

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





`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 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)

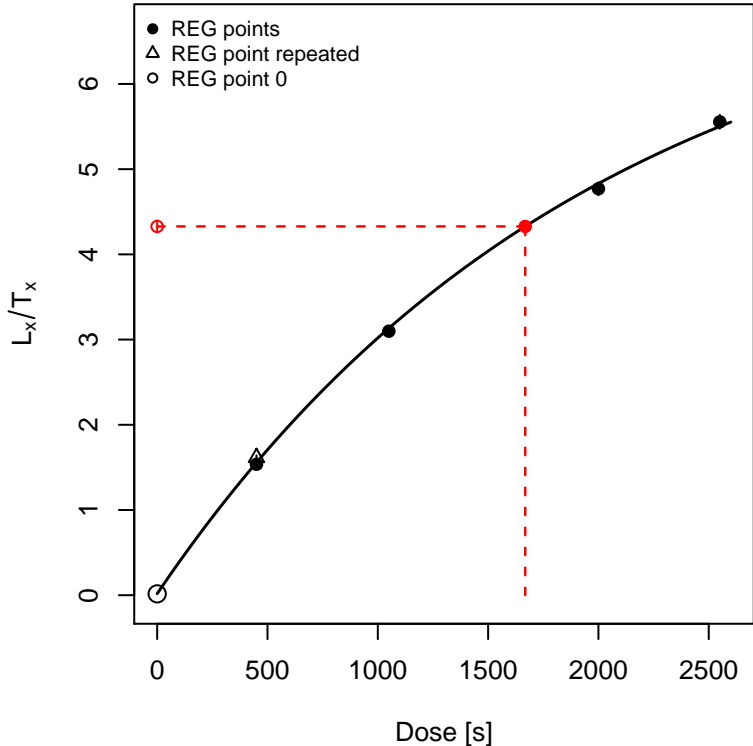
●
R4
(2550)

●
R5
(450)

●
R0
(0)

Growth curve

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

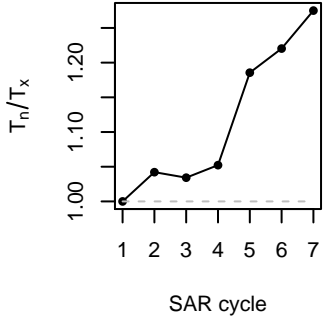


D_e from MC simulation

$D_{eMC} = 1677.48 \pm 49.22$ | 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 curvesPlateau test L_n, L_x curvesplateau Test T_n, T_x curves

Natural
(0)

Natural
(136)

Natural
(317)

Natural
(544)

Natural
(815)

Natural
(0)

Natural
(317)

Growth curve

$D_e = 406.61 \pm 48.44$ | fit: EXP



D_e from MC simulation

$D_{eMC} = 408.74 \pm 48.44$ | quality = 99.5 %



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

$D_e = 1668.25 \pm 41.38$ | 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



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 σ_{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



3-parameter Minimum Age Model

Parameters: $\sigma_b = 0.1$, $\gamma = 3.5$, $\sigma = 0.7$, $\rho = 0.01$

n = 62

mean = 66.01

weighted mean = 62.16

median = 71.07

Standardised estimate



D_e (Gy)

Source Dose Rate Prediction

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



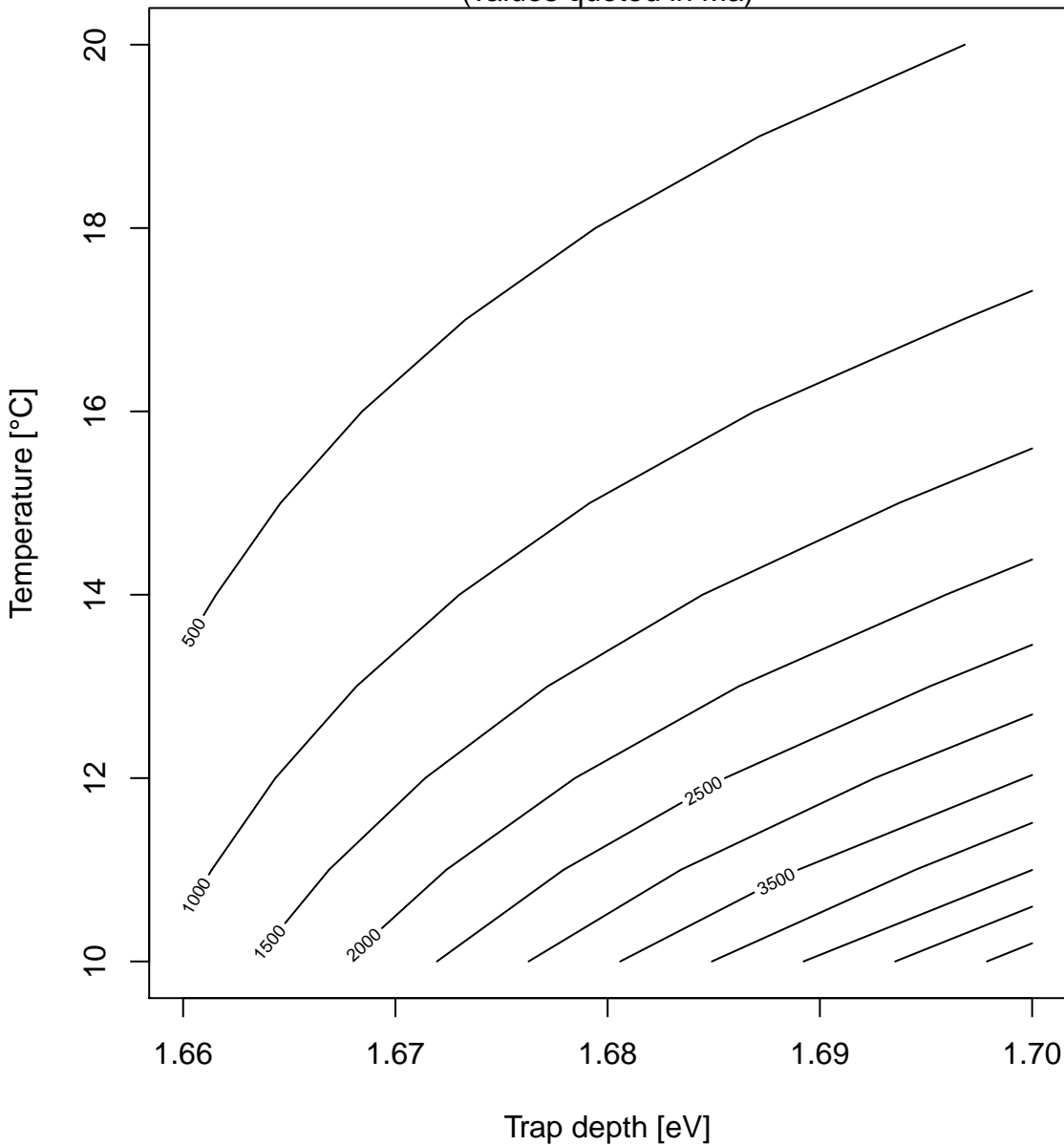
help("calc_SourceDoseRate")

D_e distribution



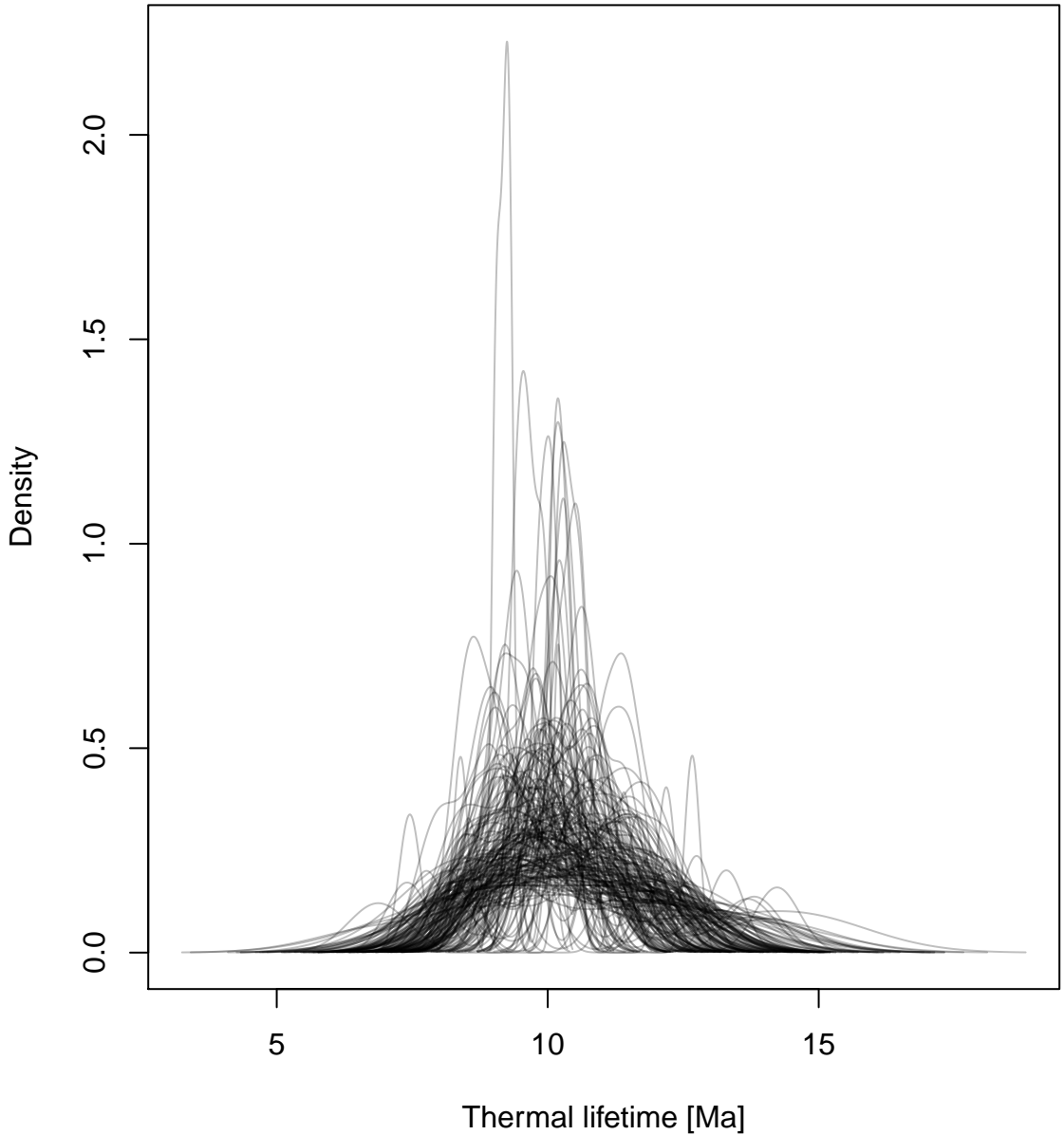
Thermal Lifetime Contour Plot

(values quoted in Ma)



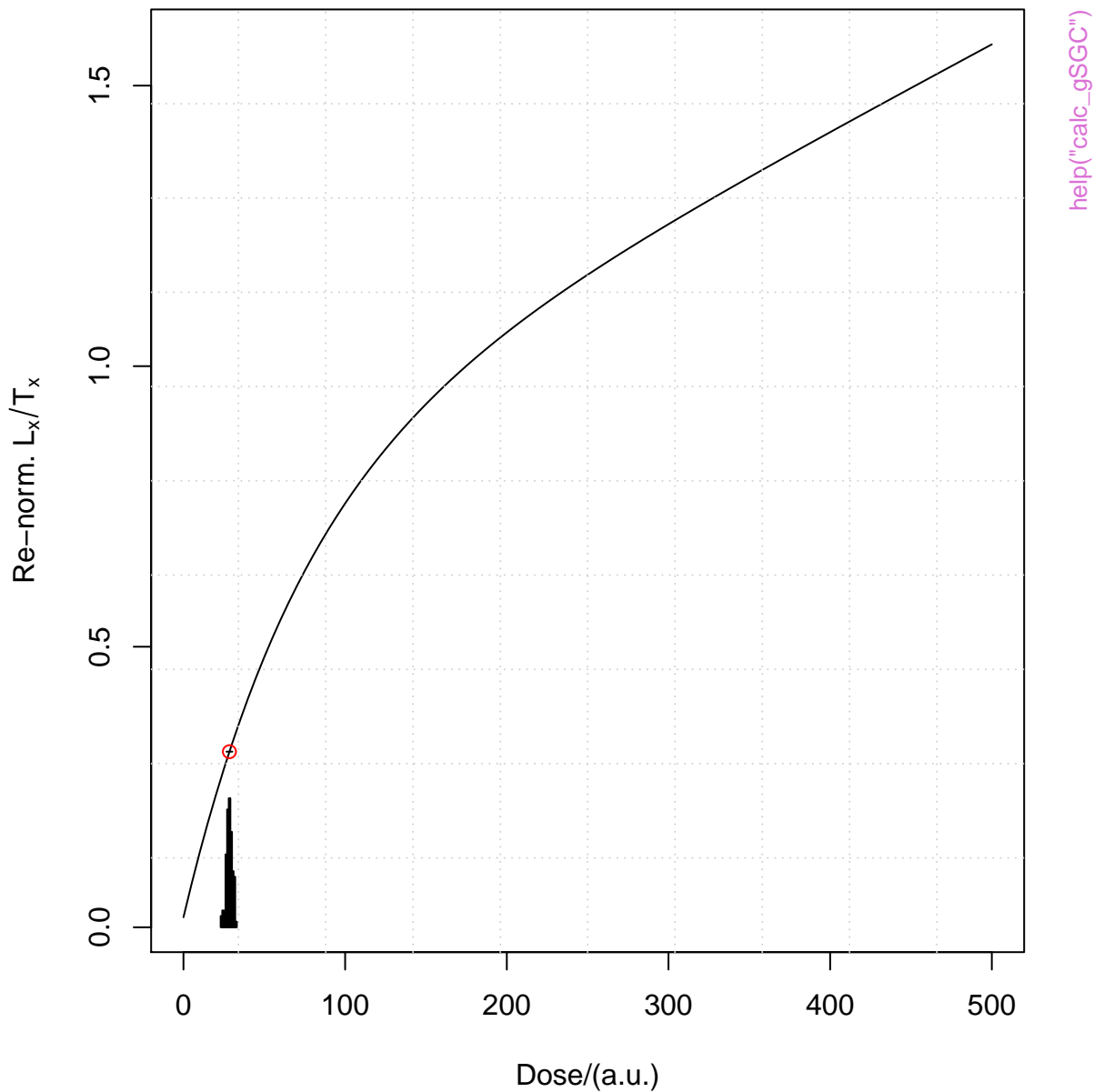
help("calc_ThermalLifetime")

Thermal Lifetime Density Plot



help("calc_ThermalLifetime")

gSGC and resulting De



CW Curve Fit

Default



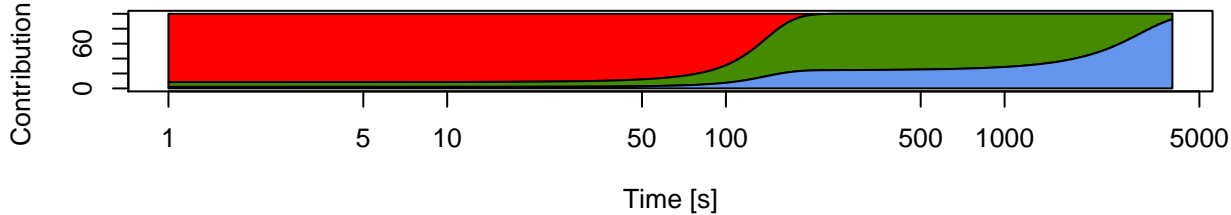
Component contribution to sum curve



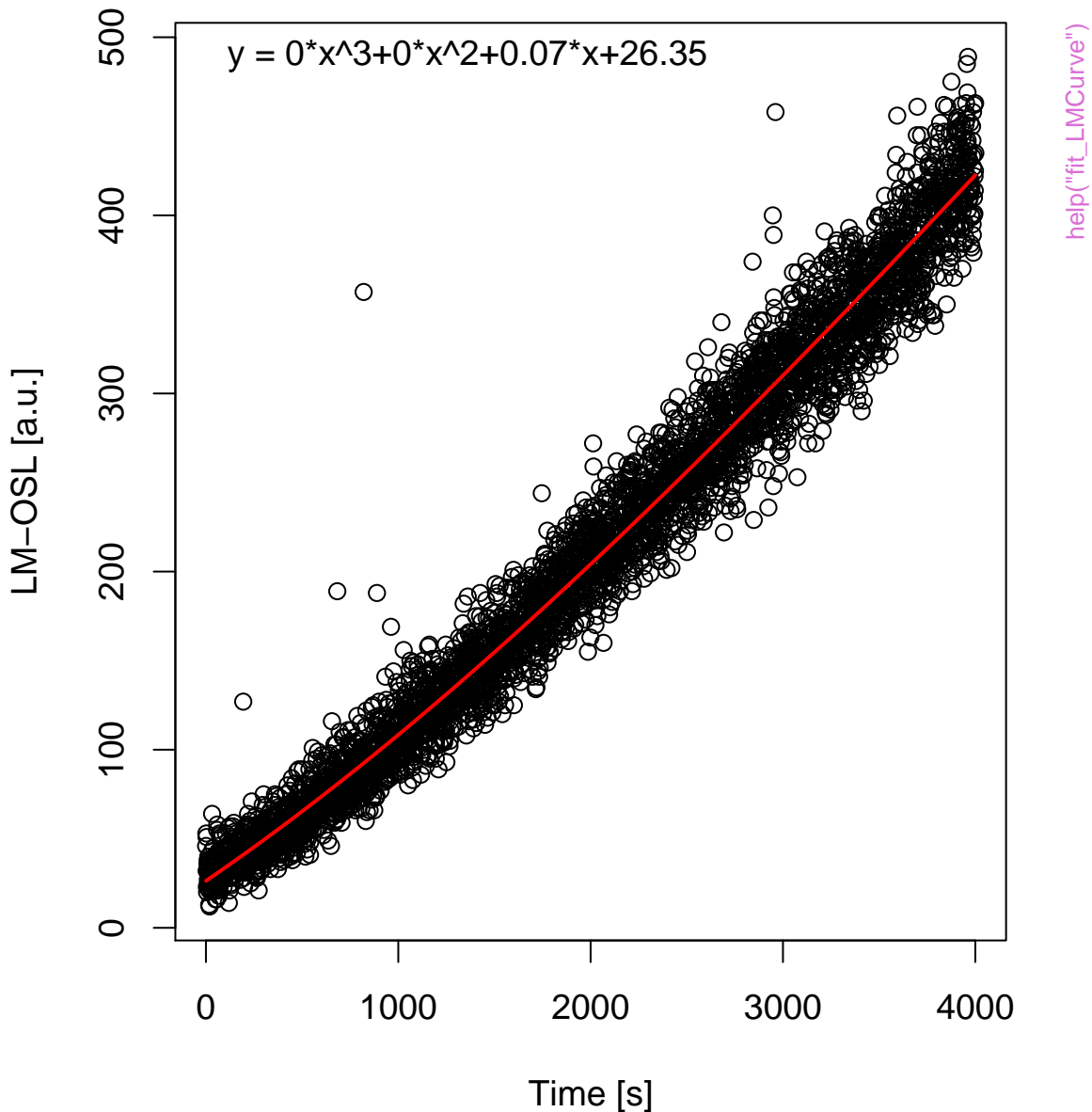
Default



Component contribution to sum curve



Background



Default



Component contribution to sum curve



Default



Component contribution to sum curve

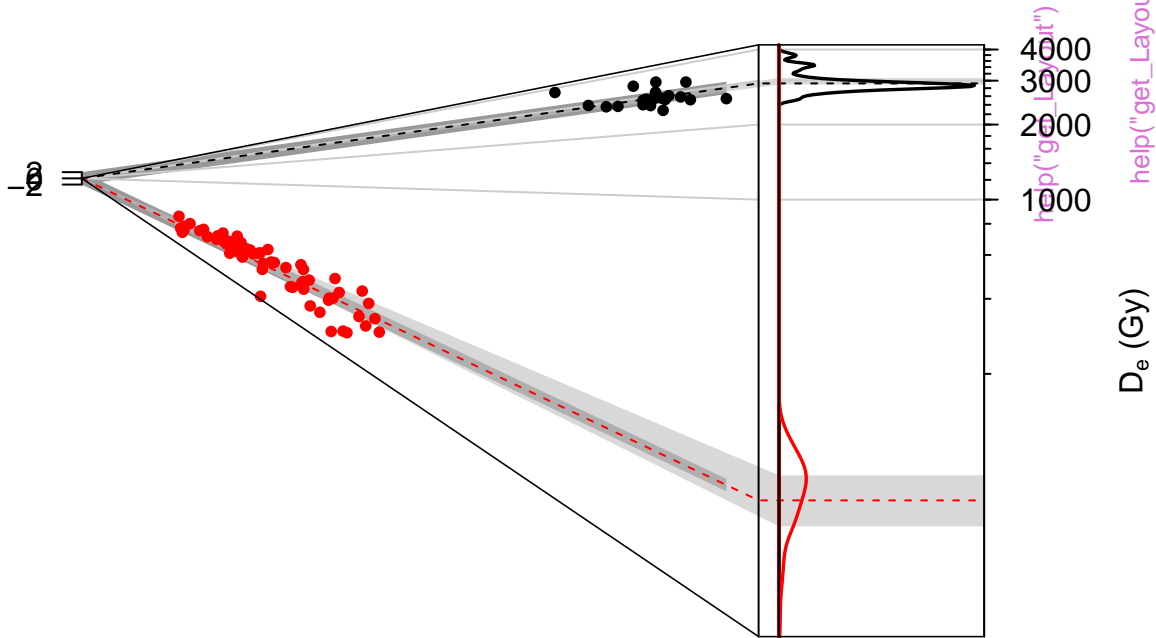


D_e distribution

n = 25

n = 62

Standardised estimate



Relative standard error (%)

10

5

3.3

0

10

20

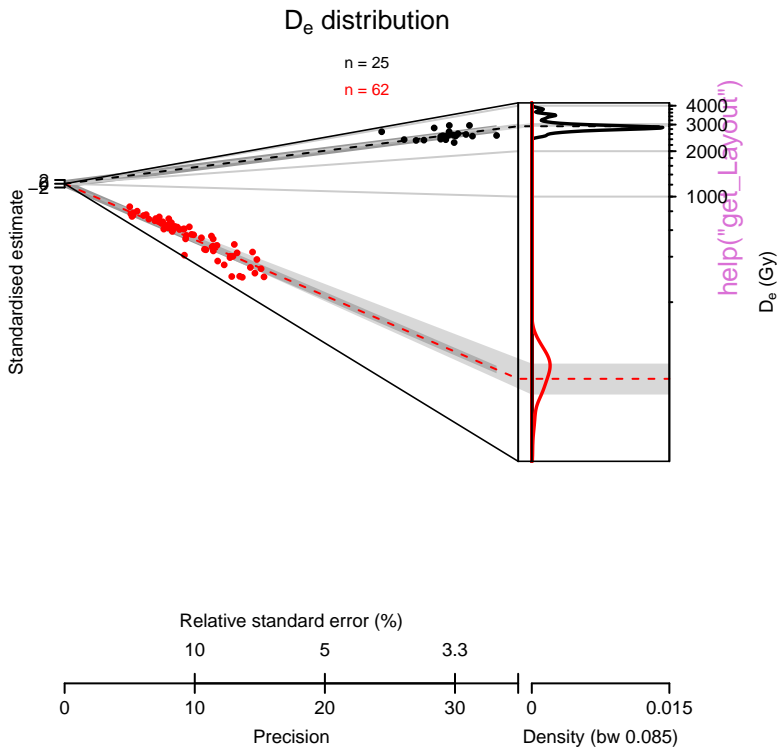
30

0

0.015

Precision

Density (bw 0.085)

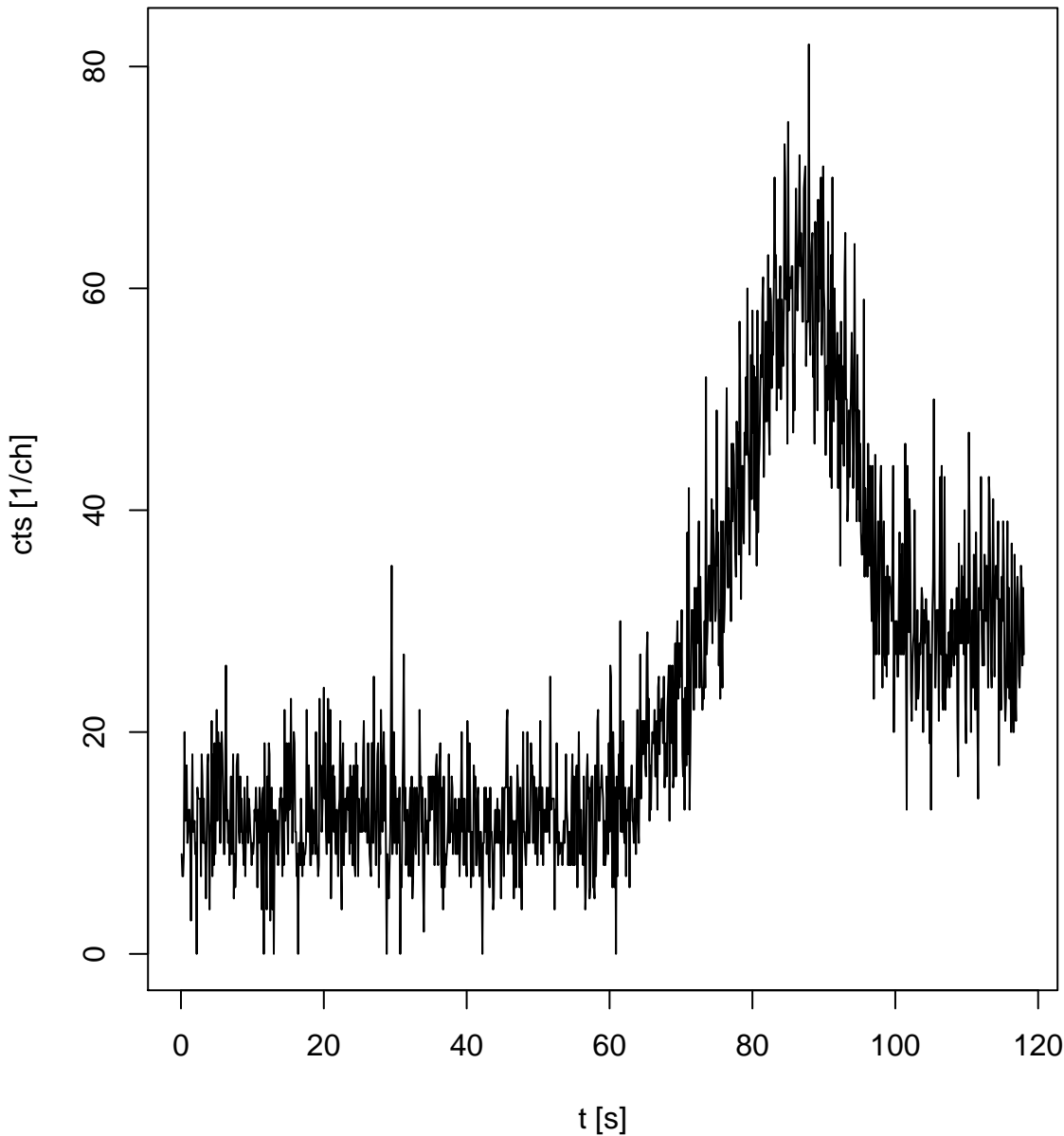


help("get_Layout")

Profile log likelihood for σ_{OD}

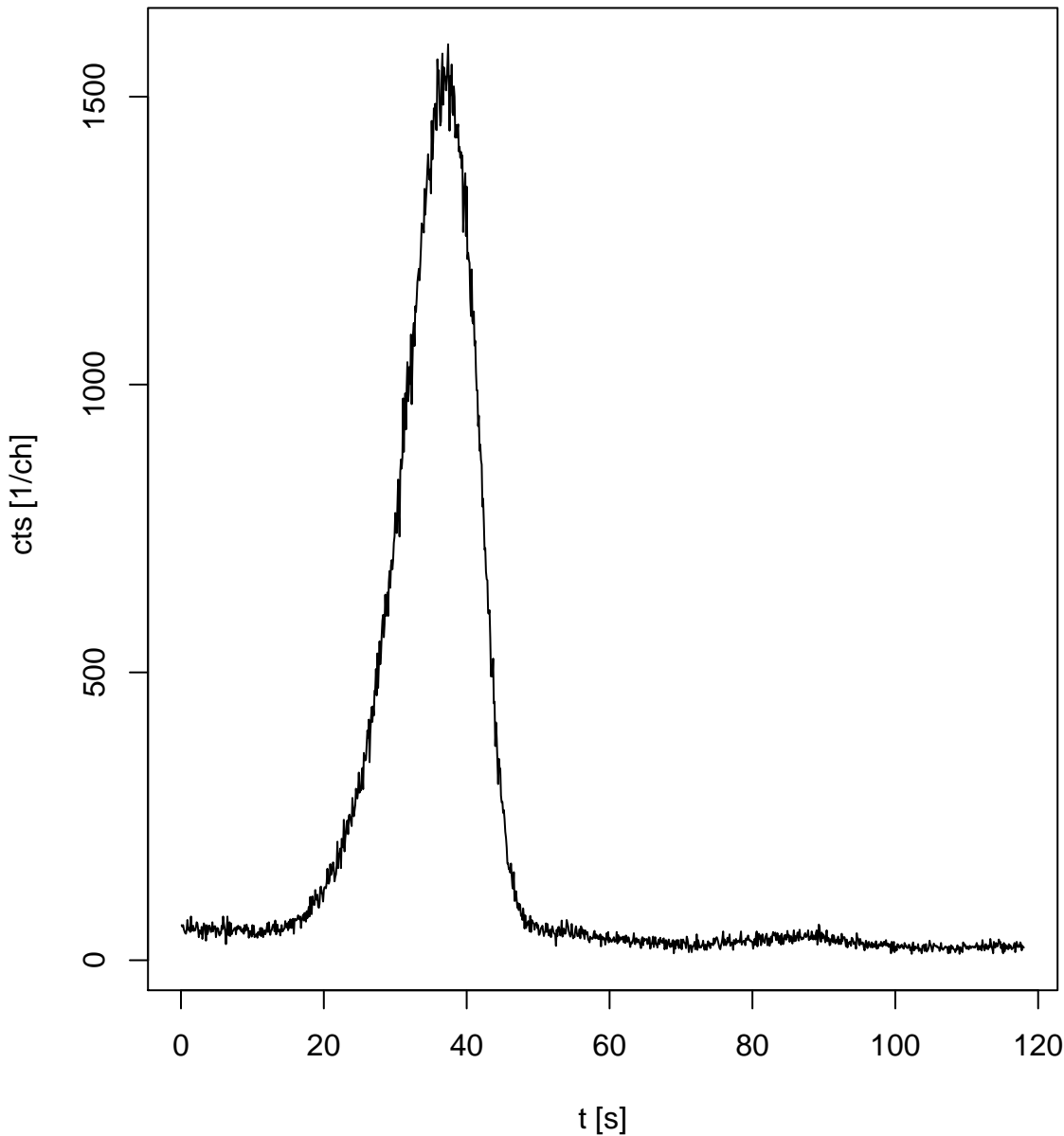


TL (UVVIS)



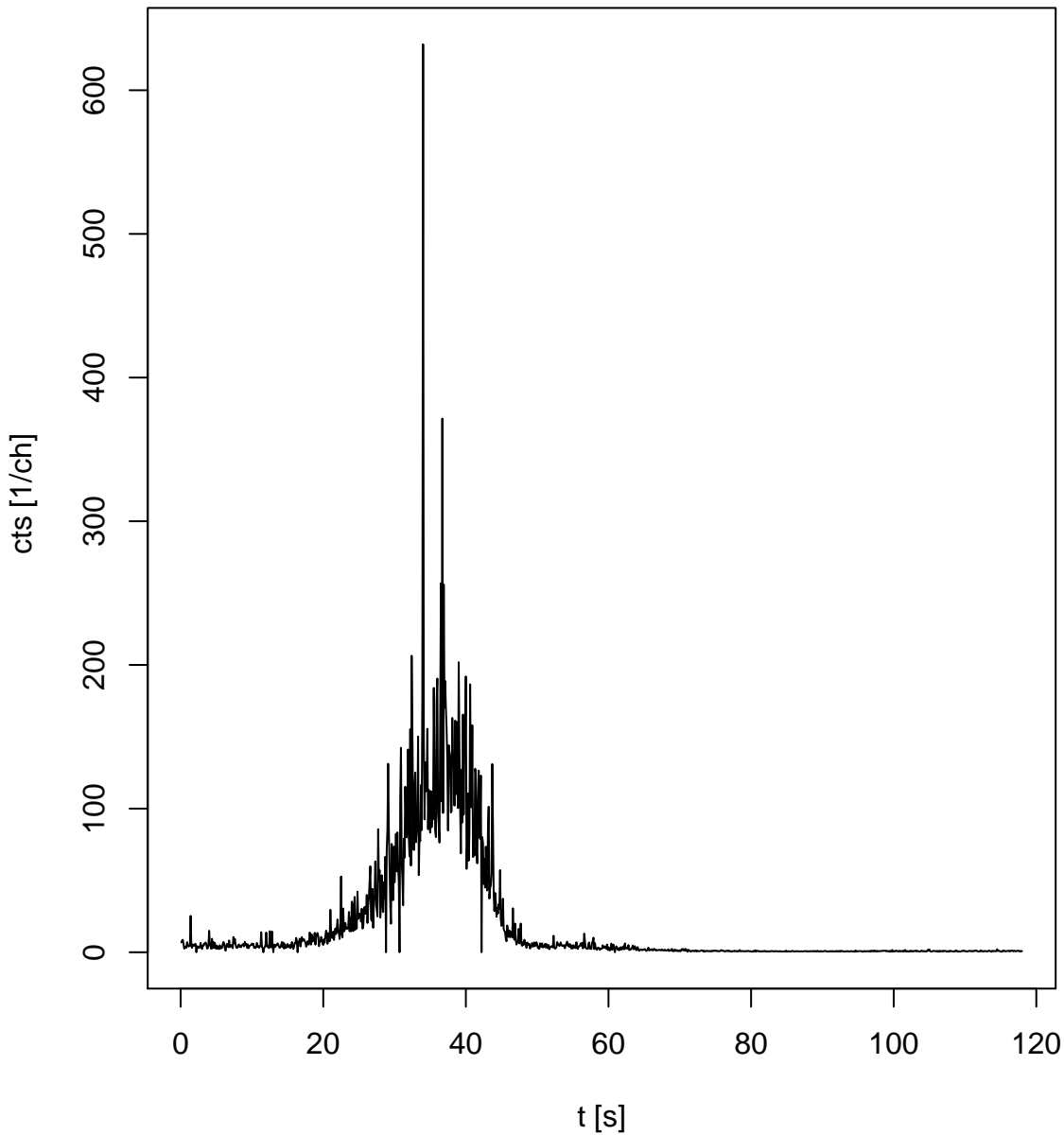
help("merge_RLum.Data.Curve")

TL (UVVIS)



help("merge_RLum.Data.Curve")

TL (UVVIS)



help("merge_RLum.Data.Curve")

Profile log likelihood for σ_{OD}

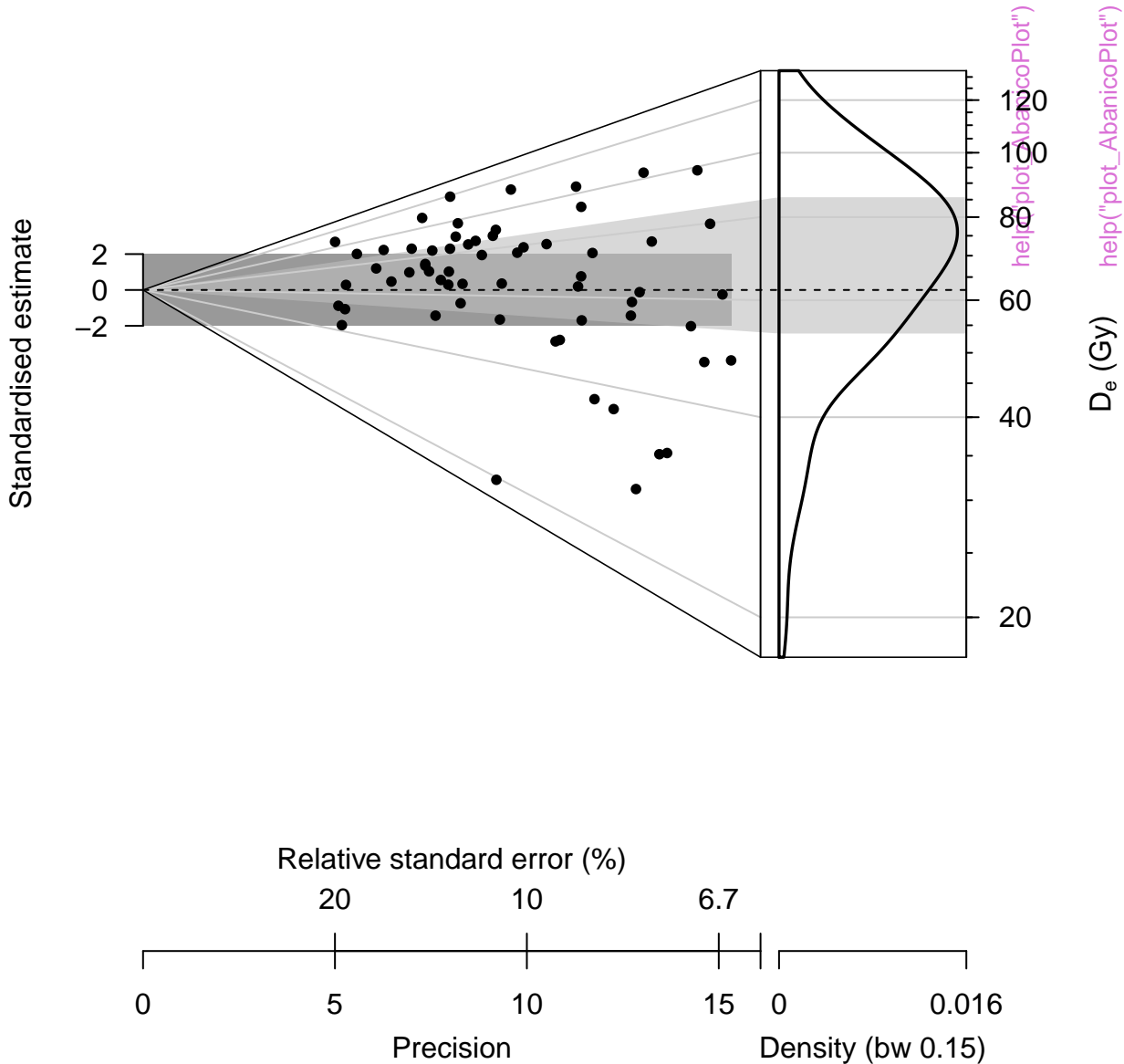


Profile log likelihood for σ_{OD}



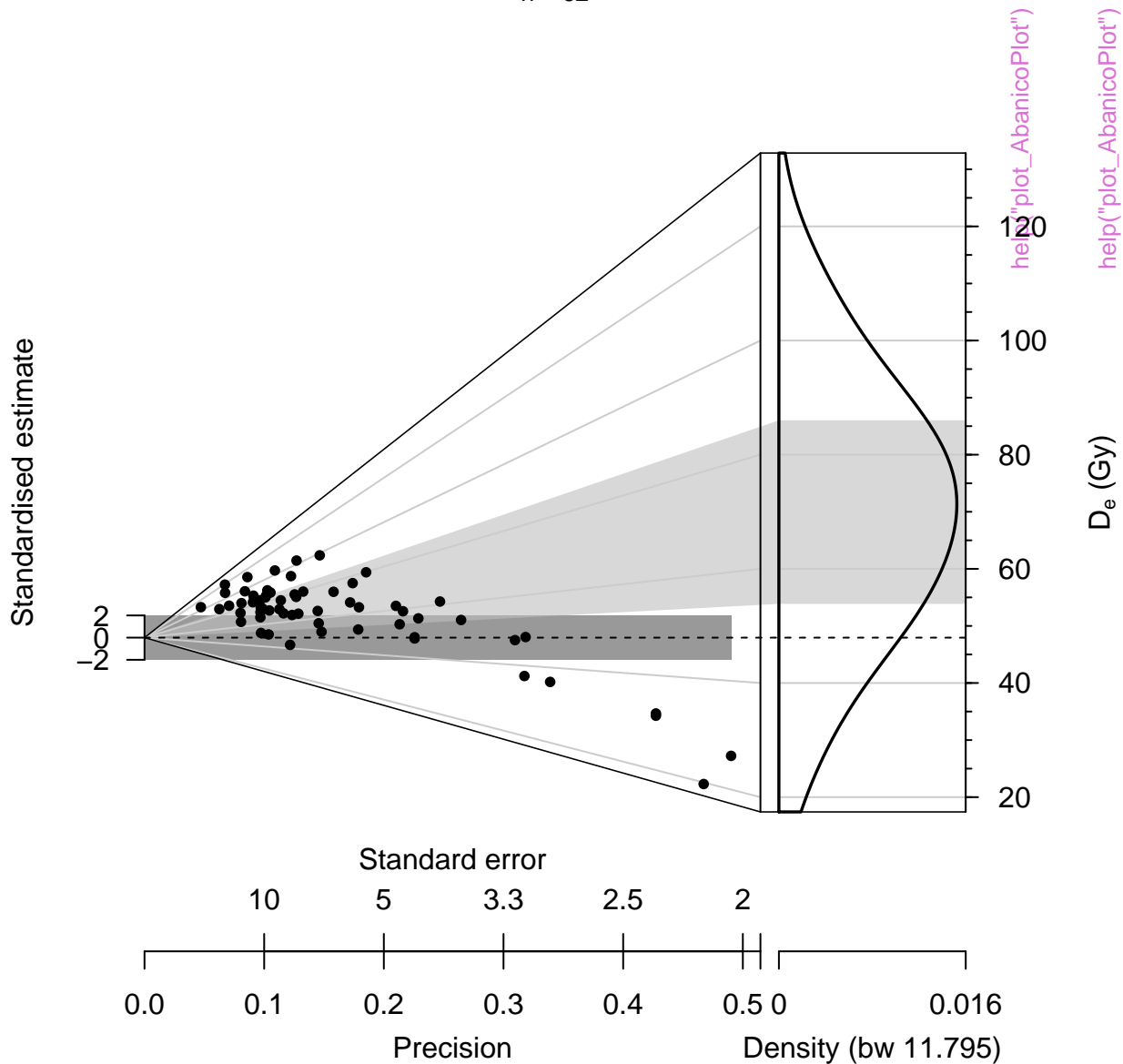
D_e distribution

n = 62



D_e distribution

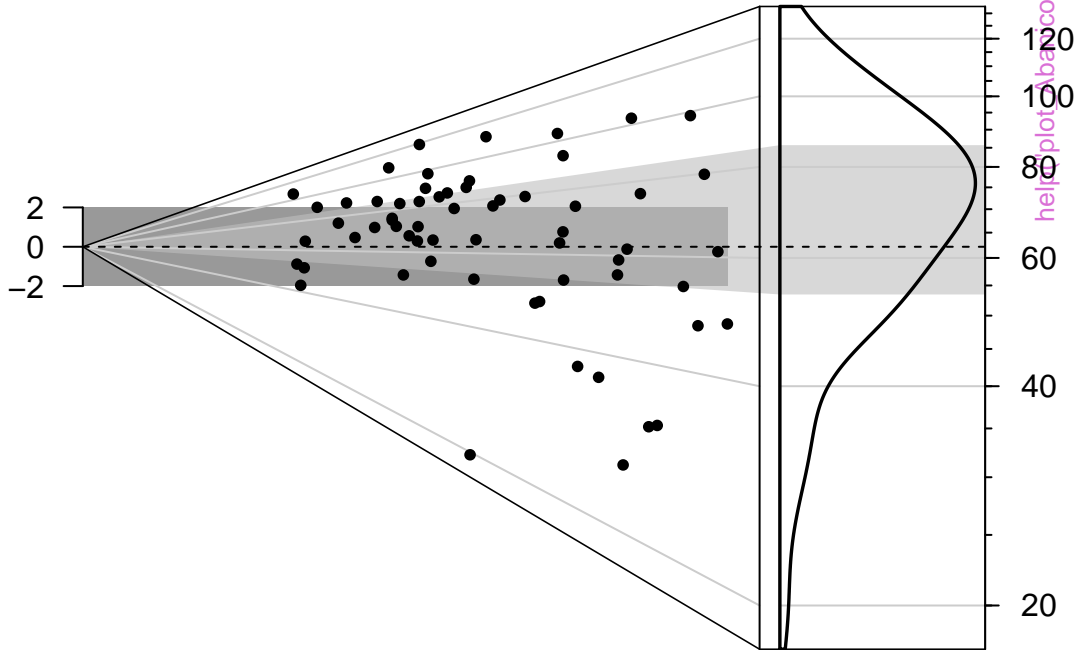
n = 62



D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

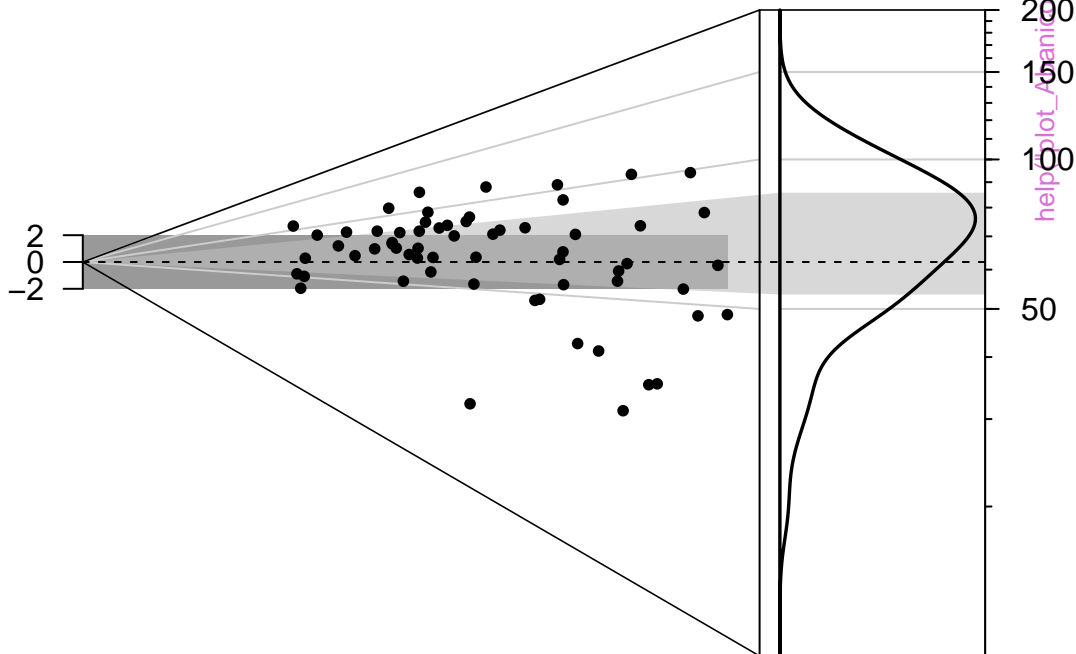
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

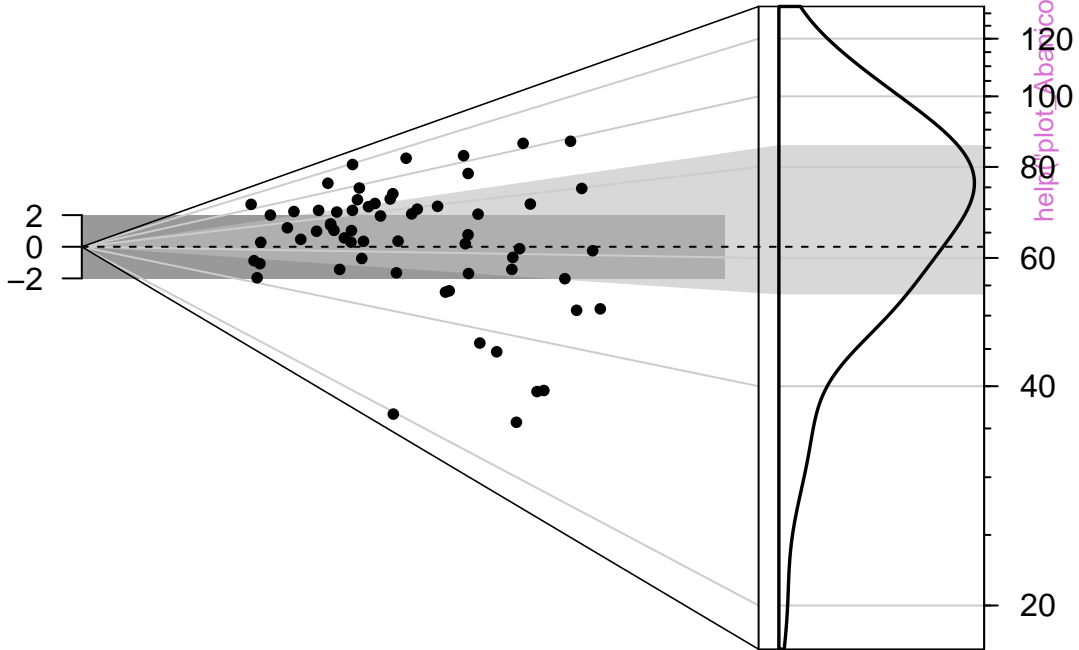
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



D_e (Gy)

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

5

0

5

10

15

200

0.016

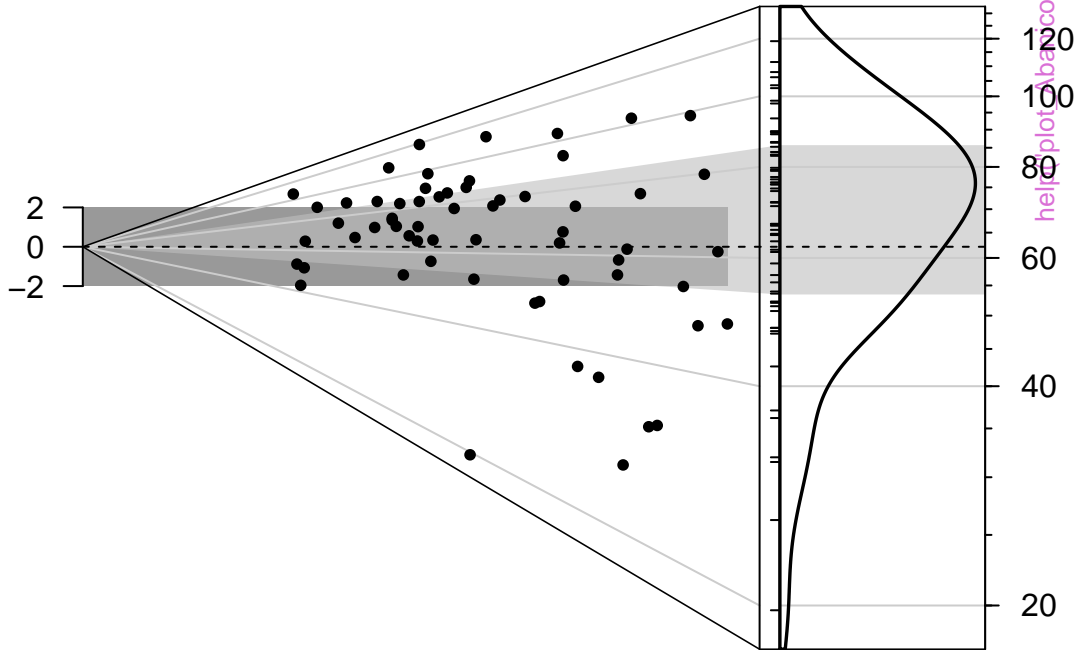
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

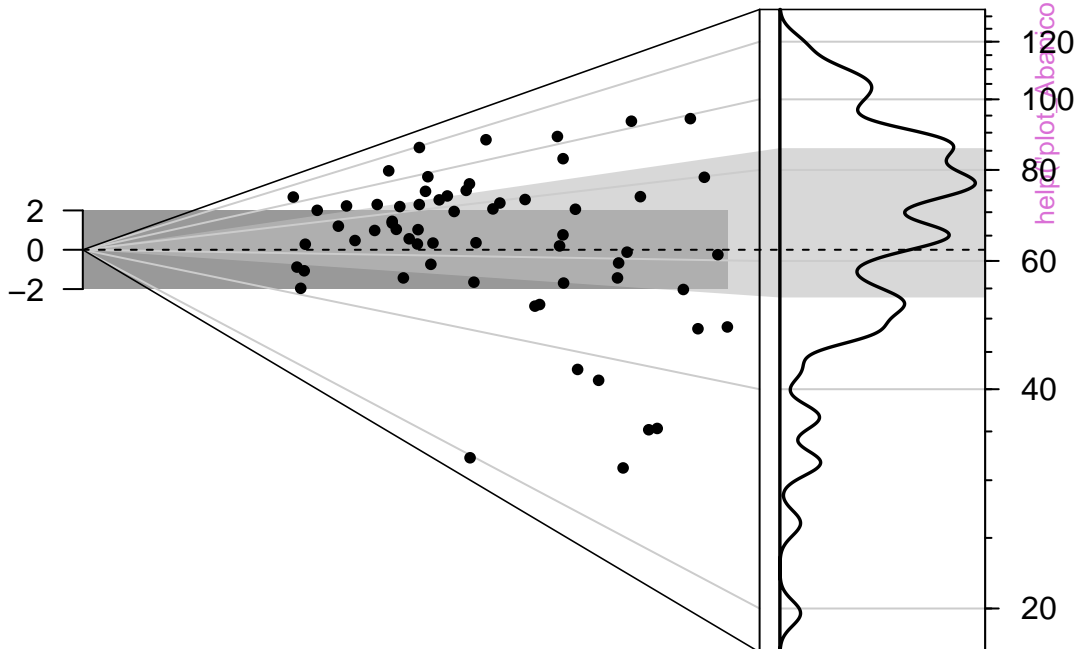
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



D_e (Gy)

Relative standard error (%)

20

10

6.7

0

5

10

15

0

0.264

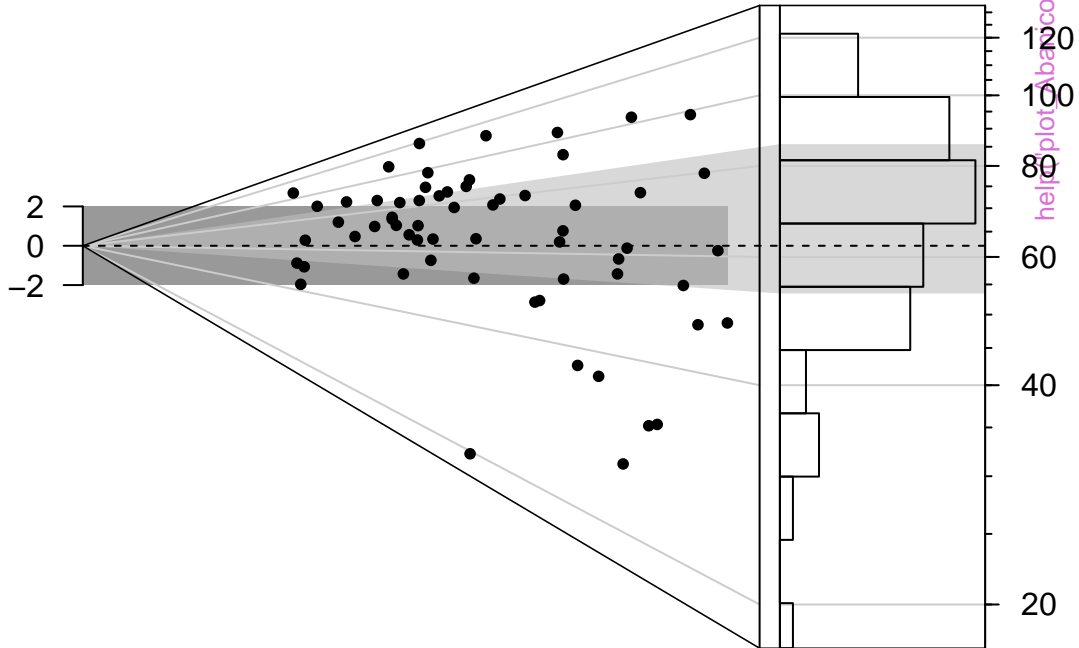
Precision

Density (bw 0.04)

D_e distribution

n = 62

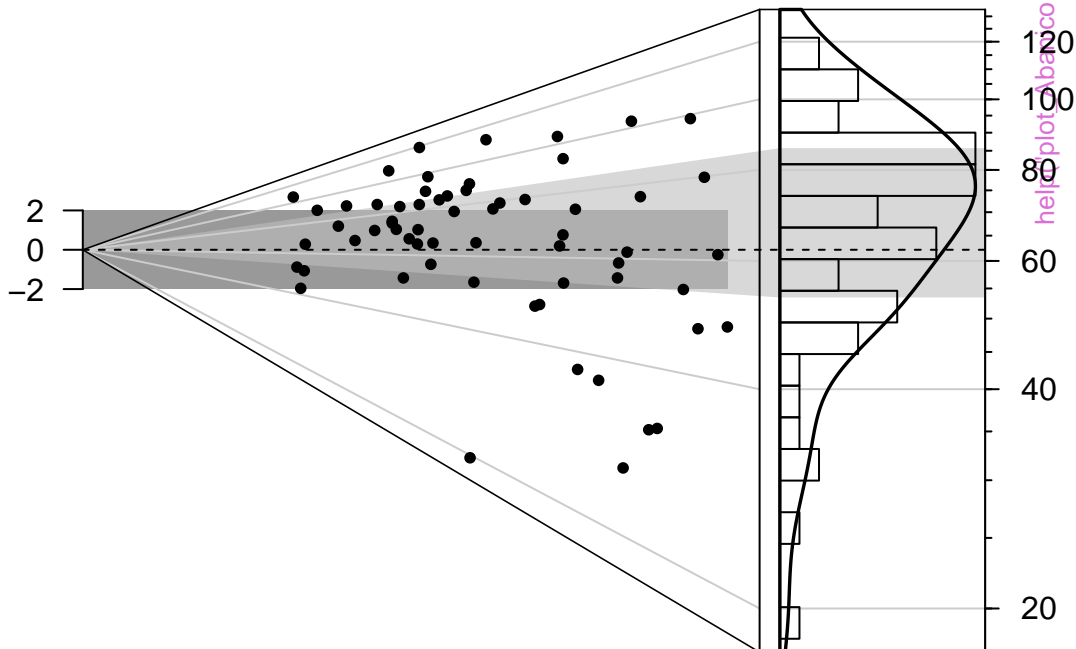
Standardised estimate



D_e distribution

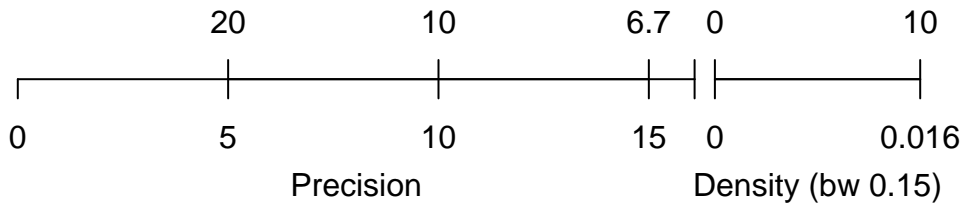
n = 62

Standardised estimate



Relative standard error (%)

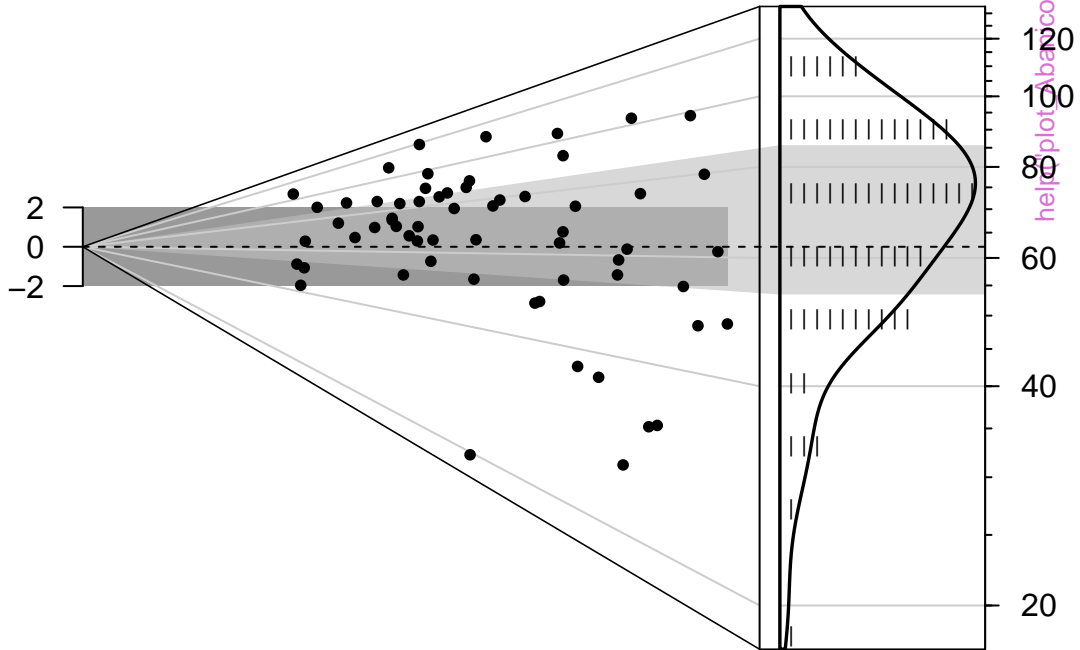
n



D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

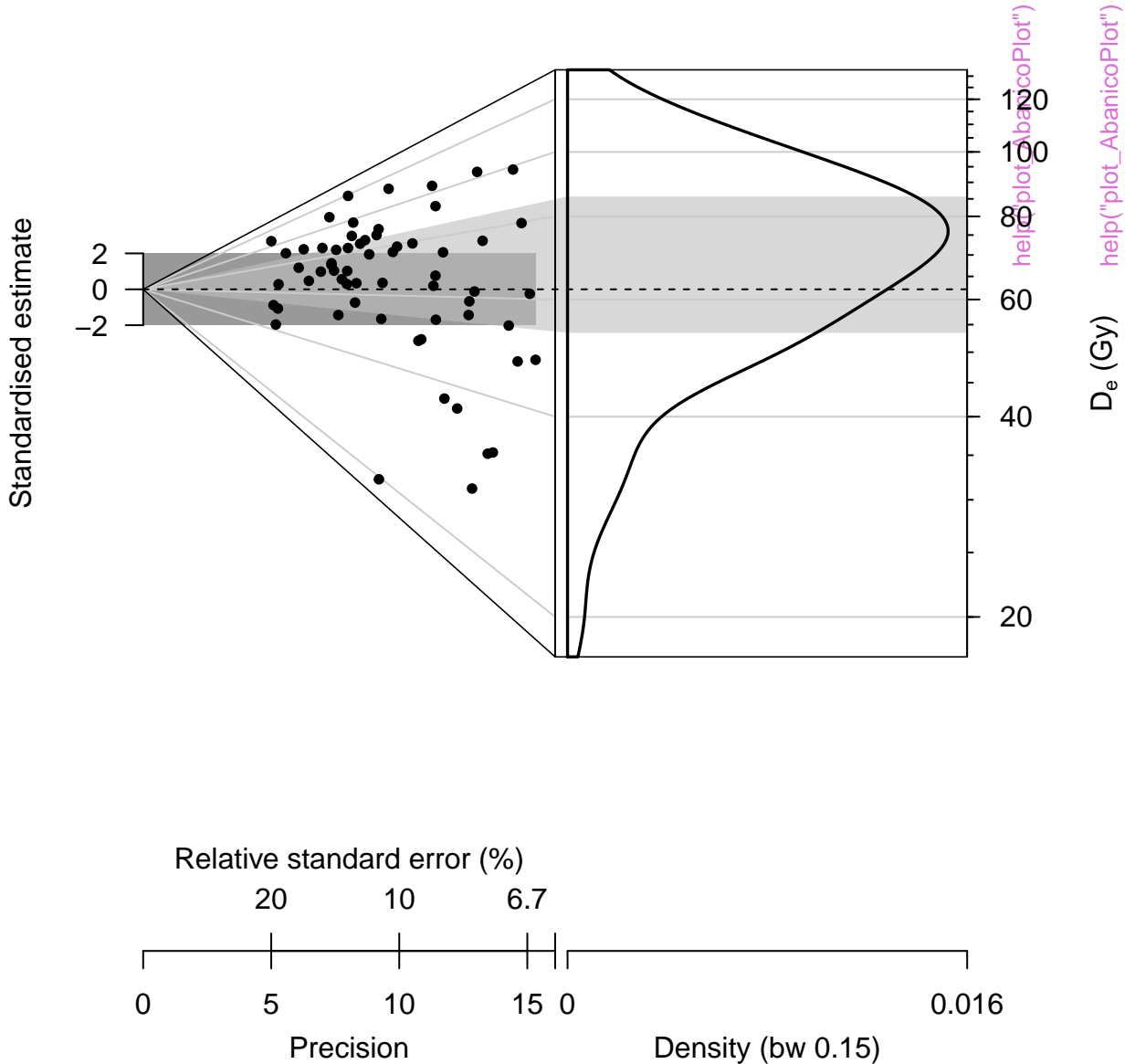
0.016

Precision

Density (bw 0.15)

D_e distribution

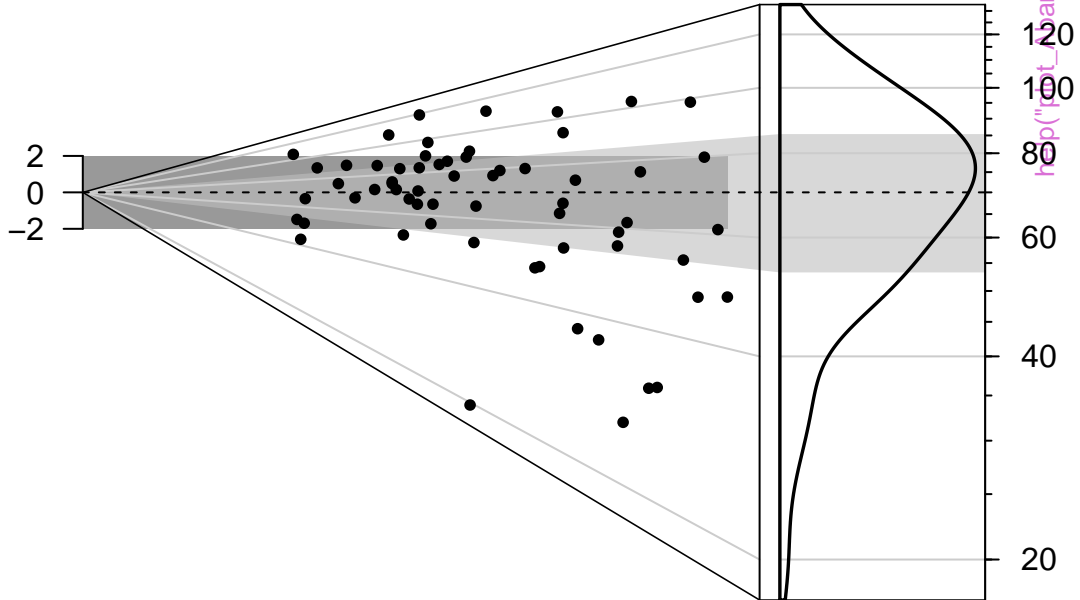
n = 62



D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

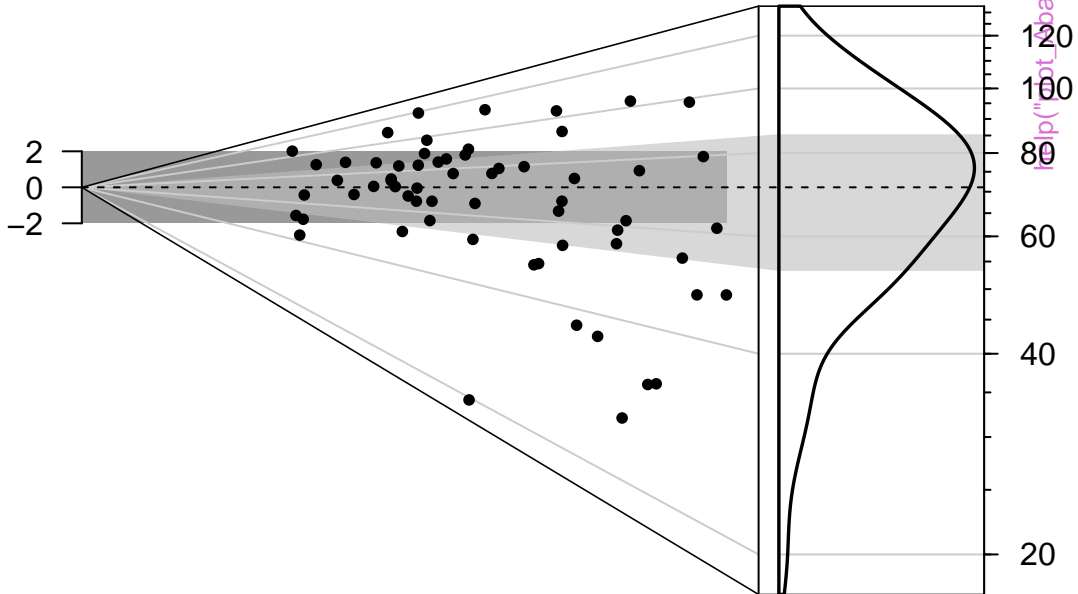
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

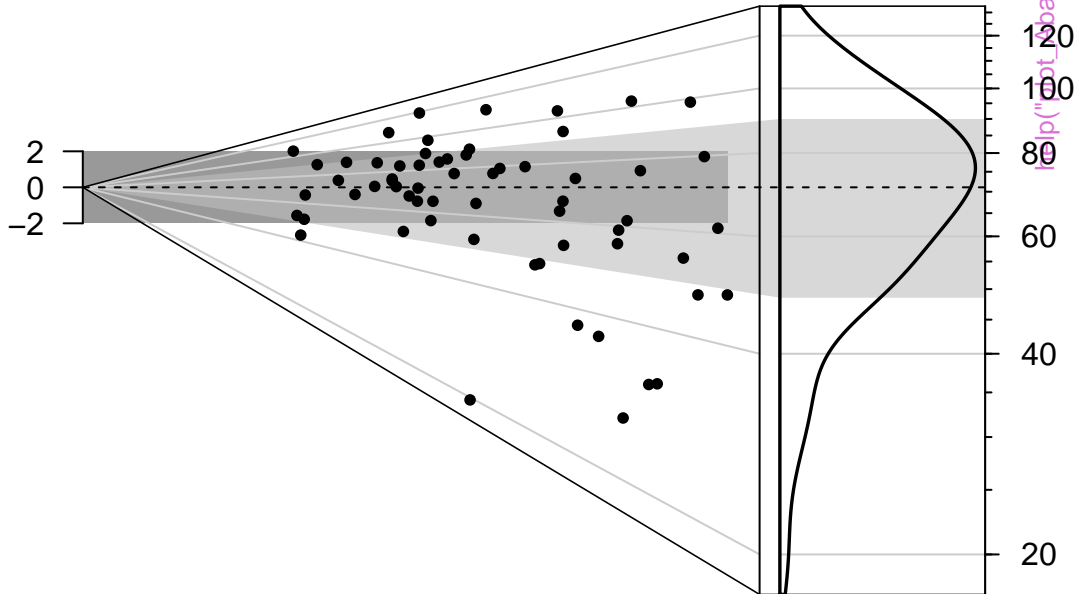
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

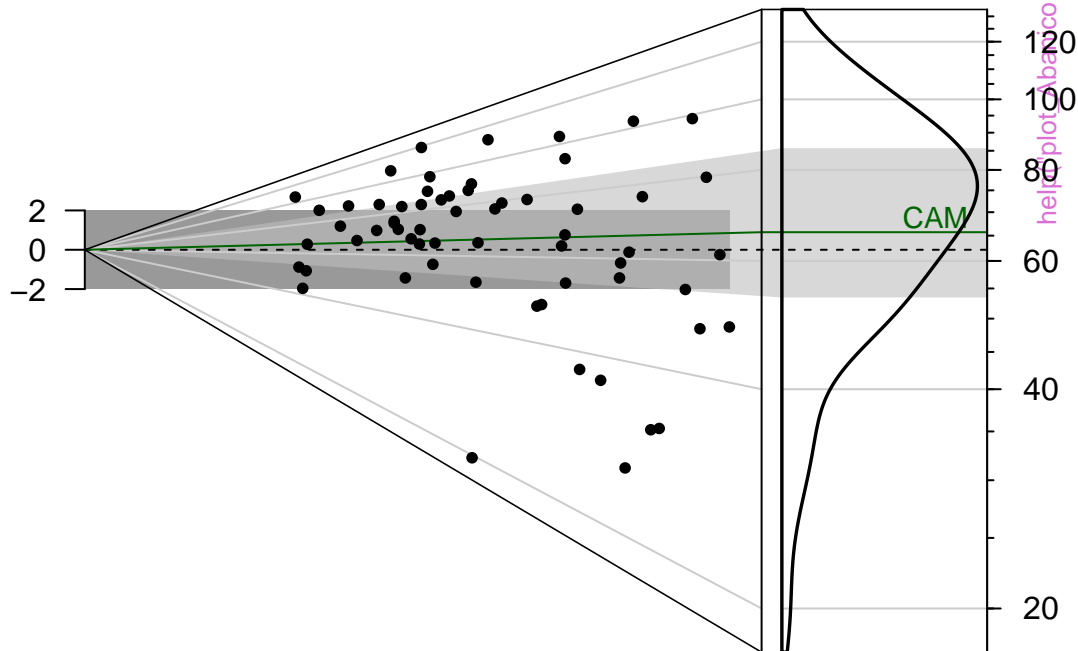
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



D_e (Gy)

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

Precision

10

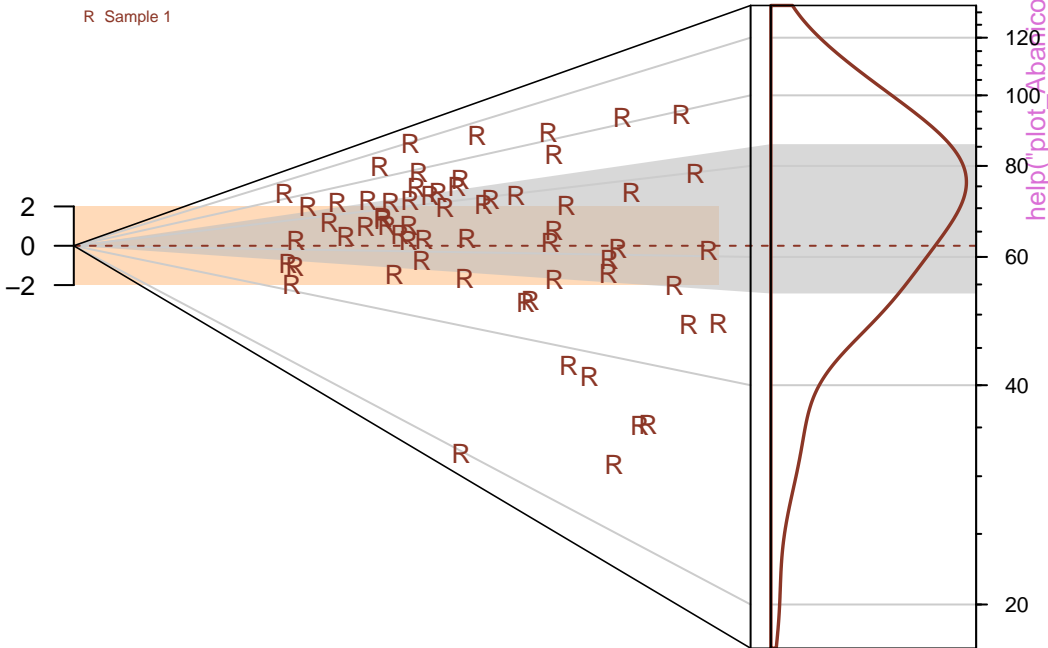
15

D_e distribution

n = 62

R Sample 1

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate

0

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

D_e (Gy)

Relative standard error (%)

20

10

6.7

0

5

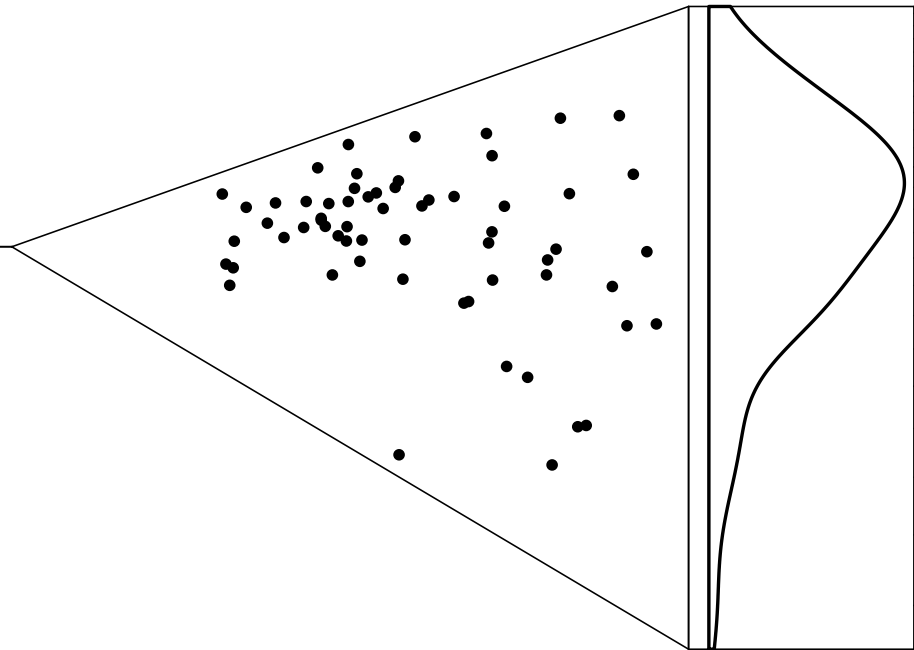
Precision

10

15

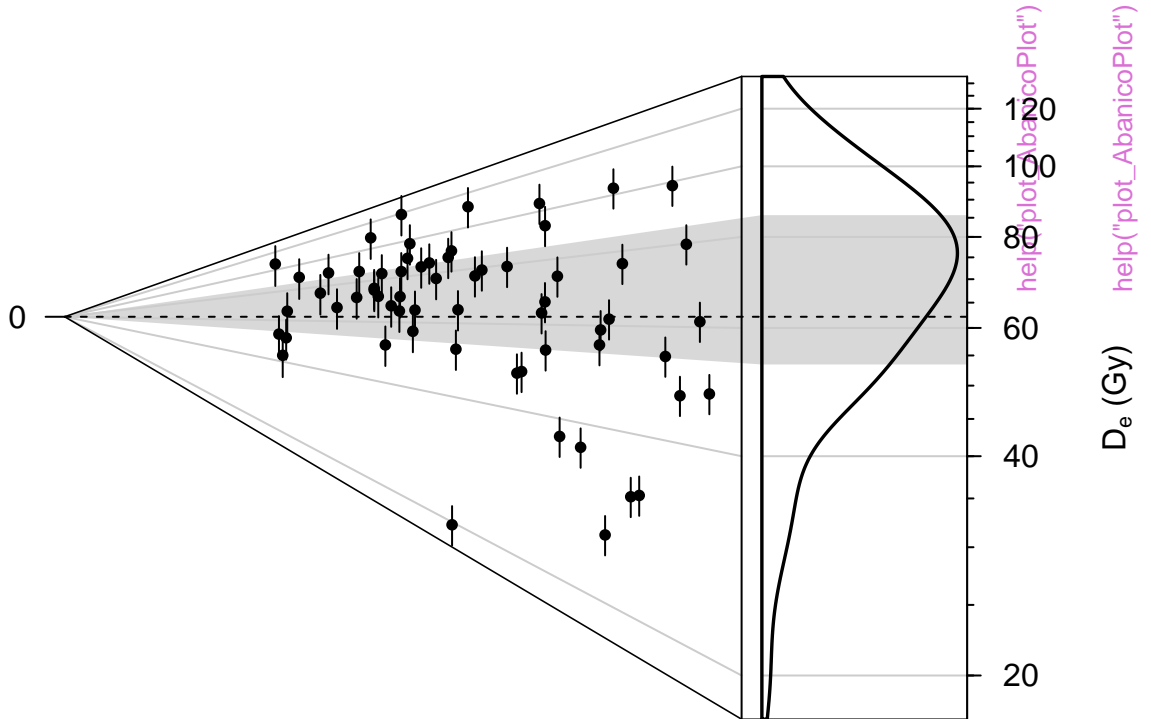
Density (bw 0.15)

0.016



D_e distribution

n = 62

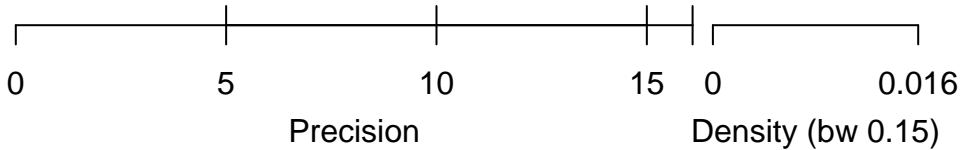


Relative standard error (%)

20

10

6.7

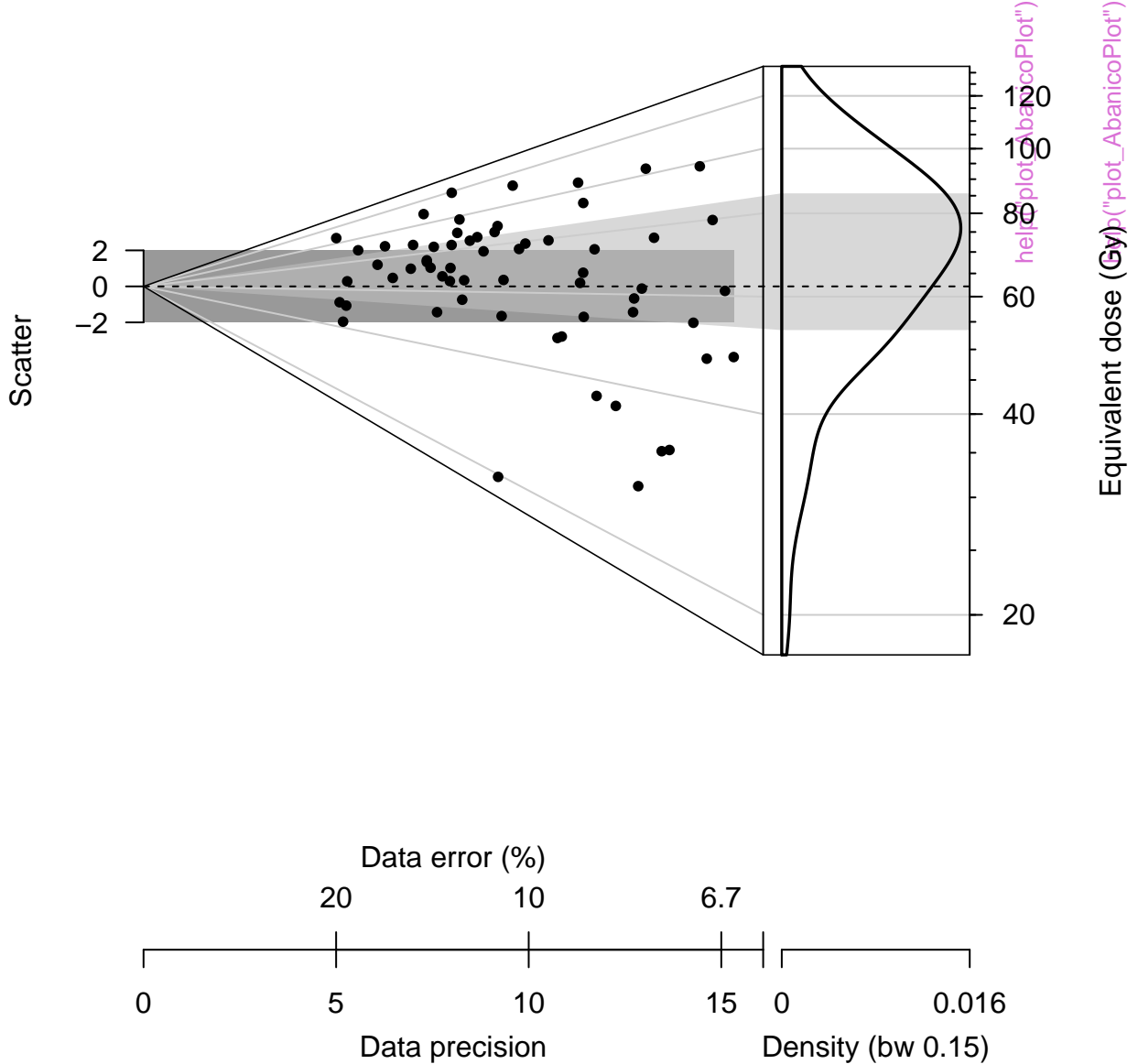


Precision

Density (bw 0.15)

D_e distribution

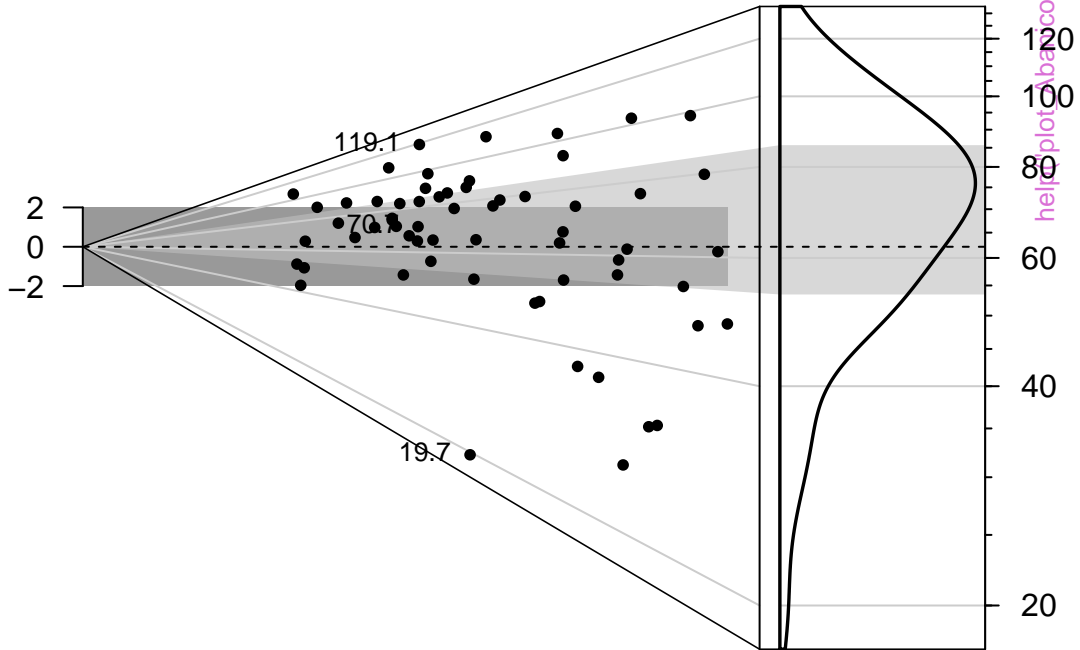
n = 62



D_e distribution

n = 62

Standardised estimate



D_e (Gy)

Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

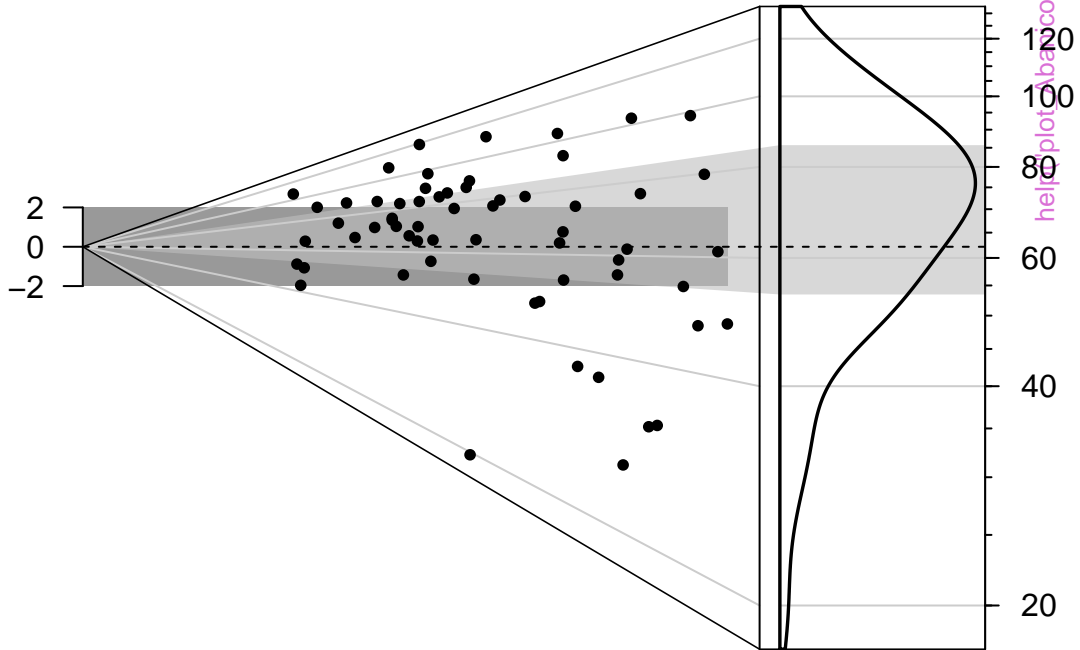
Precision

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

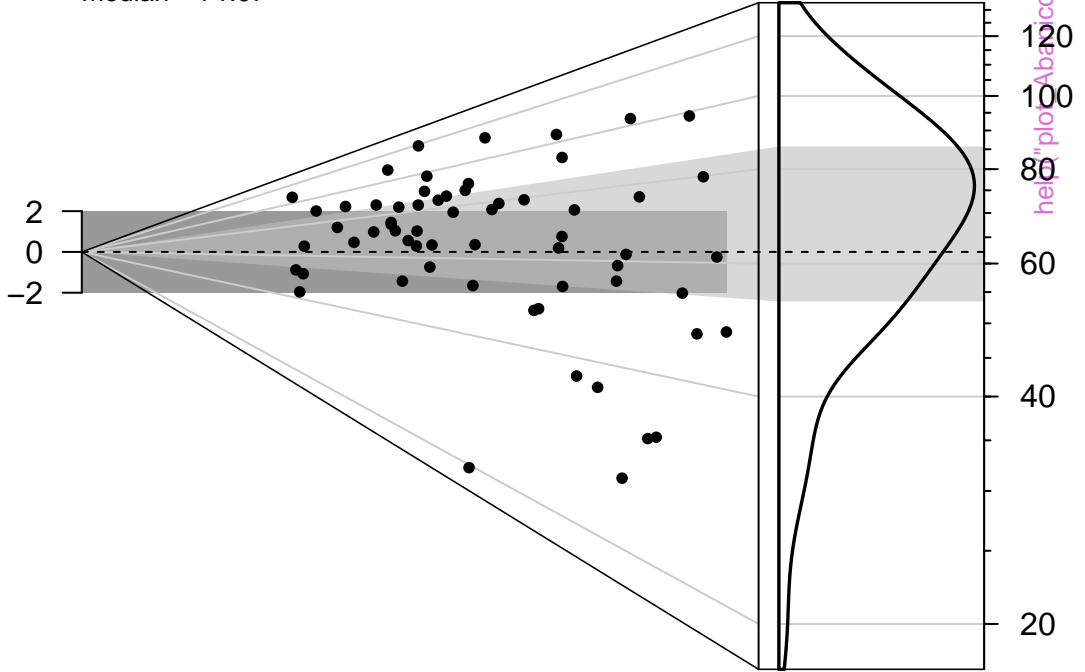
Precision

Density (bw 0.15)

D_e distribution

weighted mean = 62.16
median = 71.07

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

Precision

10

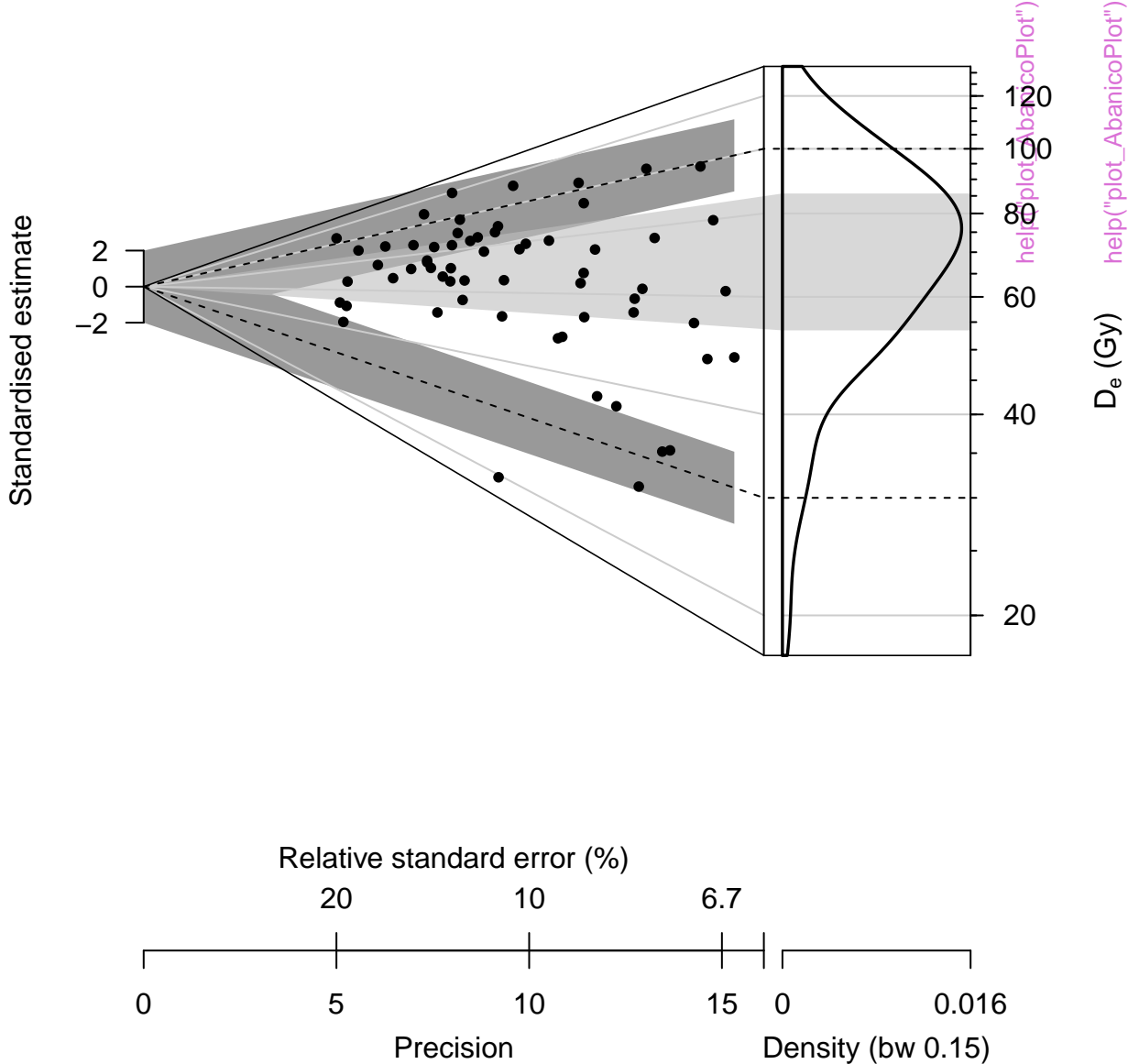
15

Density (bw 0.15)

0.016

D_e distribution

n = 62

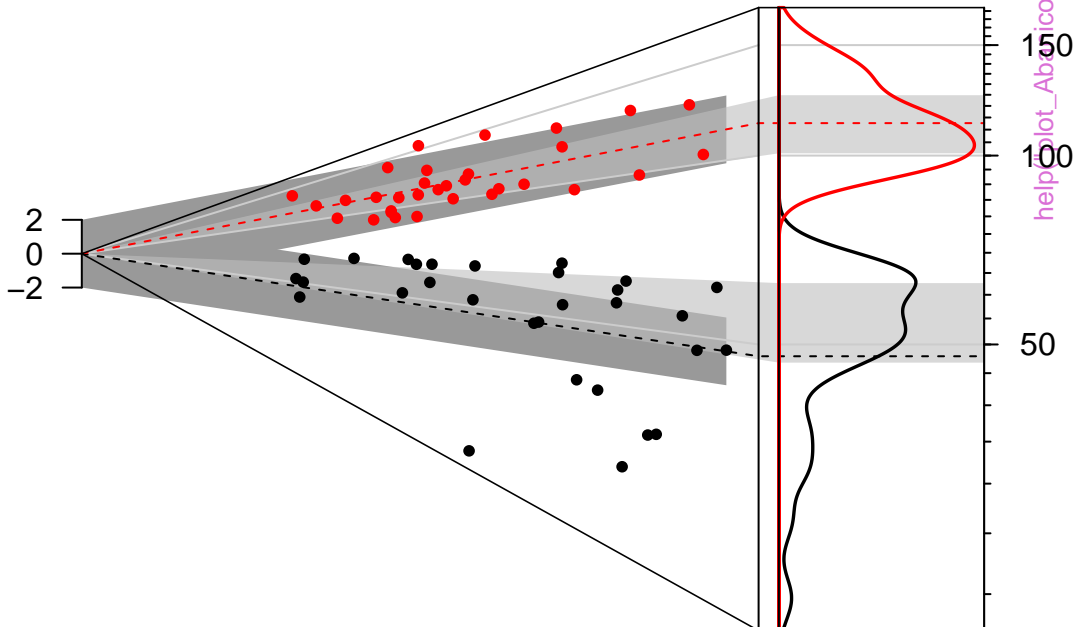


D_e distribution

n = 30

n = 32

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0

0.032

Precision

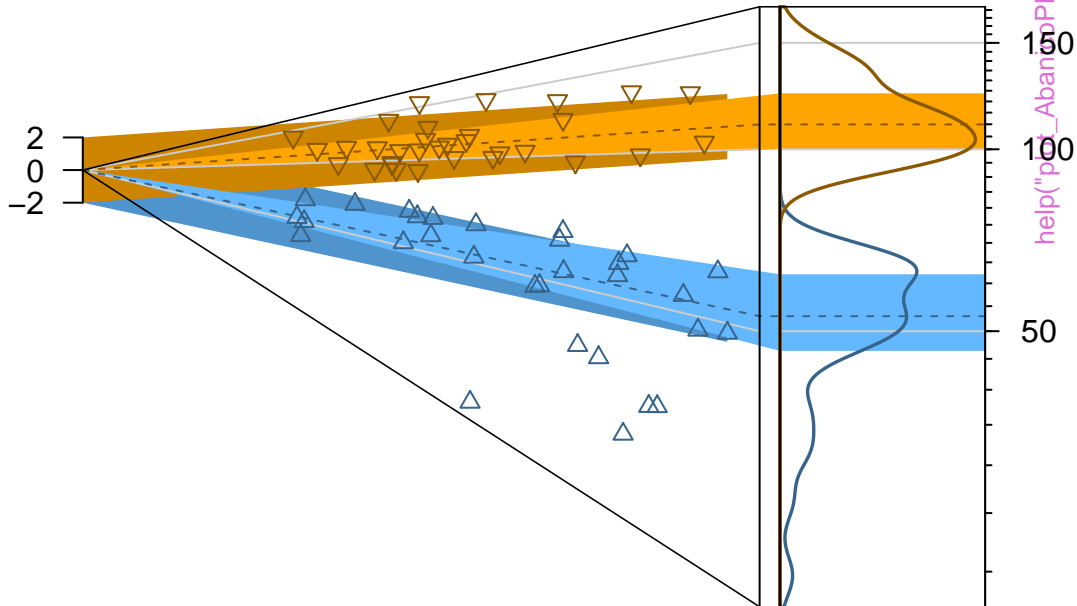
Density (bw 0.074)

D_e distribution

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

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

Standardised estimate



D_e (Gy)

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

10

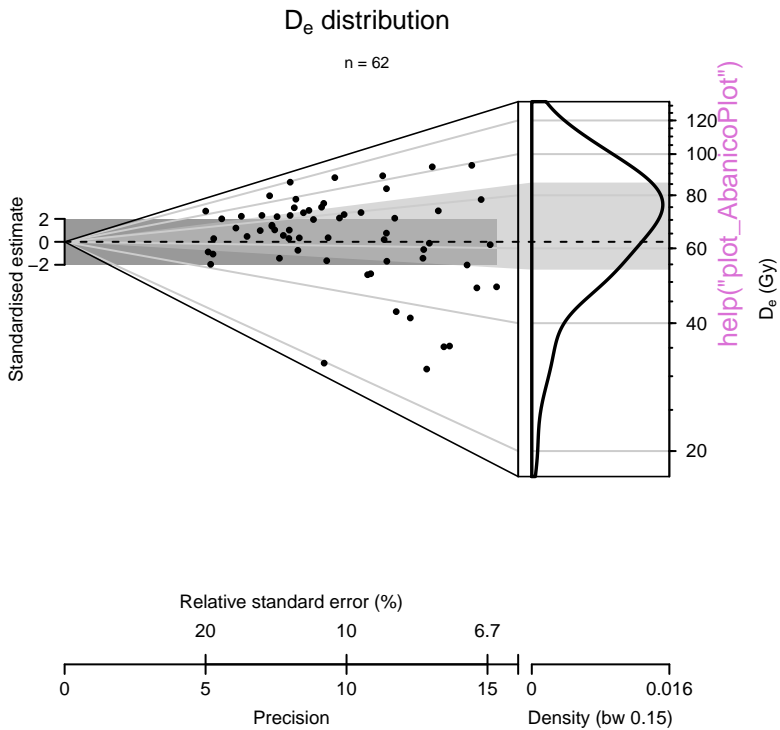
15

0

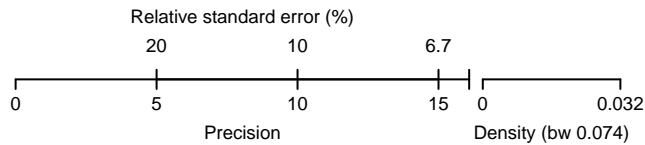
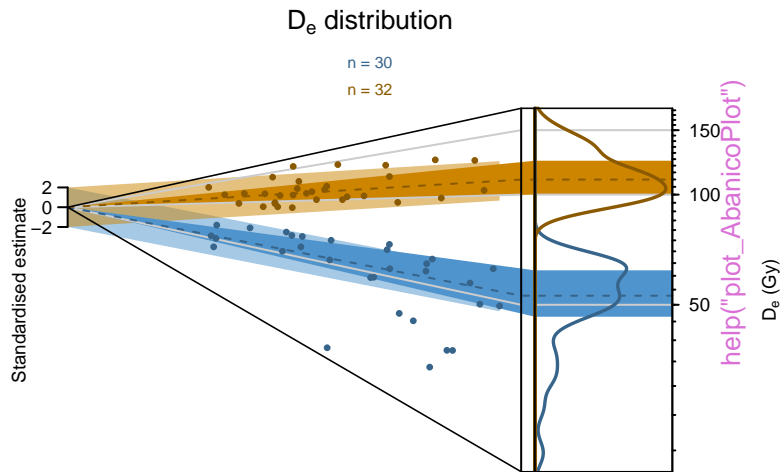
0.032

Precision

Density (bw 0.074)



`help("plot_AbanicoPlot")`



`help("plot_AbanicoPlot")`

Dose recovery test

Example data



Dose recovery test



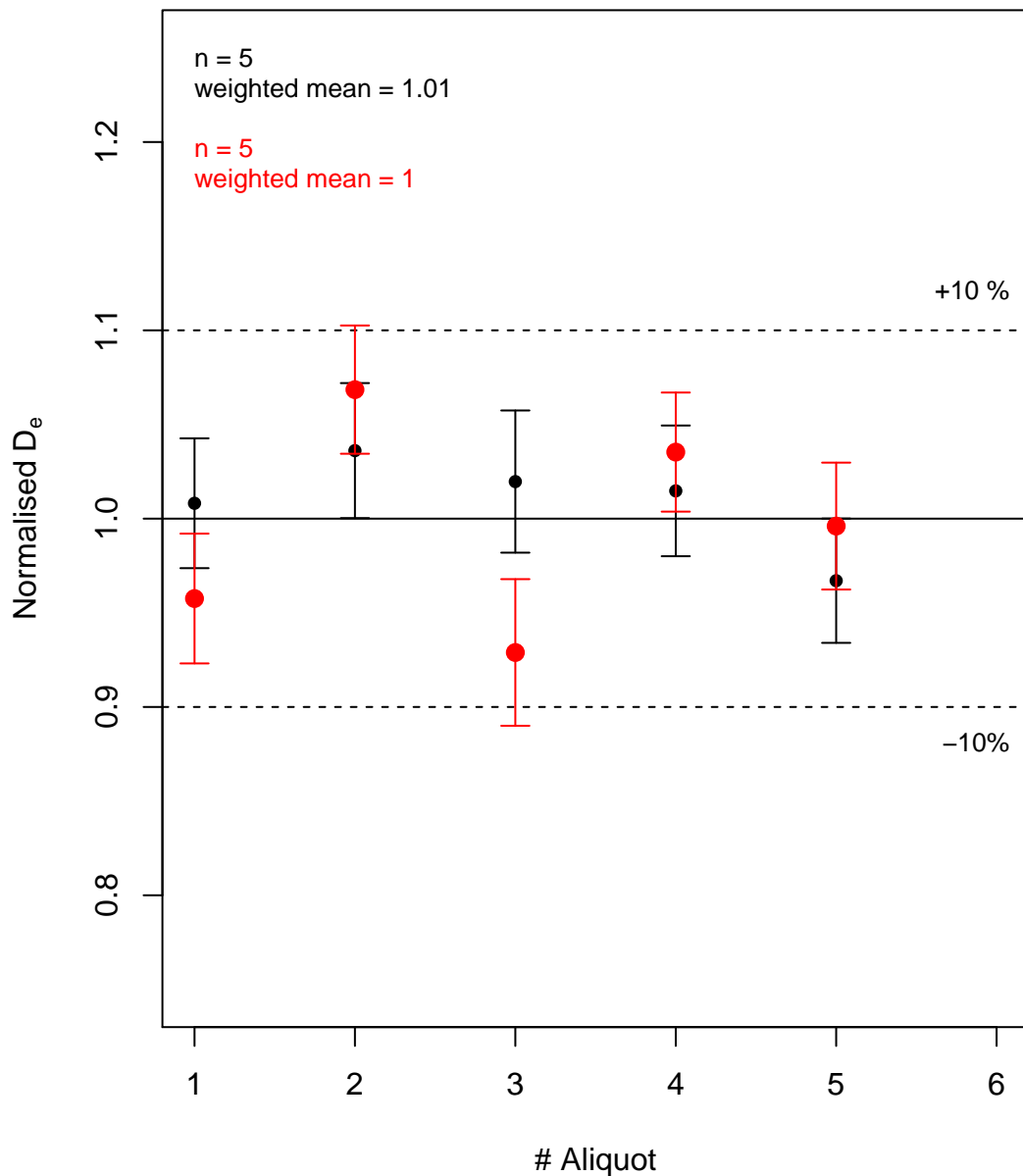
Dose recovery test



Dose recovery test



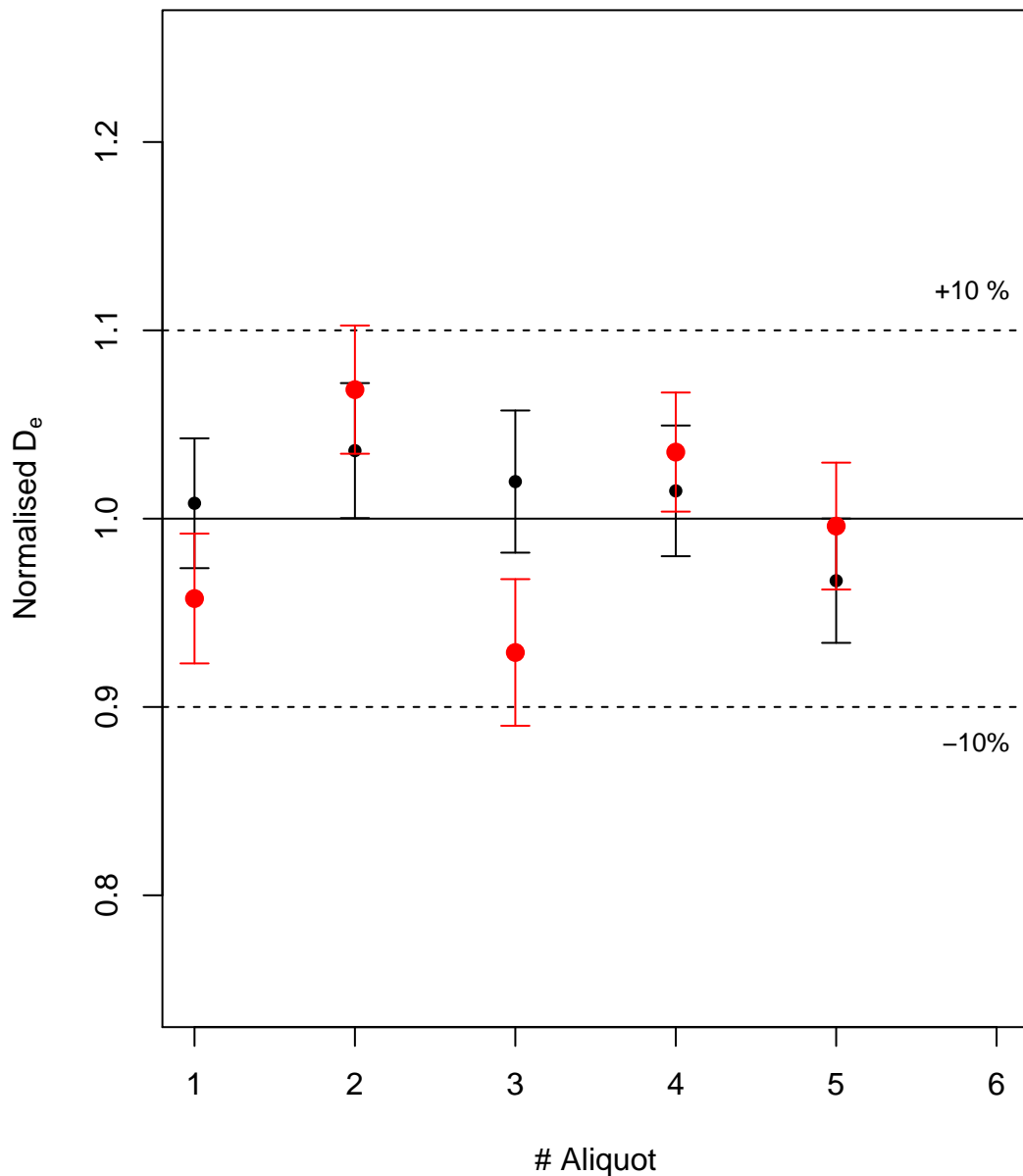
Dose recovery test



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

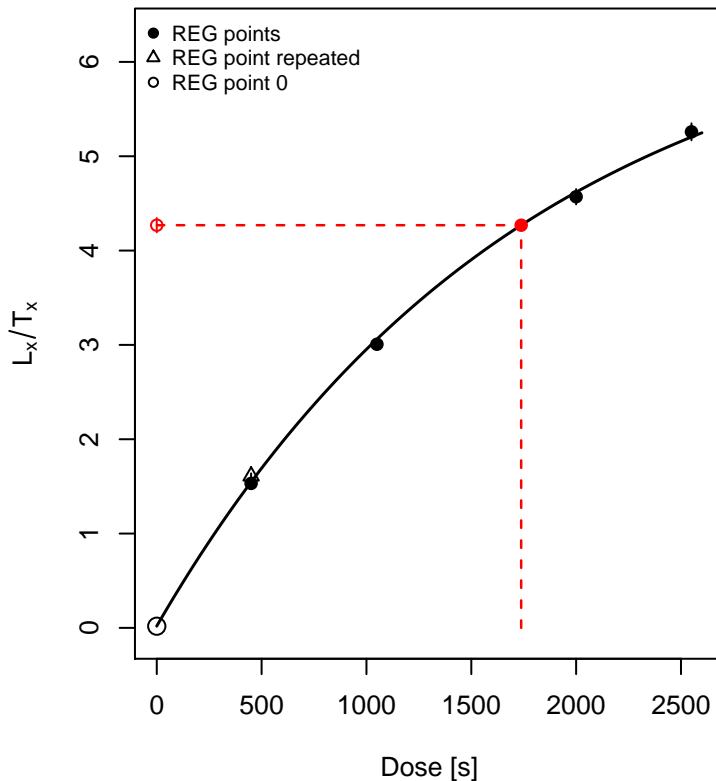


Dose recovery test



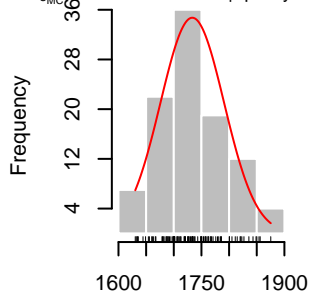
Growth curve

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

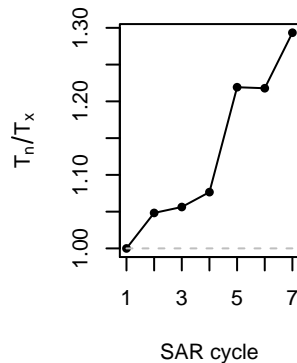


D_e from MC simulation

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

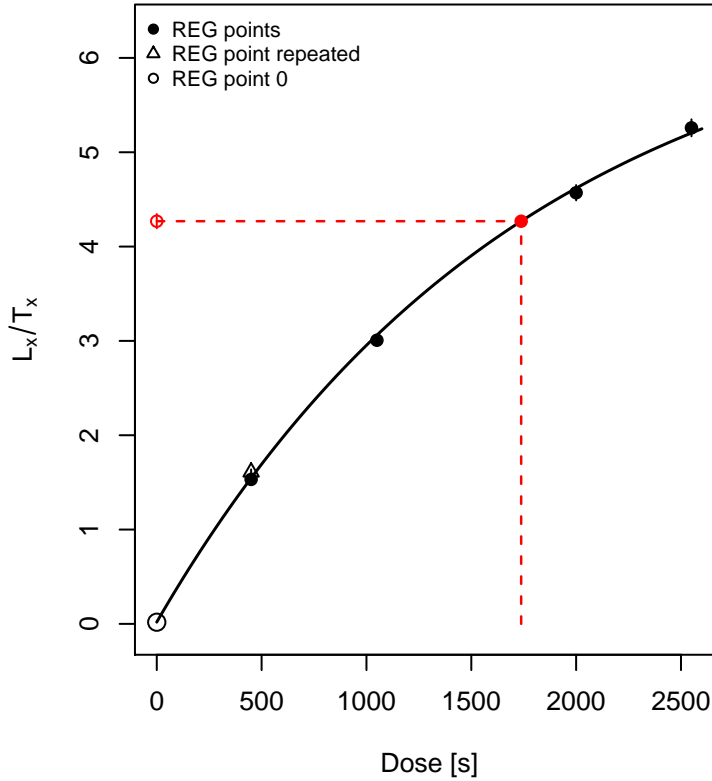


Test dose response



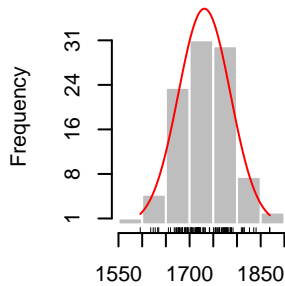
Growth curve

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

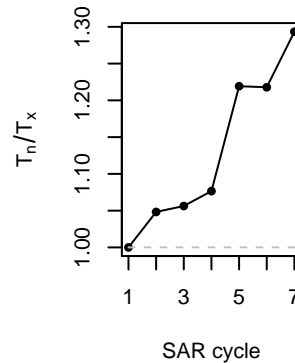


D_e from MC simulation

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

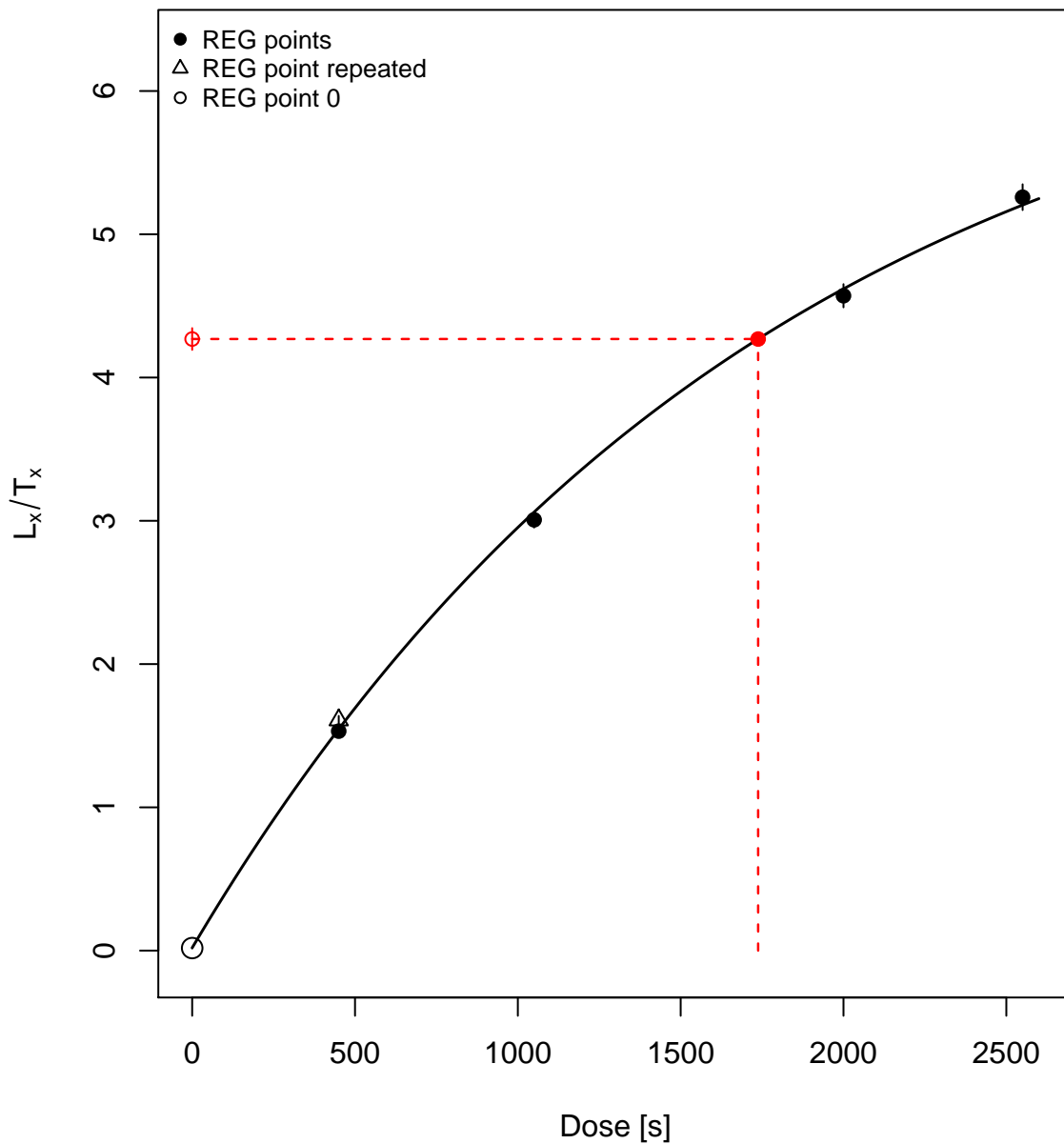


Test dose response



Growth curve

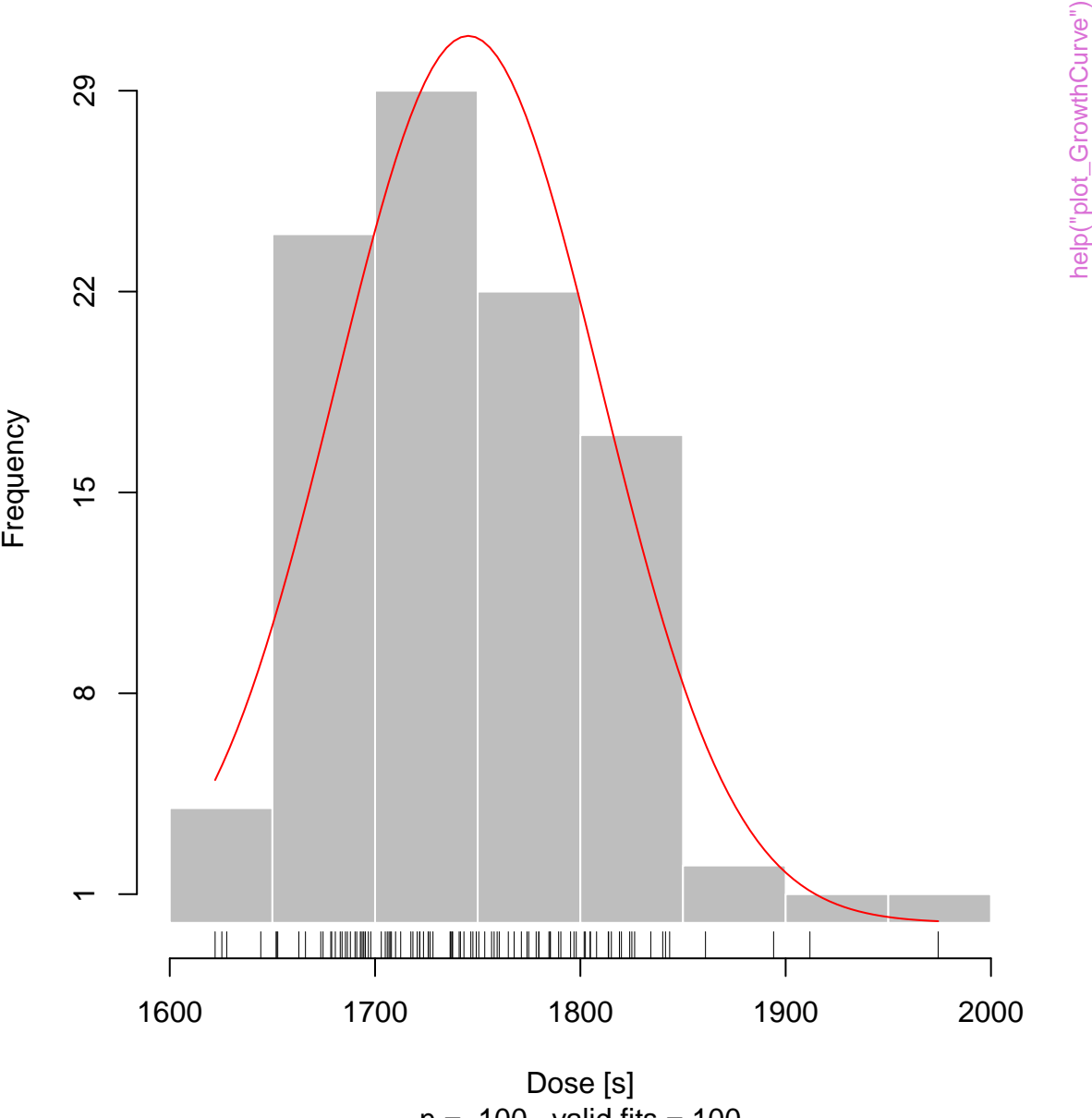
$D_e = 1737.88 \pm 64.53$ | fit: EXP



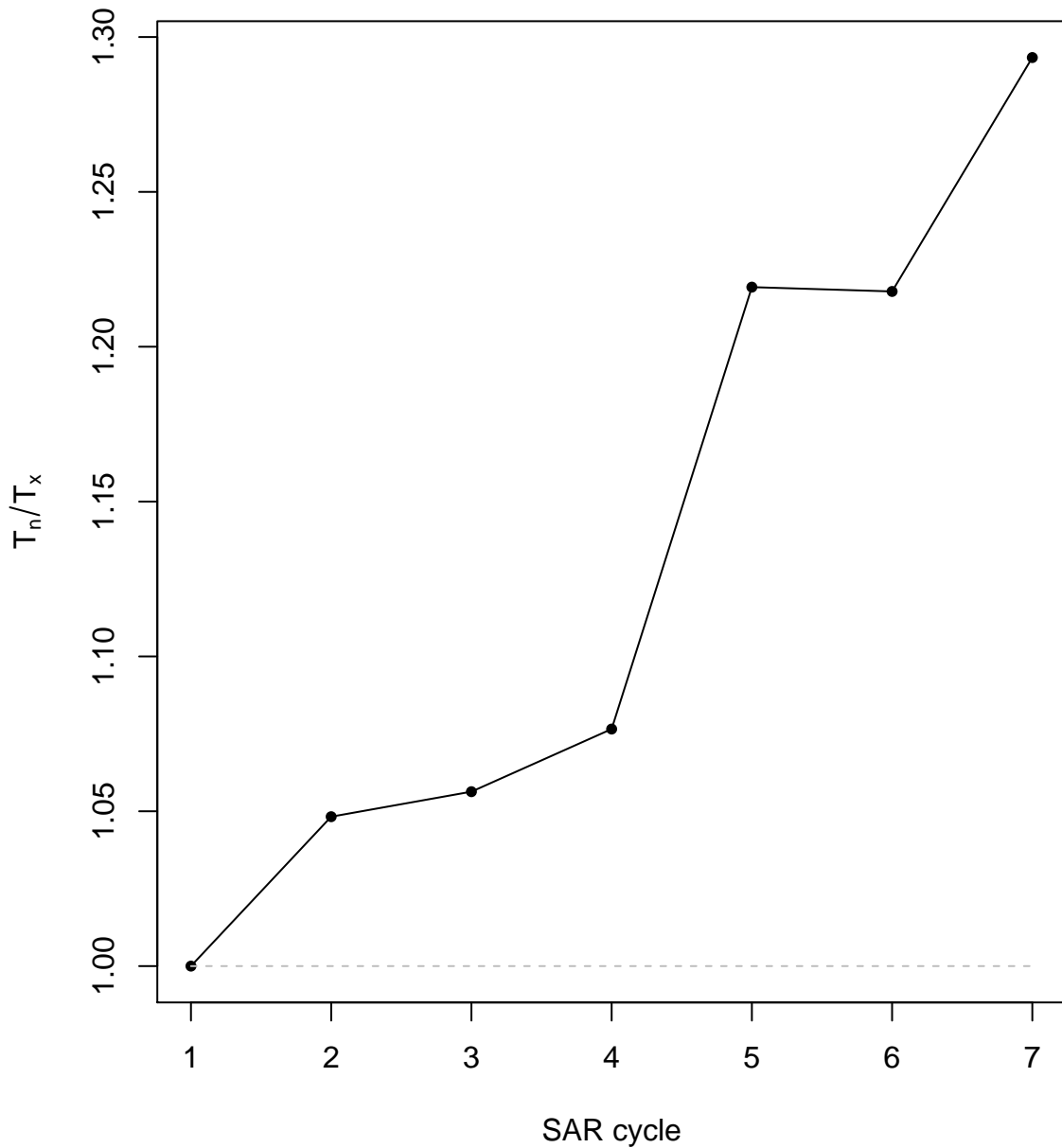
help("plot_GrowthCurve")

D_e from MC simulation

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

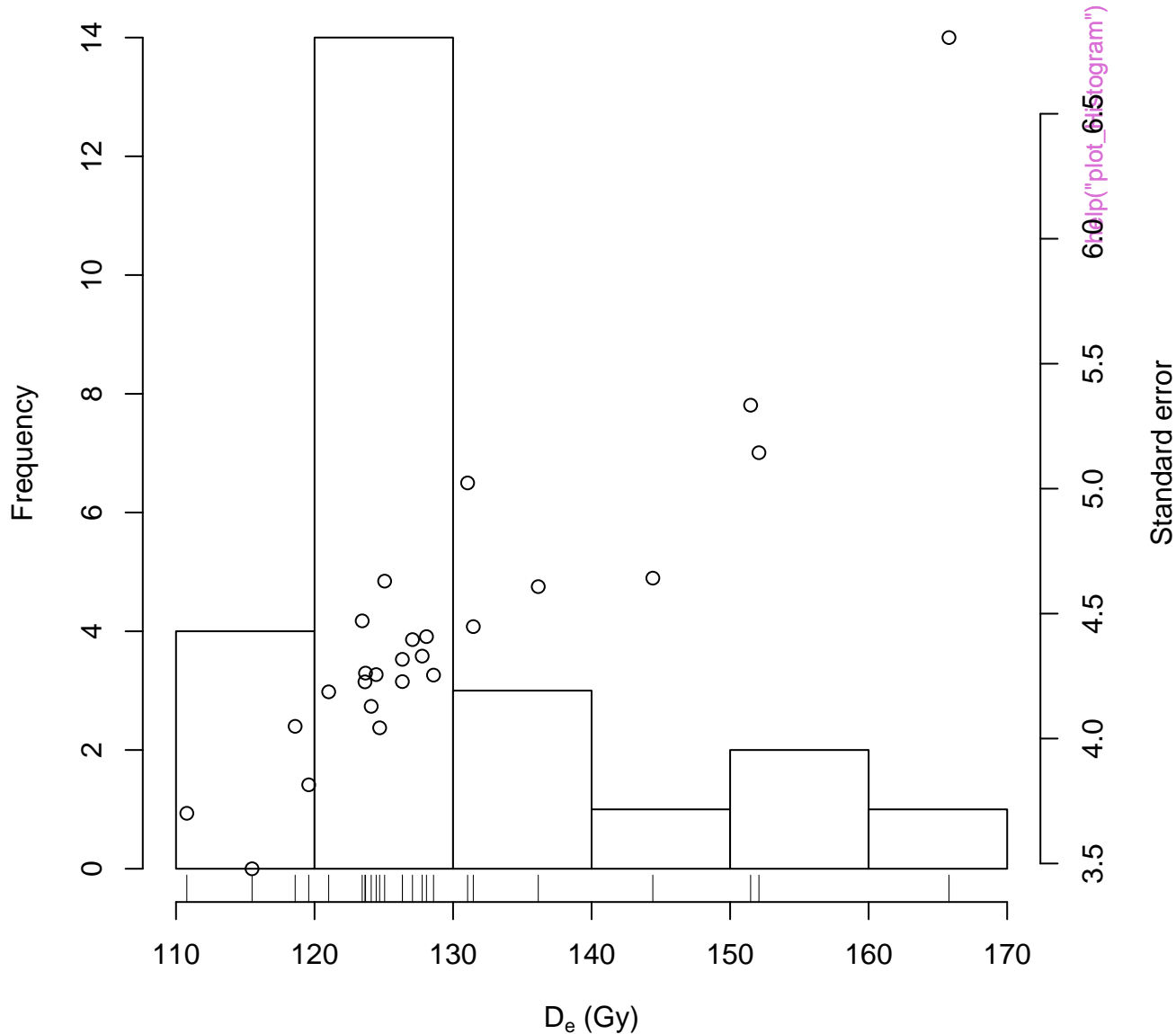


Test dose response



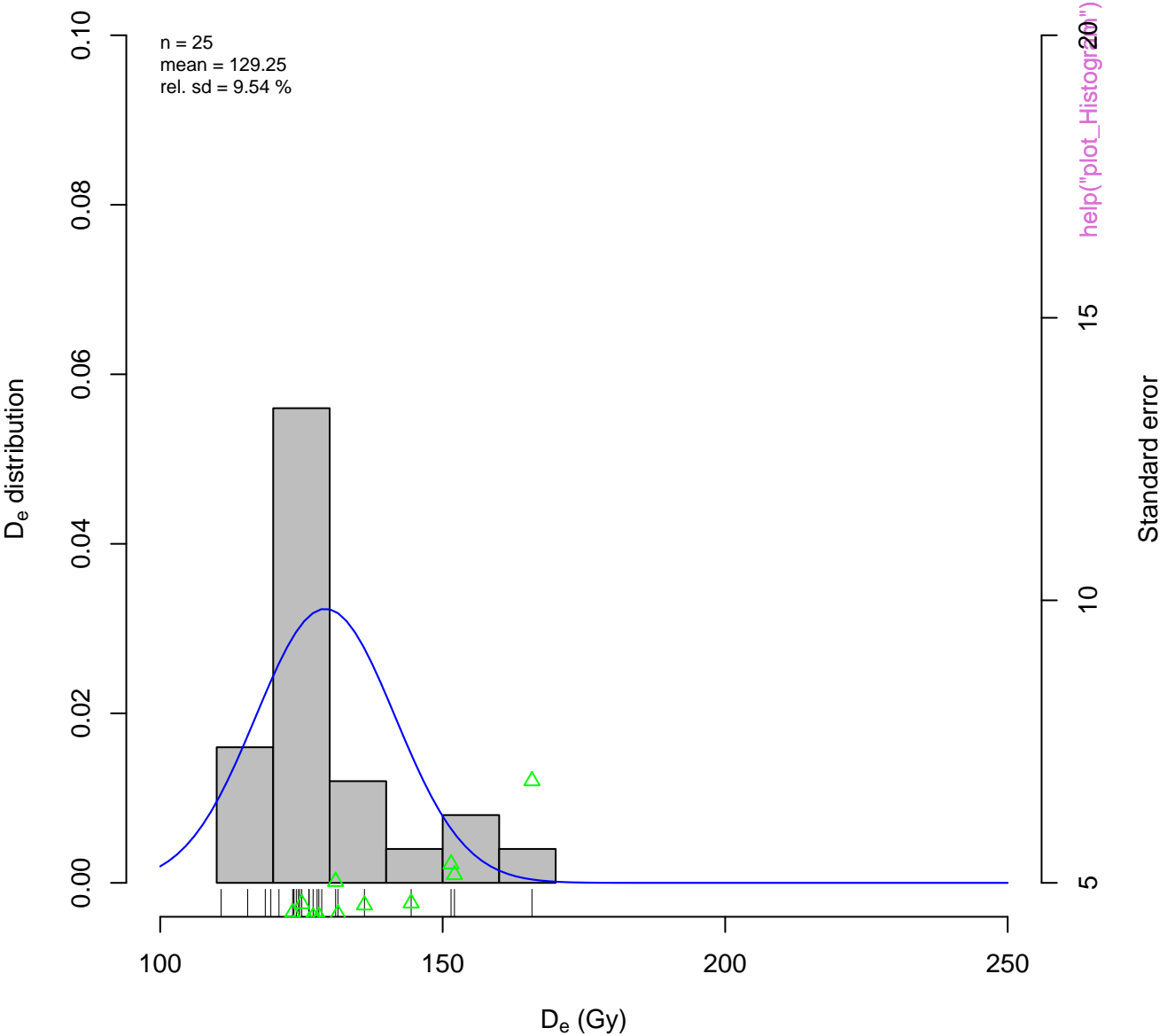
help("plot_GrowthCurve")

Histogram



Histogram of De-values

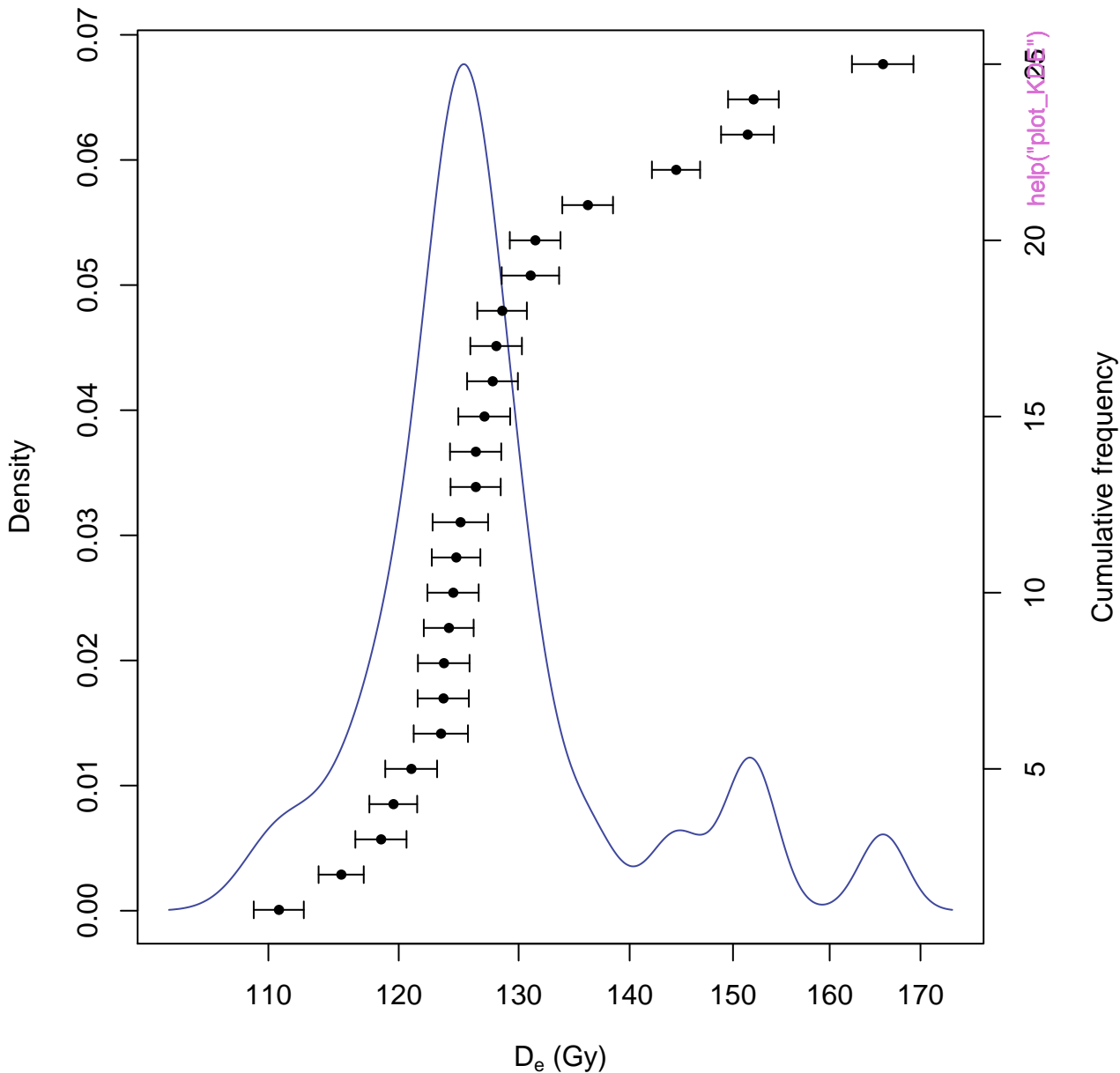
Example data set



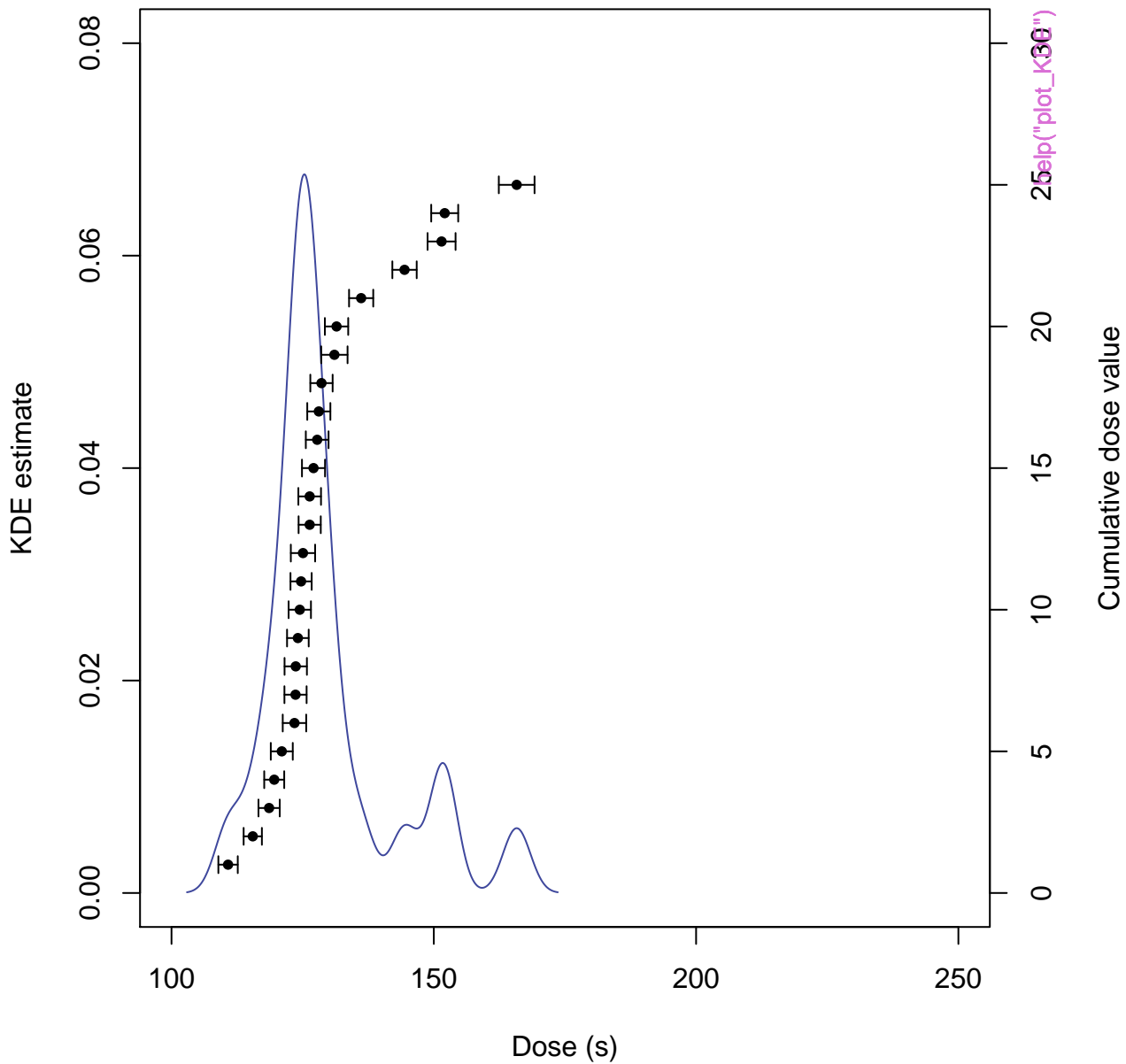
D_e distribution



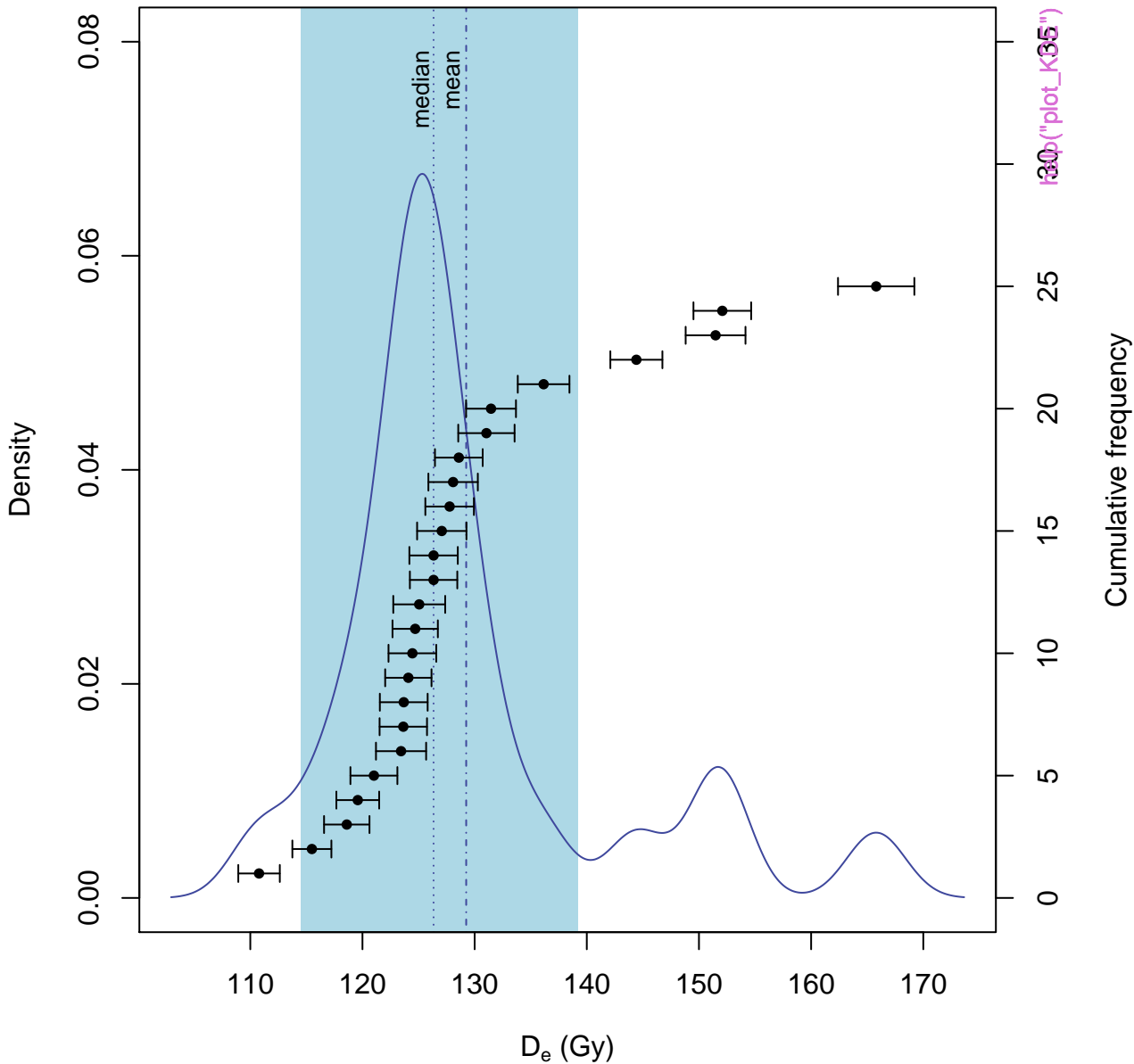
D_e distribution



Dose distribution

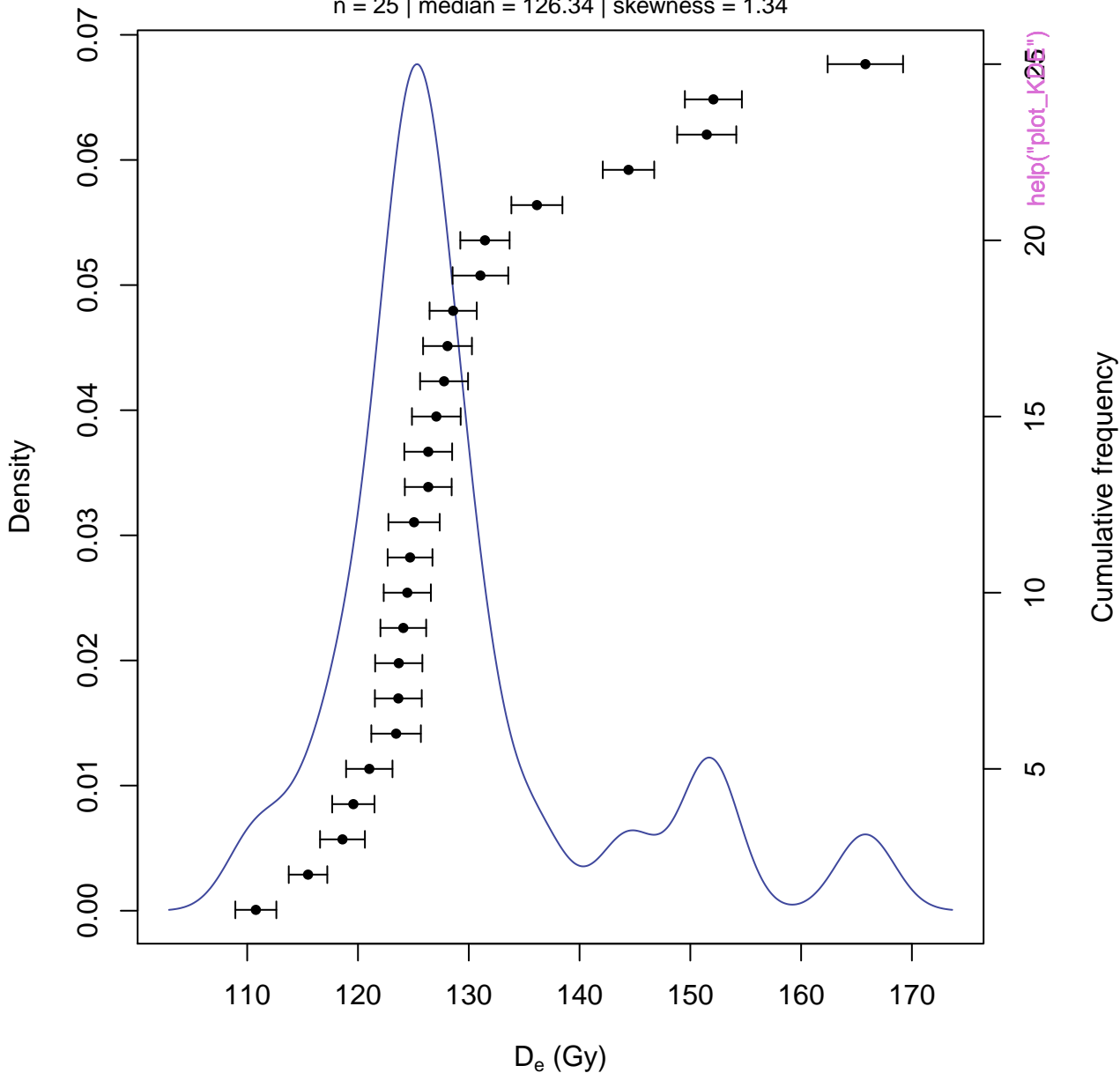


D_e distribution

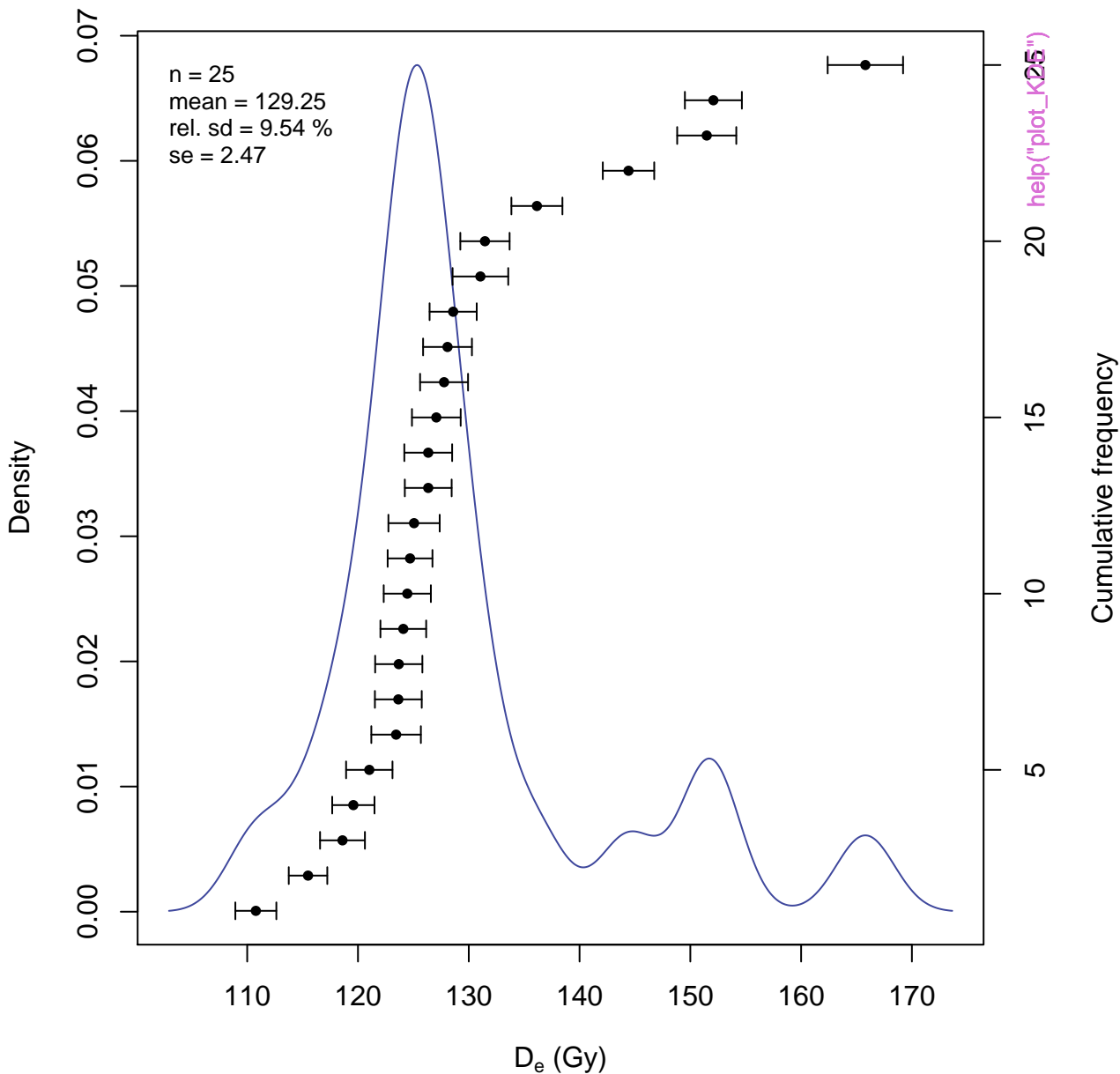


D_e distribution

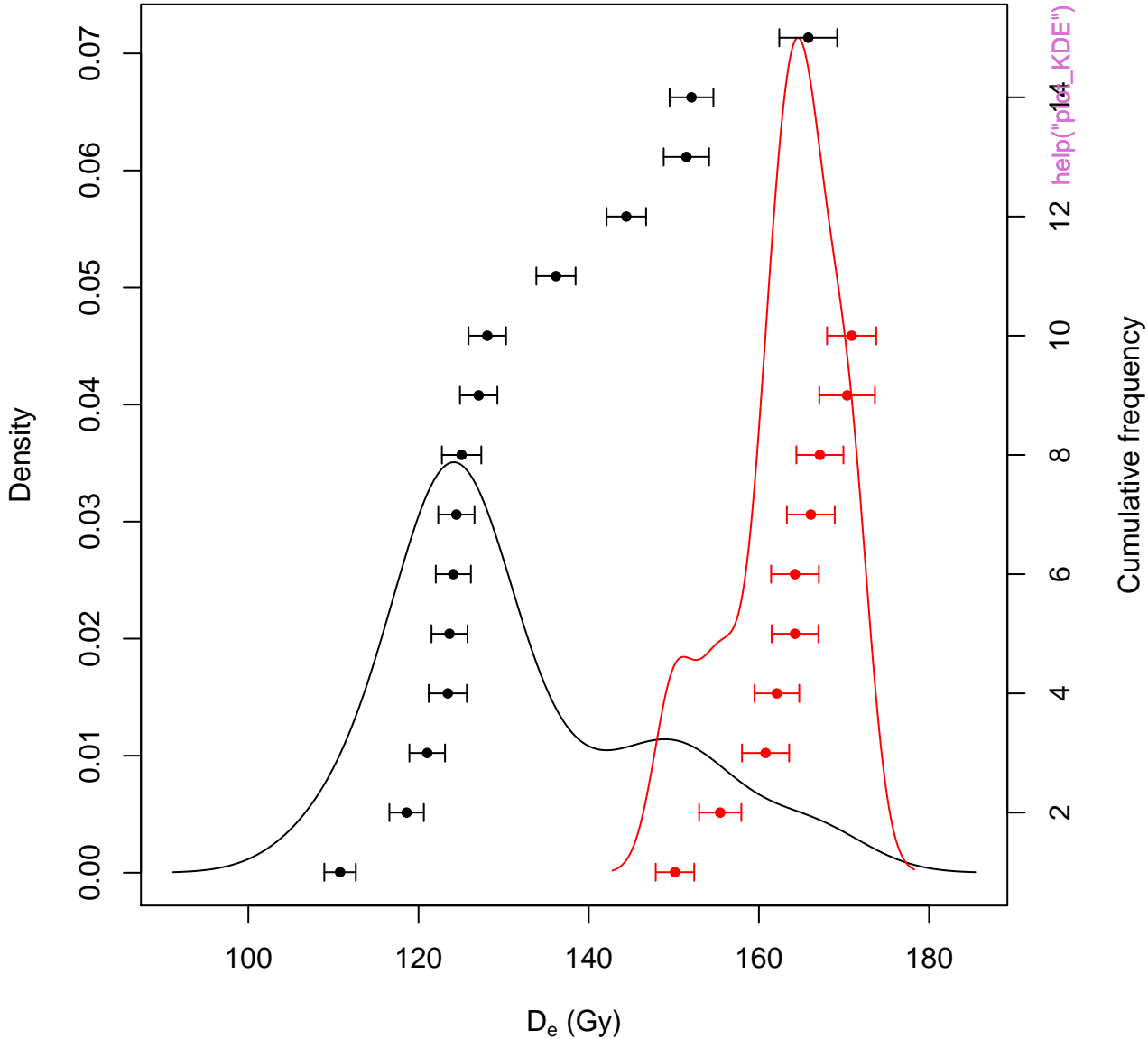
n = 25 | median = 126.34 | skewness = 1.34



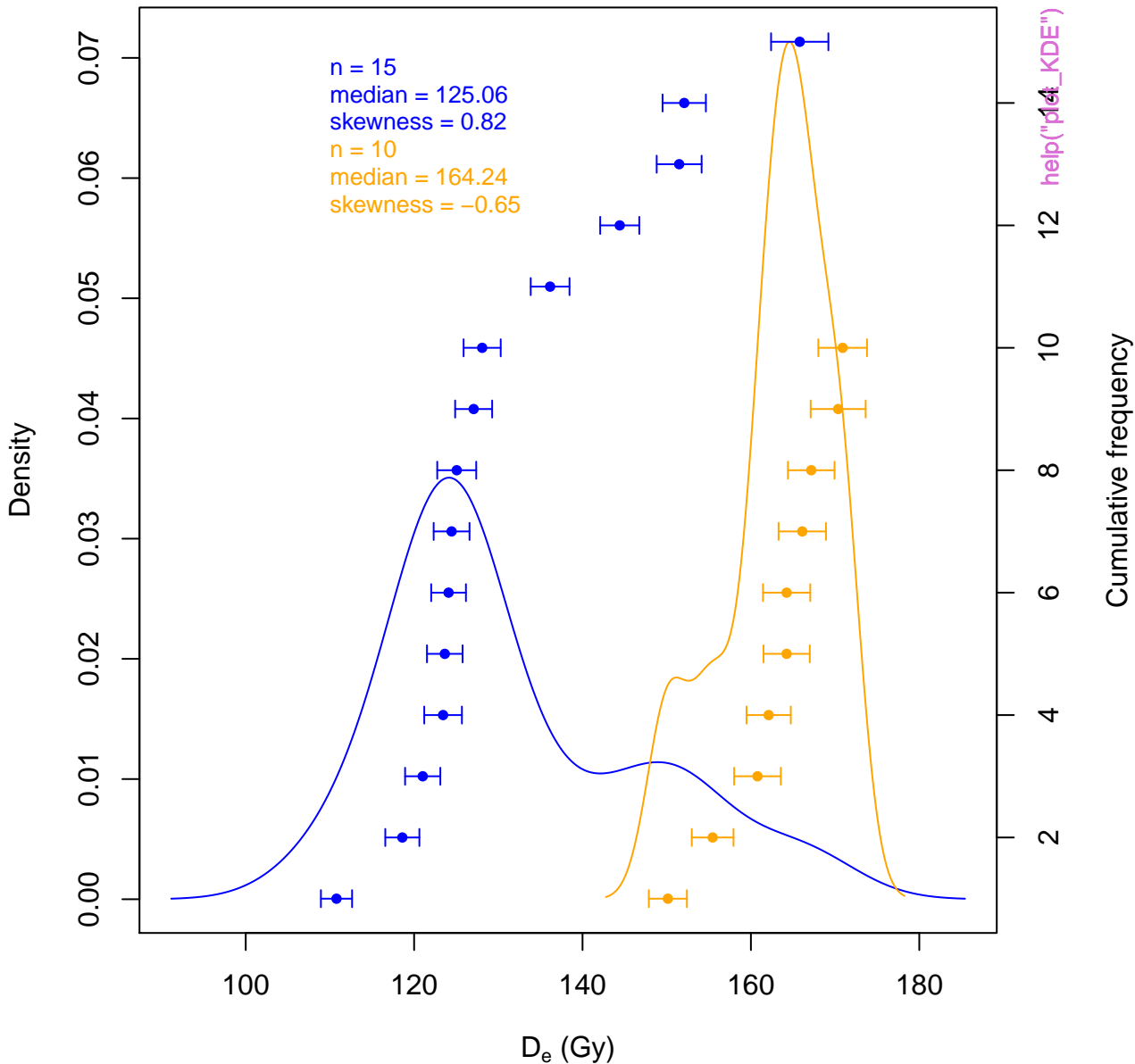
D_e distribution



D_e distribution



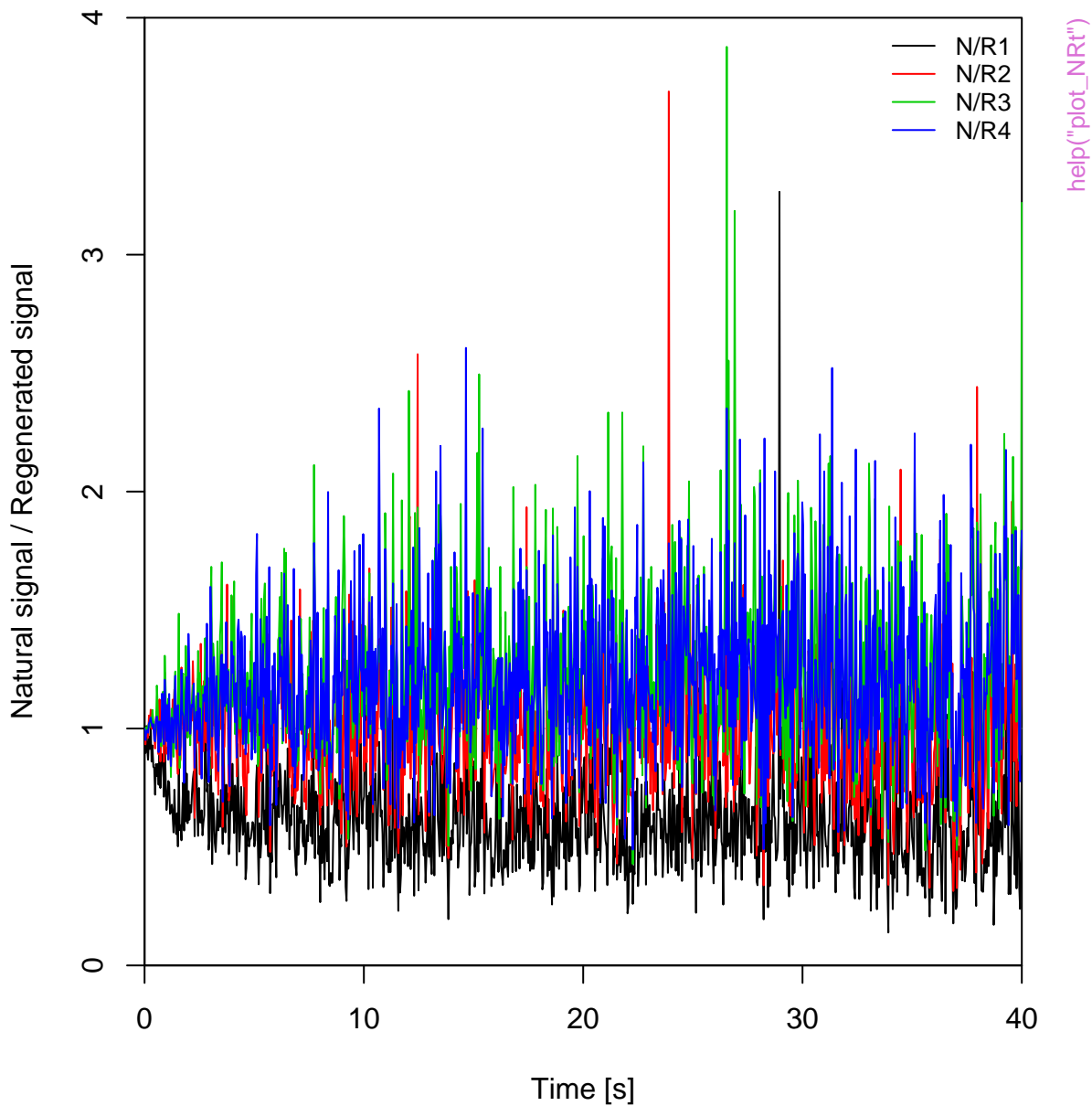
D_e distribution



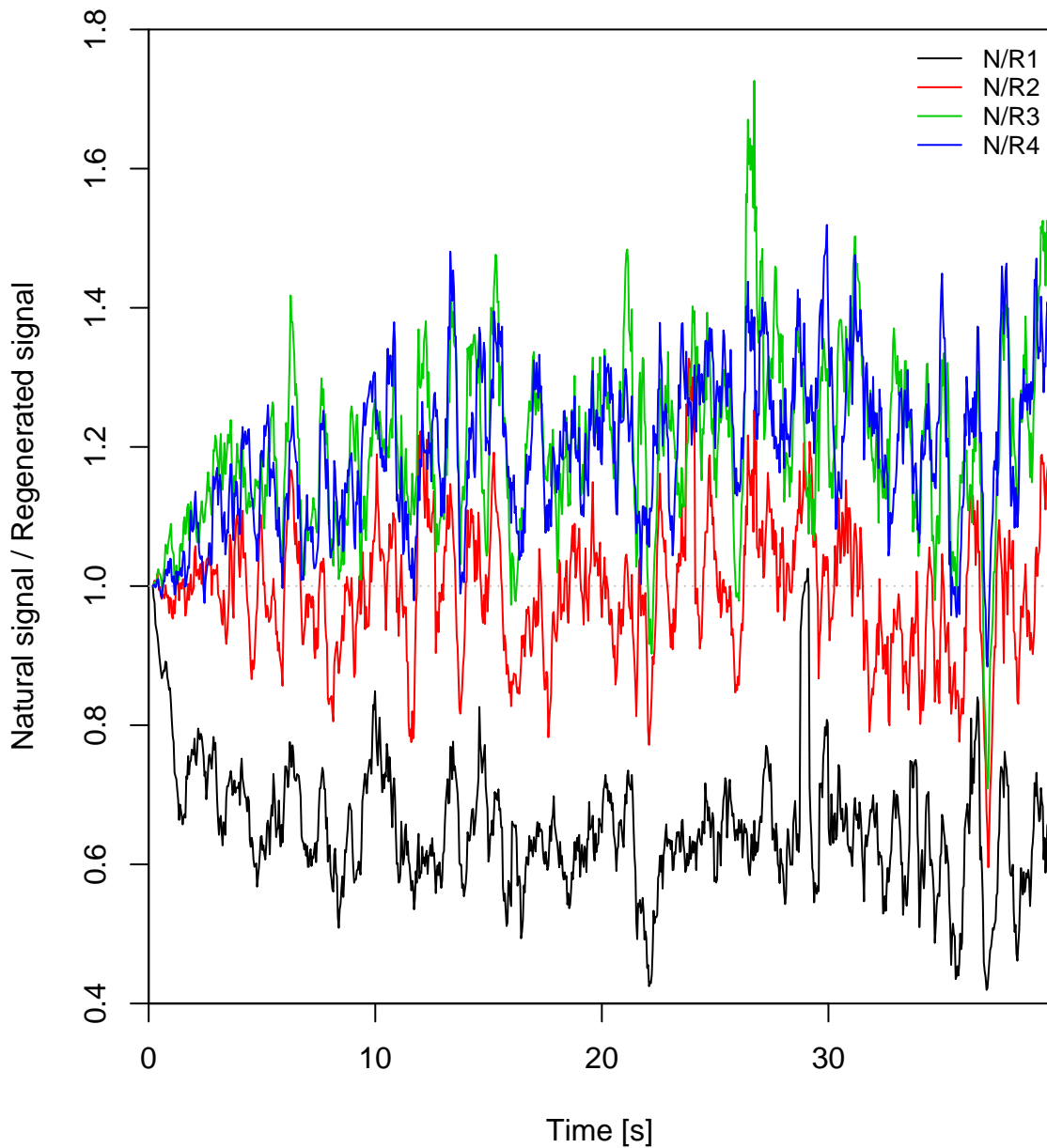
D_e distribution



NR(t) Plot

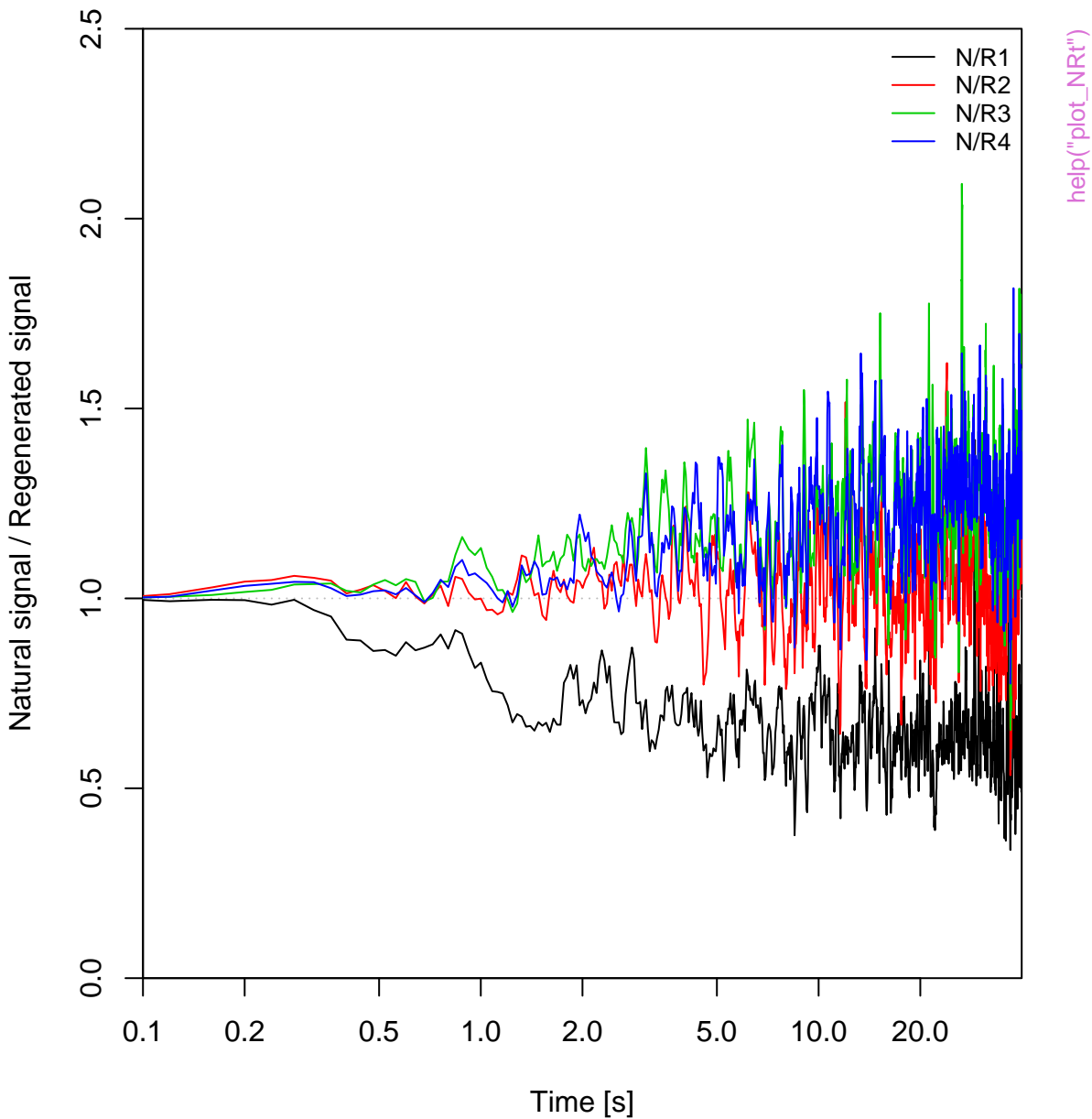


NR(t) Plot

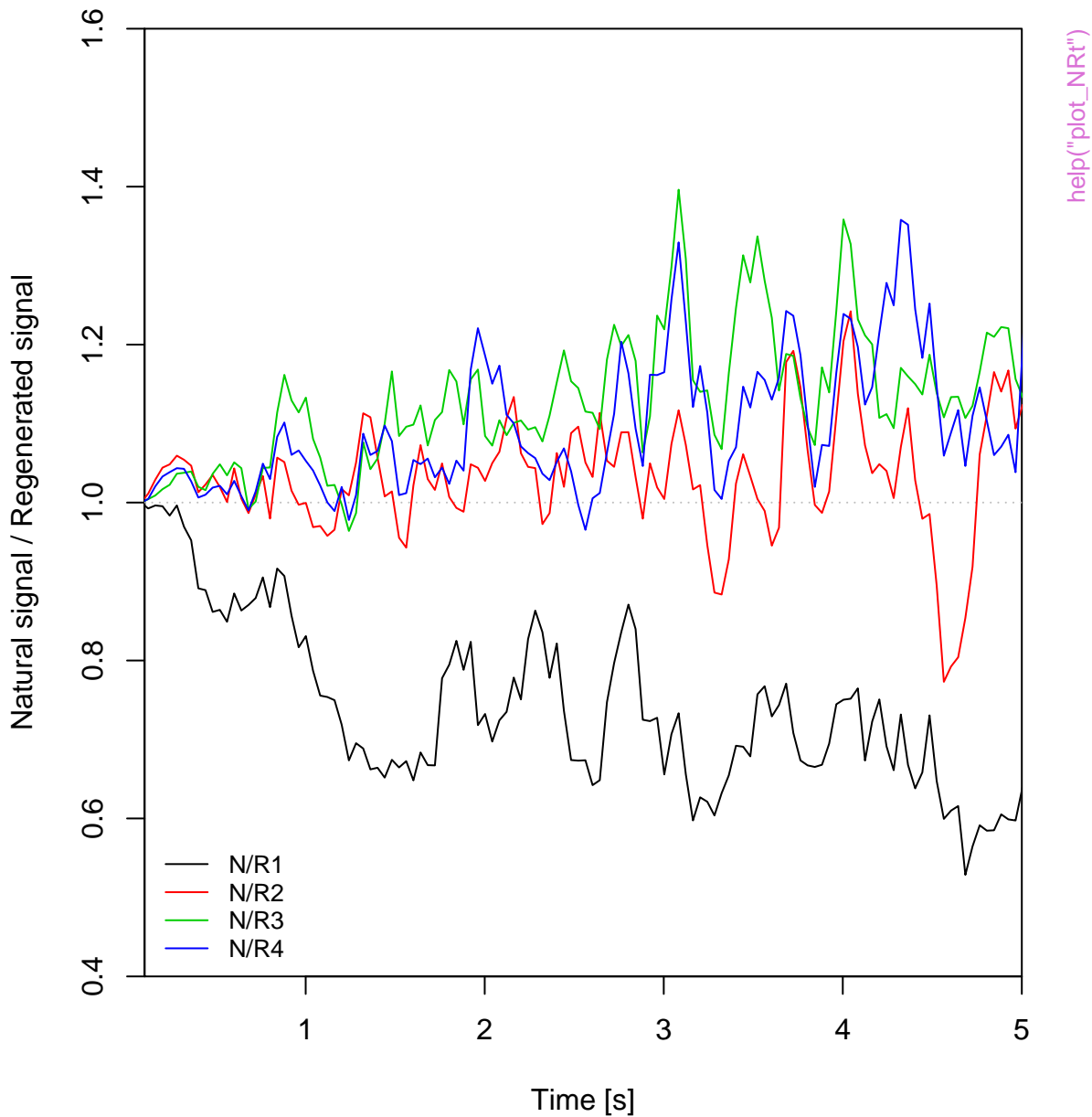


help("plot_NRt")

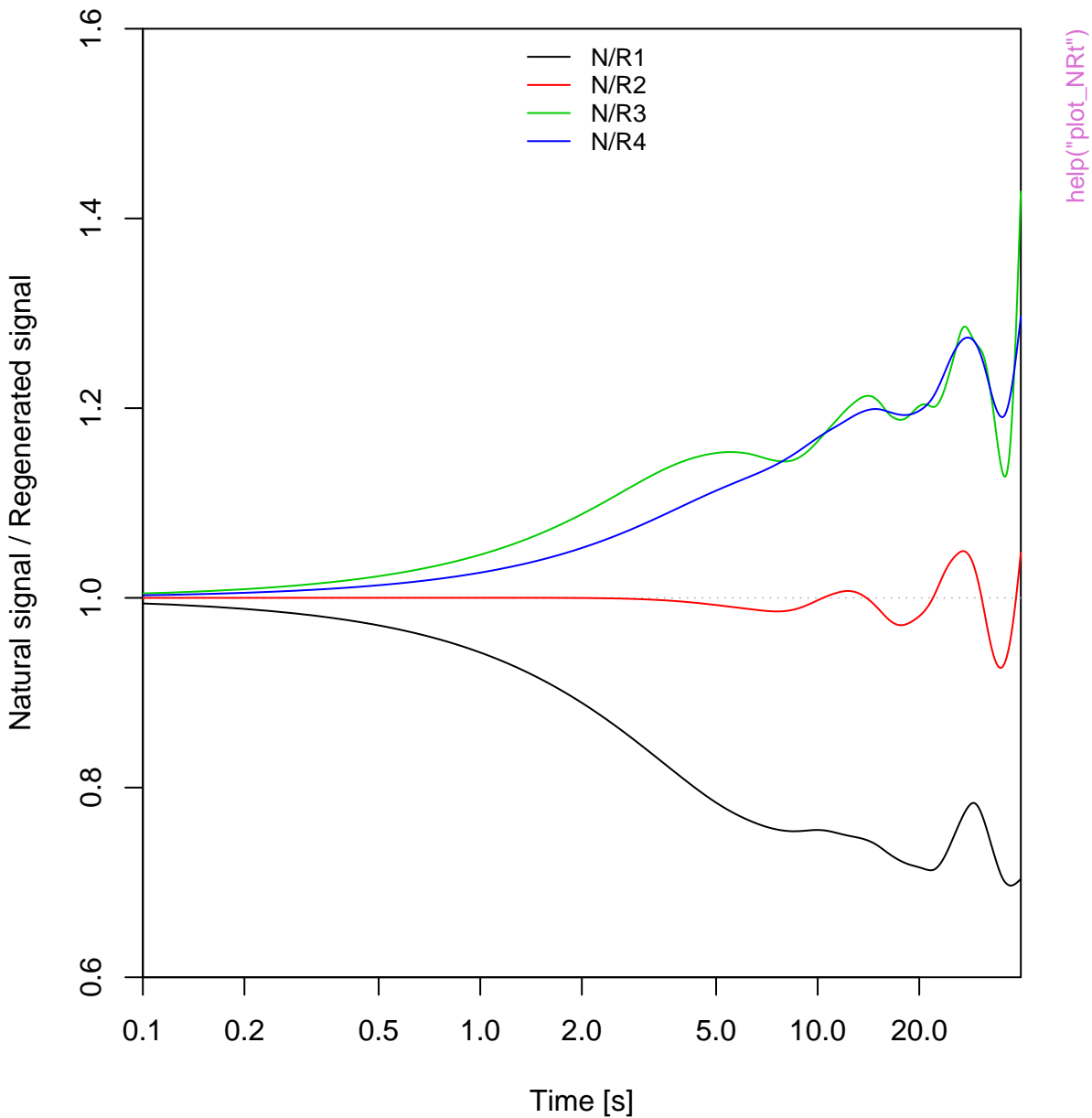
NR(t) Plot



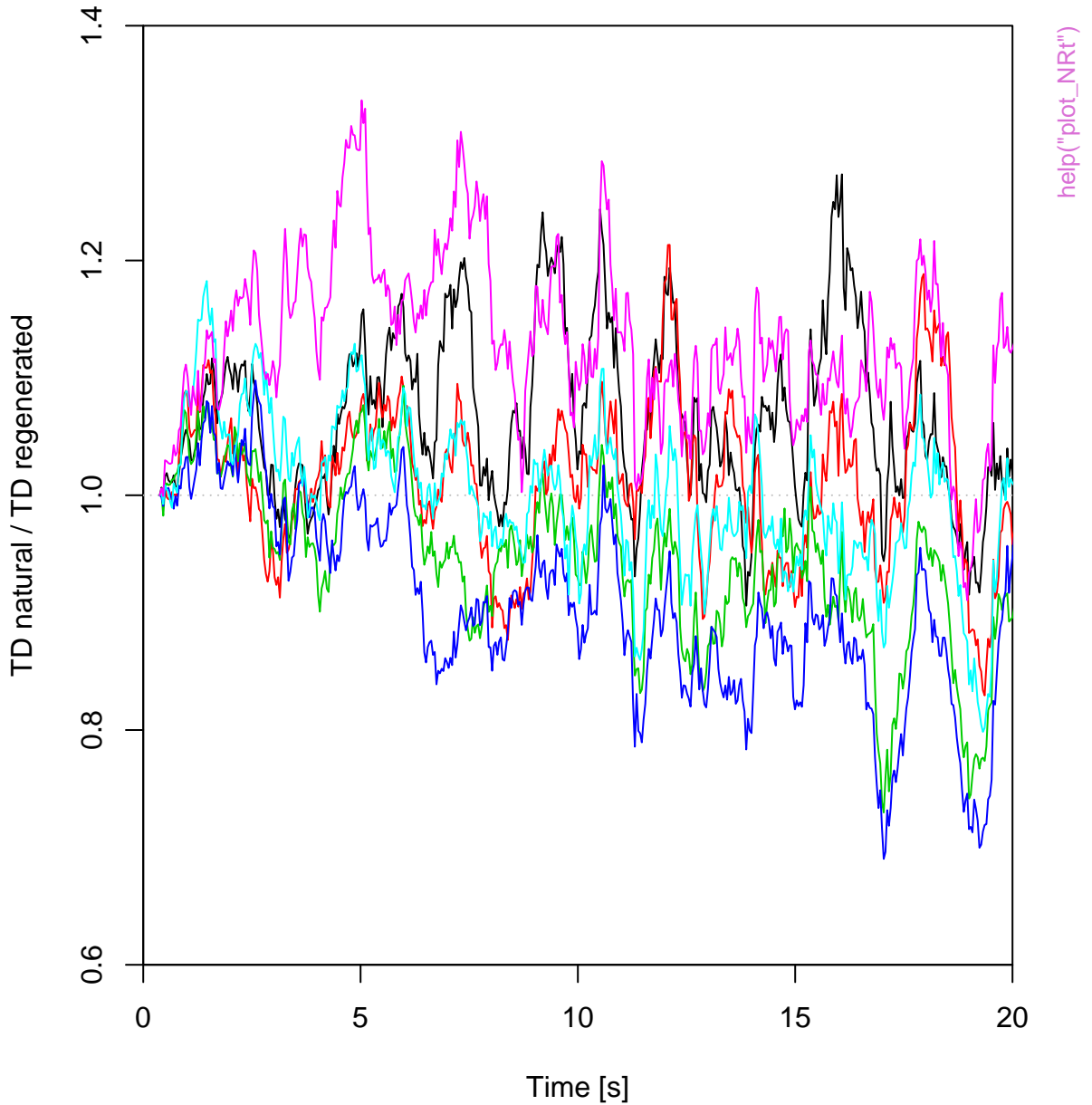
NR(t) Plot

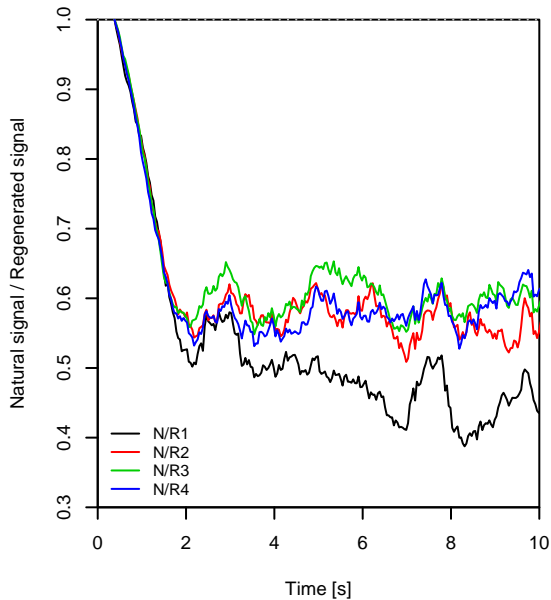
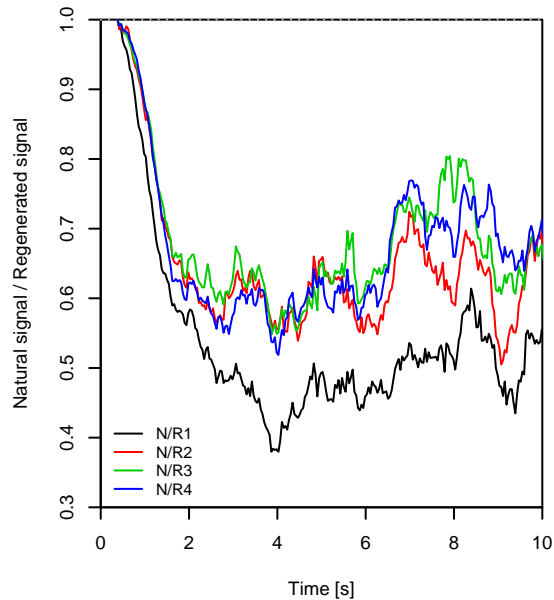


NR(t) Plot

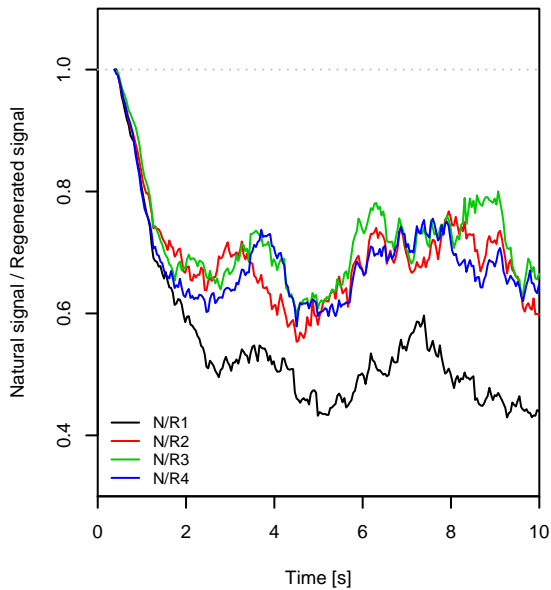
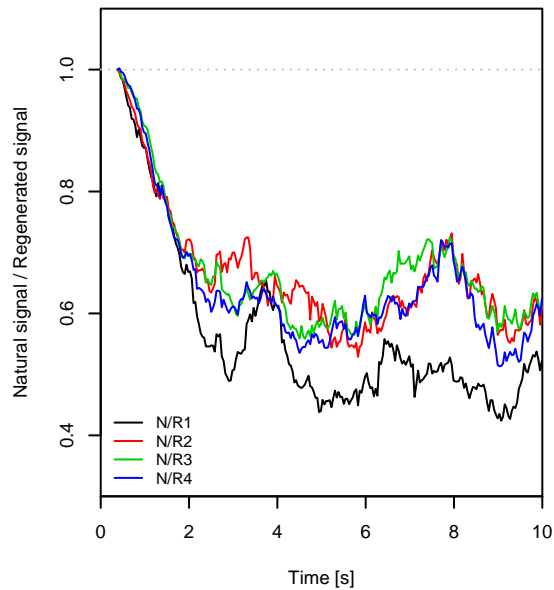


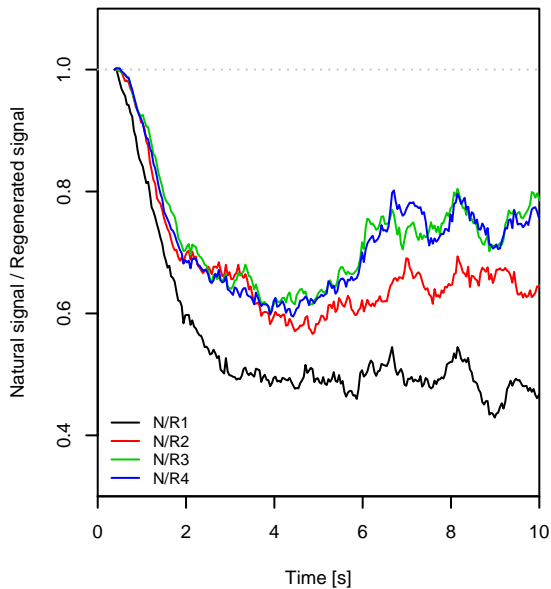
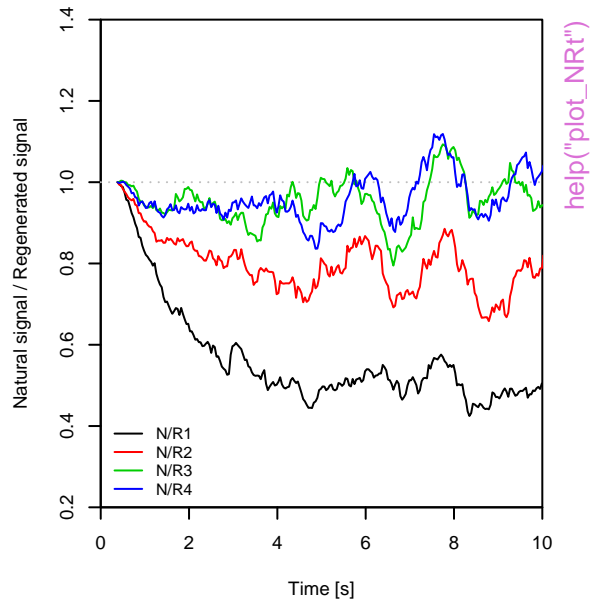
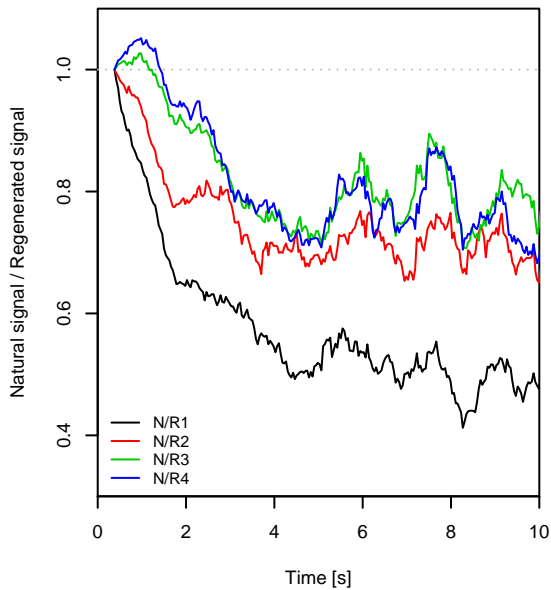
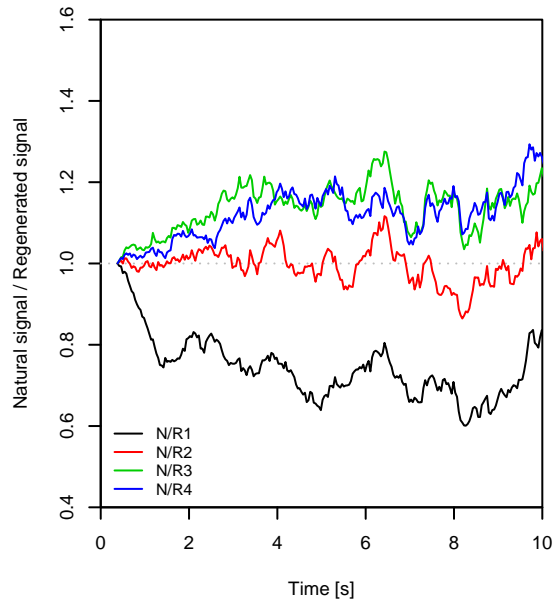
TnTx(t) Plot

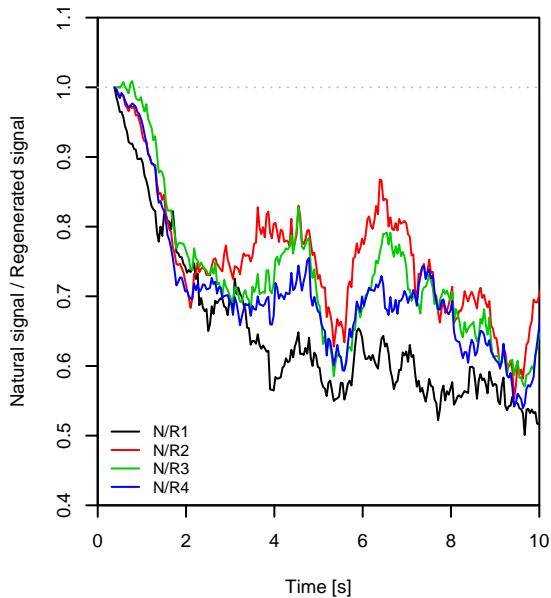
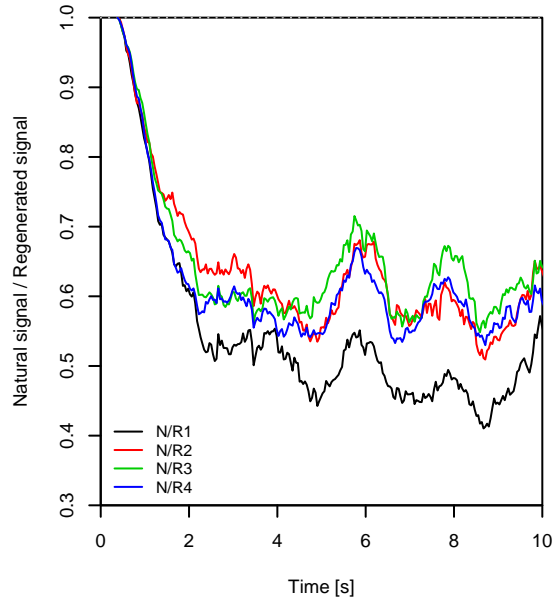


Aliquot #1**Aliquot #2**

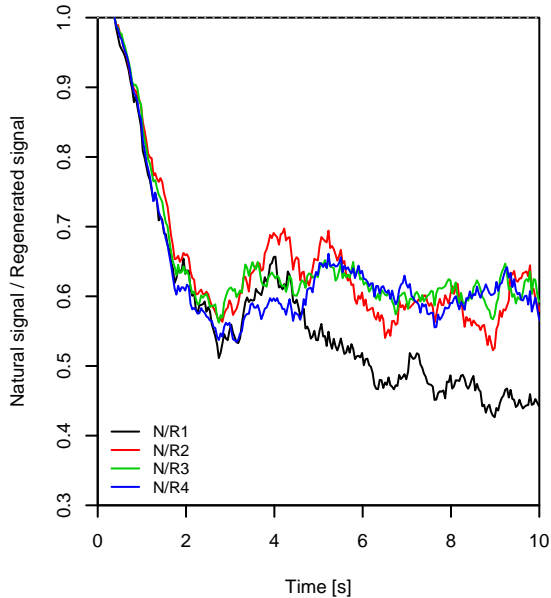
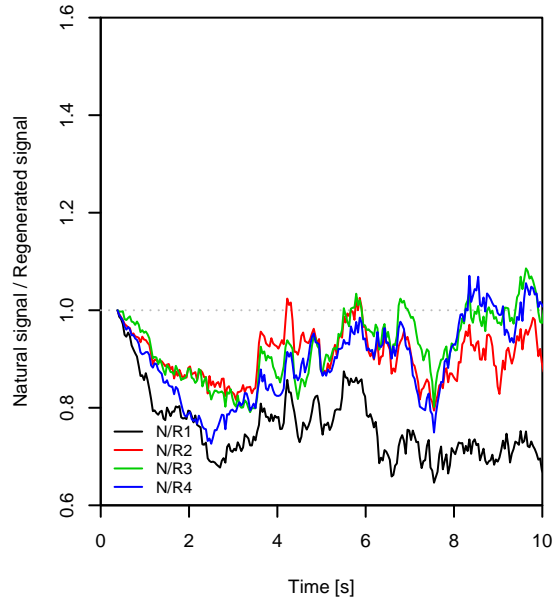
help("plot_NRt")

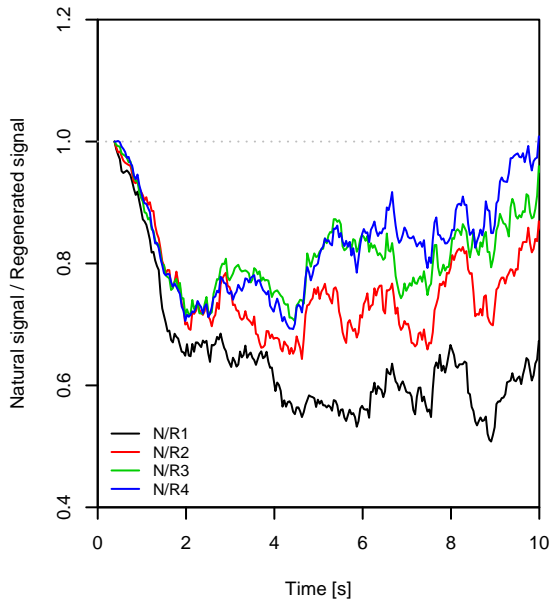
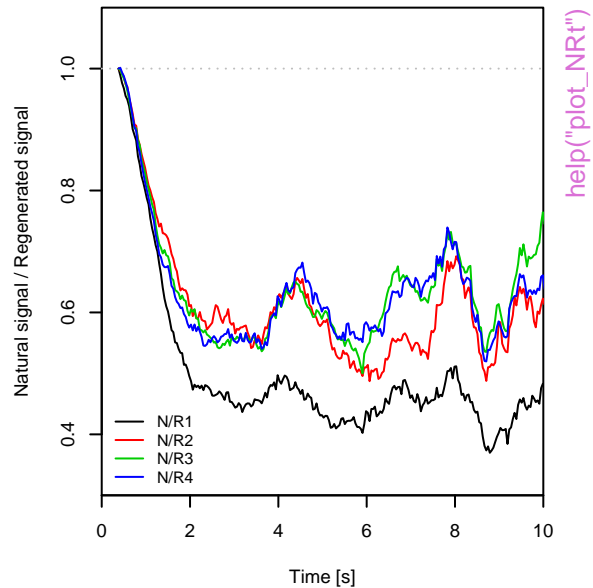
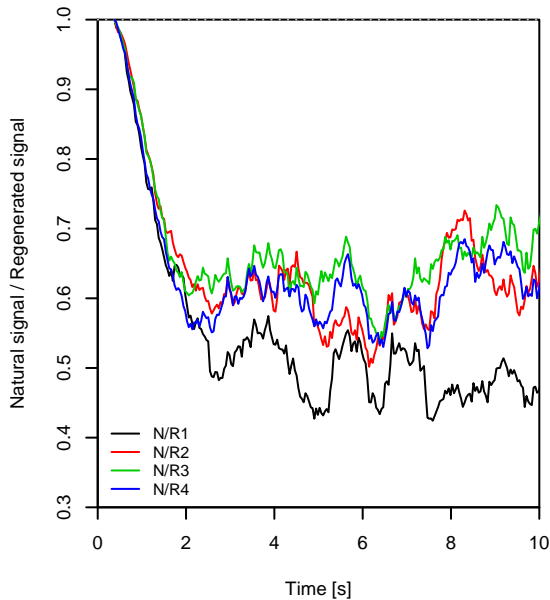
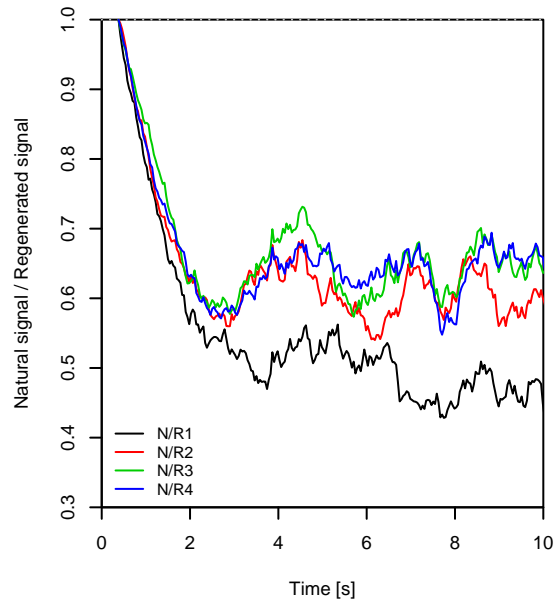
Aliquot #3**Aliquot #4**

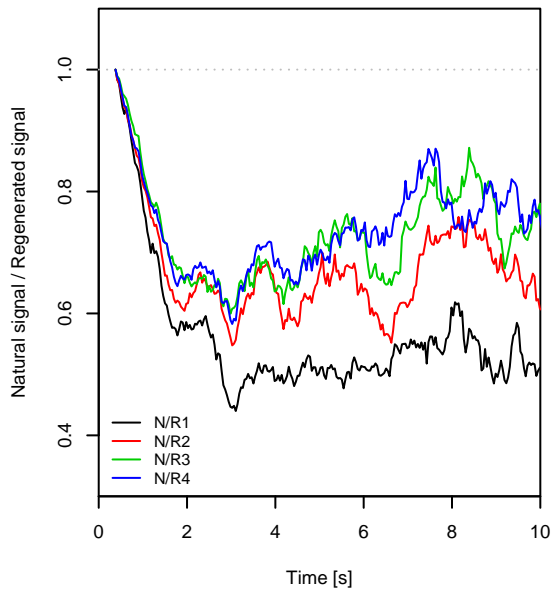
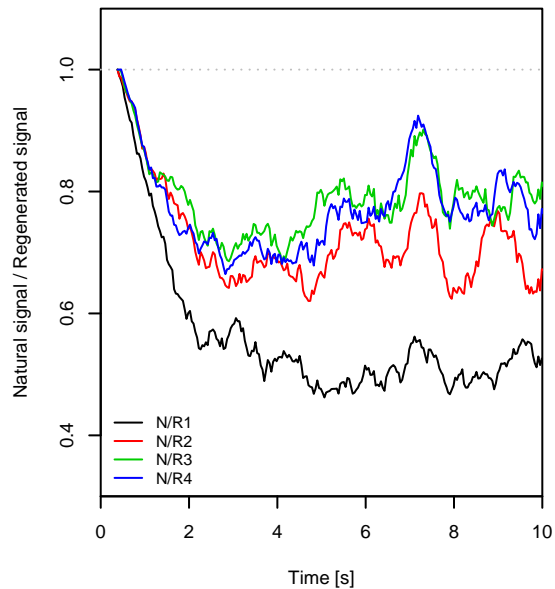
Aliquot #5**Aliquot #6****Aliquot #7****Aliquot #8**

Aliquot #9**Aliquot #10**

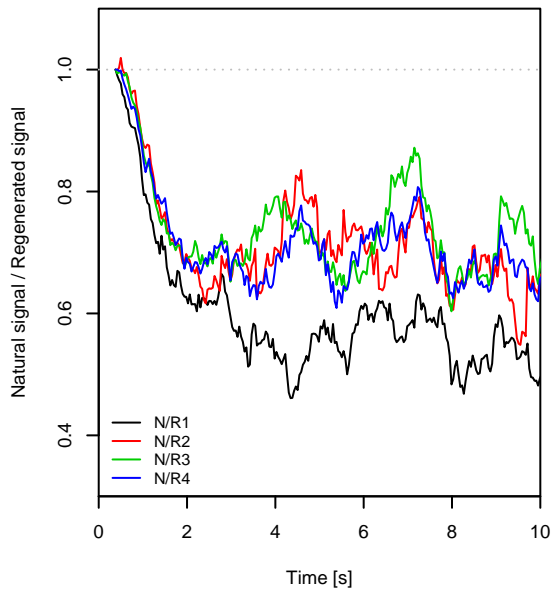
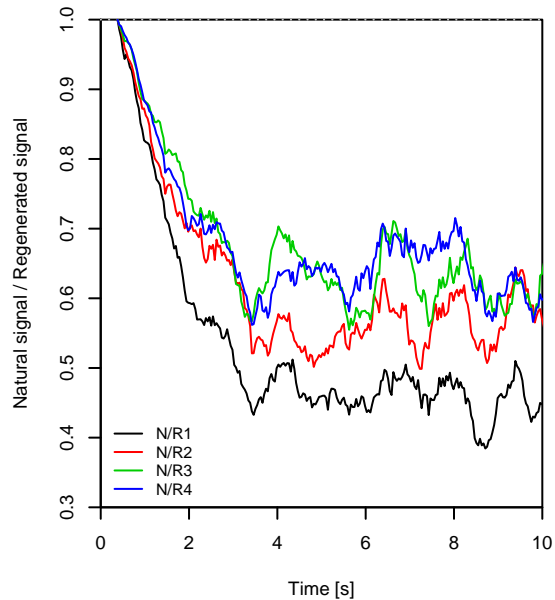
help("plot_NRt")

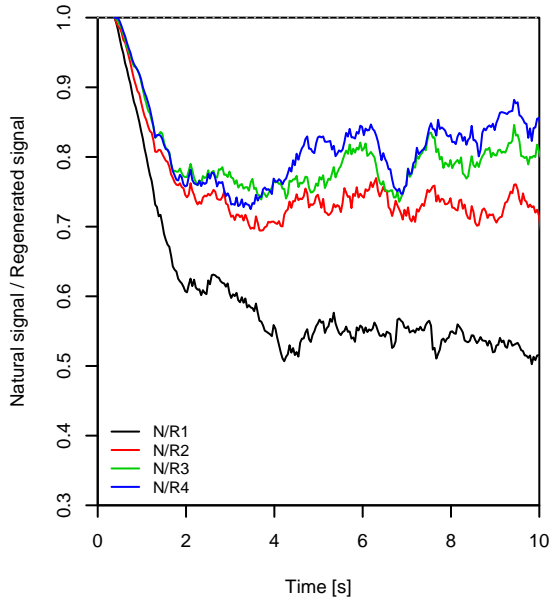
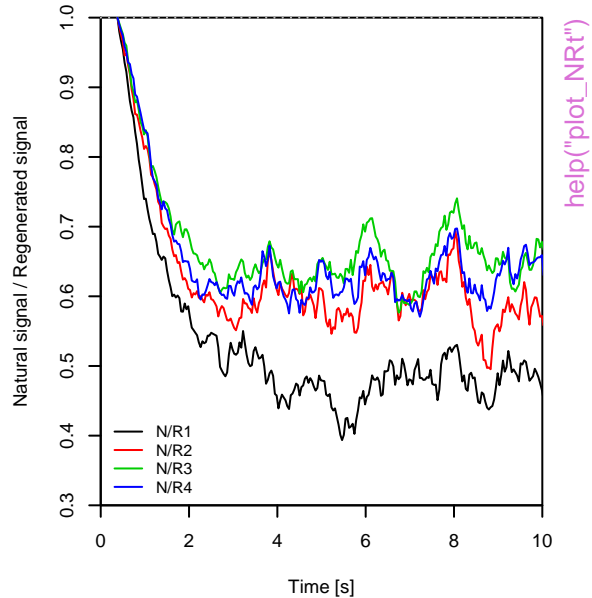
Aliquot #11**Aliquot #12**

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

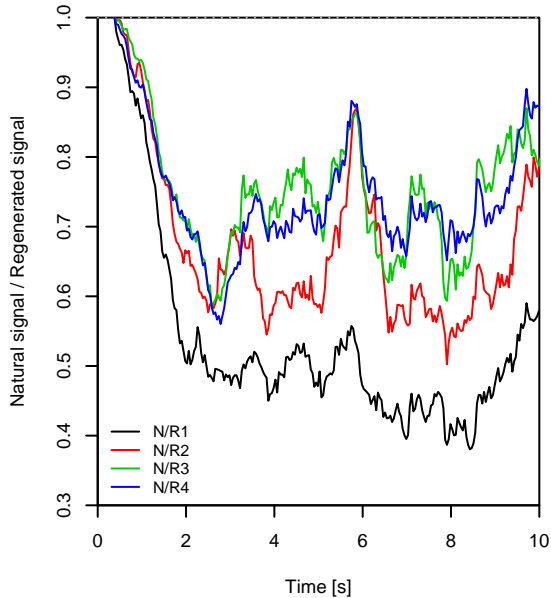
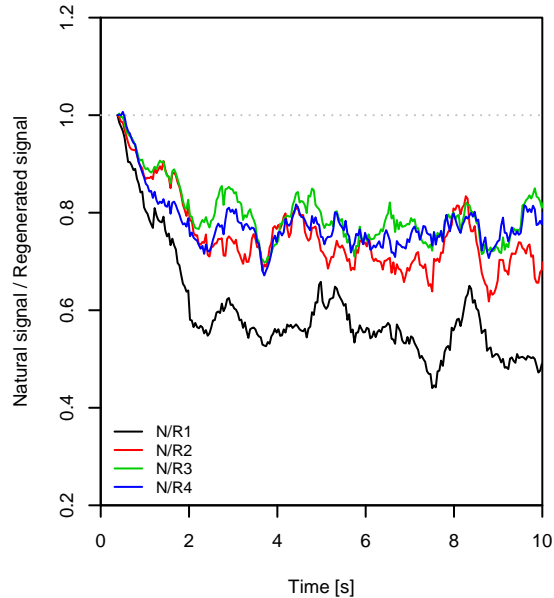
Aliquot #17**Aliquot #18**

help("plot_NRt")

Aliquot #19**Aliquot #20**

Aliquot #21**Aliquot #22**

help("plot_NRt")

Aliquot #23**Aliquot #24**

TL combined



unkown curve type



RLum.Data.Image



RLum.Data.Spectrum



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

RLum.Data.Spectrum



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

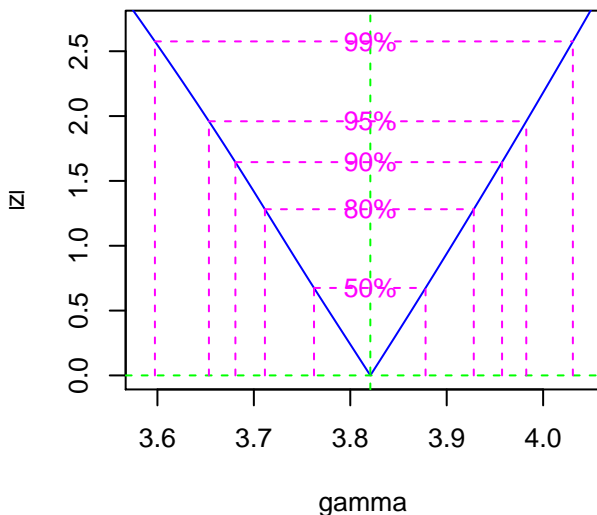
RLum.Data.Spectrum



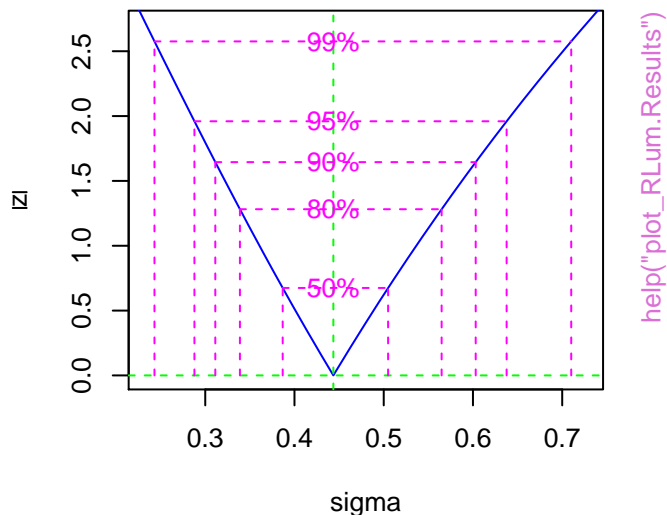
unkown curve type



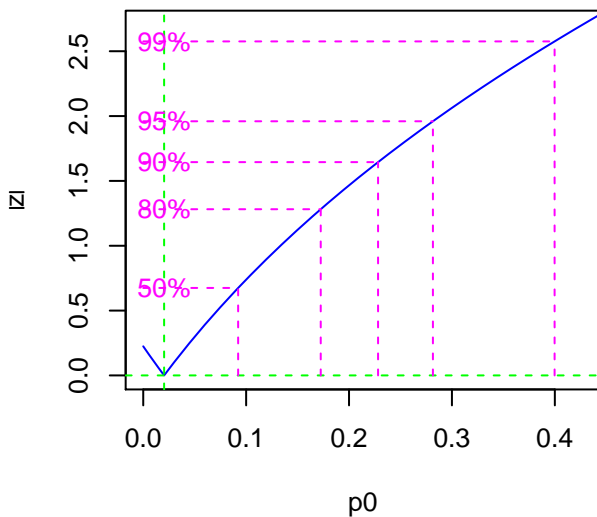
Likelihood profile: gamma



Likelihood profile: sigma



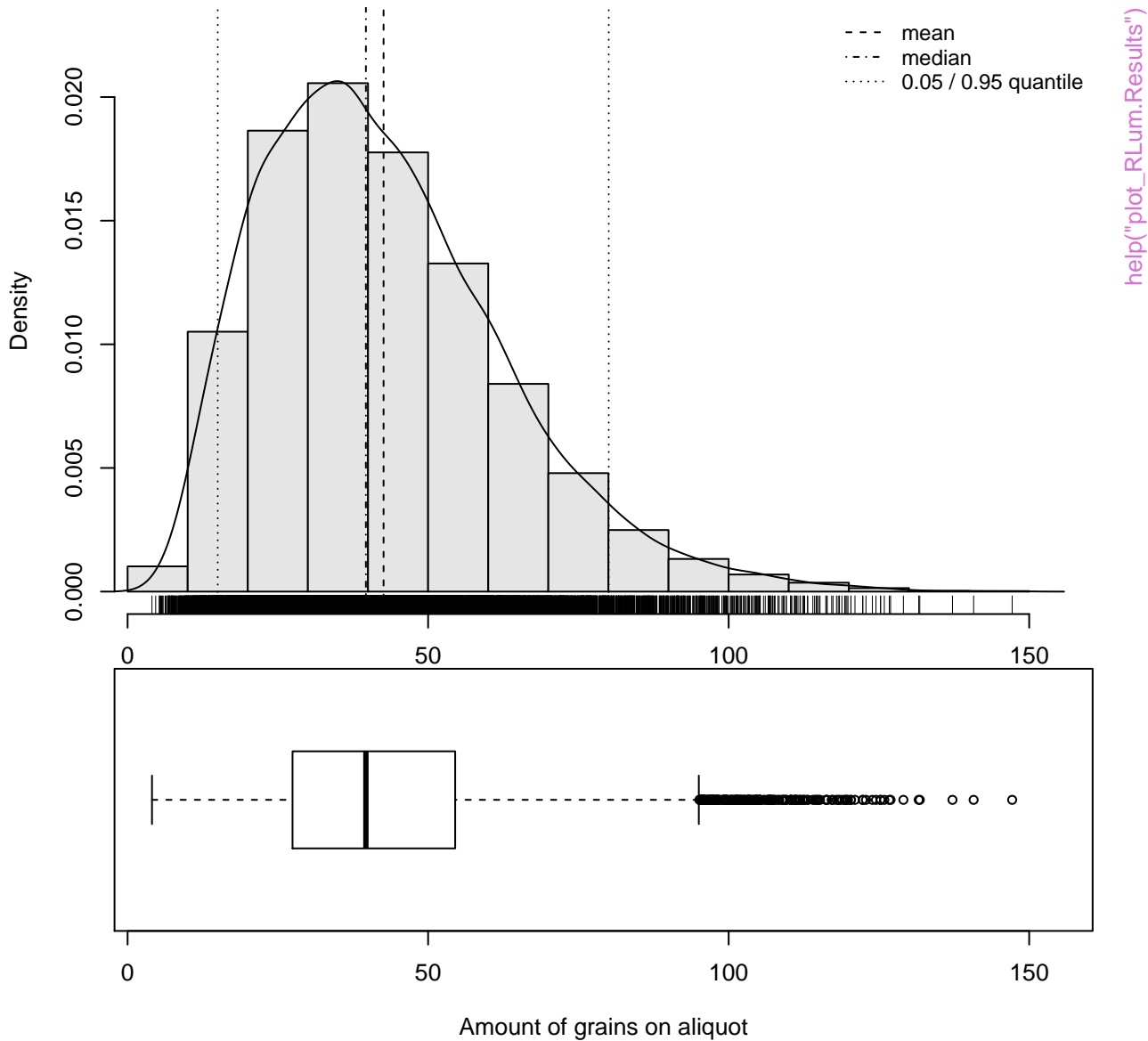
Likelihood profile: p0



help("plot_RLum.Results")

Monte Carlo Simulation

$n = 10000 \mid \hat{\mu} = 43 \mid \hat{\sigma} = 20 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 0 \mid v = 0.84$



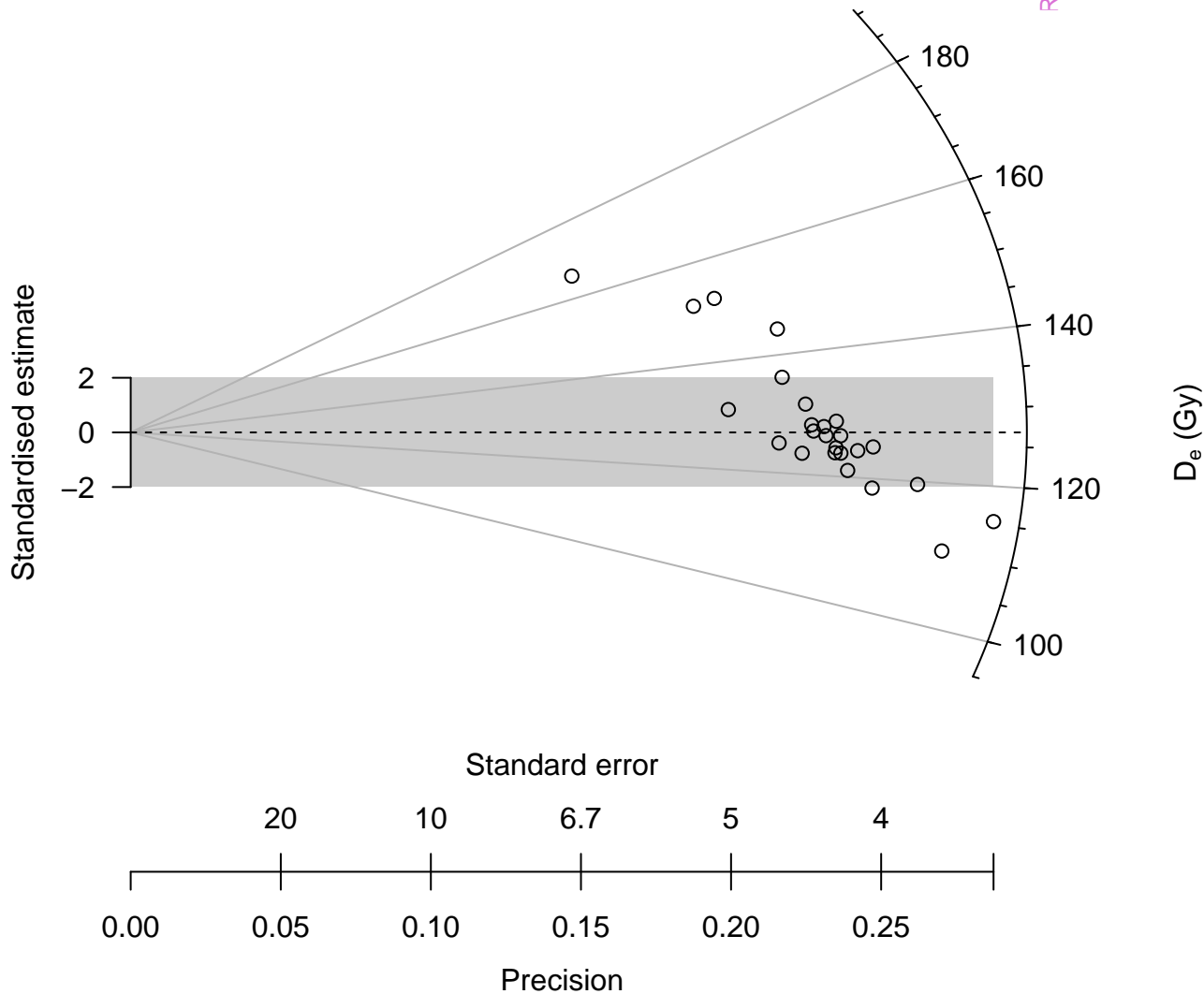
D_e distribution

n = 25 | in 2 sigma = 68 %



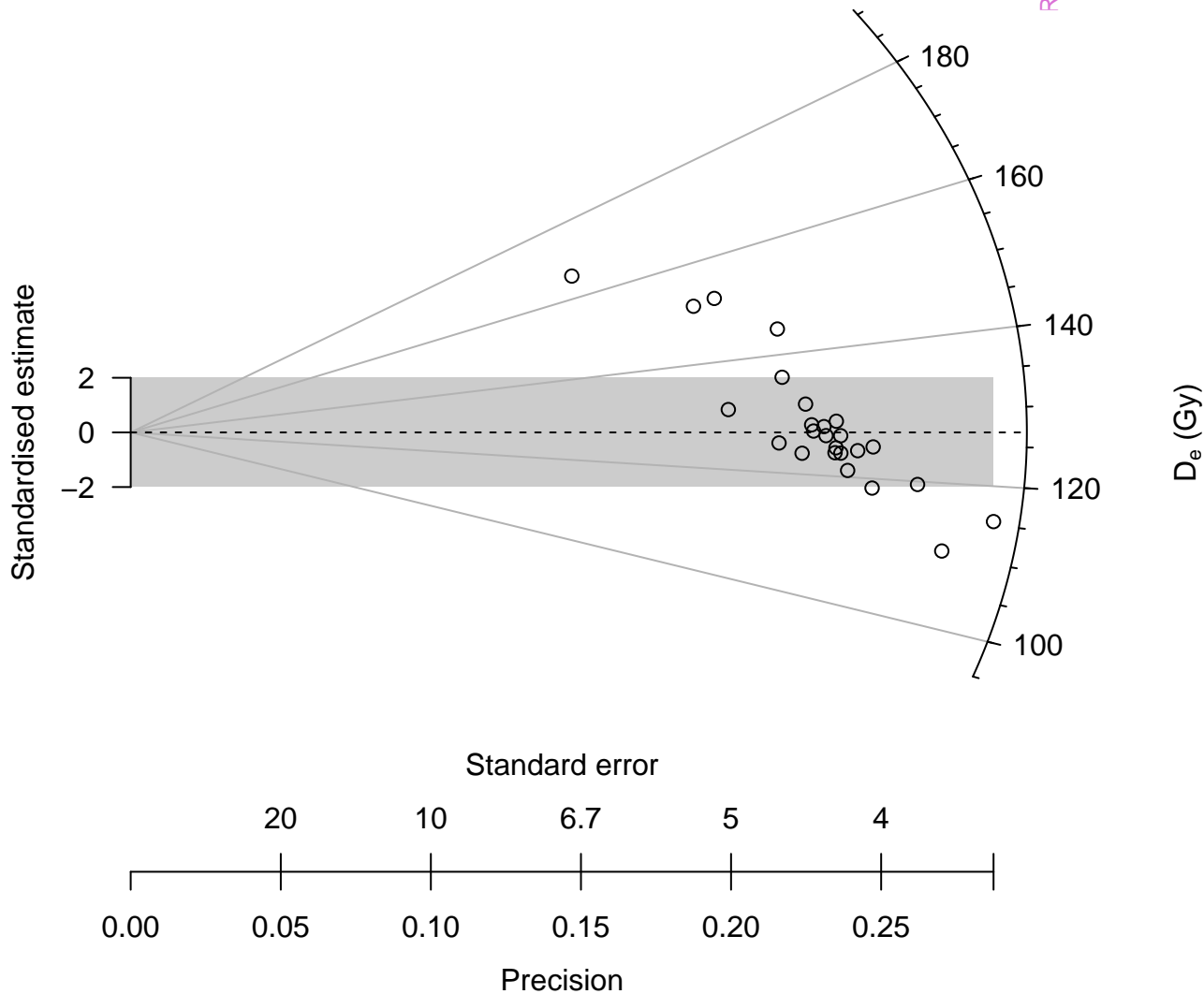
D_e distribution

n = 25 | in 2 sigma = 68 %



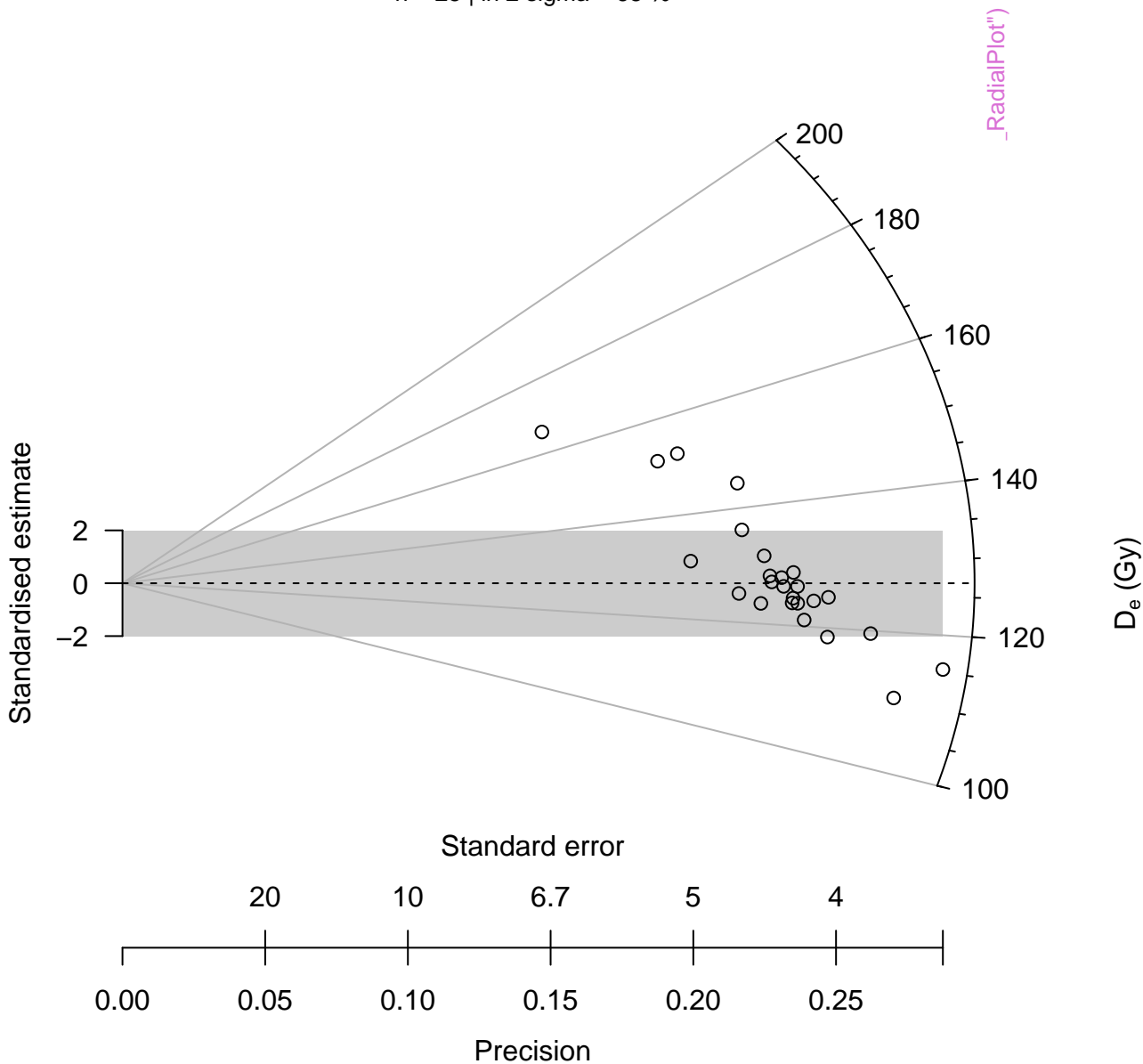
D_e distribution

n = 25 | in 2 sigma = 68 %



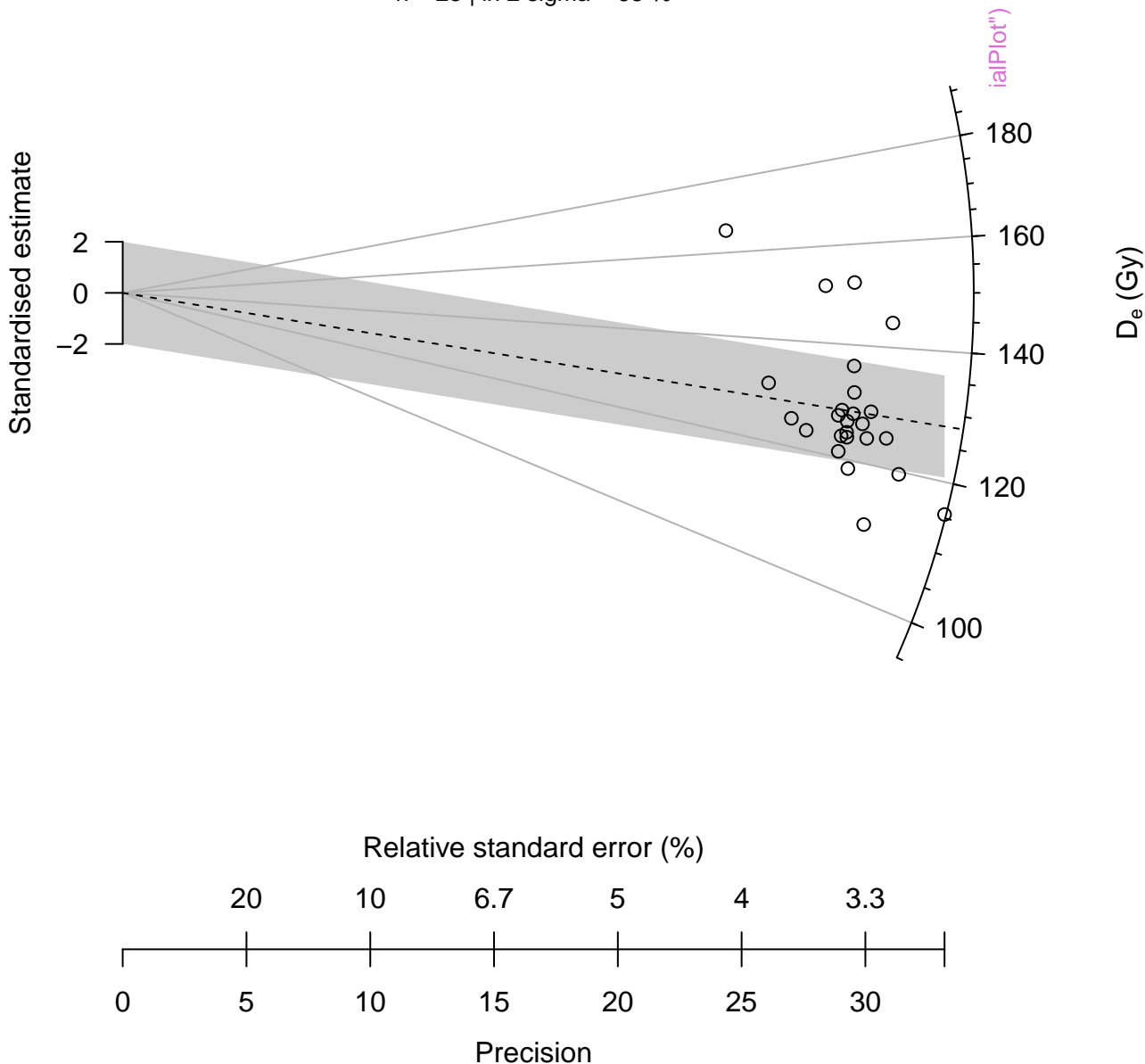
D_e distribution

n = 25 | in 2 sigma = 68 %



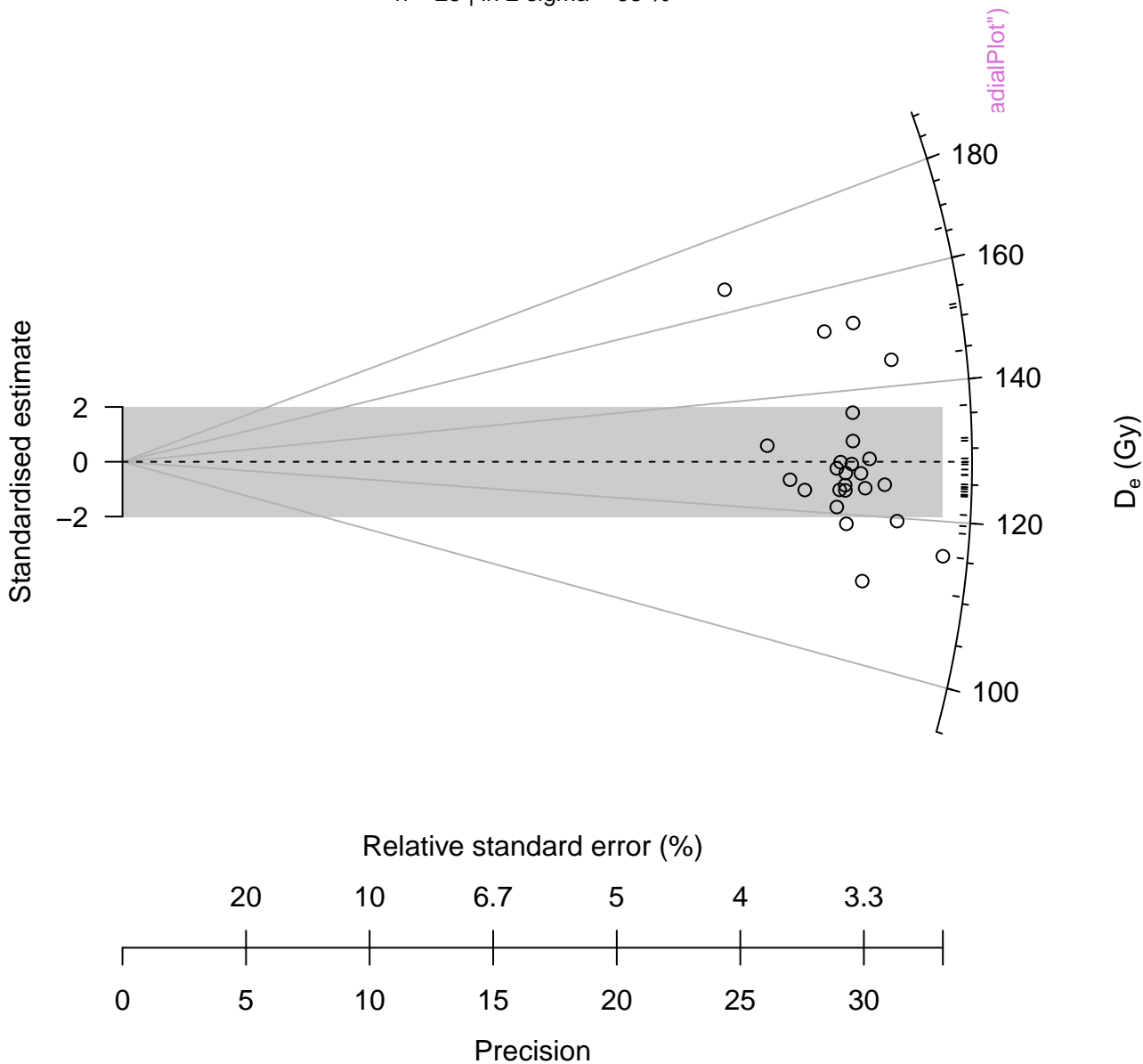
D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

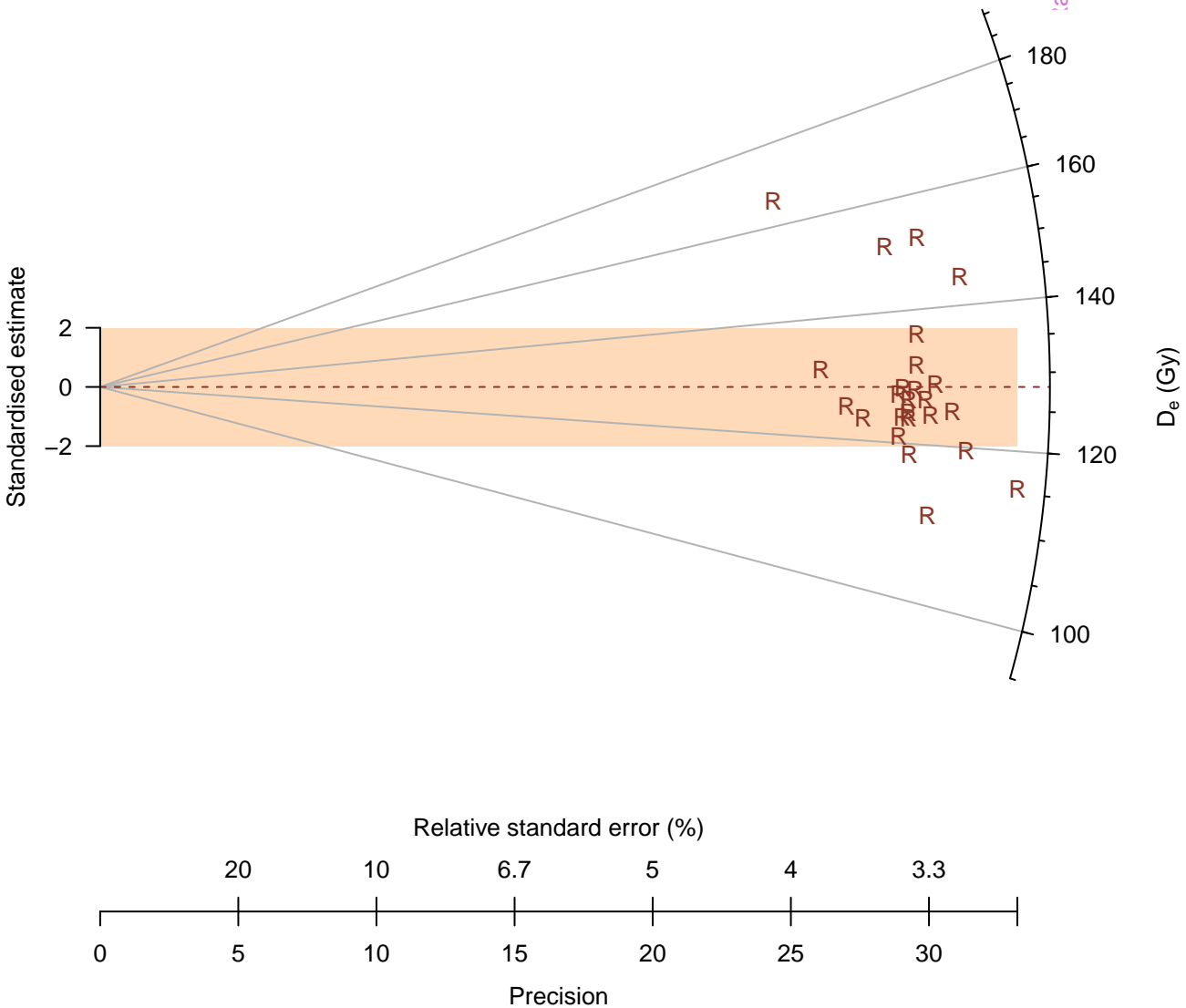
n = 25 | in 2 sigma = 68 %



D_e distribution

n = 25 | in 2 sigma = 68 %

radialPlot()



D_e 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_e (Gy)

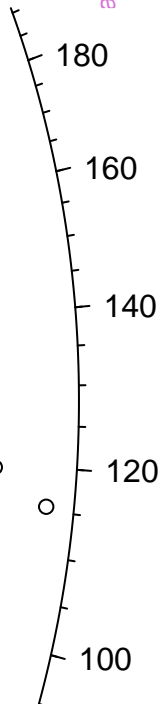
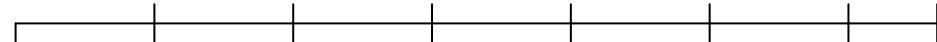
180

160

140

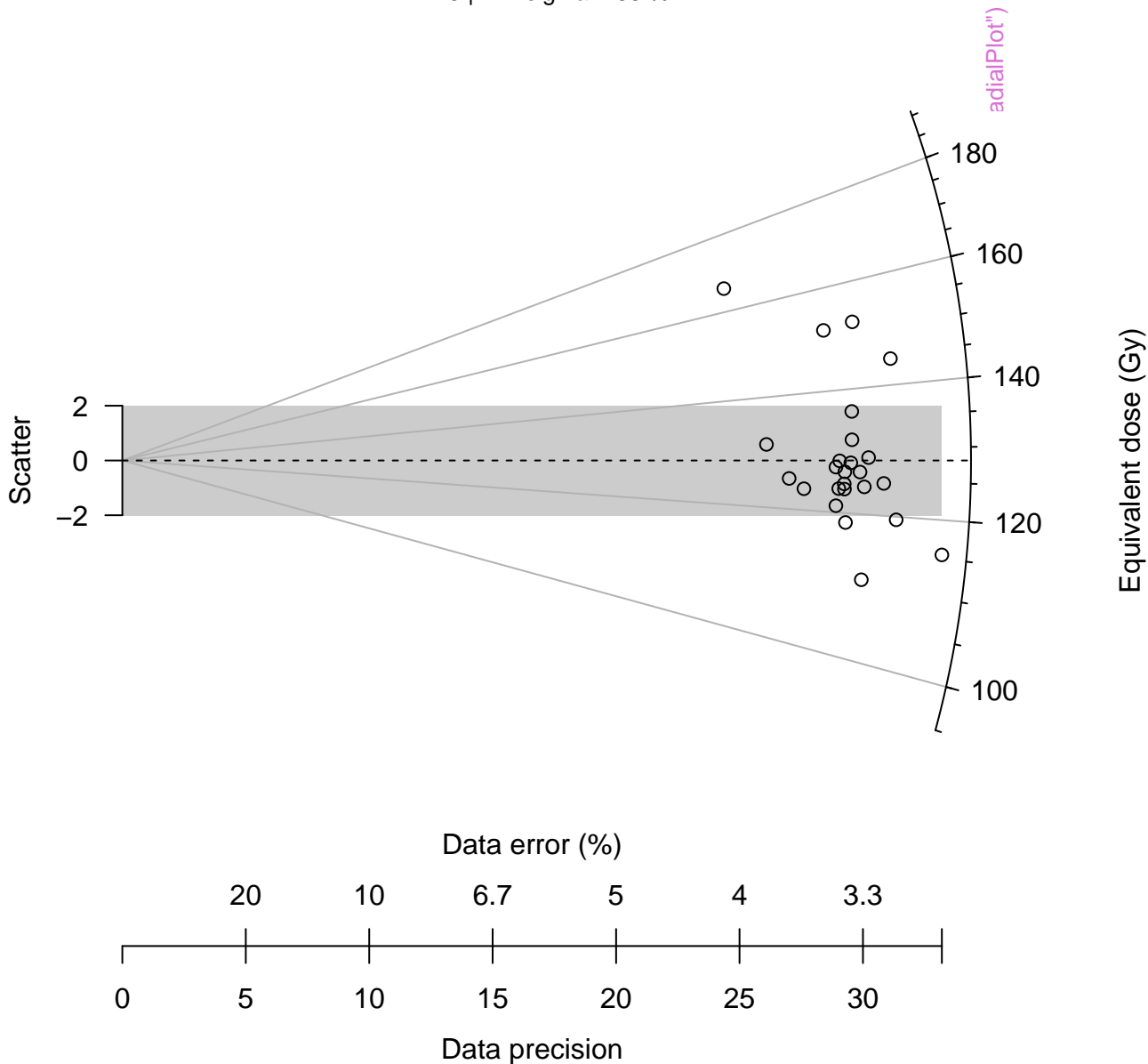
120

100



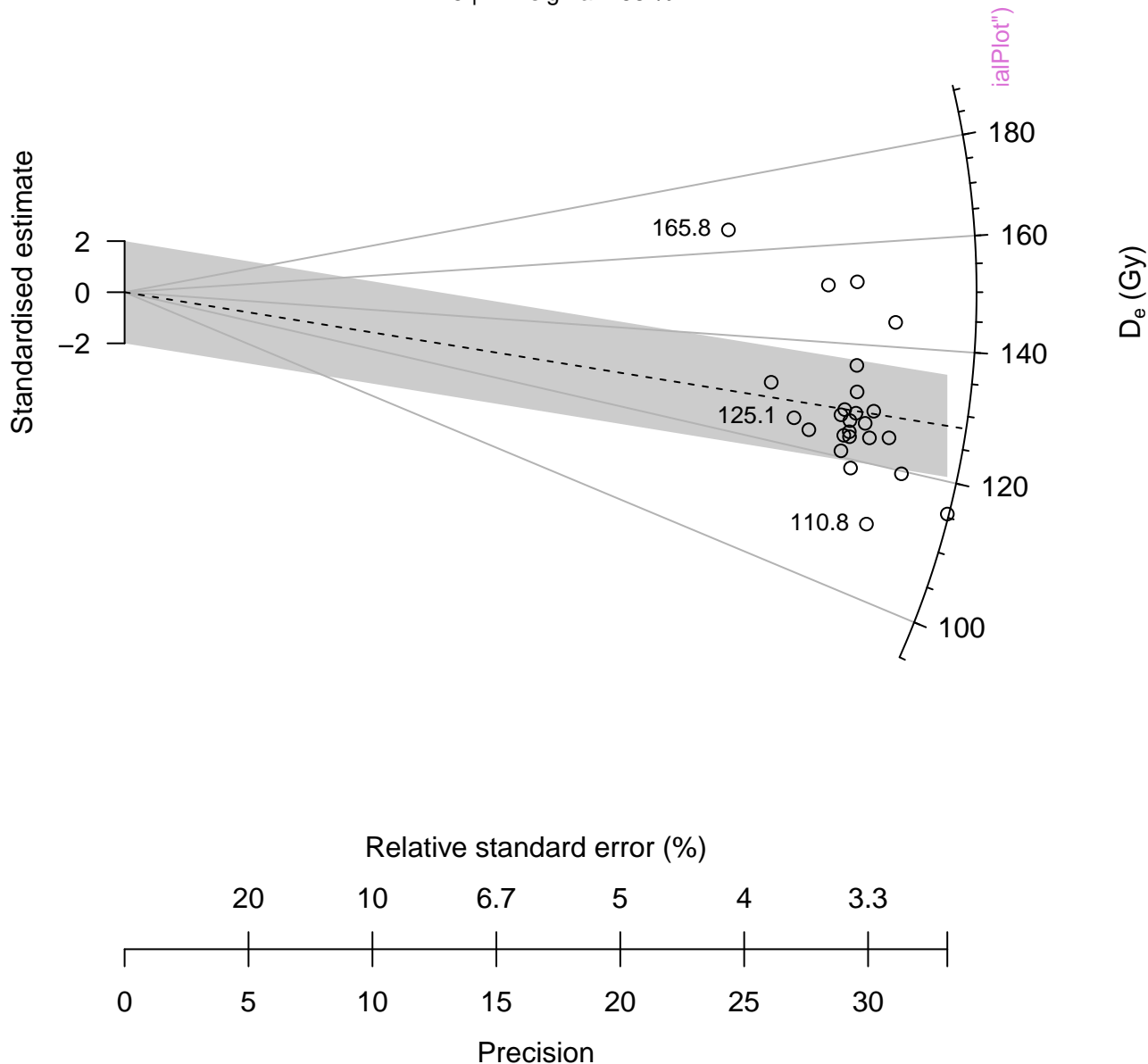
D_e distribution

n = 25 | in 2 sigma = 68 %



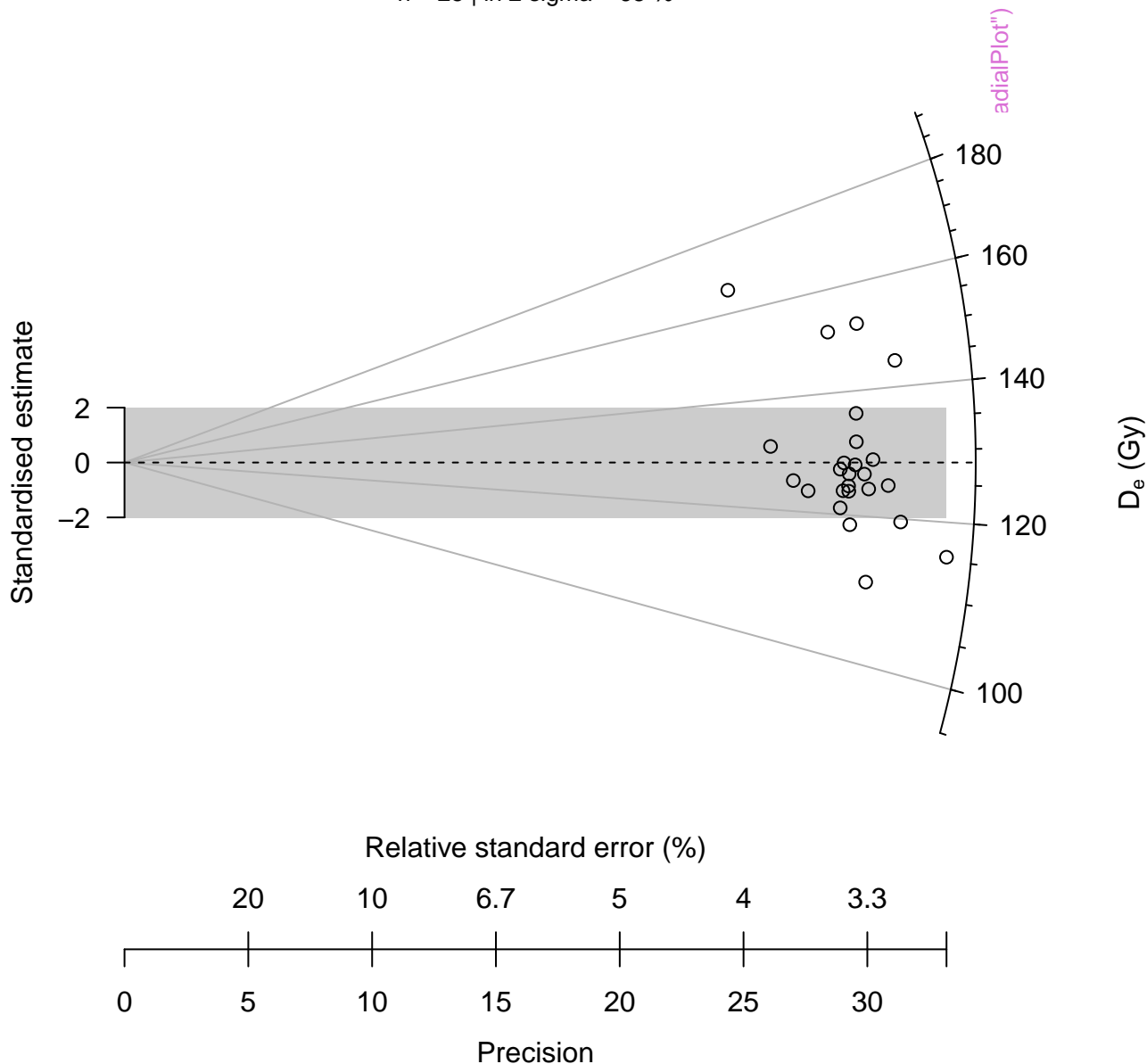
D_e distribution

n = 25 | in 2 sigma = 68 %



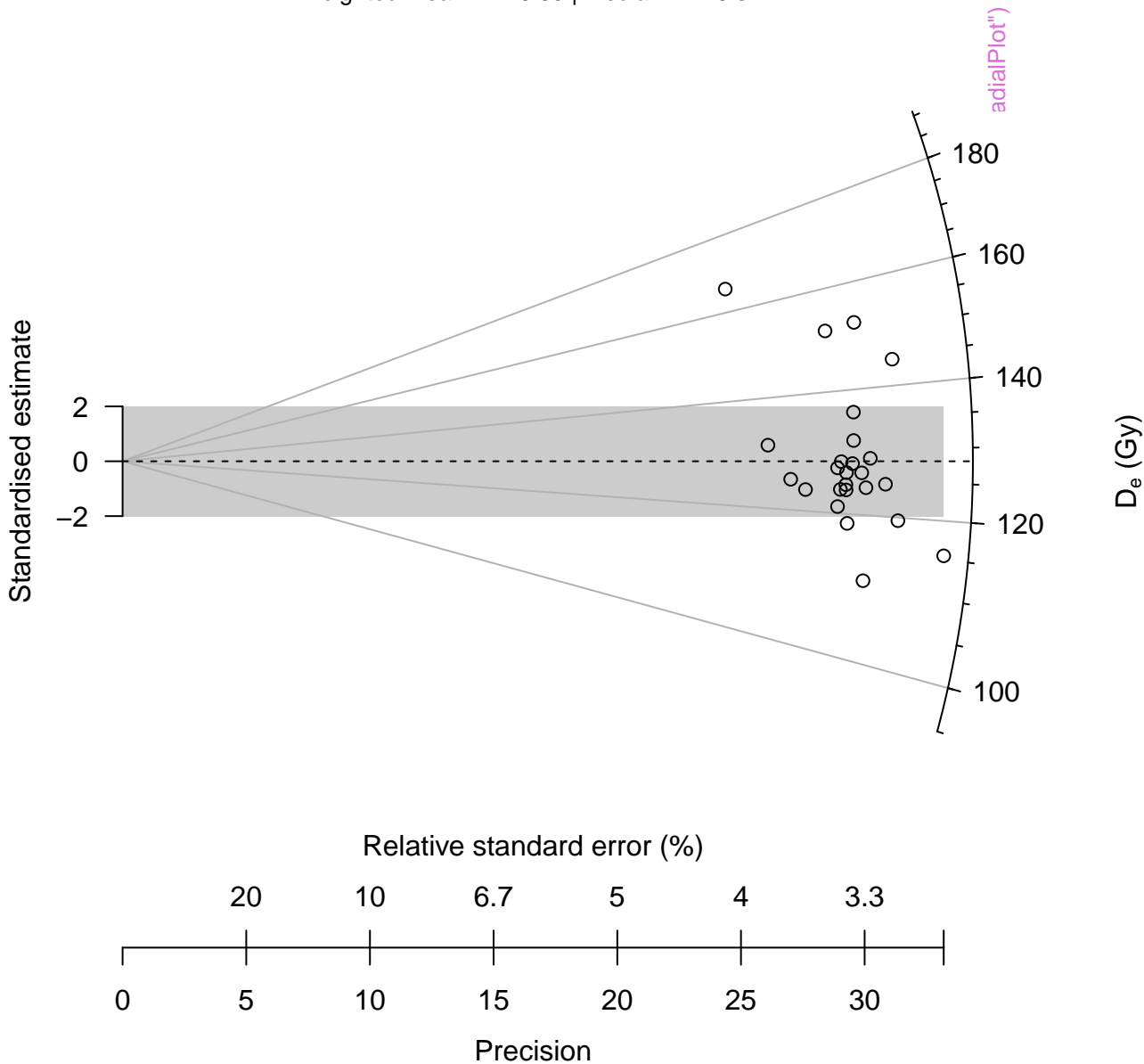
D_e distribution

n = 25 | in 2 sigma = 68 %



D_e distribution

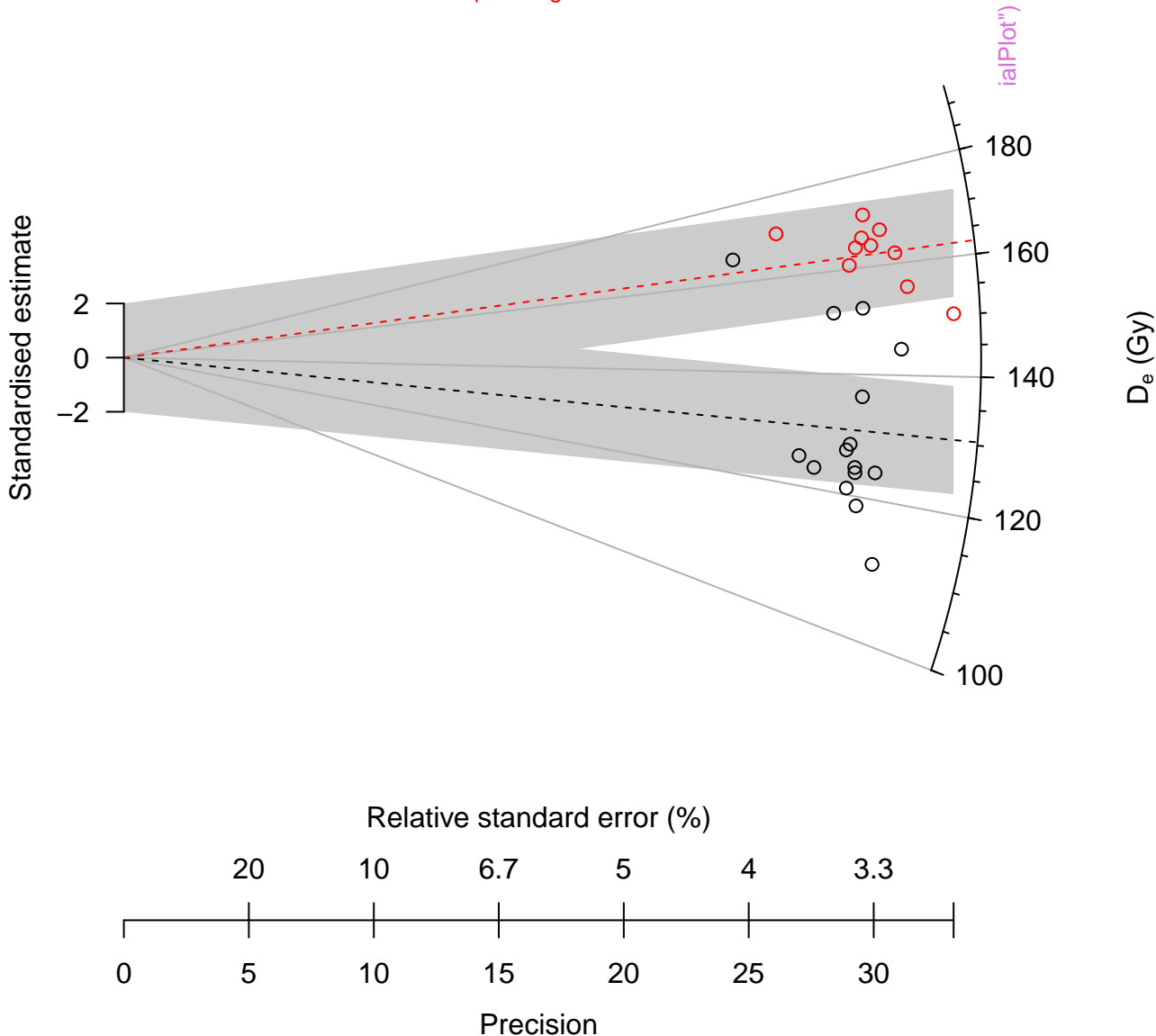
weighted mean = 126.85 | median = 126.34



D_e distribution

n = 15 | in 2 sigma = 53.3 %

n = 10 | in 2 sigma = 90 %



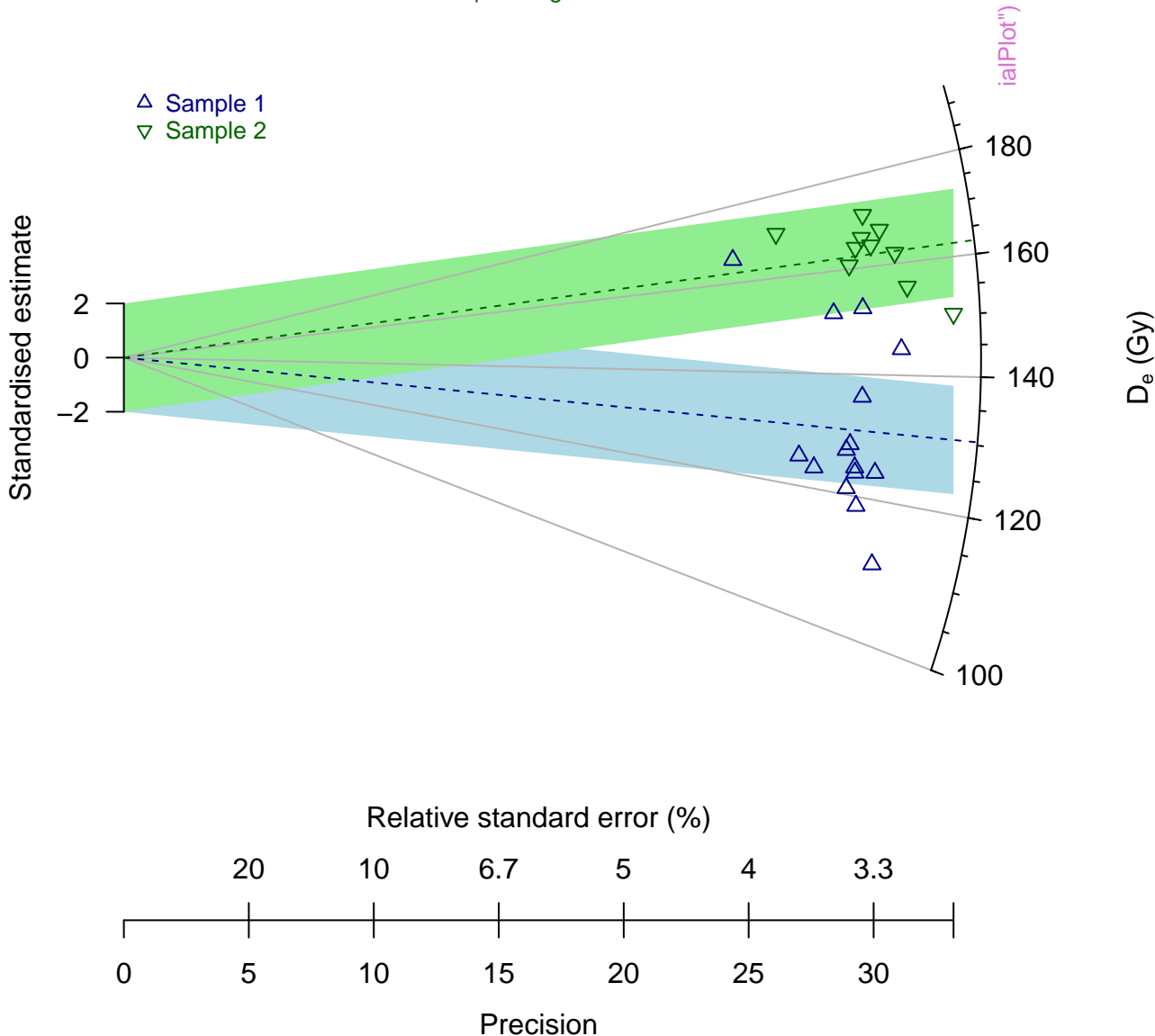
D_e distribution

n = 15 | in 2 sigma = 53.3 %

n = 10 | in 2 sigma = 90 %

△ Sample 1

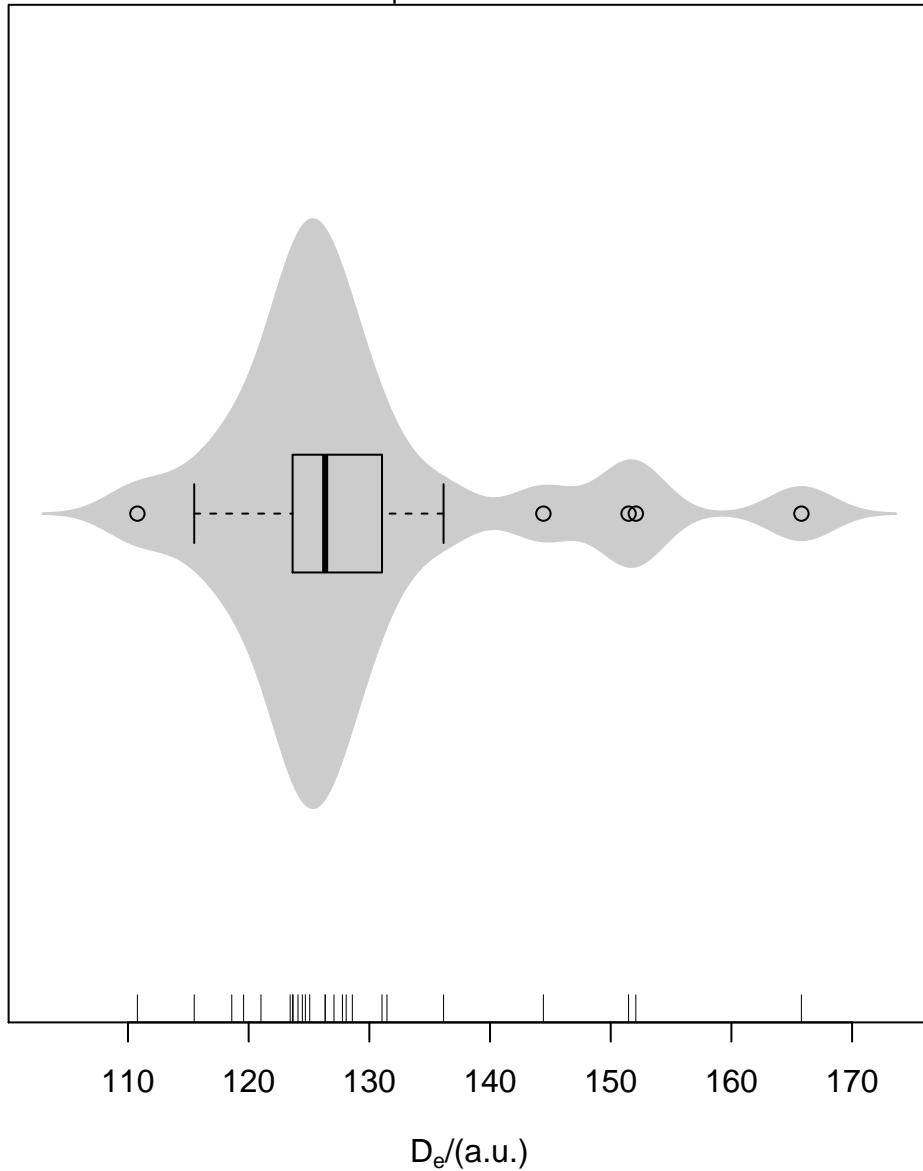
▽ Sample 2



Violin Plot

n = 25 | median = 126.34

Density



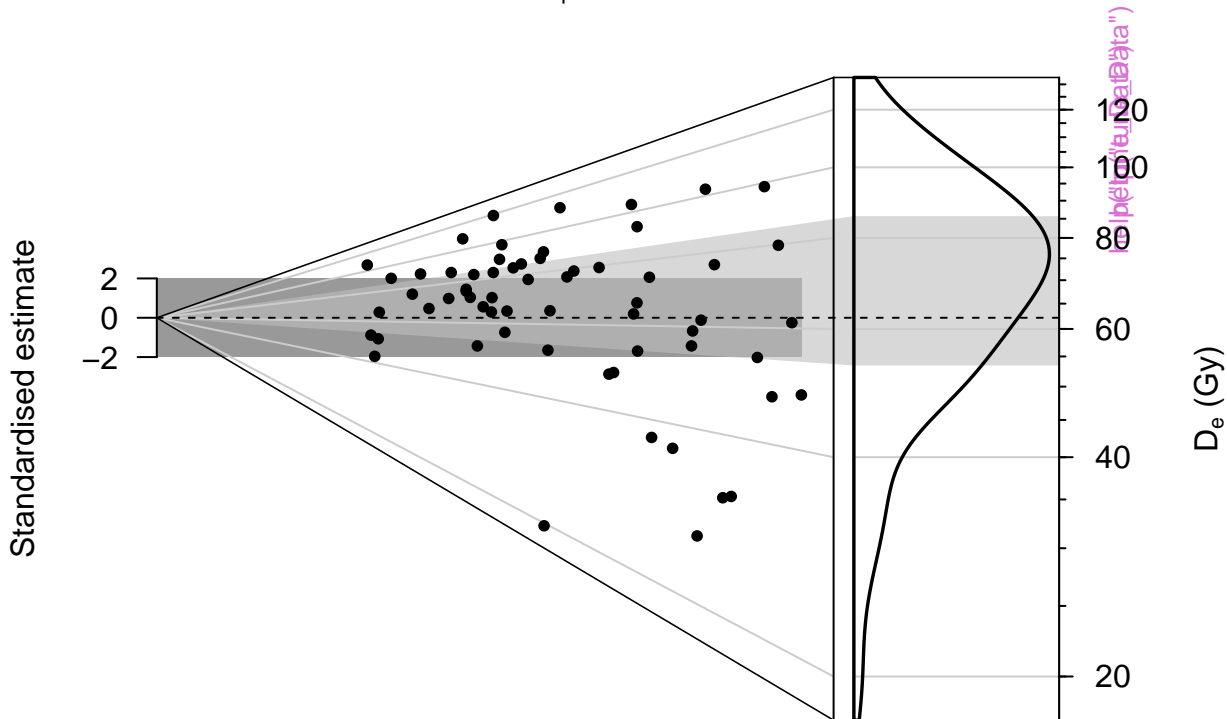
[help\("plot_ViolinPlot"\)](#)

OSL



D_e distribution

n = 62 | mean = 66.01

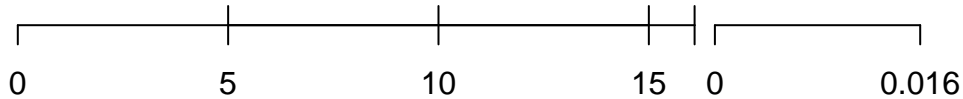


Relative standard error (%)

20

10

6.7



Precision

Density (bw 0.15)

D_e distribution

n = 62 | mean = 66.01

