

L_n, L_x curves

ALQ Pos. 1

T_n, T_x curves



Cutheat – TL curves



IRSLT

IRSL/BOSL = 0.88%



IRSL curve (10 s)



help("Analyse_SAR_OSLdata")

unkown measurement





Fig. 4 – Bos & Wallinga (2012)





`help("CW2pLM")`



Fig. 4 – Bos & Wallinga (2012)





Fig. 4 – Bos & Wallinga (2012)





Histogram



Histogram



No L_x curves detected

No T_x curves detected

help("ExampleData.Fading")

Signal Fading



Density: g-values (%/decade)



Growth curve

$D_e = 977.38 \pm 105.65$ | fit: EXP



D_e from MC simulation

$D_{eMC} = 984.66 \pm 105.65$ | quality = 99.3 %



Test dose response



Dose [s]

NA

n = 100, valid fits = 100



`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")

USER

Record: 1



IRSL

Record: 1



help("ExampleData.portableOSL")

Record: 1



Record: 1



USER

Record: 2



IRSL

Record: 2

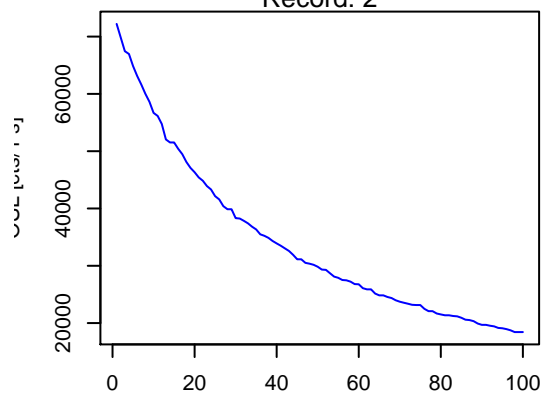


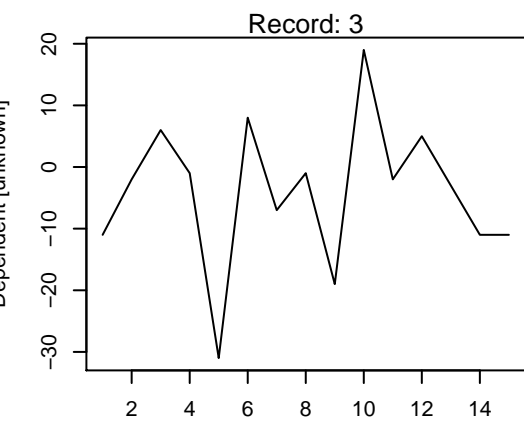
help("ExampleData.portableOSL")

Record: 2



Record: 2





USER

Record: 4



IRSL

Record: 4



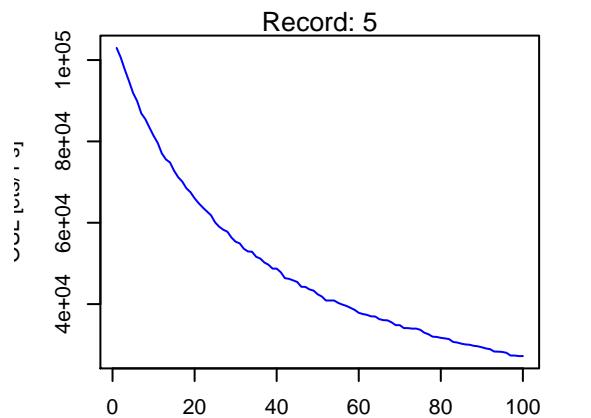
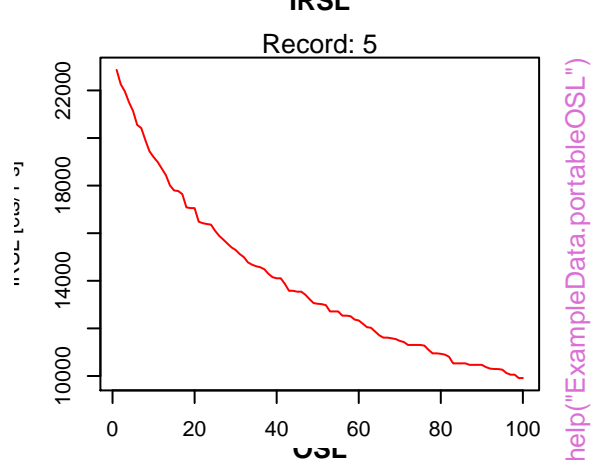
help("ExampleData.portableOSL")

Record: 4



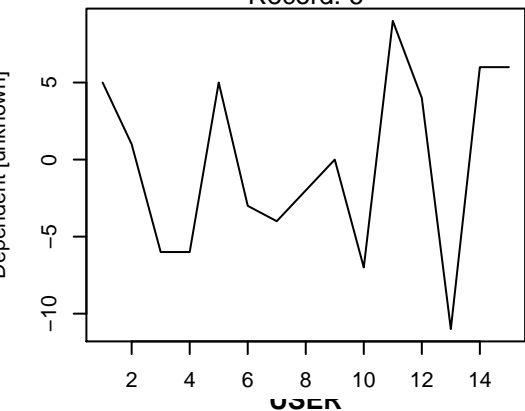
Record: 4





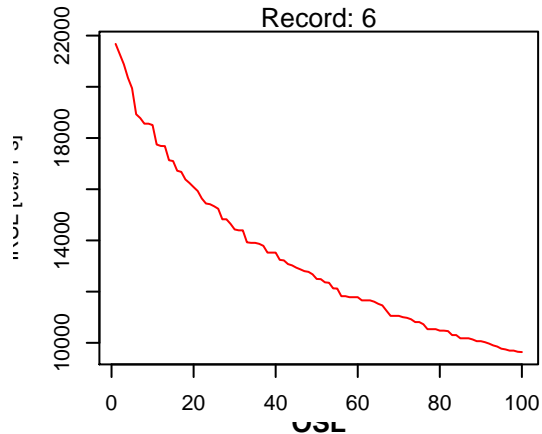
USER

Record: 6



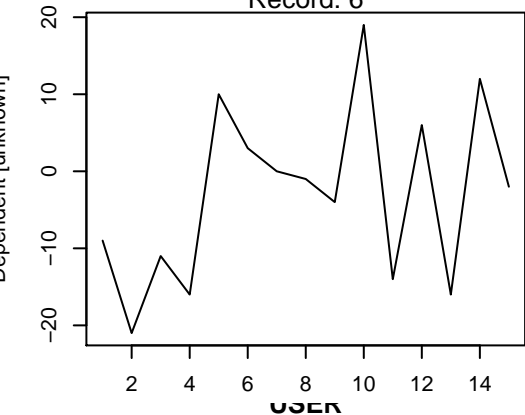
IRSL

Record: 6

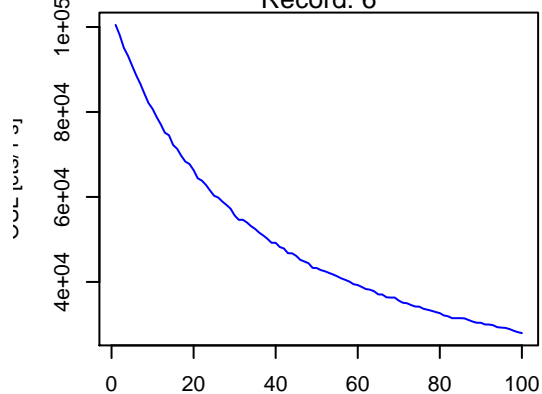


help("ExampleData.portableOSL")

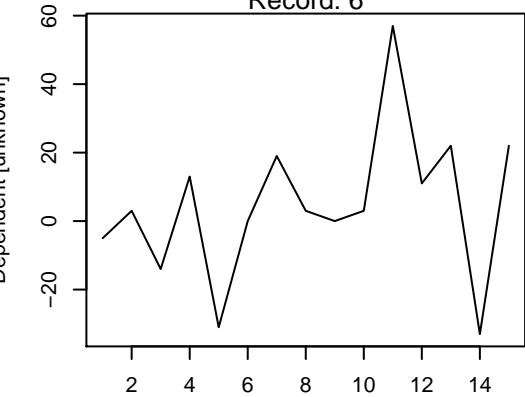
Record: 6



Record: 6



Record: 6



USER

Record: 7



IRSL

Record: 7



help("ExampleData.portableOSL")

Record: 7



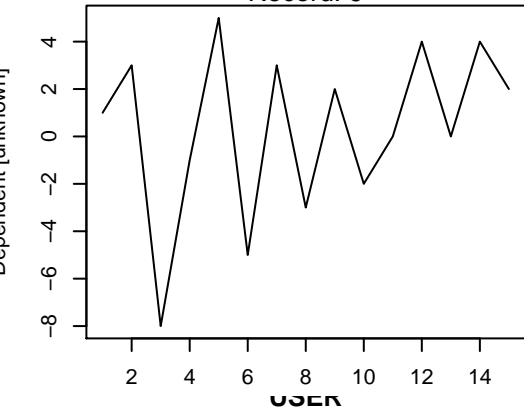
Record: 7





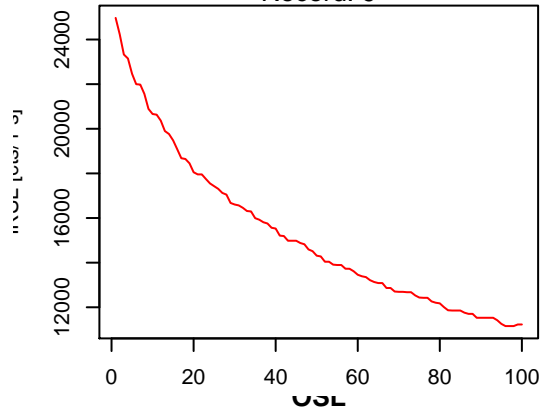
USER

Record: 9



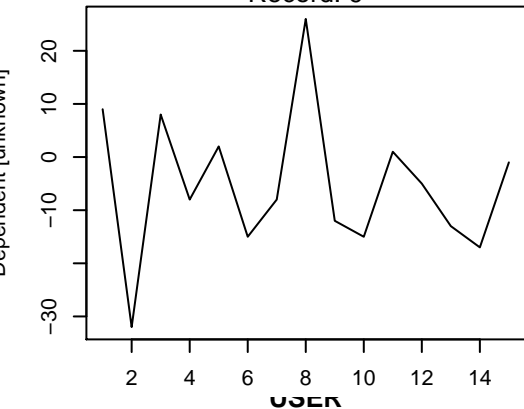
IRSL

Record: 9

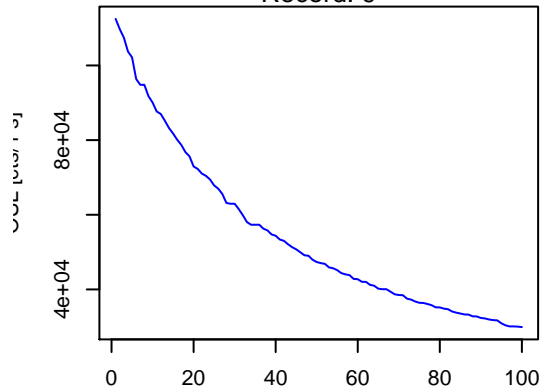


help("ExampleData.portableOSL")

Record: 9



Record: 9







USER

Record: 12



IRSL

Record: 12



help("ExampleData.portableOSL")

Record: 12



Record: 12



USER

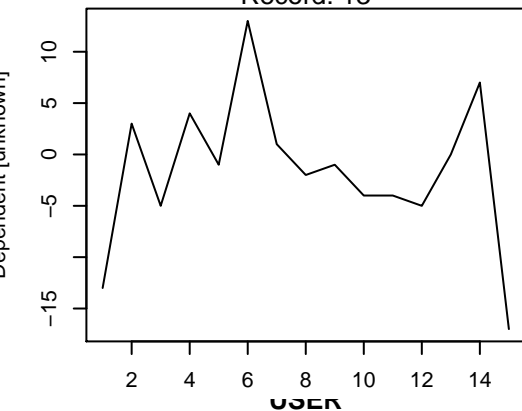
Record: 13



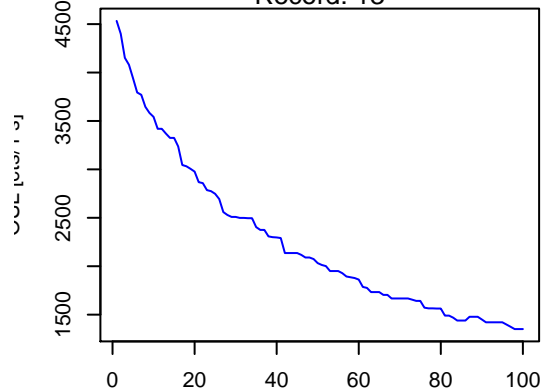
Record: 13



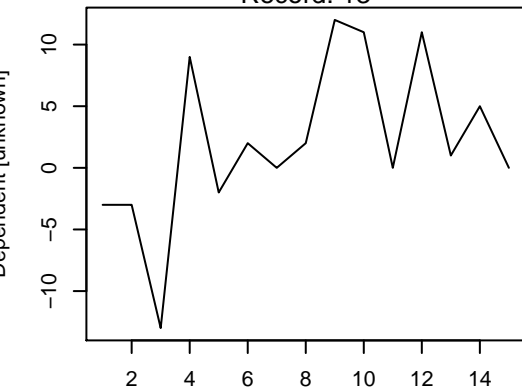
Record: 13



Record: 13



Record: 13



help("ExampleData.portableOSL")

USER

Record: 14



IRSL

Record: 14



help("ExampleData.portableOSL")

Record: 14



Record: 14



USER

Record: 1



IRSL

Record: 1



help("PSL2Riseo.BinfileData")

Record: 1



Record: 1



USER

Record: 2



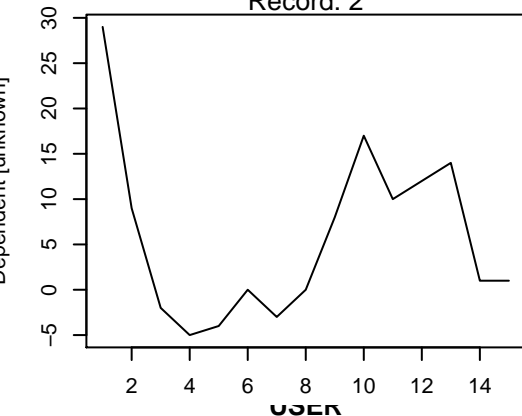
IRSL

Record: 2

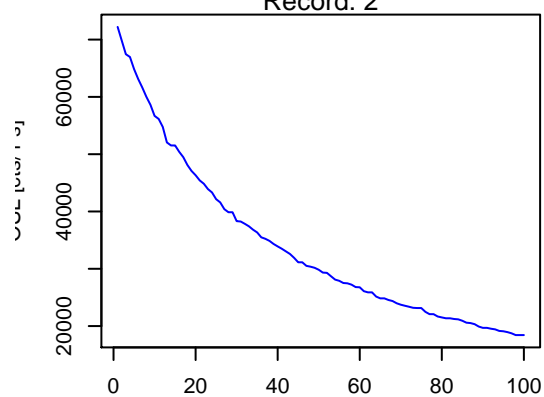


help("PSL2Riseo.BinfileData")

Record: 2



Record: 2





USER

Record: 4



Record: 4

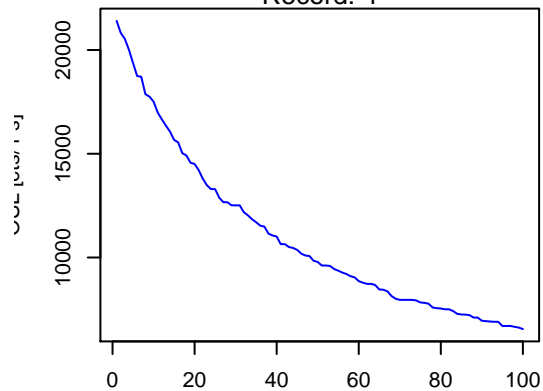


help("PSL2Risee.BINfileData")

Record: 4

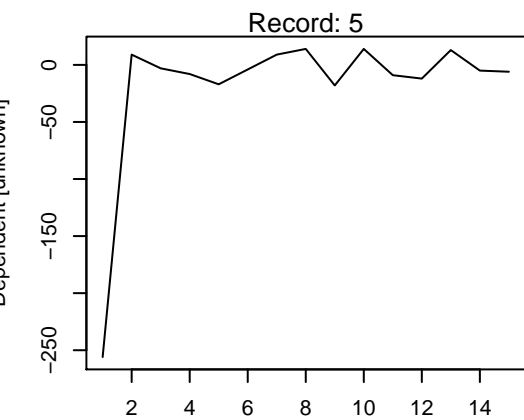
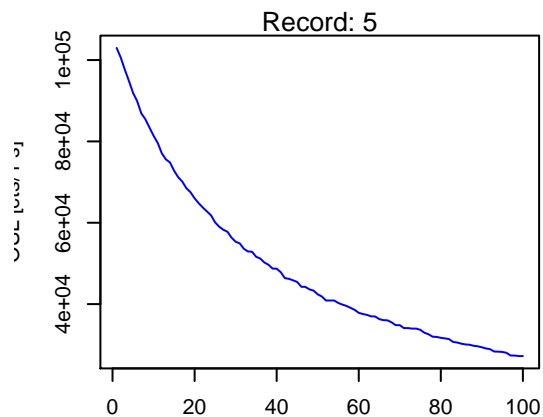


Record: 4



Record: 4







USER

Record: 7



IRSL

Record: 7



help("PSL2Riseo.BINfileData")

Record: 7



Record: 7









USER

Record: 11



IRSL

Record: 11



help("PSL2Riseo.BinfileData")

Record: 11



Record: 11



USER

Record: 12



IRSL

Record: 12

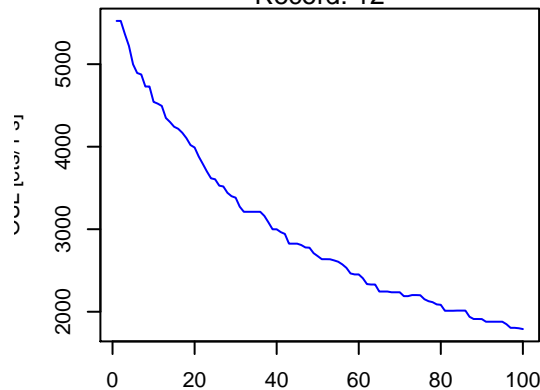


help("PSL2Riseo.BINfileData")

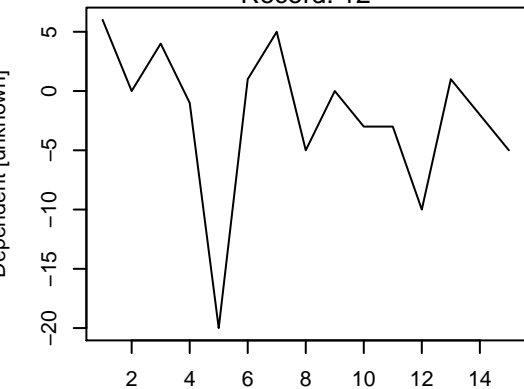
Record: 12

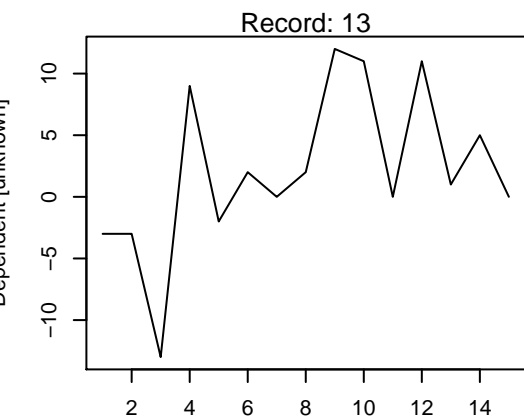


Record: 12



Record: 12





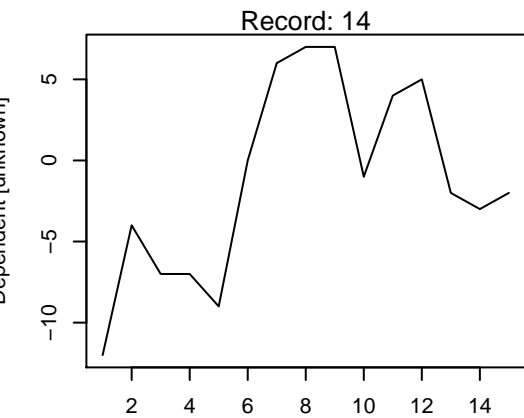
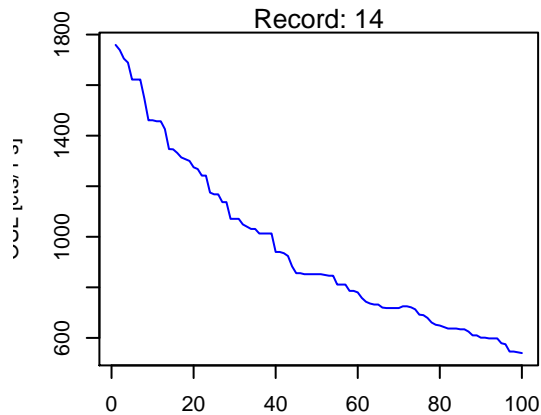
USER



IRSL



help("PSL2Riseo.BINfileData")



No L_x curves detected

No T_x curves detected

Signal Fading

g-value: 5.18 ± 0.67 (%/decade) | $t_c = 3.78e+02$



Density: g-values (%/decade)



IR-RF

$D_e = 623.25$ [600.63 ; 635.8]



IR-RF

$D_e = 610.17$ [567.19 ; 653.15]



TL previous L_n, L_x curvesTL previous T_n, T_x curves L_n, L_x curves T_n, T_x curves

●
Natural
(0)

●
R1
(450)

●
R2
(1050)

●
R3
(2000)

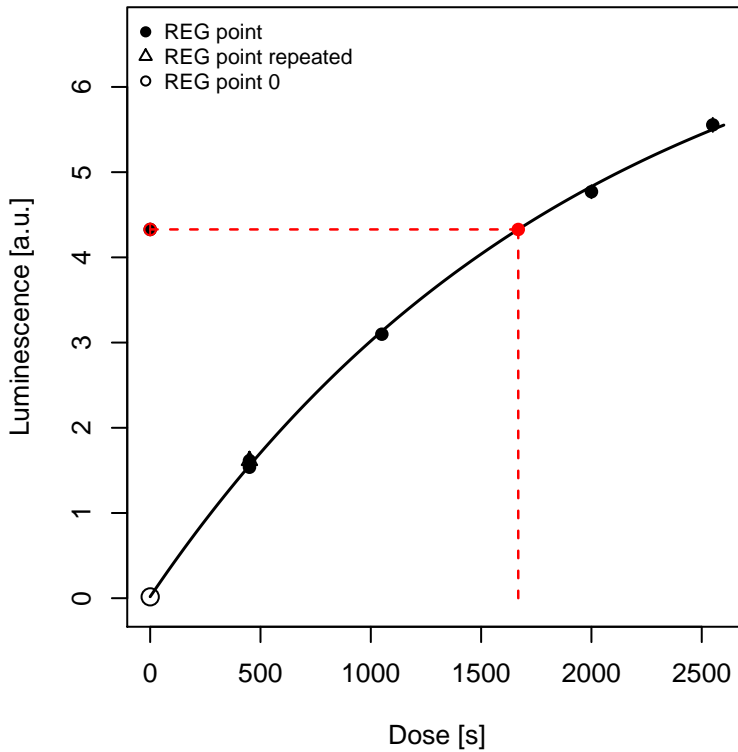
●
R4
(2550)

●
R5
(450)

●
R0
(0)

Growth curve

$D_e = 1668.25 \pm 49.22$ | fit: EXP



D_e from MC simulation

$D_{eMC} = 1677.48 \pm 49.22$ | quality = 99.4 %



Test dose response



Rejection criteria



- 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)

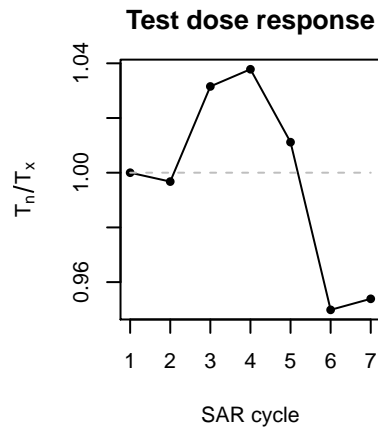
Natural
(317)

Natural
(544)

Natural
(815)

Natural
(0)

Natural
(317)



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



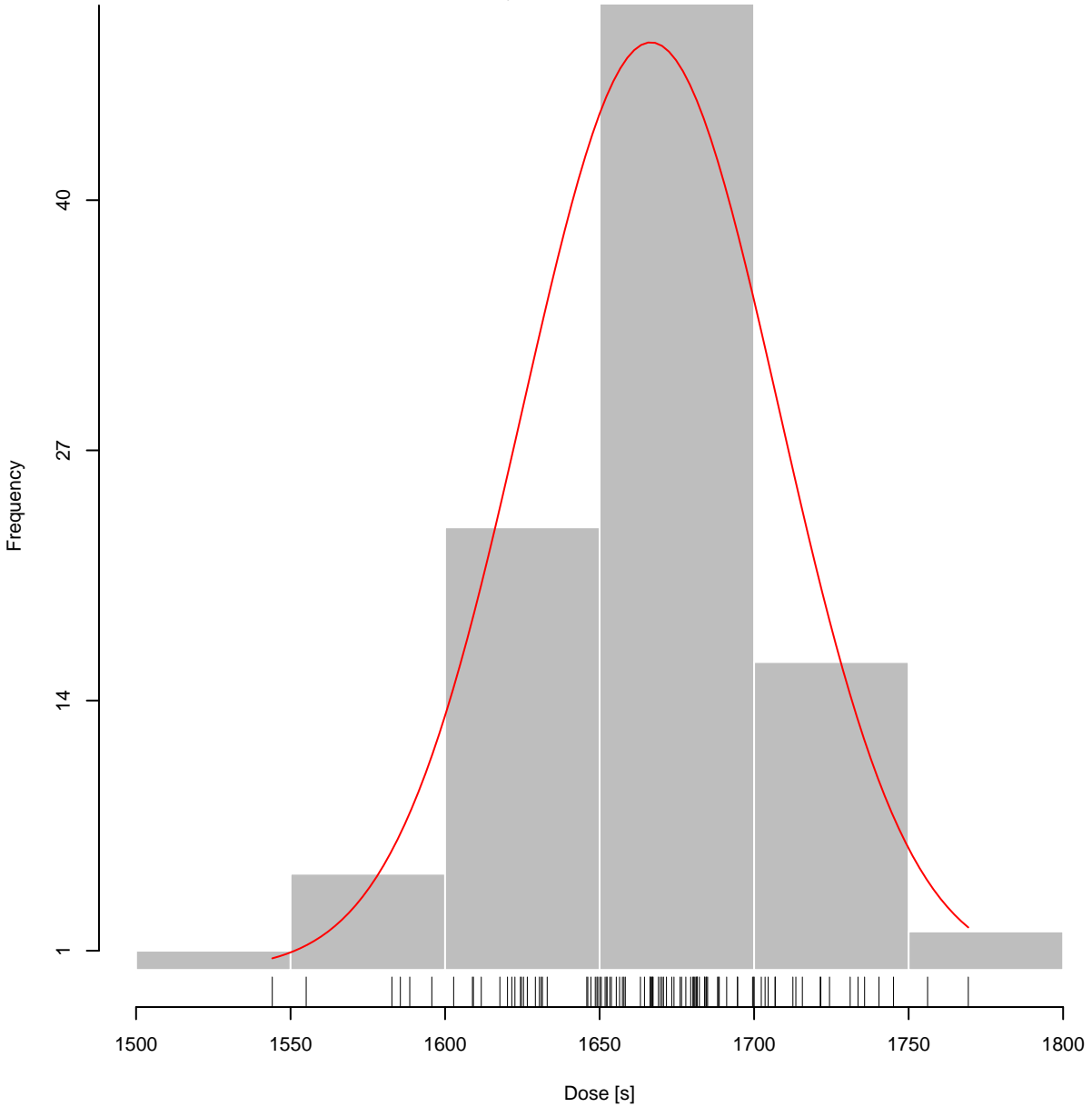
Pseudo pIRIR data set based on quartz OSL

$D_e = 1668.25 \pm 41.38$ | fit: EXP



D_e from MC simulation

D_{eMC} = 1666.57 ± 41.38 | quality = 99.9 %



help("analyse_pIRIRSequence")

Test dose response



Pseudo pIRIR data set based on quartz OSL



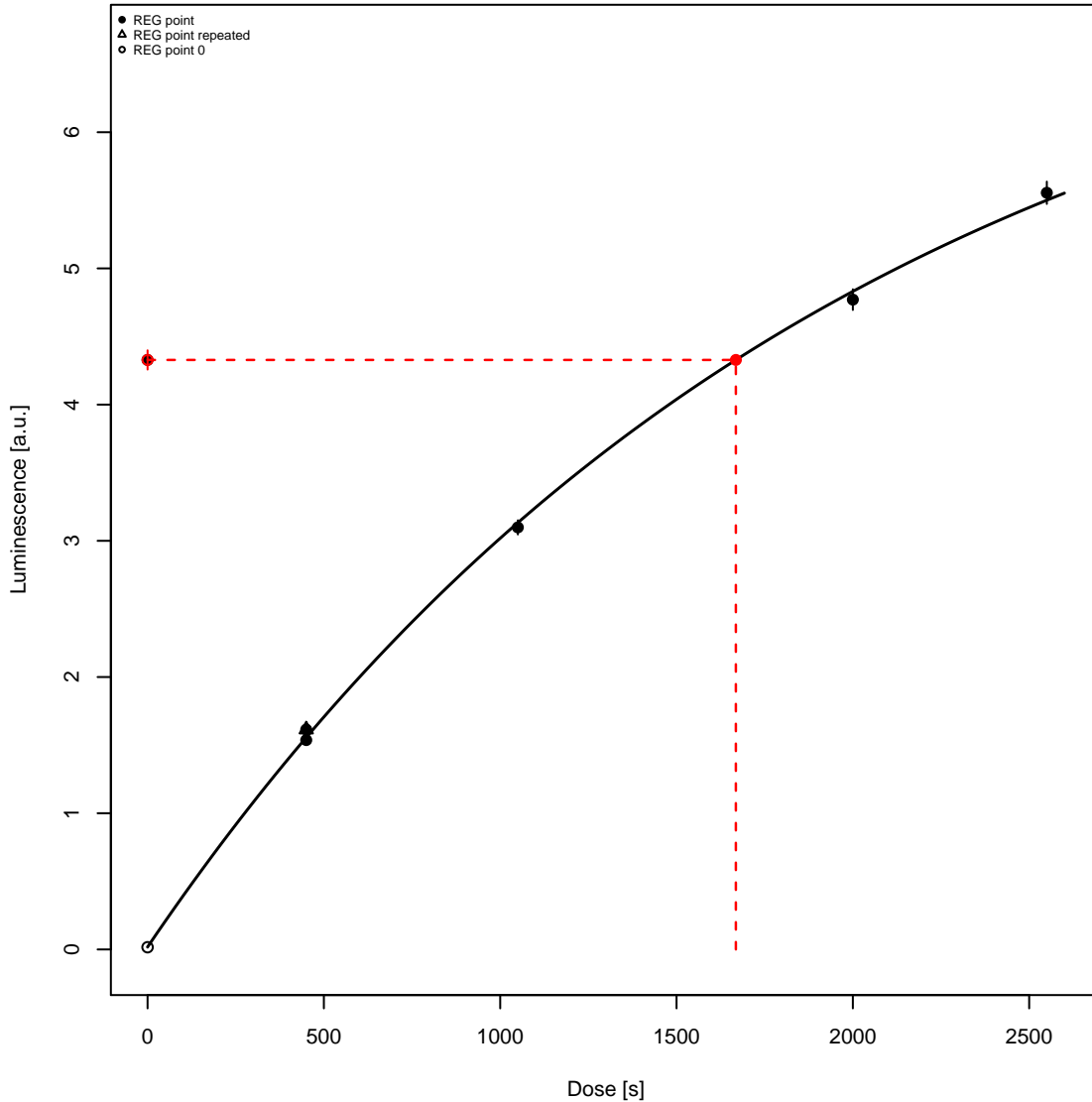
Pseudo pIRIR data set based on quartz OSL





Pseudo pIRIR data set based on quartz OSL

$D_e = 1668.25 \pm 47.59$ | fit: EXP



help("analyse_pIRIRSequence")

D_e from MC simulation

D_{e,MC} = 1669.37 ± 47.59 | quality = 99.9 %



Dose [s]

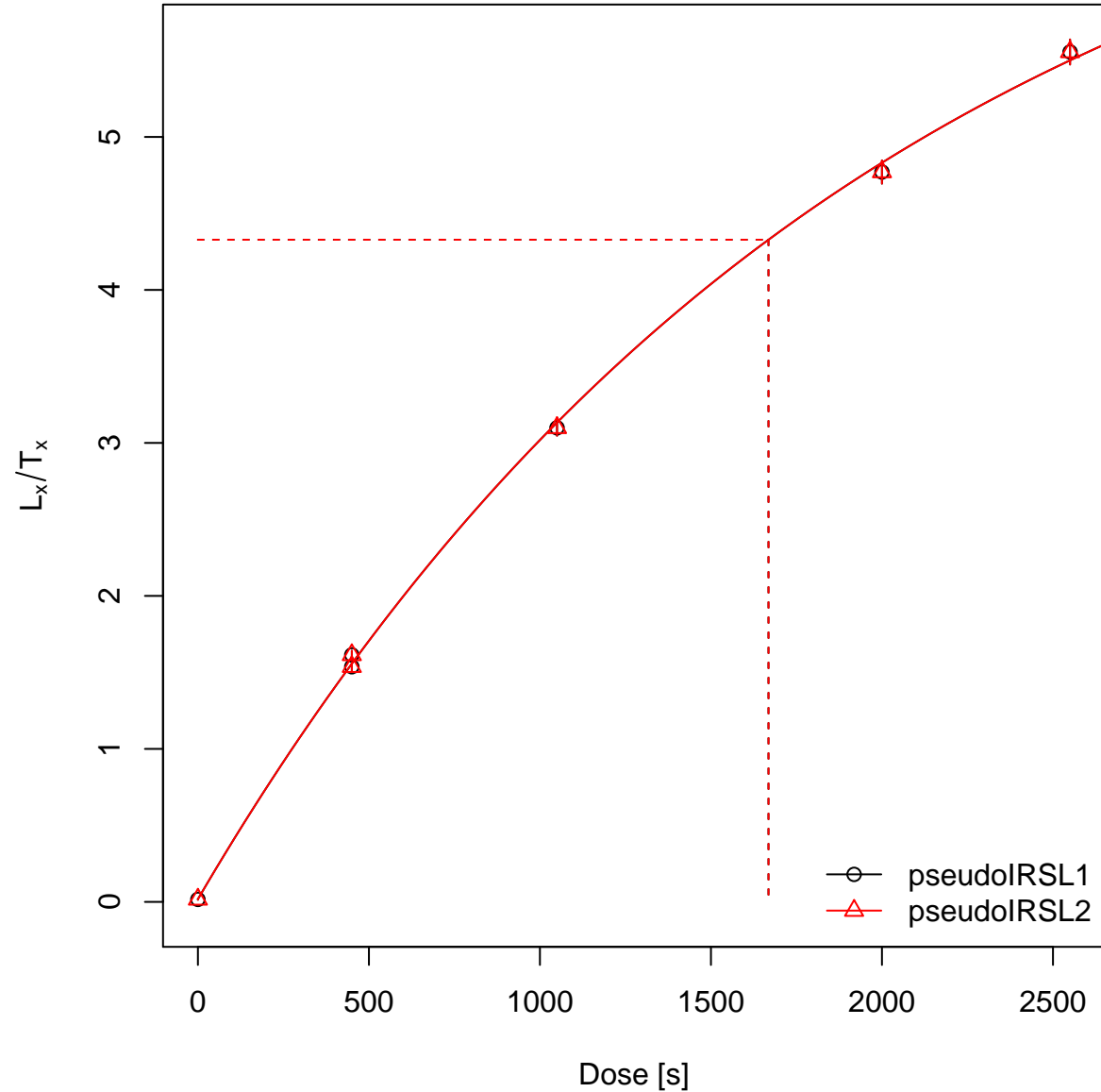
n = 100 , valid fits = 100

help("analyse_pIRSequence")

Test dose response



Summarised Dose Response Curves



help("analyse_pIRSequence")

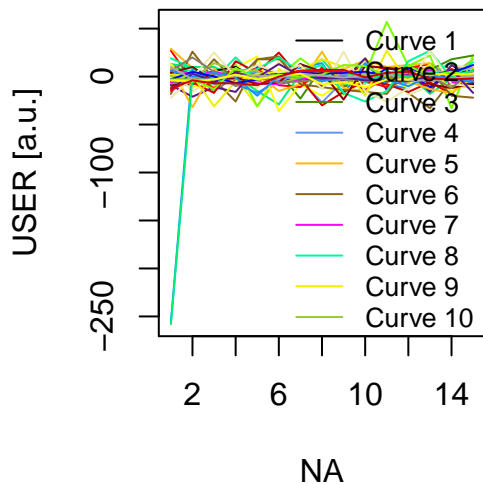
Sensitivity change



Rejection criteria



USER combined



IRSL combined



help("analyse_portableOSL")

OSL combined



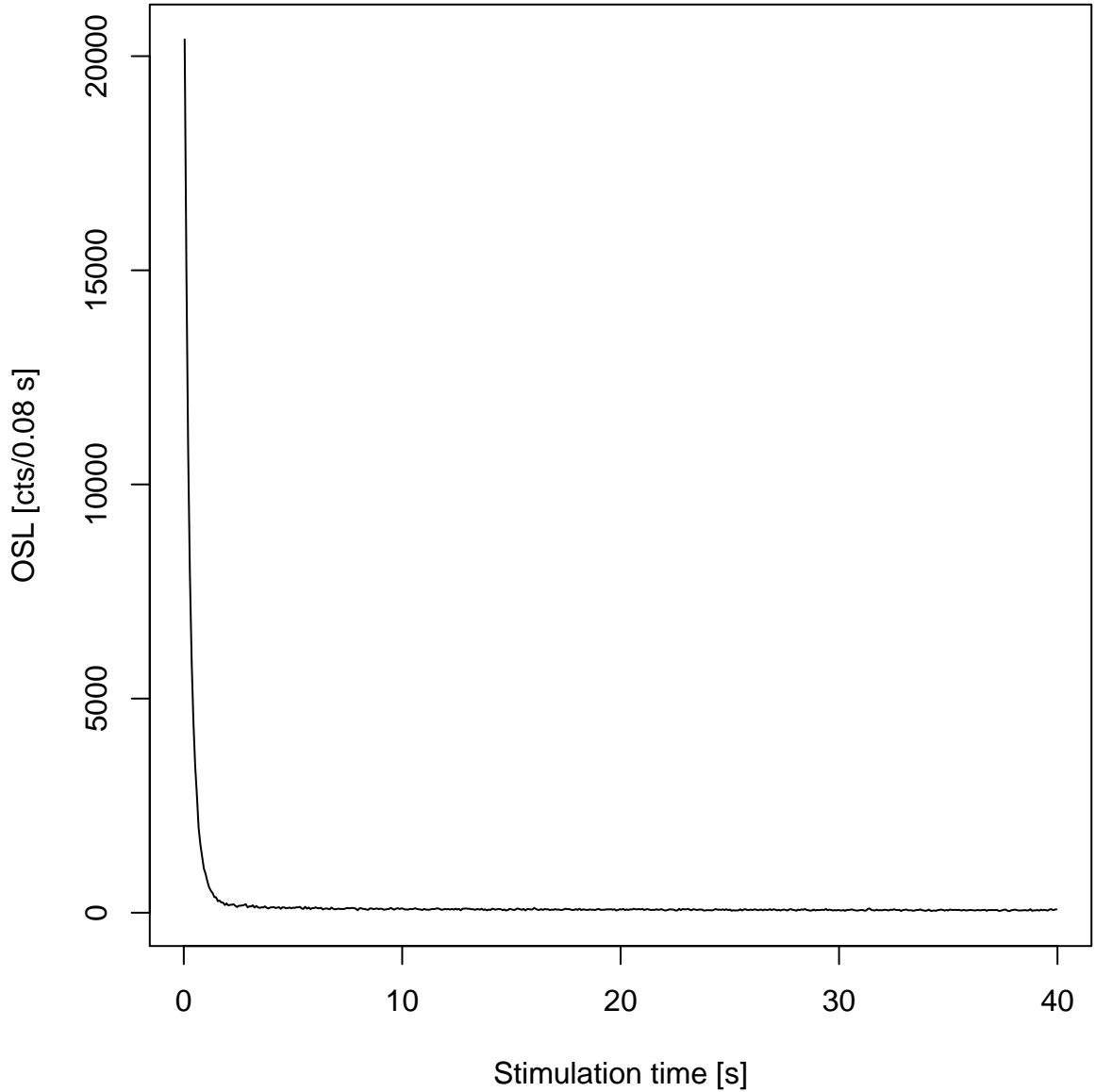


OSL



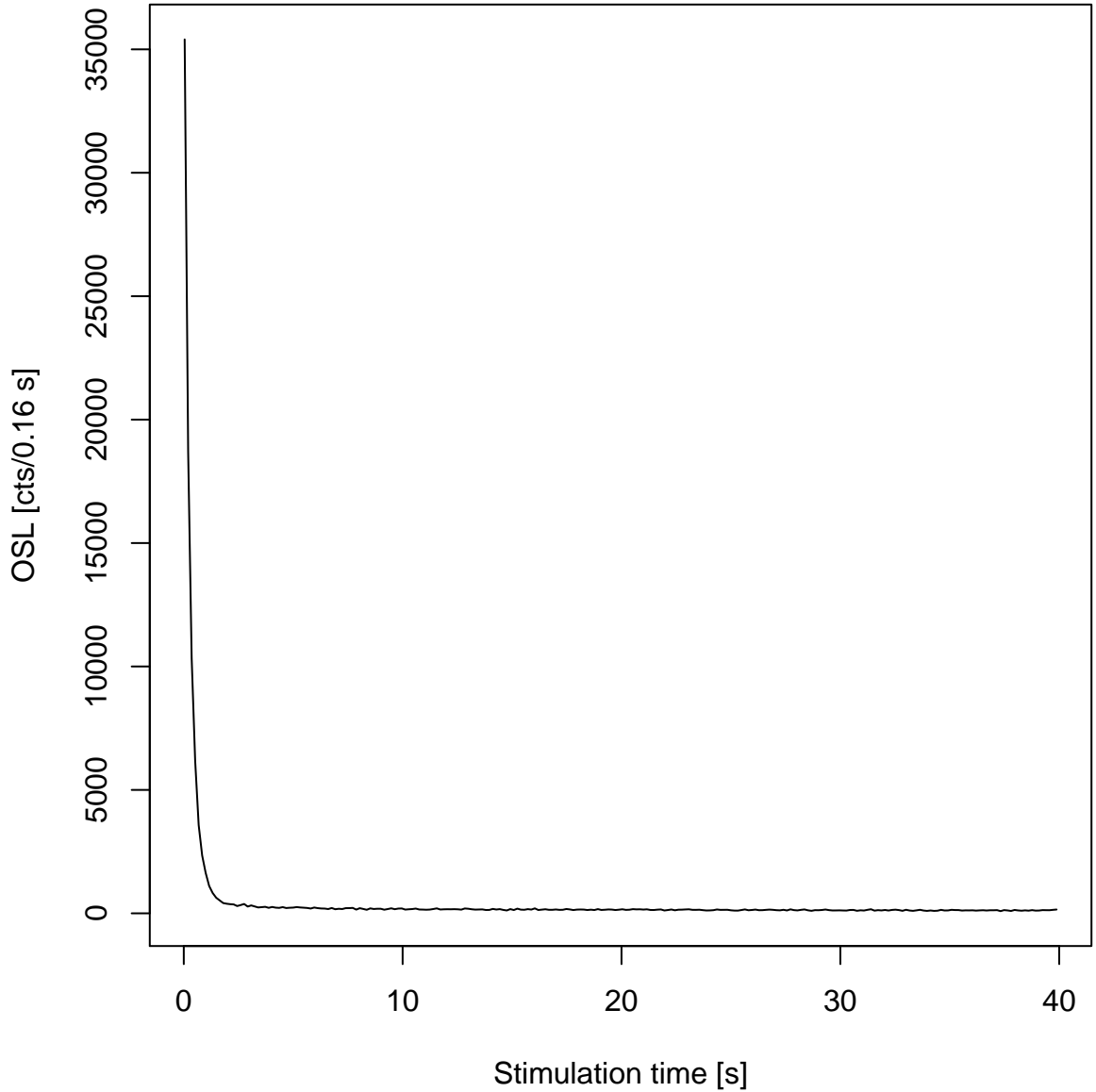
`help("bin_RLum.Data")`

OSL



help("bin_RLum.Data")

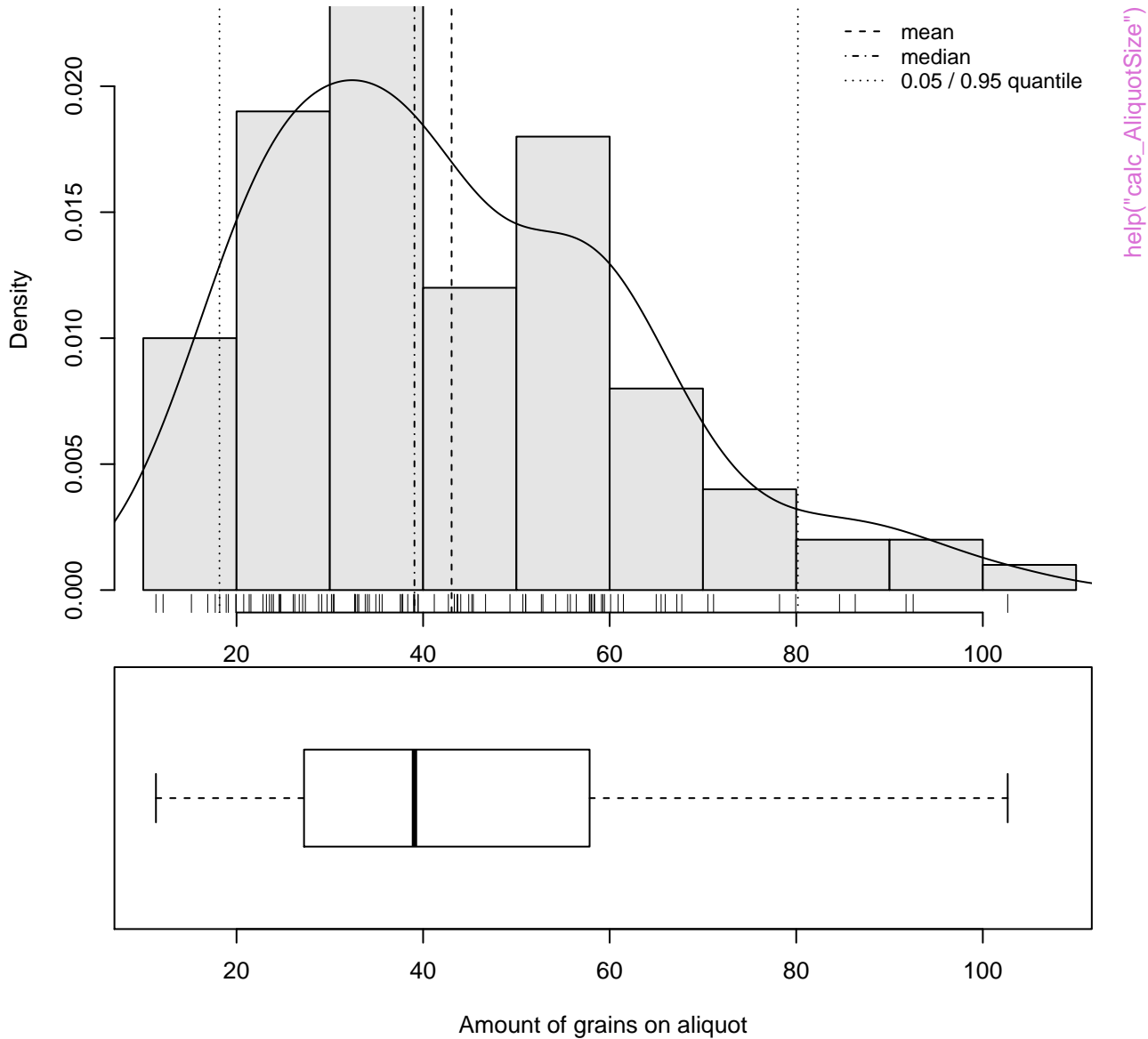
OSL



help("bin_RLum.Data")

Monte Carlo Simulation

$$n = \left| \hat{\mu} = 43 \mid \hat{\sigma} = 20 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 2 \mid v = 0.73 \right|$$



Observed: Equivalent dose

n = 56



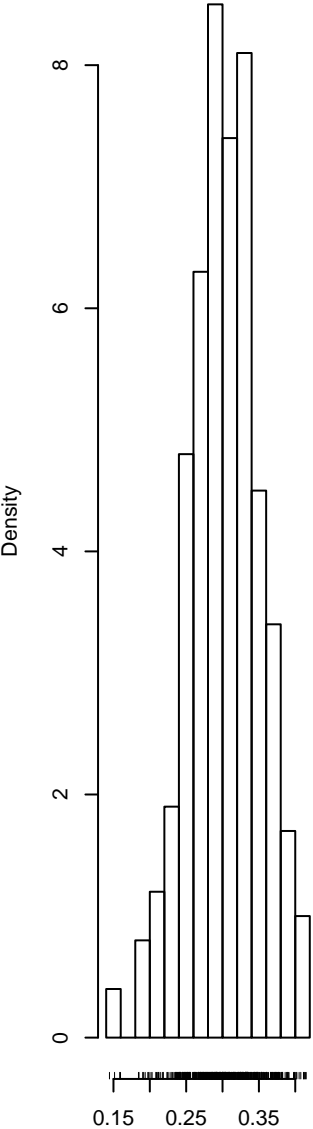
Bootstrapping: Average Dose

n = 500



Bootstrapping: Sigma_d

n = 500



help("calc_AverageDose")

D_e distribution

n = 56 | in 2 sigma = 53.6 %



Profile log likelihood for σ_{OD}



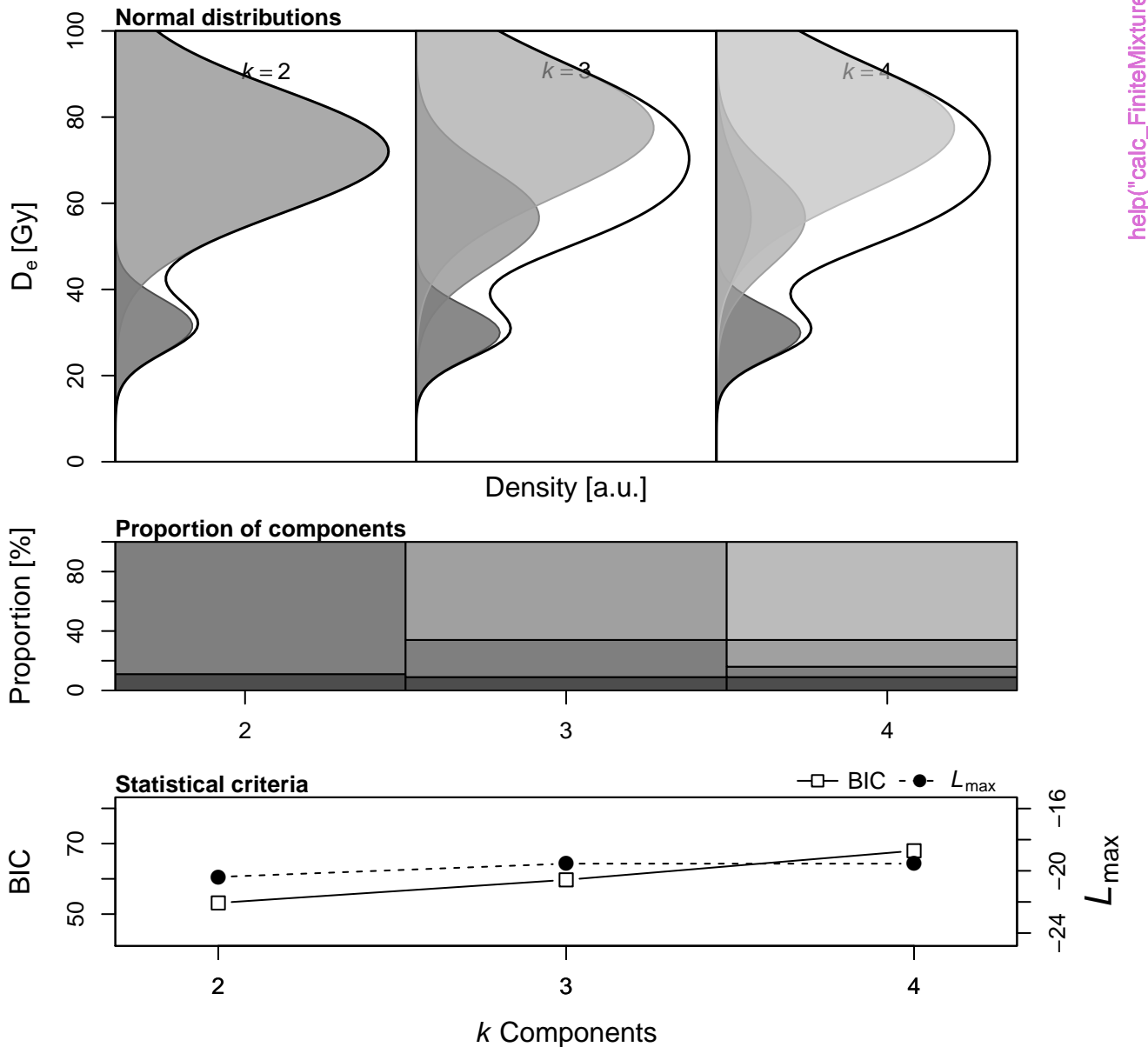
Fast Ratio



help("calc_FastRatio")

Finite Mixture Model

$\sigma_b = 0.2 \mid n = 62$



Fuchs & Lang (2001)







help("calc_I EU")

No L_x curves detected

No T_x curves detected

help("calc_Kars2008")

Signal Fading



Density: g-values (%/decade)



Measured dose response curve

$D_e = 130.97 \pm 17.12$ | fit: EXP



D_e from MC simulation

$D_{eMC} = 132.17 \pm 17.12$ | quality = 99.1 %



Dose (Gy)

n = 100, valid fits = 100

Test dose response



NA

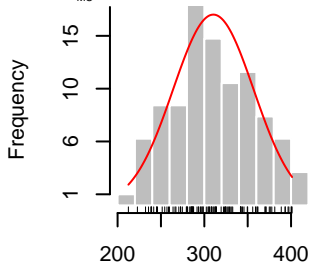
Simulated dose response curve

$D_e = 301.32 \pm 46.49$ | fit: EXP



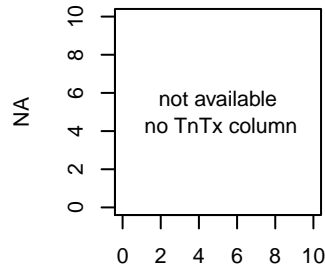
D_e from MC simulation

$D_{eMC} = 310.4 \pm 46.49$ | quality = 97 %



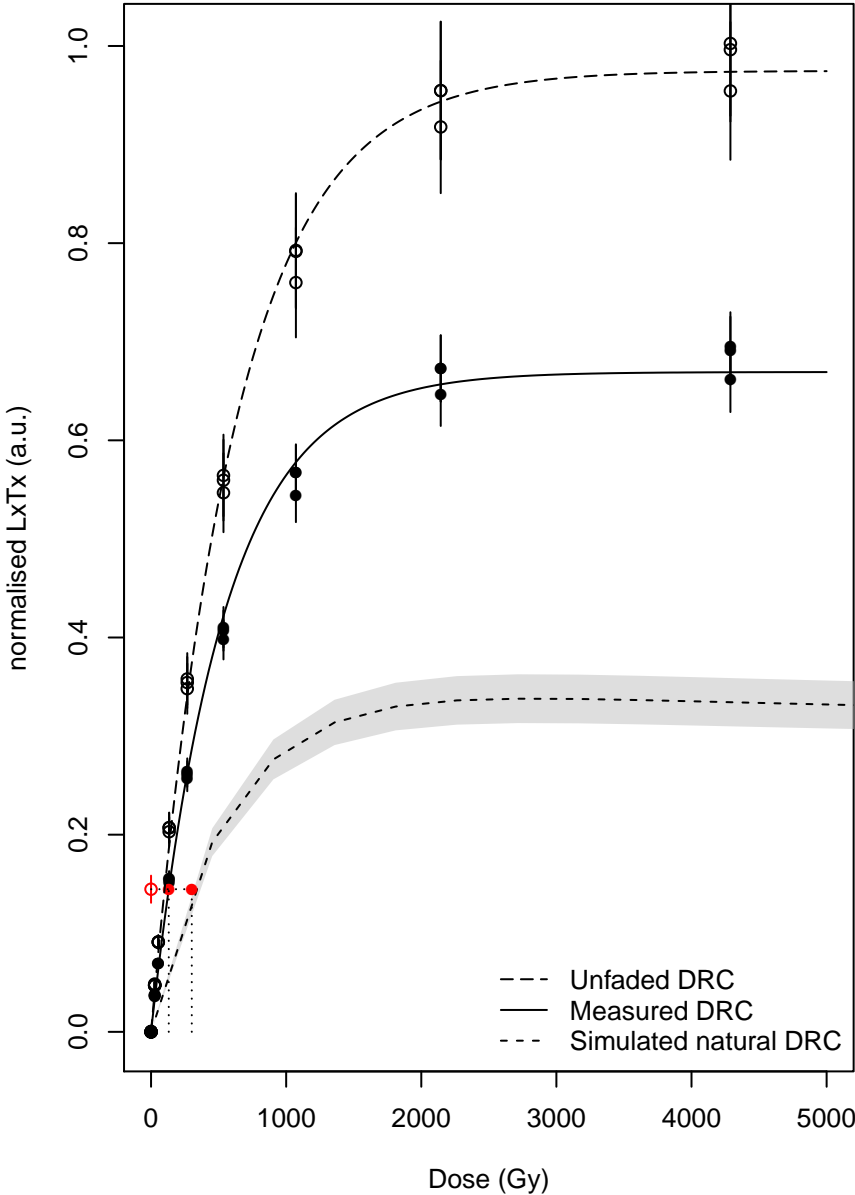
Dose (Gy)
n = 100, valid fits = 100

Test dose response



NA

Dose response curves



$$\dot{D} = 7 \pm 0 \frac{\text{Gy}}{\text{ka}}$$

$$\dot{D}_{\text{Reader}} = 0.134 \pm 0.007 \frac{\text{Gy}}{\text{s}}$$

$$\log_{10}(\rho') = -5.42 \pm 0.09$$

$$\left(\frac{n}{N}\right) = 0.14 \pm 0.02$$

$$\left(\frac{n}{N}\right)_{\text{SS}} = 0.35 \pm 0.06$$

$$D_{\text{E,sim}} = 301.32 \pm 46.49 \text{ Gy}$$

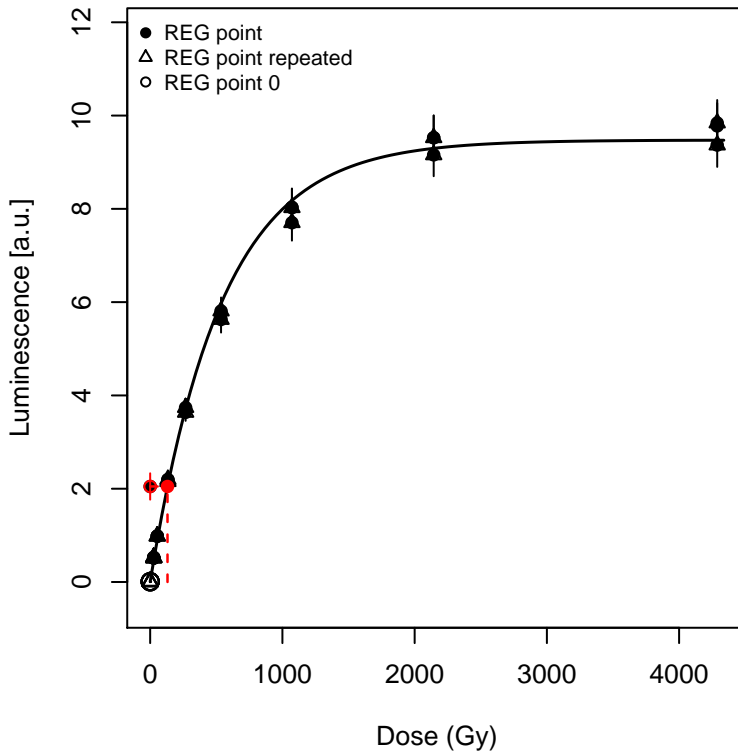
$$D_{0,\text{sim}} = 548.27 \pm 74.3 \text{ Gy}$$

$$\text{Age}_{\text{sim}} = 43.05 \pm 6.98 \text{ ka}$$

calc_Kars2008"

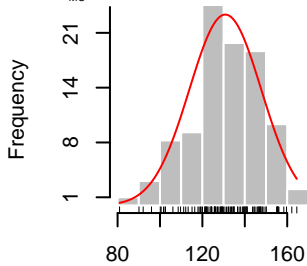
Measured dose response curve

$D_e = 130.97 \pm 16.98$ | fit: EXP



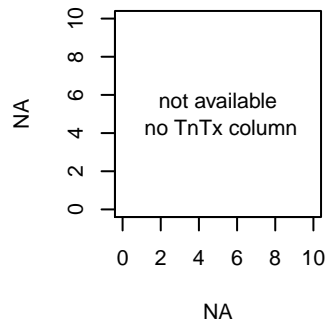
D_e from MC simulation

$D_{EMC} = 130.8 \pm 16.98$ | quality = 99.9 %



Dose (Gy)
n = 100, valid fits = 100

Test dose response



Simulated dose response curve

$D_e = 307.28 \pm 60.56$ | fit: EXP

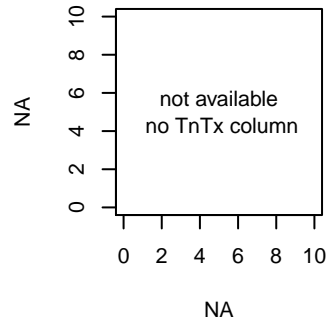


D_e from MC simulation

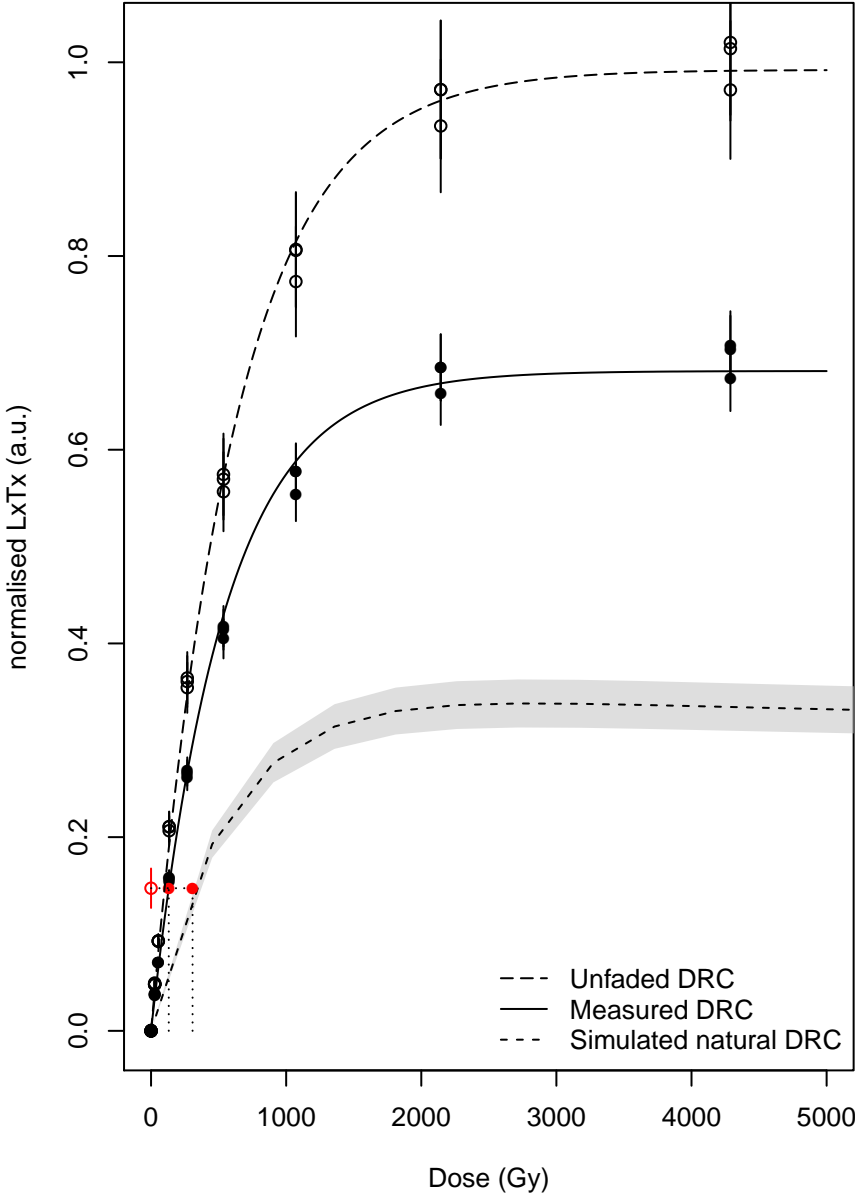
$D_{EMC} = 311.2 \pm 60.56$ | quality = 98.7 %



Test dose response



Dose response curves



$$\dot{D} = 7 \pm 0 \frac{\text{Gy}}{\text{ka}}$$

$$\dot{D}_{\text{Reader}} = 0.134 \pm 0.007 \frac{\text{Gy}}{\text{s}}$$

$$\log_{10}(\rho') = -5.42 \pm 0.09$$

$$\left(\frac{n}{N}\right) = 0.15 \pm 0.02$$

$$\left(\frac{n}{N}\right)_{\text{SS}} = 0.36 \pm 0.07$$

$$D_{\text{E,sim}} = 307.28 \pm 60.56 \text{ Gy}$$

$$D_{0,\text{sim}} = 546.15 \pm 90.11 \text{ Gy}$$

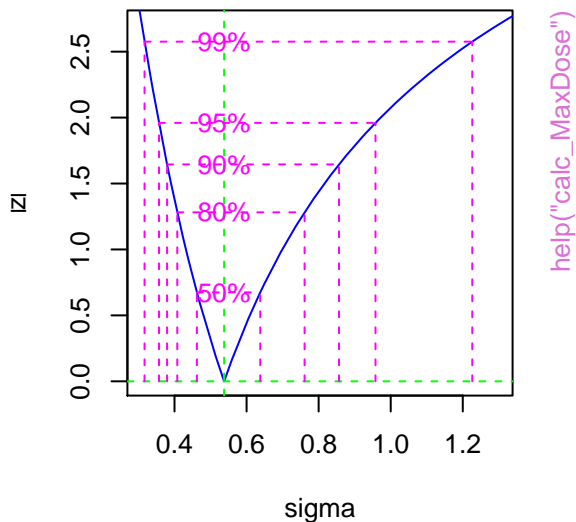
$$\text{Age}_{\text{sim}} = 43.9 \pm 8.93 \text{ ka}$$

calc_Kars2008"

Likelihood profile: gamma



Likelihood profile: sigma



help("calc_MaxDose")

Likelihood profile: p0



Likelihood profile: gamma

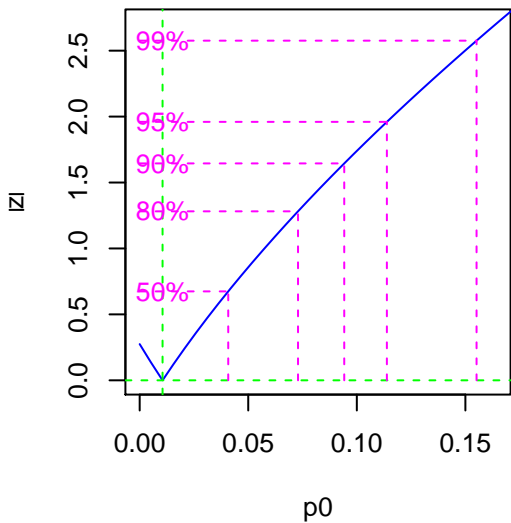


Likelihood profile: sigma



help("calc_MinDose")

Likelihood profile: p0



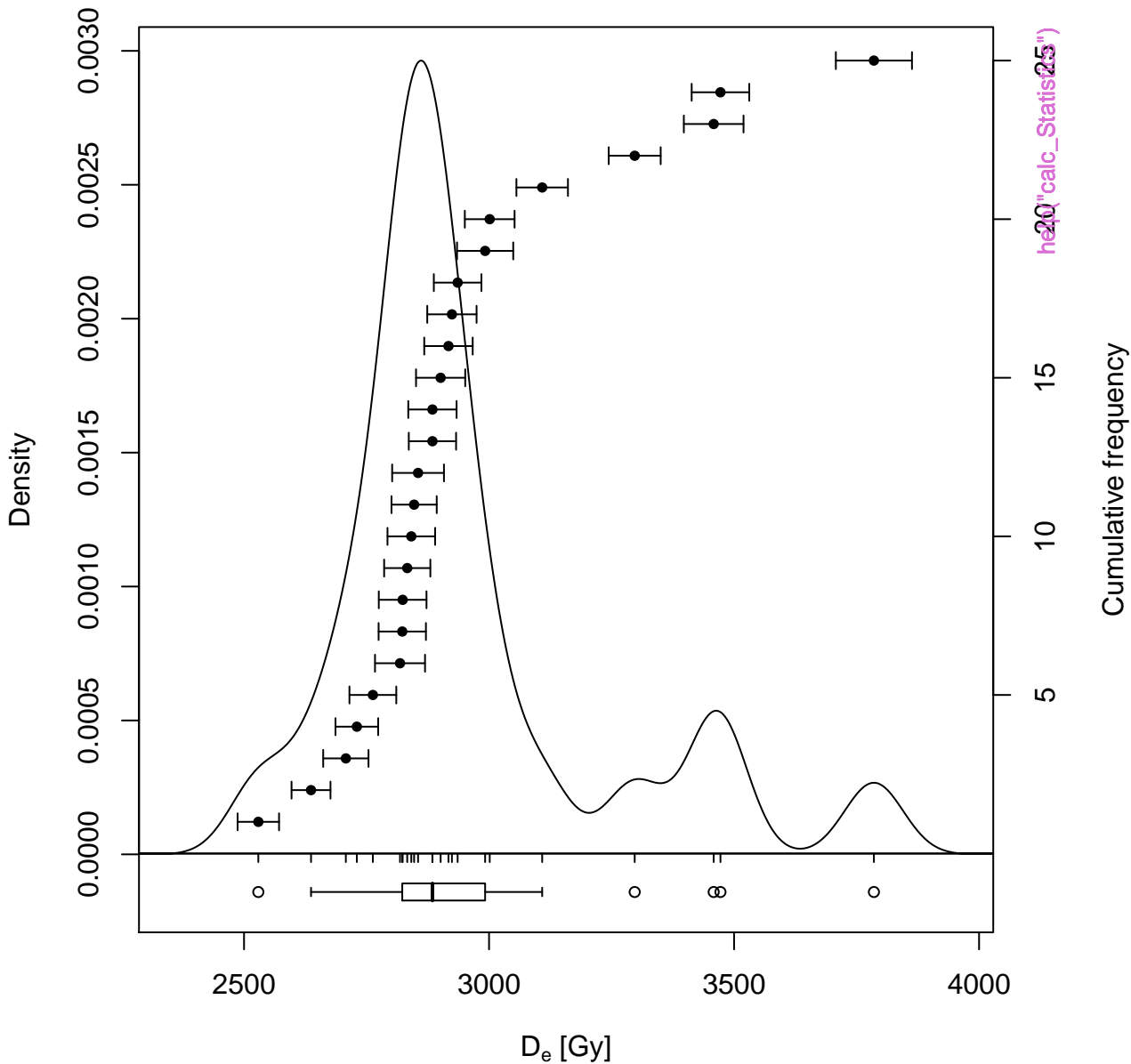
Source Dose Rate Prediction

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



help("calc_SourceDoseRate")

D_e distribution



Thermal Lifetime Contour Plot

(values quoted in Ma)



help("calc_ThermalLifetime")

Thermal Lifetime Density Plot



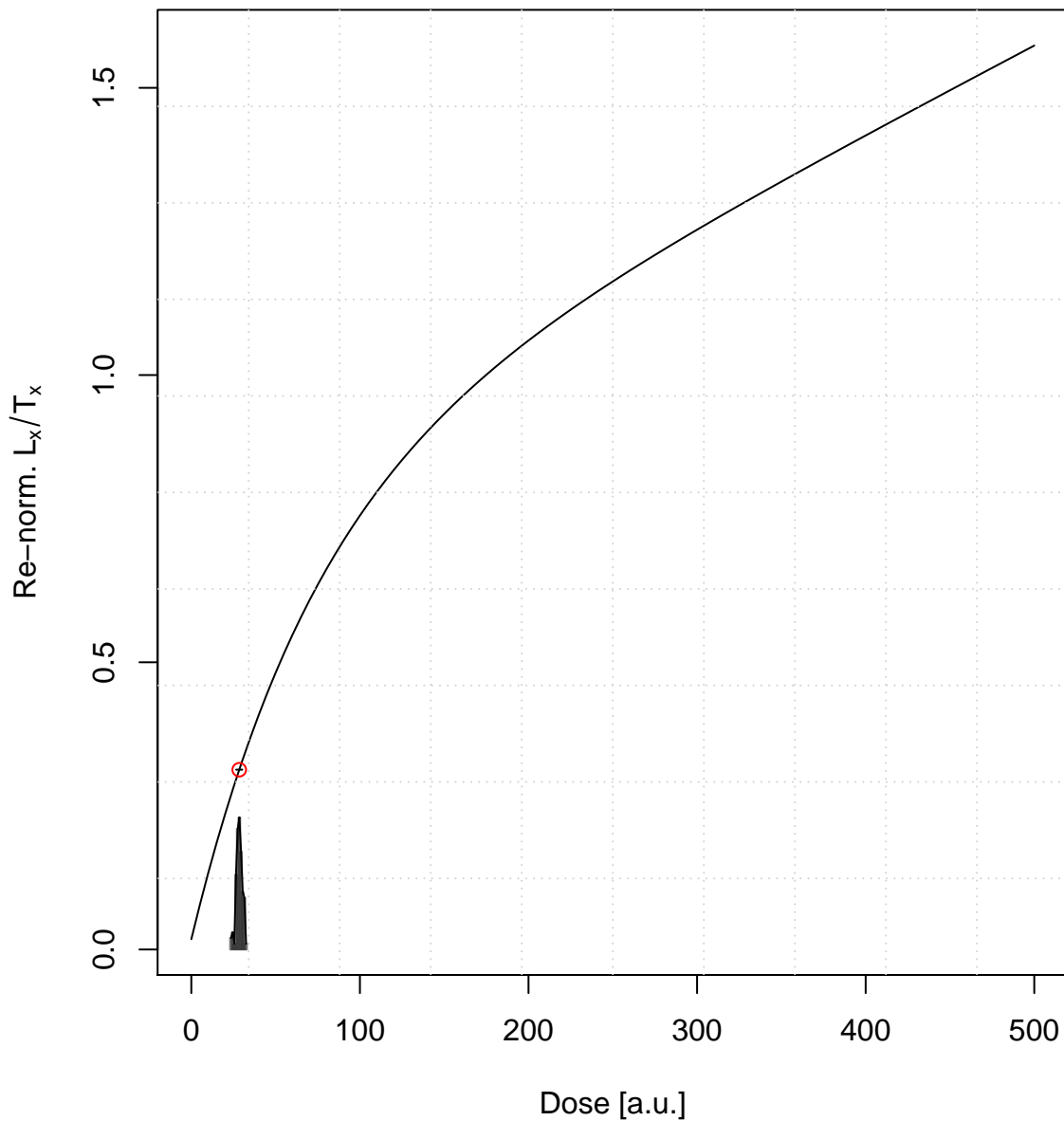
`help("calc_ThermalLifetime")`

D_e estimation applying Woda and Fuchs (2008)



help("calc_WodaFuchs2008")

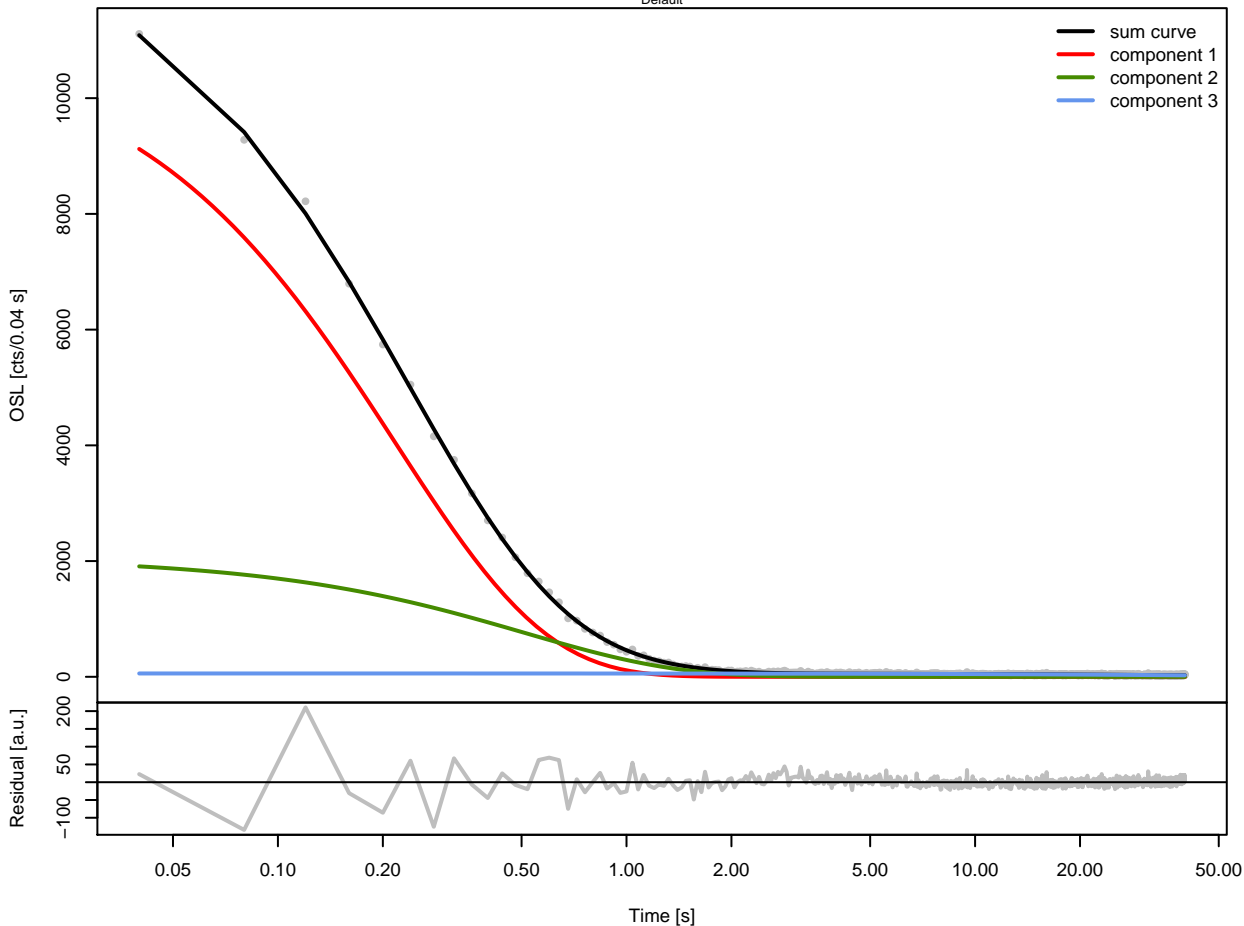
gSGC and resulting De



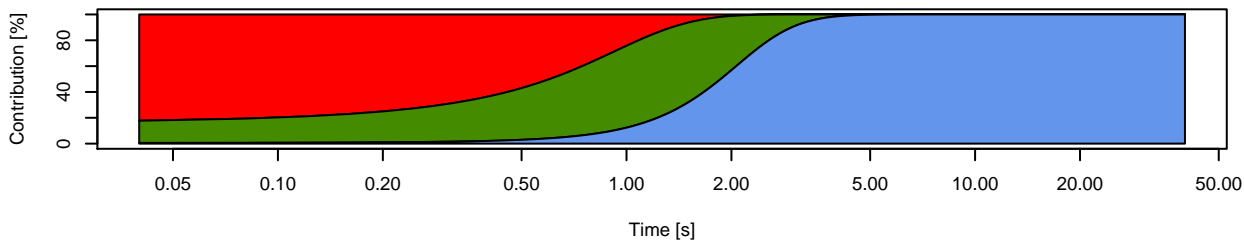
help("calc_gSGC")

CW Curve Fit

Default



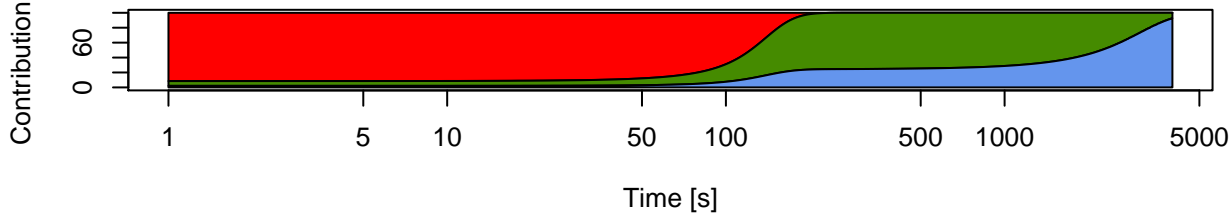
Component contribution to sum curve



Default



Component contribution to sum curve



Background



Default



Component contribution to sum curve



Default



Component contribution to sum curve

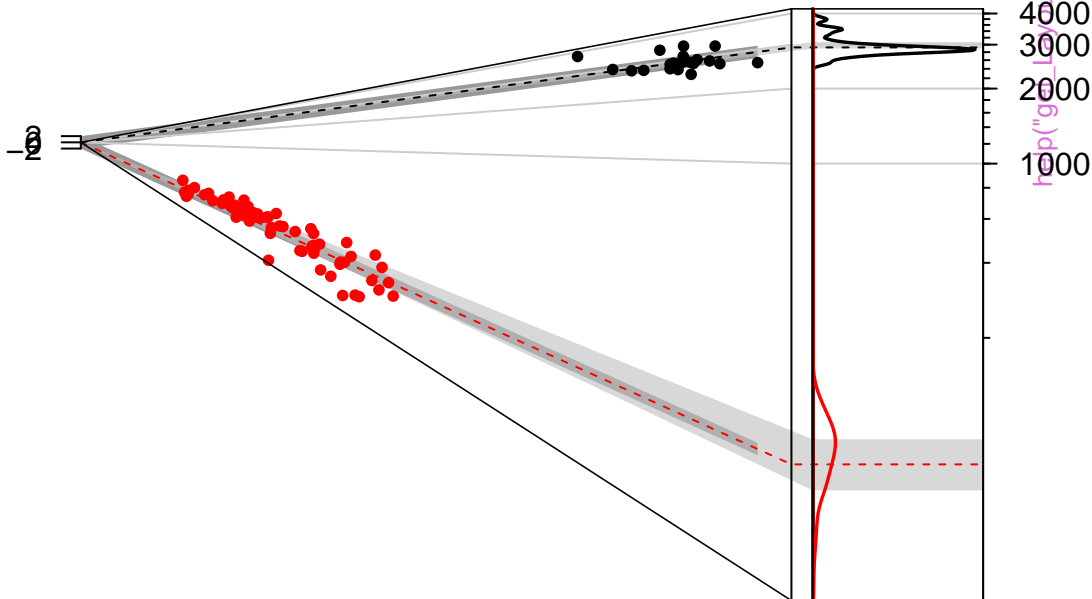


D_e distribution

n = 25 | in 2 sigma = 68 %

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e [Gy]

help("get_Layout")

Relative standard error (%)

10

5

3.3

0

10

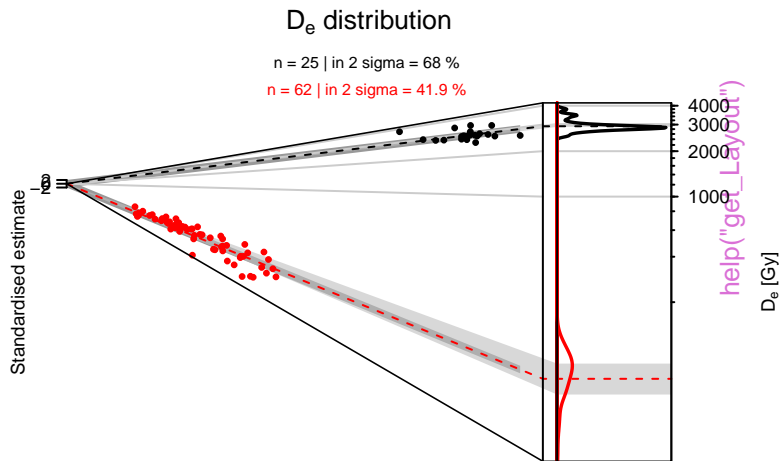
20

30

0.015

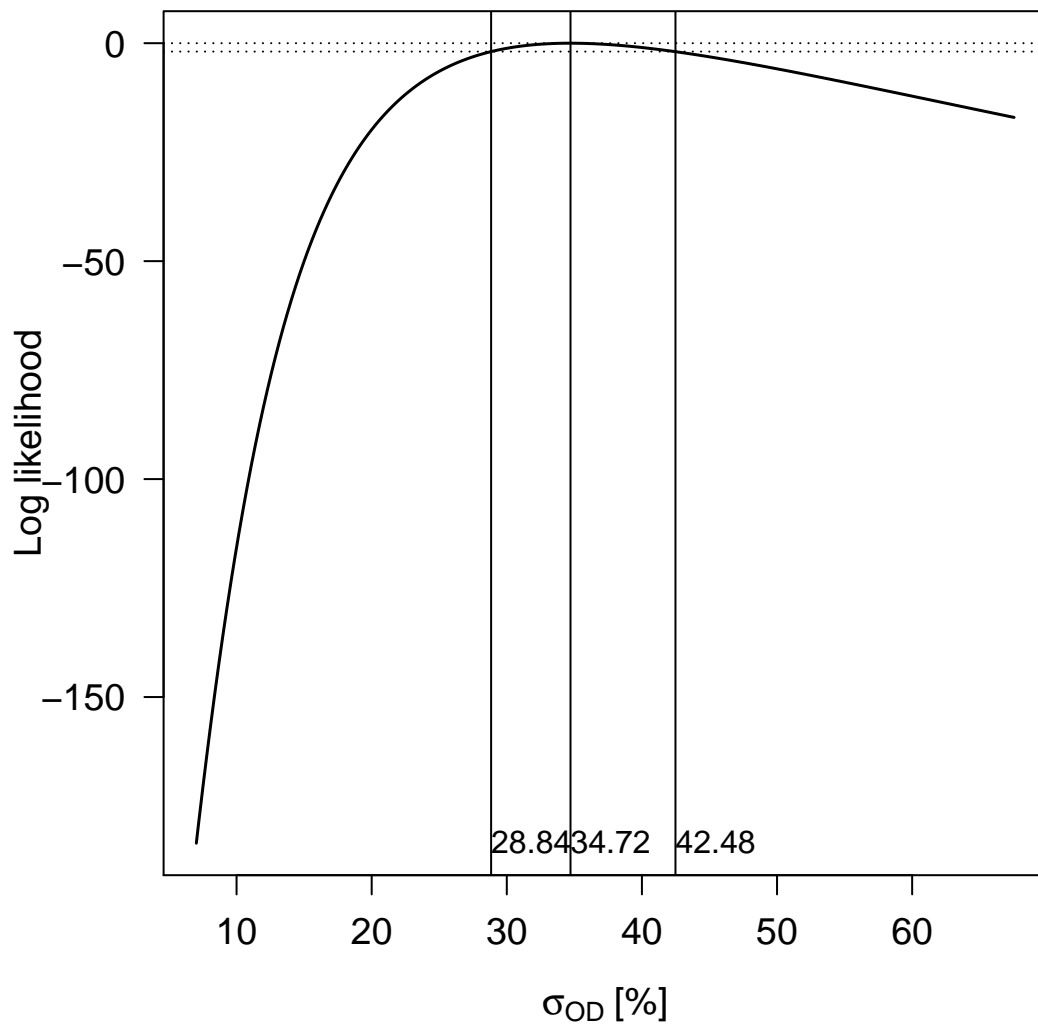
Precision

Density (bw 0.085)



help("get_Layout")

Profile log likelihood for σ_{OD}



TL (UVVIS)



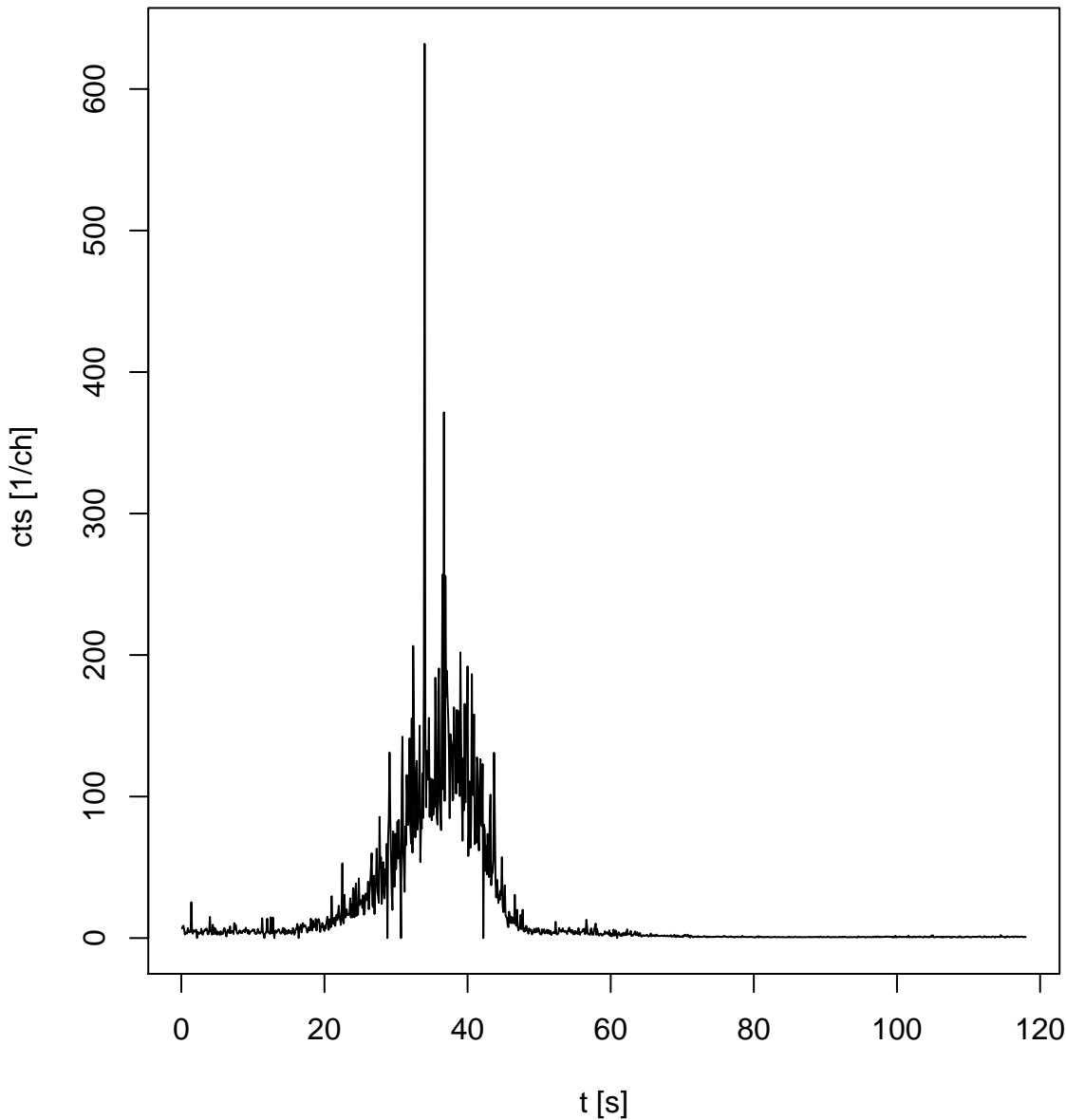
help("merge_RLum.Data.Curve")

TL (UVVIS)



help("merge_RLum.Data.Curve")

TL (UVVIS)



help("merge_RLum.Data.Curve")

Profile log likelihood for σ_{OD}



Profile log likelihood for σ_{OD}



D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

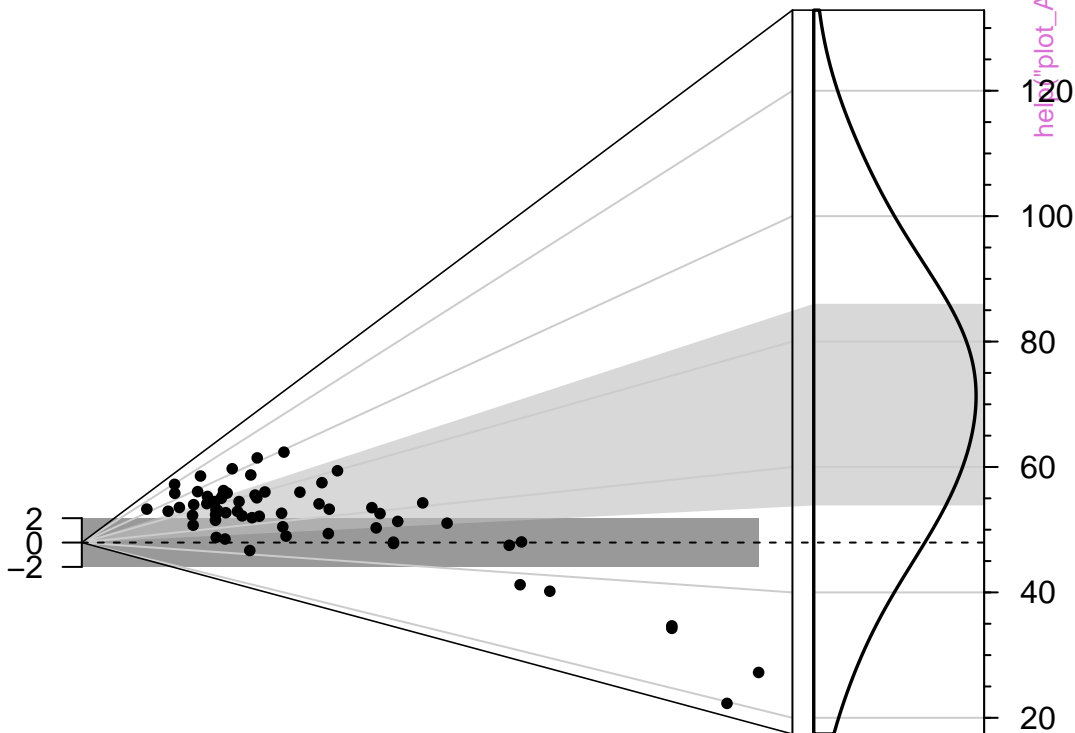
Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 24.2 %

Standardised estimate



help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Standard error

10

5

3.3

2.5

2

0.0

0.1

0.2

0.3

0.4

0.5

0.016

Precision

Density (bw 11.795)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e [Gy]

Relative standard error (%)

20

10

6.7

5

0

5

10

15

200

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e [Gy]

Relative standard error (%)

20

10

6.7

0

5

10

15

0

0.264

Precision

Density (bw 0.04)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

n

20

10

6.7

0

15

0

5

10

15

Precision

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e [Gy]

Relative standard error (%)

n

20

10

6.7

0

10

0

5

10

15

0

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

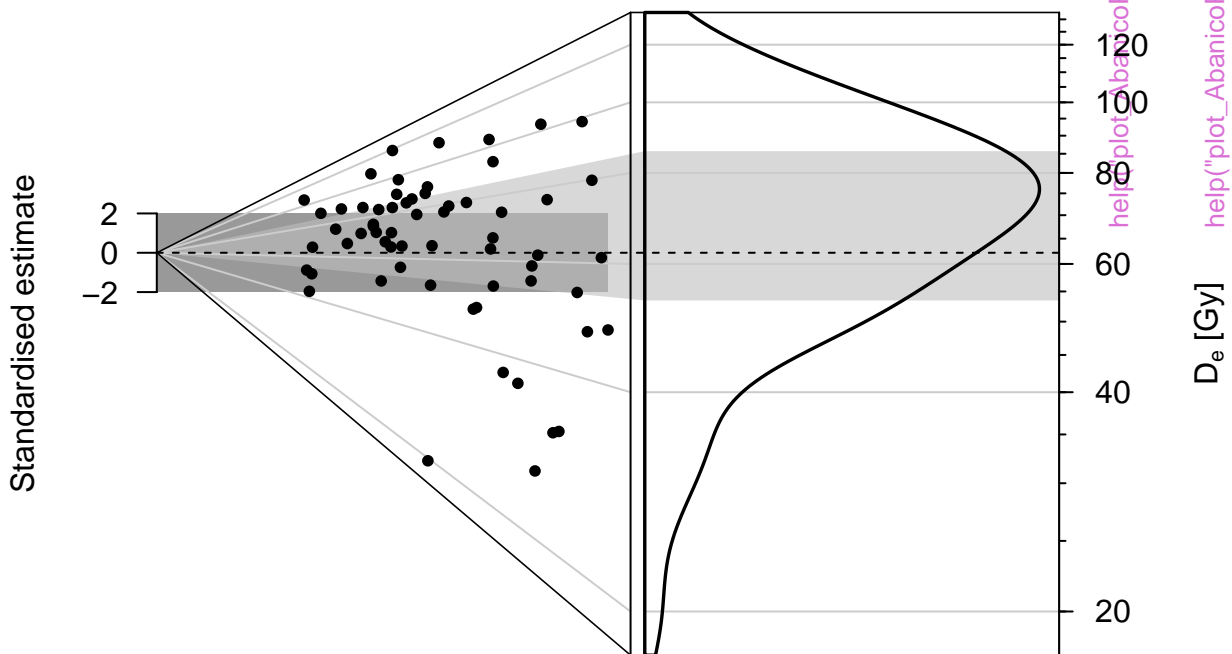
0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %



Relative standard error (%)

20

10

6.7

0

5

10

15

0

0.016

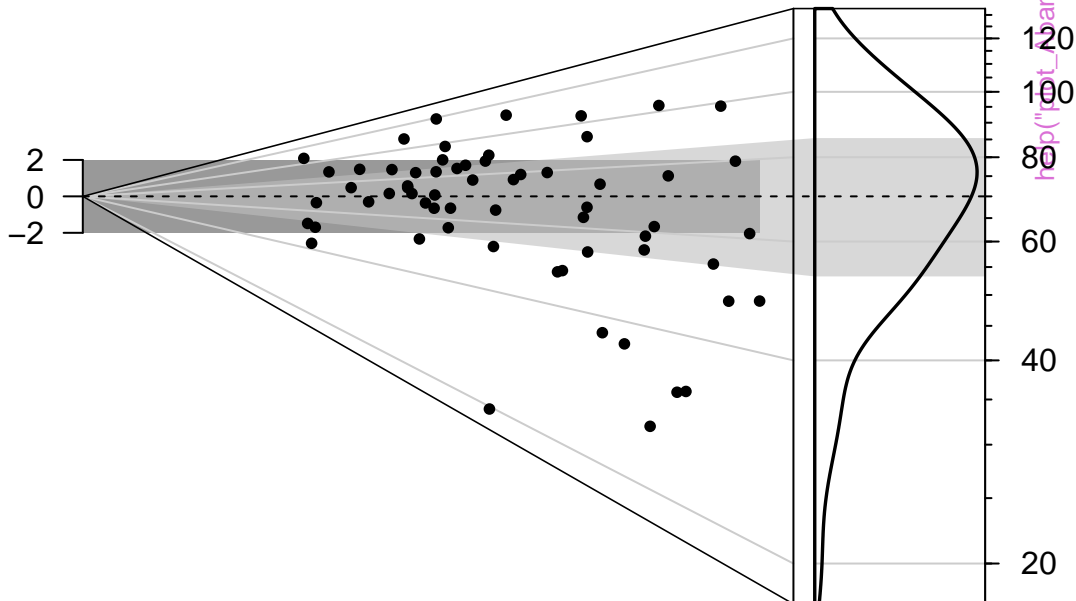
Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 53.2 %

Standardised estimate



help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

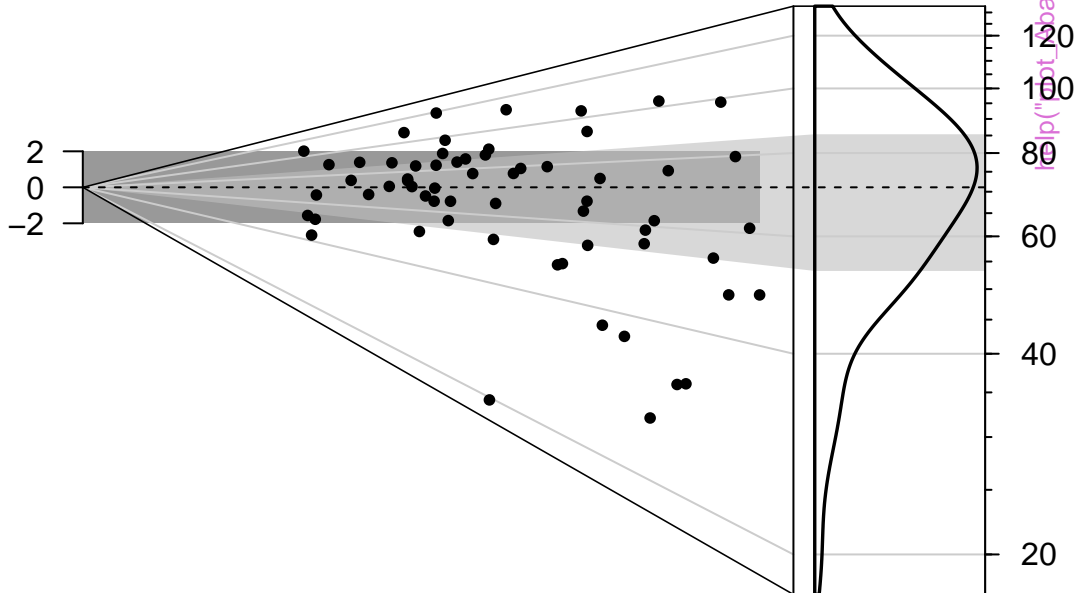
Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 54.8 %

Standardised estimate



D_e [Gy]

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 54.8 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %



D_e distribution

n = 62 | in 2 sigma = 41.9 %

R Sample 1

Standardised estimate



D_e [Gy]

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate

0

120
100
80
60
40
20

D_e [Gy]

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

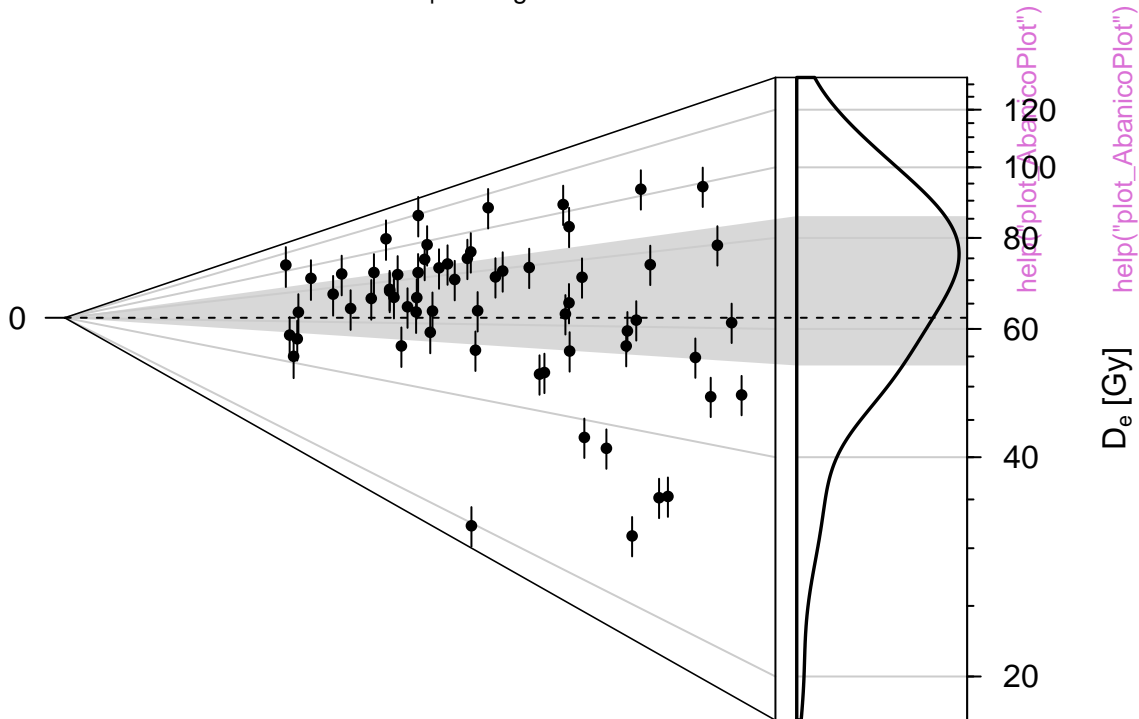
Precision

Density (bw 0.15)



D_e distribution

n = 62 | in 2 sigma = 41.9 %

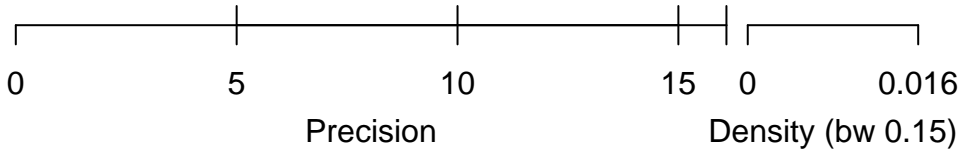


Relative standard error (%)

20

10

6.7



D_e distribution

n = 62 | in 2 sigma = 41.9 %



D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e [Gy]

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

D_e distribution

median = 71.07

Standardised estimate



D_e [Gy]

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

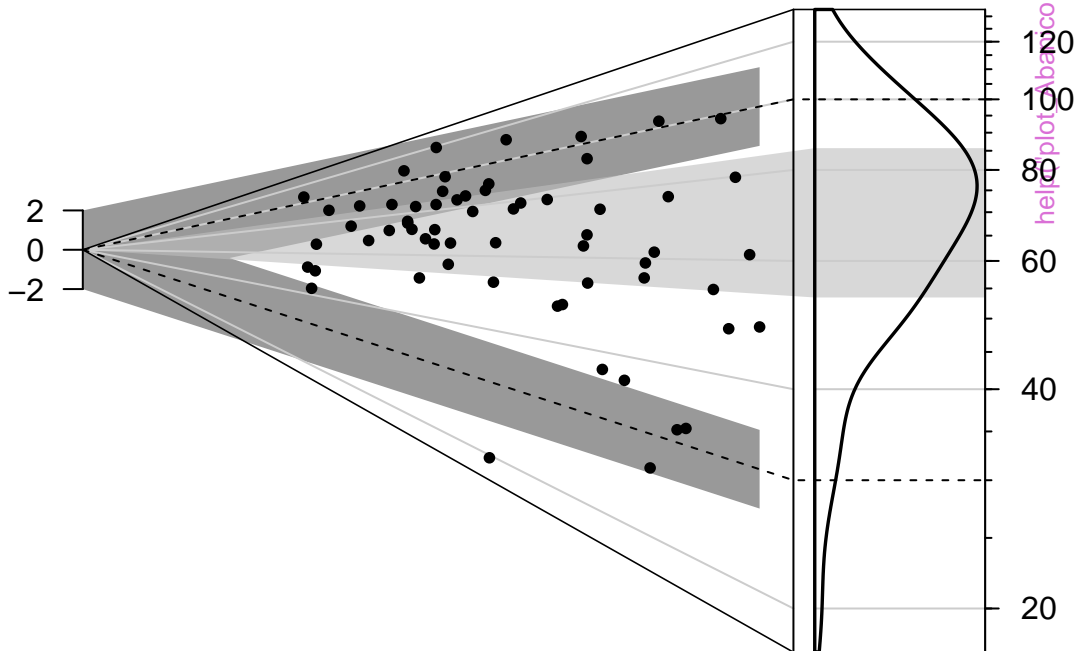
Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

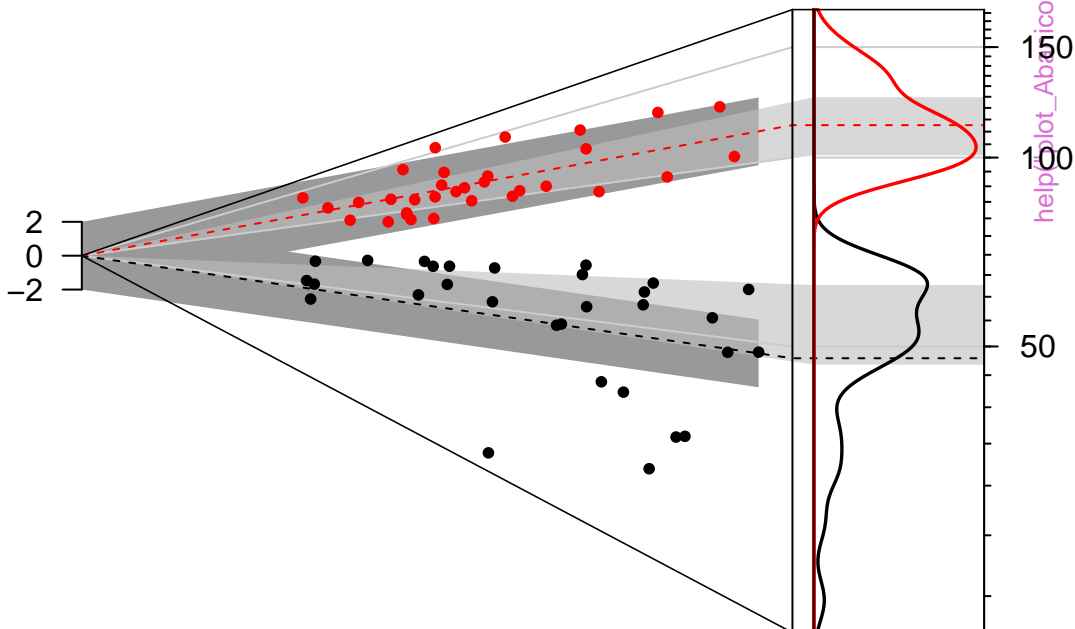
Density (bw 0.15)

D_e distribution

n = 30 | in 2 sigma = 46.7 %

n = 32 | in 2 sigma = 87.5 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.032

Precision

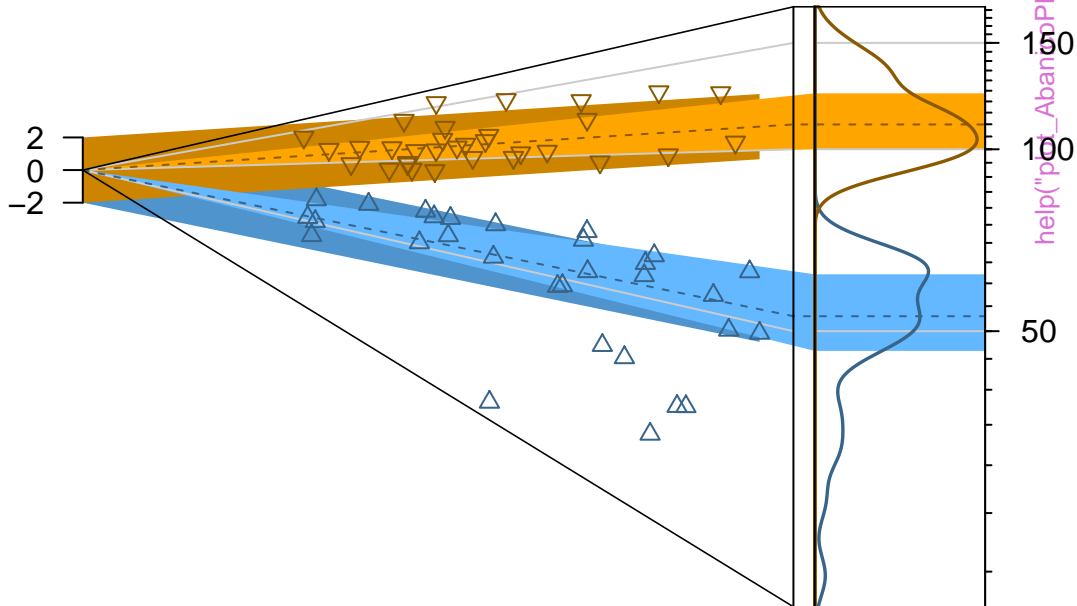
Density (bw 0.074)

D_e distribution

n = 30 | in 2 sigma = 70 % | median = 52.94

n = 32 | in 2 sigma = 84.4 % | median = 109.93

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

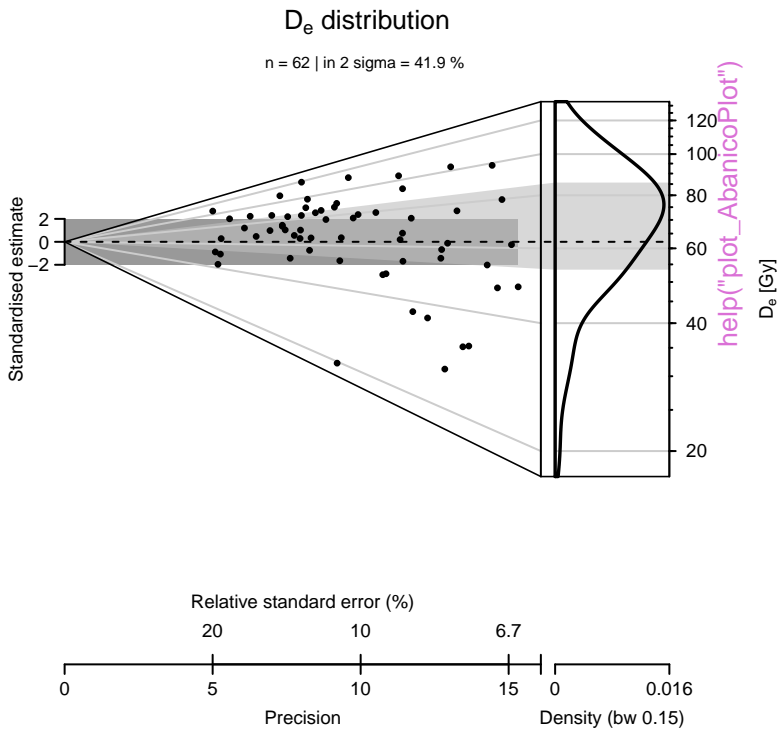
10

15

0.032

Precision

Density (bw 0.074)



help("plot_AbanicoPlot")



help("plot_AbanicoPlot")

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

Precision

Density (bw 0.15)

Dose recovery test

Example data



Dose recovery test



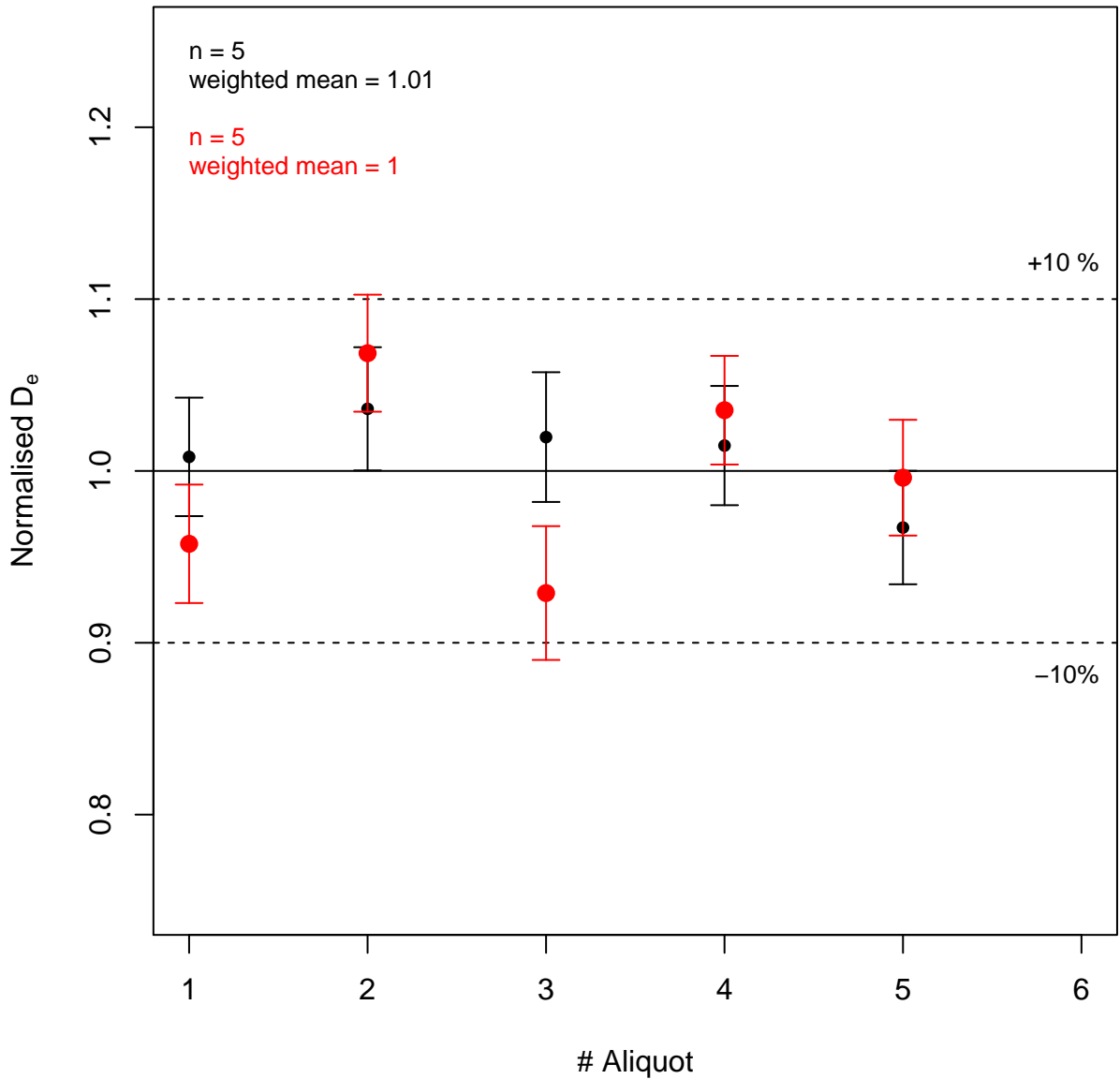
Dose recovery test



Dose recovery test



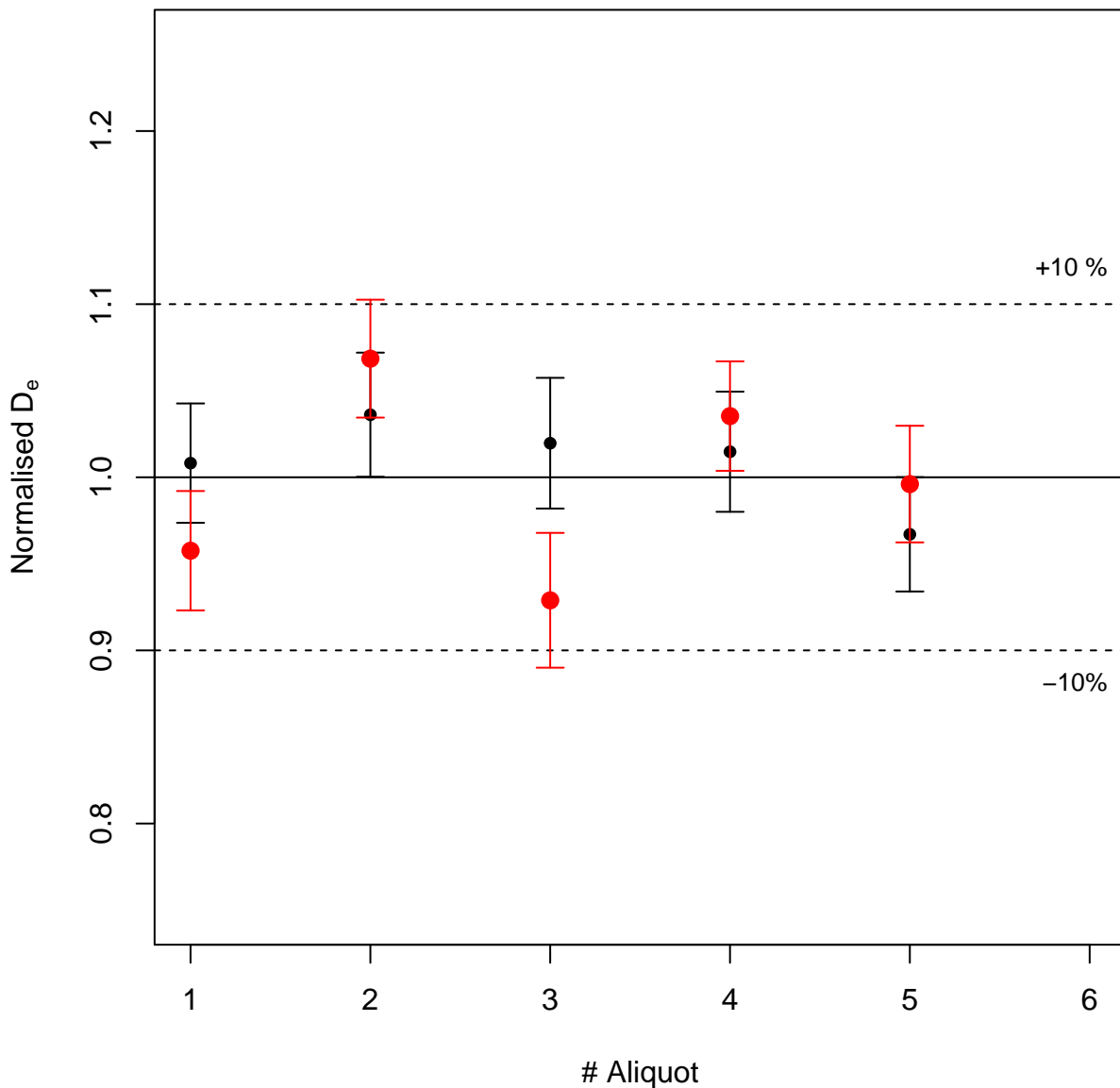
Dose recovery test



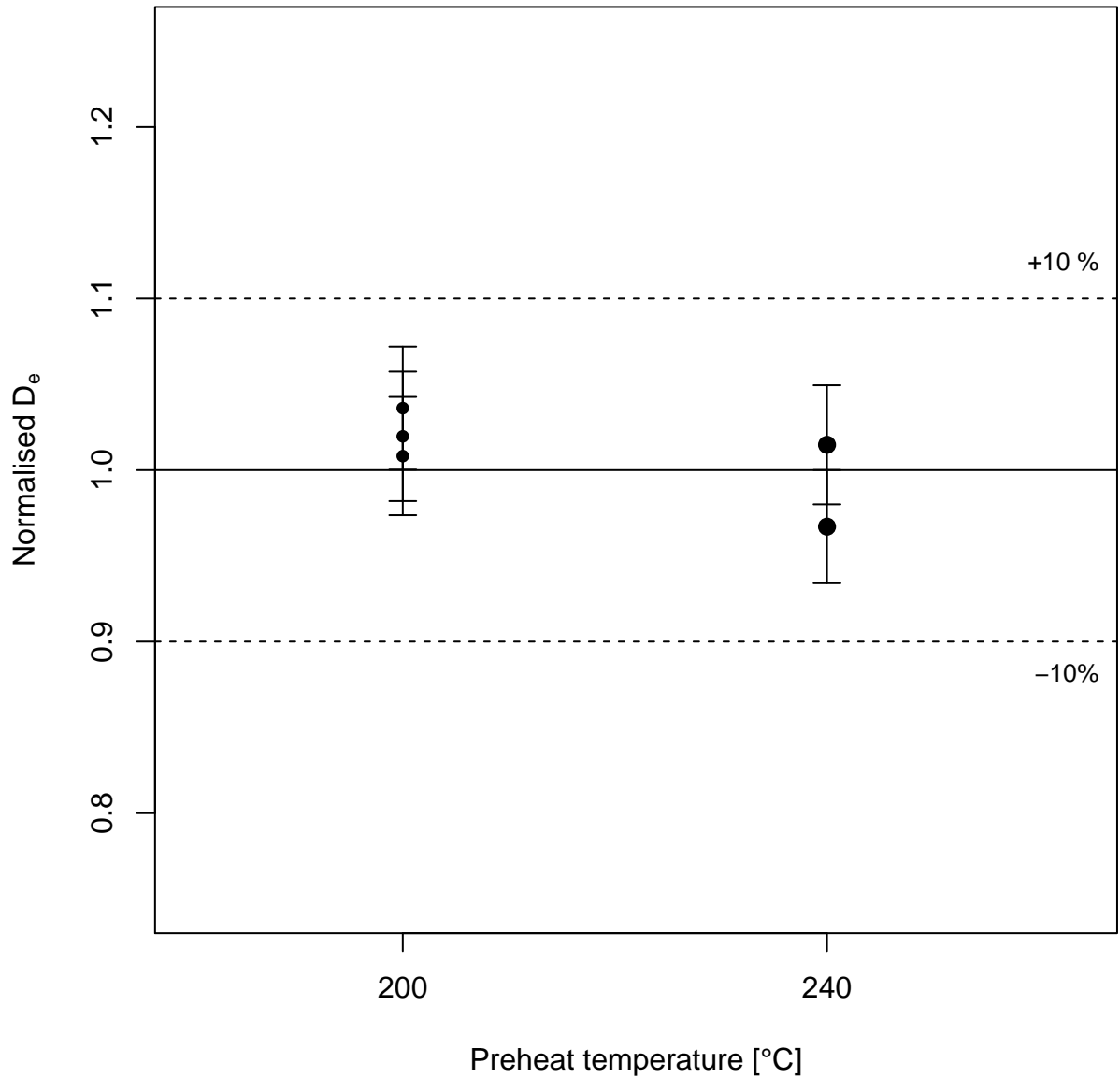
Dose recovery test

| n = 5 | weighted mean = 1.01 |

| n = 5 | weighted mean = 1 |



Dose recovery test

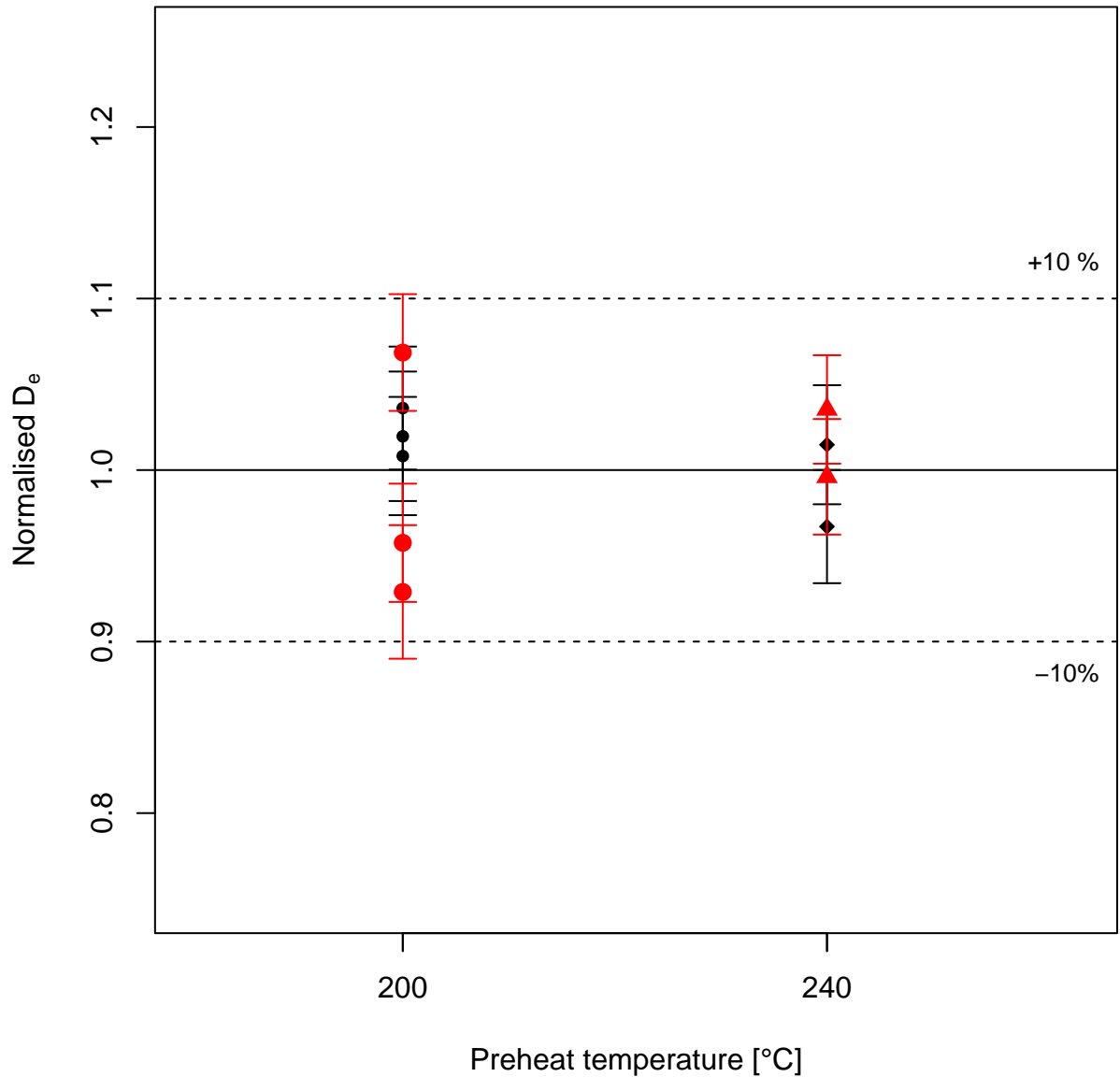


Dose recovery test

Example data



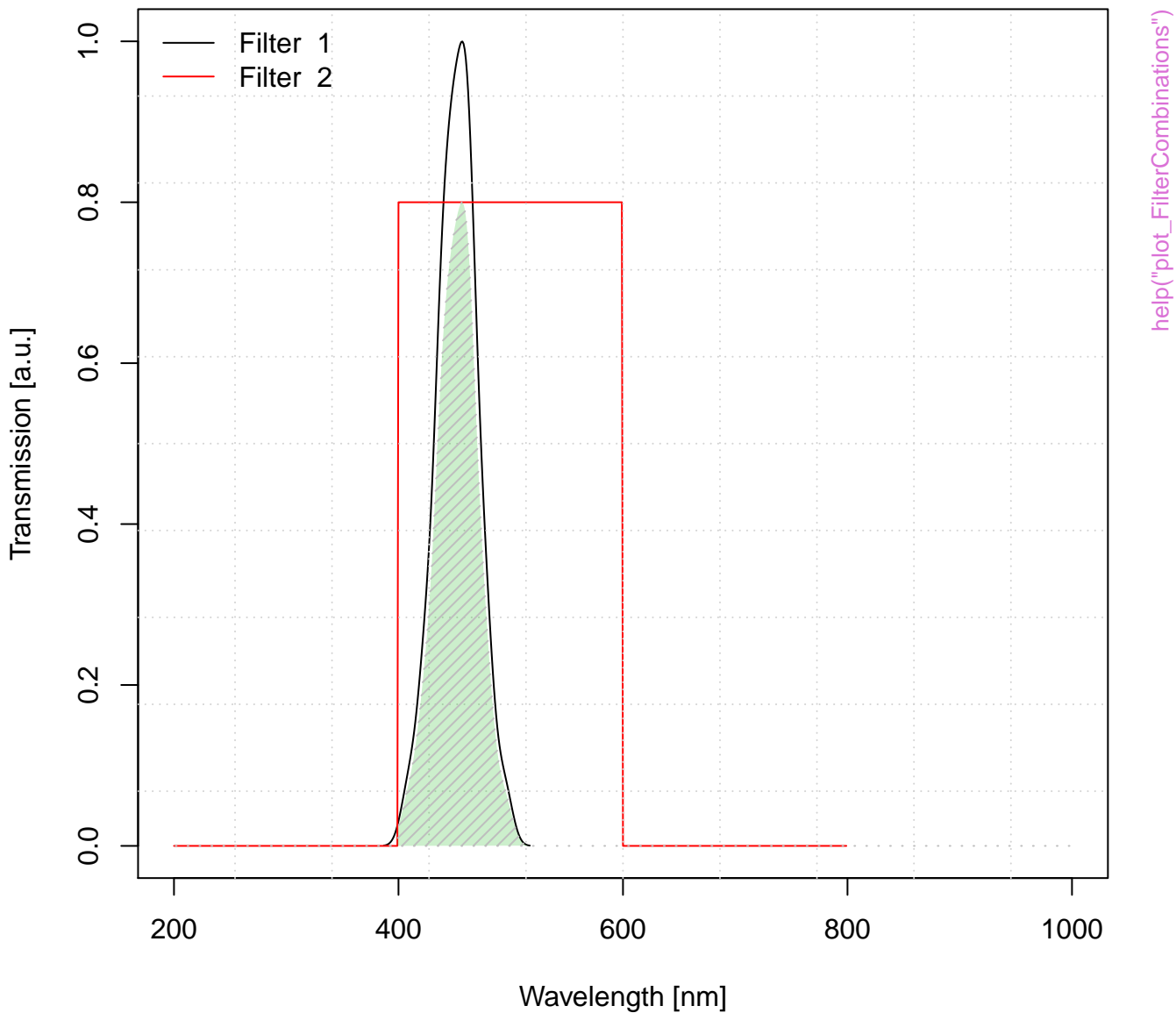
Dose recovery test



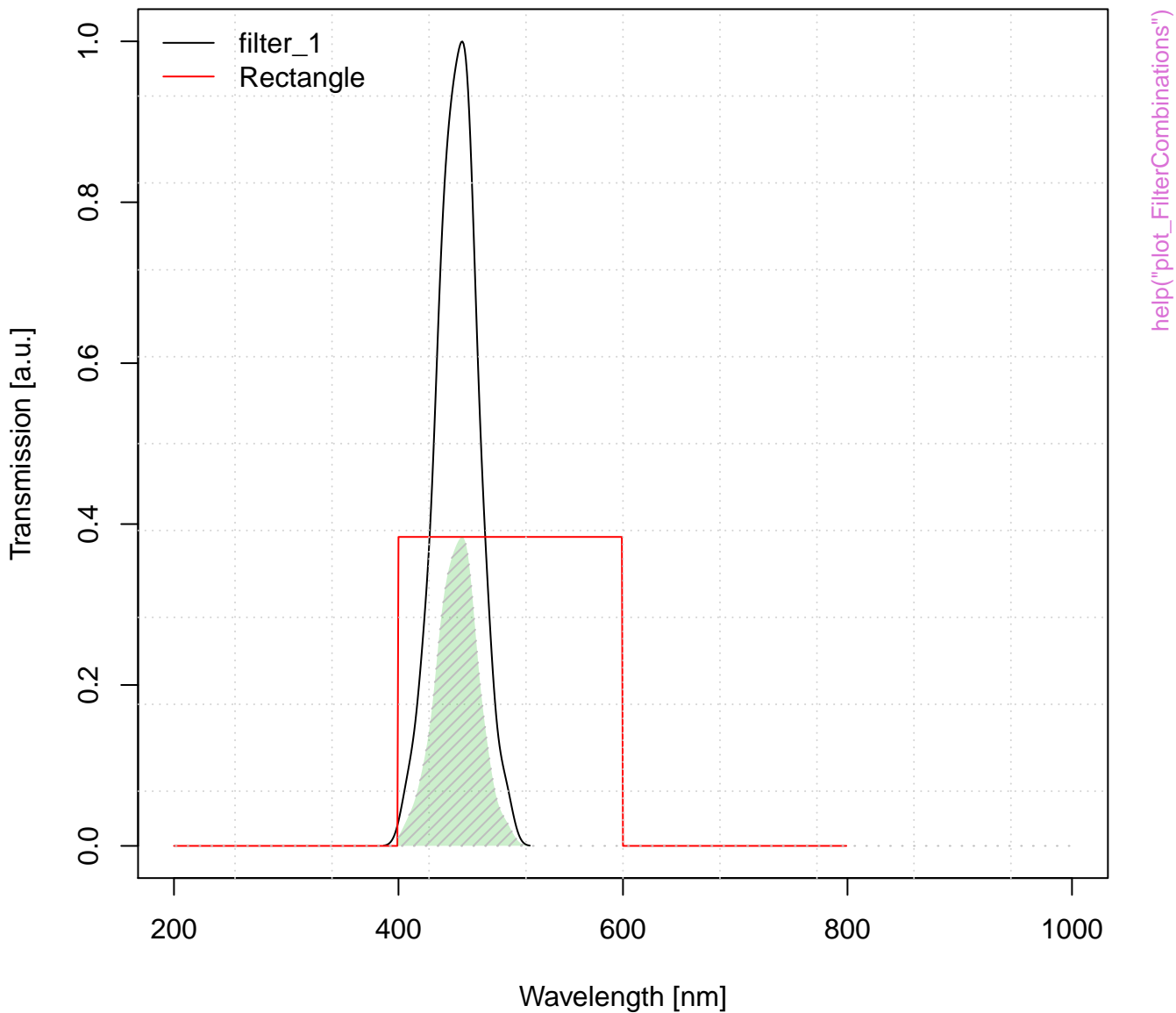
Dose recovery test



Filter Combination



Filter Combination





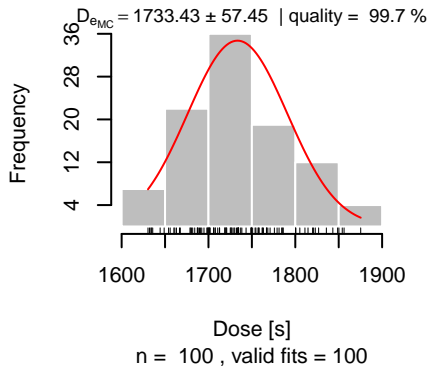
`help("plot_FilterCombinations")`

Growth curve

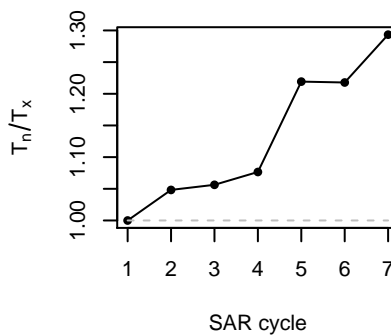
$D_e = 1737.88 \pm 57.45$ | fit: EXP



D_e from MC simulation

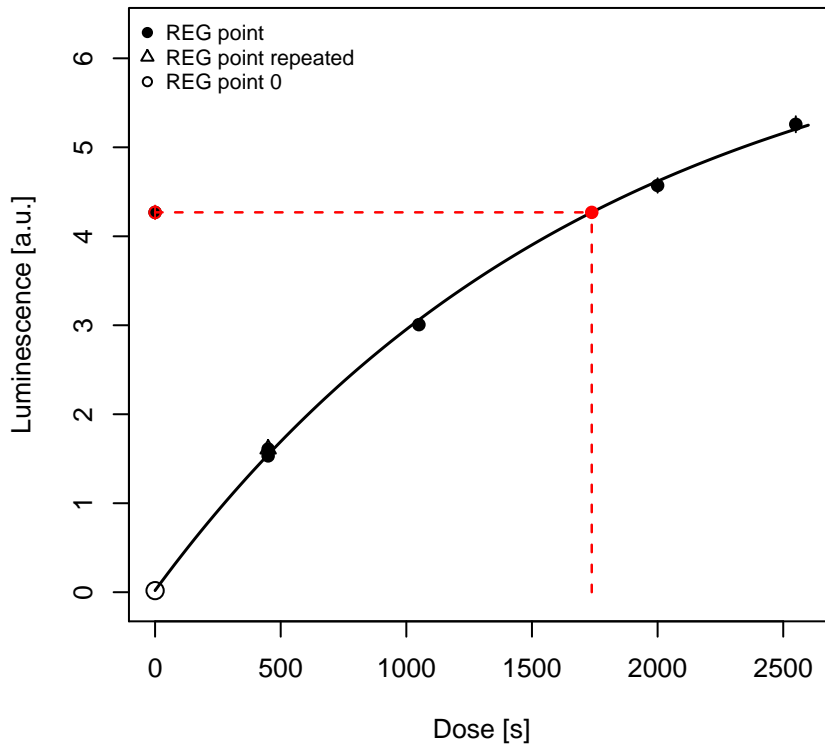


Test dose response



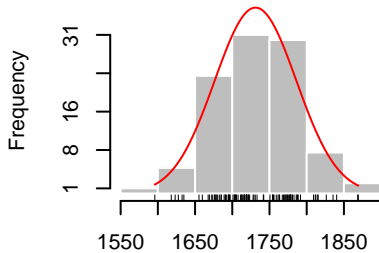
Growth curve

$D_e = 1737.88 \pm 54.9$ | fit: EXP



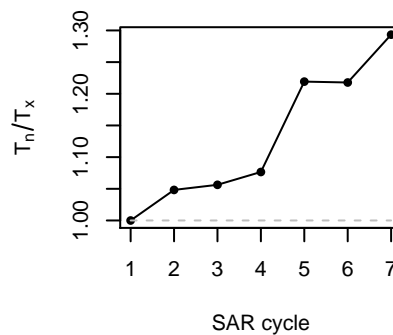
D_e from MC simulation

$D_{eMC} = 1731.23 \pm 54.9$ | quality = 99.6 %



Dose [s]
n = 100 , valid fits = 100

Test dose response



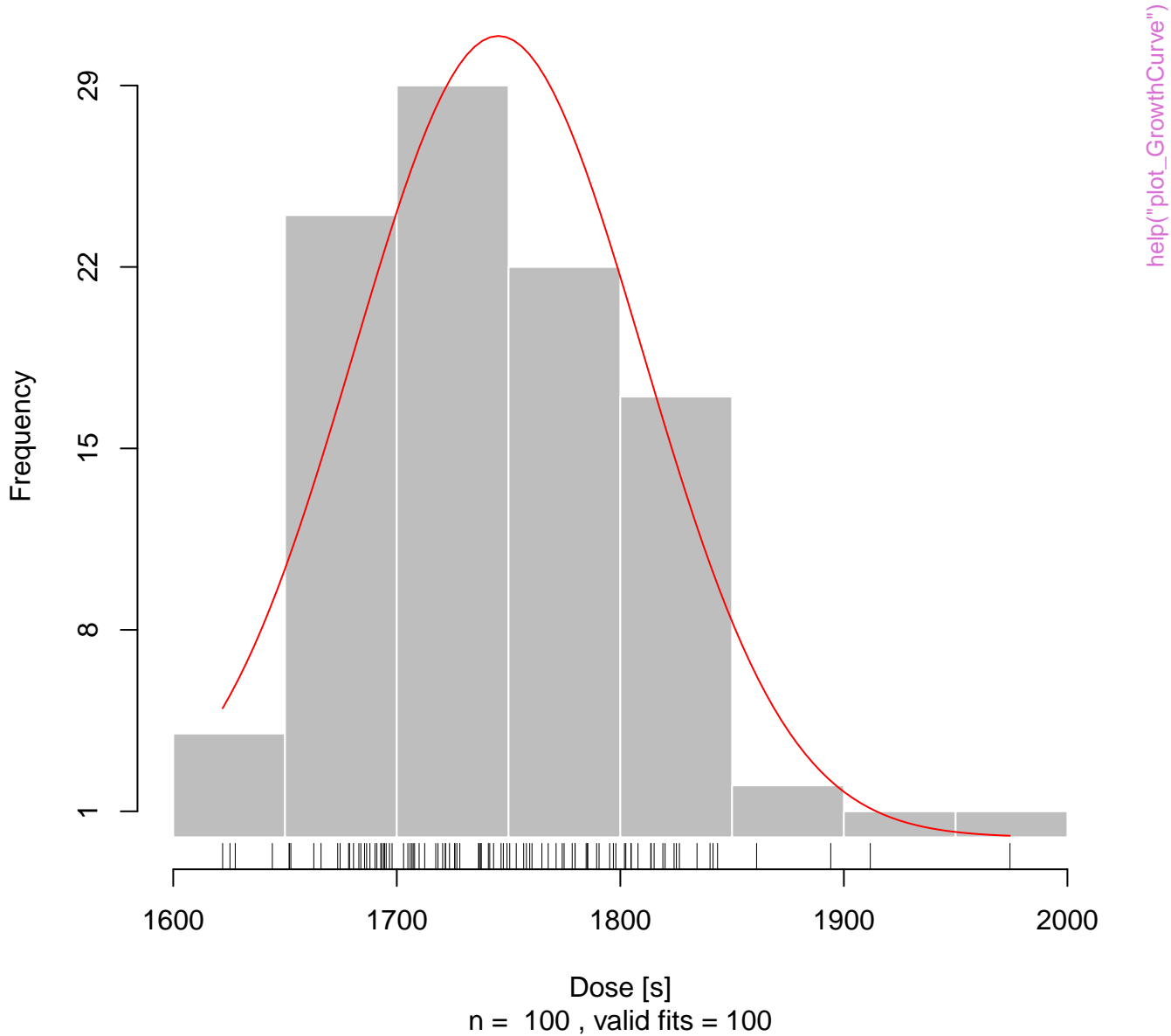
Growth curve

$D_e = 1737.88 \pm 64.53$ | fit: EXP



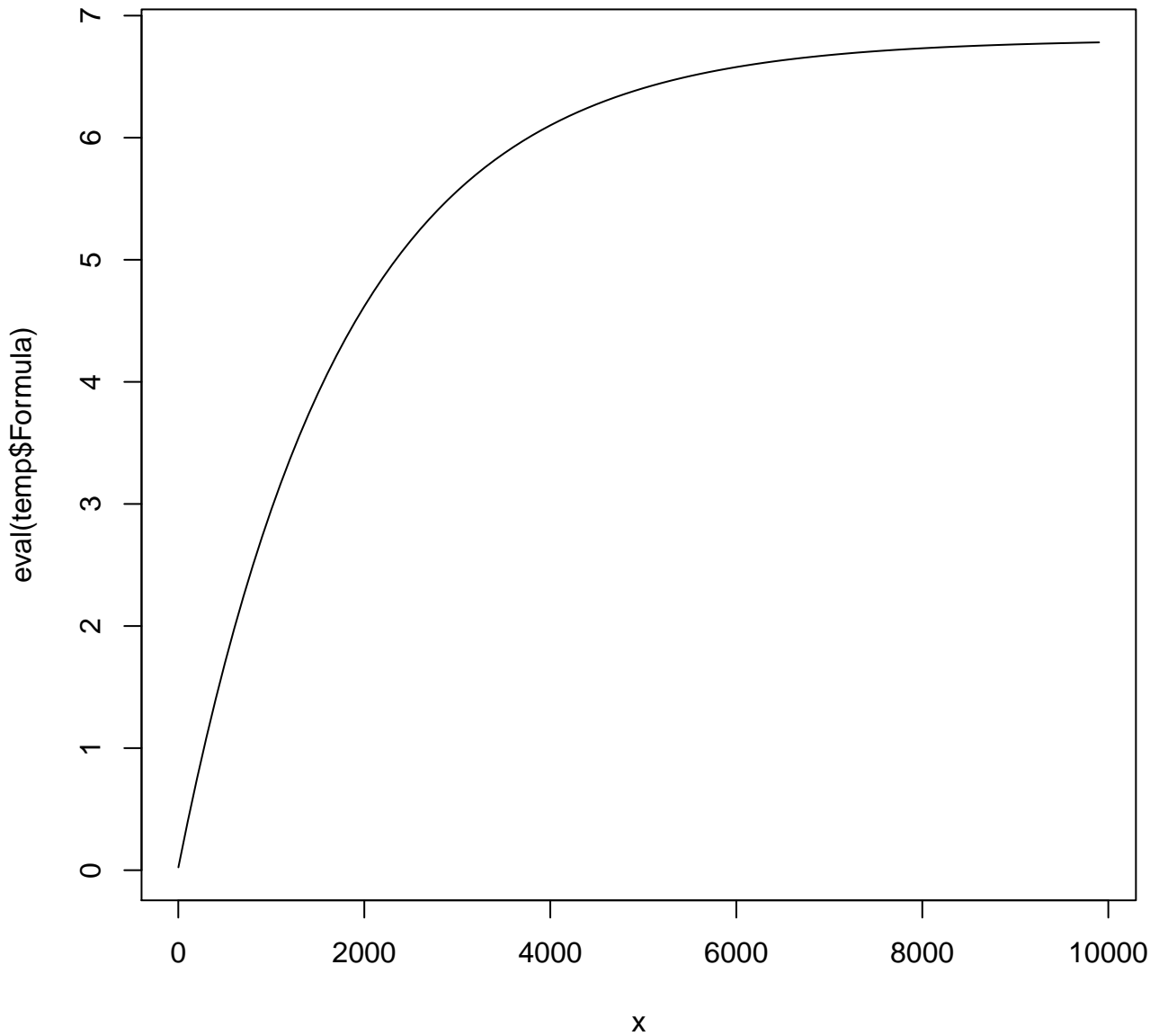
D_e from MC simulation

D_{eMC} = 1745.42 ± 64.53 | quality = 99.6 %



Test dose response





help("plot_GrowthCurve")

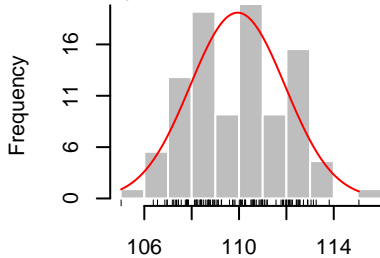
Growth curve

$D_e = 109.74 \pm 2$ | fit: EXP



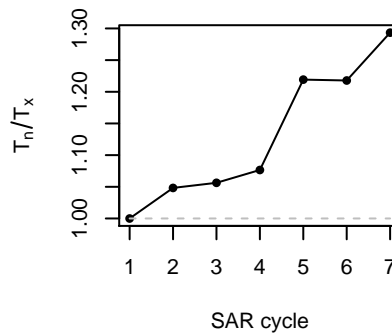
D_e from MC simulation

$D_{eMC} = 109.94 \pm 2$ | quality = 300.2 %



n = 100 , valid fits = 100

Test dose response



Growth curve



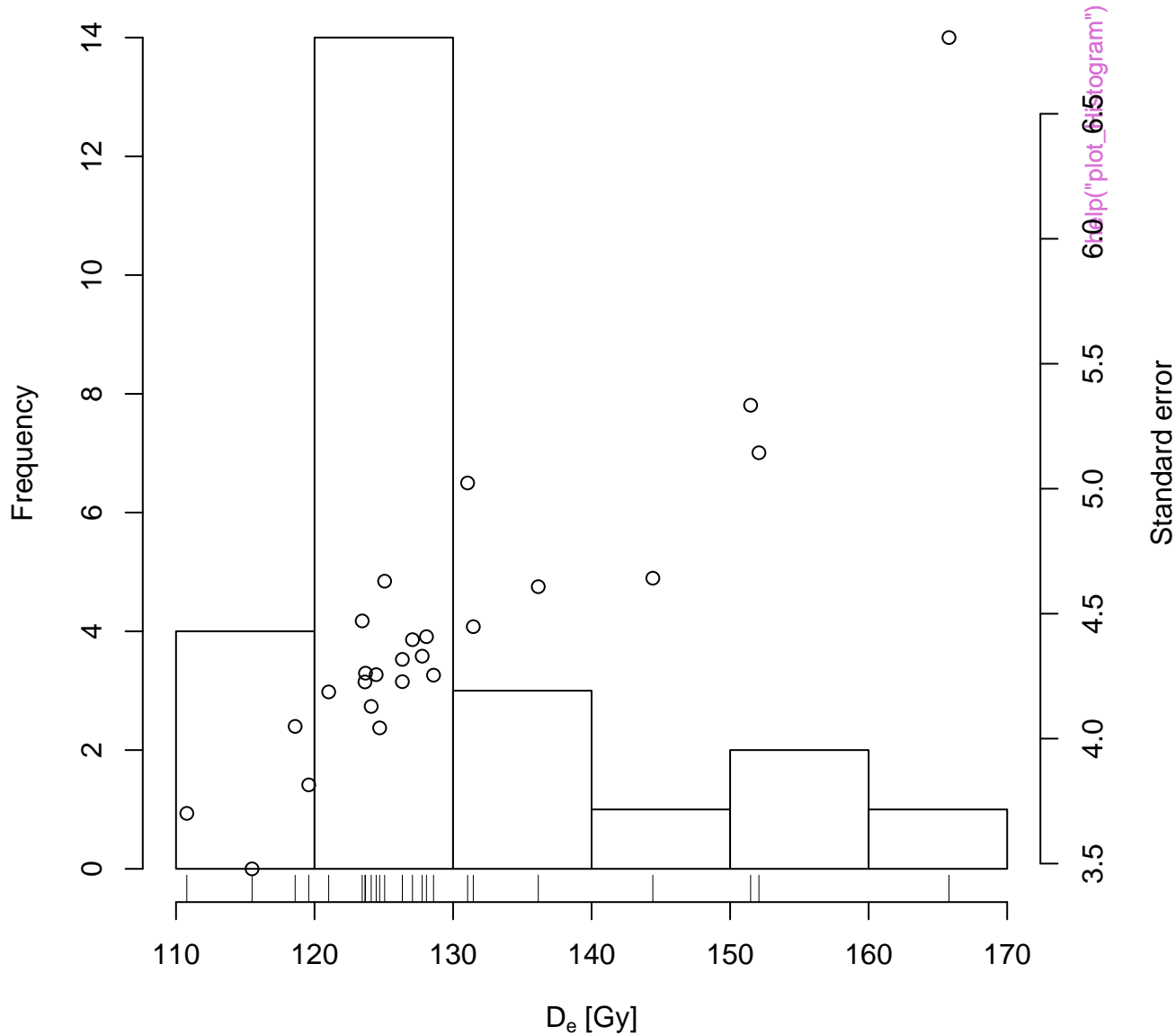
D_e from Monte Carlo simulation



Test dose response



Histogram



Histogram of De-values

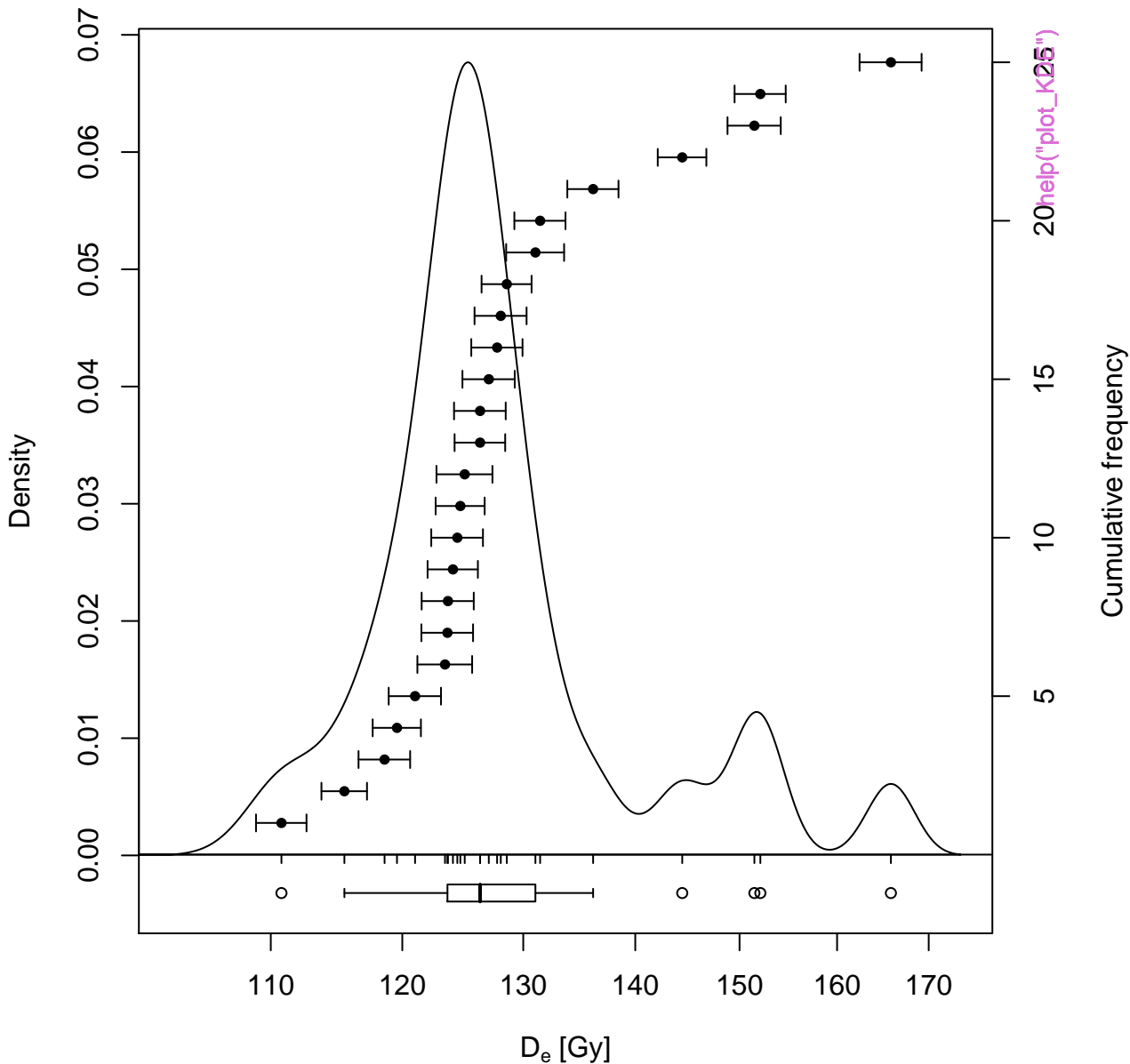
Example data set



D_e distribution



D_e distribution



Dose distribution



D_e distribution



D_e distribution

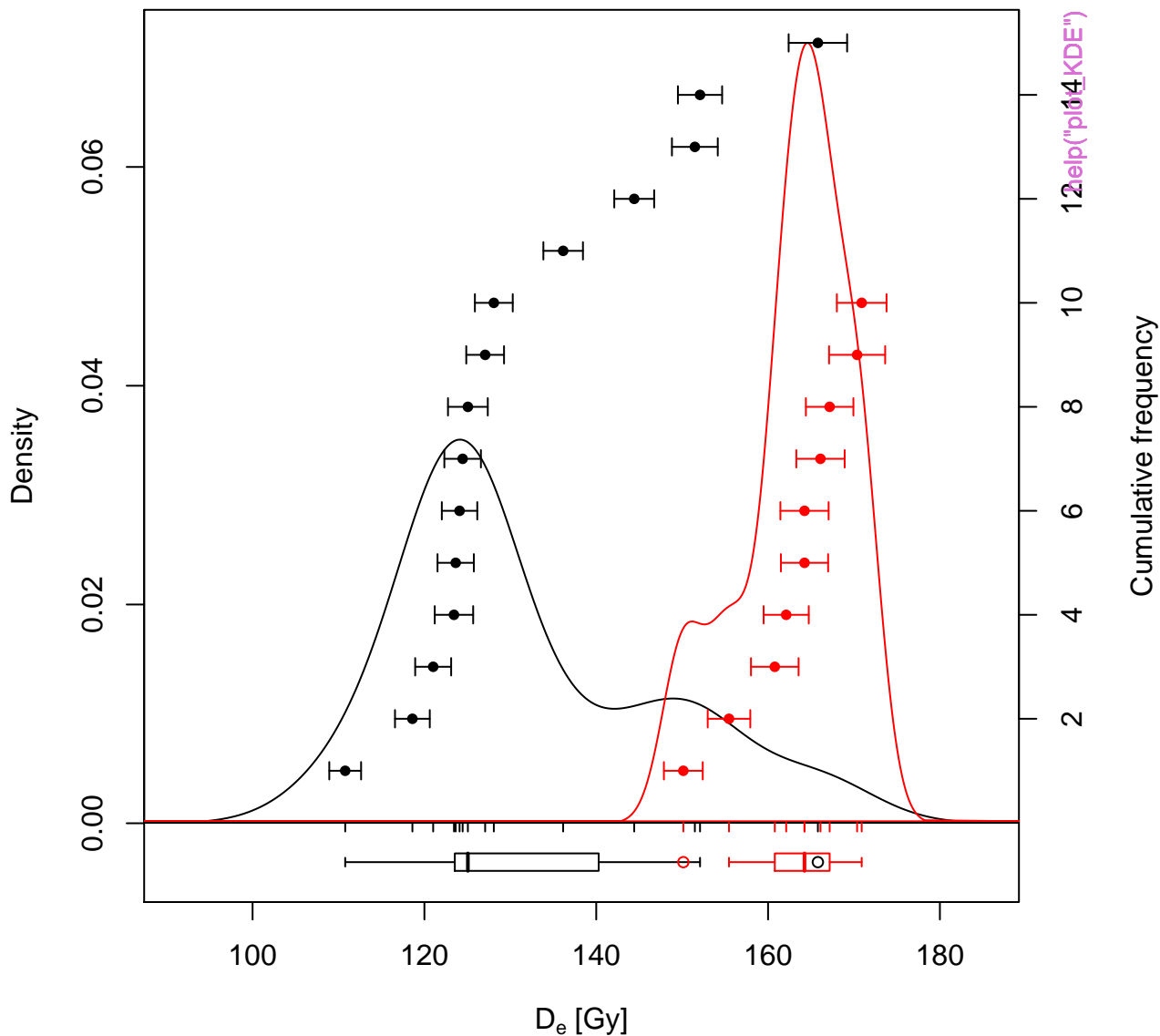
n = 25 | median = 126.34 | skewness = 1.34 | in 2 sigma = 96 %



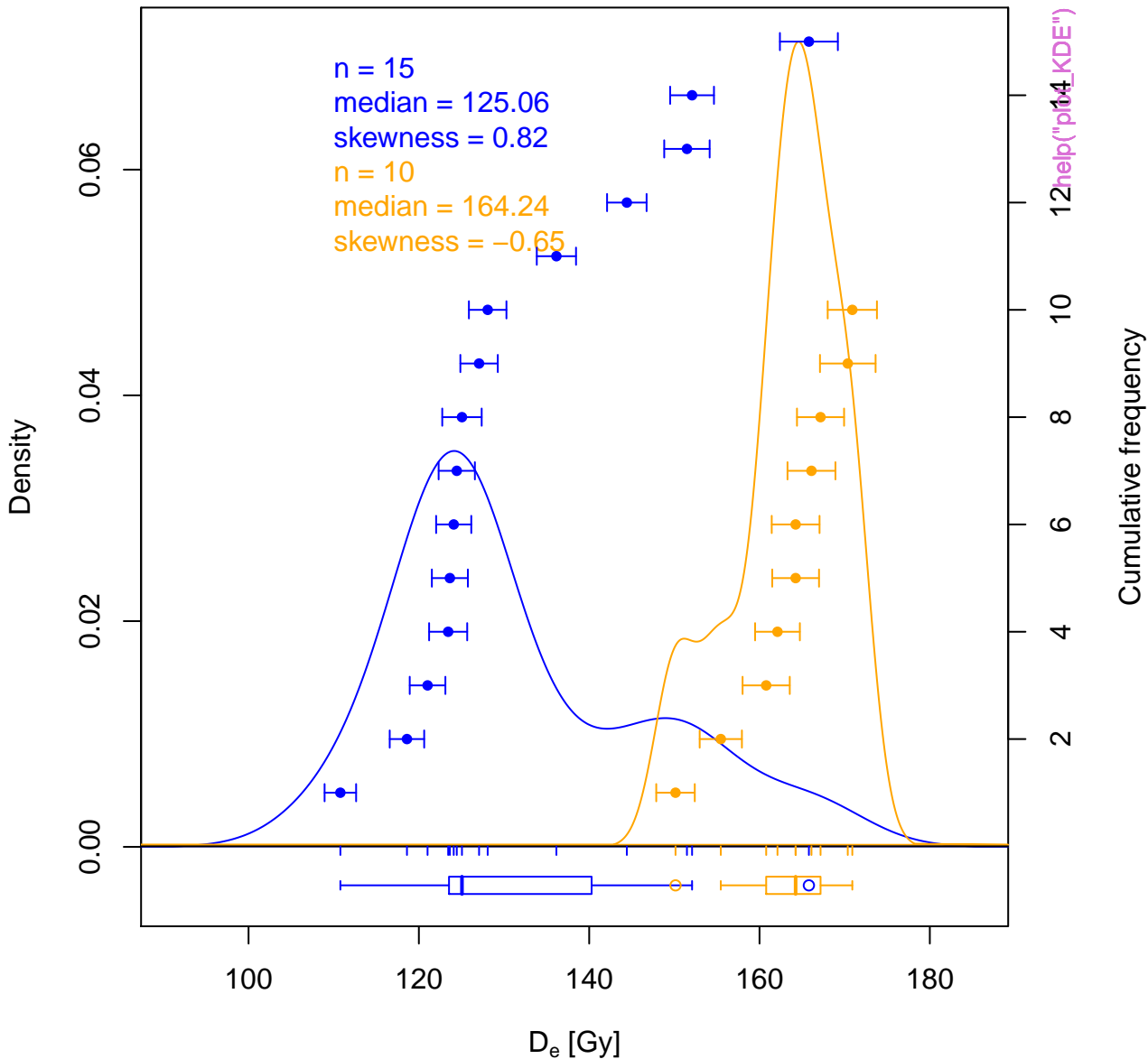
D_e distribution



D_e distribution



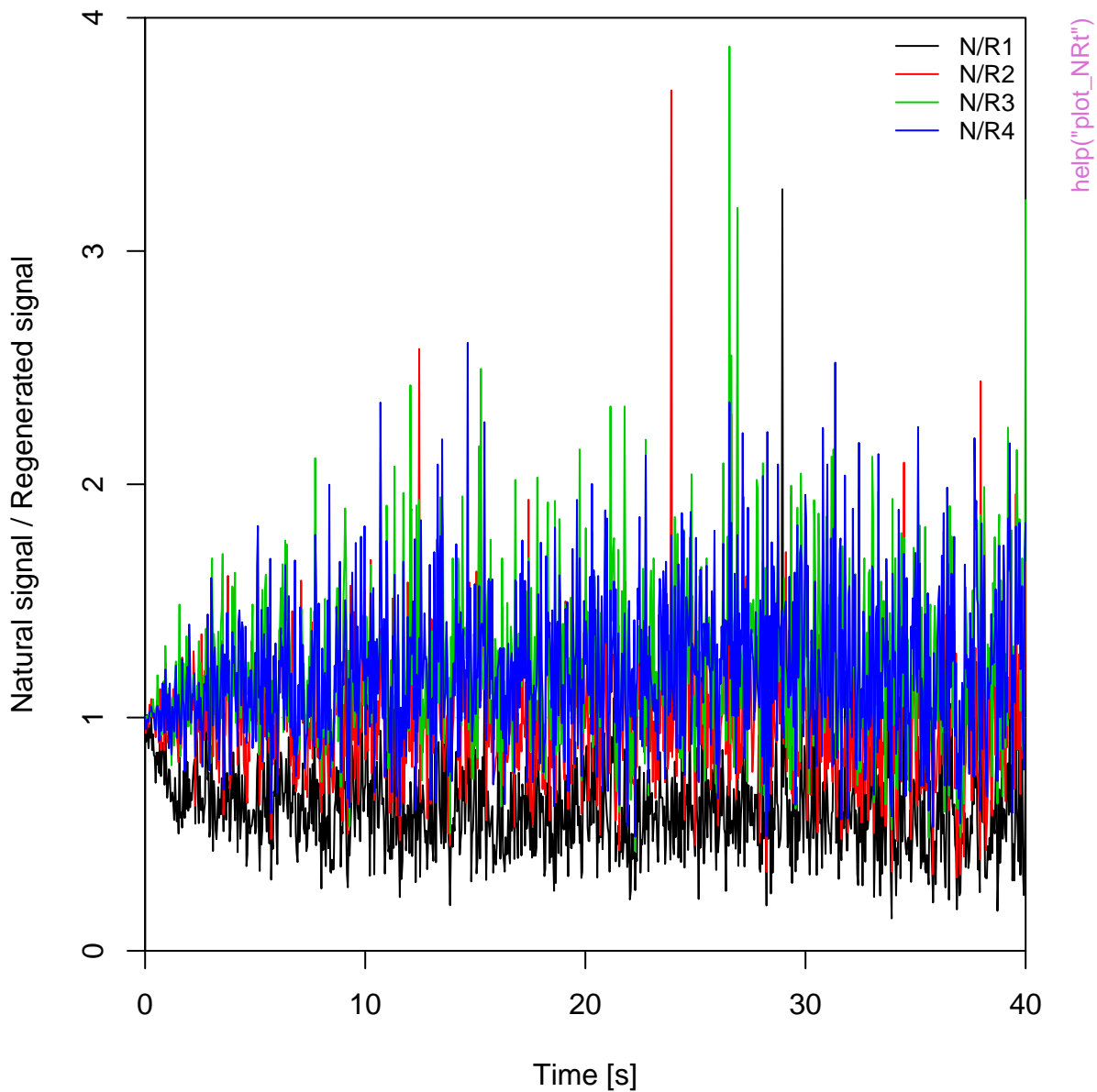
D_e distribution



D_e distribution



NR(t) Plot

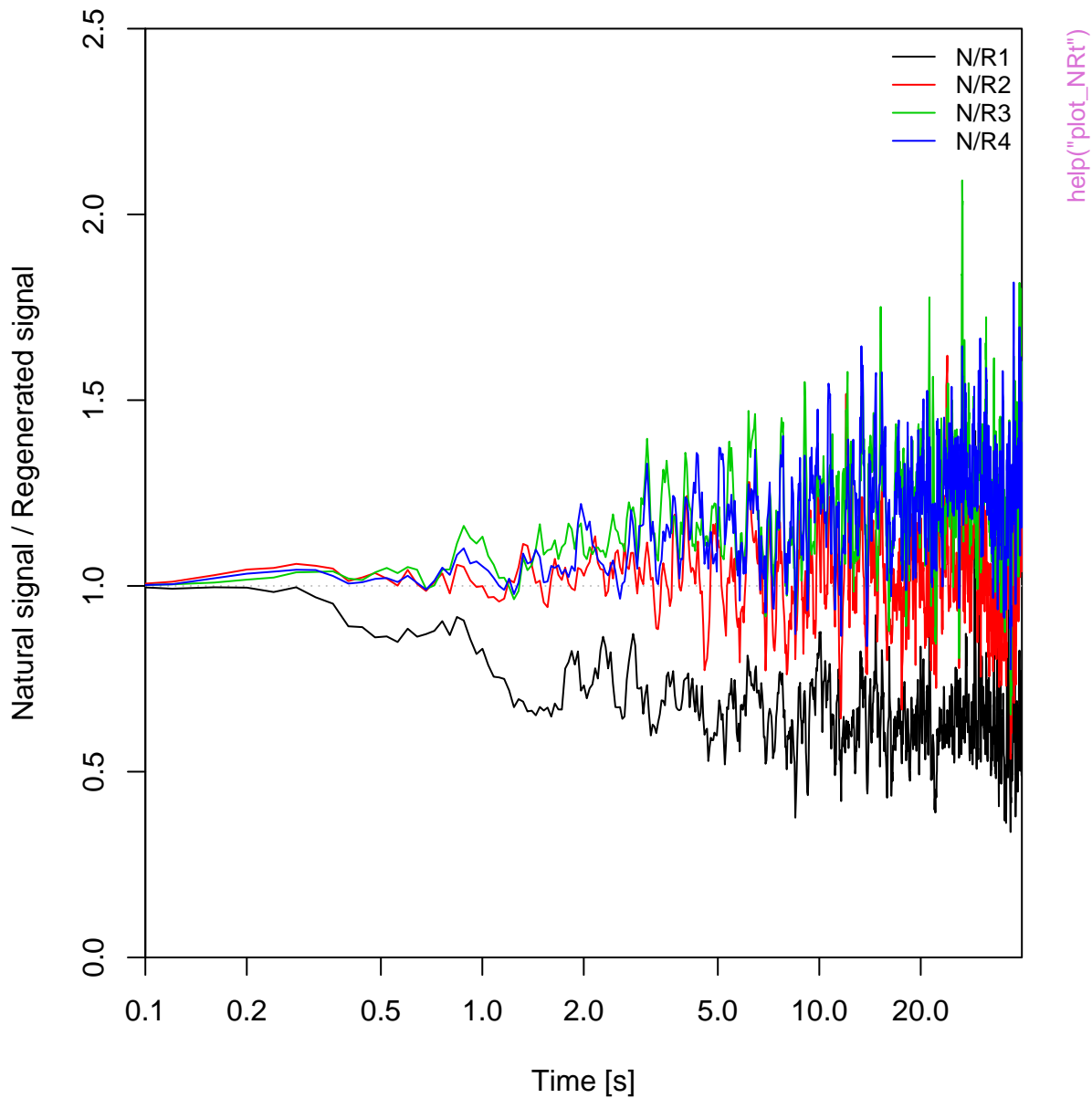


NR(t) Plot



help("plot_NRt")

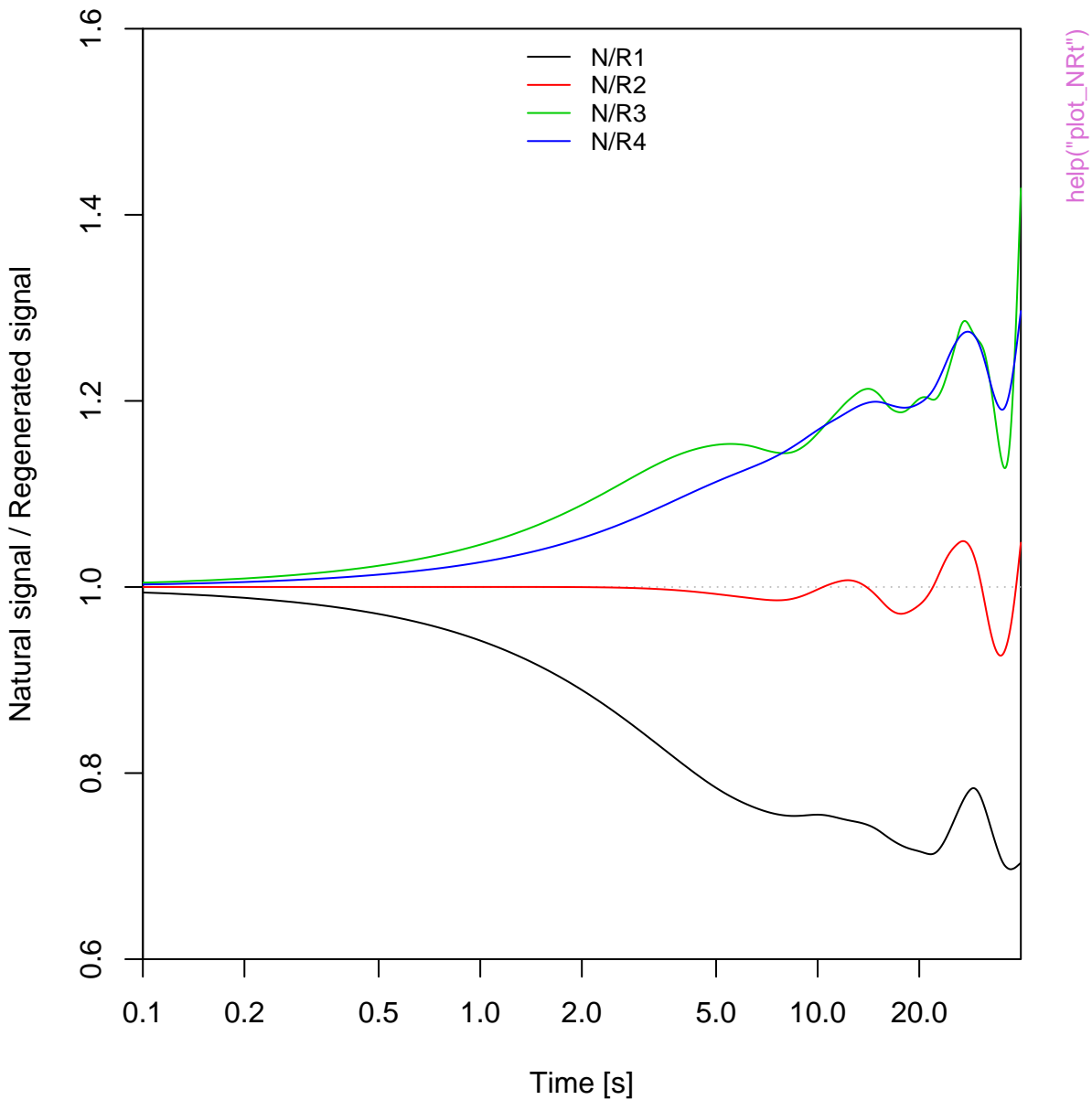
NR(t) Plot



NR(t) Plot



NR(t) Plot



TnTx(t) Plot

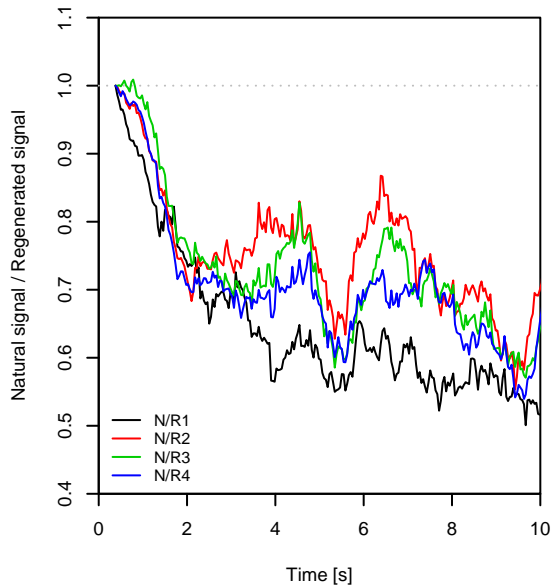
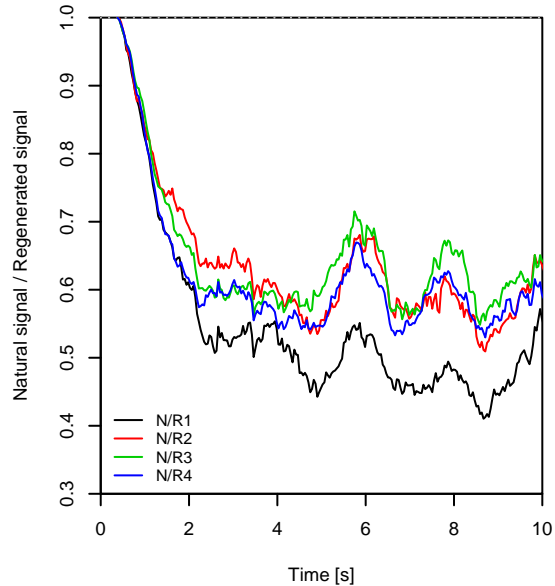


Aliquot #1**Aliquot #2**

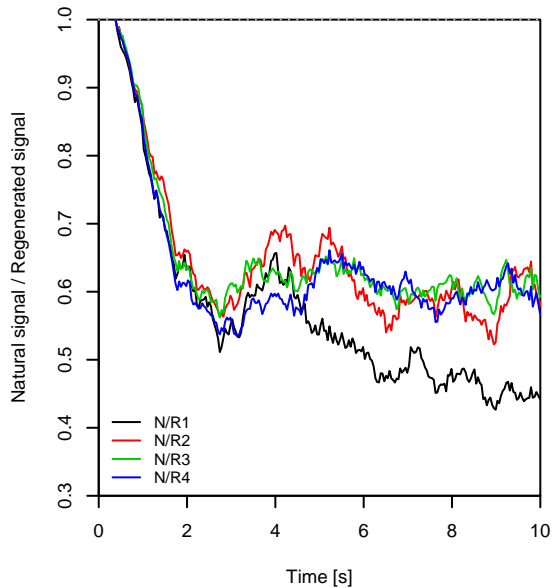
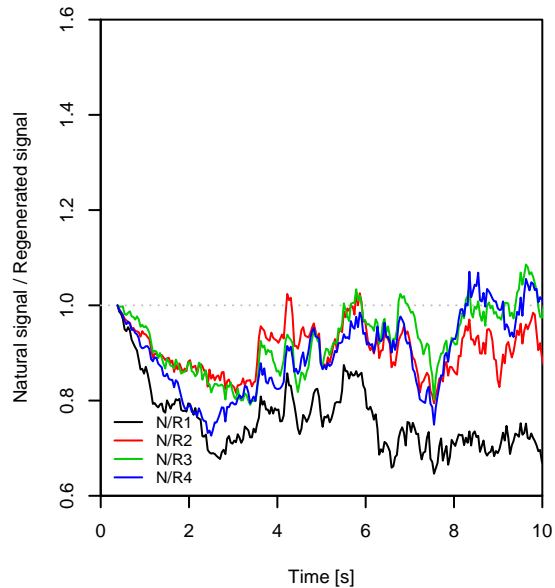
help("plot_NRt")

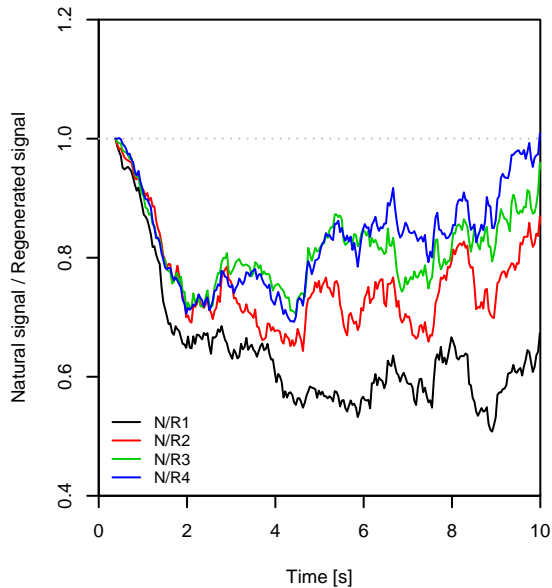
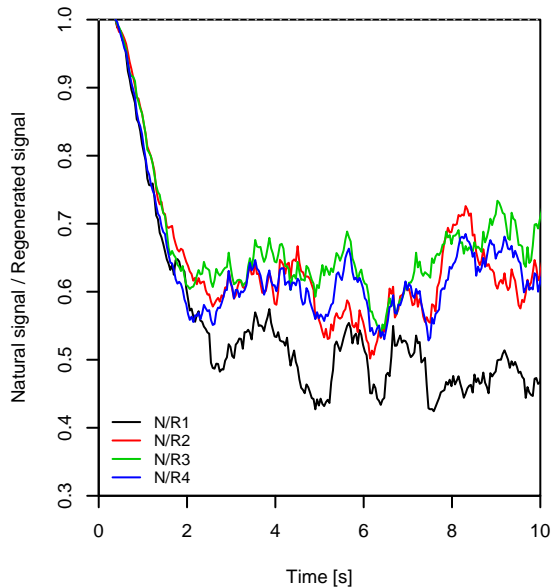
Aliquot #3**Aliquot #4**

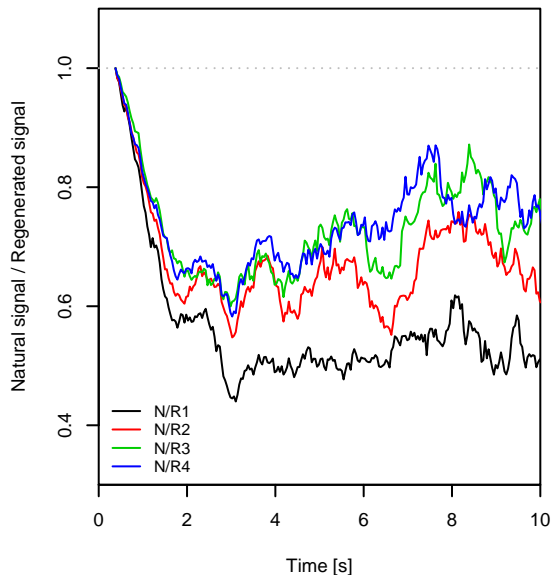
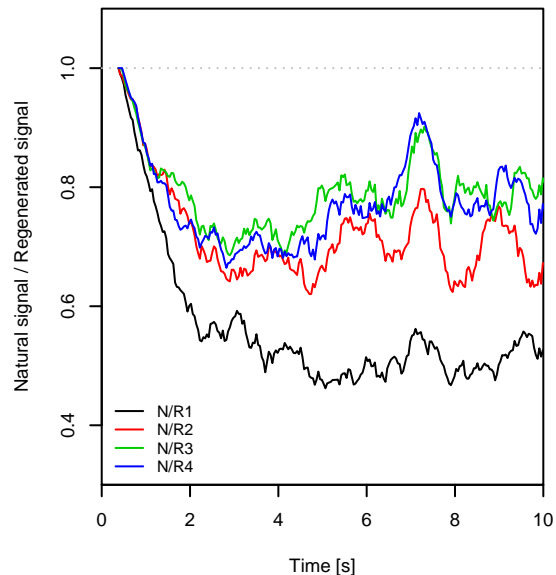
Aliquot #5**Aliquot #6****Aliquot #7****Aliquot #8**

Aliquot #9**Aliquot #10**

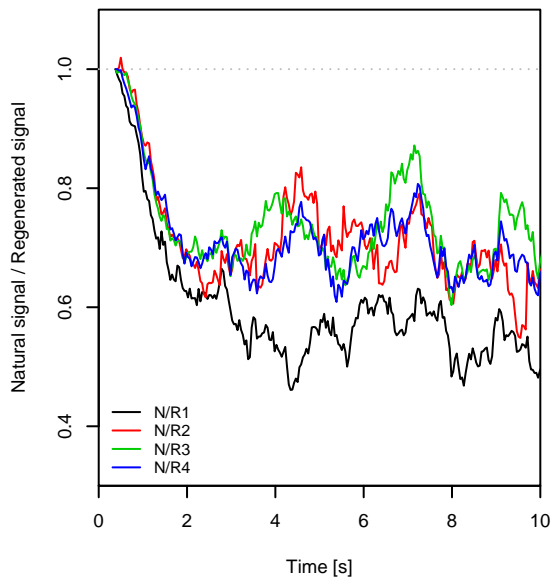
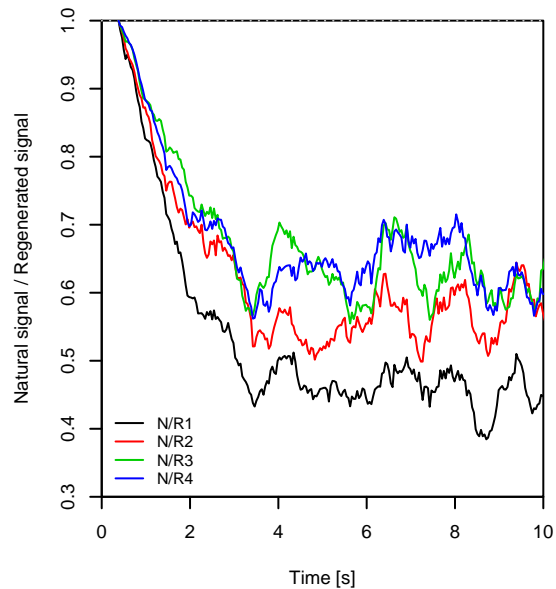
help("plot_NRt")

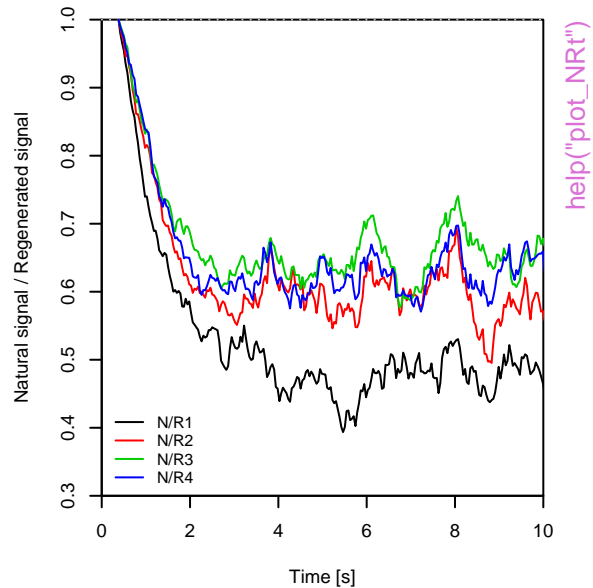
Aliquot #11**Aliquot #12**

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

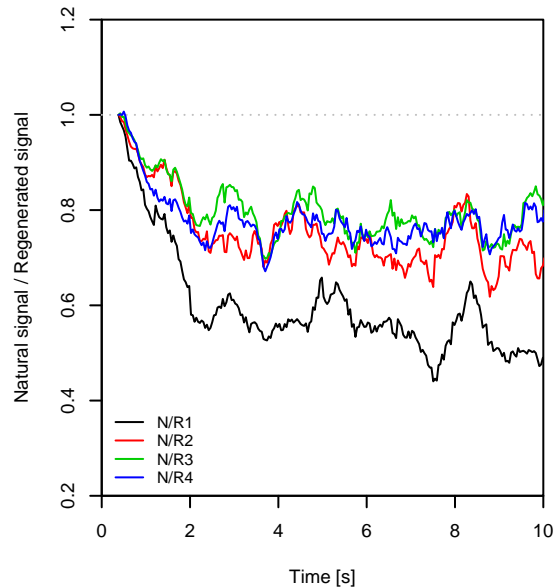
Aliquot #17**Aliquot #18**

help("plot_NRt")

Aliquot #19**Aliquot #20**

Aliquot #21**Aliquot #22**

help("plot_NRt")

Aliquot #23**Aliquot #24**

TL combined



TL combined



unkown curve type



RLum.Data.Image



RLum.Data.Spectrum



[help\("plot_RLum.Data.Spectrum"\)](#)

RLum.Data.Spectrum



`help("plot_RLum.Data.Spectrum")`

RLum.Data.Spectrum



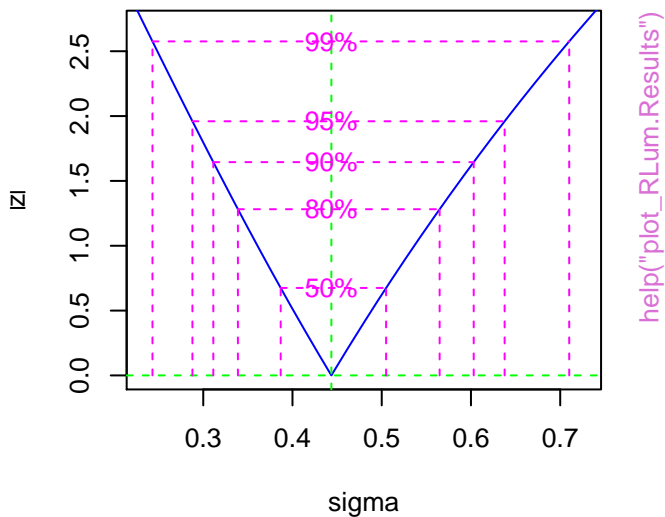
unkown curve type



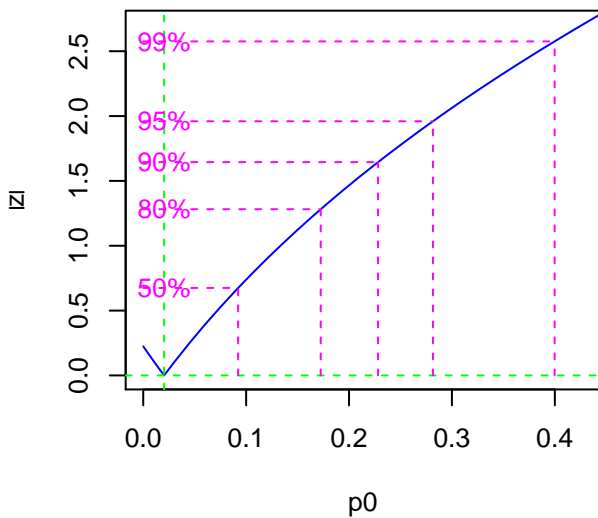
Likelihood profile: gamma



Likelihood profile: sigma



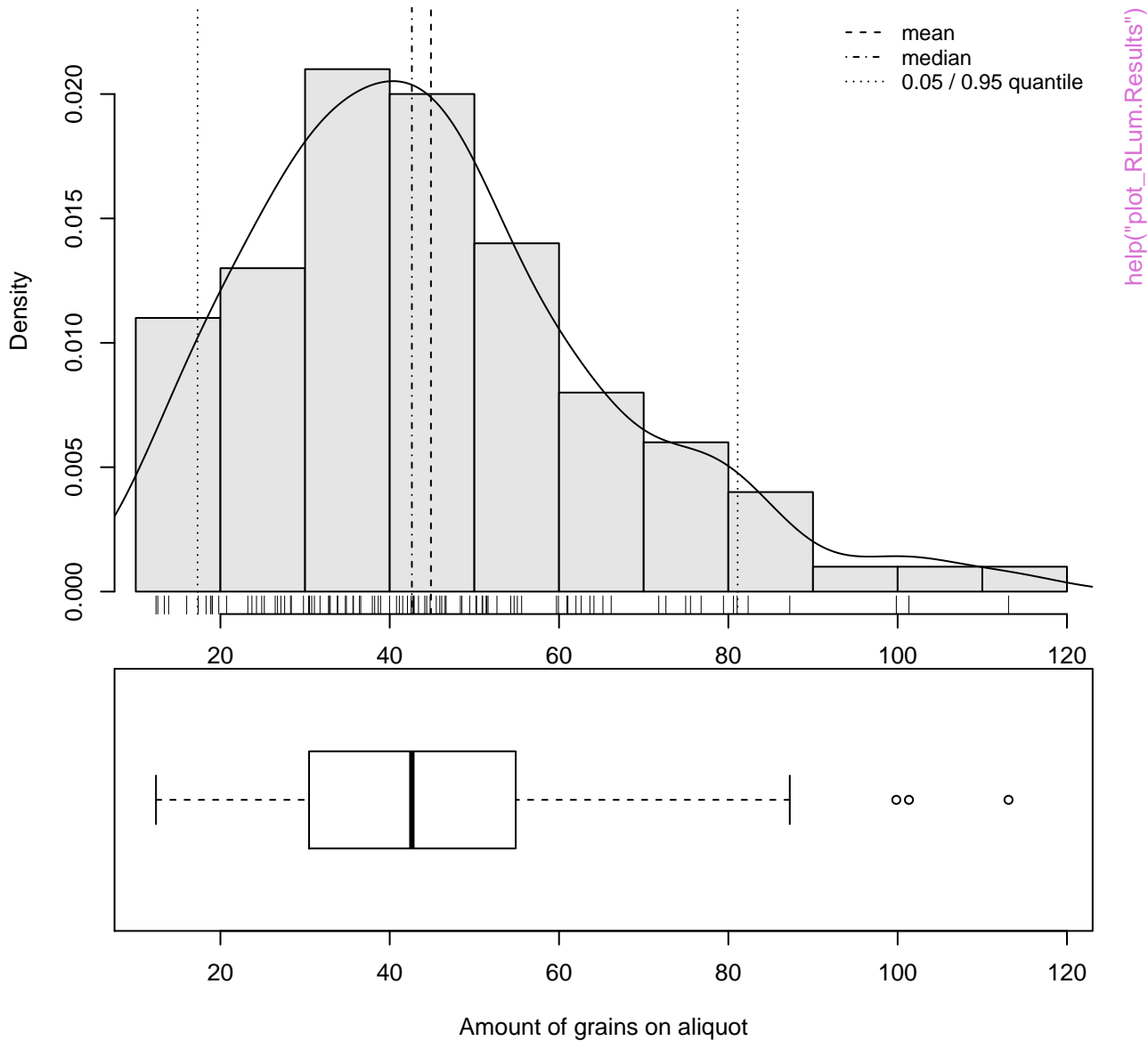
Likelihood profile: p0



help("plot_RLum.Results")

Monte Carlo Simulation

$$n = \left| \hat{\mu} = 45 \mid \hat{\sigma} = 21 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 2 \mid v = 0.84 \right.$$



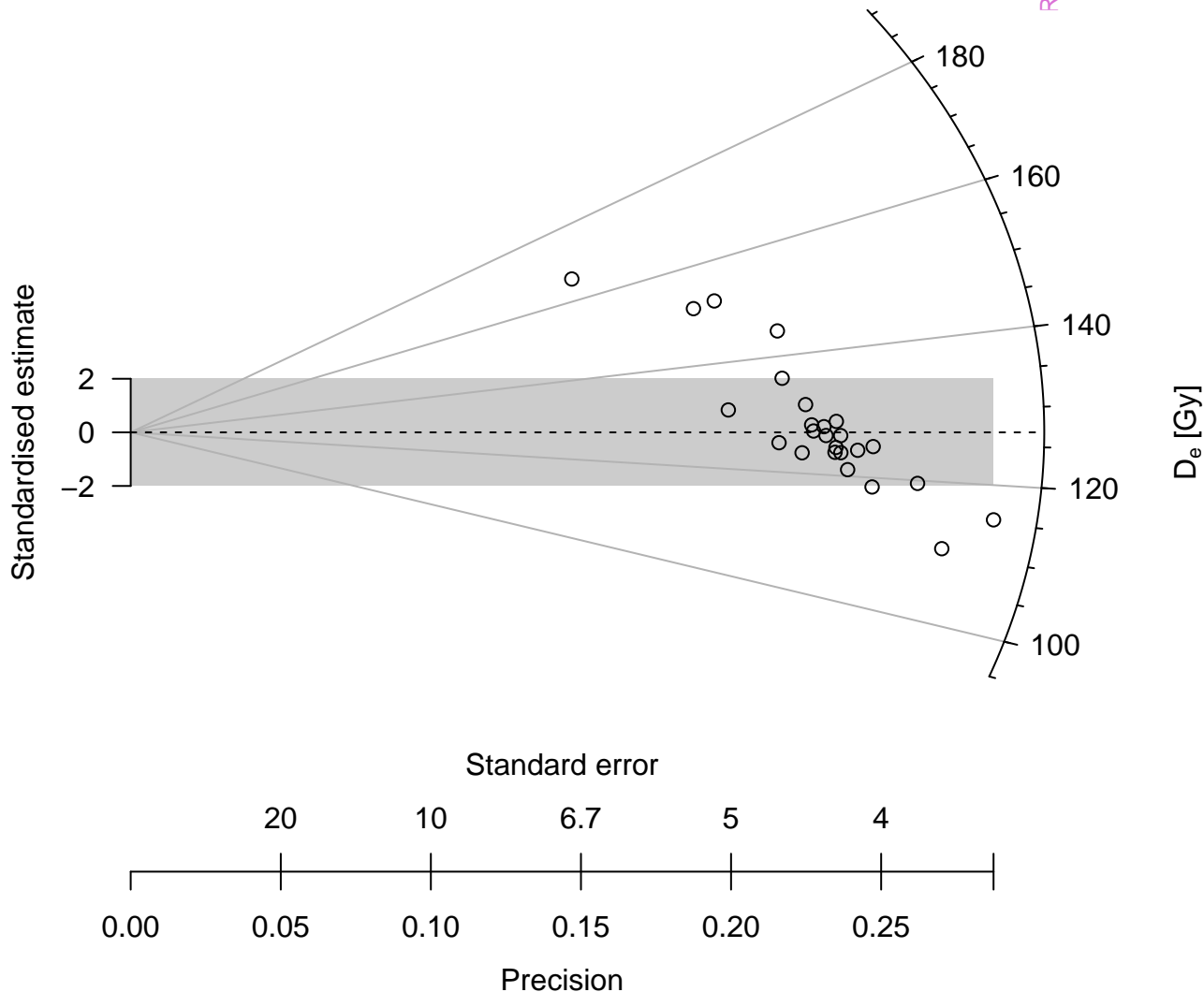
D_e distribution

n = 25 | in 2 sigma = 68 %



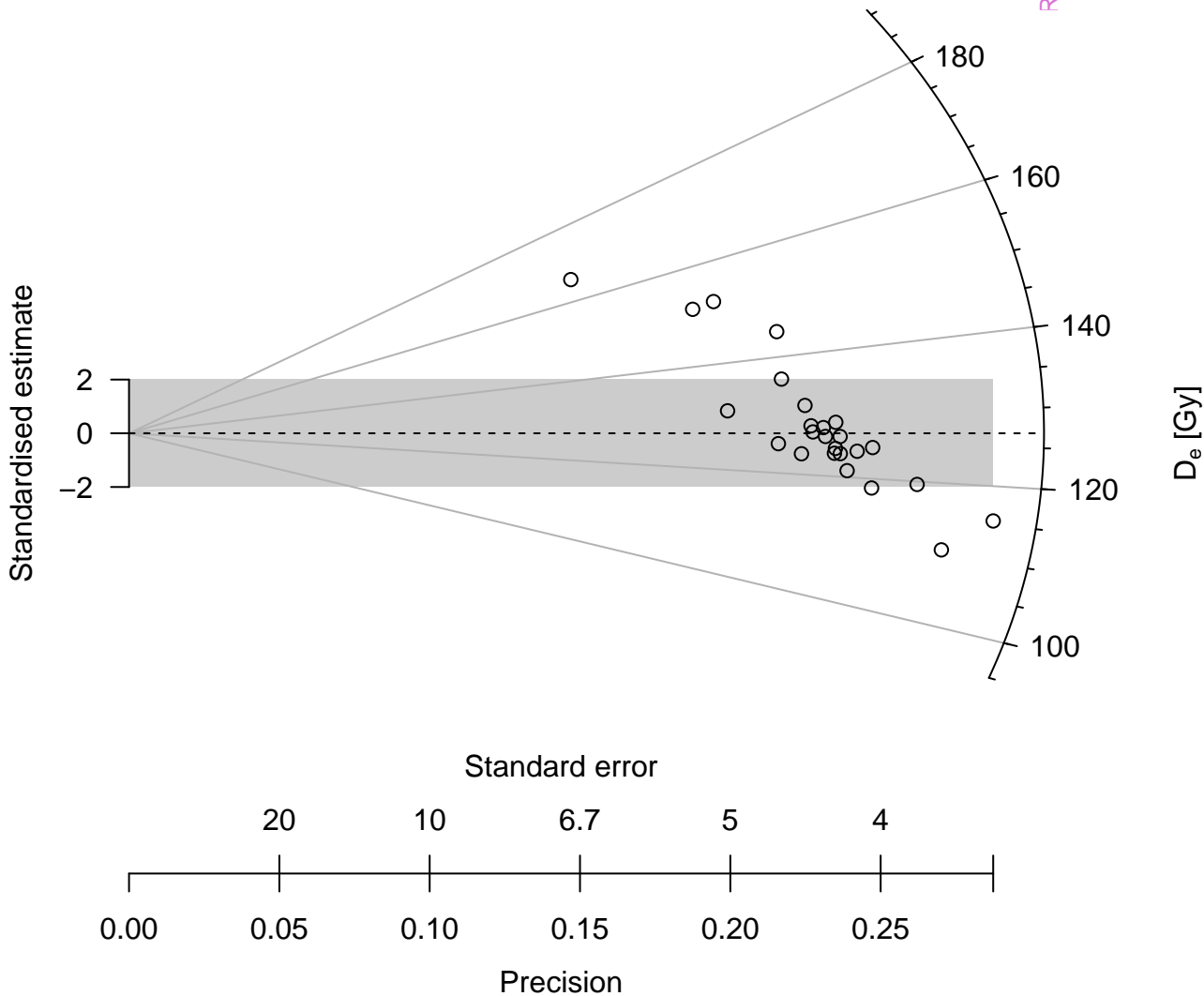
D_e distribution

n = 25 | in 2 sigma = 68 %



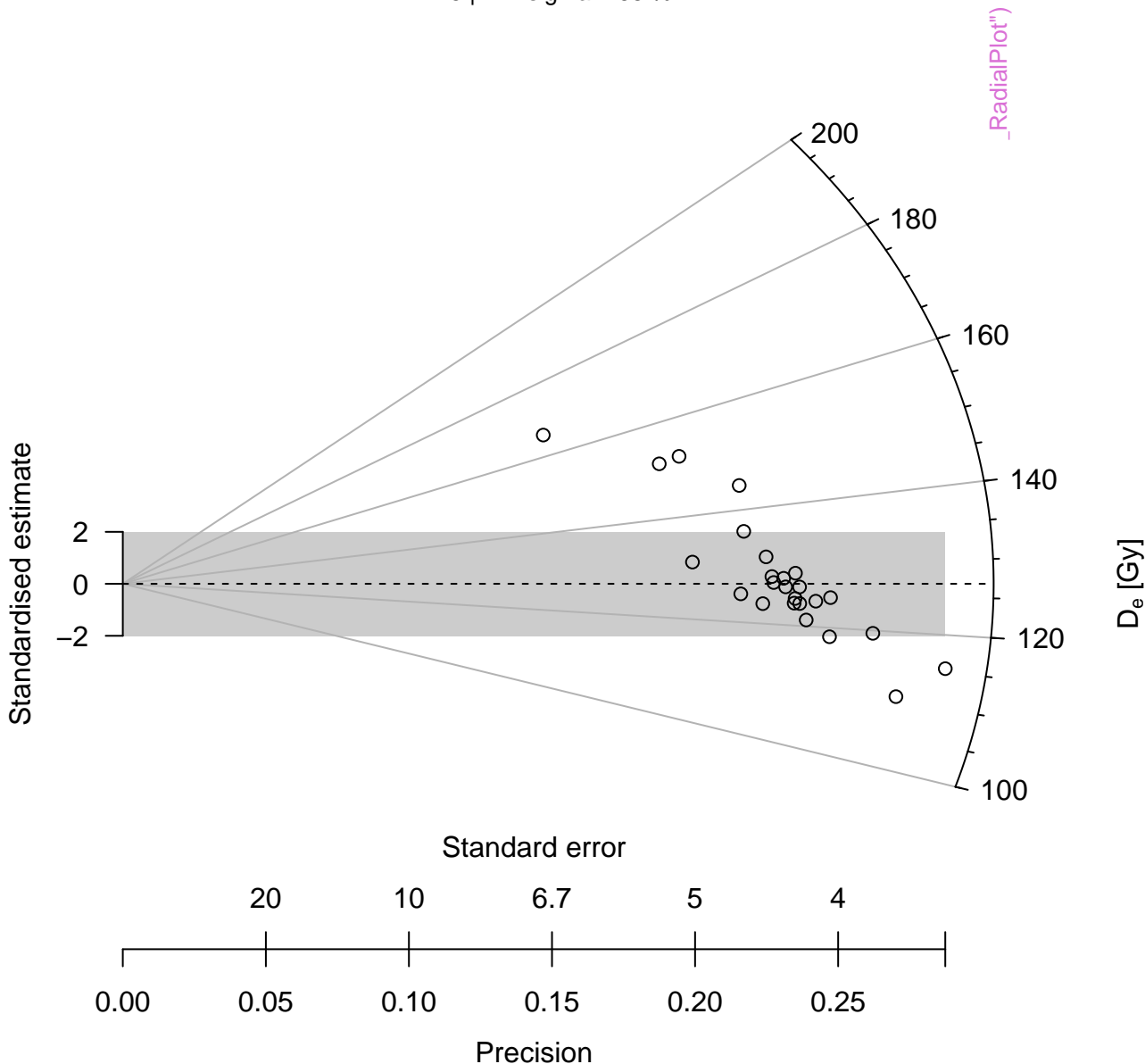
D_e distribution

n = 25 | in 2 sigma = 68 %



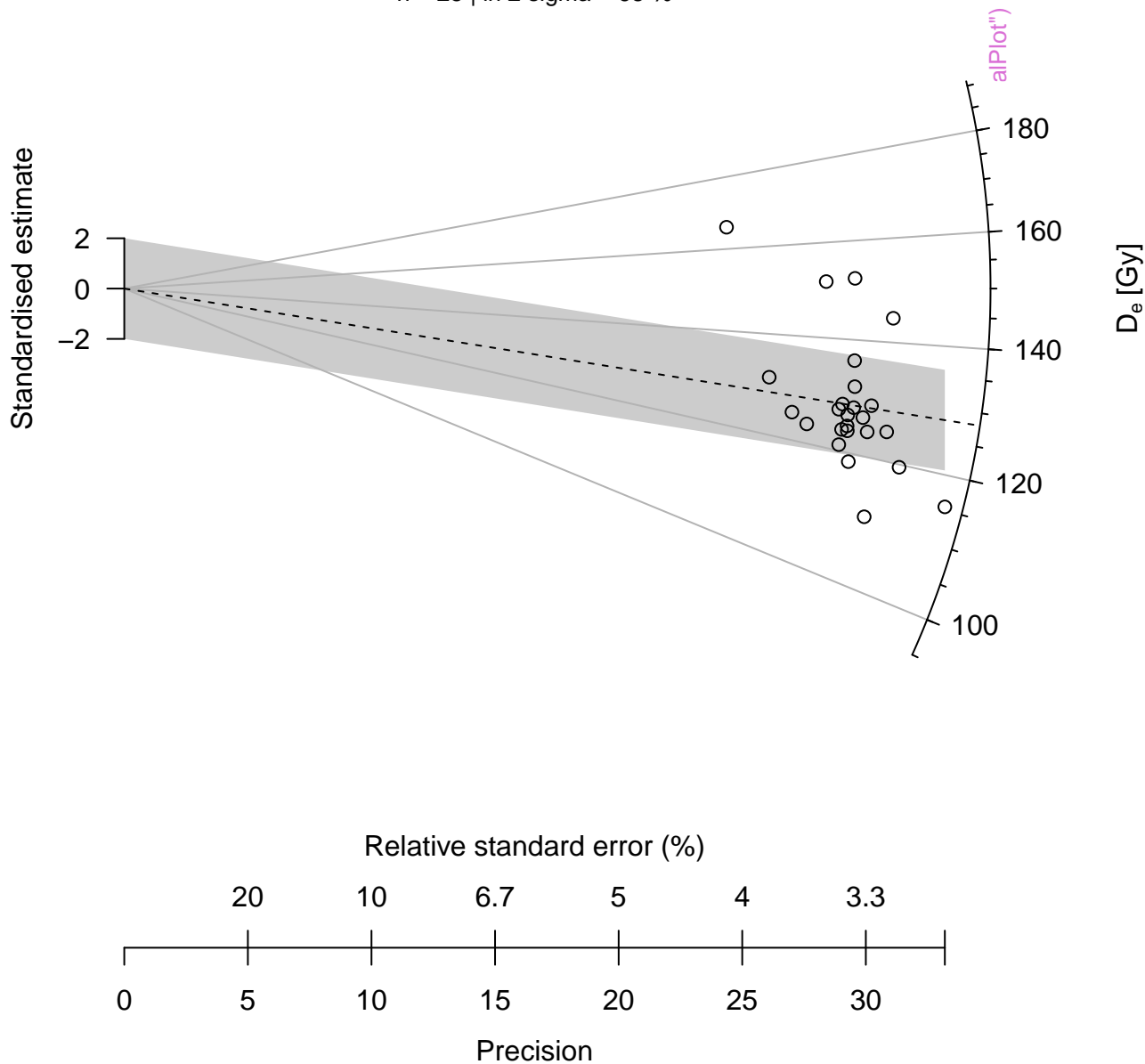
D_e distribution

n = 25 | in 2 sigma = 68 %



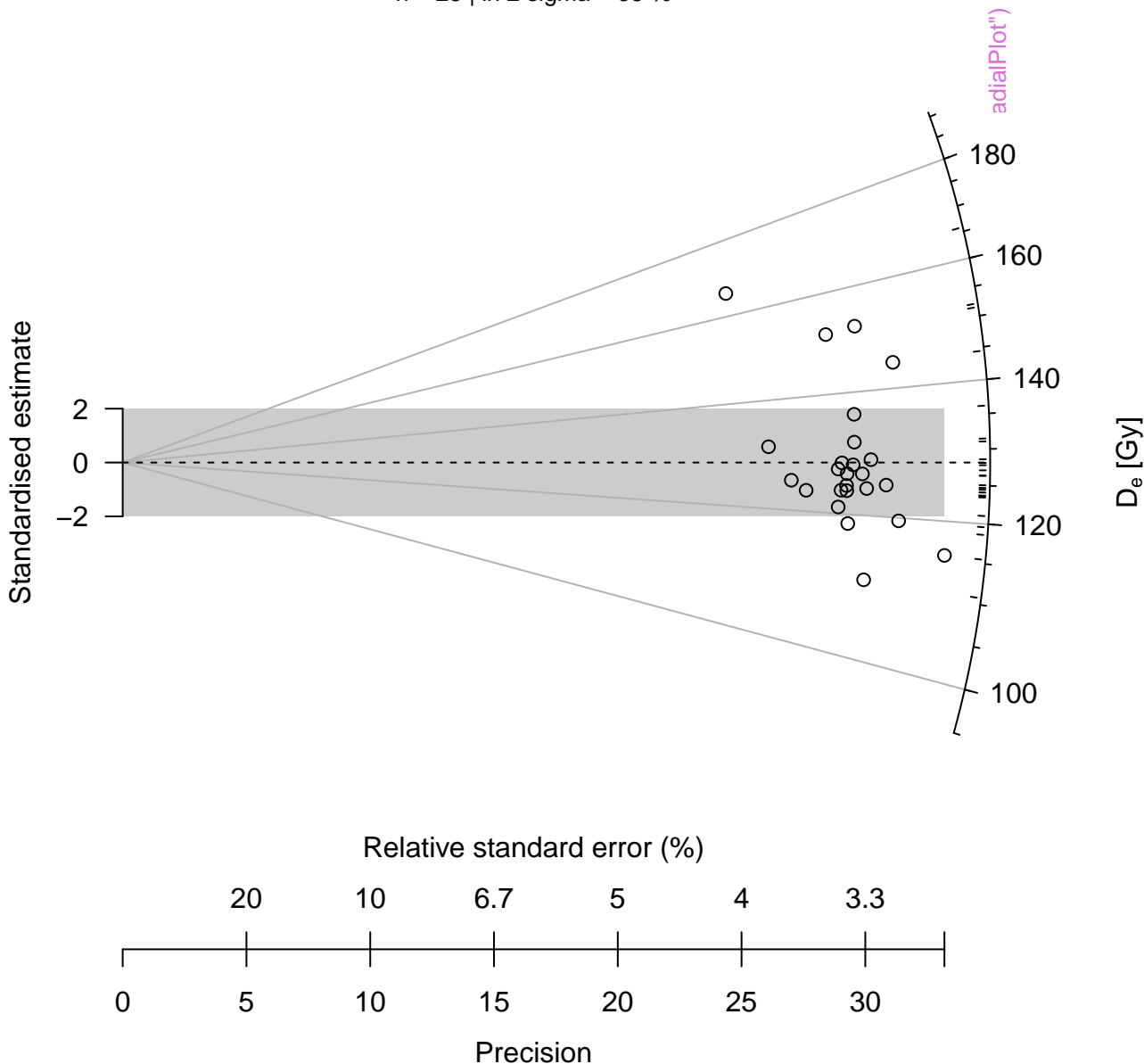
D_e distribution

n = 25 | in 2 sigma = 68 %



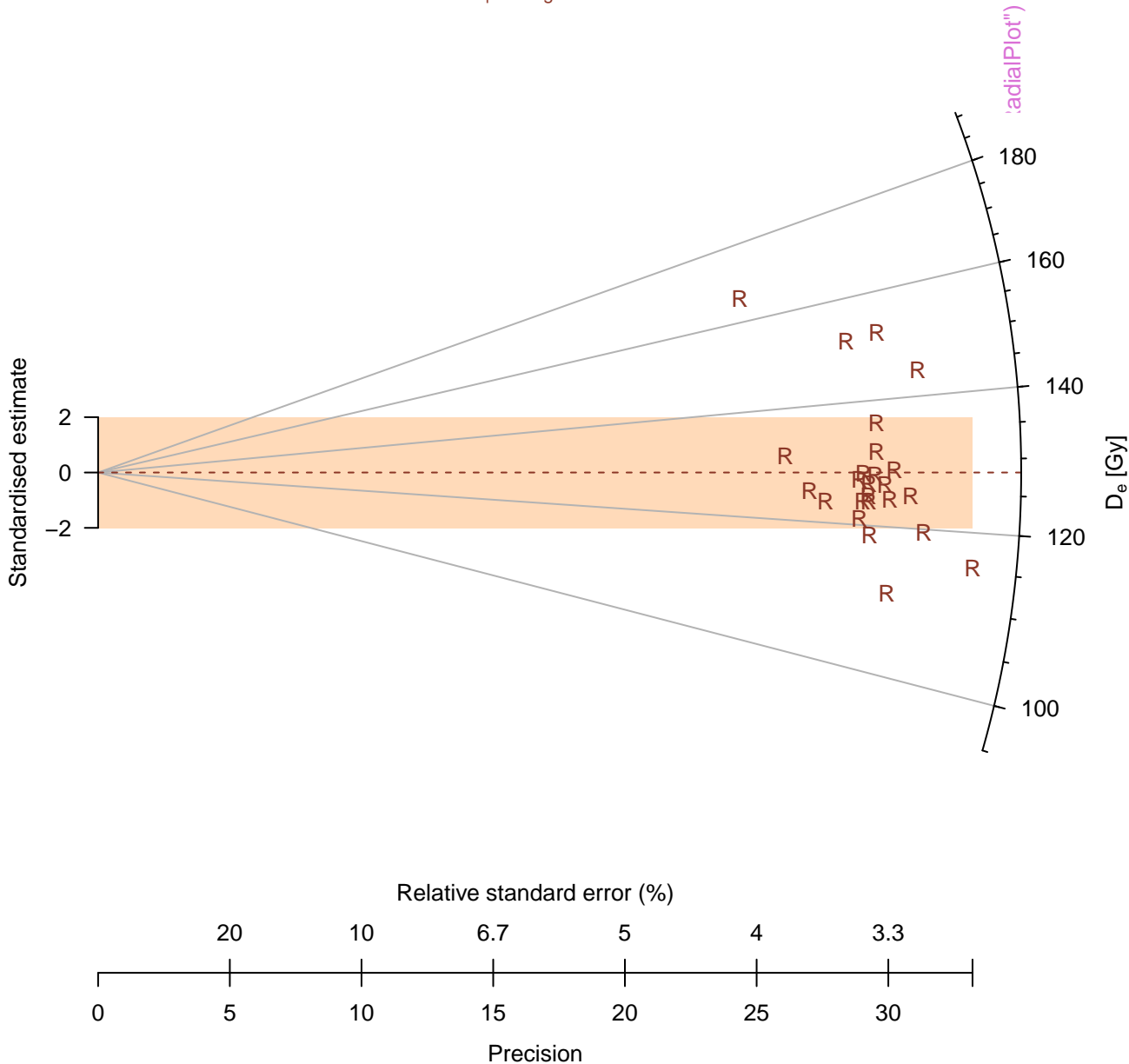
D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

n = 25 | in 2 sigma = 68 %

Standardised estimate

0

0

20

5

10

10

Relative standard error (%)

6.7

15

5

20

4

25

3.3

30

Precision

adialPlot")

180

160

140

D_e [Gy]

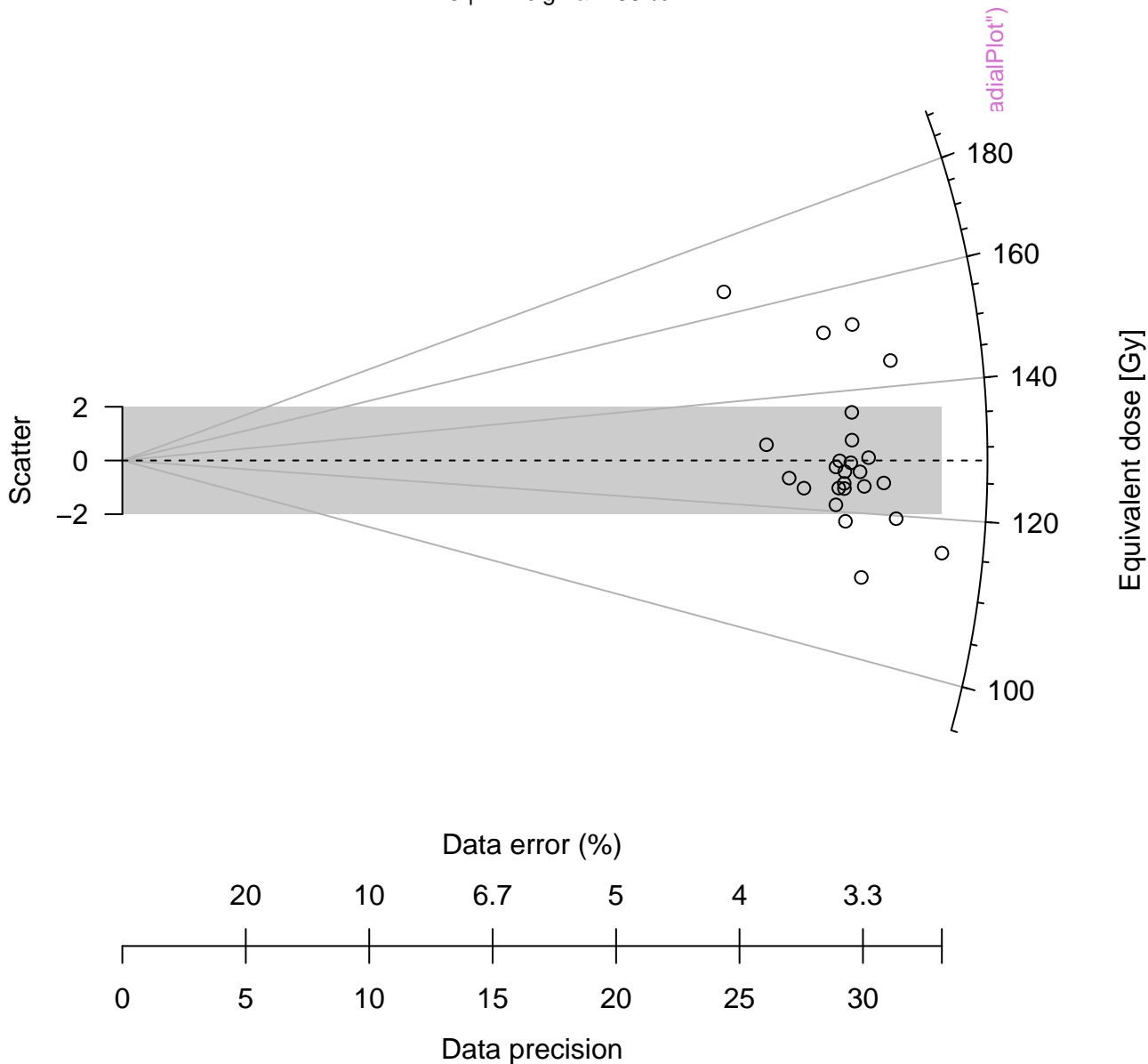
120

100



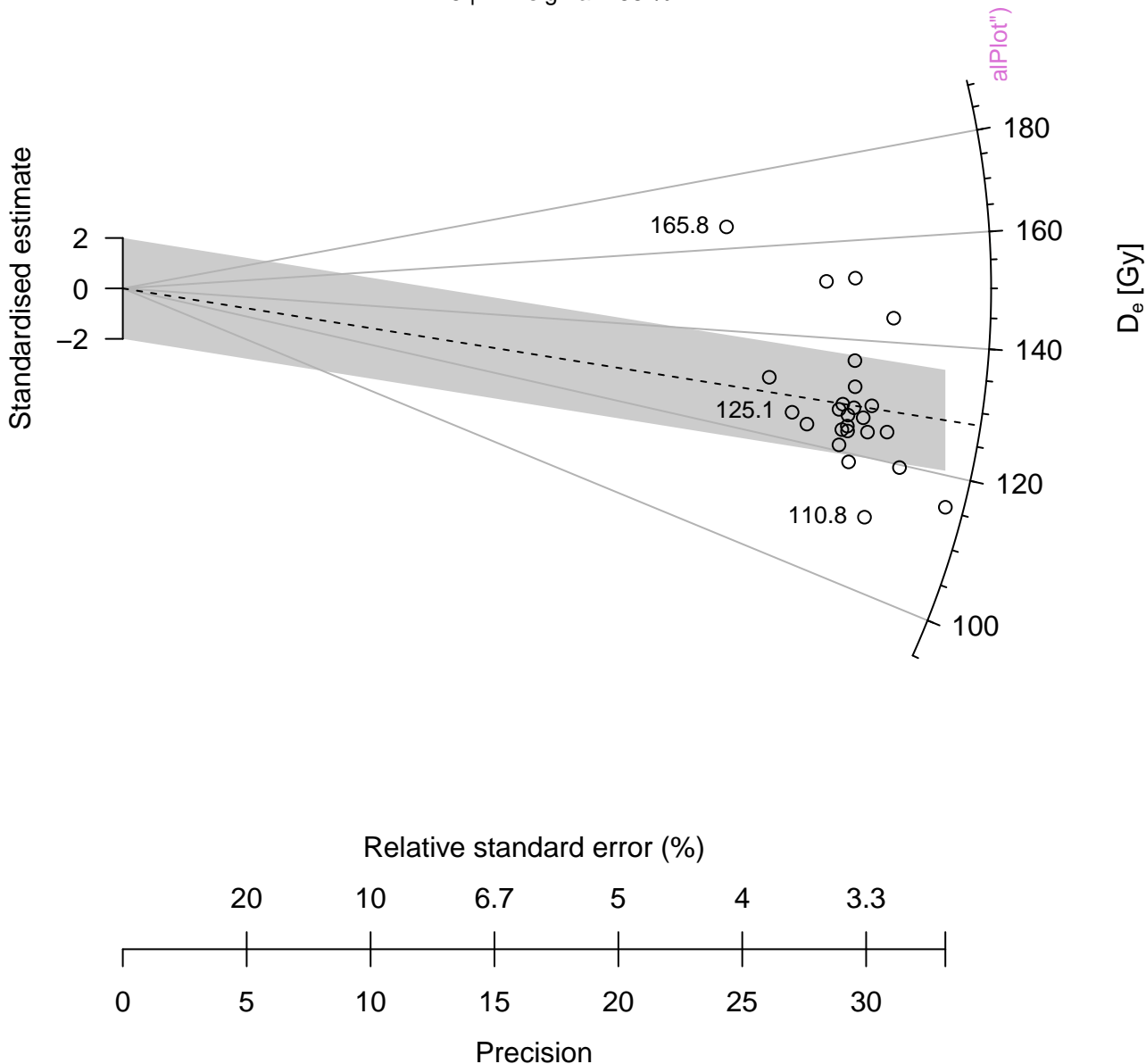
D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

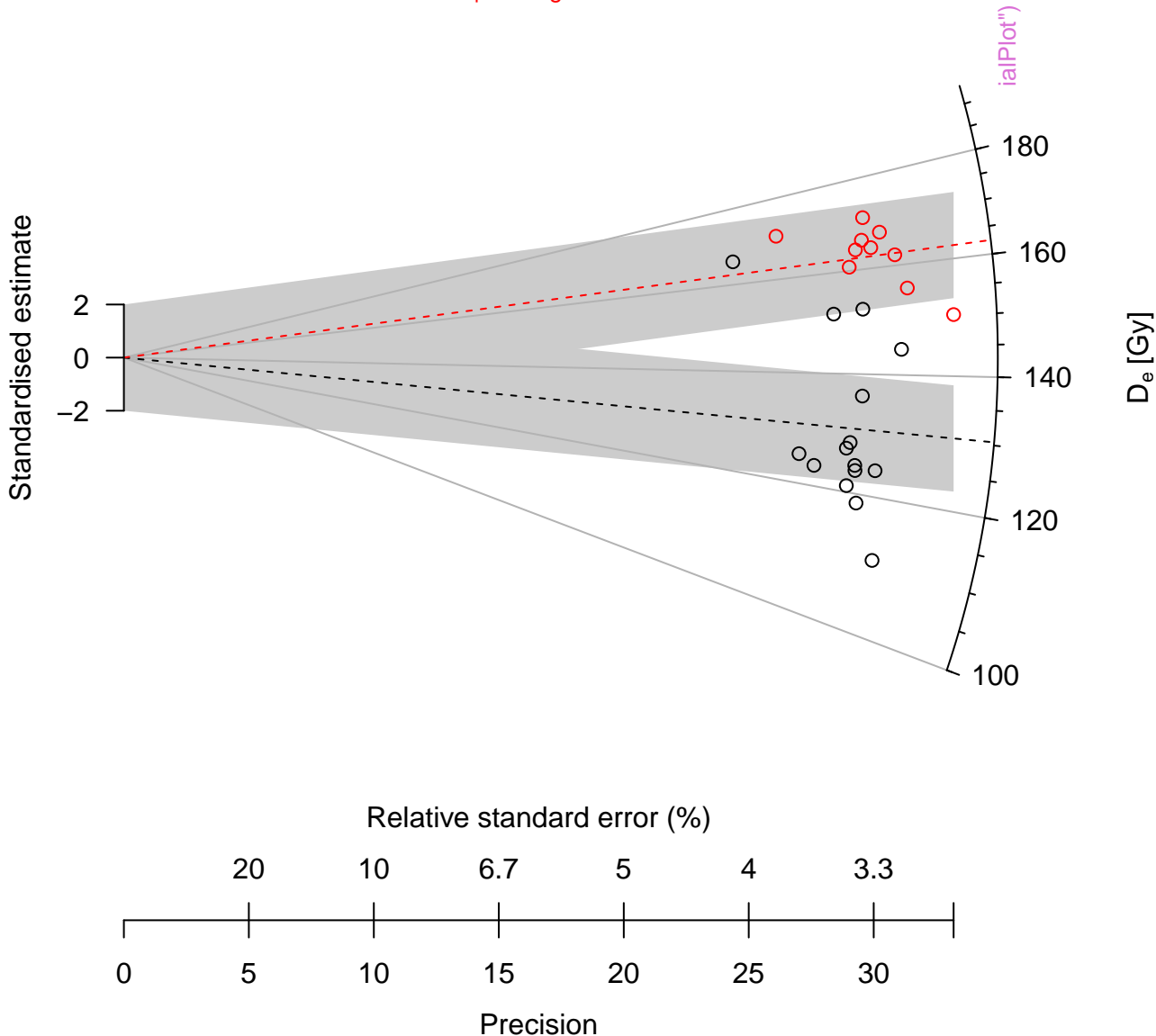
weighted mean = 126.85 | median = 126.34



D_e distribution

n = 15 | in 2 sigma = 53.3 %

n = 10 | in 2 sigma = 90 %



D_e 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

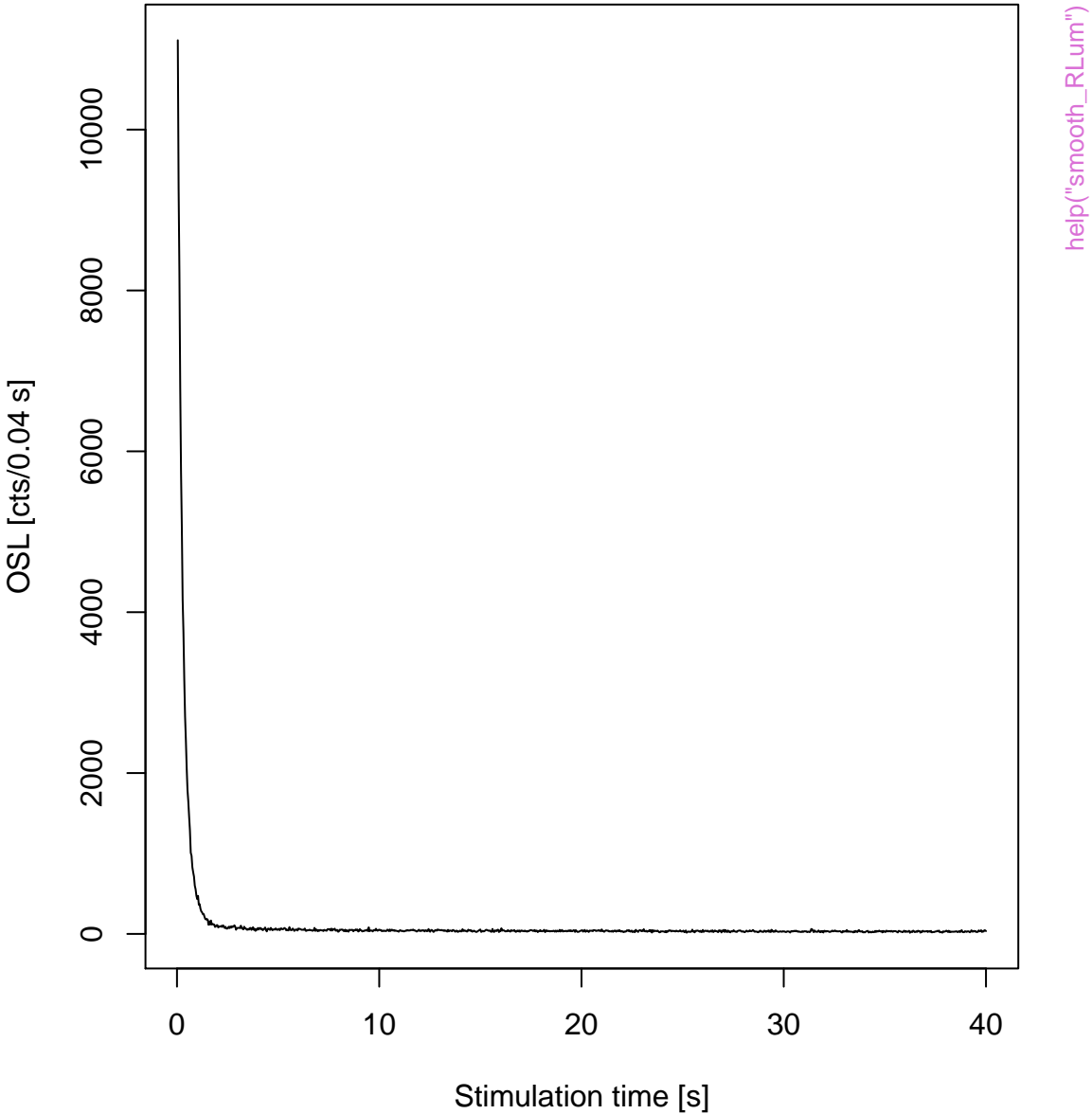


[help\("plot_ViolinPlot"\)](#)

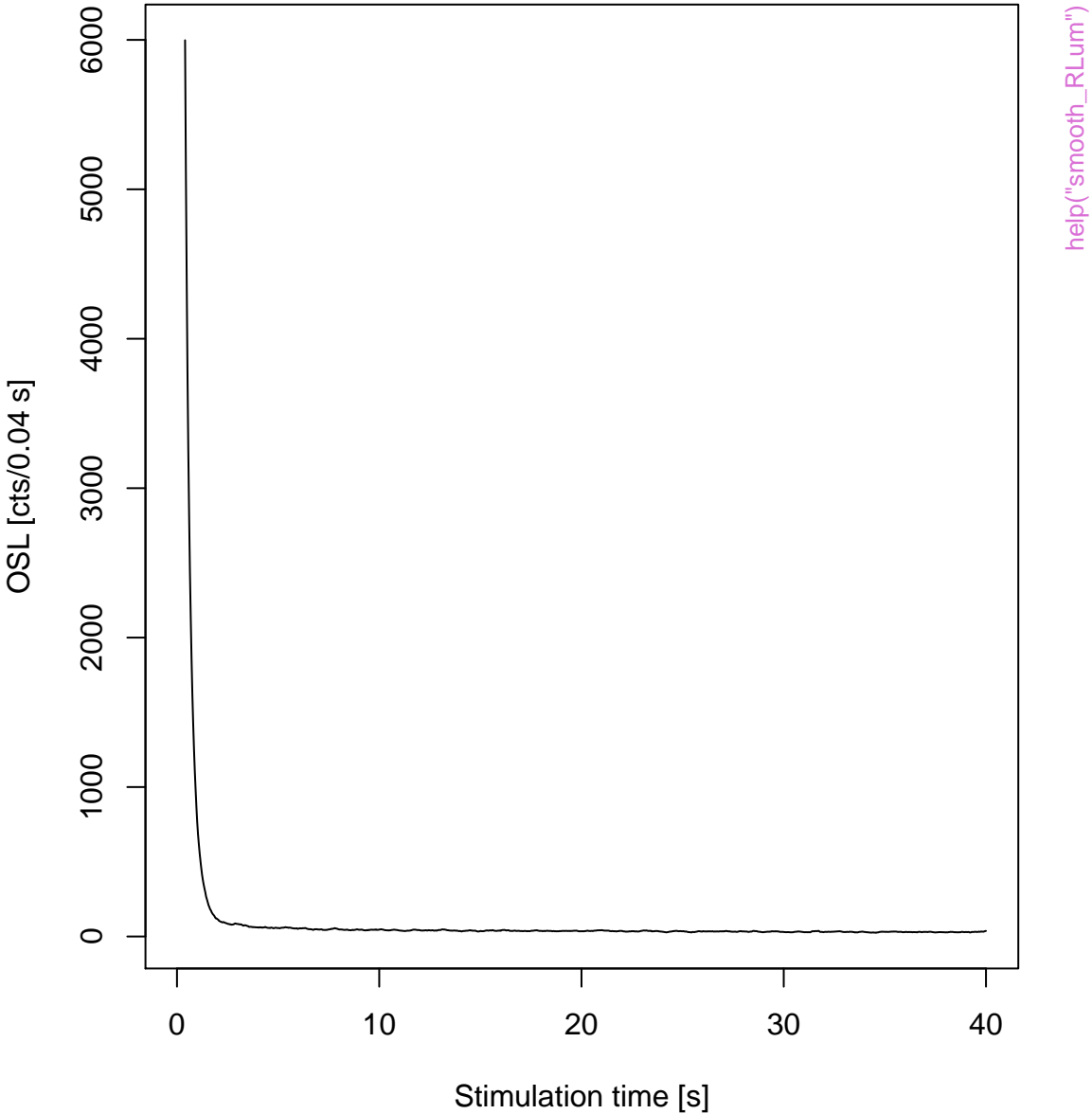
OSL



OSL



OSL



D_e distribution

n = 62 | mean = 66.01



D_e distribution

n = 62 | mean = 66.01

