

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

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

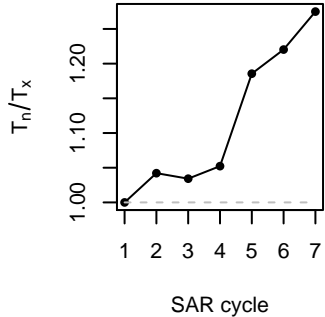


D_e from MC simulation

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



Test dose response



Rejection criteria

Recycling ratio



Recuperation rate

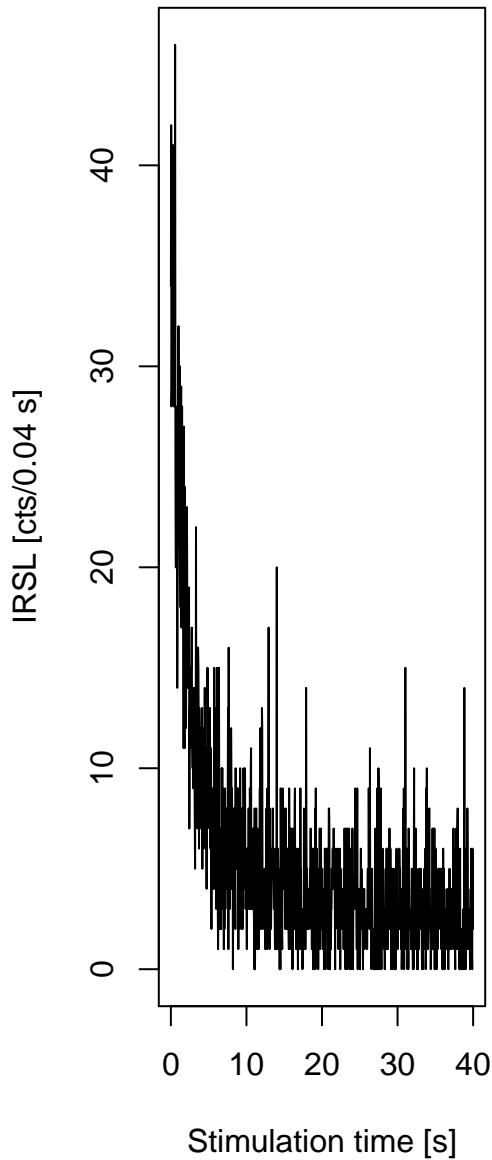


Palaeodose error



— 0.2 + 0.2

IRSL



`help("analyse_SAR.CWOSL")`

L_n, L_x curves



T_n, T_x curves



Plateau test L_n, L_x curves



plateau Test T_n, T_x curves



Natural
(0)

Natural
(136)

Natural
(317)

Natural
(544)

Natural
(815)

Natural
(0)

Natural
(317)

Growth curve

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

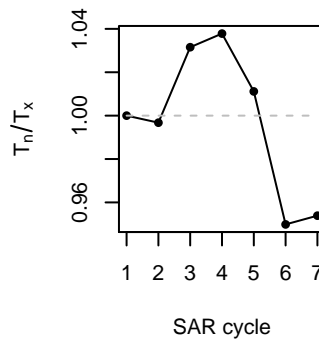


D_e from MC simulation

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



Test dose response



Pseudo pIRIR data set based on quartz OSL

TL
pseudolRSL1
pseudolRSL2

help("analyse_pIRIRSequence")

Pseudo pIRIR data set based on quartz OSL



Pseudo pIRIR data set based on quartz OSL



Pseudo pIRIR data set based on quartz OSL



Pseudo pIRIR data set based on quartz OSL



Pseudo pIRIR data set based on quartz OSL

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



D_e from MC simulation

D_{MC} = 1664.49 ± 46.11 | quality = 99.8 %



help("analyse_pIRIRSequence")

Test dose response



Pseudo pIRIR data set based on quartz OSL



Pseudo pIRIR data set based on quartz OSL





Pseudo pIRIR data set based on quartz OSL

$D_e = 1668.25 \pm 43.79$ | fit: EXP



help("analyse_pIRIRSequence")

D_e from MC simulation

D_{e,MC} = 1662.56 ± 43.79 | quality = 99.7 %



Frequency

Dose [s]

n = 100 , valid fits = 100

help("analyse_pIRSequence")

Test dose response



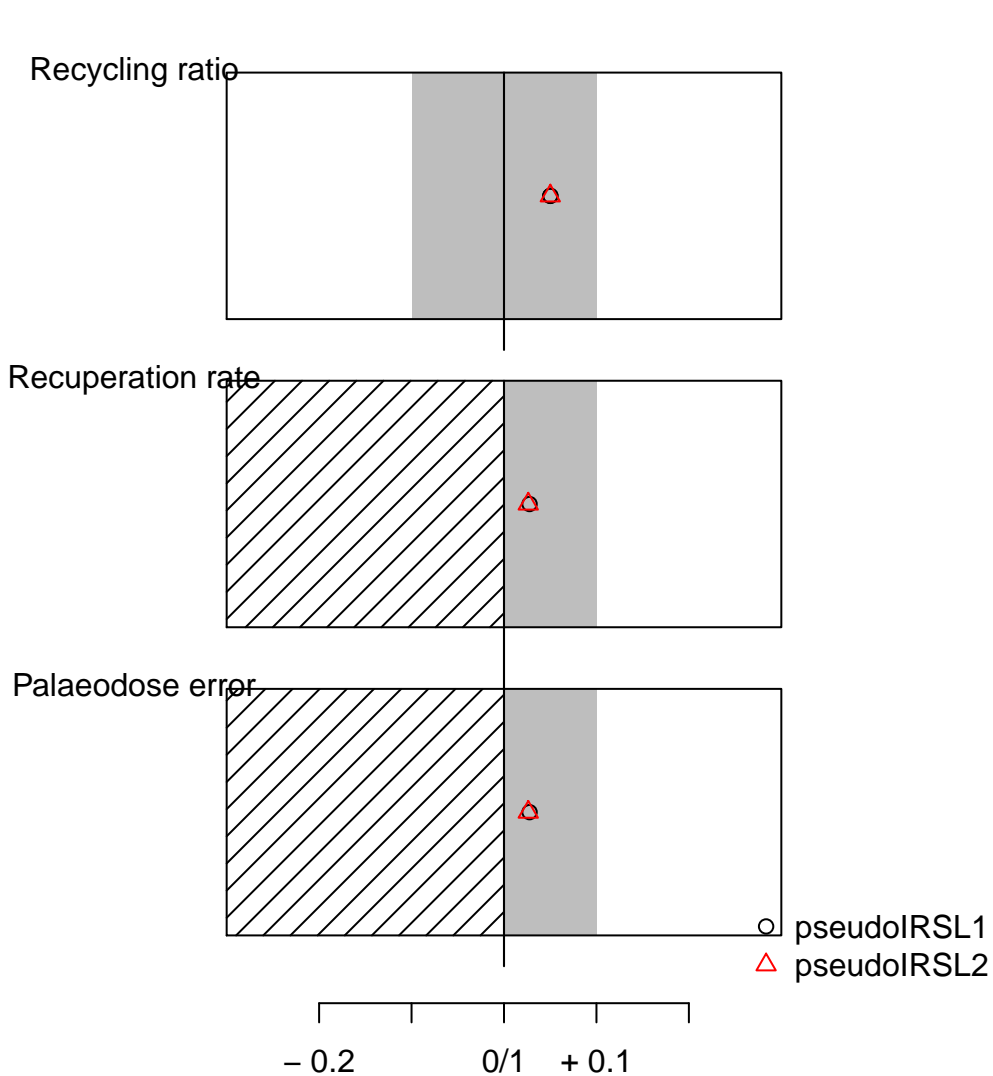
Summarised Dose Response Curves



Sensitivity change



Rejection criteria



Monte Carlo Simulation

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



Profile log likelihood for 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)

help("calc_MinDose")

help("calc_MinDose")

34.3±2.6 Gy

Source Dose Rate Prediction

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



help("calc_SourceDoseRate")

D_e distribution



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

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

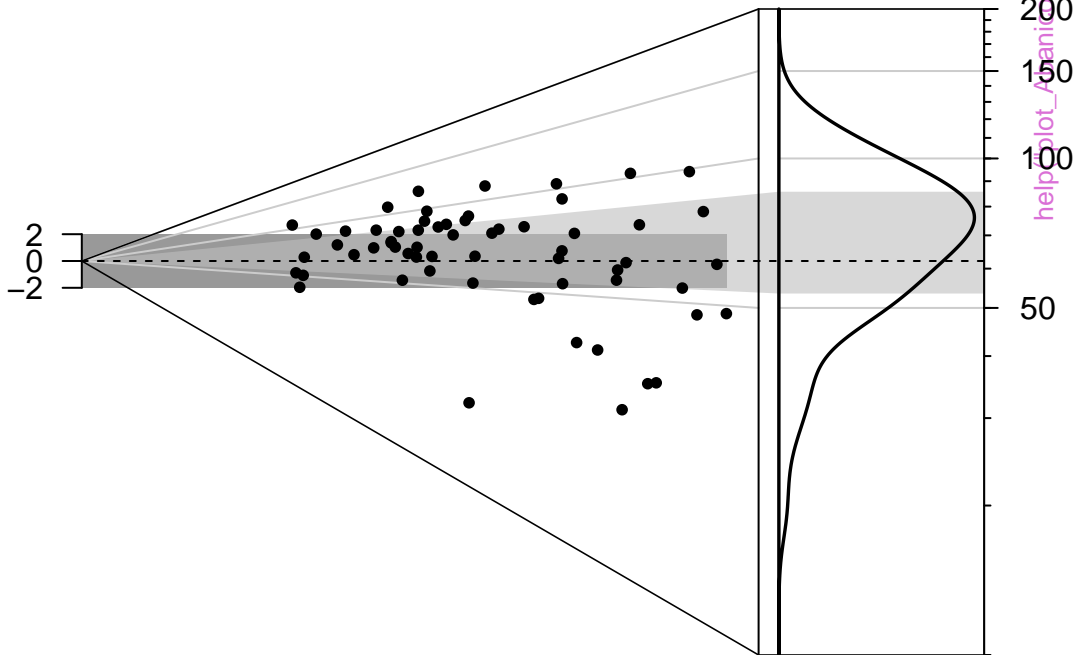
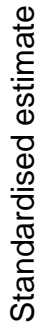
0.016

Precision

Density (bw 0.15)

D_e distribution

n = 62

 $D_e \text{ (Gy)}$

```
help("plot_AbanicoPlot")
```

help("plot AlbanicaPlot")

Relative standard error (%)

20

10

6.7

0

5

10

15

Density (bw 0.15)

0.016

Precision

D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

5

0

5

10

15

200

0.016

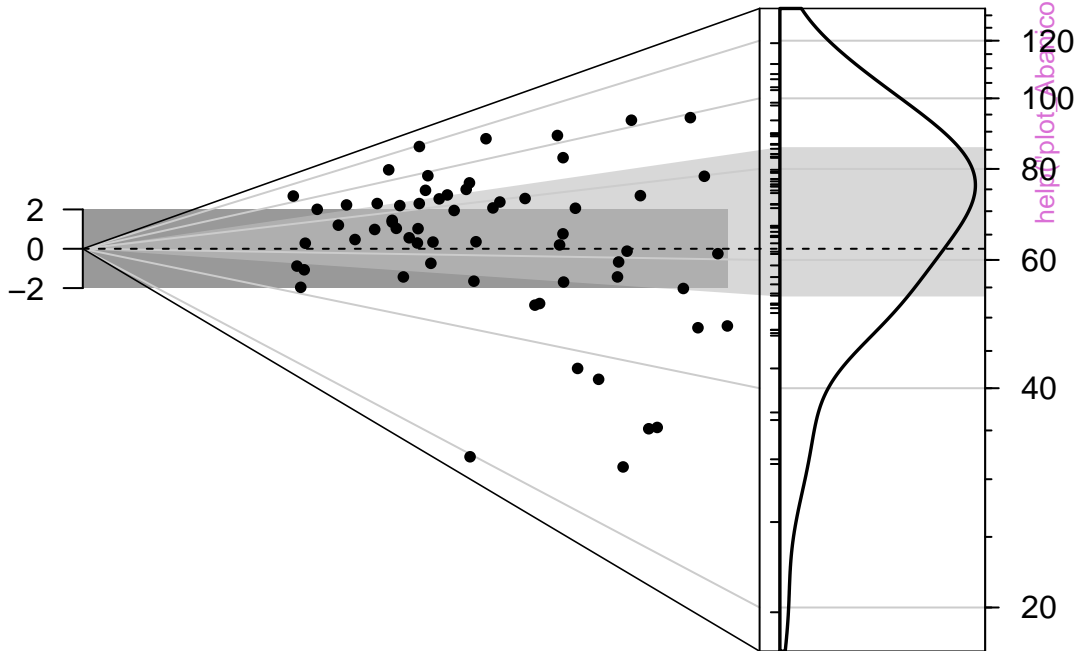
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

10

15

0.016

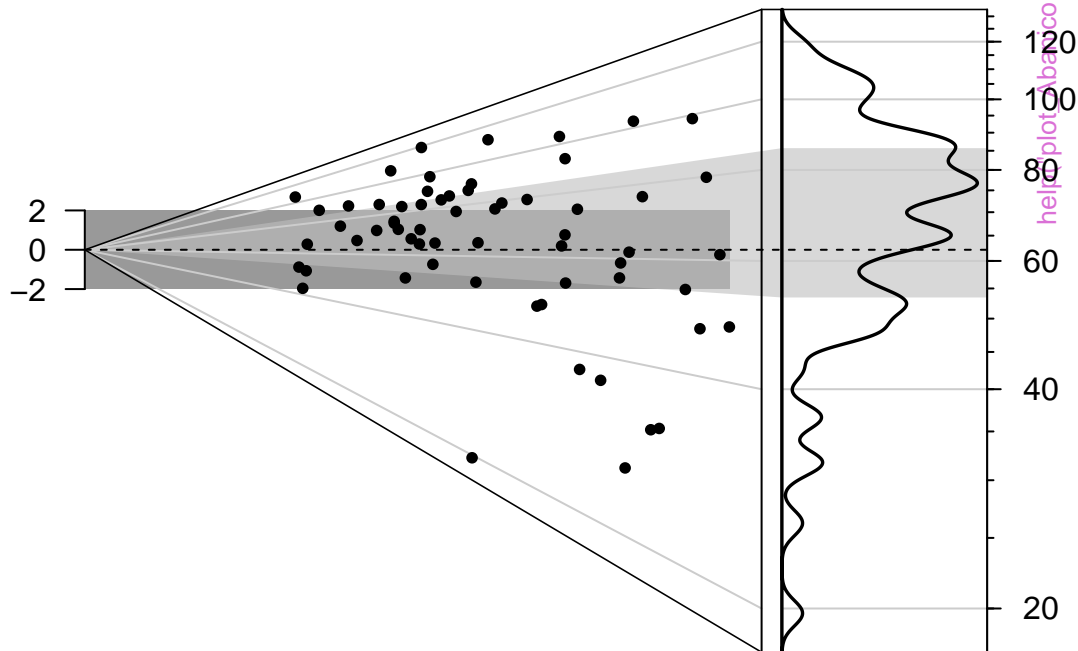
Precision

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 (Gy)

Relative standard error (%)

n

20

10

6.7

0

15

0

5

Precision

10

15

D_e distribution

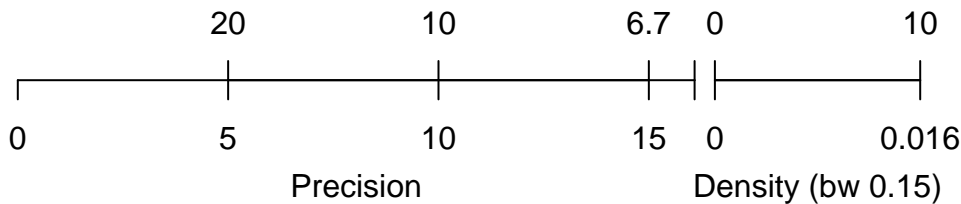
n = 62

Standardised estimate



Relative standard error (%)

n



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

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

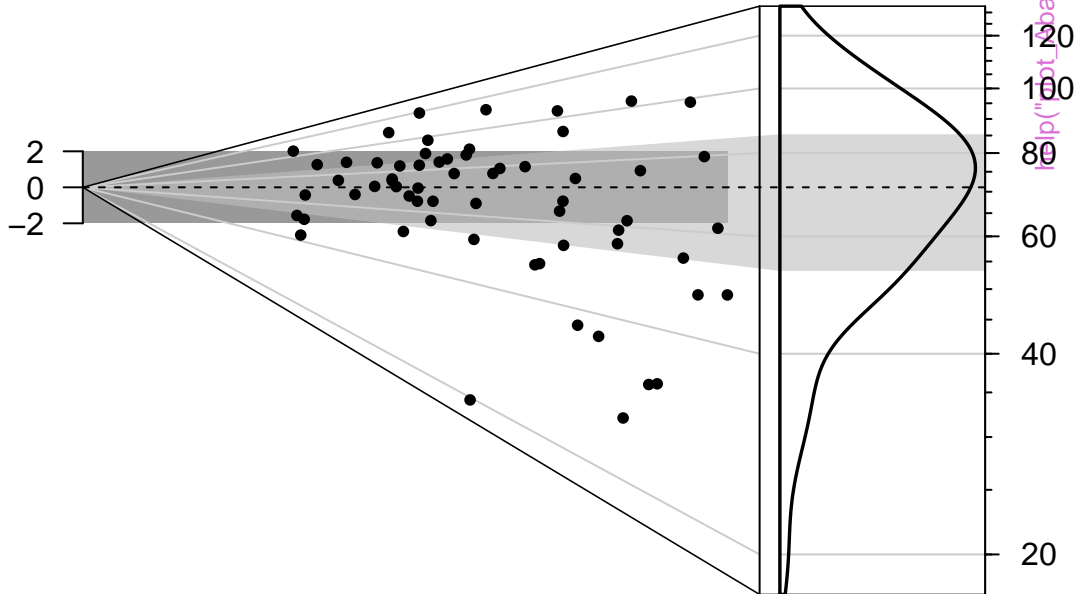
Precision

Density (bw 0.15)

D_e distribution

n = 62

Standardised estimate



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

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

R Sample 1

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

0

help("plot_AbanicoPlot")

help("plot_AbanicoPlot")

D_e (Gy)

Relative standard error (%)

20

10

6.7

0

5

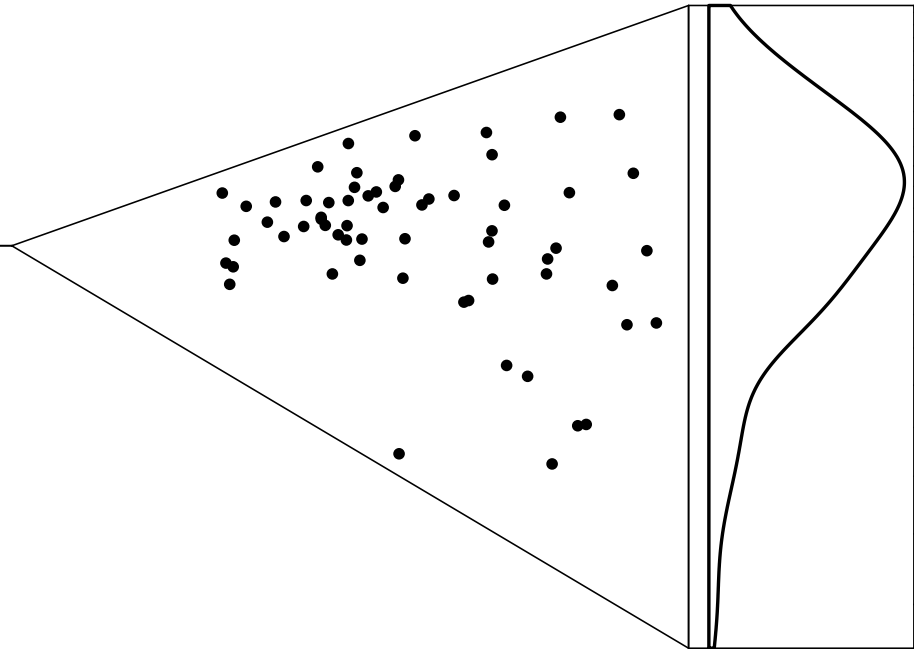
Precision

10

15

Density (bw 0.15)

0.016



D_e distribution

n = 62



Relative standard error (%)

20

10

6.7



D_e distribution

n = 62



D_e distribution

n = 62



D_e distribution

n = 62 | in 2 sigma = 41.9 %



D_e distribution

weighted mean = 62.16
median = 71.07

Standardised estimate



Relative standard error (%)

20

10

6.7

0

5

Precision

10

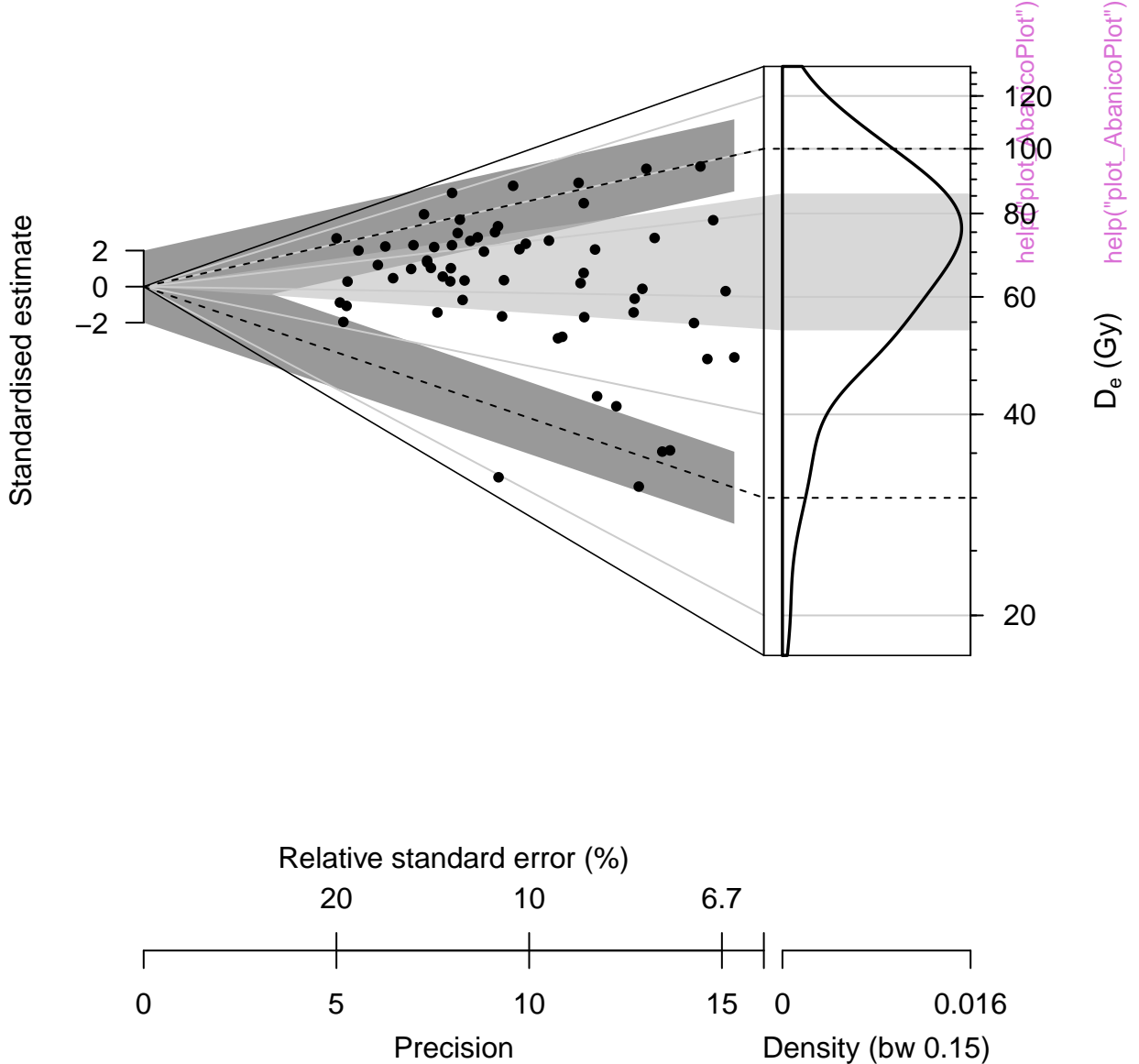
15

Density (bw 0.15)

0.016

D_e distribution

n = 62

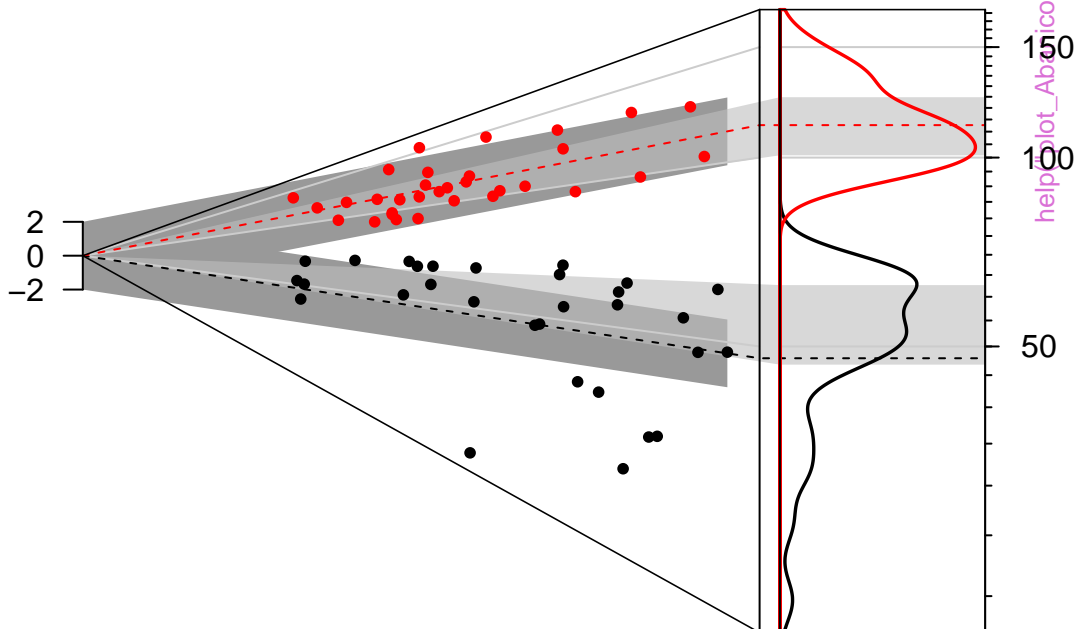


D_e distribution

n = 30

n = 32

Standardised estimate



D_e (Gy)

help(plot_AbanicoPlot")

help("plot_AbanicoPlot")

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



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

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



D_e from MC simulation

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



Test dose response



Growth curve

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



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

D_e from MC simulation

D_{MC} = 1743.04 ± 61.2 | quality = 99.7 %



help("plot_GrowthCurve")

Test dose response



help("plot_GrowthCurve")

Histogram



Histogram of De-values

Example data set



D_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")

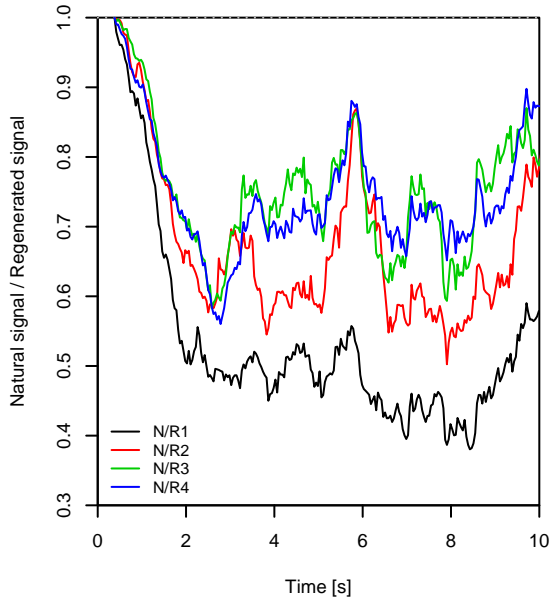
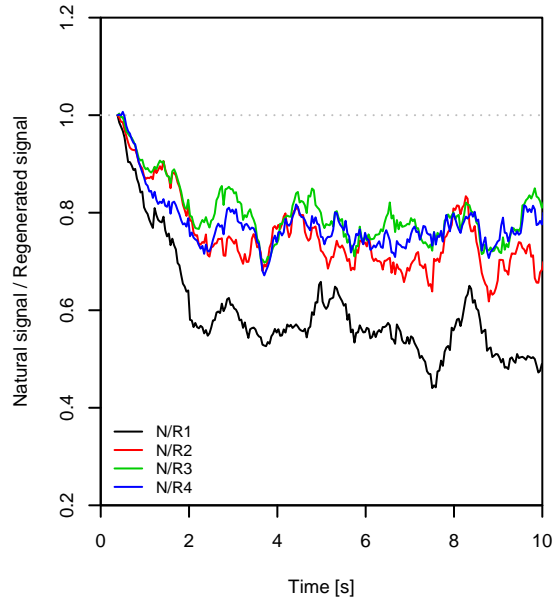
Aliquot #11**Aliquot #12**

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

Aliquot #17**Aliquot #18**

help("plot_NRt")

Aliquot #19**Aliquot #20**

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



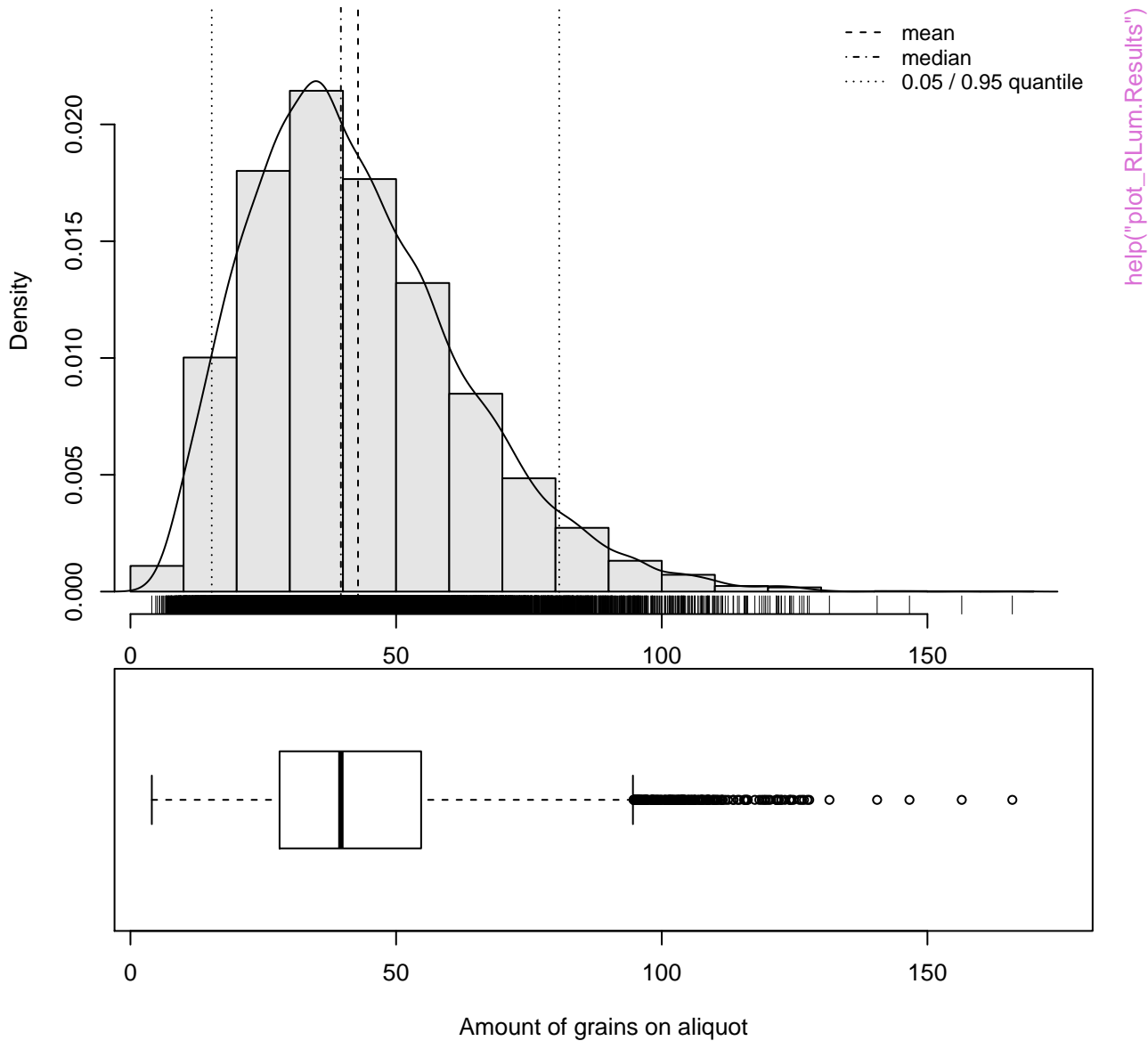
Likelihood profile: p0



help("plot_RLum.Results")

Monte Carlo Simulation

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



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

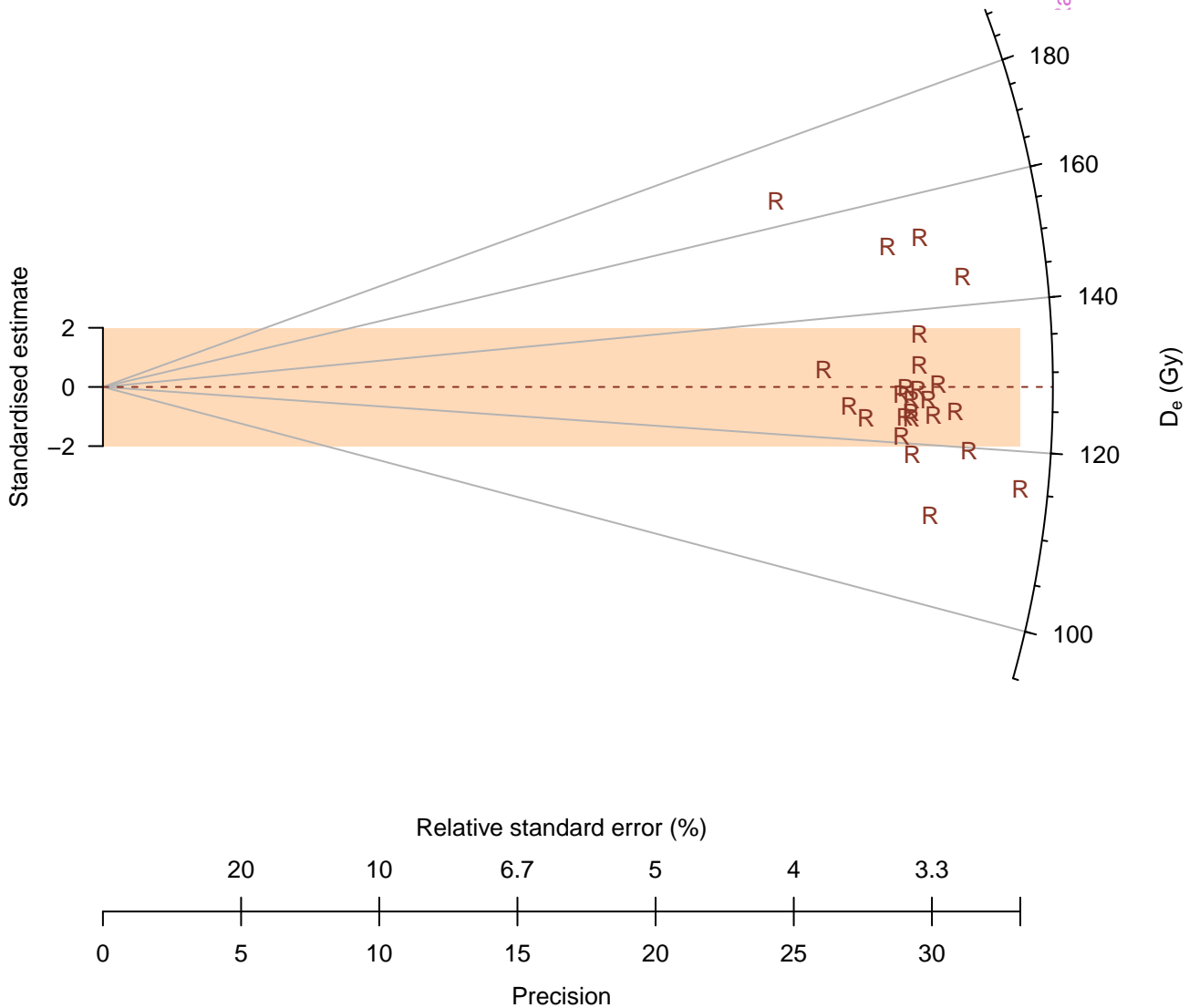
n = 25 | in 2 sigma = 68 %



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")

180

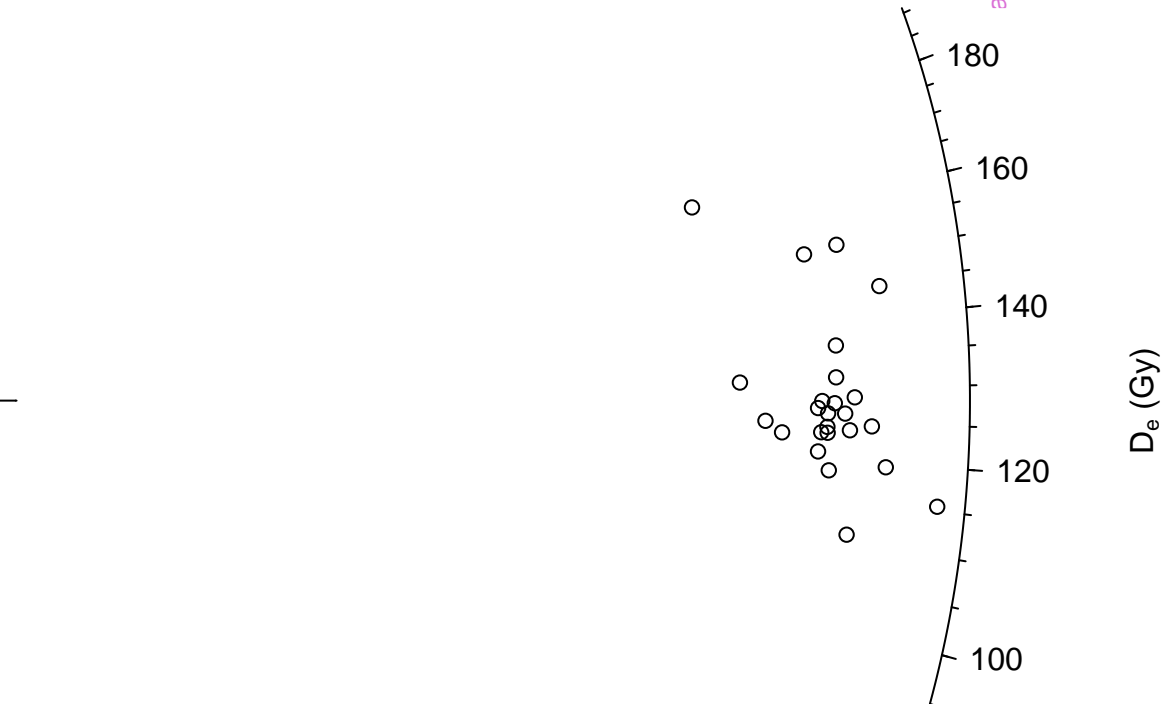
160

140

120

100

D_e (Gy)



D_e distribution

n = 25 | in 2 sigma = 68 %



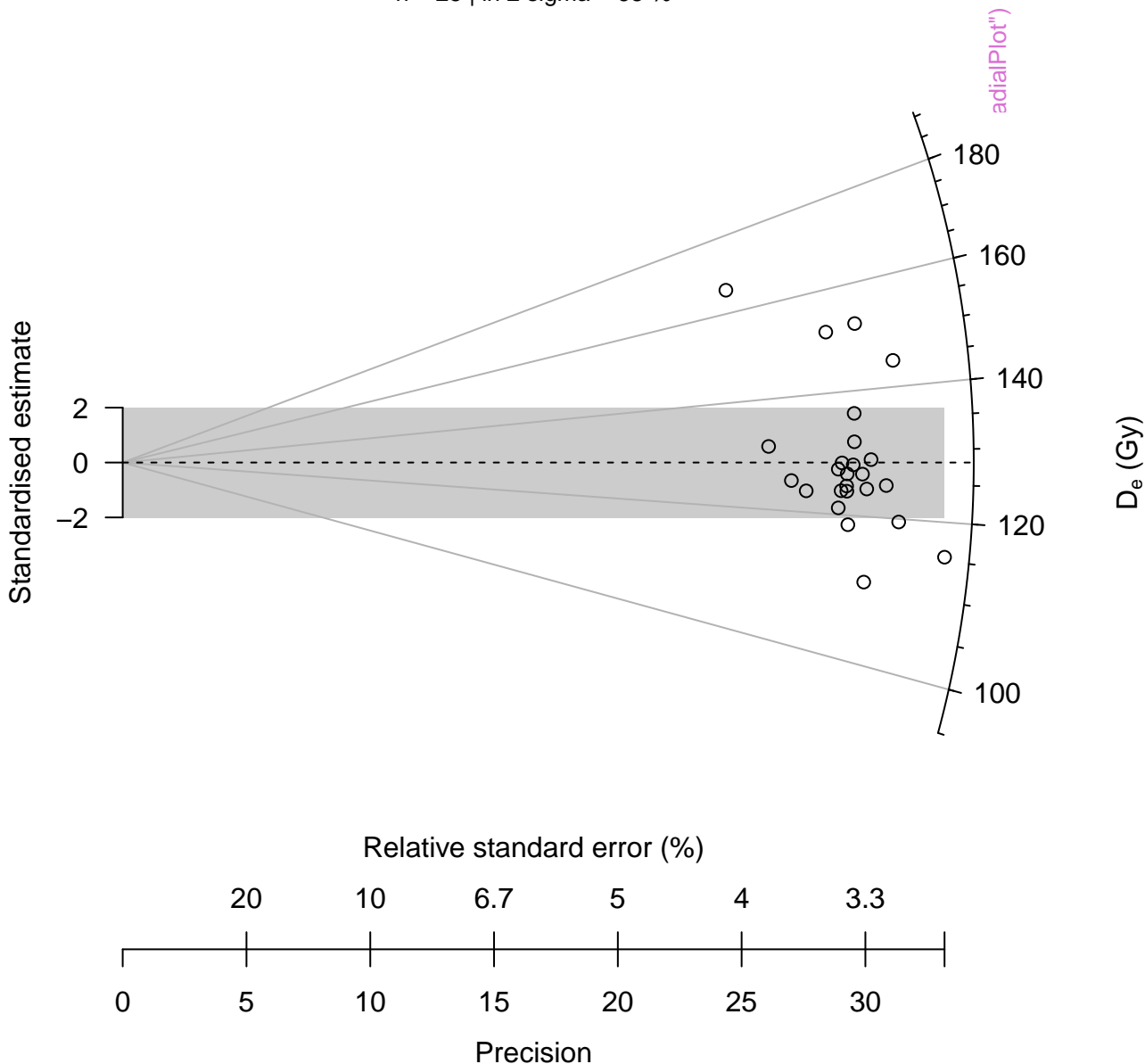
D_e distribution

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

0

5

Precision

10

15

Density (bw 0.15)

0.016

D_e distribution

n = 62 | mean = 66.01

