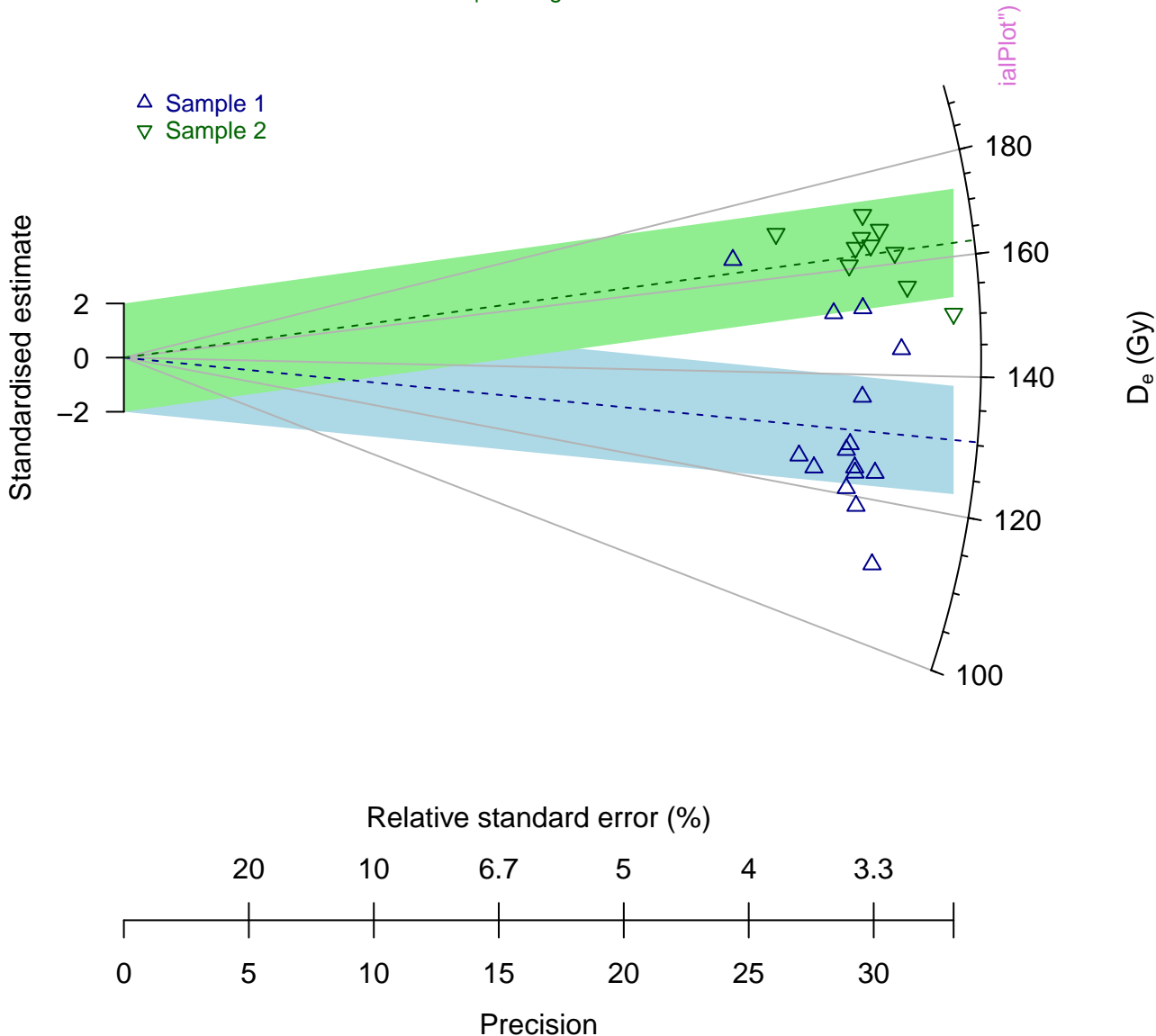
# D<sub>e</sub> distribution

n = 15 | in 2 sigma = 53.3 %

n = 10 | in 2 sigma = 90 %

△ Sample 1

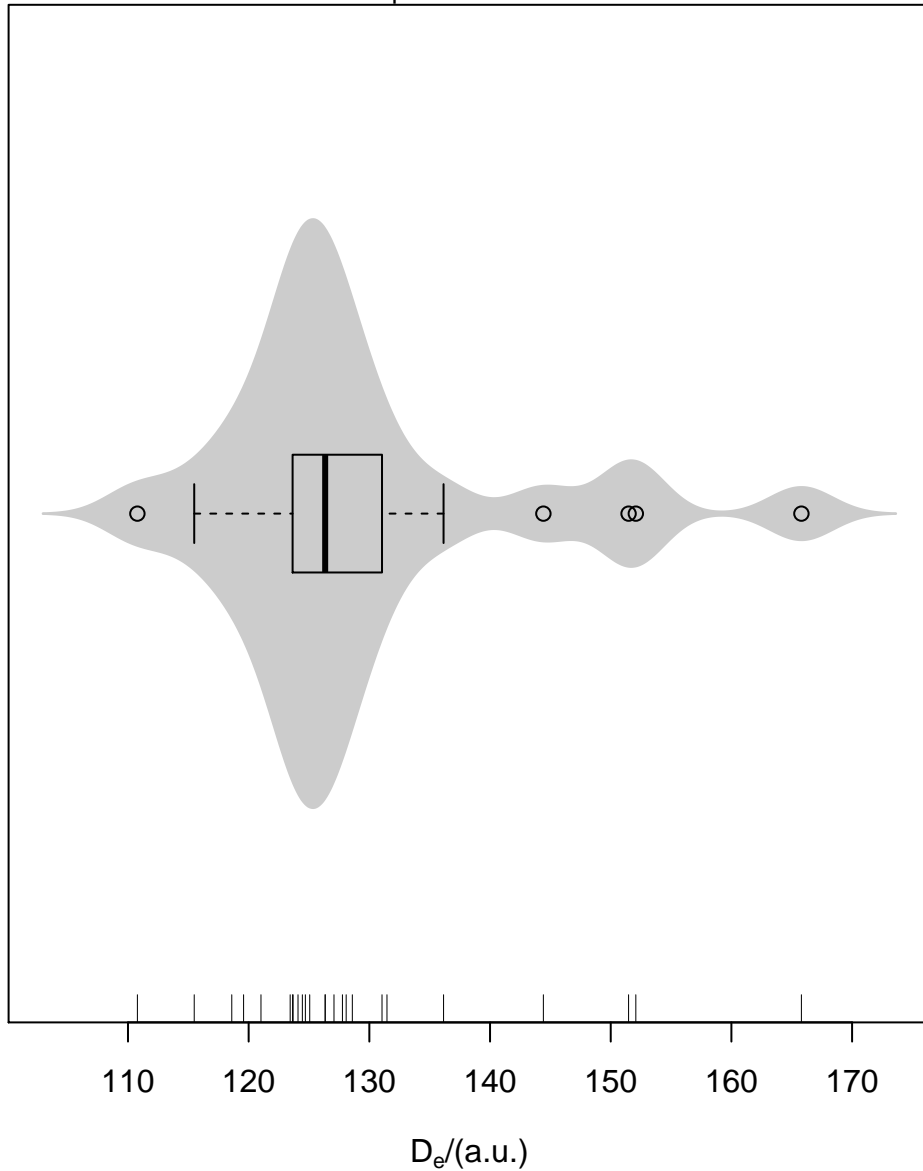
▽ Sample 2



# Violin Plot

n = 25 | median = 126.34

Density



[help\("plot\\_ViolinPlot"\)](#)