

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]



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)

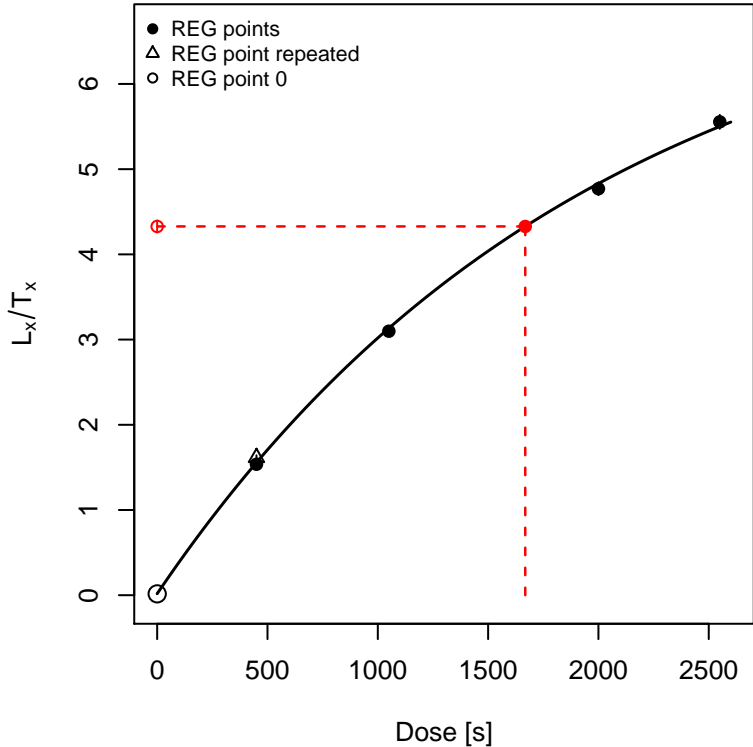
●
R4
(2550)

●
R5
(450)

●
R0
(0)

Growth curve

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

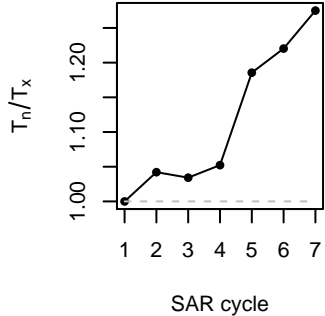


D_e from MC simulation

$D_{eMC} = 1677.48 \pm 49.22$ | 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)

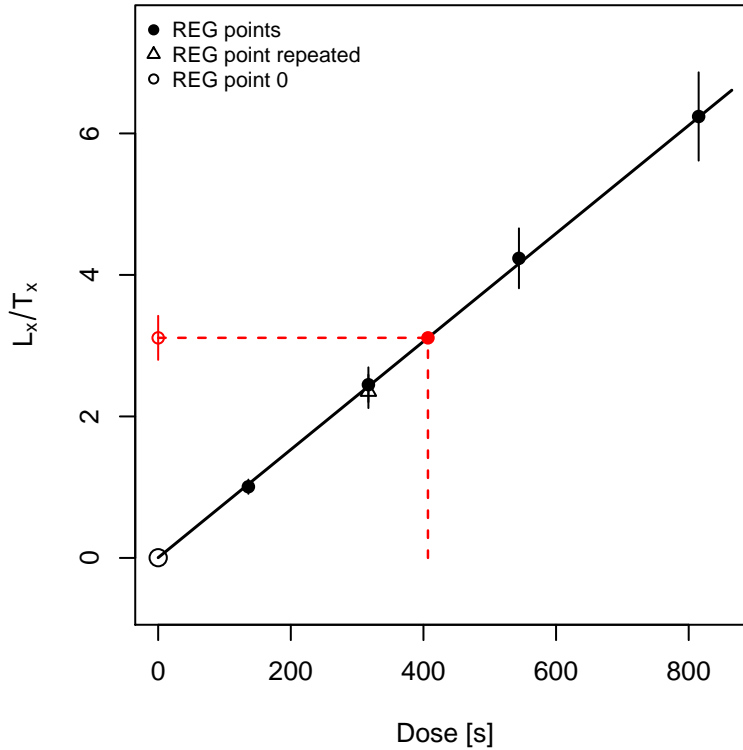
■ Natural
(815)

■ Natural
(0)

■ Natural
(317)

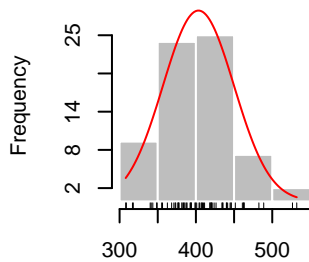
Growth curve

$D_e = 406.8 \pm 46.54$ | fit: EXP



D_e from MC simulation

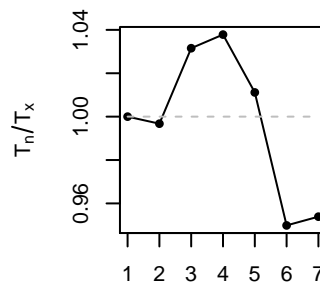
$D_{eMC} = 403.34 \pm 46.54$ | quality = 99.1 %



Dose [s]

n = 100, valid fits = 67

Test dose response



SAR cycle

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

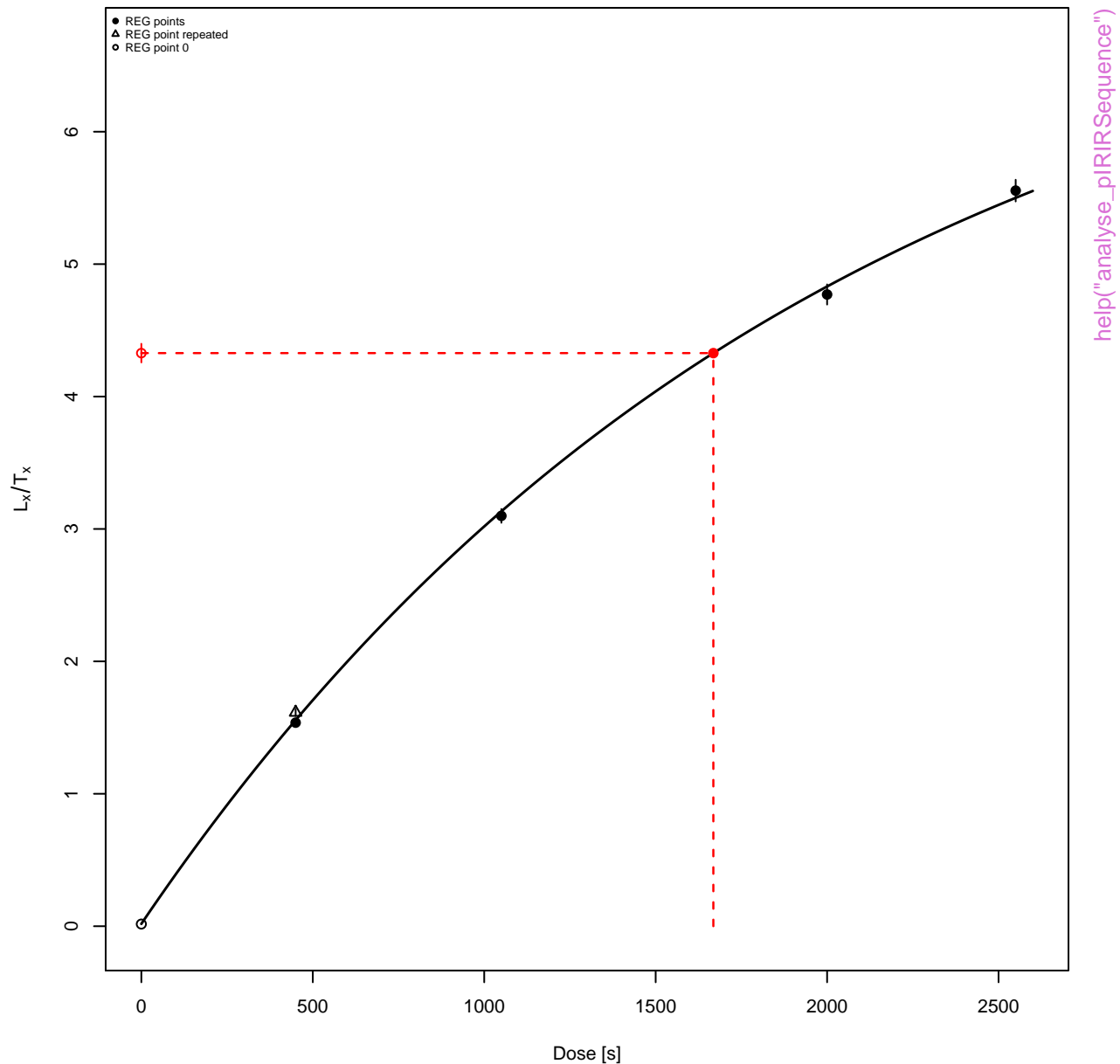


Pseudo pIRIR data set based on quartz OSL



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



OSL



`help("bin_RLum.Data")`

OSL



help("bin_RLum.Data")

OSL



help("bin_RLum.Data")

Monte Carlo Simulation

$$n = 100 \mid \hat{\mu} = 43 \mid \hat{\sigma} = 20 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 2 \mid v = 0.73$$



Profile log likelihood for σ_{OD}



Fast Ratio



help("calc_FastRatio")

Finite Mixture Model

$\sigma_b = 0.2 \mid n = 62$

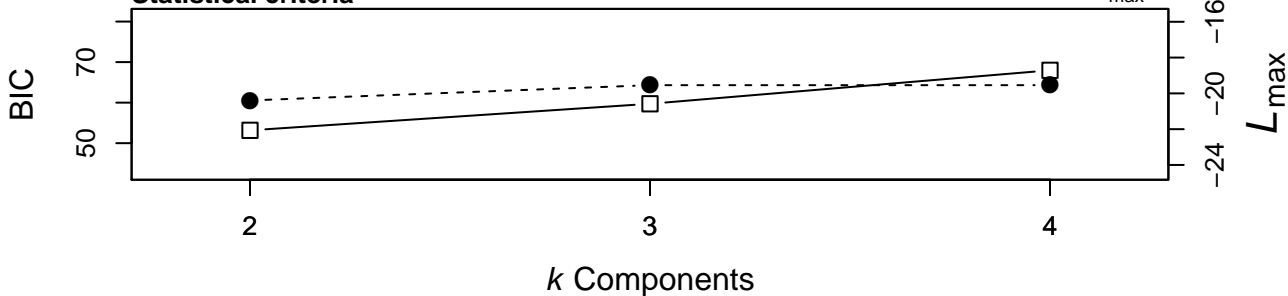
Normal distributions



Proportion of components

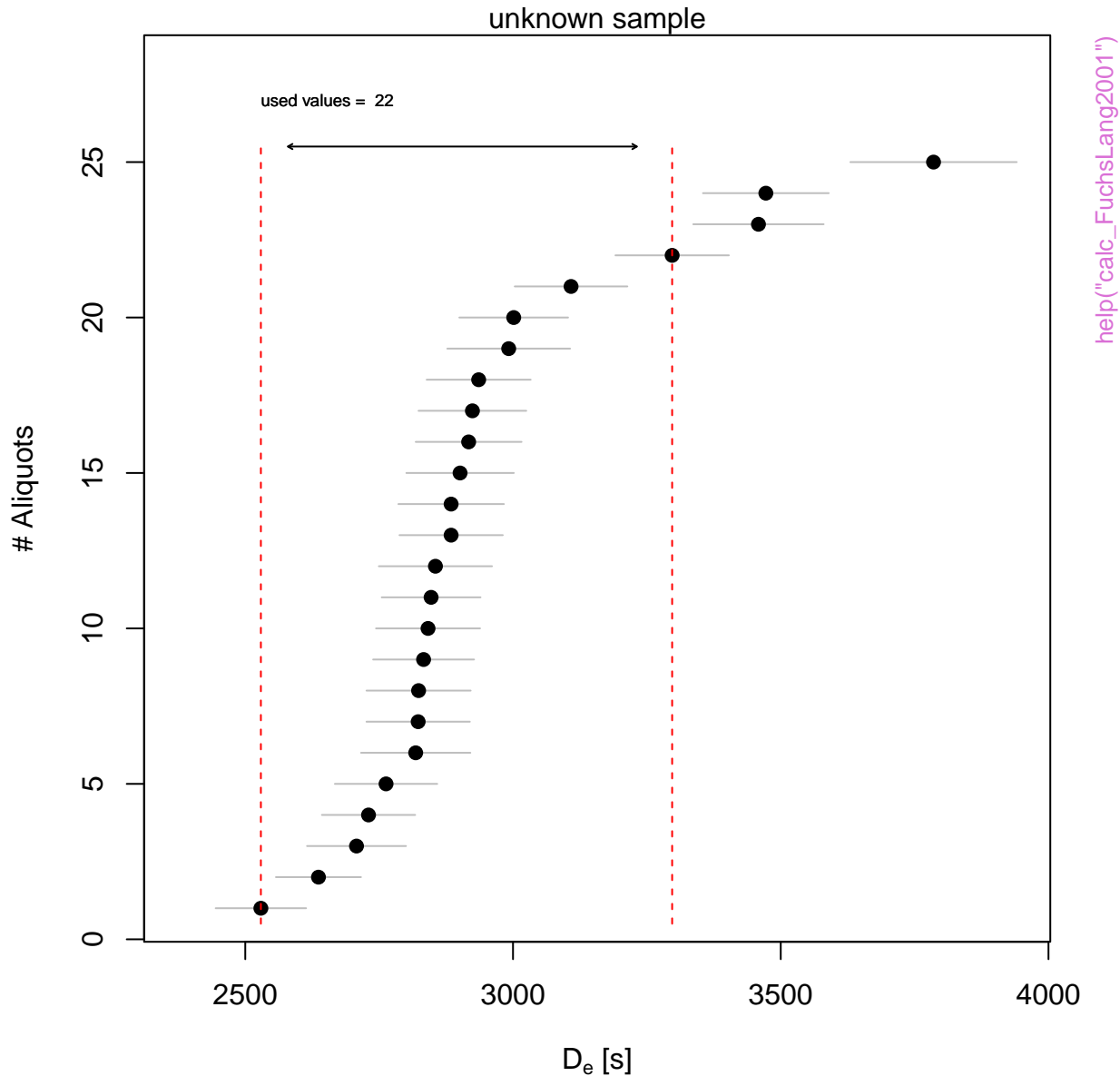


Statistical criteria



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



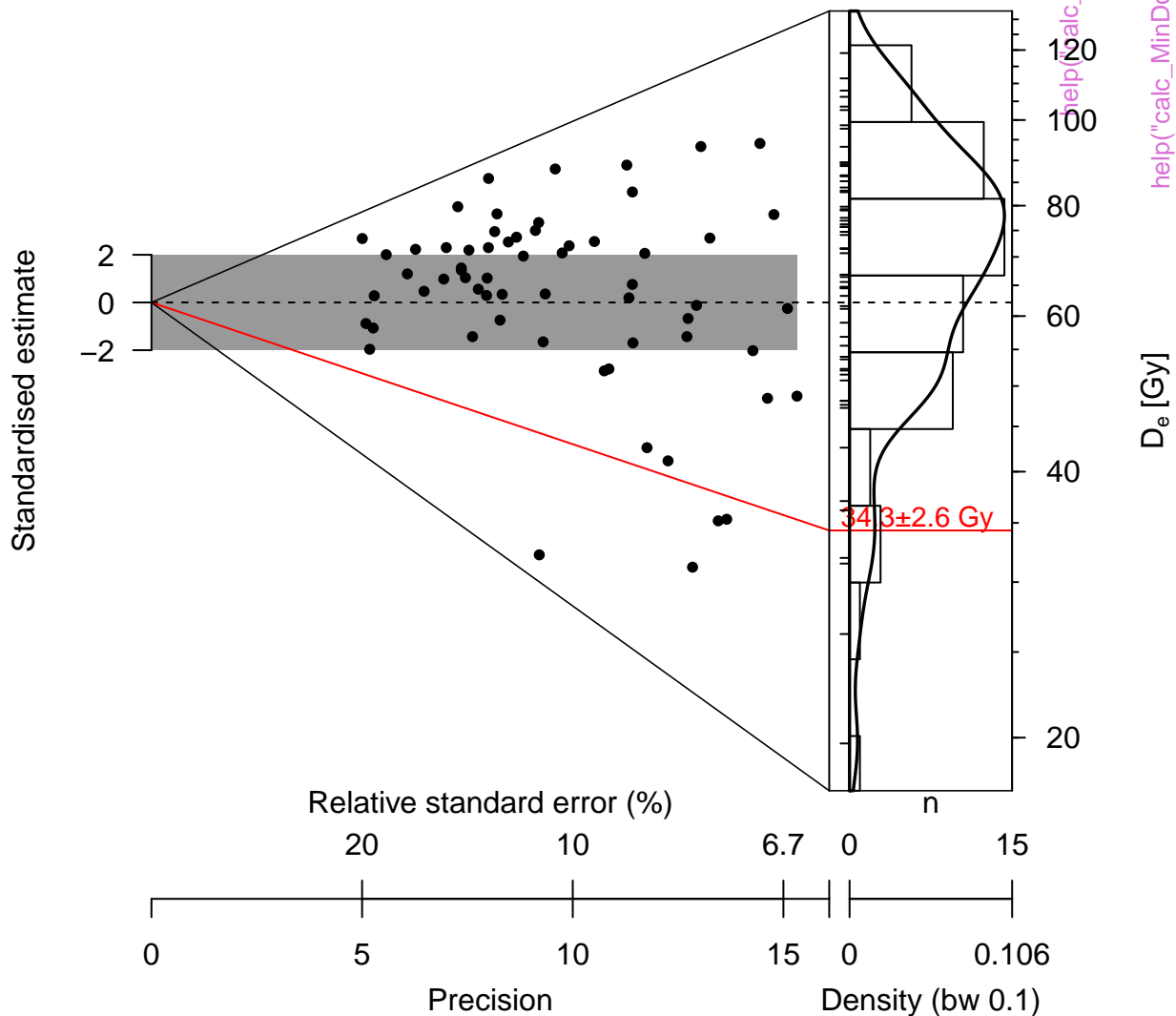
help("calc_MinDose")

Likelihood profile: p0



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

median = 69.64



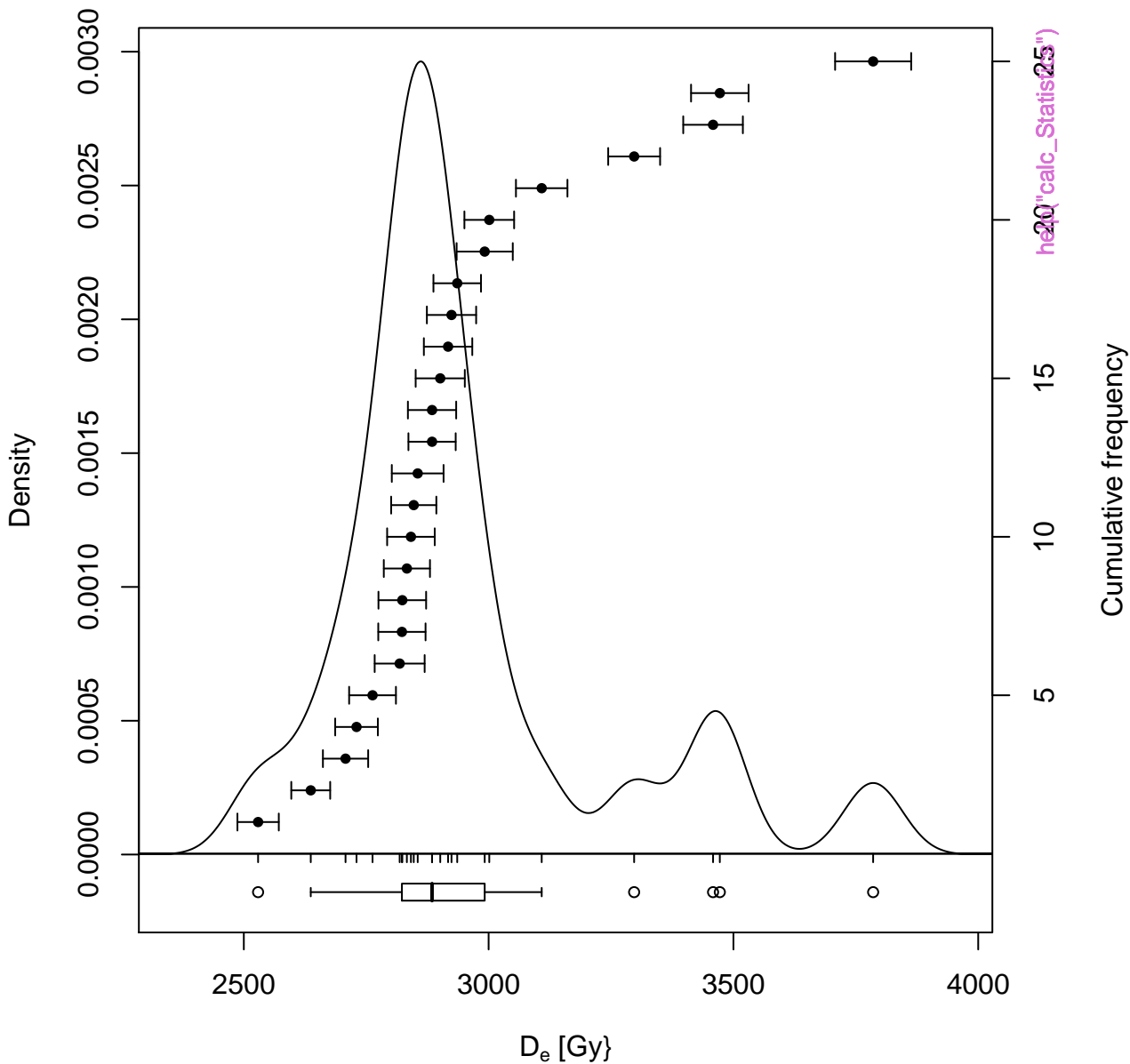
Source Dose Rate Prediction

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



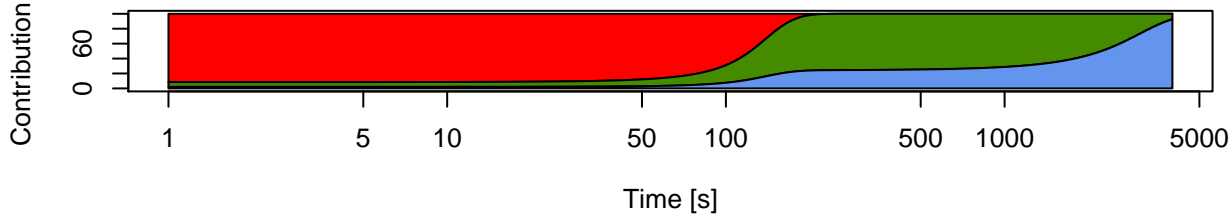
Component contribution to sum curve



Default



Component contribution to sum curve



Background



Default



Component contribution to sum curve



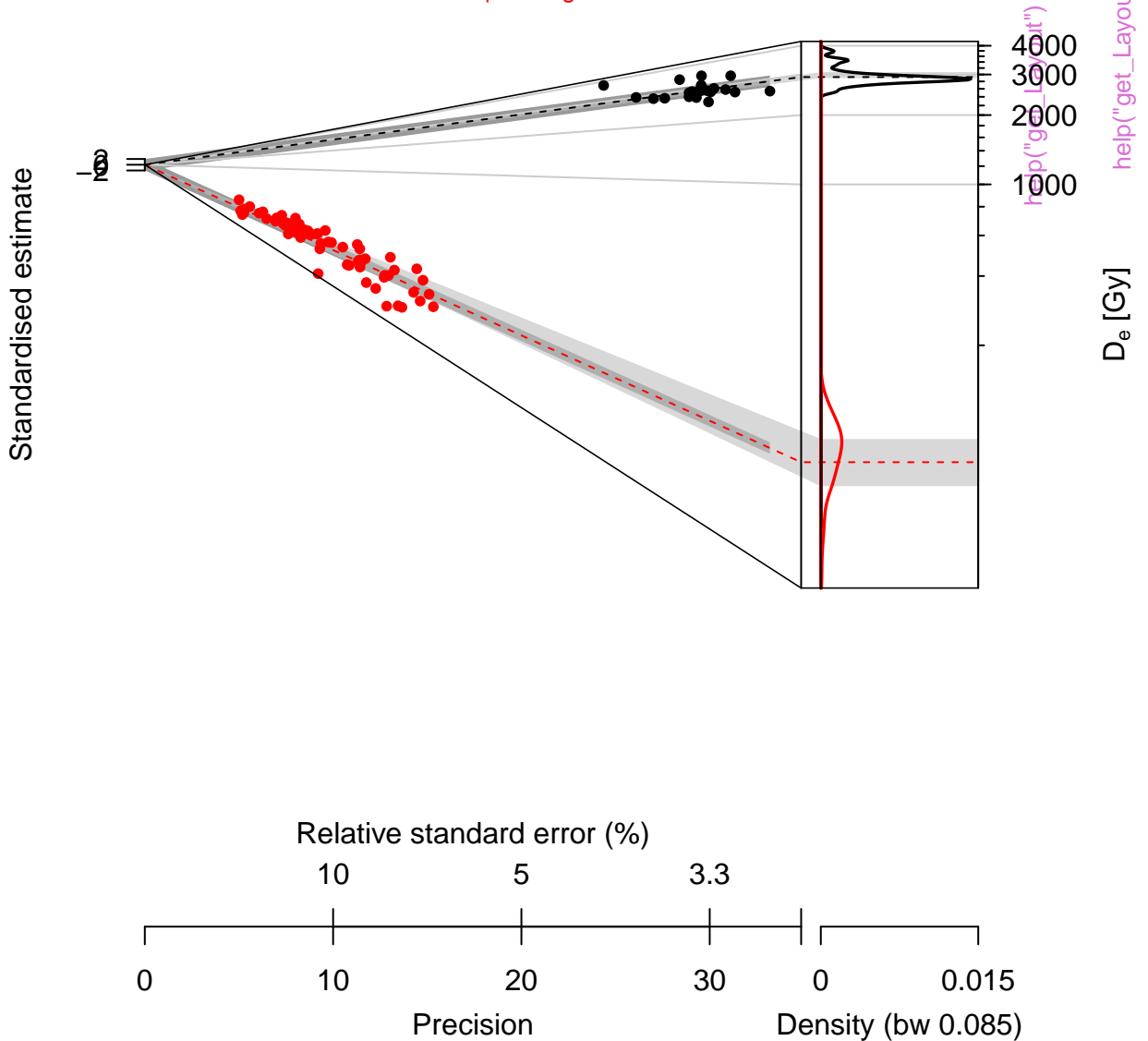
Default



Component contribution to sum curve



n = 25 | in 2 sigma = 68 %
n = 62 | in 2 sigma = 41.9 %





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



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 = 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

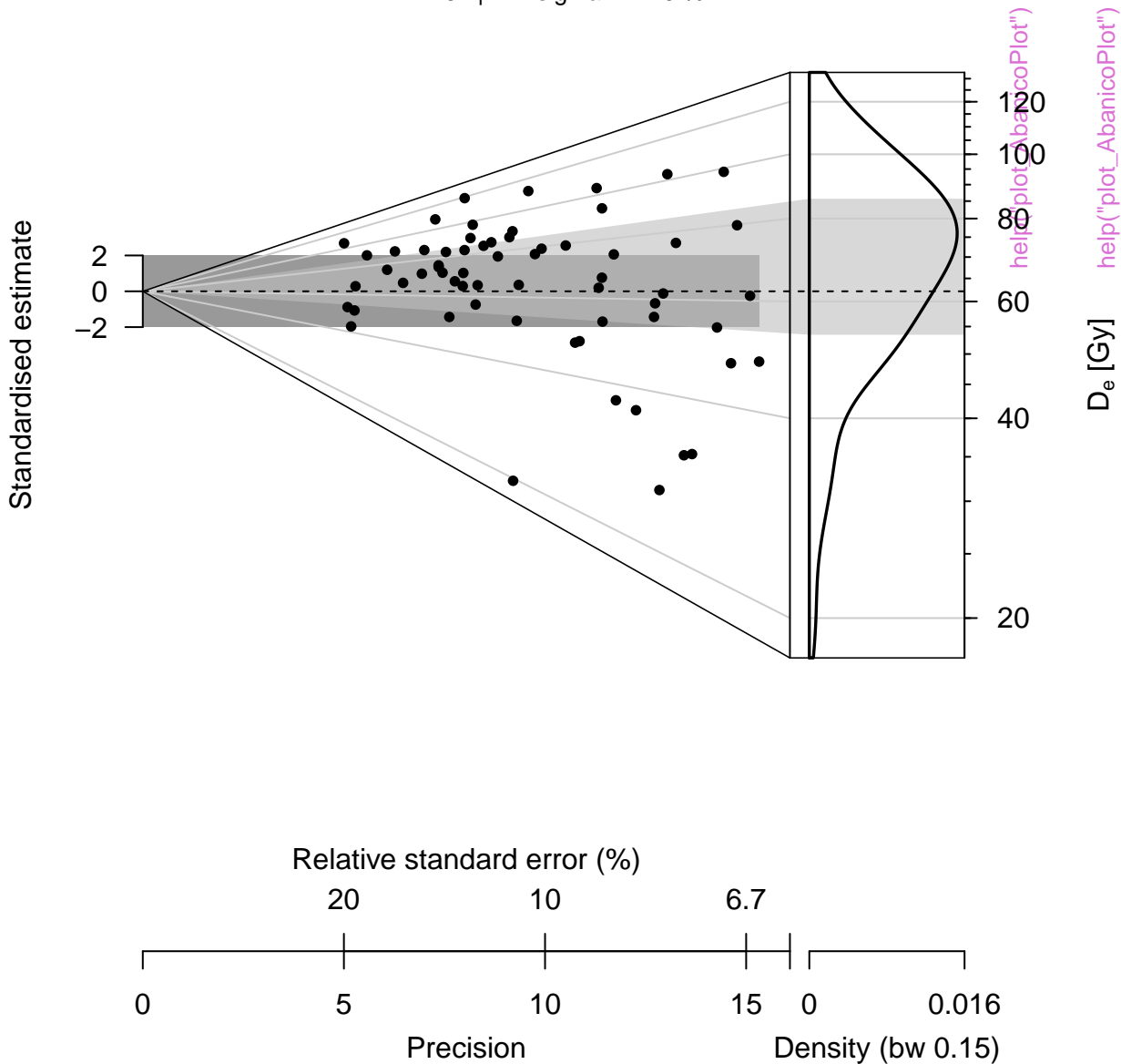
0.016

Precision

Density (bw 11.795)

D_e distribution

n = 62 | in 2 sigma = 41.9 %



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

0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e [Gy]

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

10

15

0

0.264

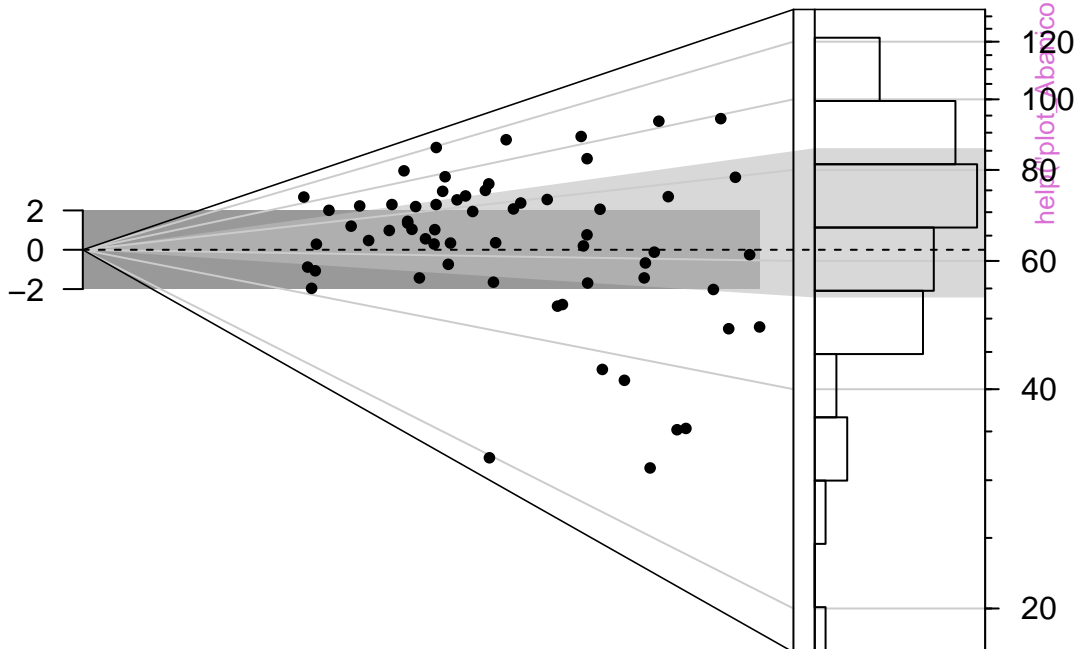
Precision

Density (bw 0.04)

D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



D_e distribution

n = 62 | in 2 sigma = 41.9 %

Standardised estimate



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

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



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



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



D_e [Gy]

Relative standard error (%)

20

10

6.7

0

5

10

15

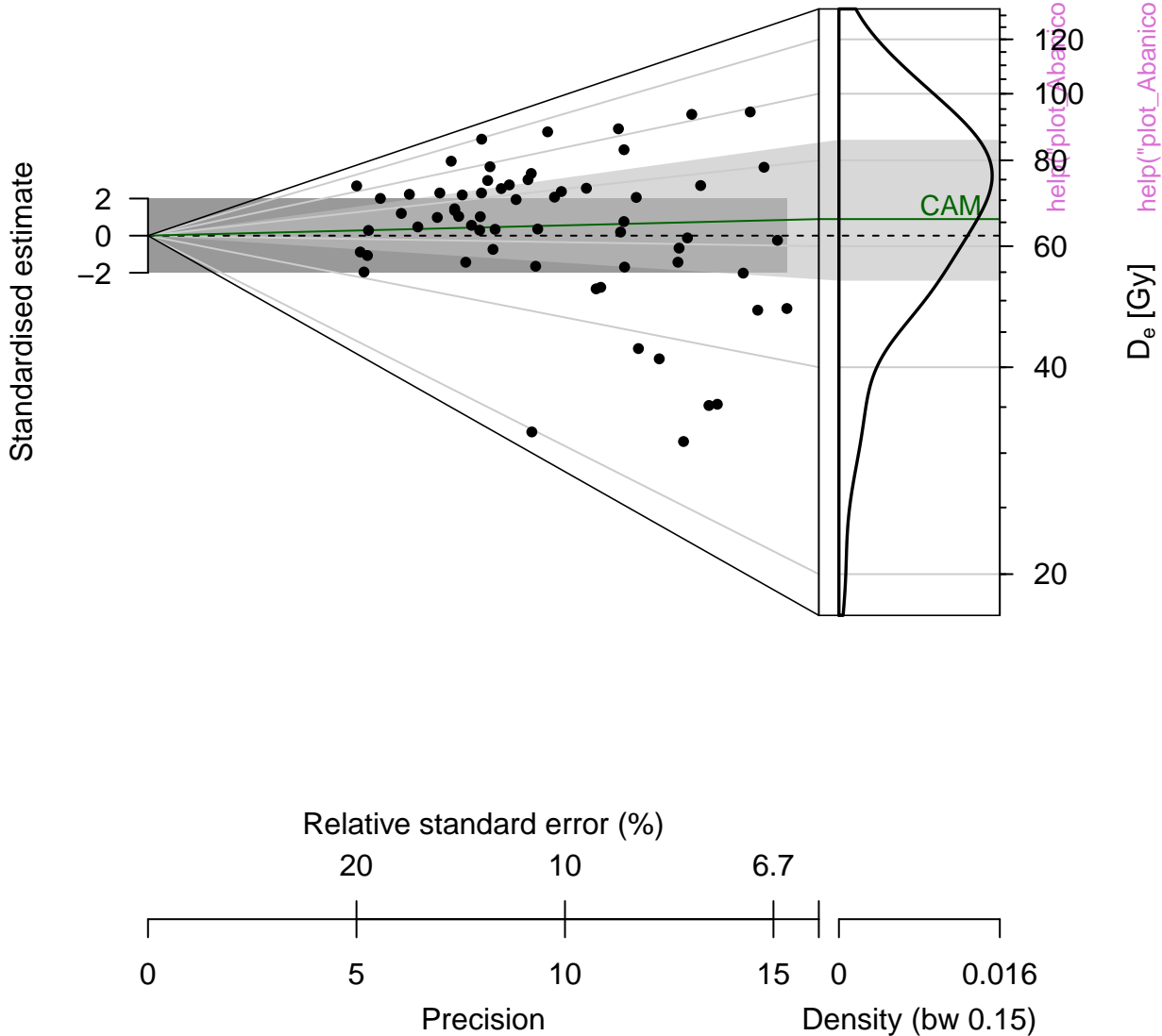
0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %



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

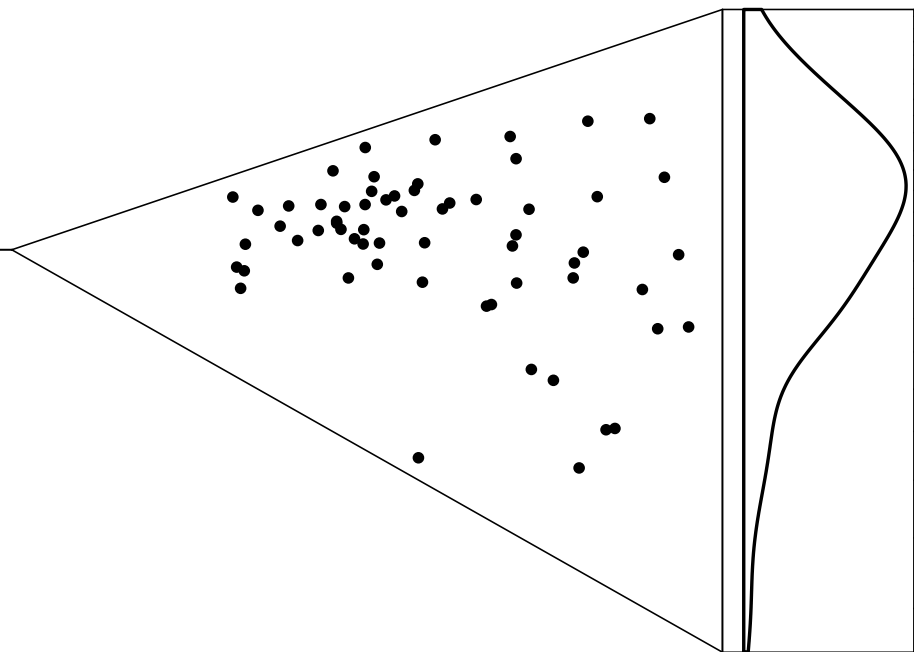
10

15

0.016

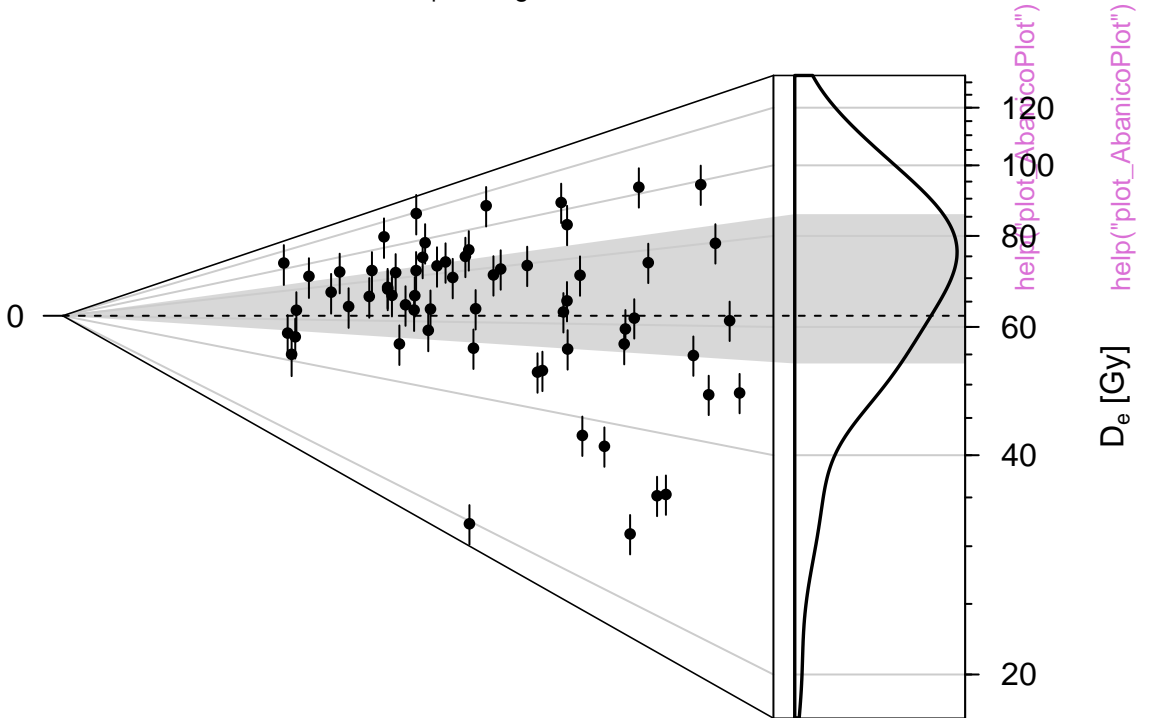
Precision

Density (bw 0.15)



D_e distribution

n = 62 | in 2 sigma = 41.9 %

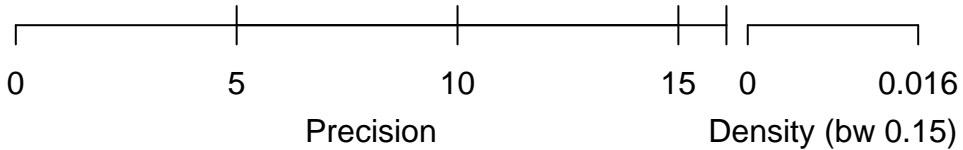


Relative standard error (%)

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



Relative standard error (%)

20

10

6.7

0

5

10

15

0

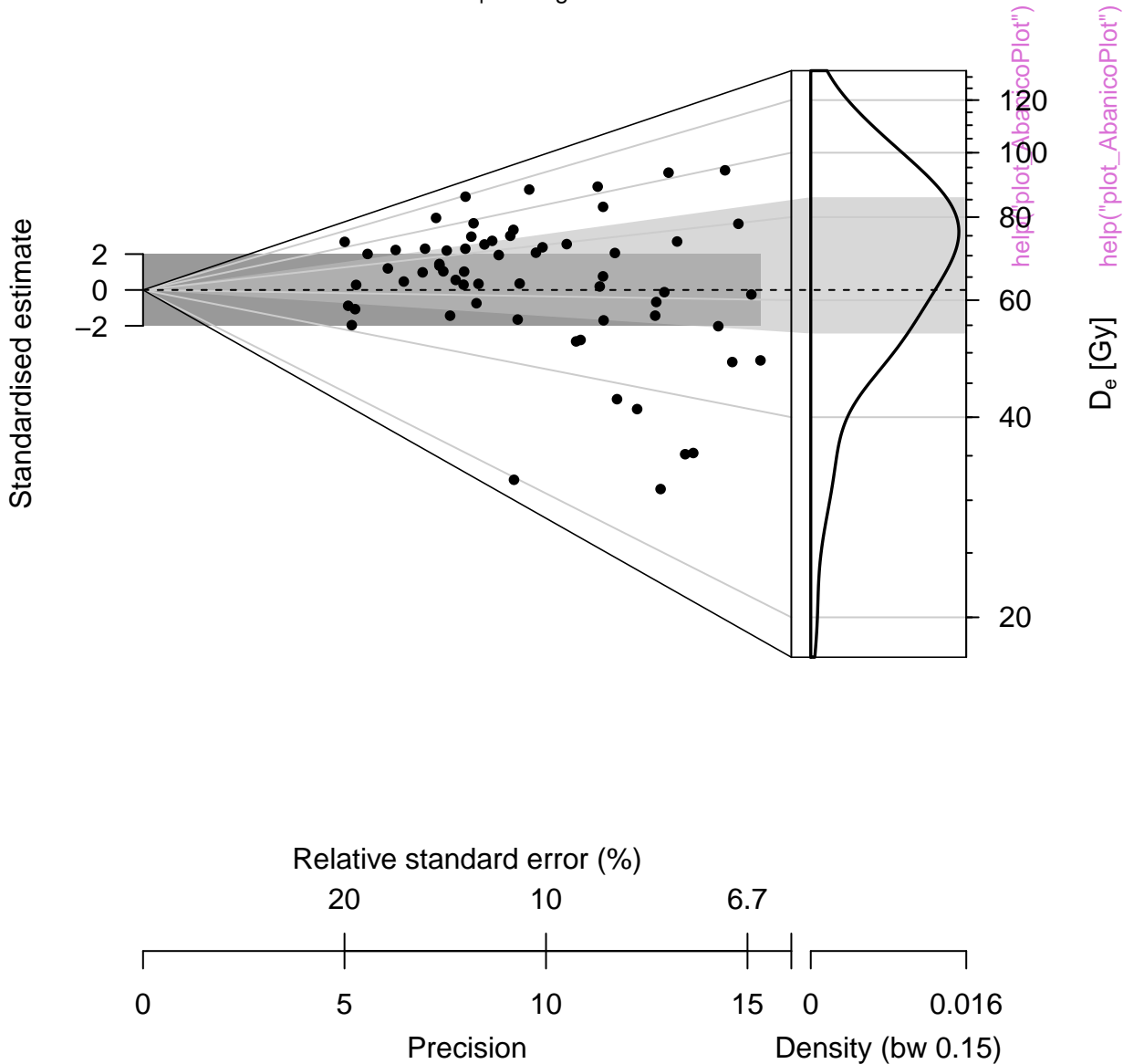
0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %



D_e distribution

median = 69.75

Standardised estimate



D_e [Gy]

Relative standard error (%)

20

10

6.7

0

5

10

15

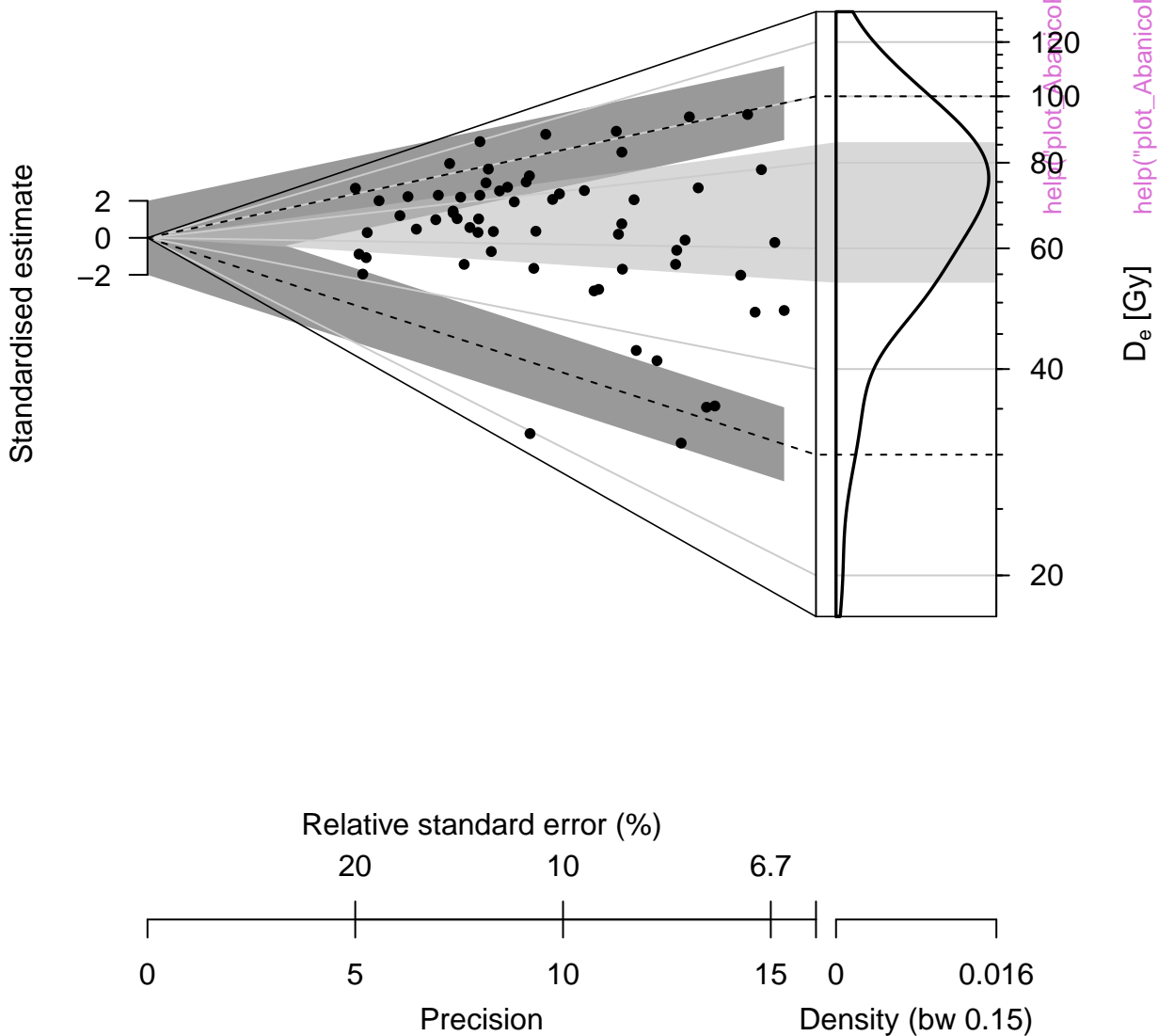
0.016

Precision

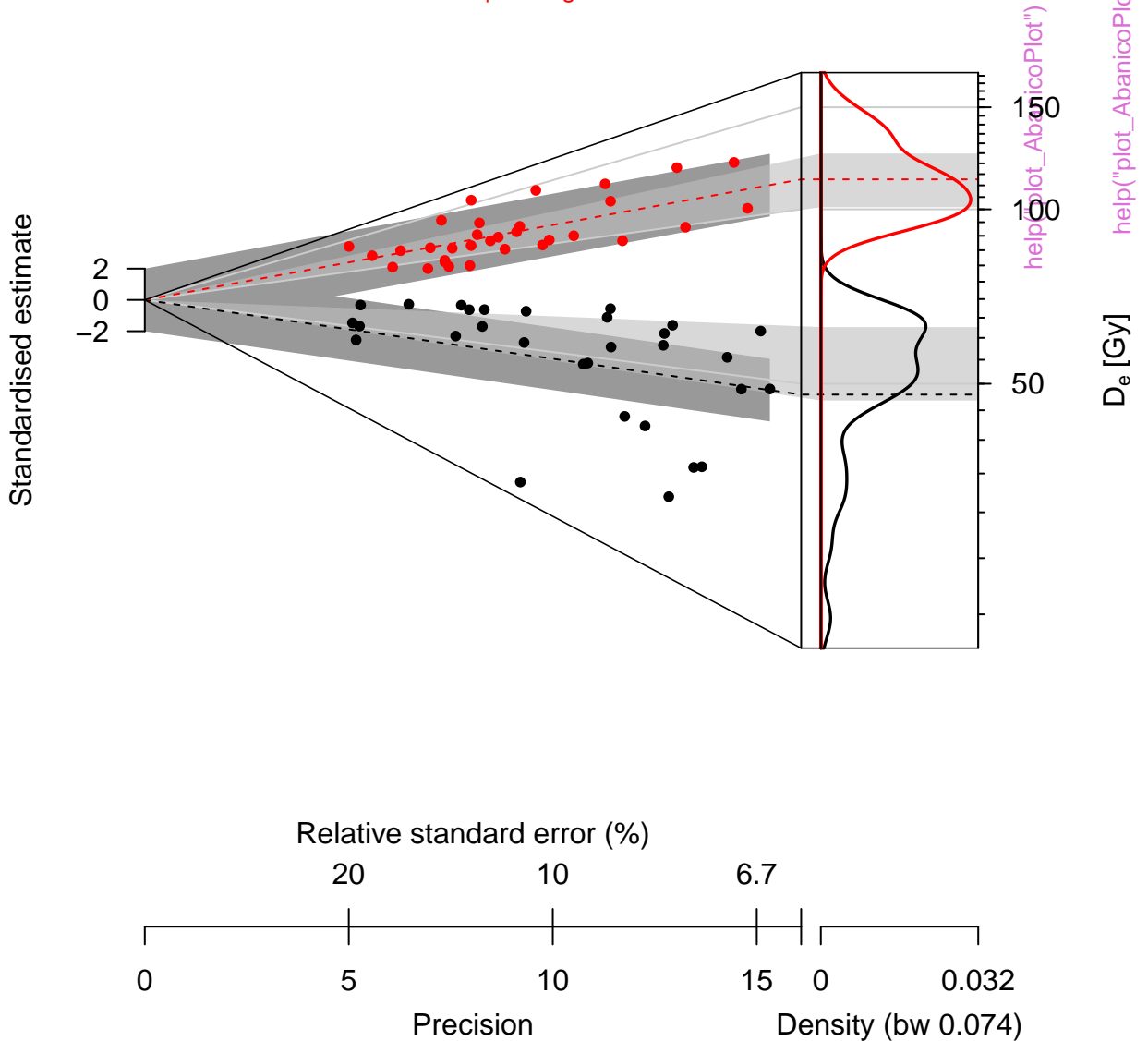
Density (bw 0.15)

D_e distribution

n = 62 | in 2 sigma = 41.9 %



n = 30 | in 2 sigma = 46.7 %
n = 32 | in 2 sigma = 87.5 %



D_e distribution

n = 30 | in 2 sigma = 70 % median = 53.39

n = 32 | in 2 sigma = 84.4 % median = 110.51

Standardised estimate



help("plot_AbanicoPlot")

D_e [Gy] help("plot_AbanicoPlot")

Relative standard error (%)

20

10

6.7

0

5

10

15

0.032

Precision

Density (bw 0.074)



help("plot_AbanicoPlot")



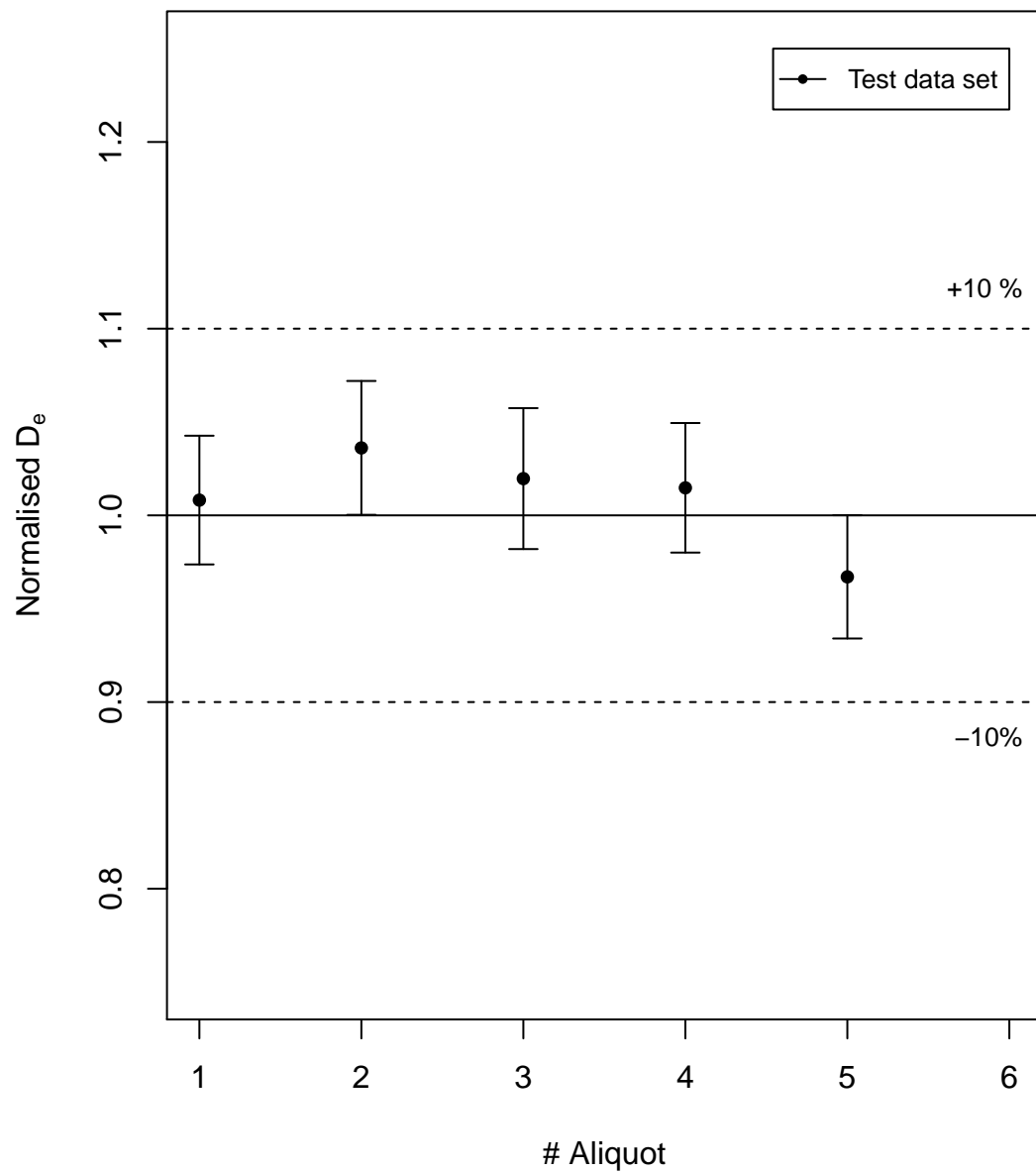
help("plot_AbanicoPlot")

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



Filter Combination



`help("plot_FilterCombinations")`

Filter Combination



`help("plot_FilterCombinations")`

Growth curve

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



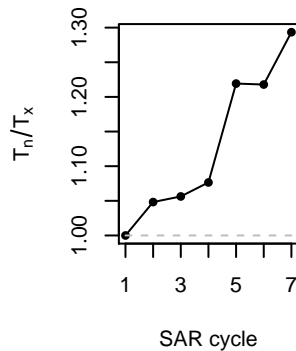
D_e from MC simulation

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



n = 100 , valid fits = 100

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



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

D_e from MC simulation

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



Dose [s]

n = 100 , valid fits = 100

help("plot_GrowthCurve")

Test dose response



help("plot_GrowthCurve")

Histogram



Histogram of De-values

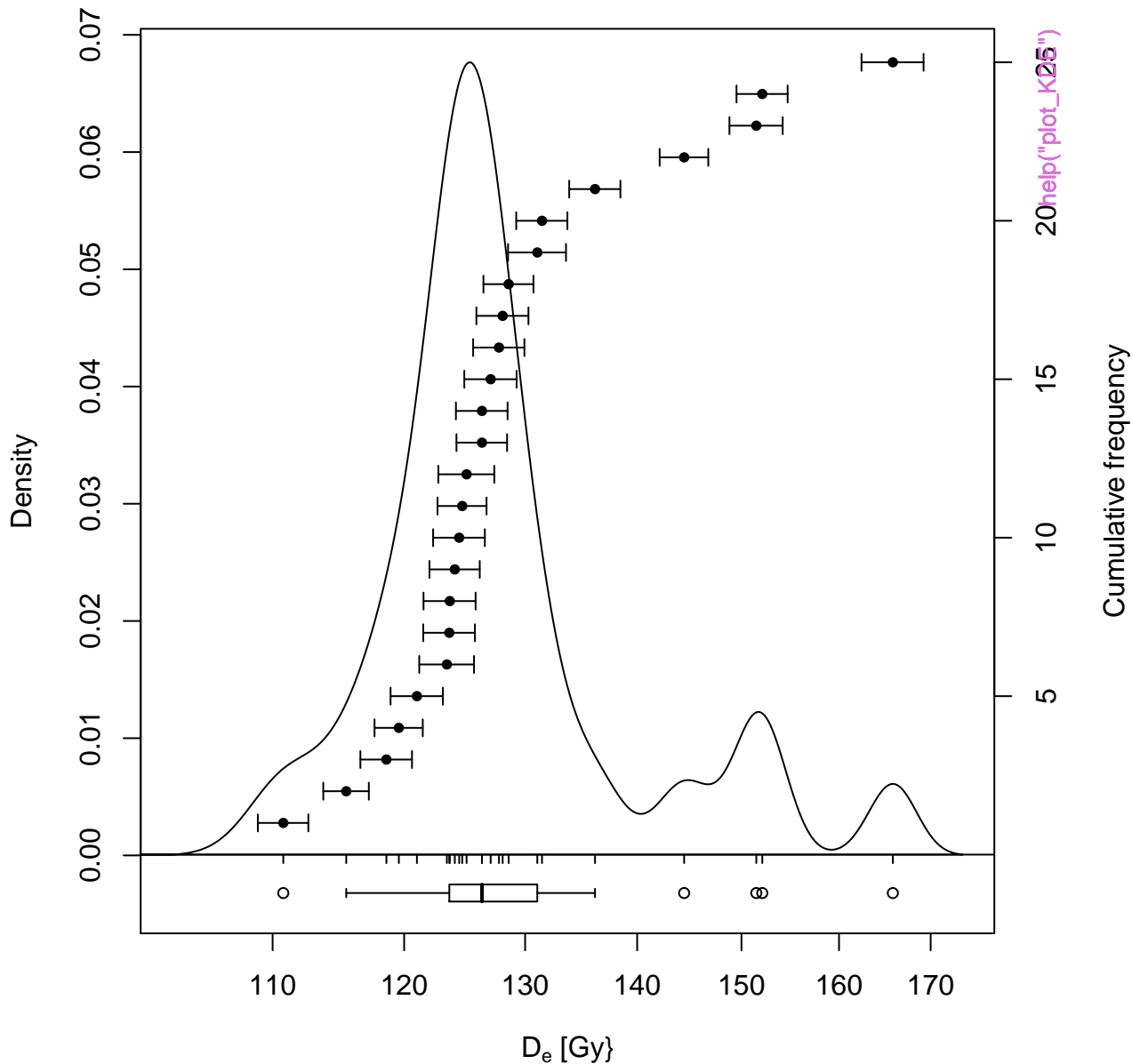
Example data set



D_e distribution



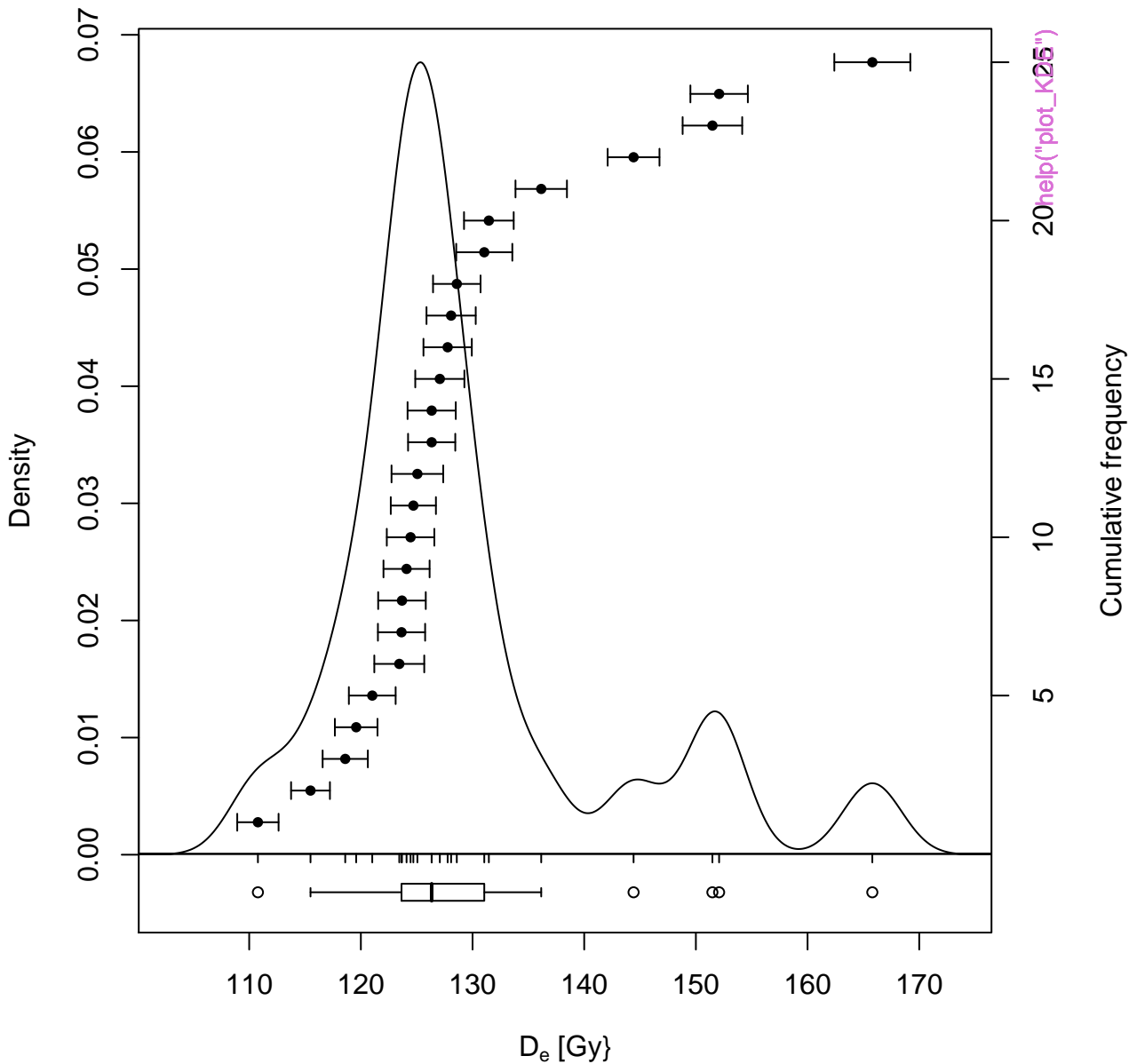
D_e distribution



Dose distribution

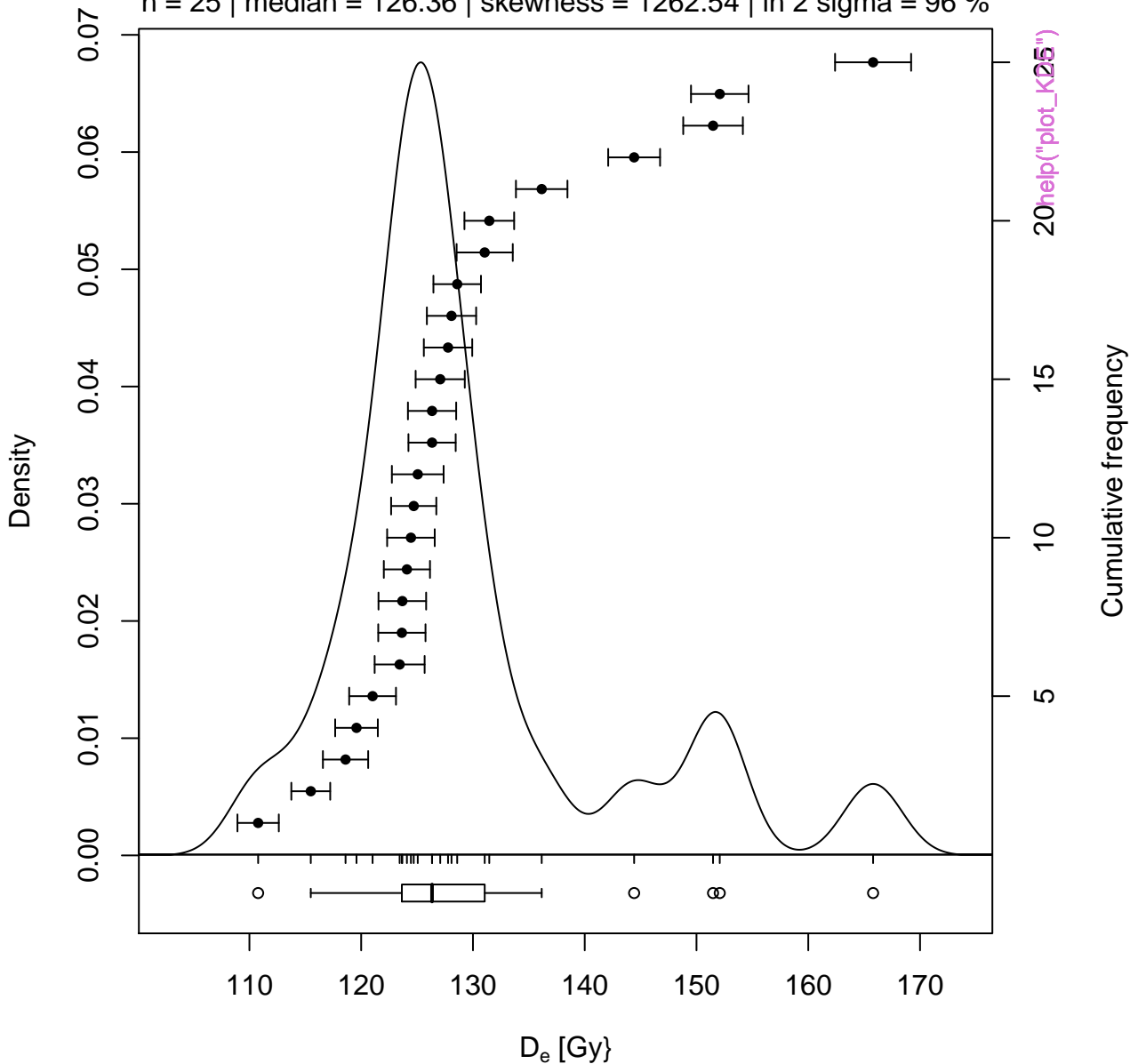


D_e distribution

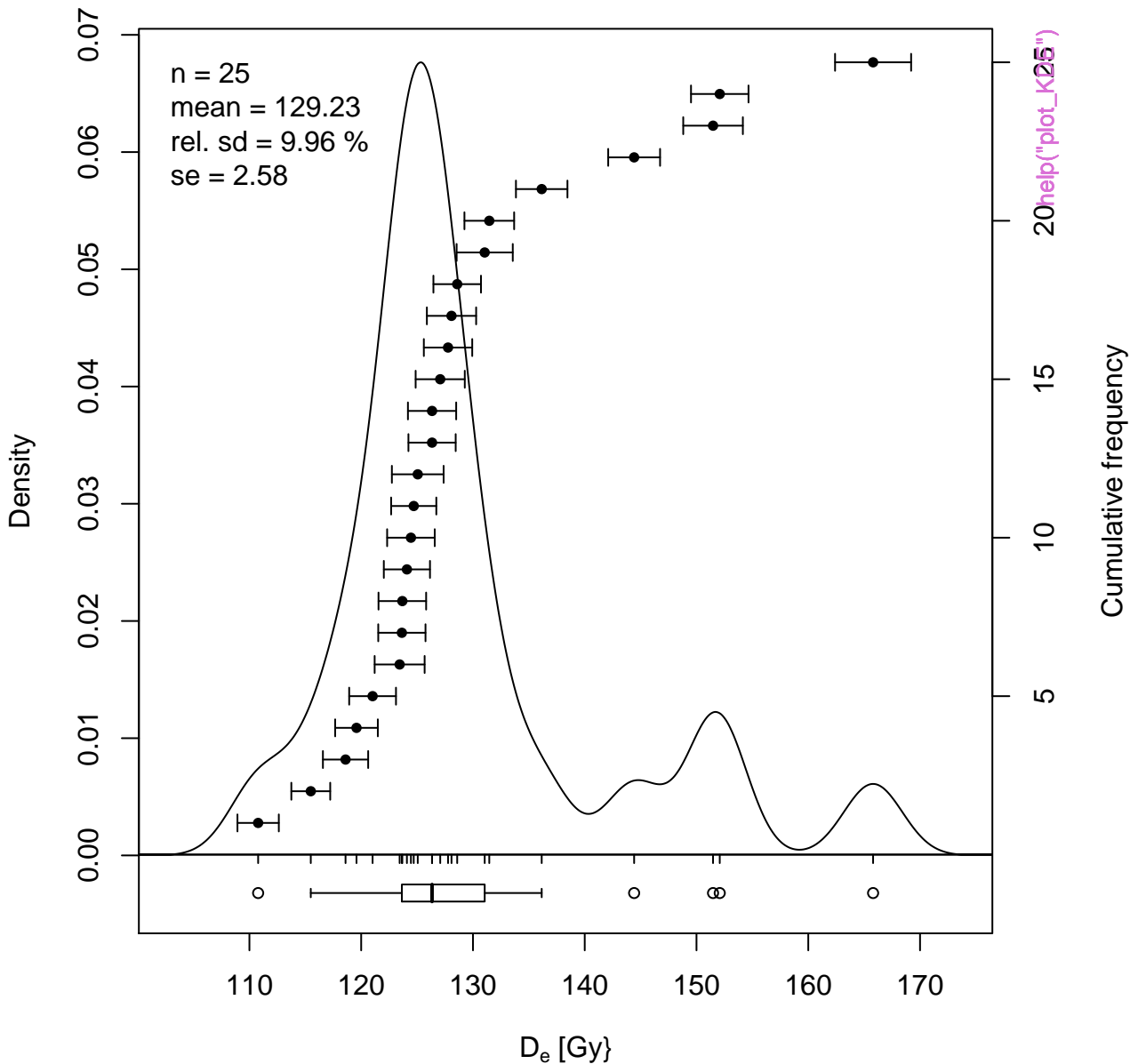


D_e distribution

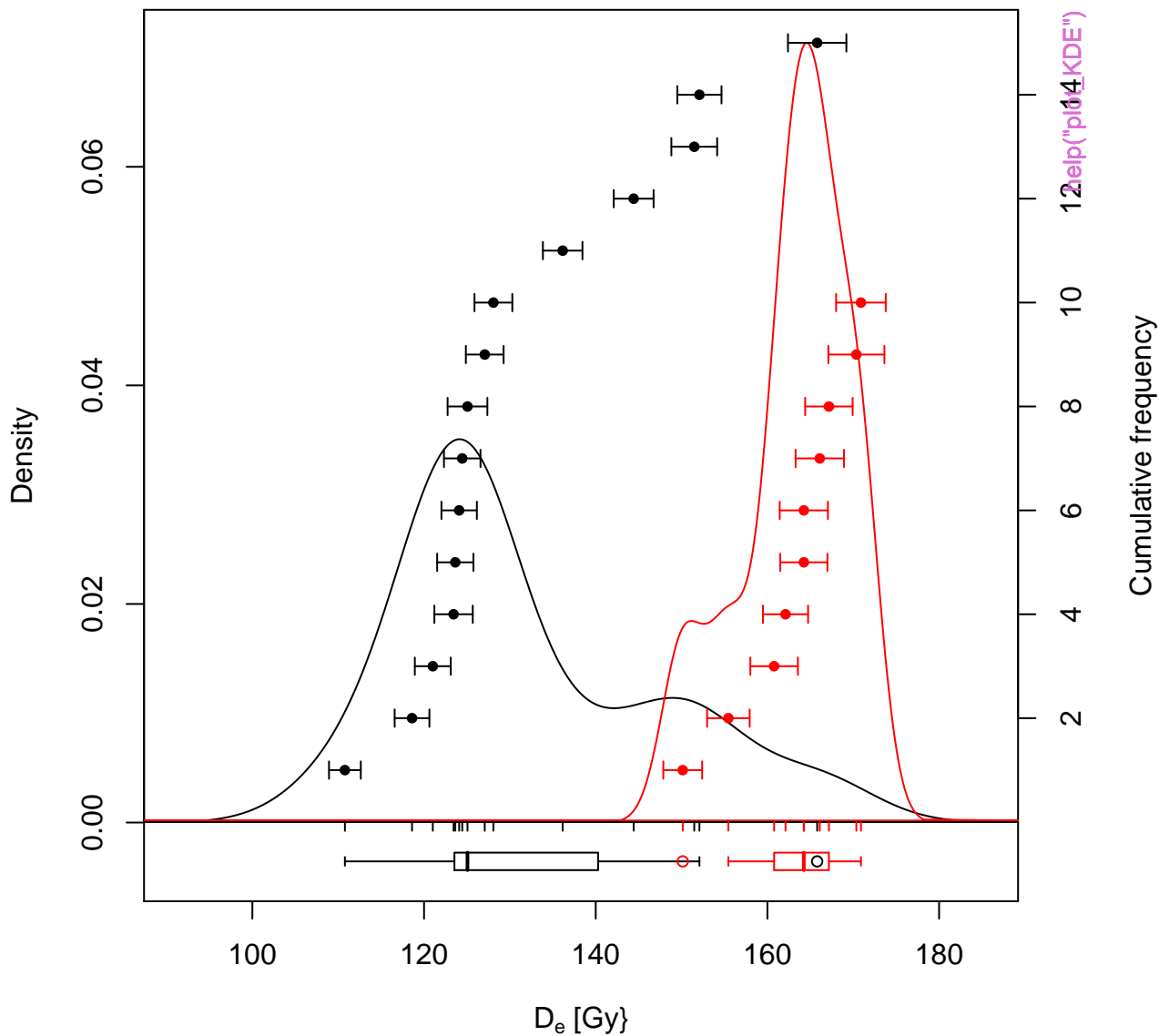
n = 25 | median = 126.36 | skewness = 1262.54 | in 2 sigma = 96 %



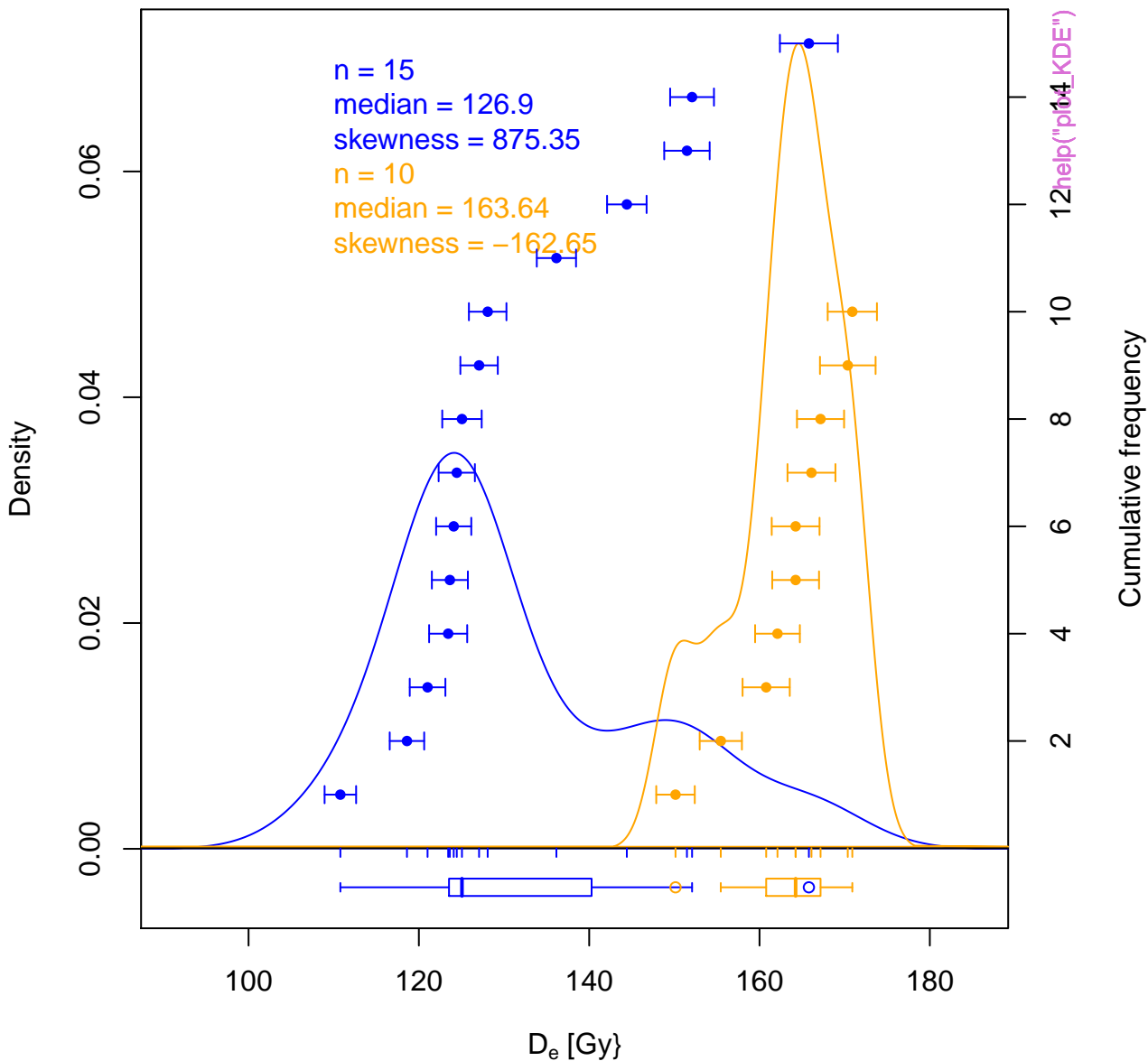
D_e distribution



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

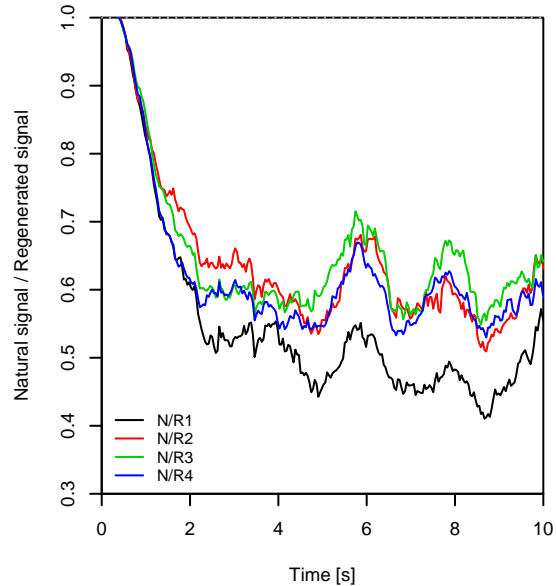


Aliquot #1**Aliquot #2**

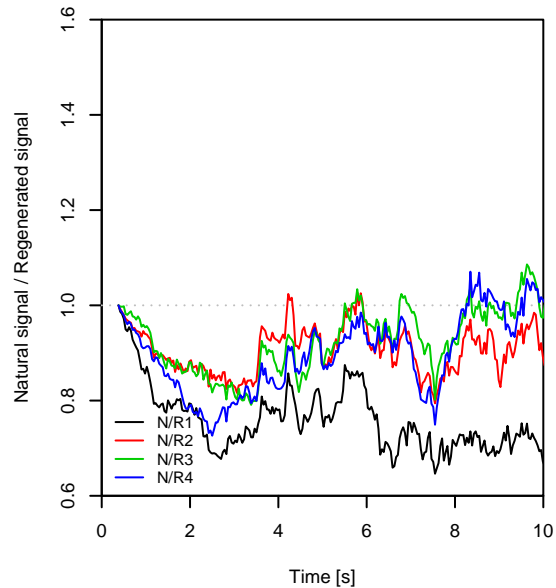
help("plot_NRt")

Aliquot #3**Aliquot #4**

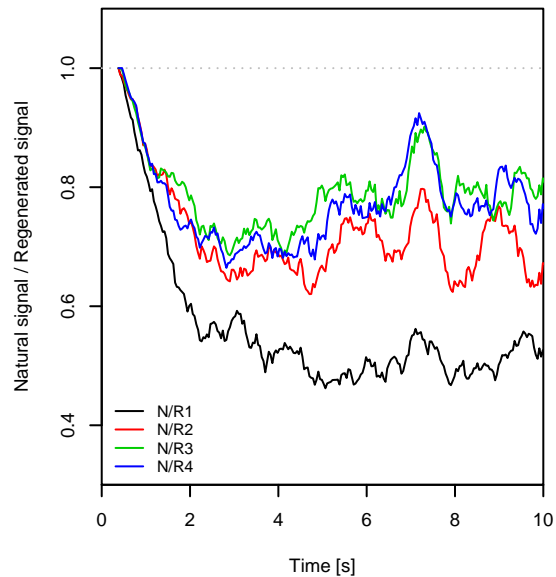
Aliquot #5**Aliquot #6****Aliquot #7****Aliquot #8**

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



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")

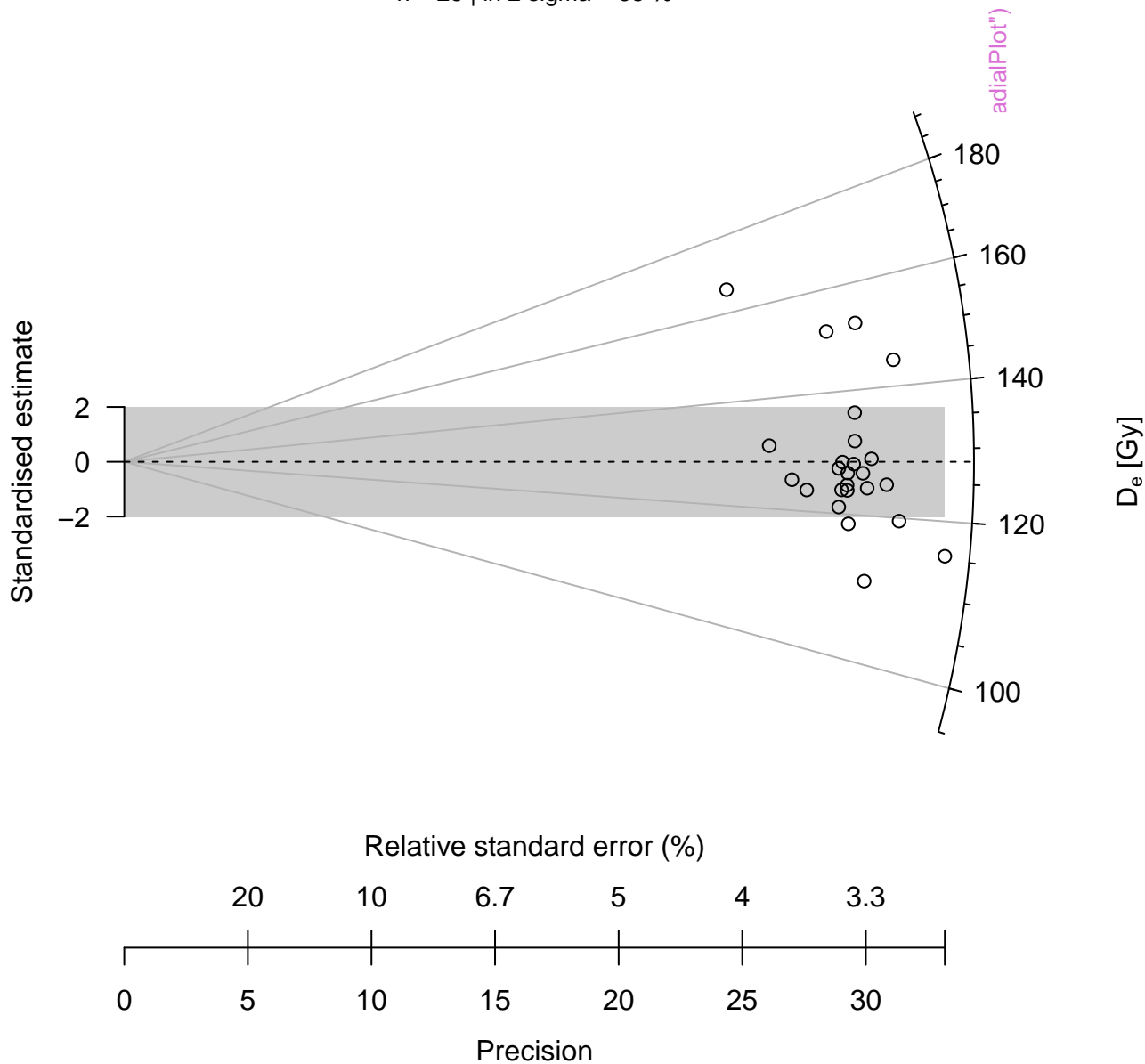
Monte Carlo Simulation

$$n = 100 \mid \hat{\mu} = 45 \mid \hat{\sigma} = 21 \mid \frac{\hat{\sigma}}{\sqrt{n}} = 2 \mid v = 0.84$$



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 %



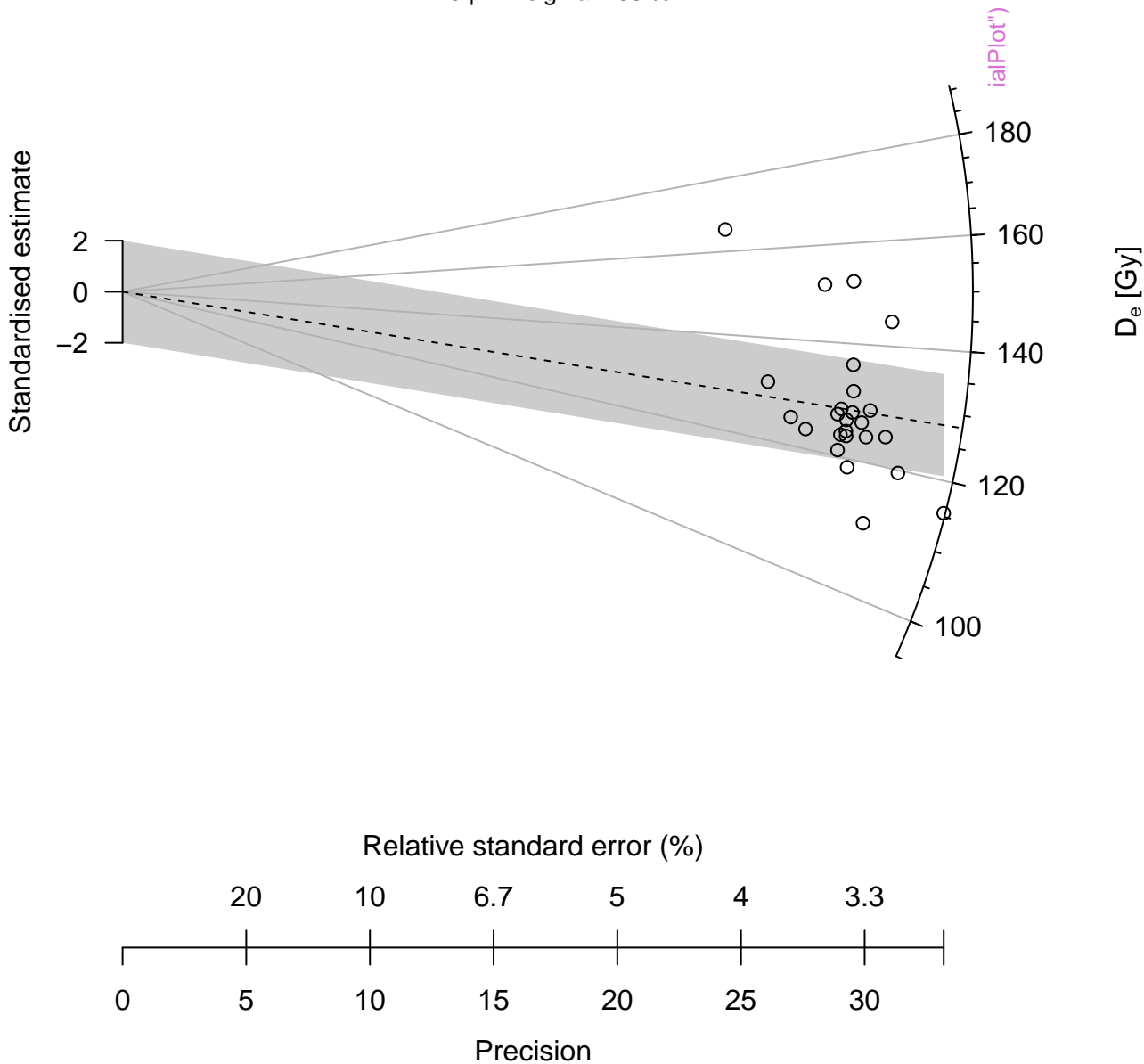
D_e distribution

n = 25 | in 2 sigma = 68 %



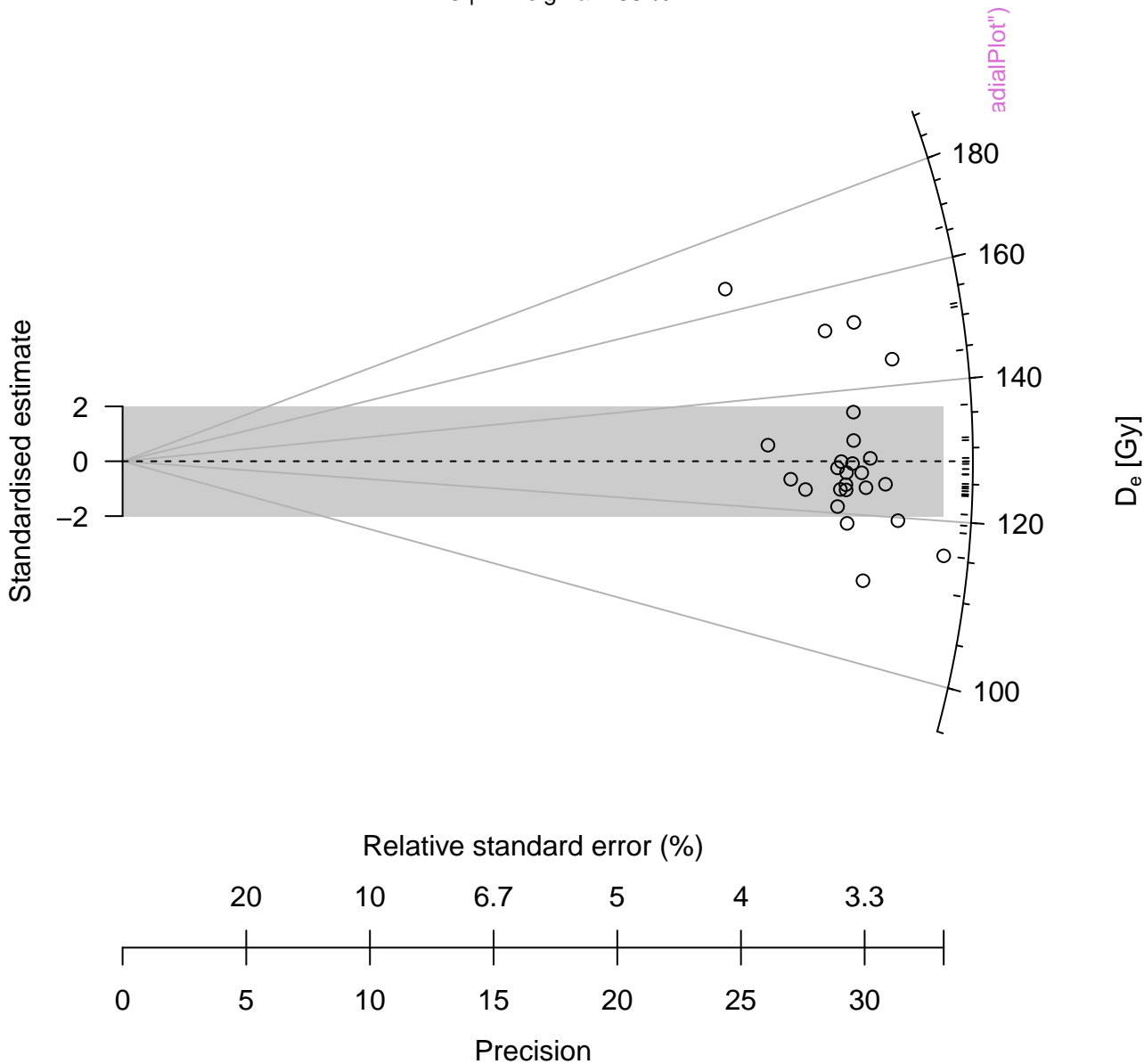
D_e distribution

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

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



D_e distribution

n = 62 | mean = 66



D_e distribution

n = 62 | mean = 66

