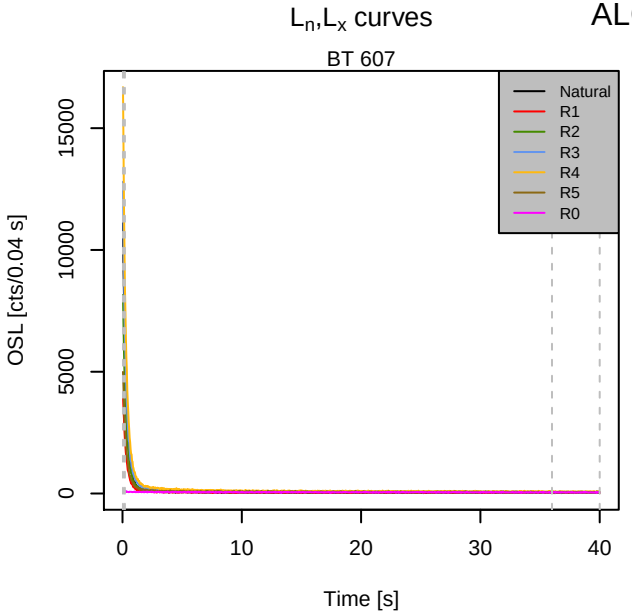
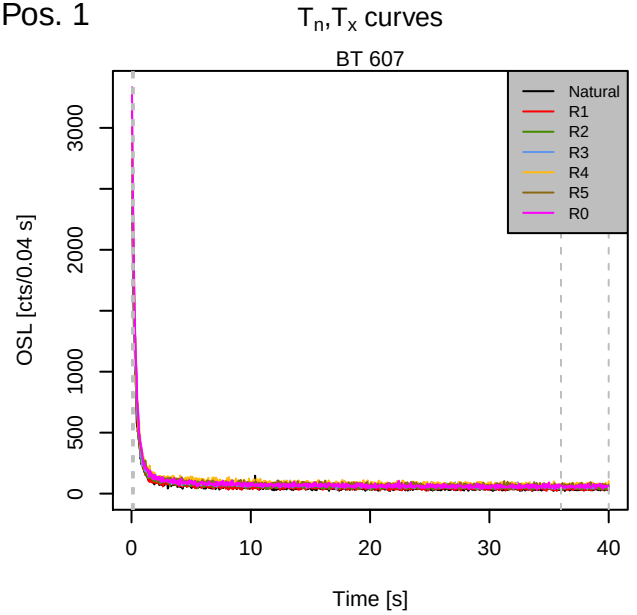
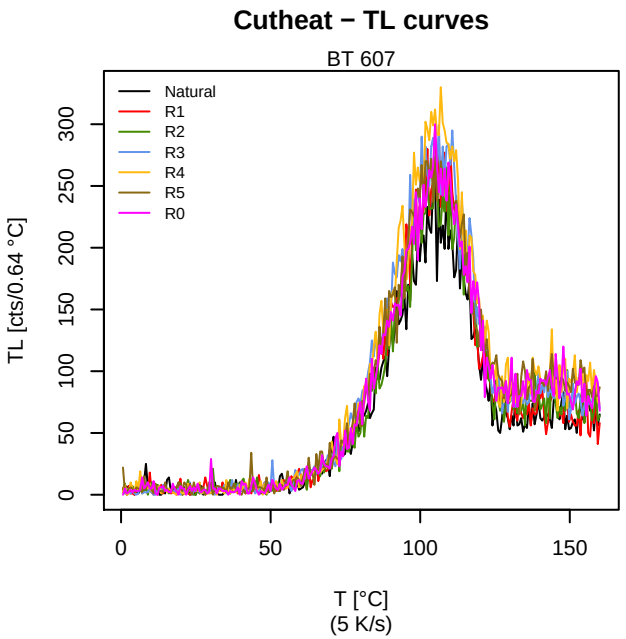
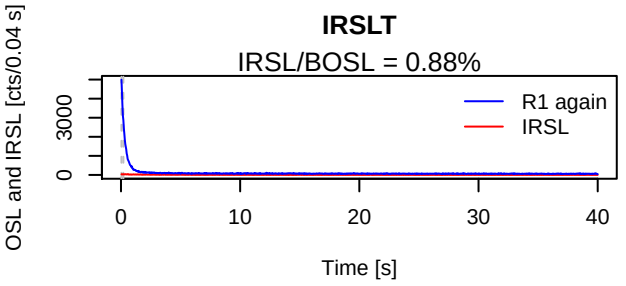
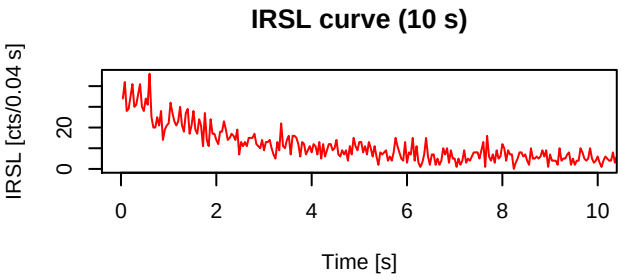
ALQ Pos. 1





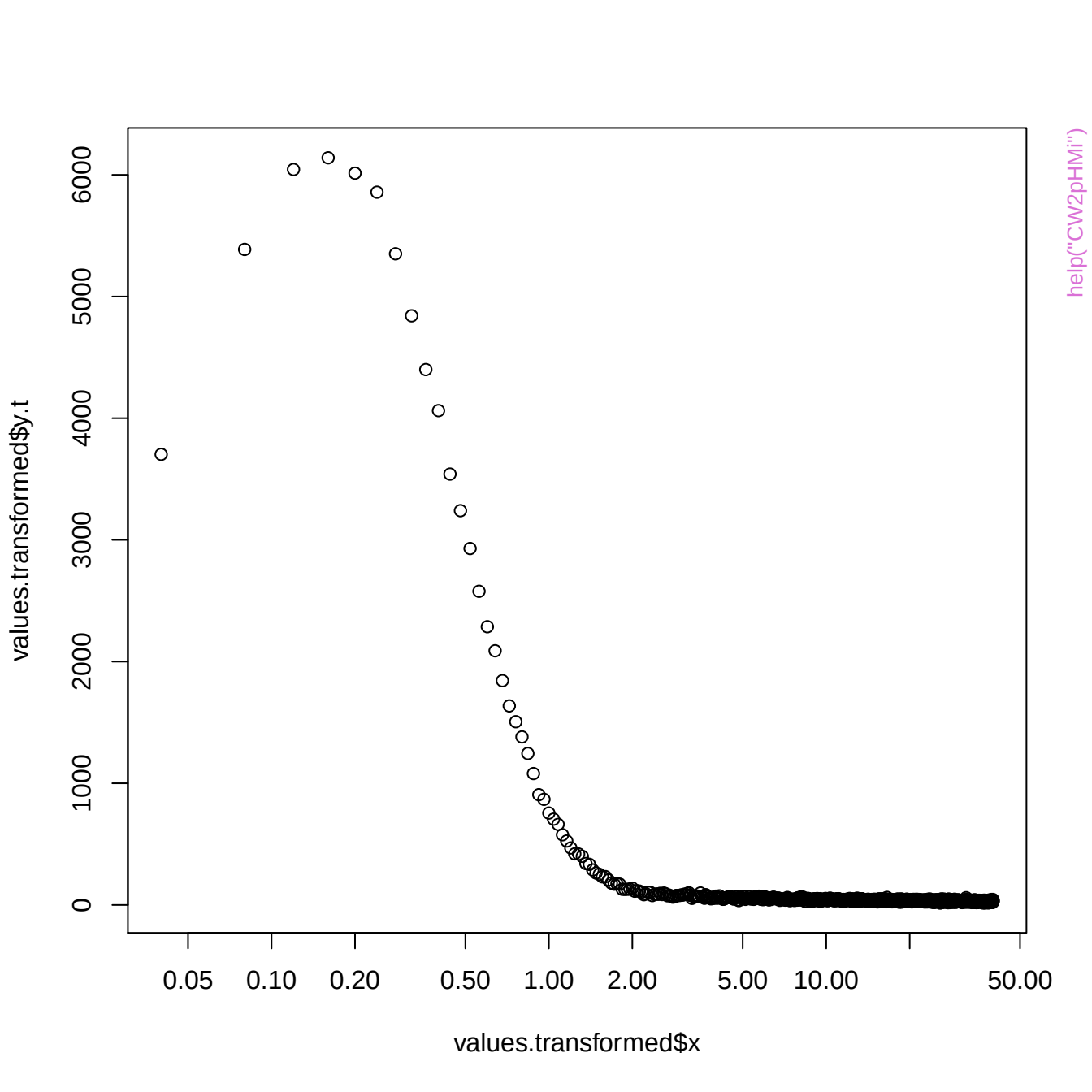






help("Analyse_SAR.OSLdata")

unkown measurement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0
1000
2000
3000
4000
5000
6000
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
50.00
values.transformed$x
help("CW2pHMi")

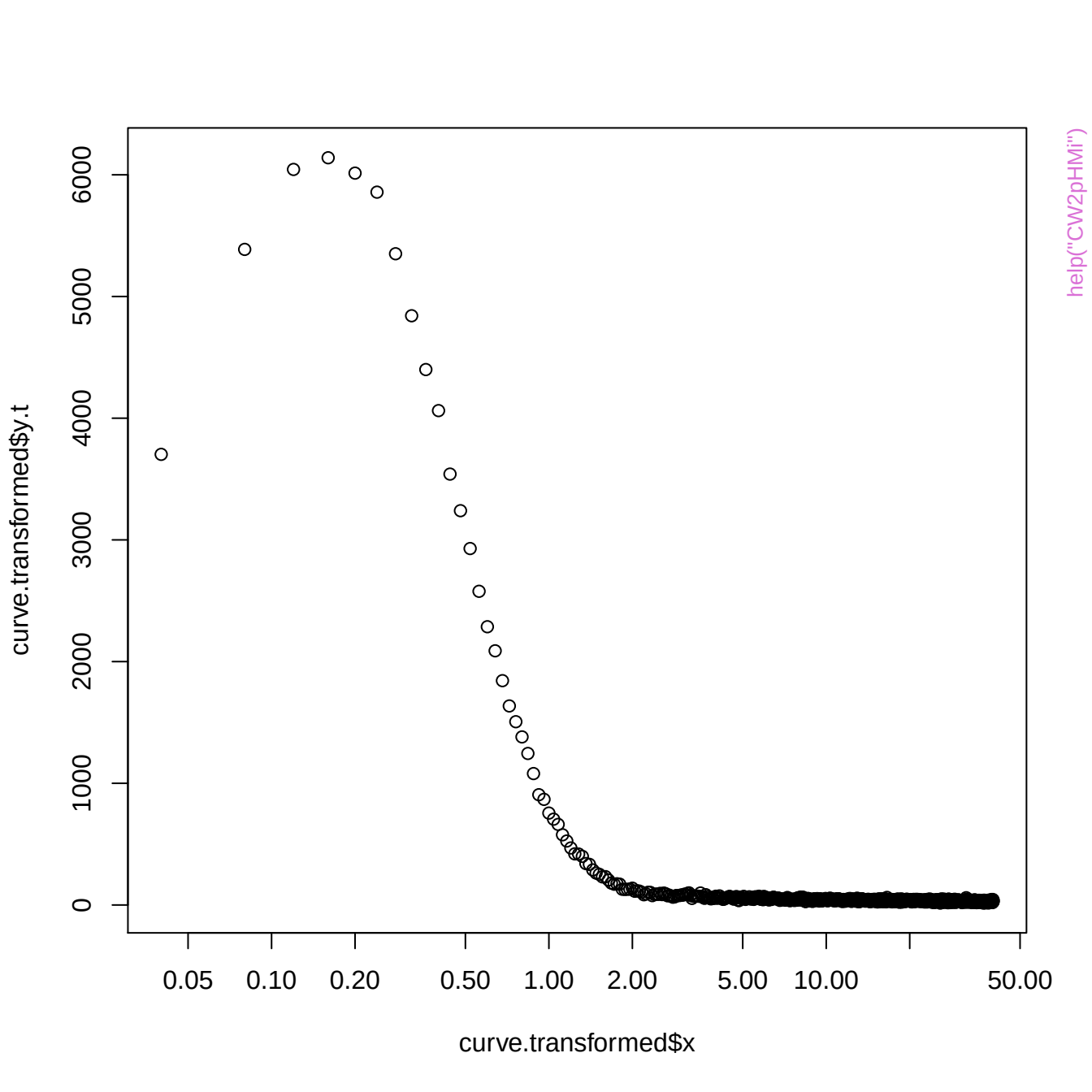
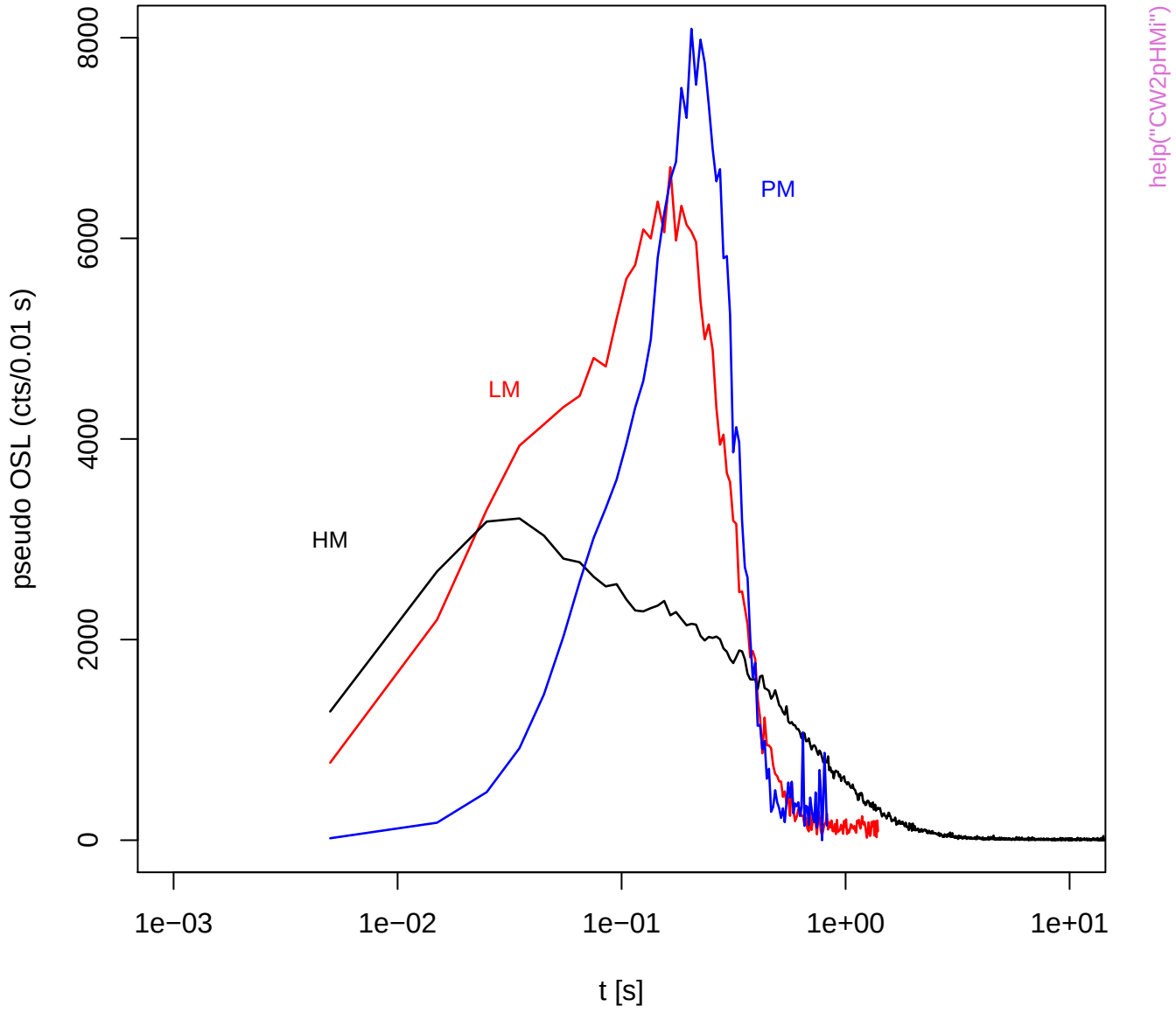
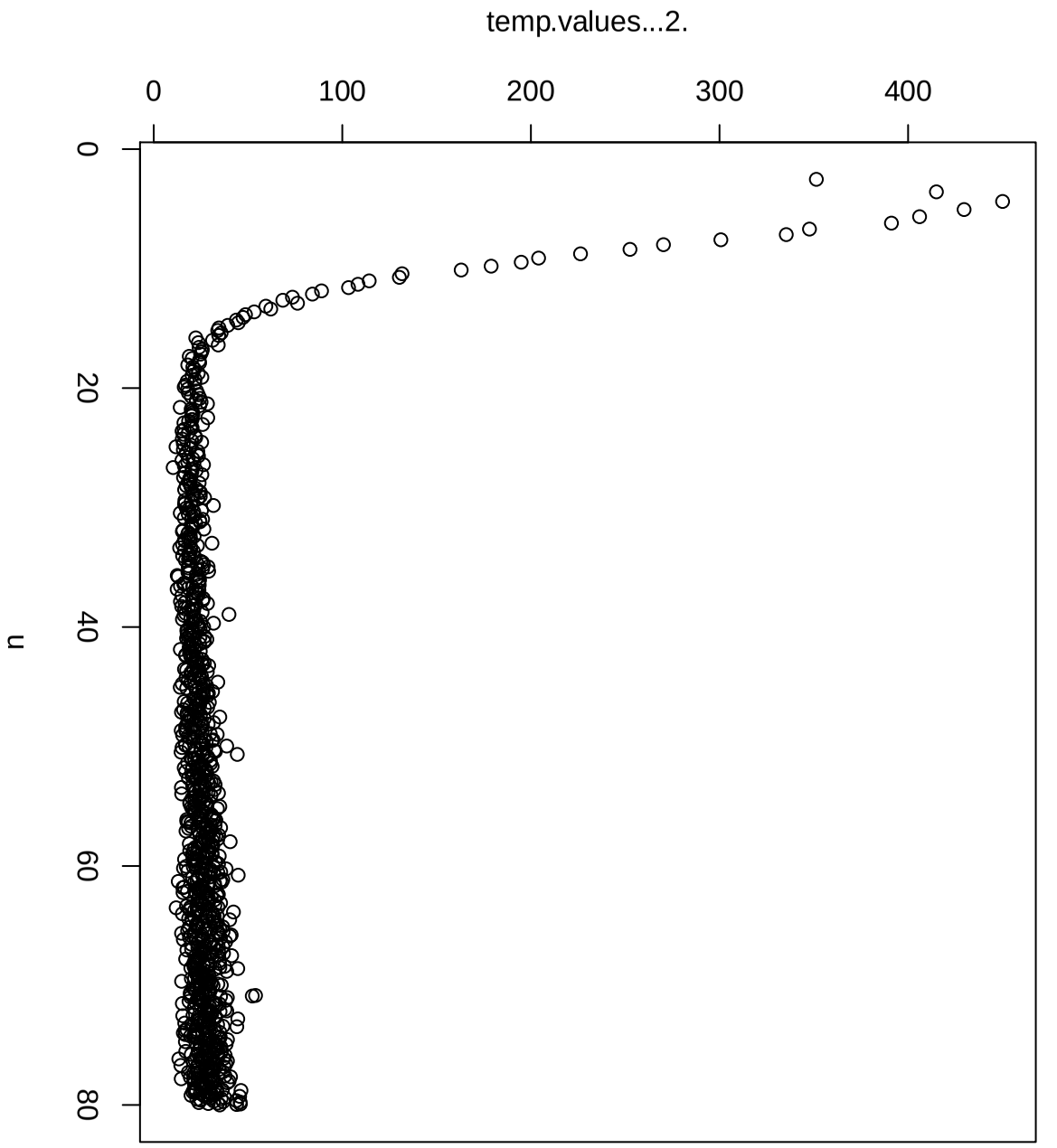

curve.transformed$y.t
0
1000
2000
3000
4000
5000
6000
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
50.00
curve.transformed$x
help("CW2pHMi")

Fig. 4 − Bos & Wallinga (2012)





help("CW2pLM")

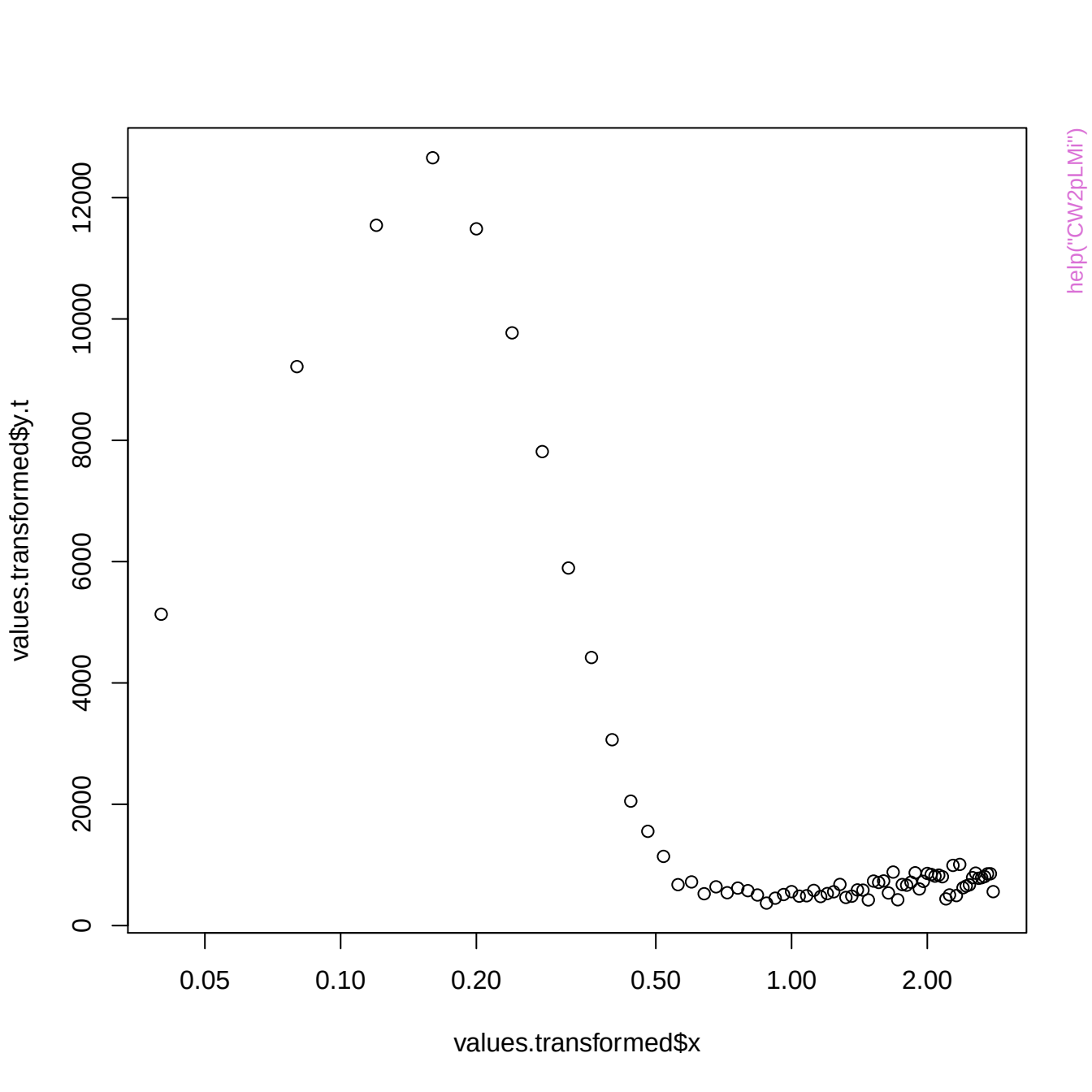
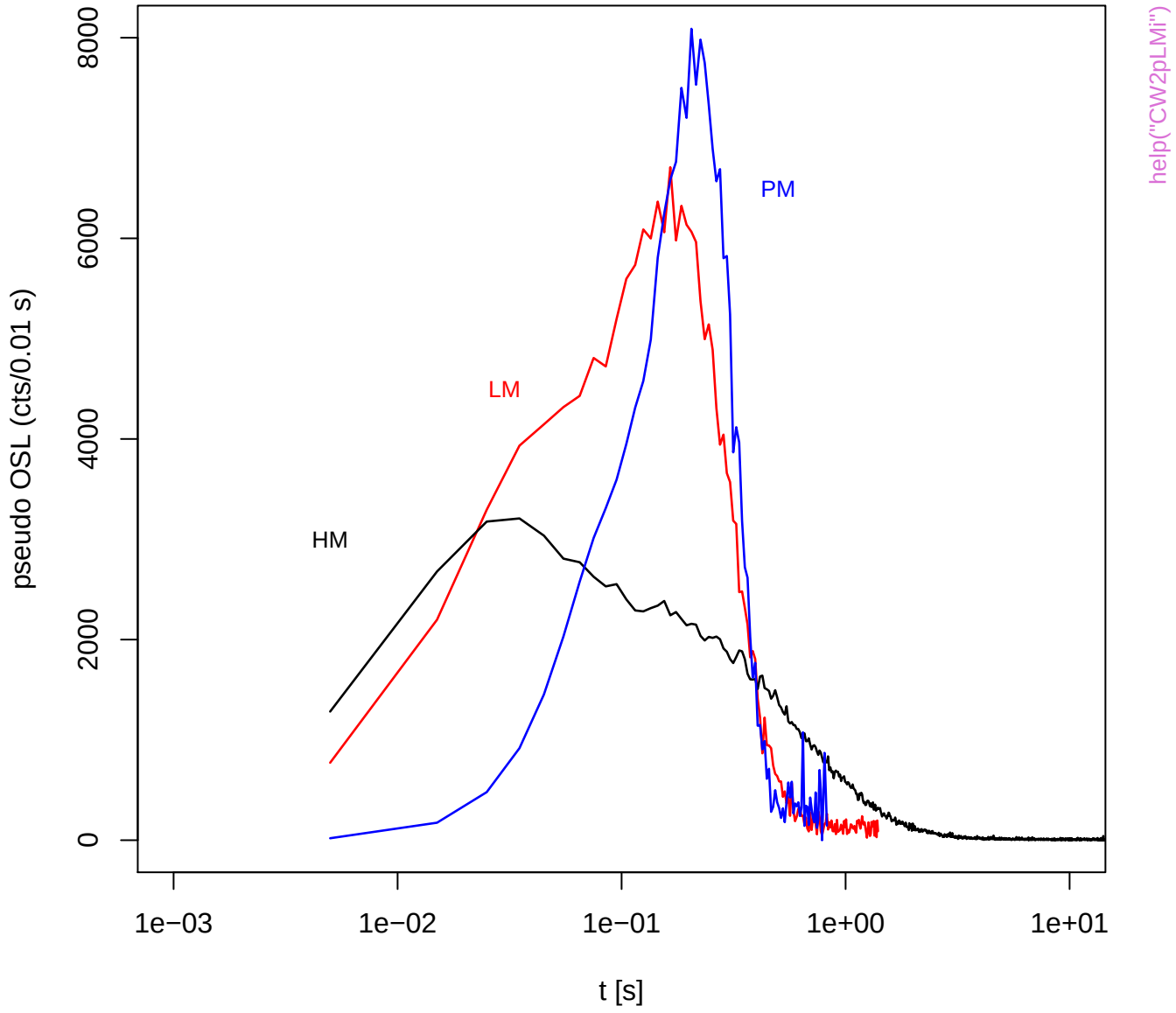

values.transformed$y.t
0
2000
4000
6000
8000
10000
12000
0.05
0.10
0.20
0.50
1.00
2.00
values.transformed$x
help("CW2pLMI")

Fig. 4 − Bos & Wallinga (2012)



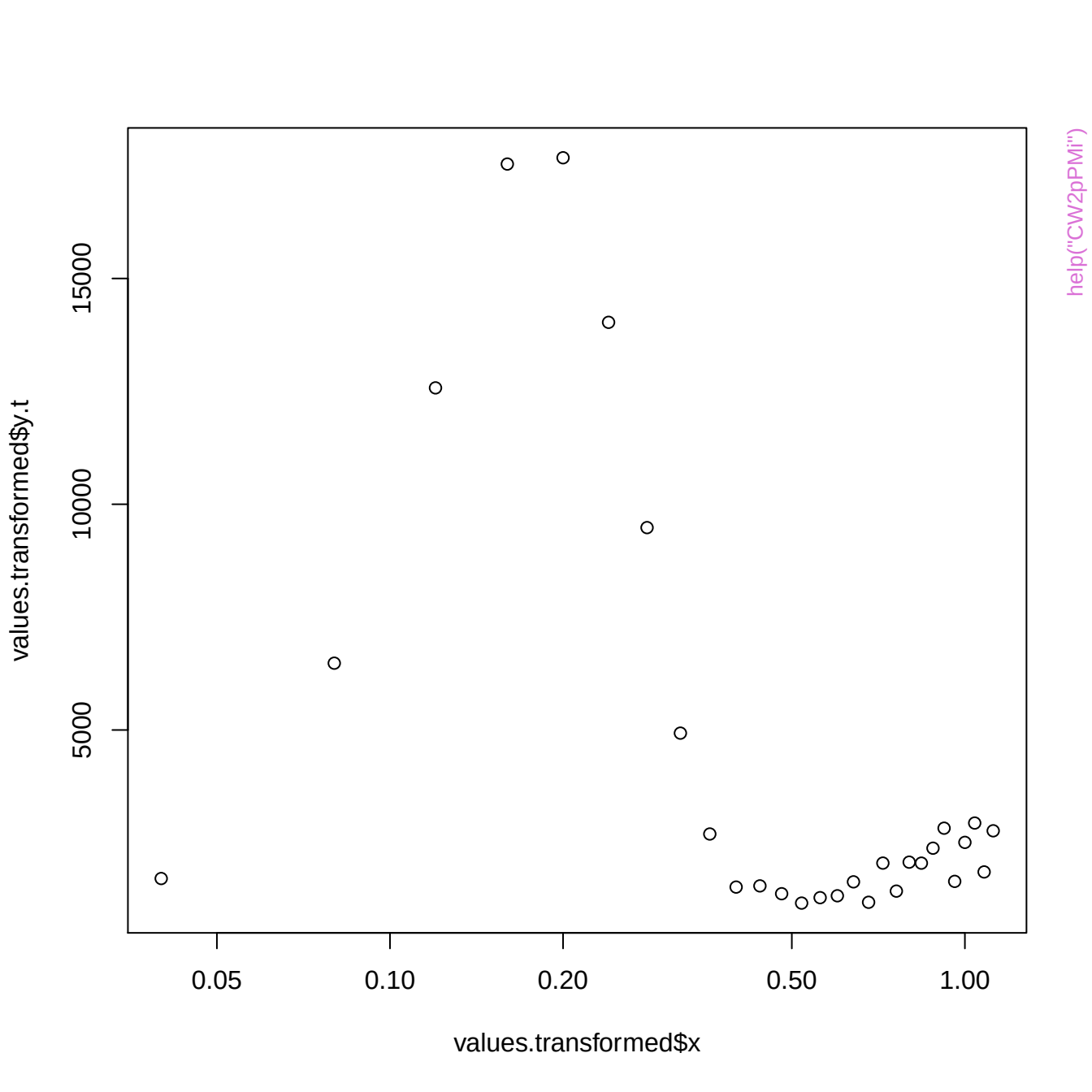
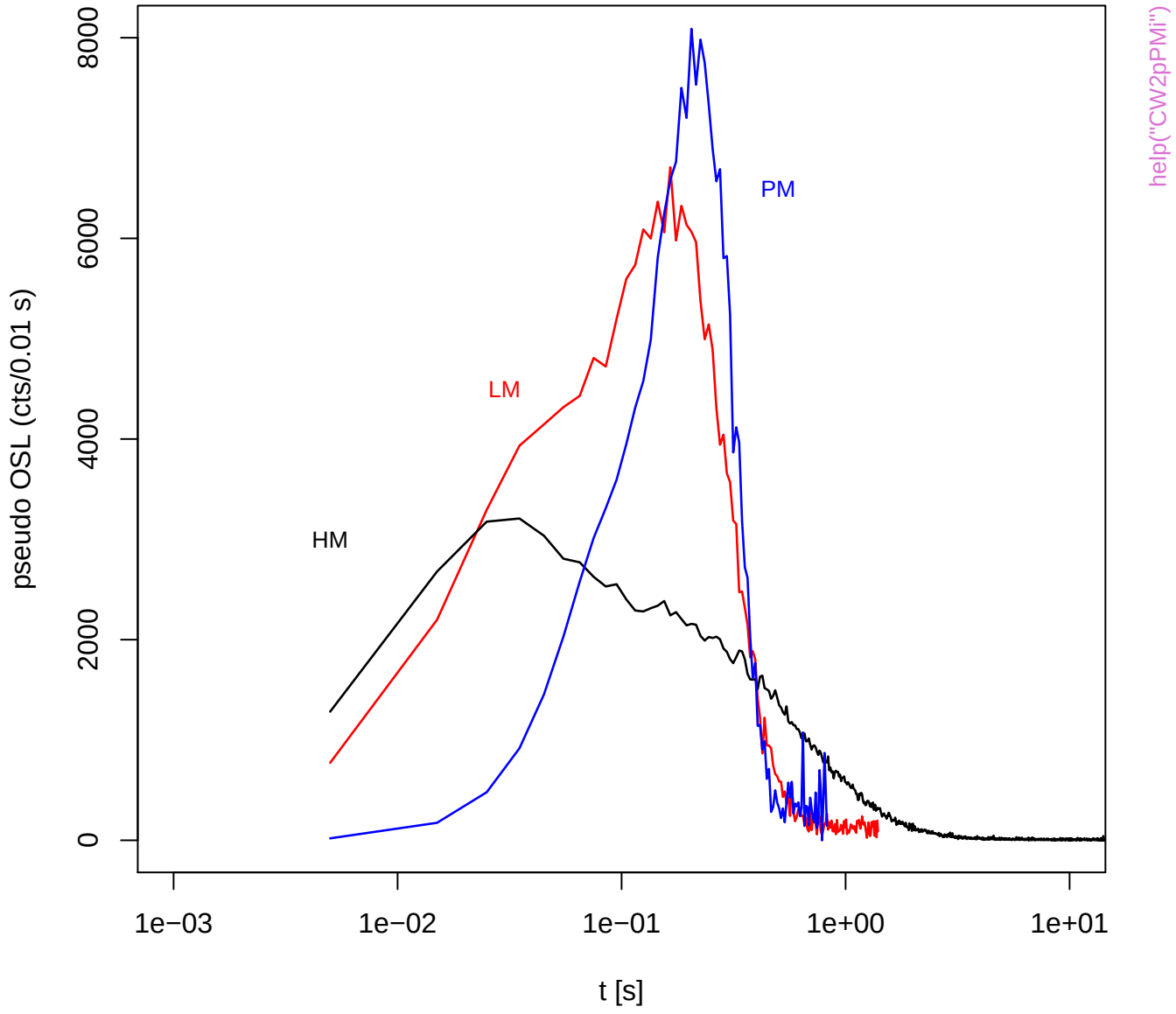
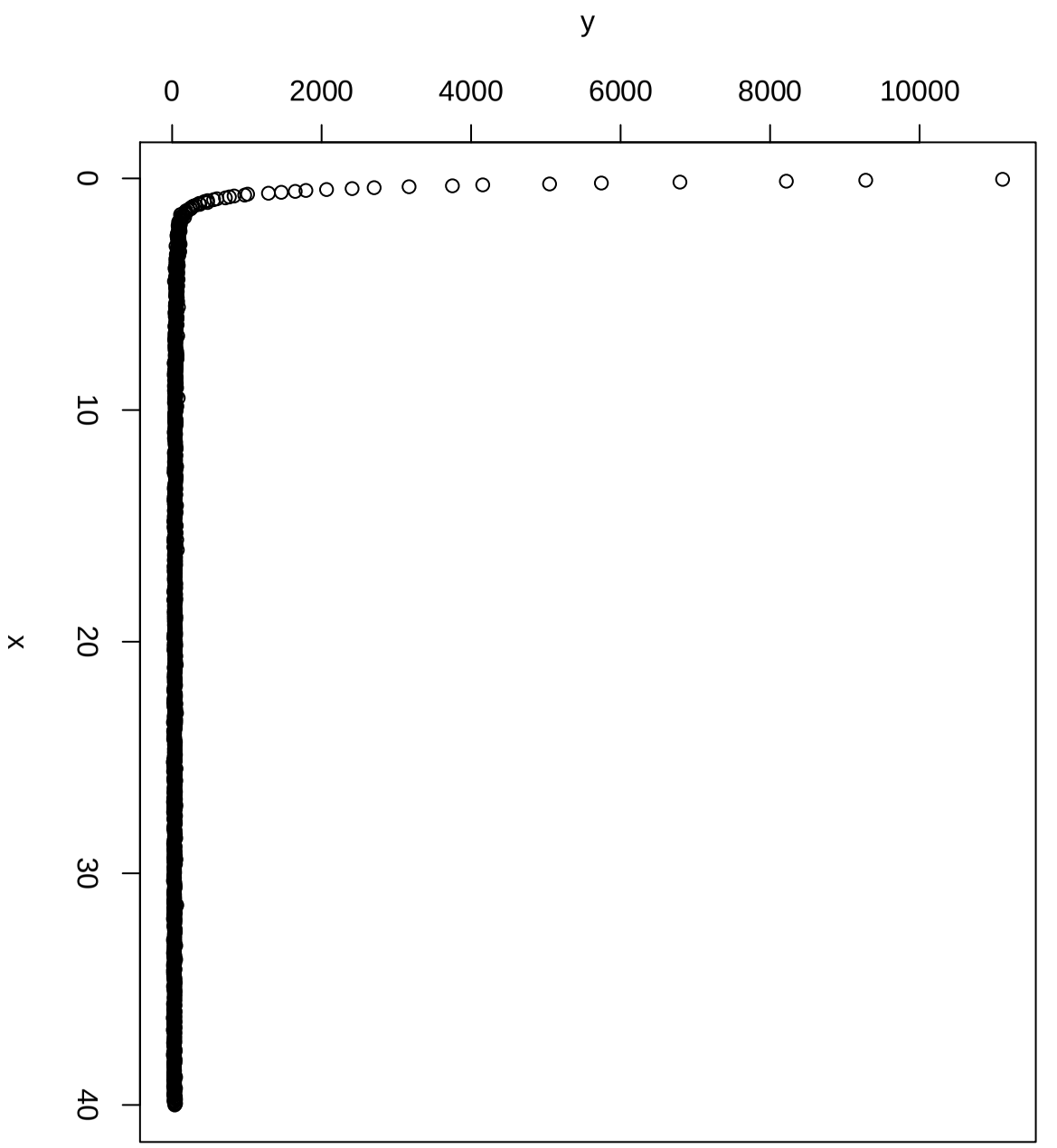
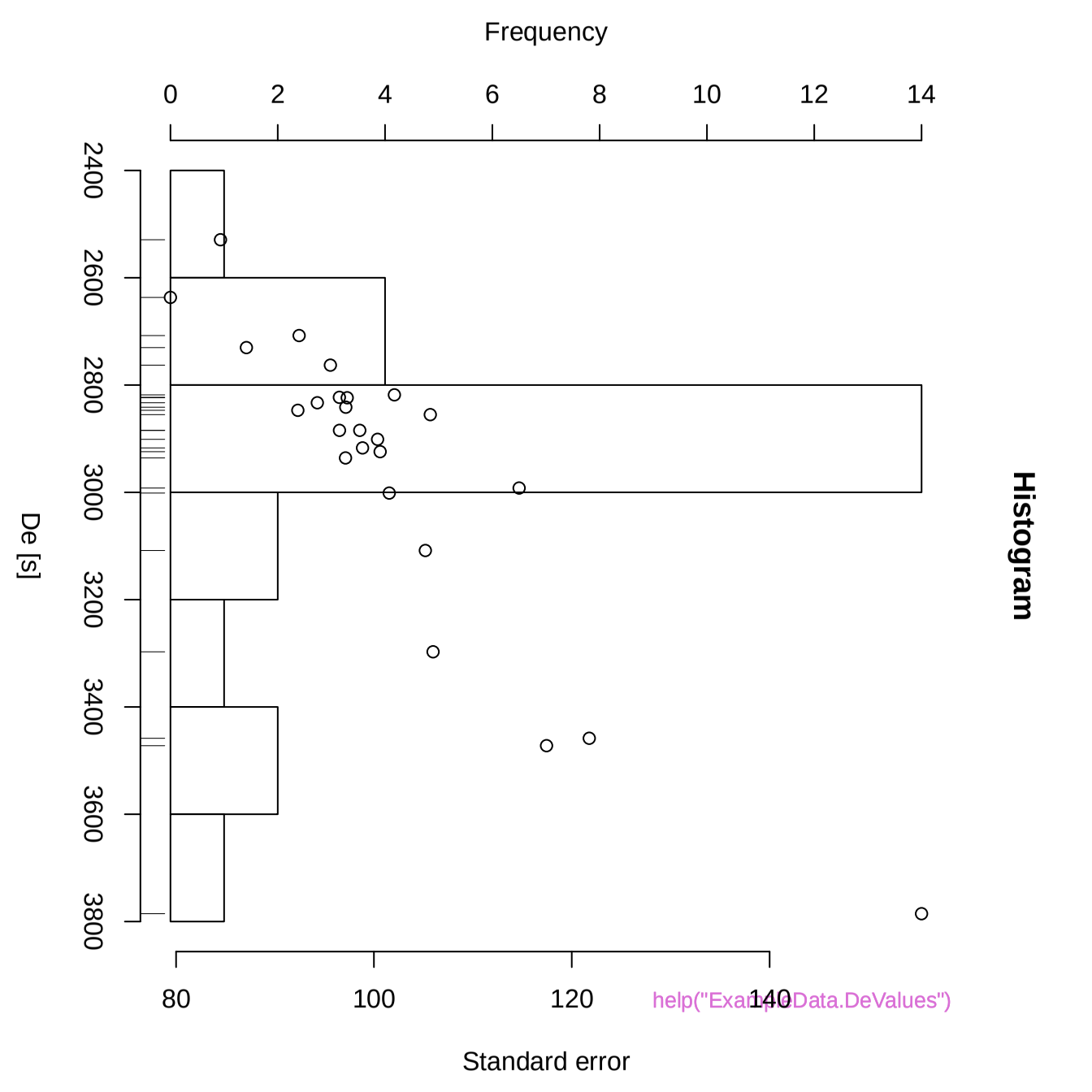

values.transformed$y.t
5000
10000
15000
0.05
0.10
0.20
0.50
1.00
values.transformed$x
help("CW2pPMi")

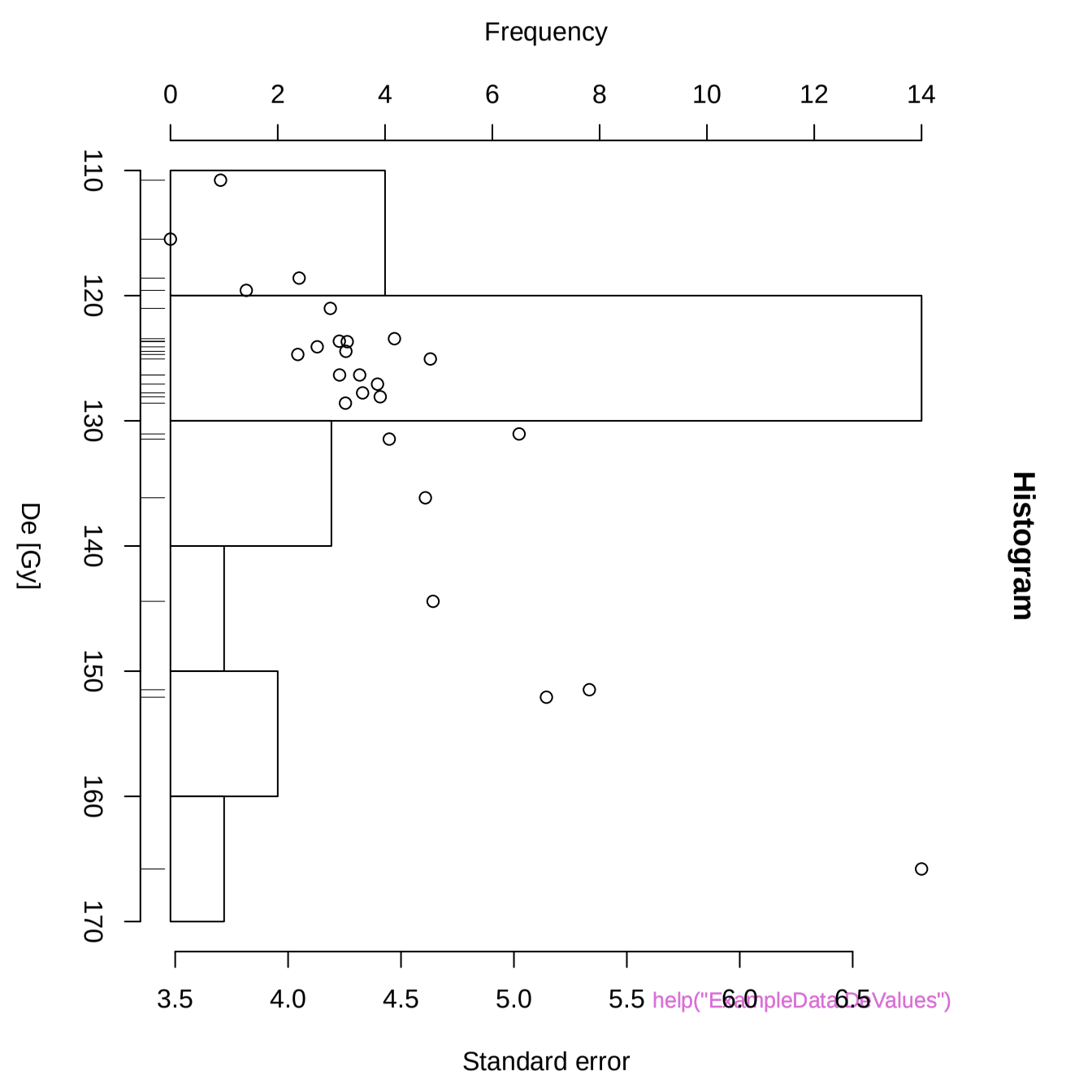
Fig. 4 − Bos & Wallinga (2012)





help("ExampleData.CW_OSL_Curve")

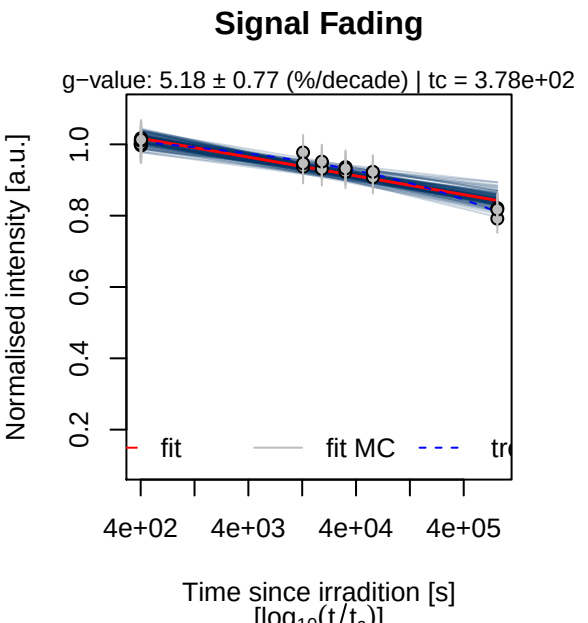

Frequency
0
2
4
6
8
10
12
14
2400
2600
2800
3000
3200
3400
3600
3800
De [s]
Histogram
80
100
120
140
help("ExampleData.DeValues")
Standard error

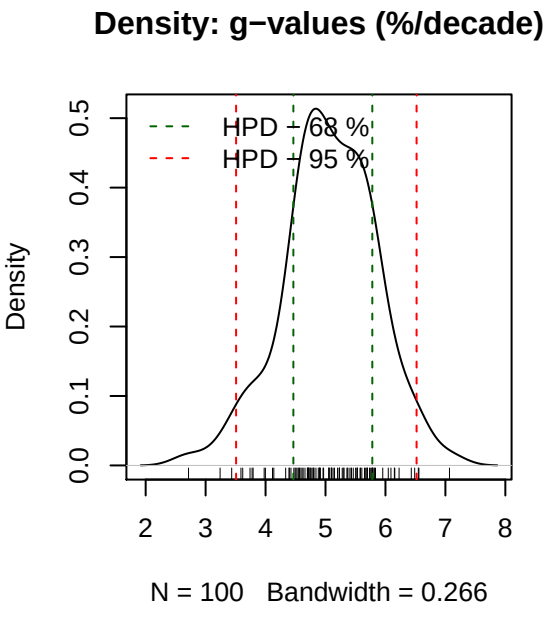

Frequency
0
2
4
6
8
10
12
14
110
120
130
140
150
160
170
De [Gy]
Histogram
3.5
4.0
4.5
5.0
5.5
6.0
6.5
Standard error
help("ExampleData.DeValues")

No L_x curves detected

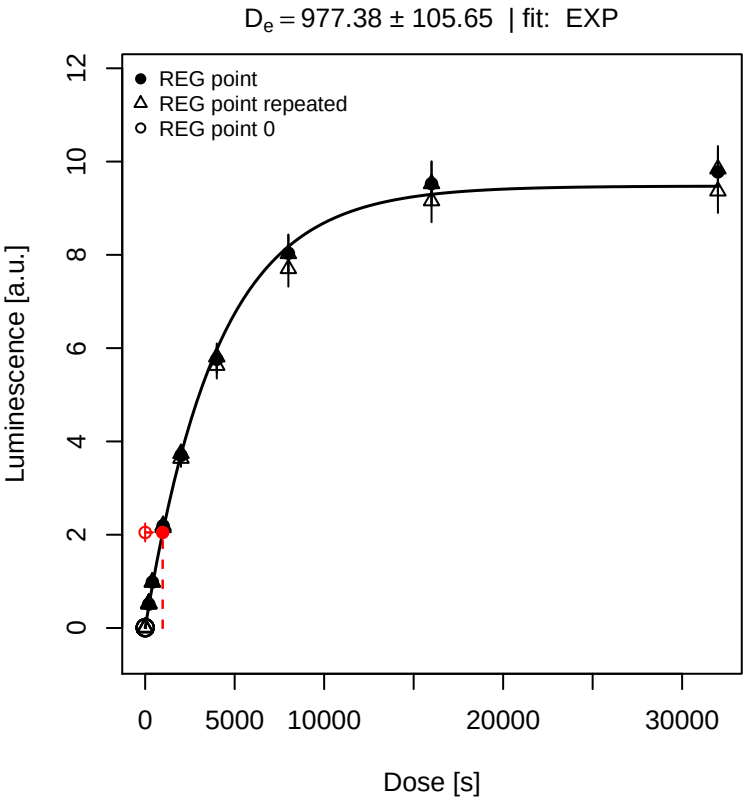
No T_x curves detected

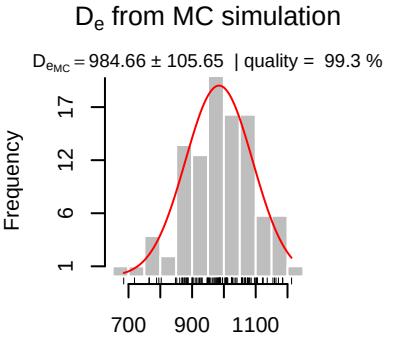
help("ExampleData.Fading")

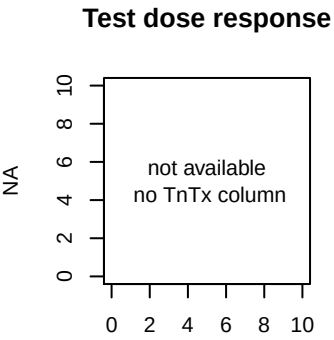


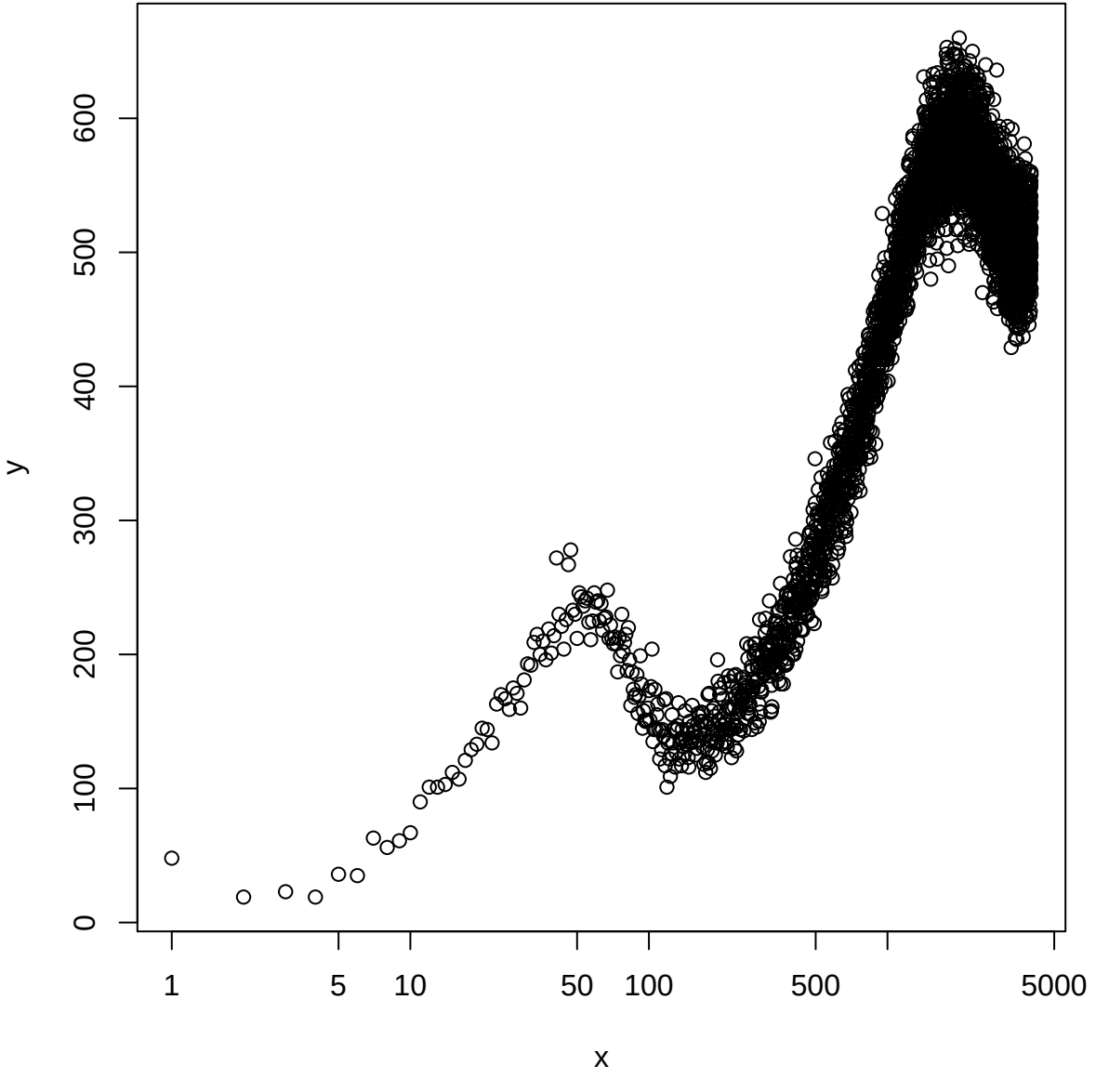


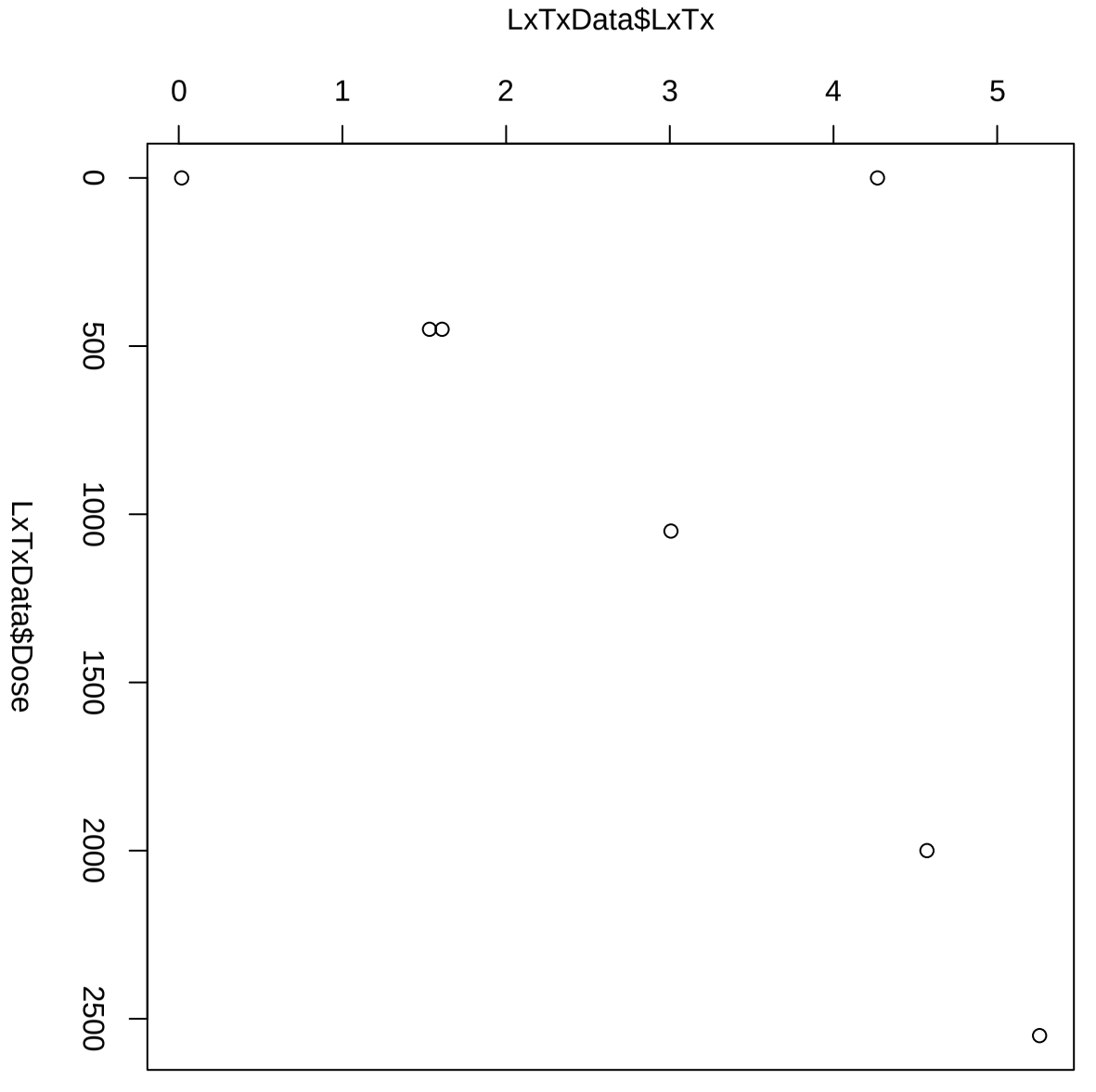
Growth curve



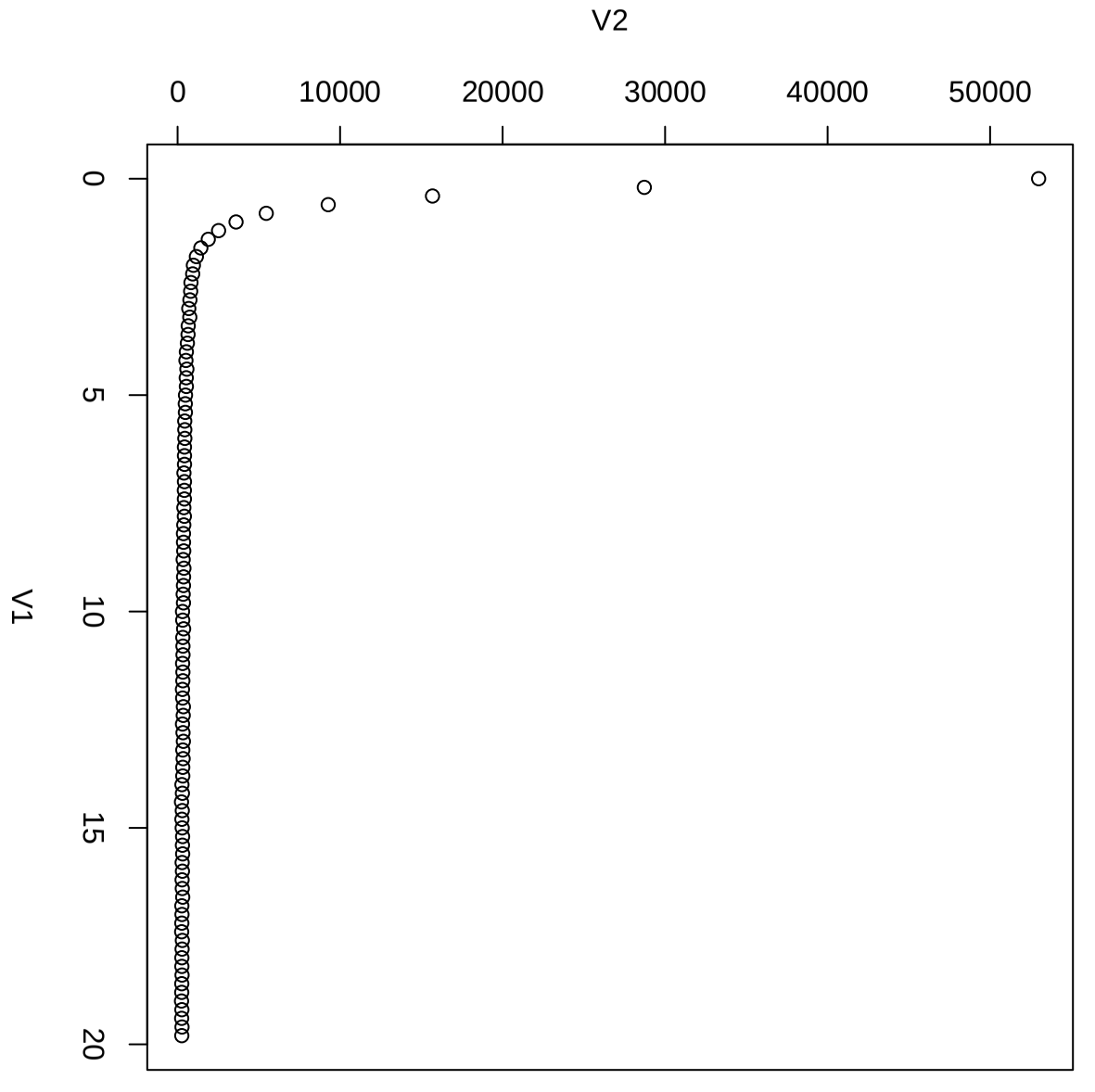




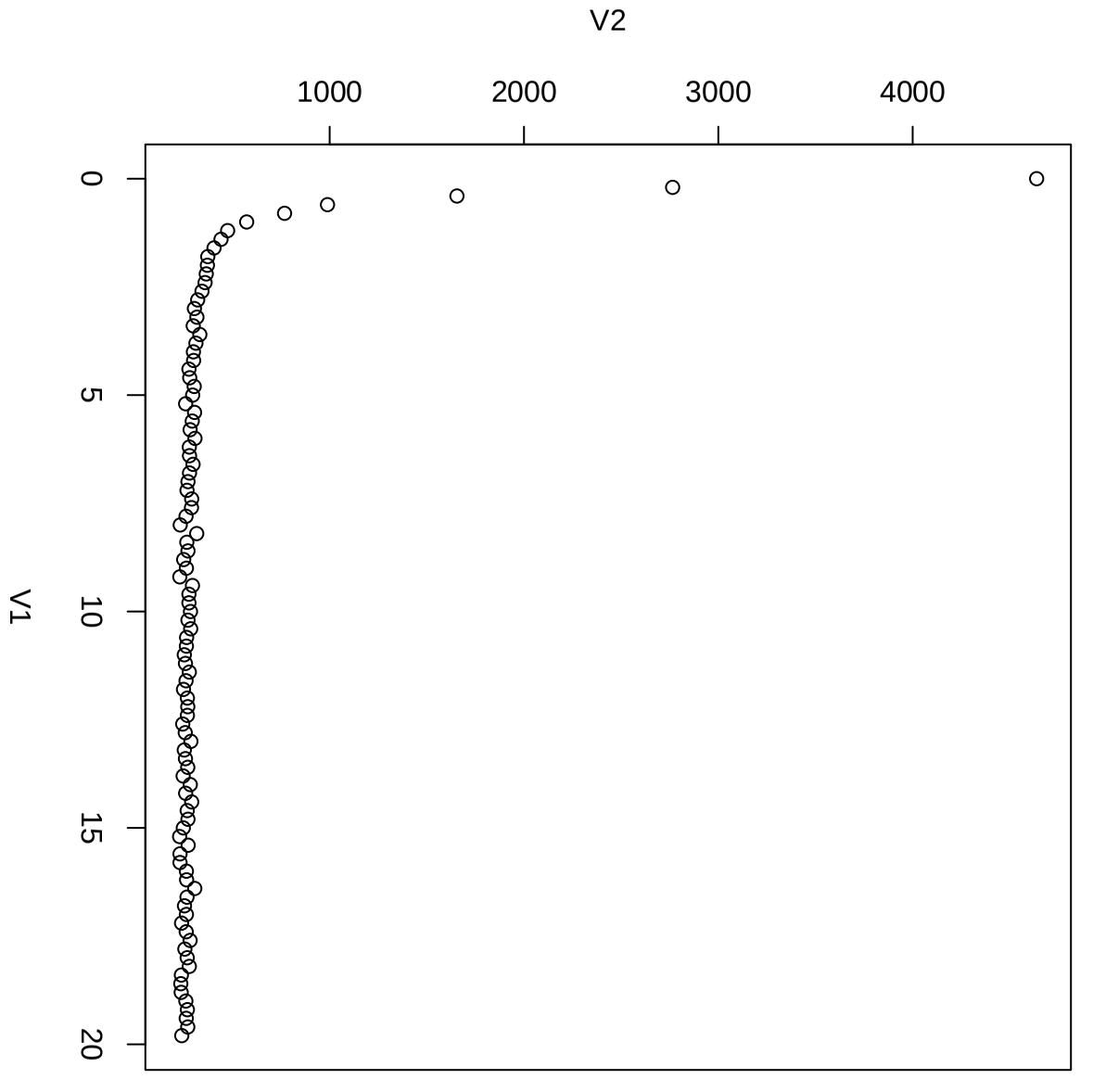

y
0
100
200
300
400
500
600
x
1
5
10
50
100
500
5000
help("ExampleData.FittingLM")



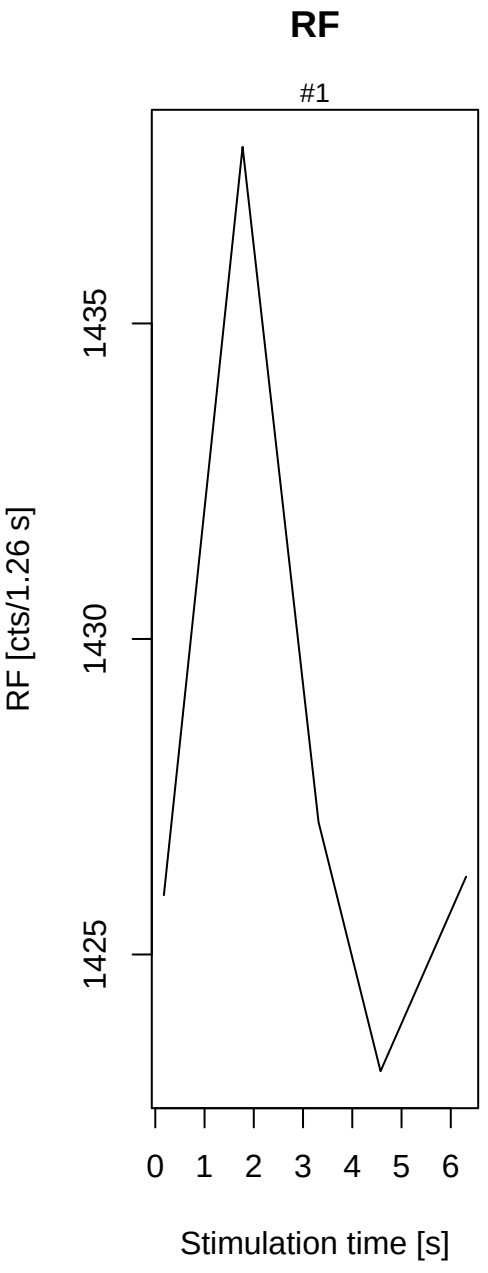
help("ExampleData.LxTxData")

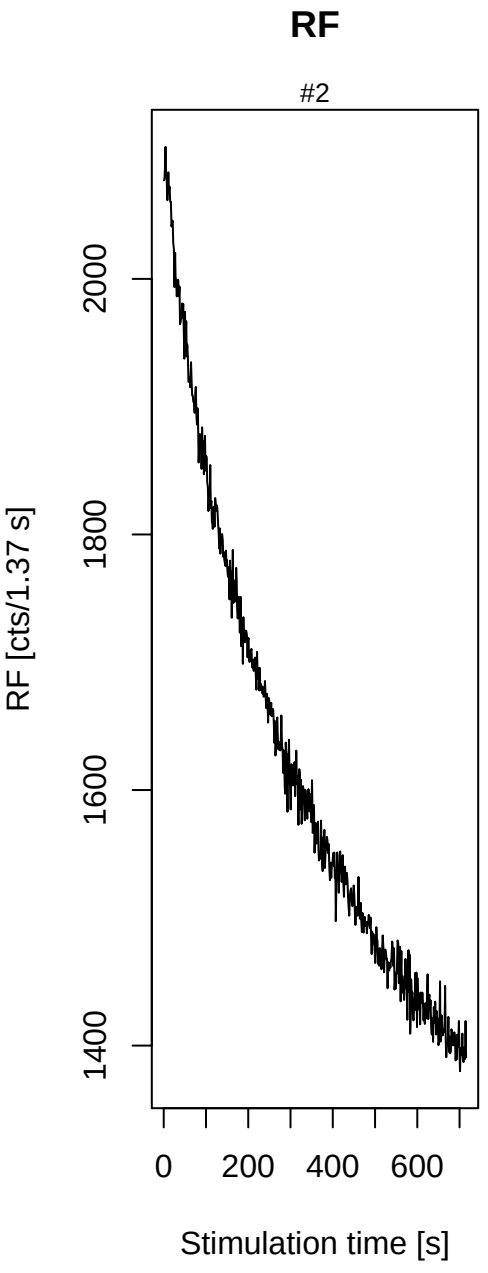


help("ExampleData.LxTxOSLData")

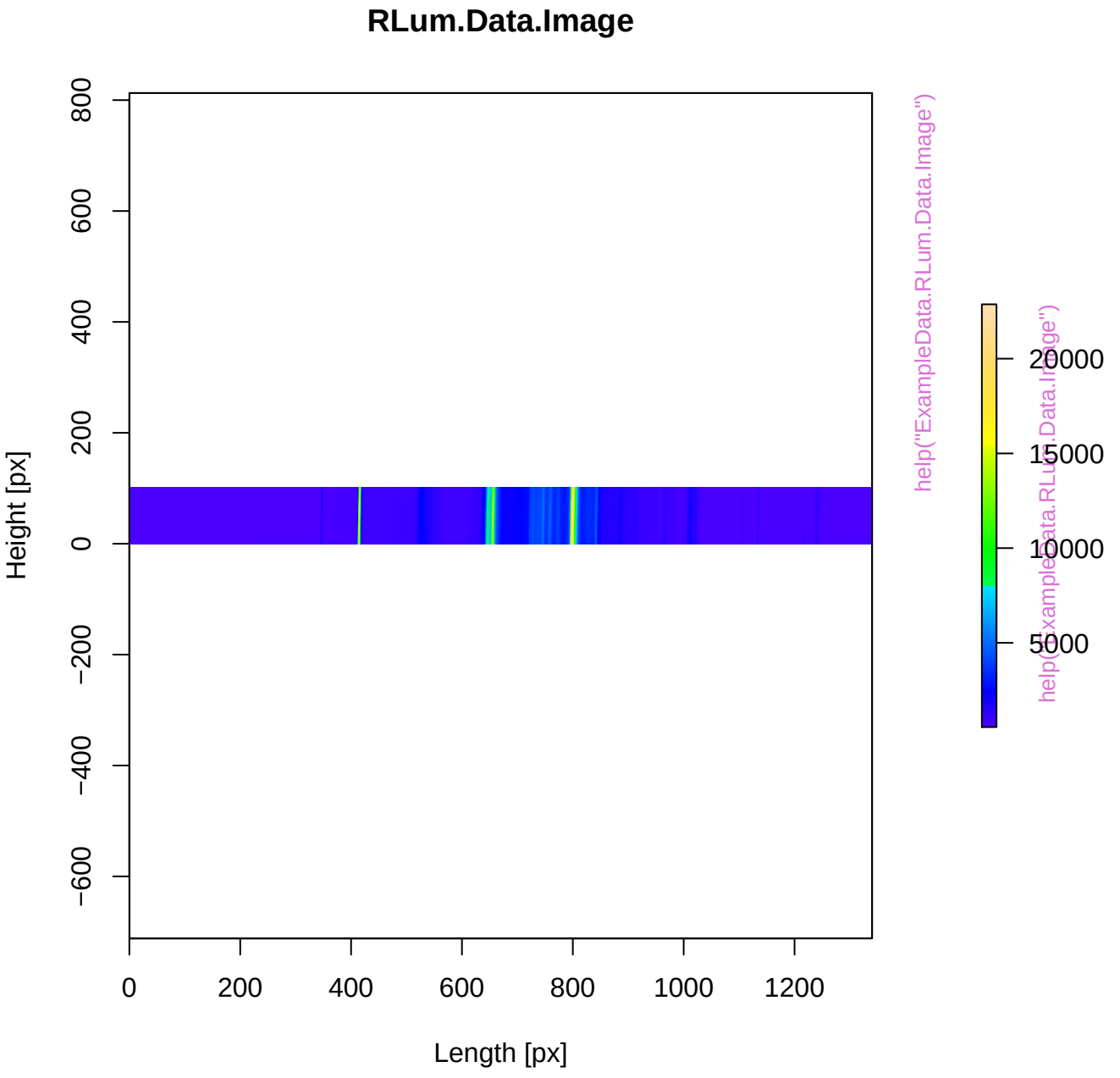


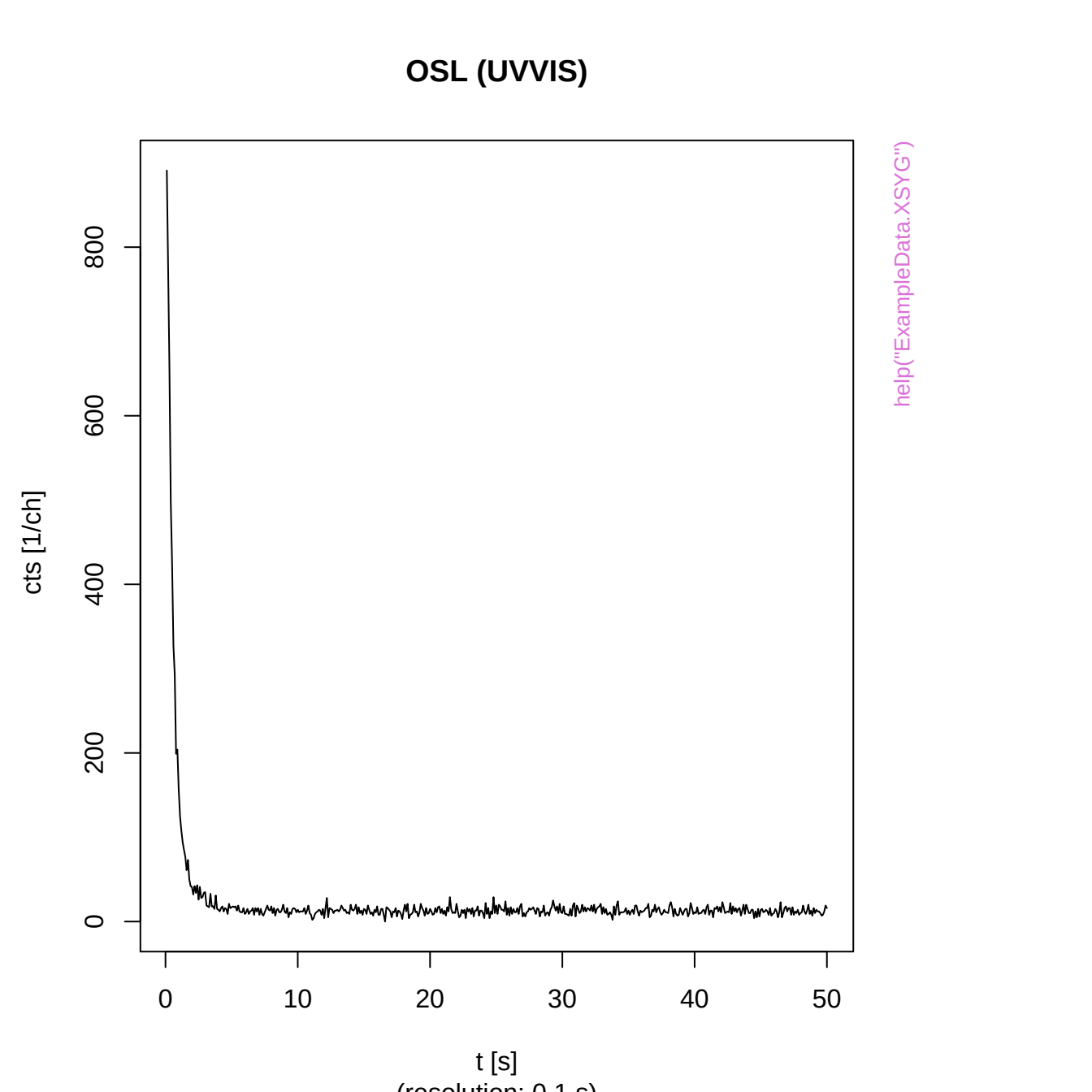
help("ExampleData.LxTxOSLData")

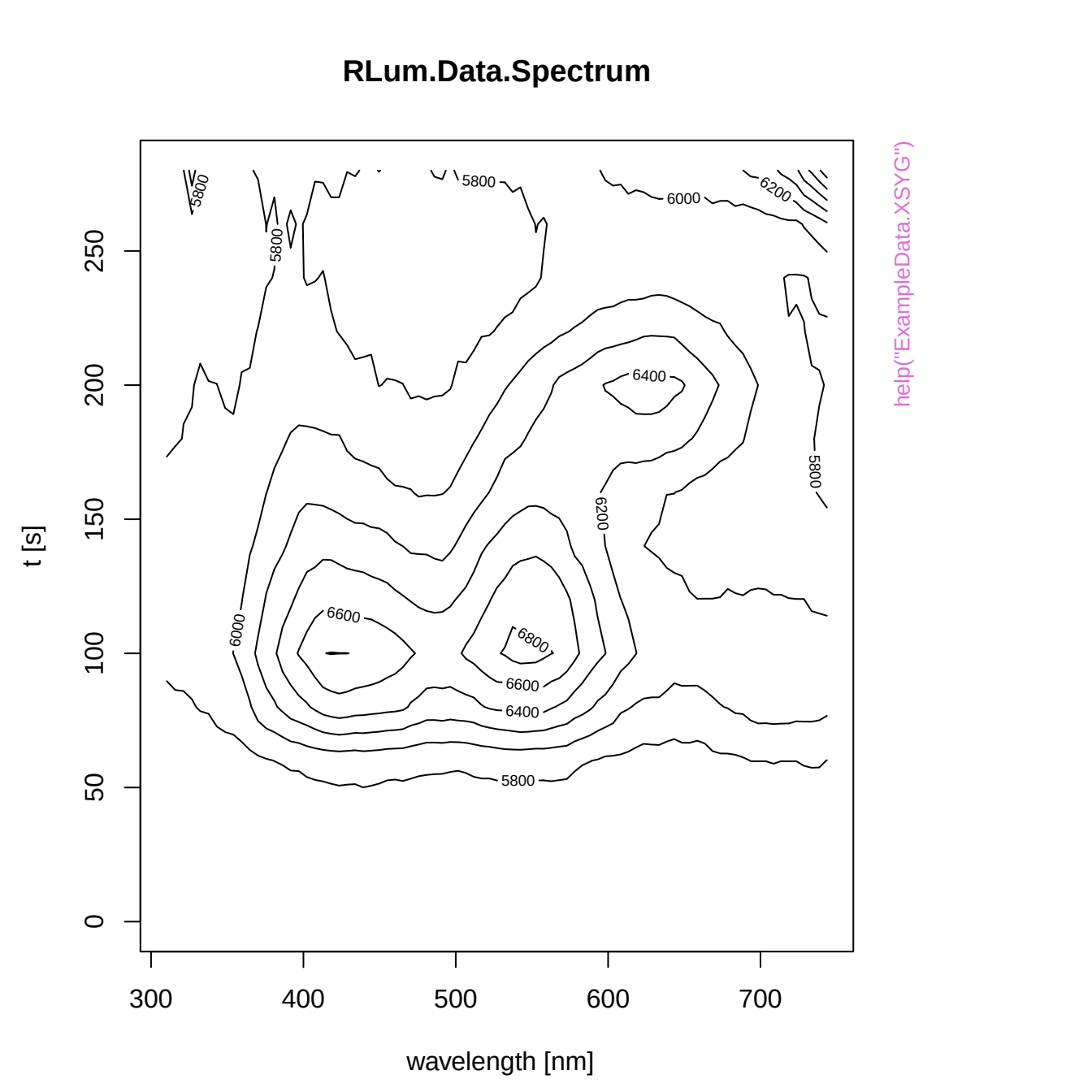




help("ExampleData.RLum.Analysis")


RLum.Data.Image
Height [px]
800
600
400
200
0
−200
−400
−600
0
200
400
600
800
1000
1200
Length [px]
help("ExampleData.RLum.Data.Image")
20000
15000
10000
5000
help("ExampleData.RLum.Data.Image")


OSL (UVVIS)
cts [1/ch]
0
200
400
600
800
0
10
20
30
40
50
t [s]
(resolution: 0.1 s)
help("ExampleData.XSYG")


RLum.Data.Spectrum
t [s]
wavelength [nm]
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200
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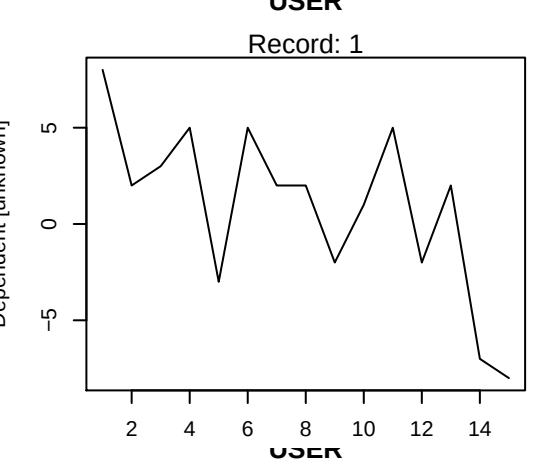
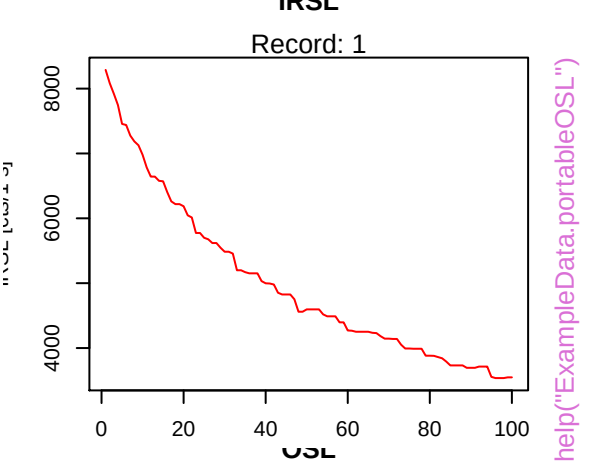
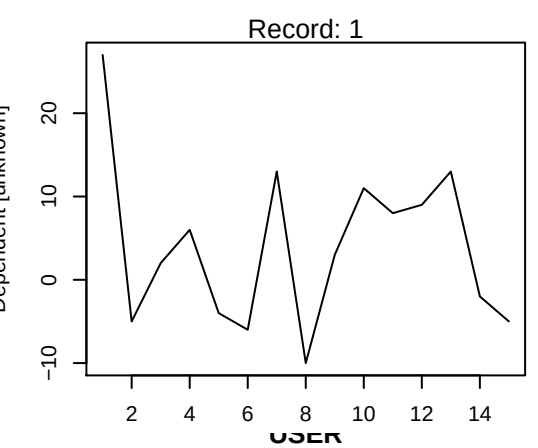
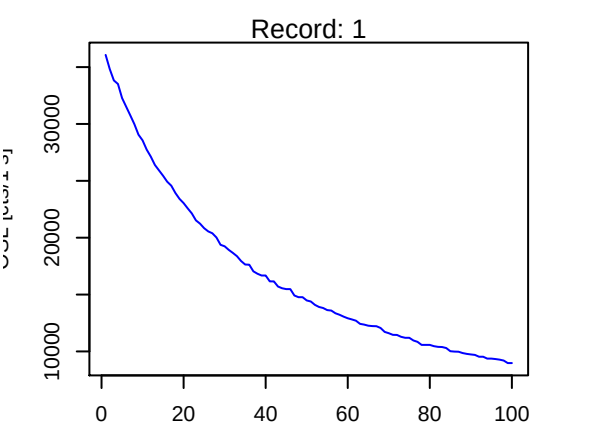
300
400
500
600
700
5800
6000
6200
6400
6600
6800
help("ExampleData.XSYG")

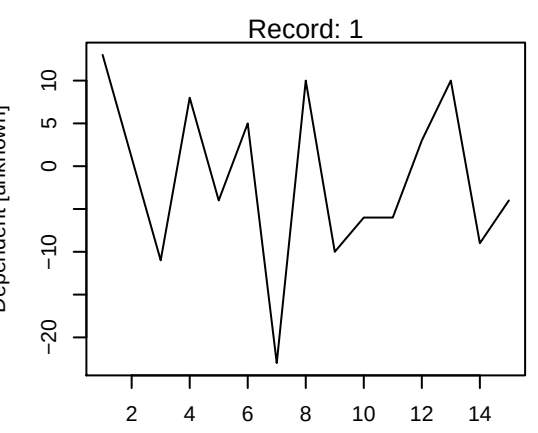


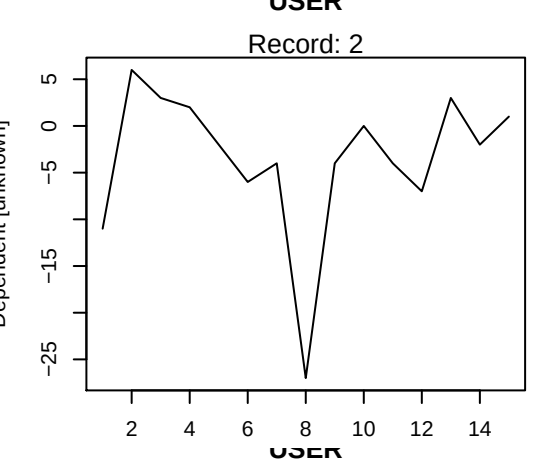


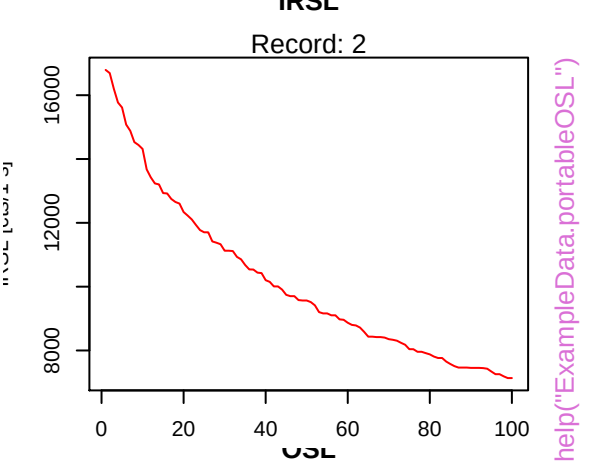
help("ExampleData.portableOSL")



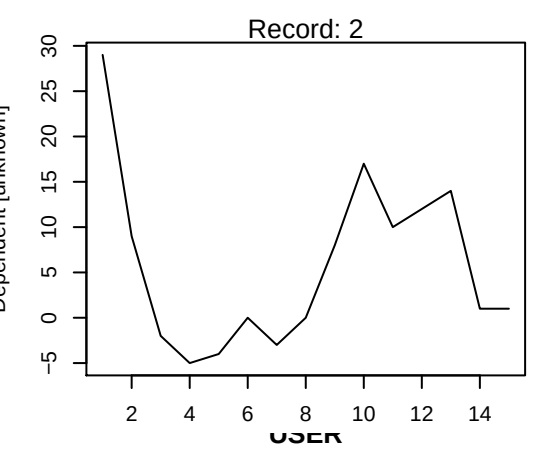


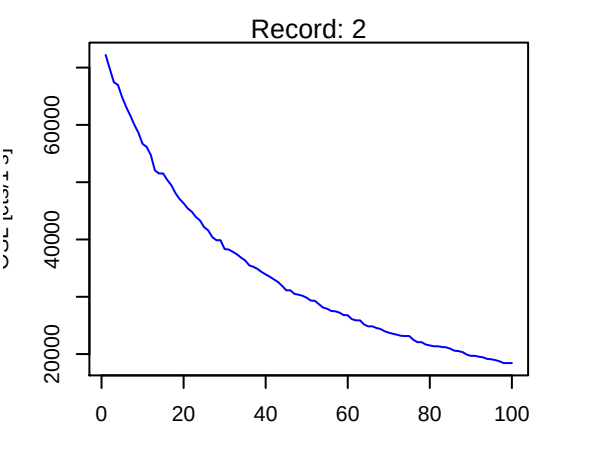


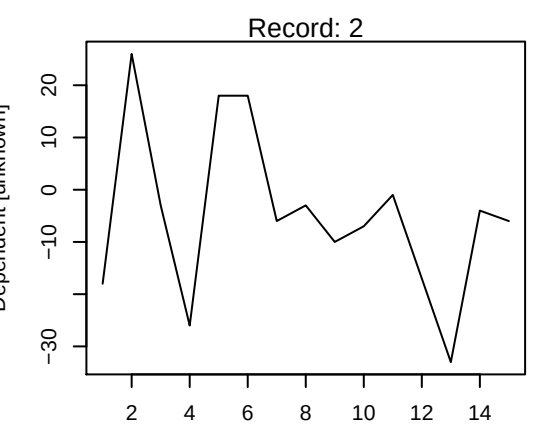


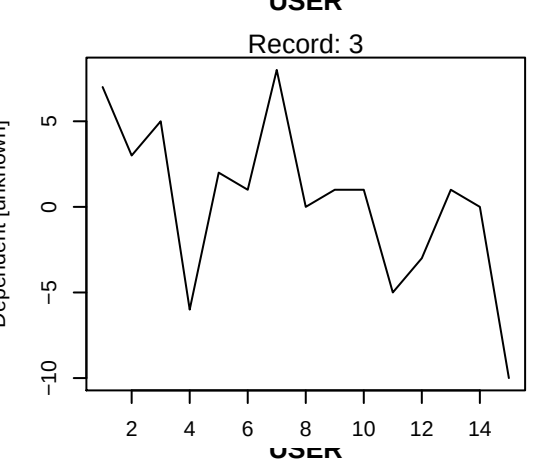


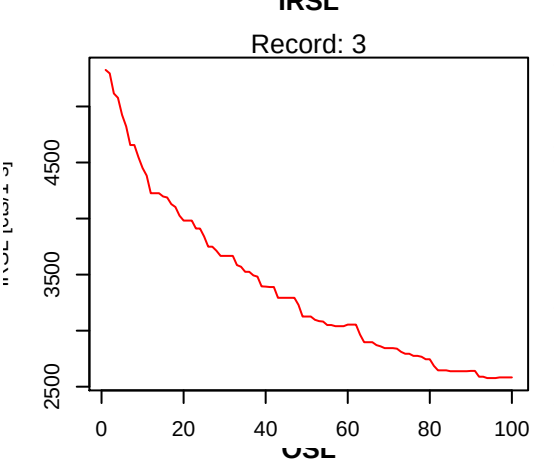
help("ExampleData.portableOSL")



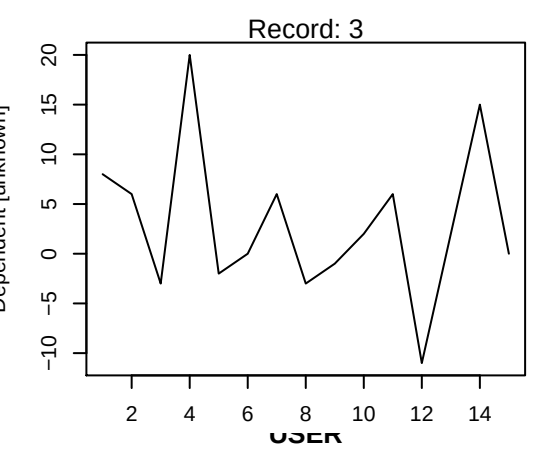


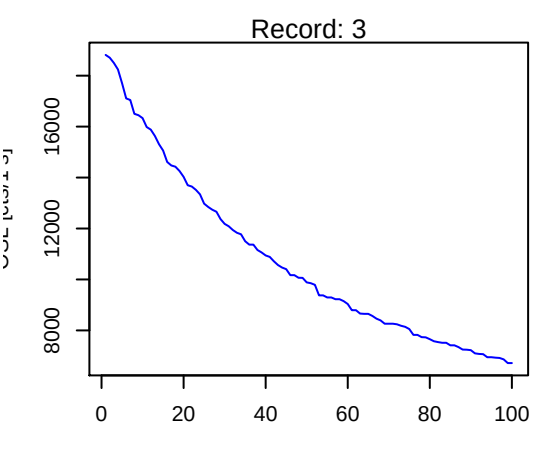


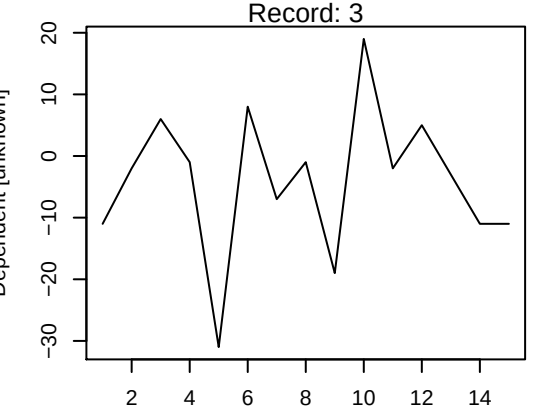


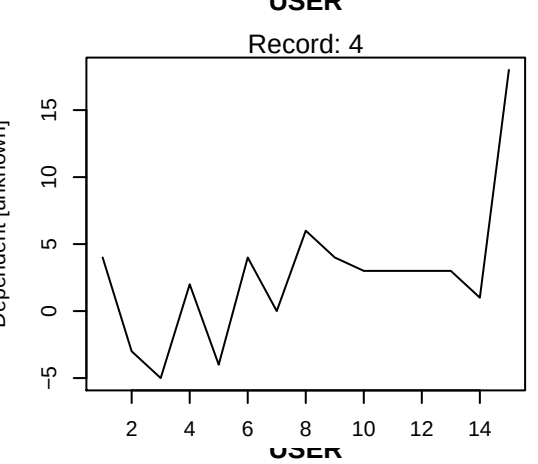


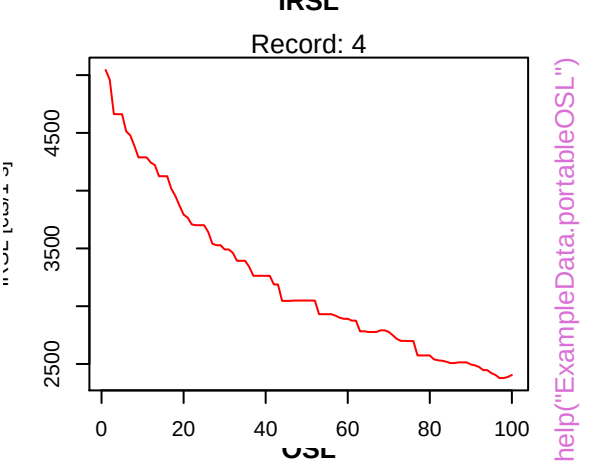
help("ExampleData.portableOSL")



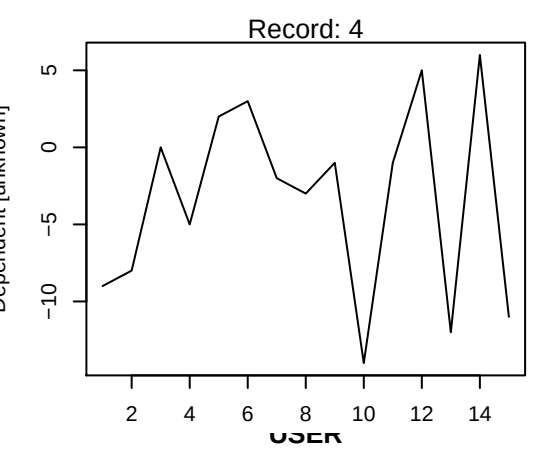


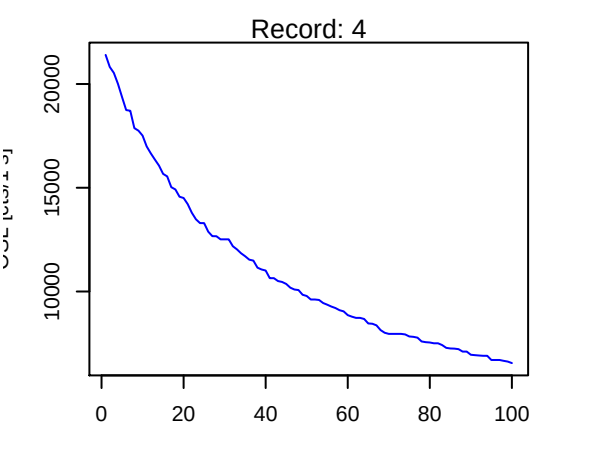


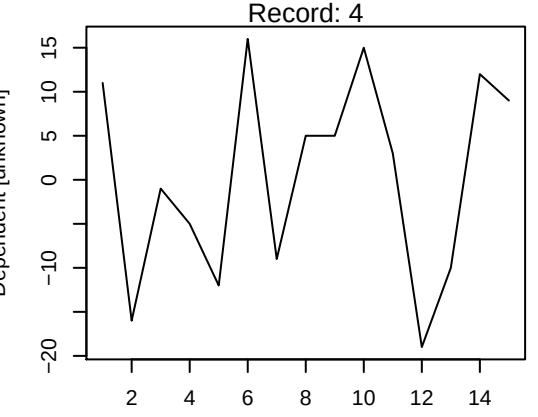


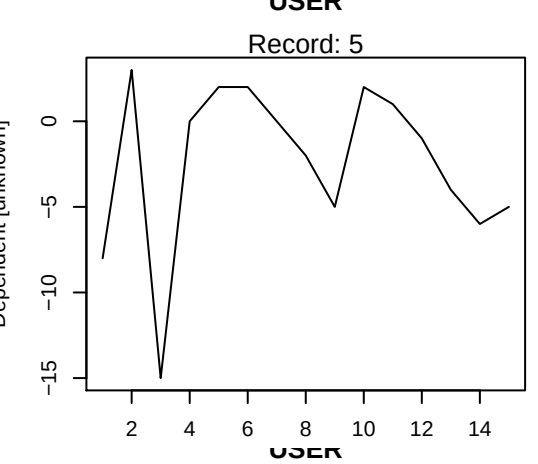


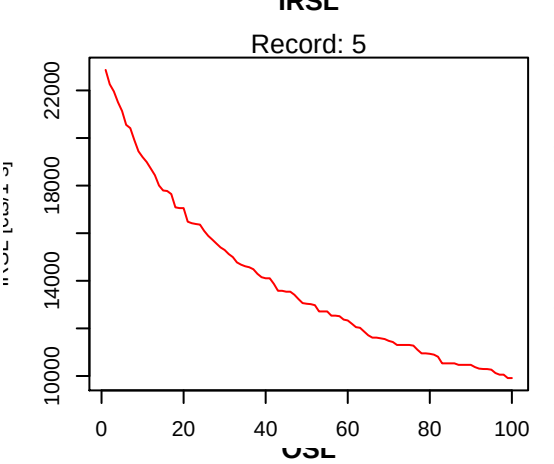
help("ExampleData.portableOSL")











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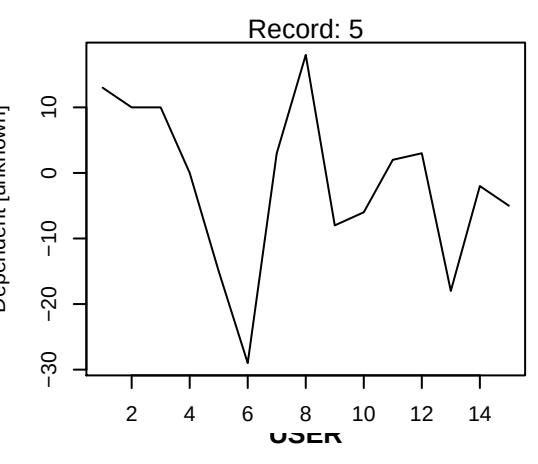

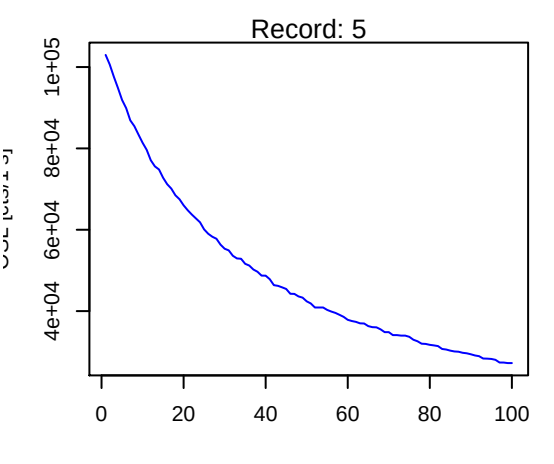

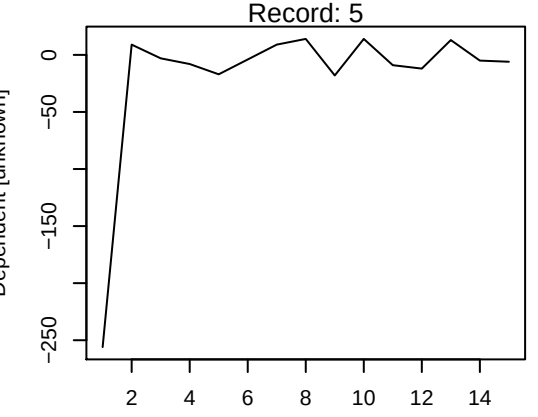

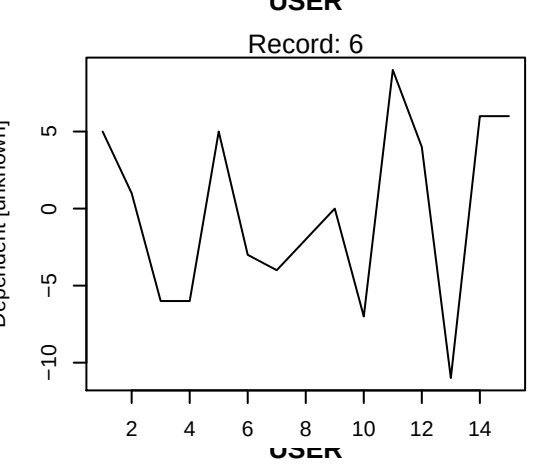

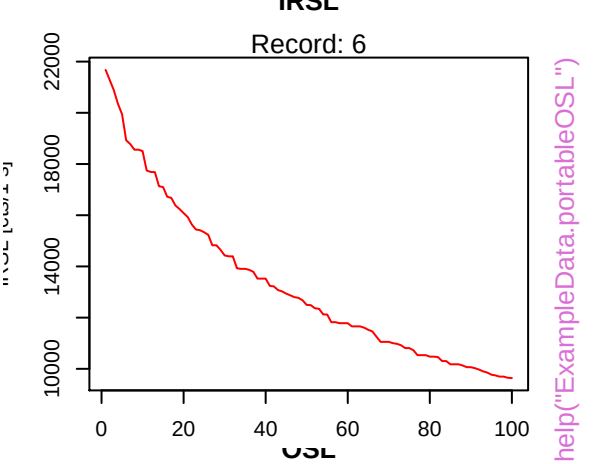

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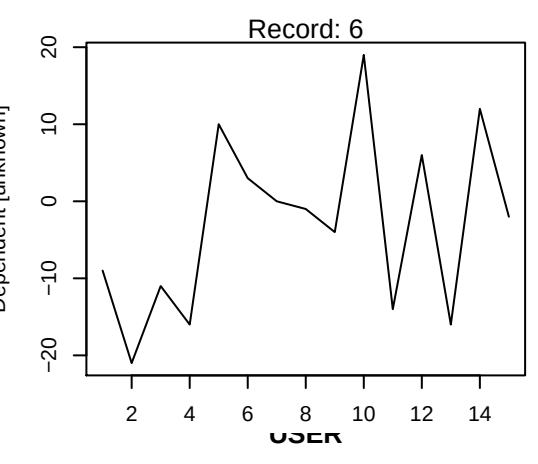

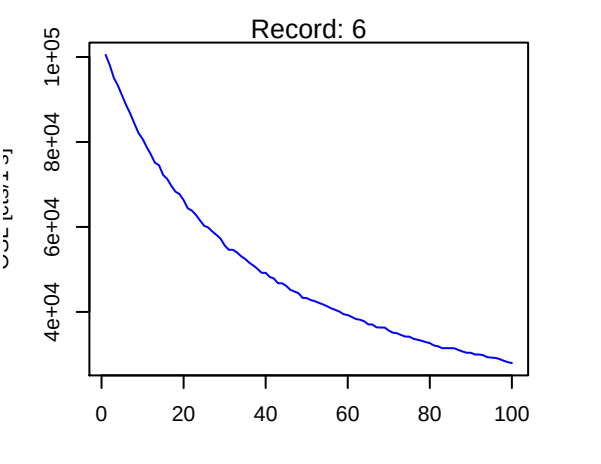

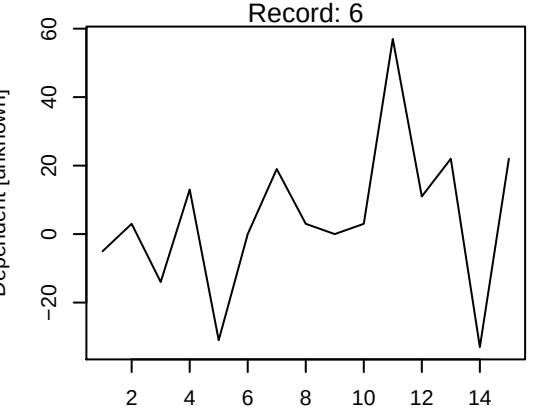

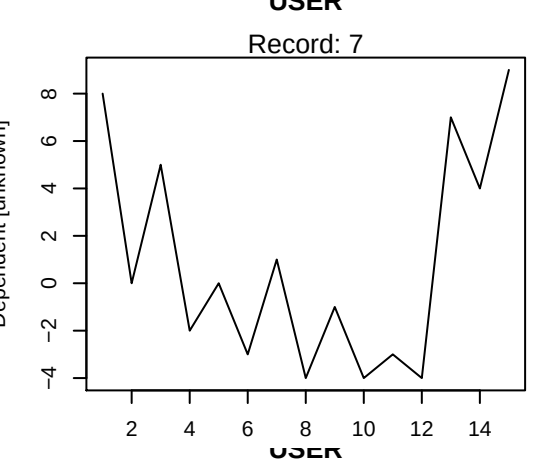

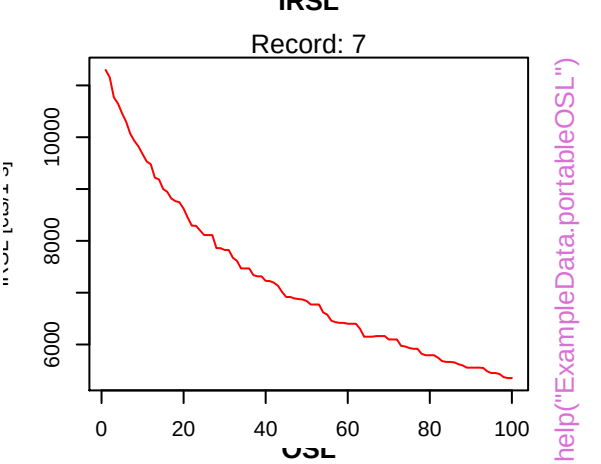

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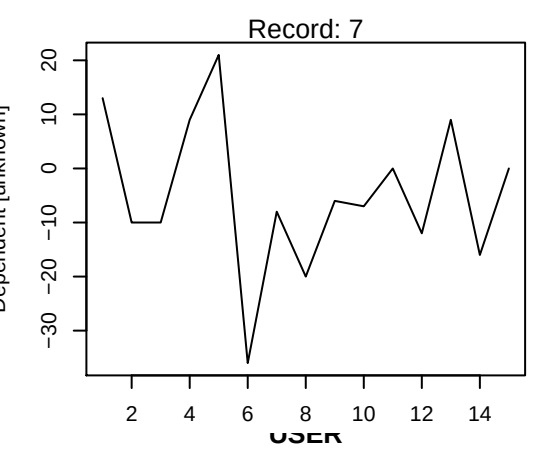

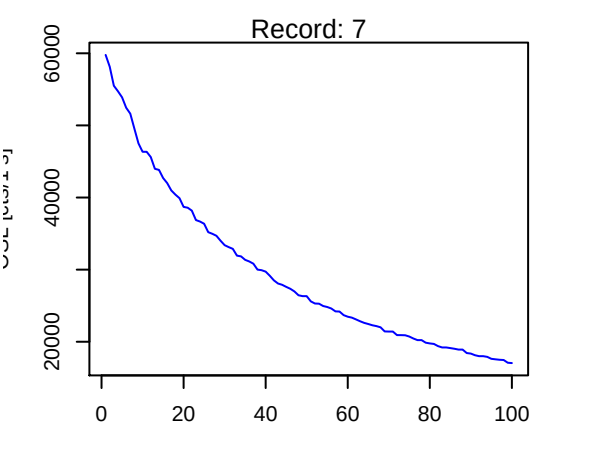

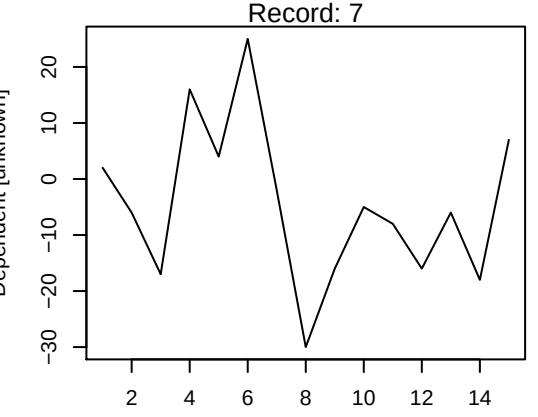

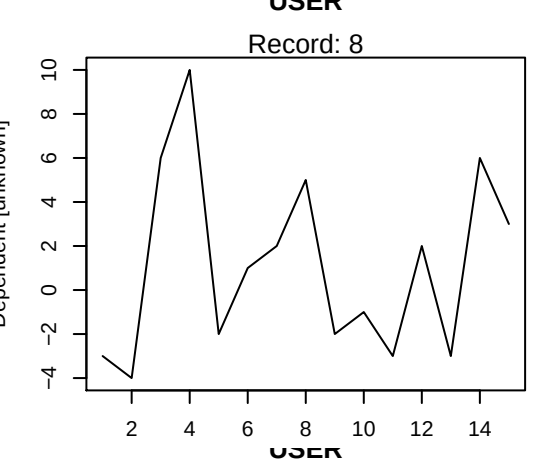

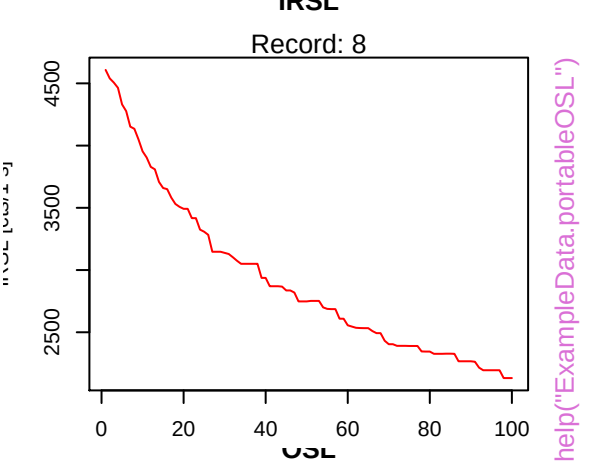

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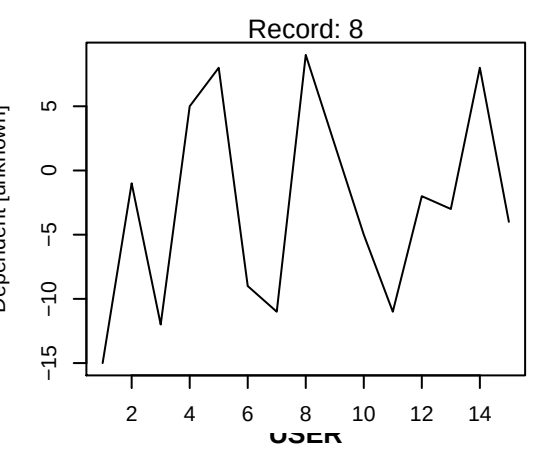

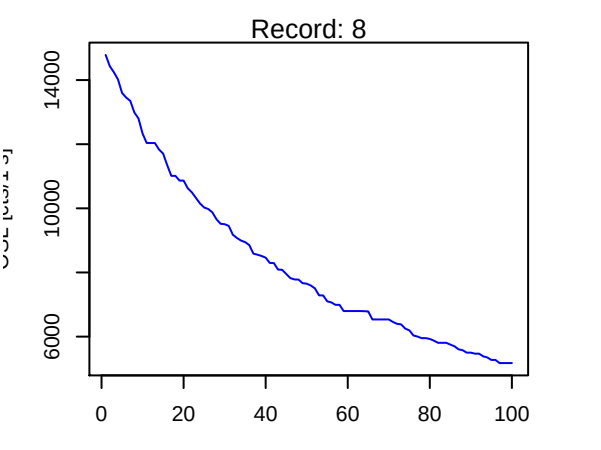

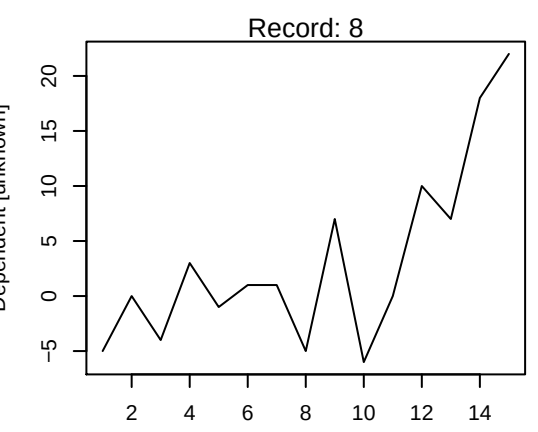

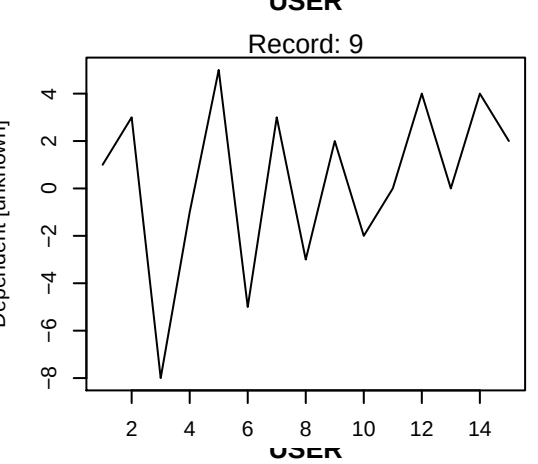

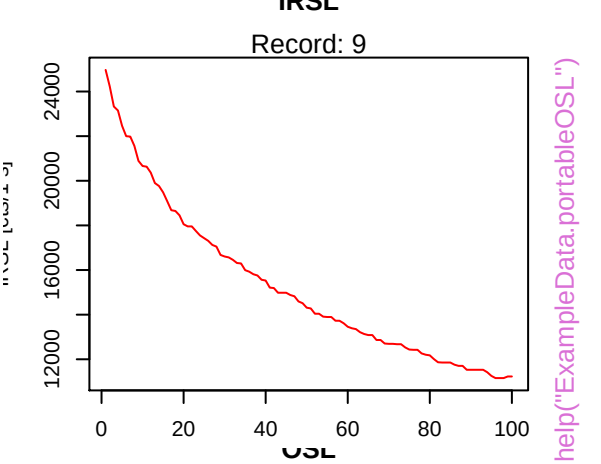

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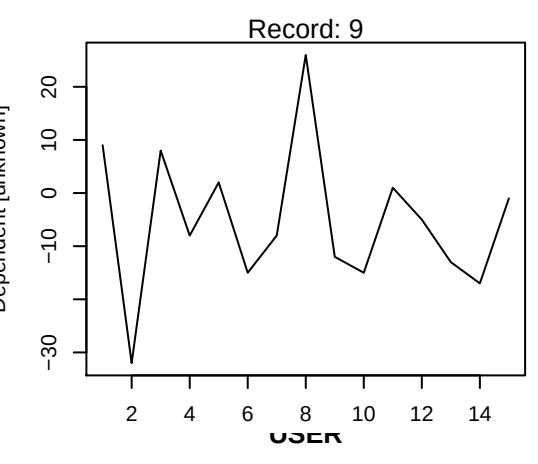

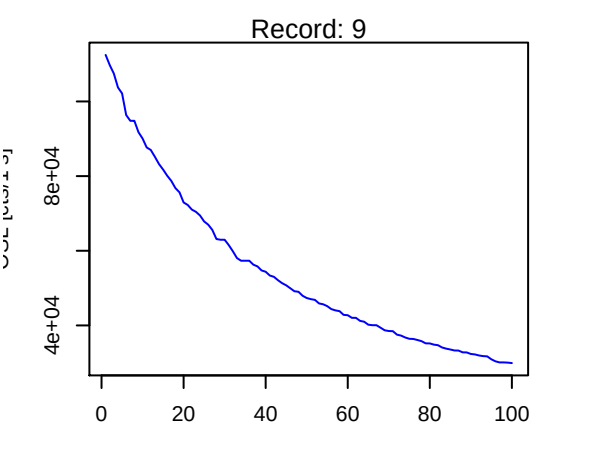

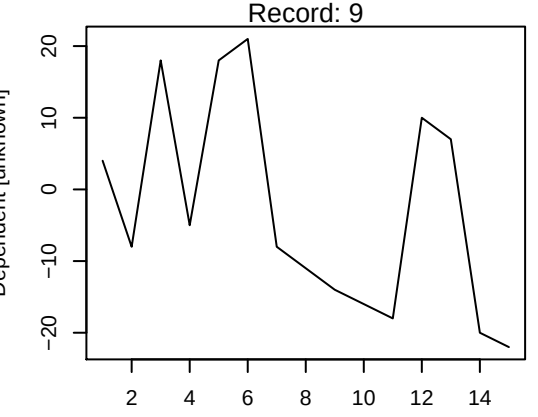

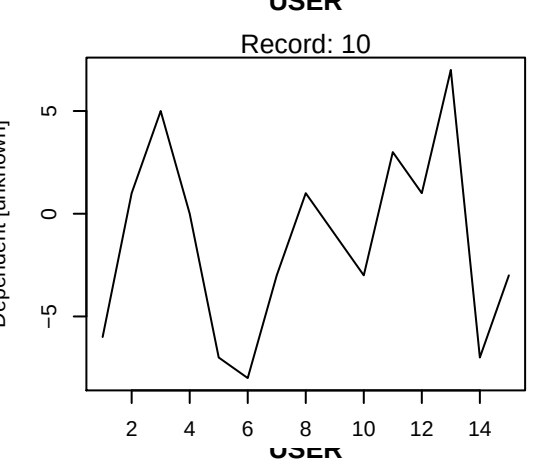

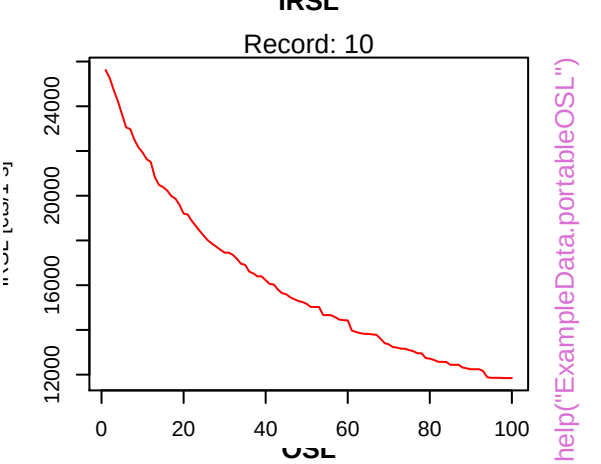

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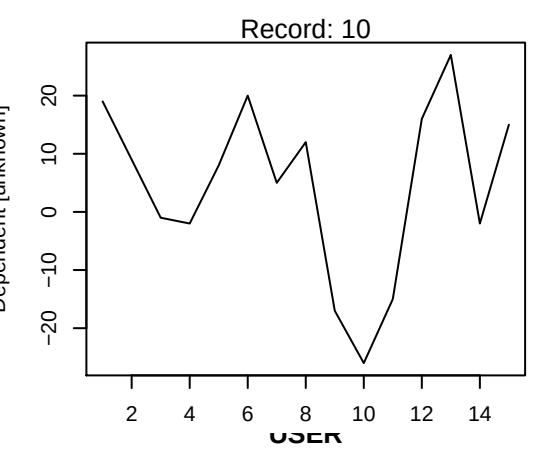

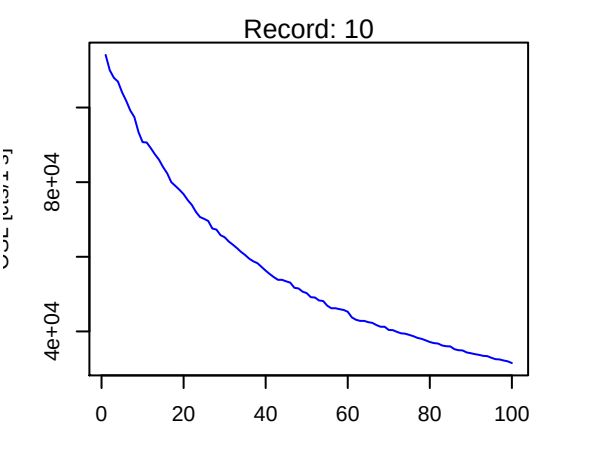

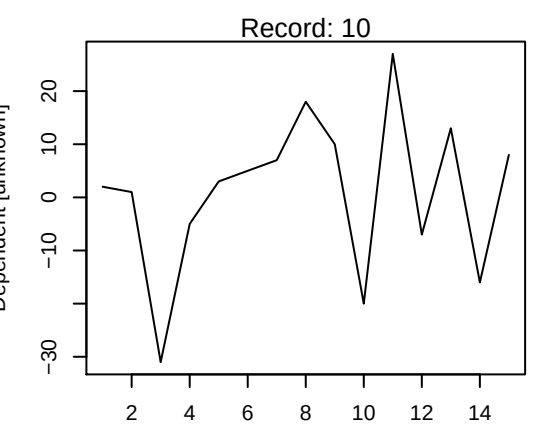

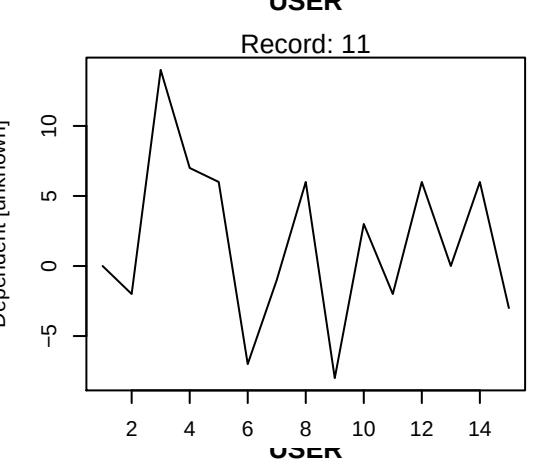
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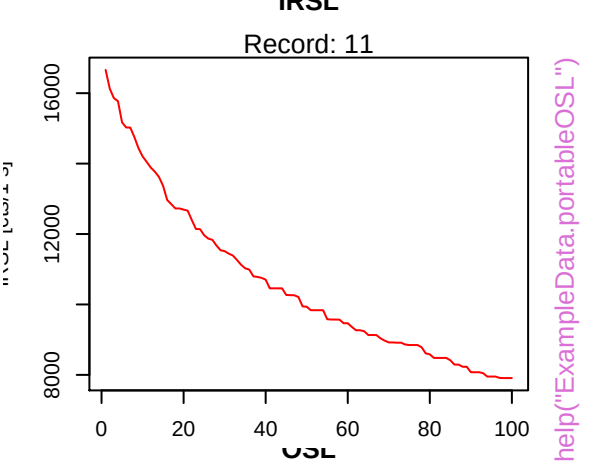
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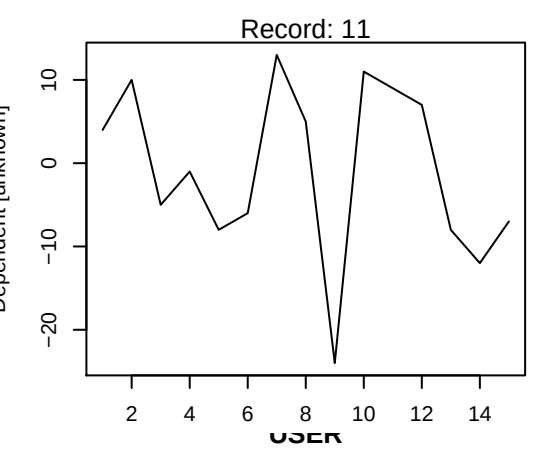
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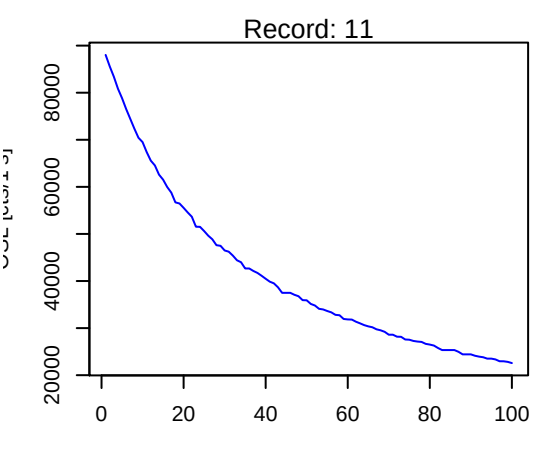
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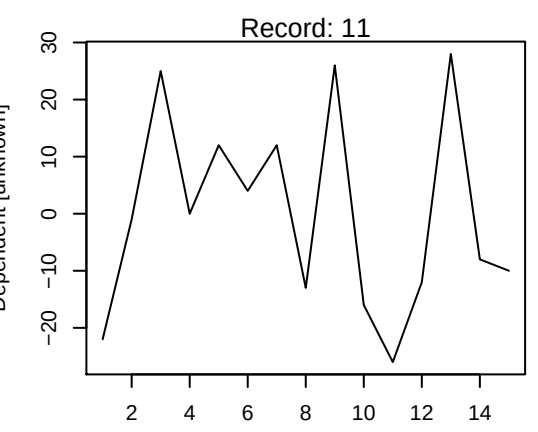
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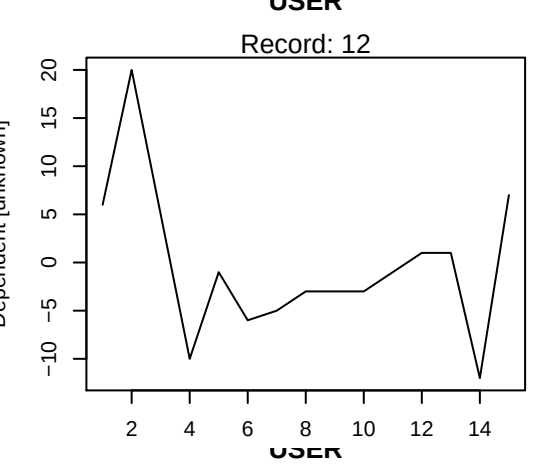

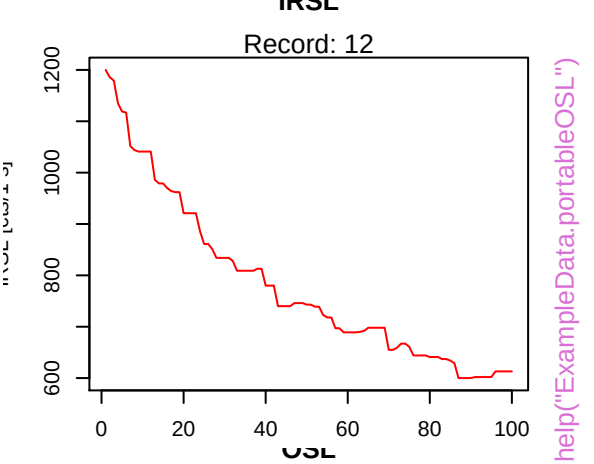

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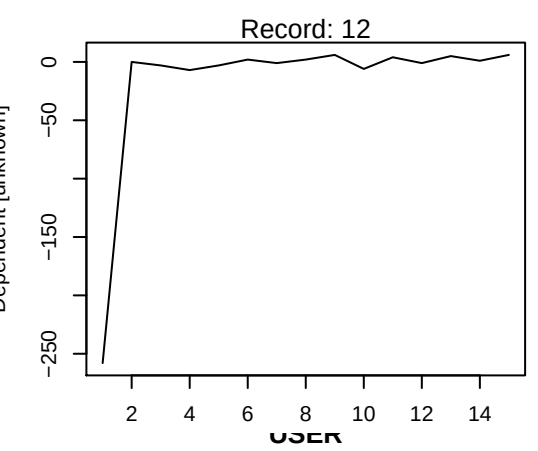

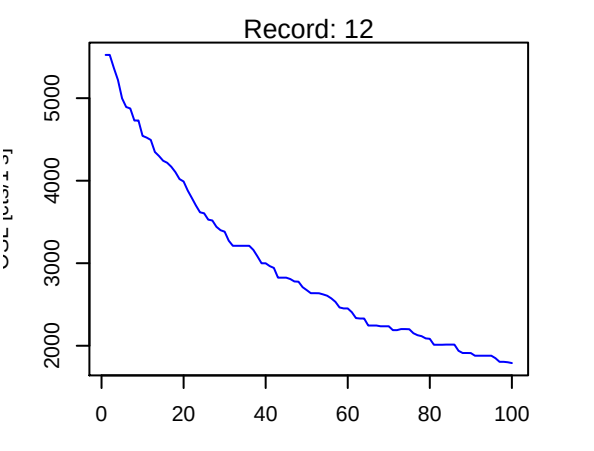

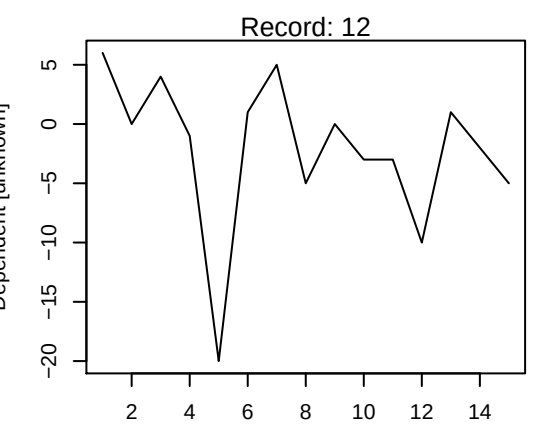

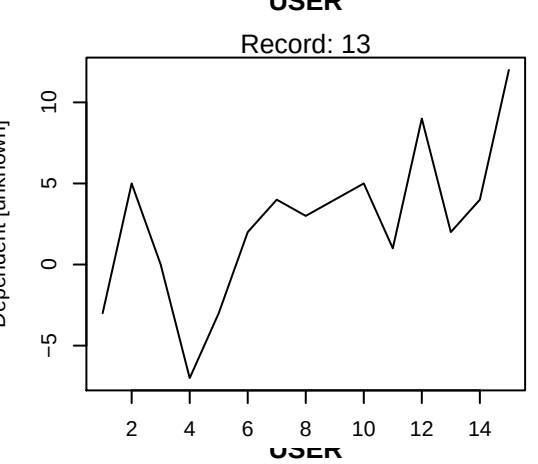

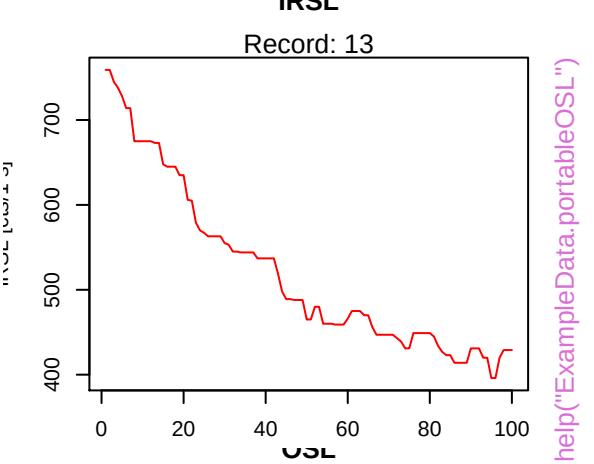

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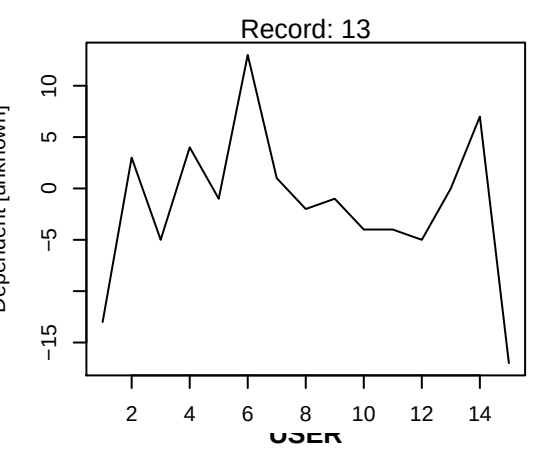

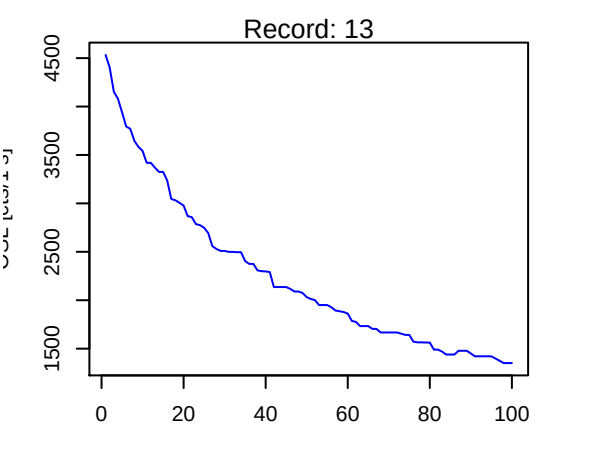

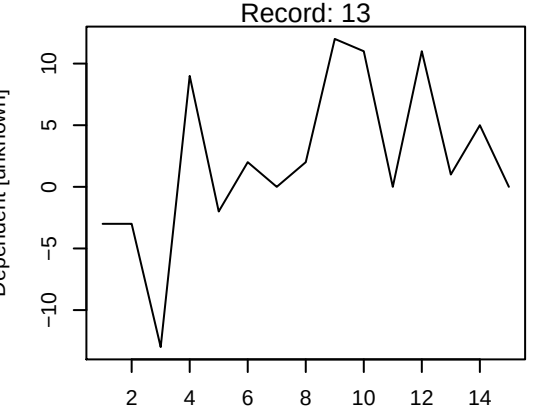

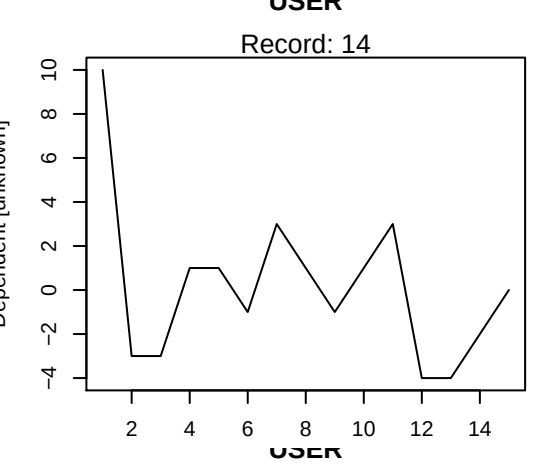

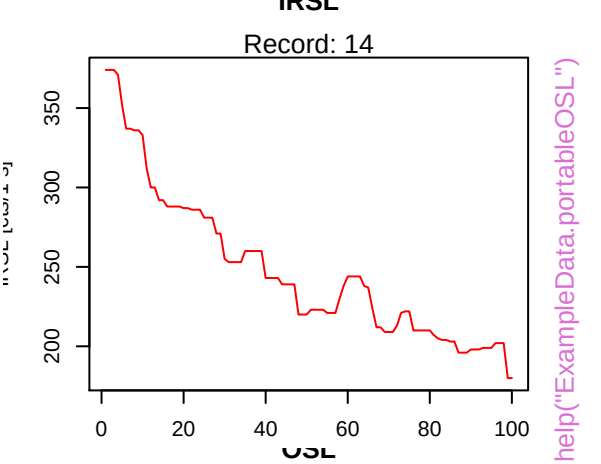

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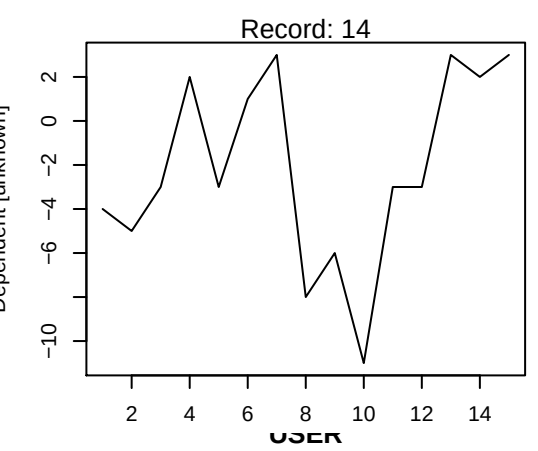

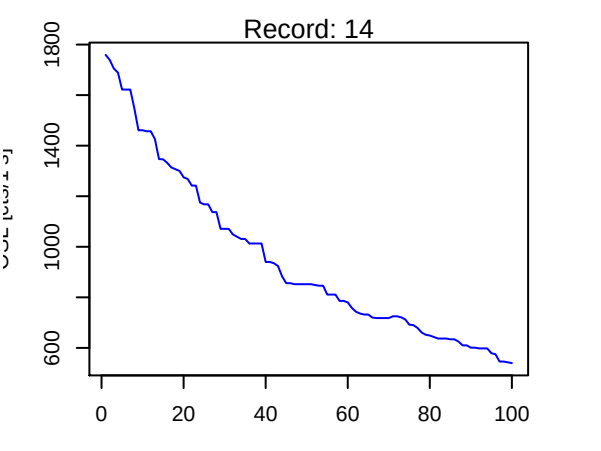

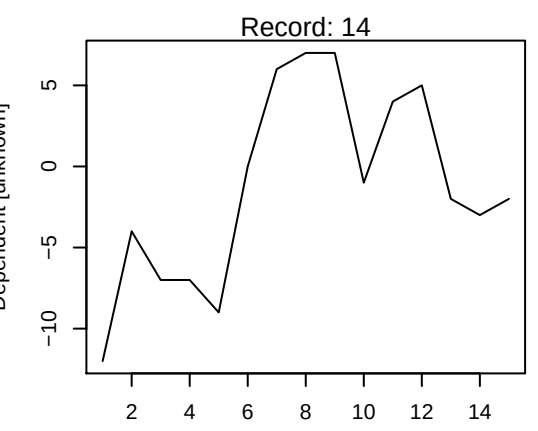

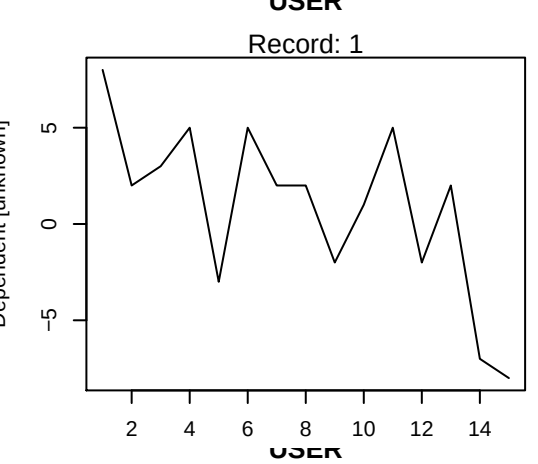
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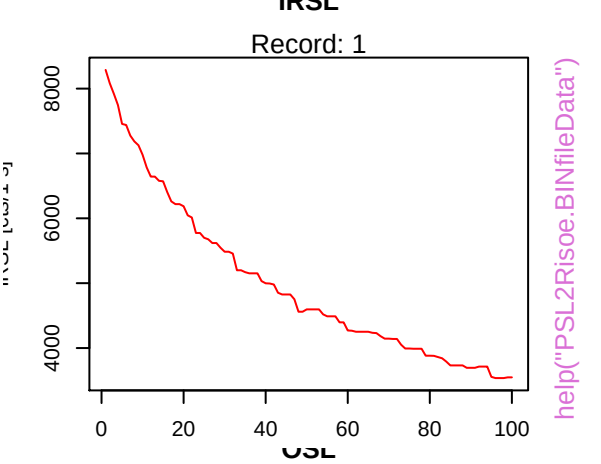
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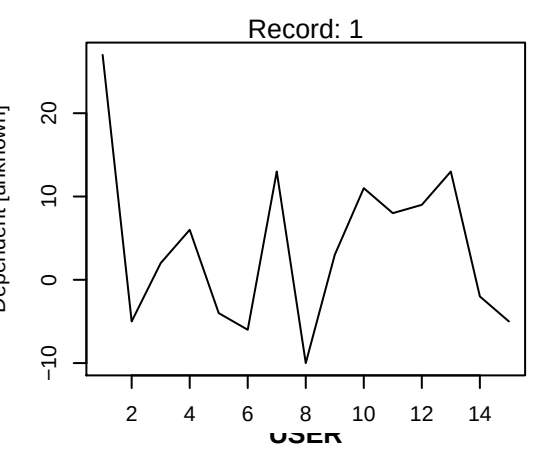
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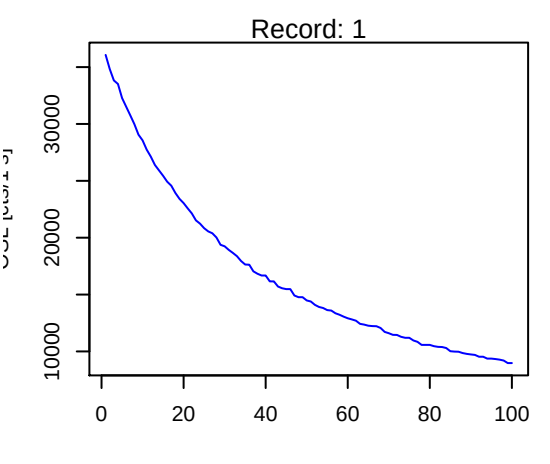
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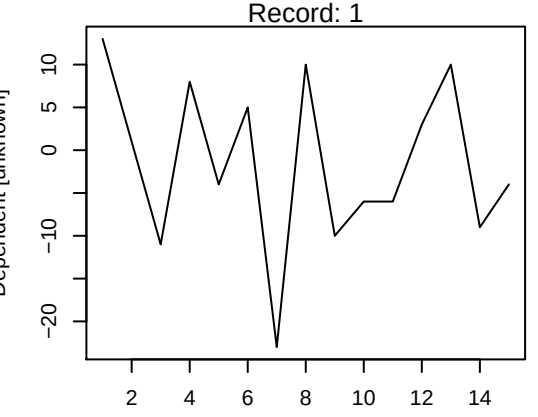
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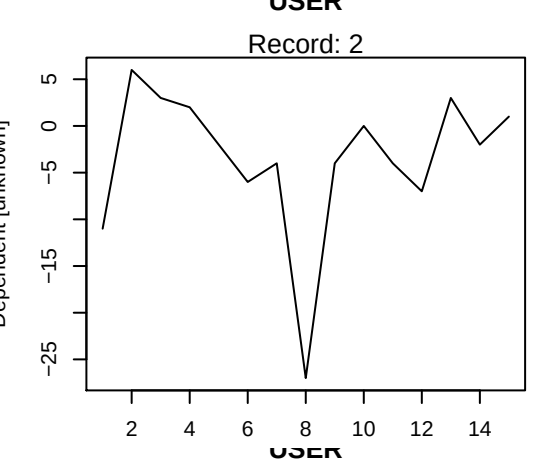

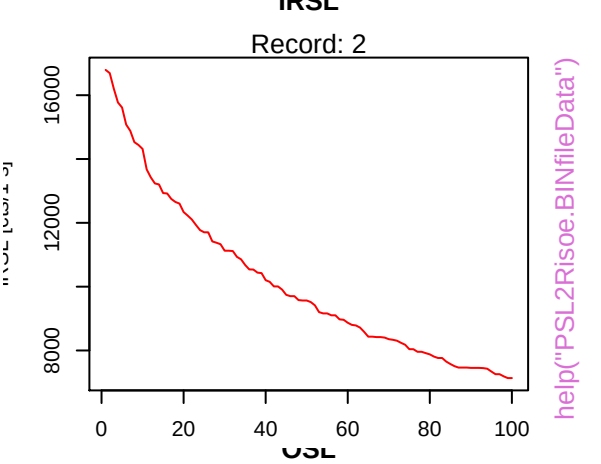

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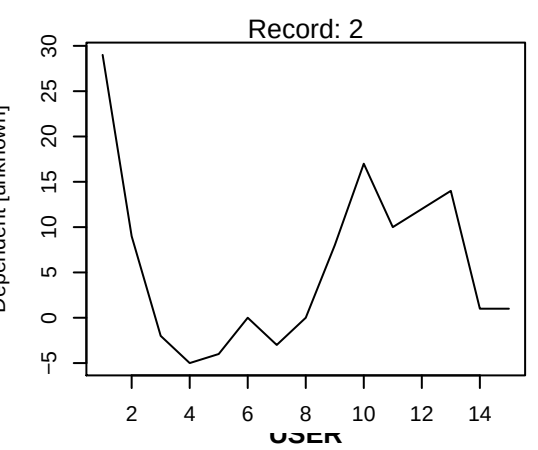

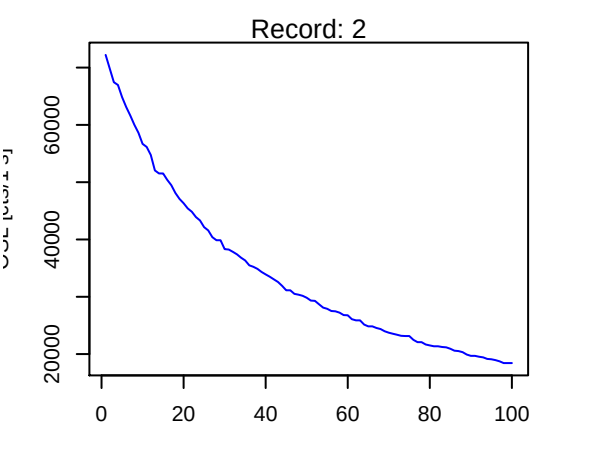

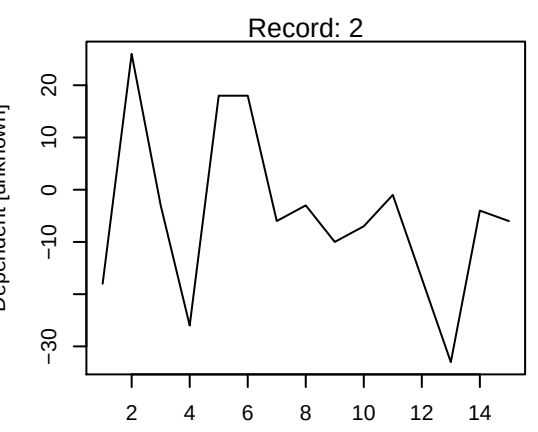

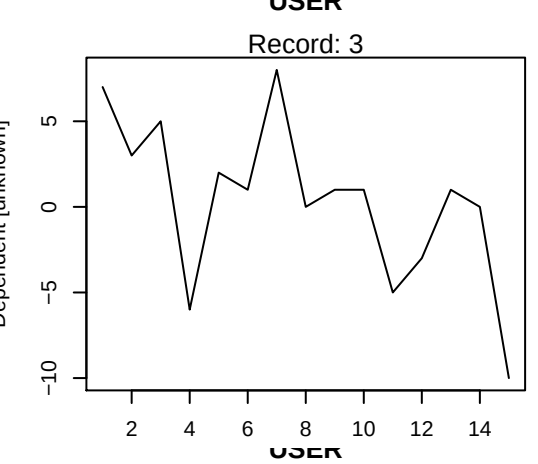
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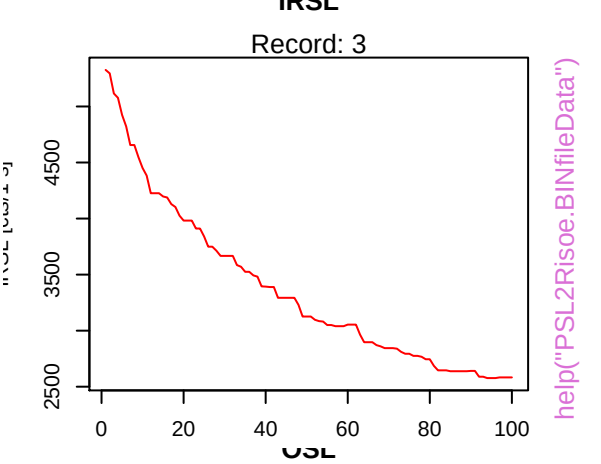
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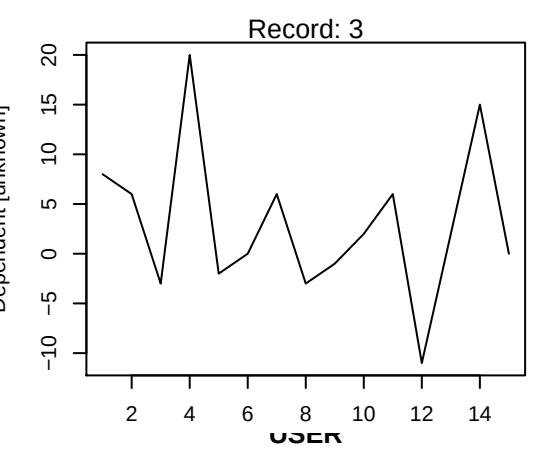
help("PSL2Risoe.BINfileData")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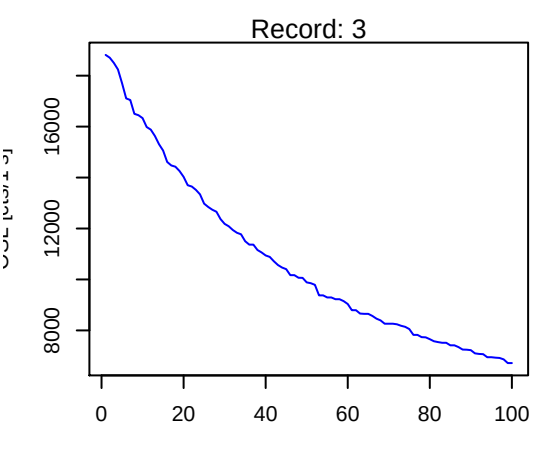
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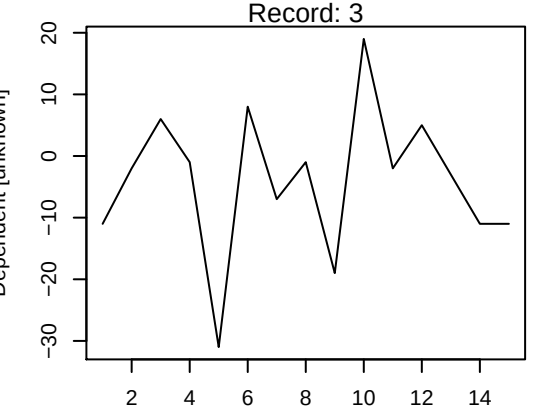
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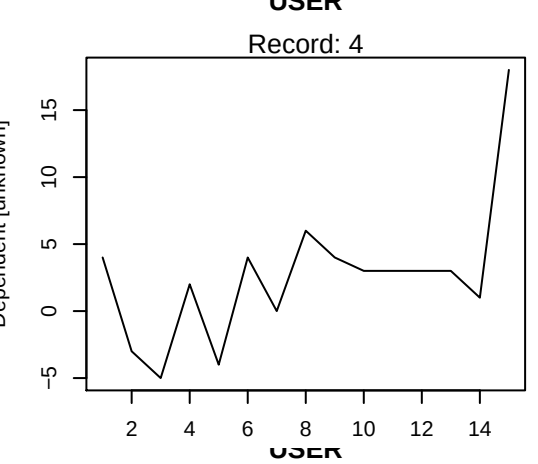
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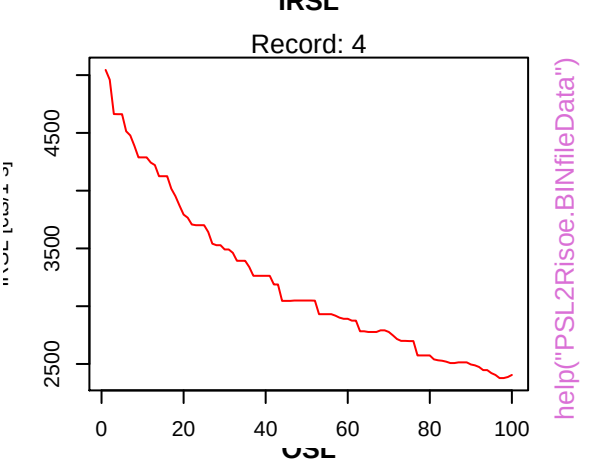
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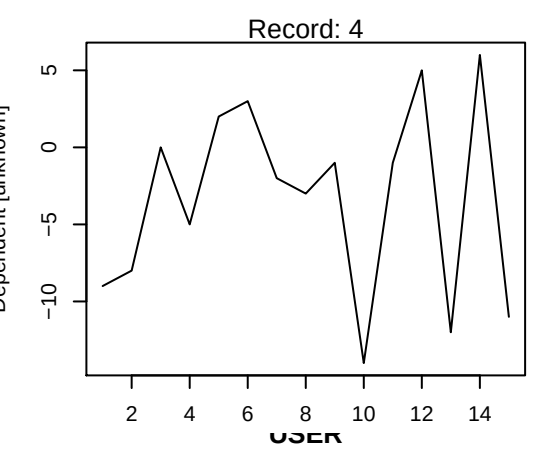
help("PSL2Risoe.BINfileData")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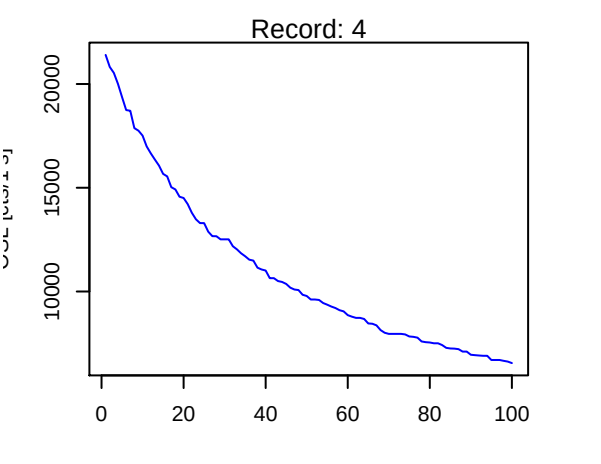
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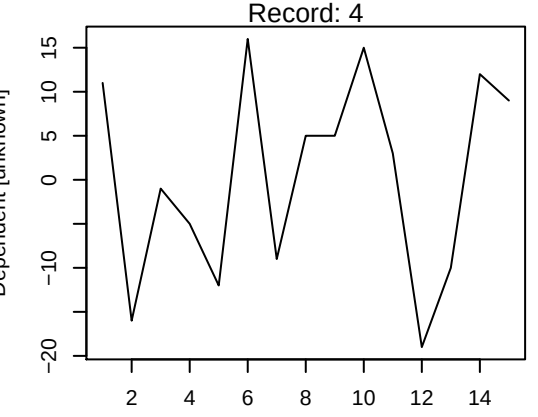
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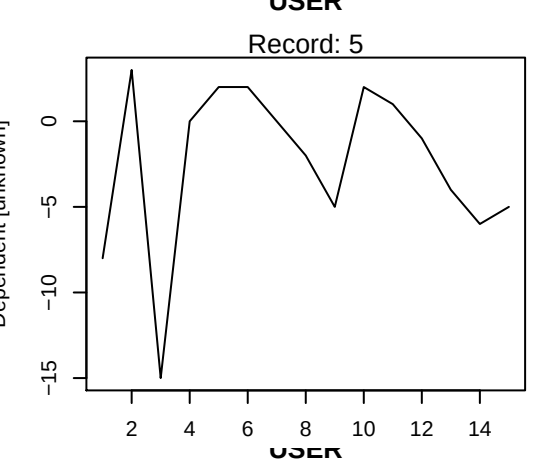
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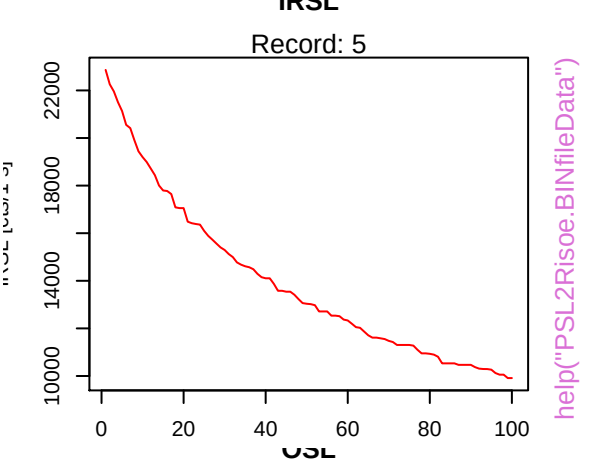
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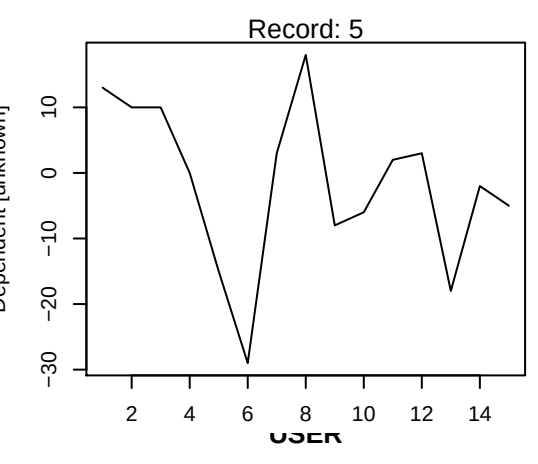
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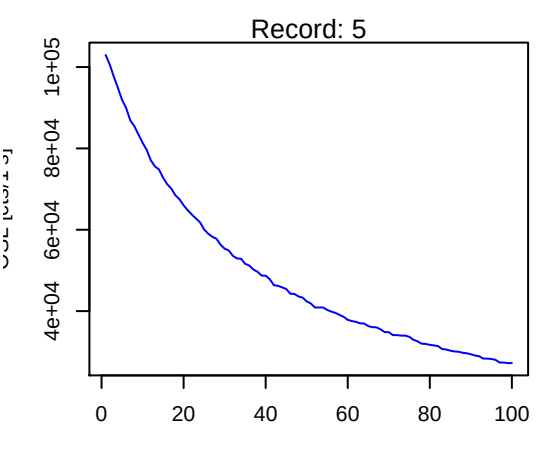
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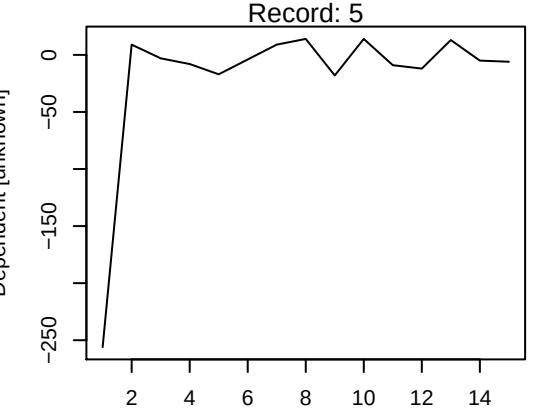
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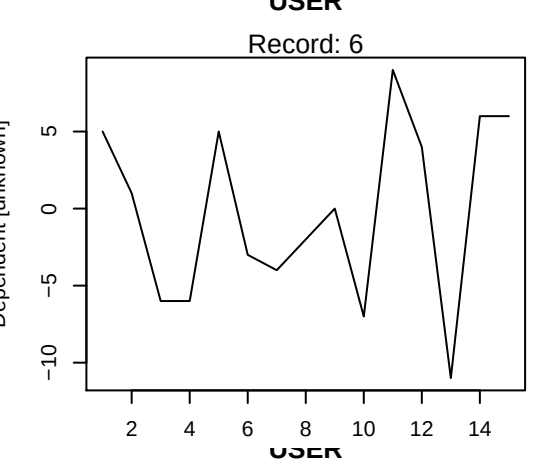

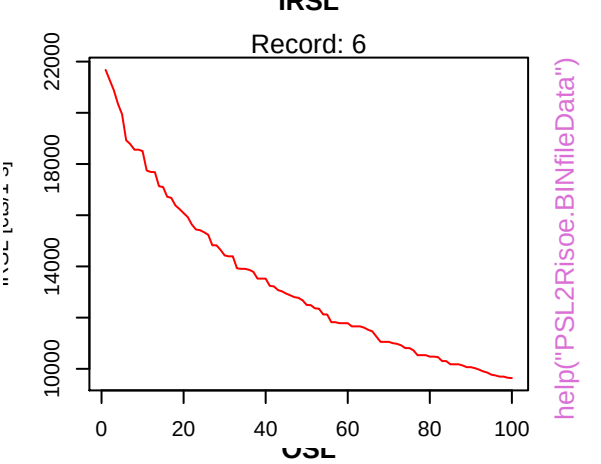

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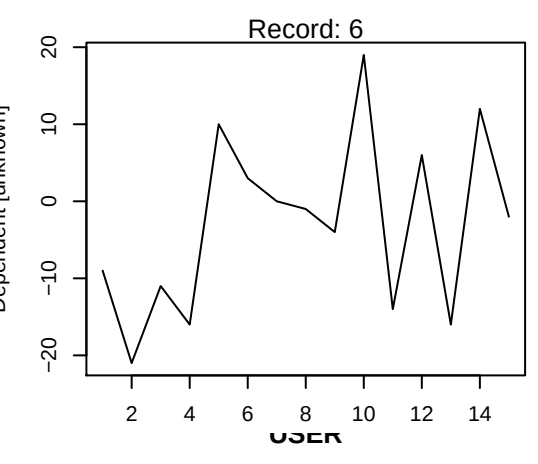

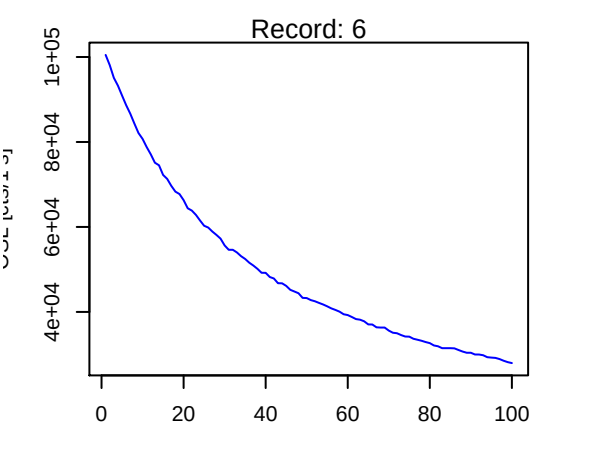

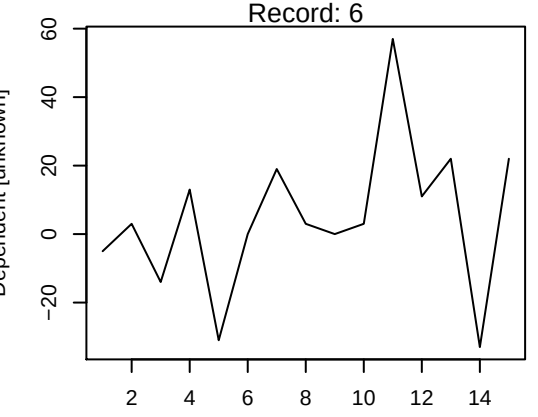

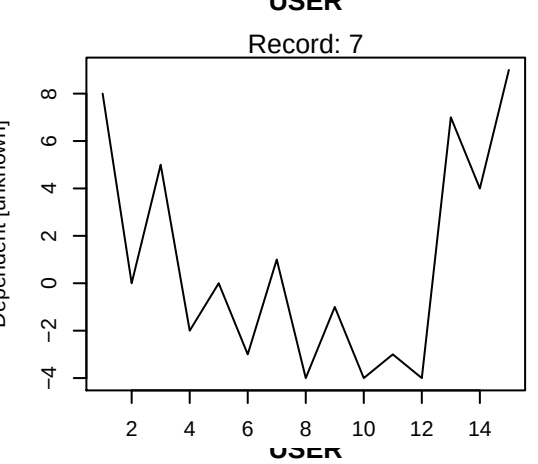

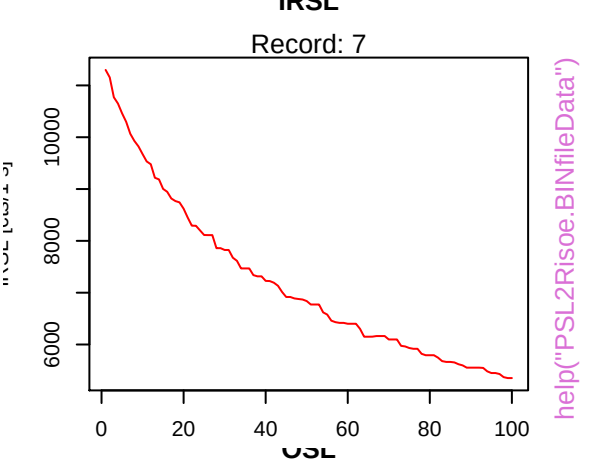

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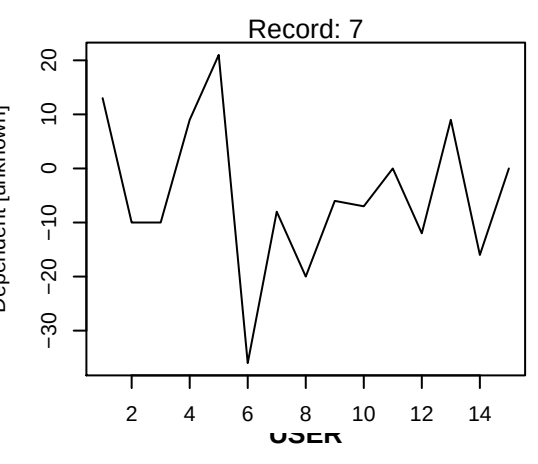

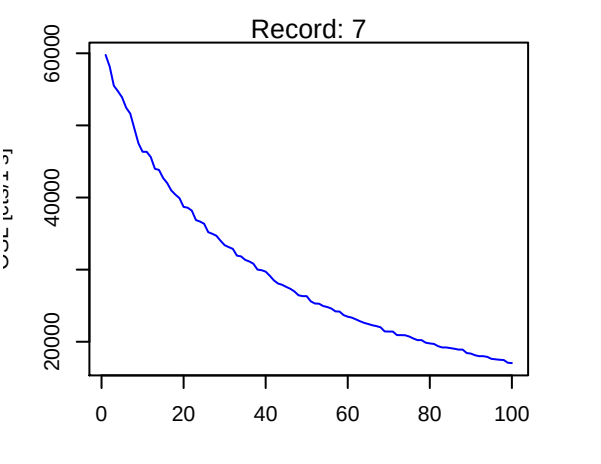

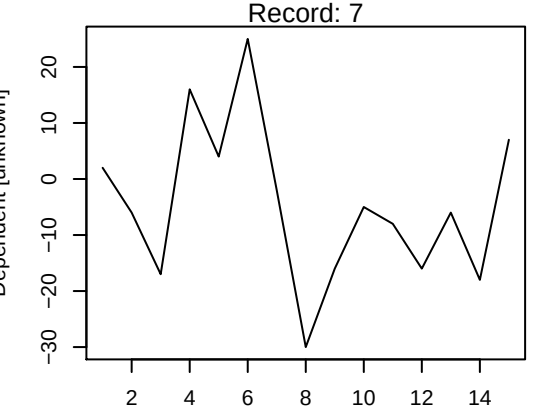

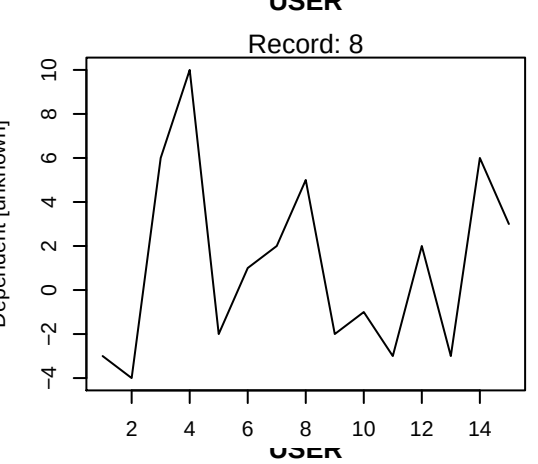
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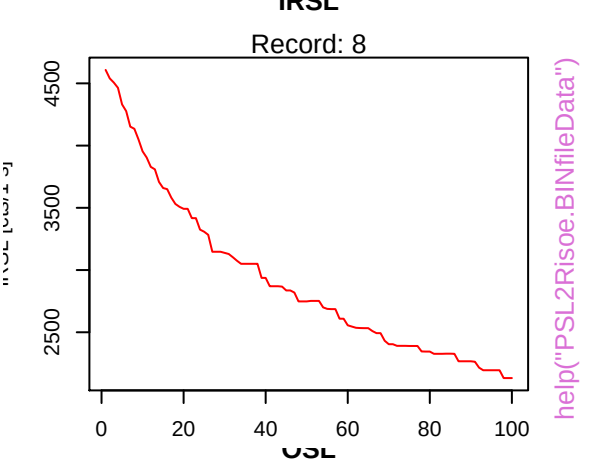
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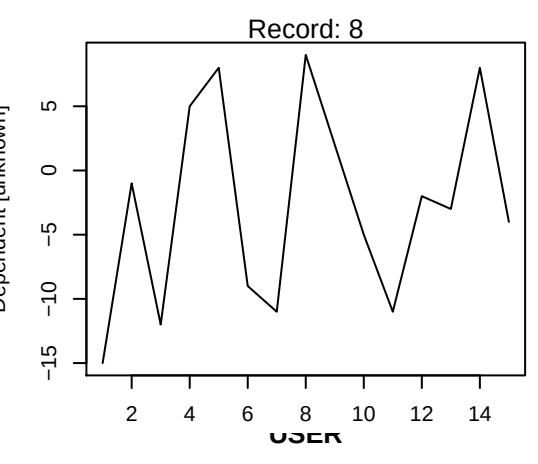
help("PSL2Risoe.BINfileData")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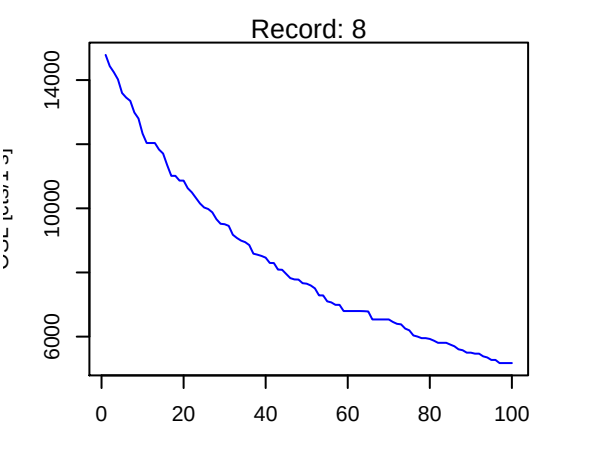
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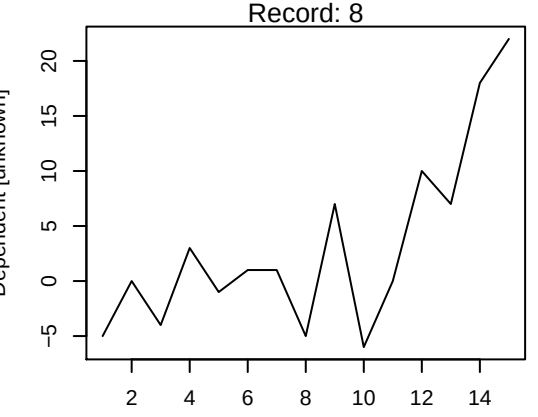
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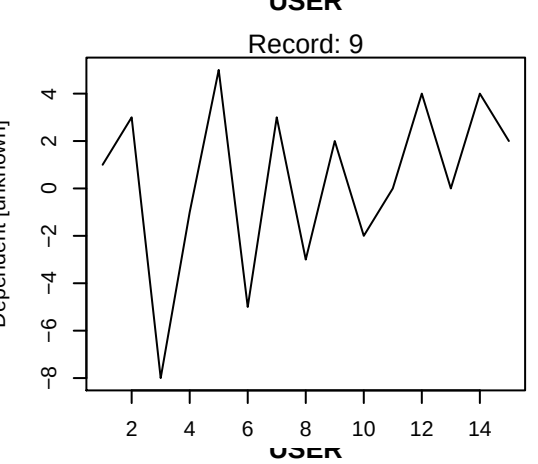
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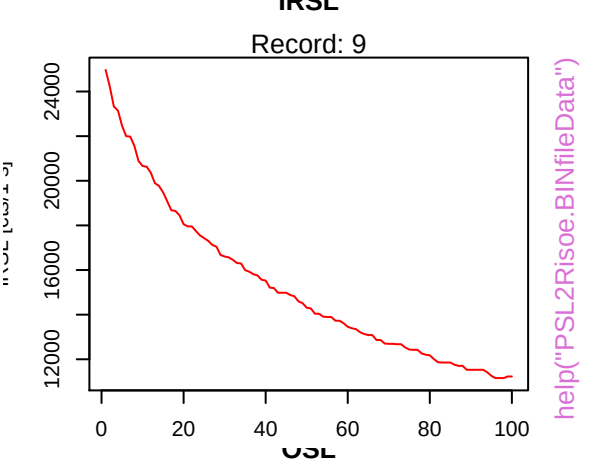
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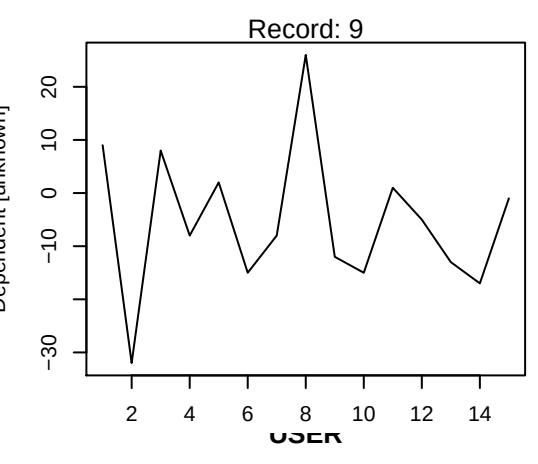
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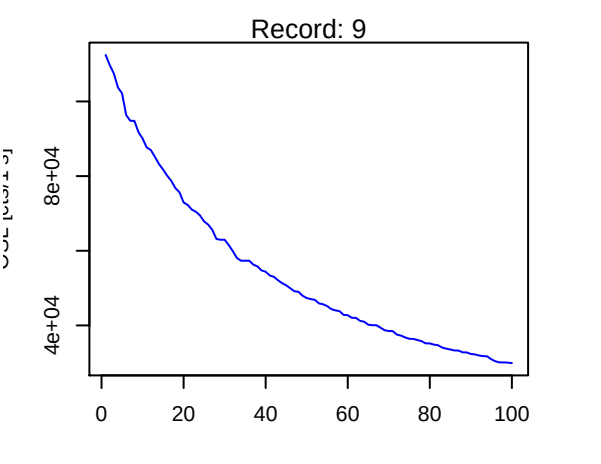
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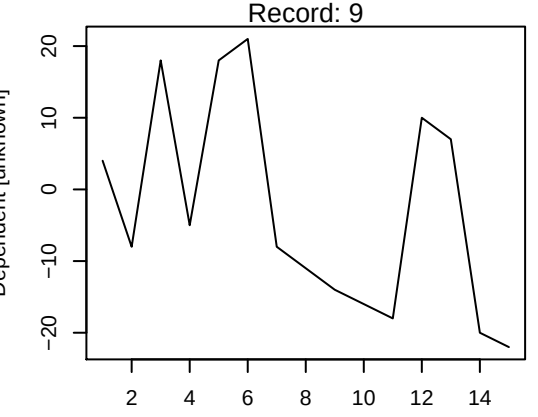
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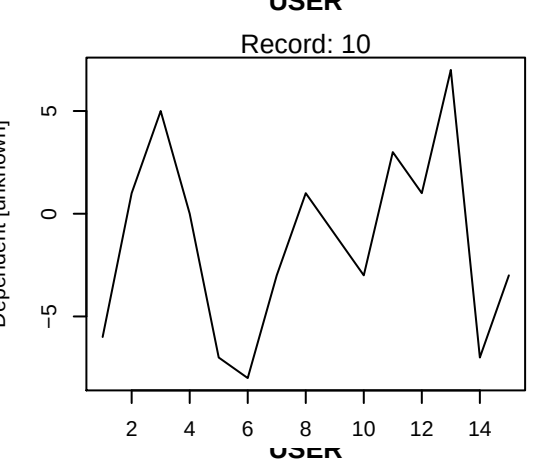
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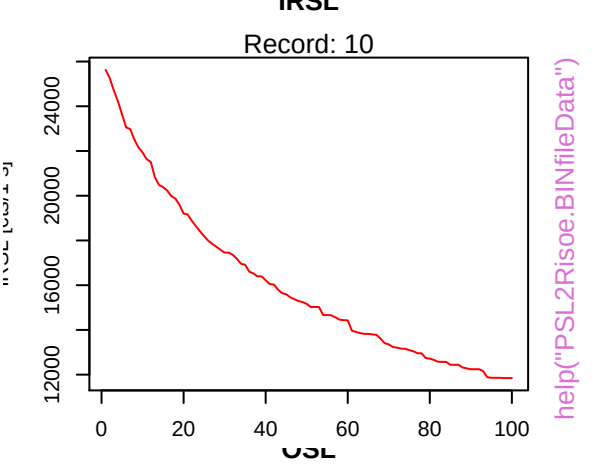
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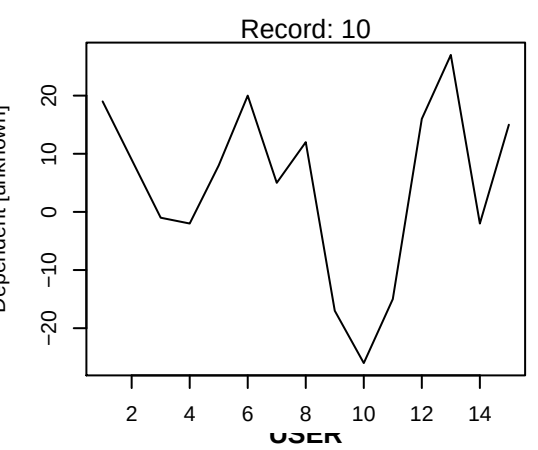
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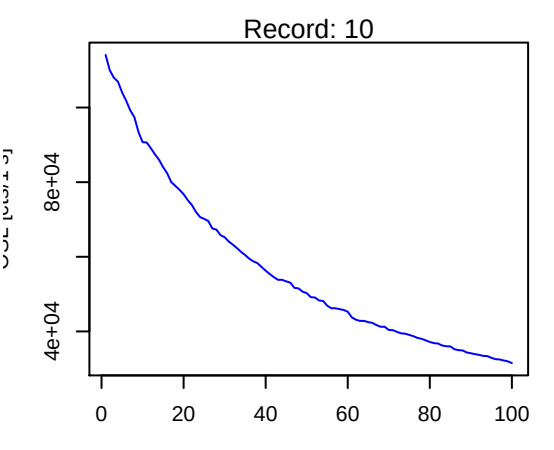
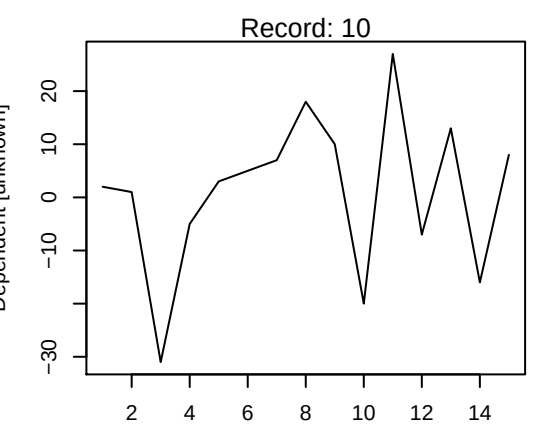
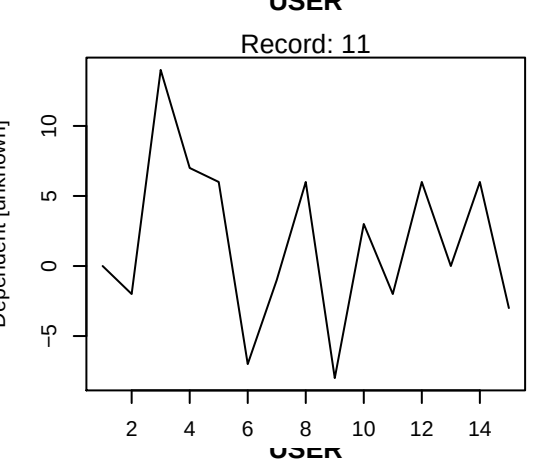
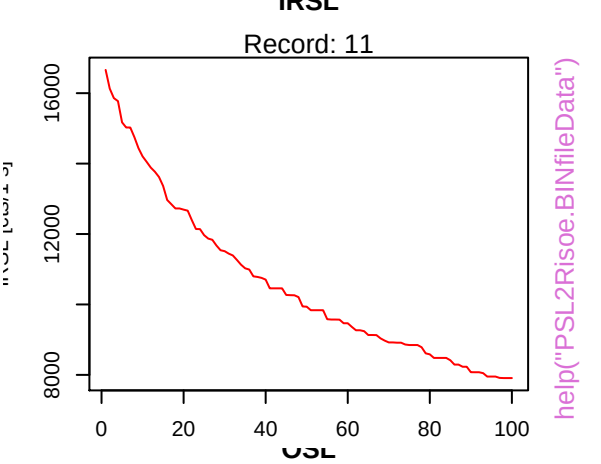
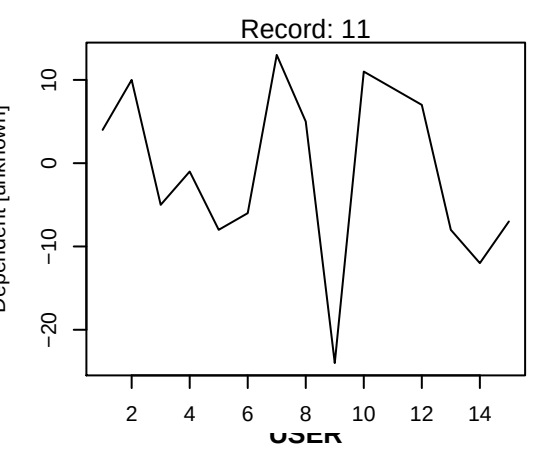
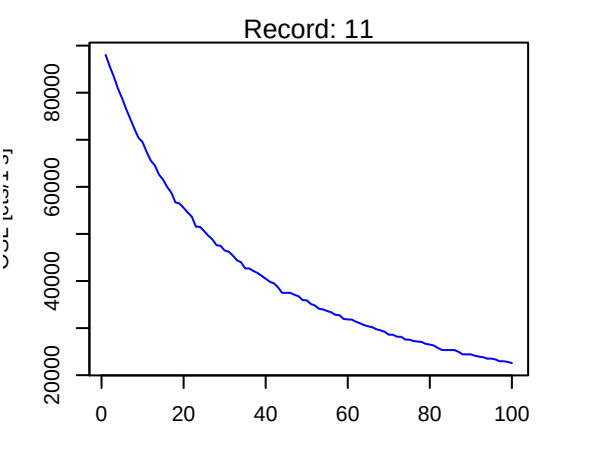

Record: 10
8e+04
4e+04
0
20
40
60
80
100

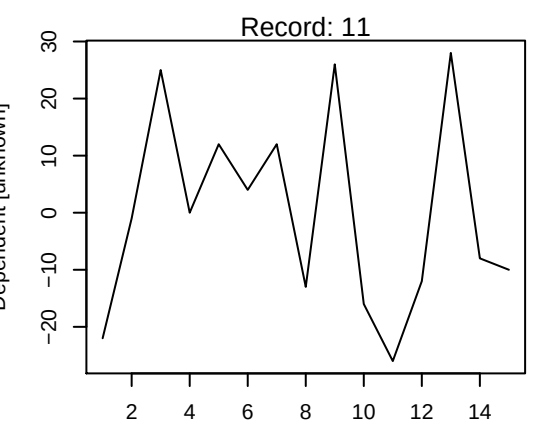

USER
Record: 10
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14

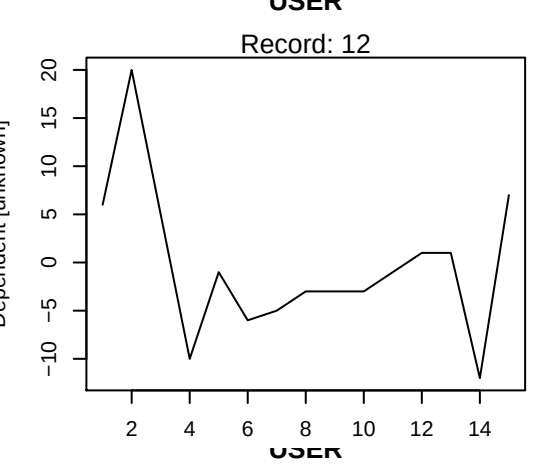

USER
Record: 11
Dependent [unknown]
10
5
0
−5
2
4
6
8
10
12
14

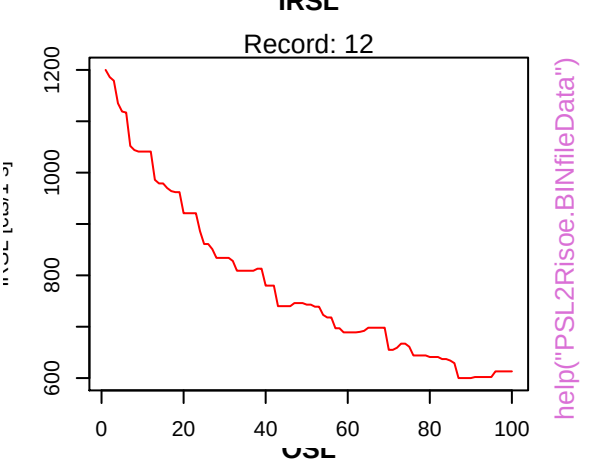

IRSL
Record: 11
16000
12000
8000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")

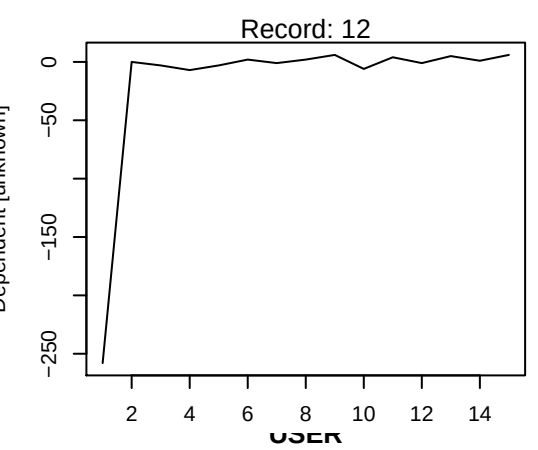

USER
Record: 11
Dependent [unknown]
10
0
−10
−20
2
4
6
8
10
12
14

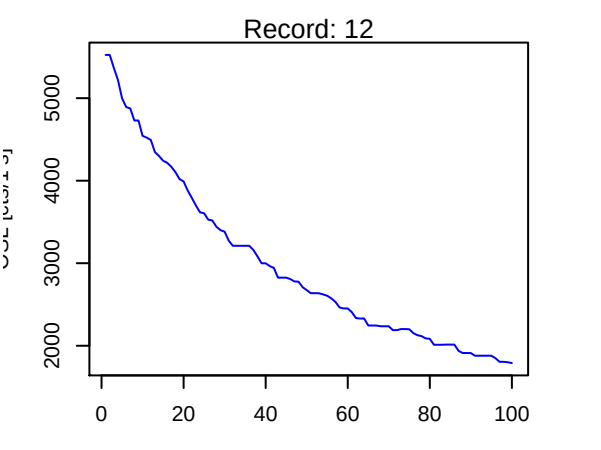

USL
Record: 11
80000
60000
40000
20000
0
20
40
60
80
100

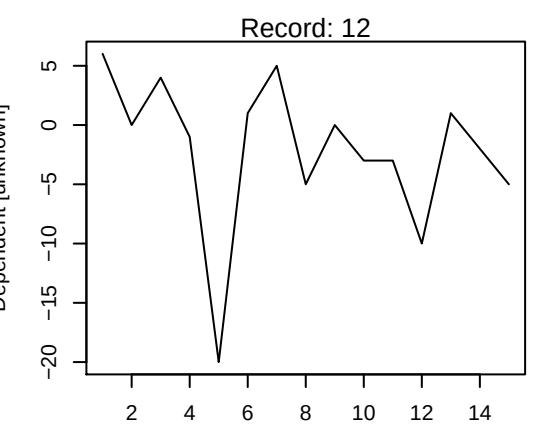

USER
Record: 11
Dependent [unknown]
30
20
10
0
−10
−20
2
4
6
8
10
12
14

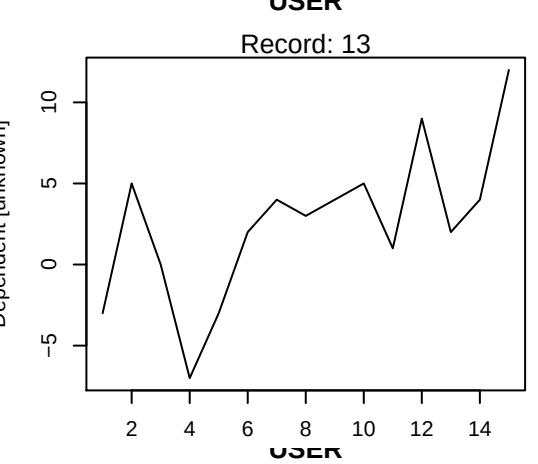

USER
Record: 12
Dependent [unknown]
20
15
10
5
0
−5
−10
2
4
6
8
10
12
14

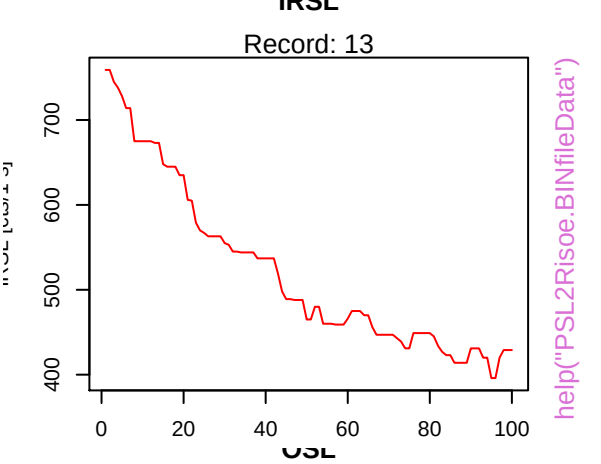

IRSL
Record: 12
1200
1000
800
600
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")

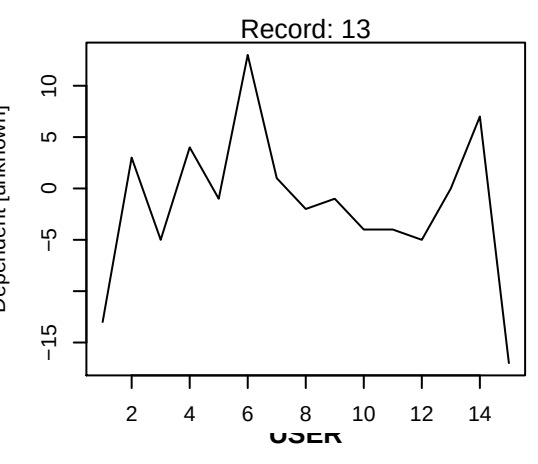

USER
Record: 12
Dependent [unknown]
0
−50
−150
−250
2
4
6
8
10
12
14

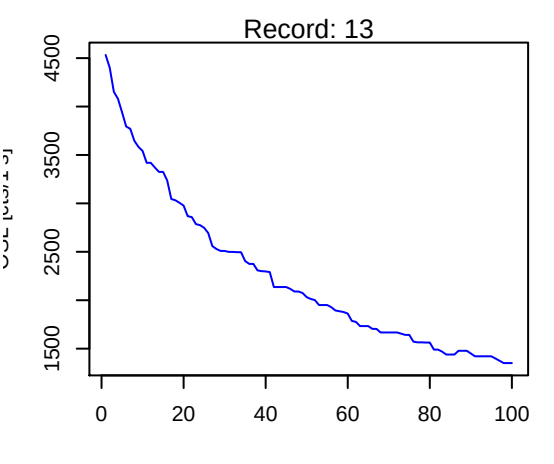

OSL
Record: 12
5000
4000
3000
2000
0
20
40
60
80
100

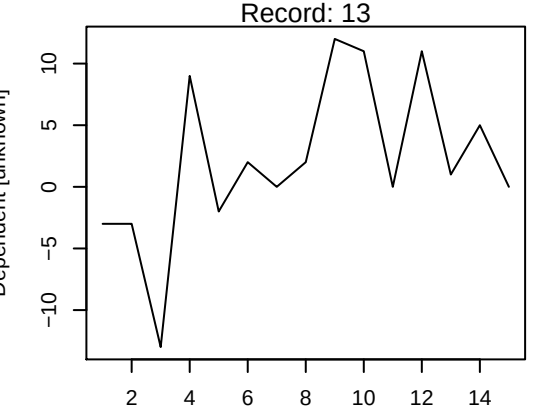

USER
Record: 12
Dependent [unknown]
5
0
−5
−10
−15
−20
2
4
6
8
10
12
14

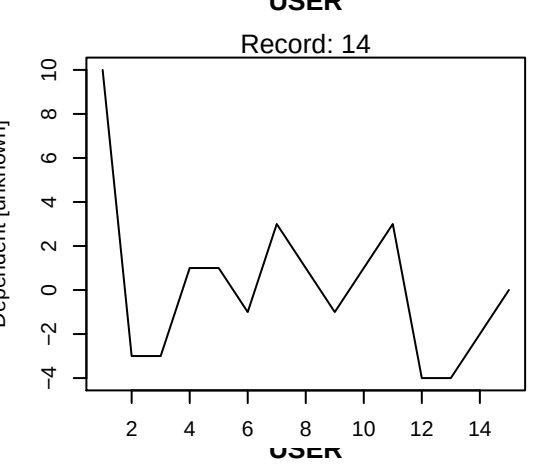

USER
Record: 13
Dependent [unknown]
10
5
0
−5
2
4
6
8
10
12
14

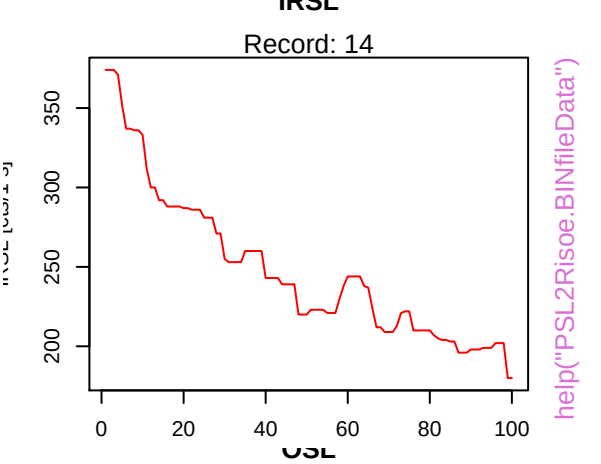

IRSL
Record: 13
700
600
500
400
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")

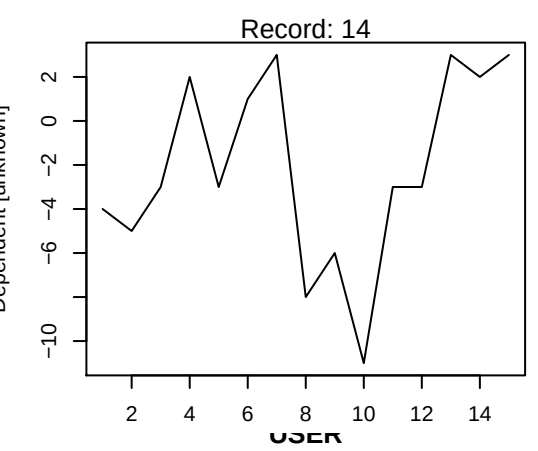

USER
Record: 13
Dependent [unknown]
10
5
0
−5
−15
2
4
6
8
10
12
14

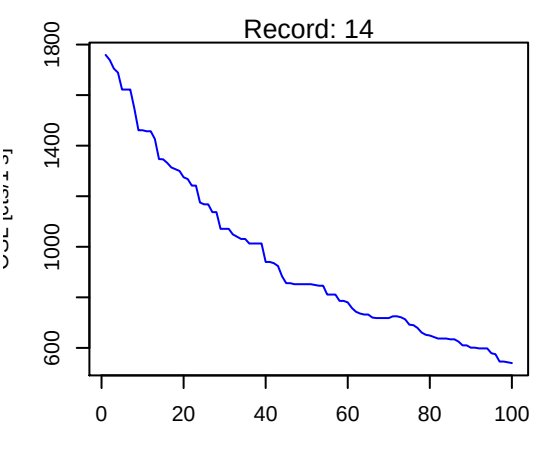

USL
Record: 13
4500
3500
2500
1500
0
20
40
60
80
100

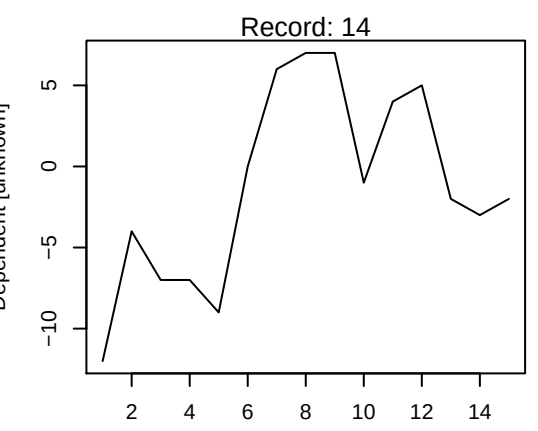

USER
Record: 13
Dependent [unknown]
10
5
0
−5
−10
2
4
6
8
10
12
14

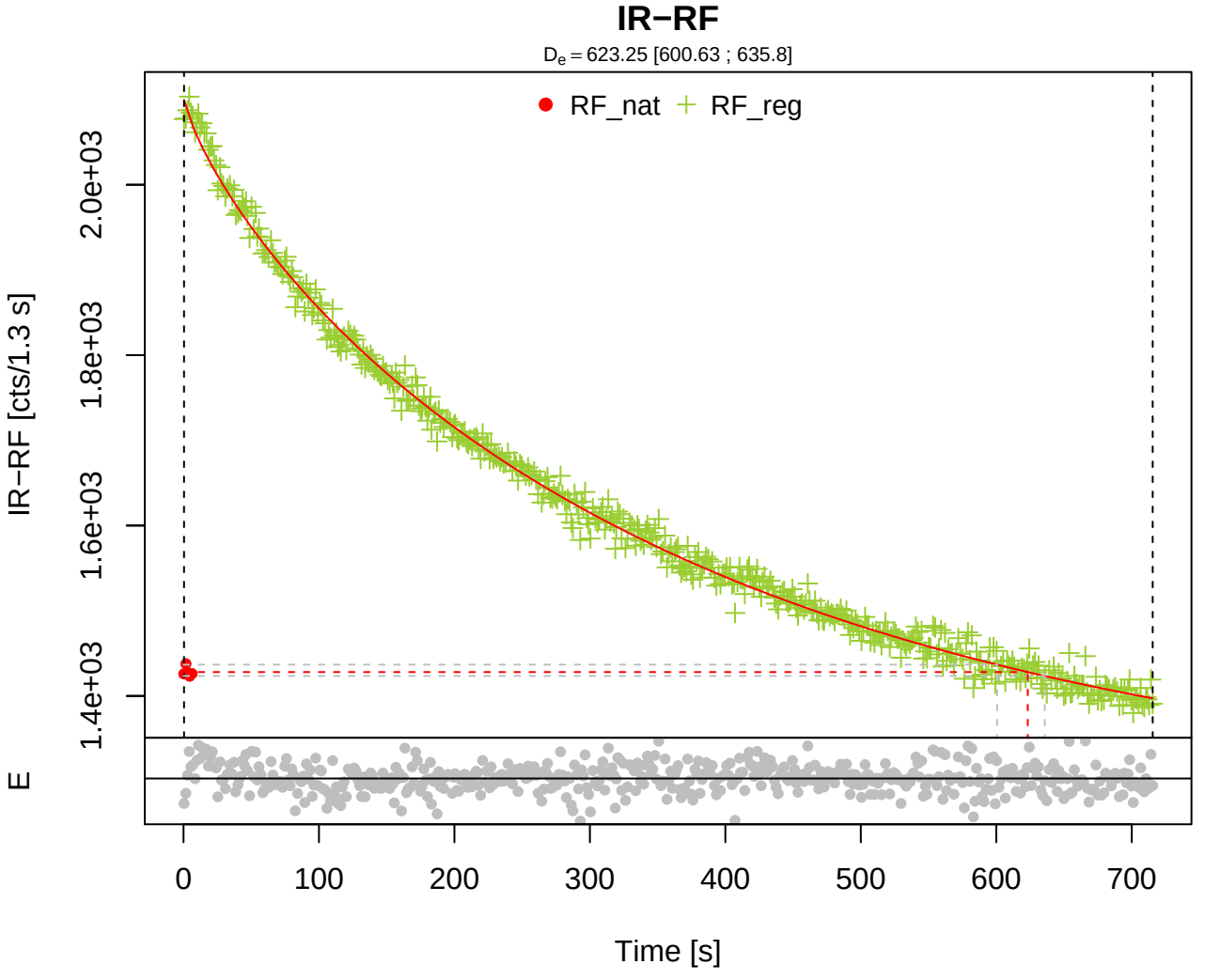

USER
Record: 14
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14

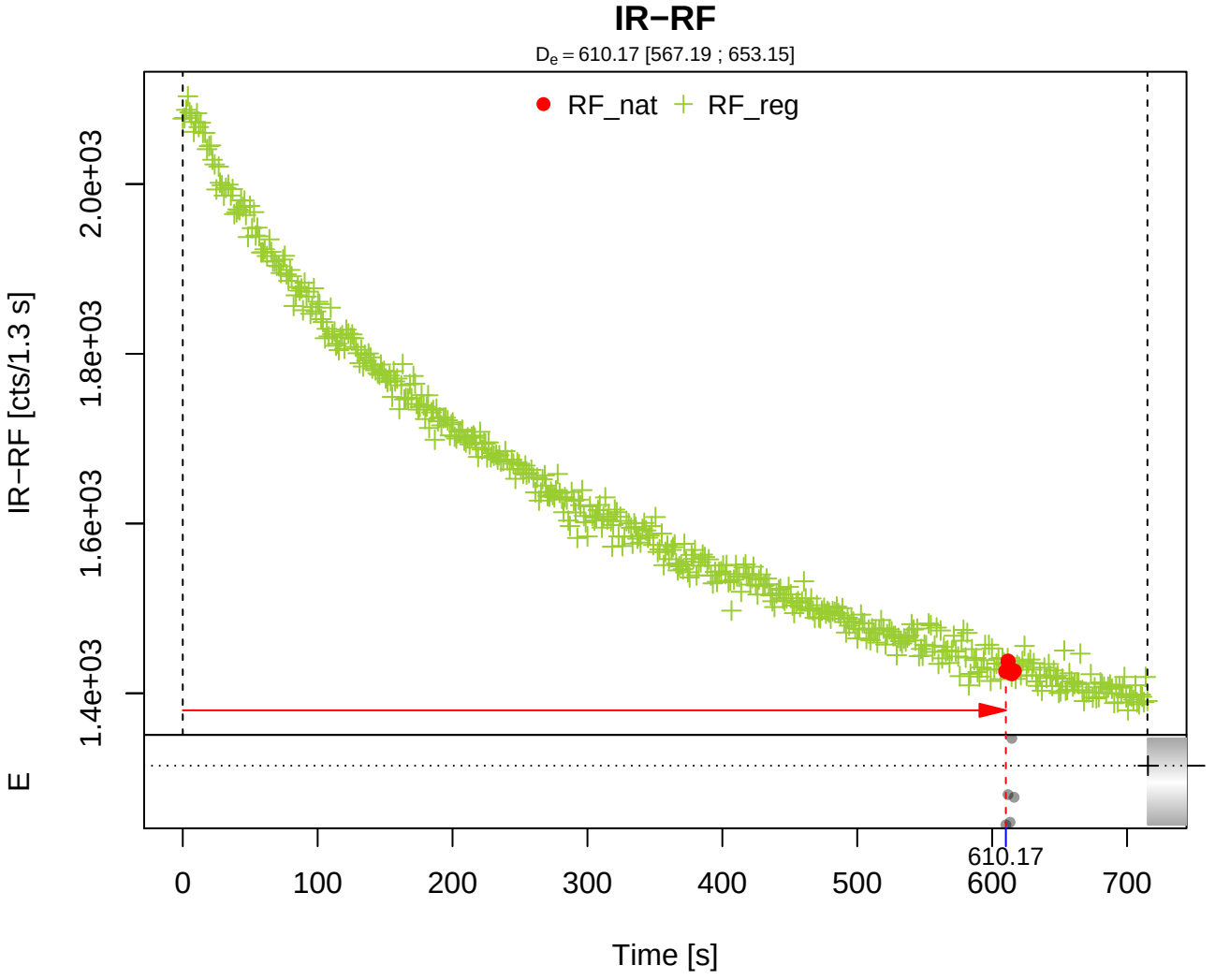

IRSL
Record: 14
350
300
250
200
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")

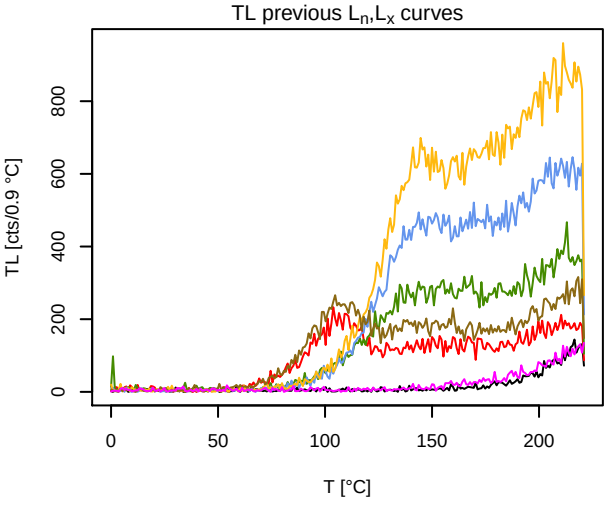

USER
Record: 14
Dependent [unknown]
2
0
−2
−4
−6
−10
2
4
6
8
10
12
14

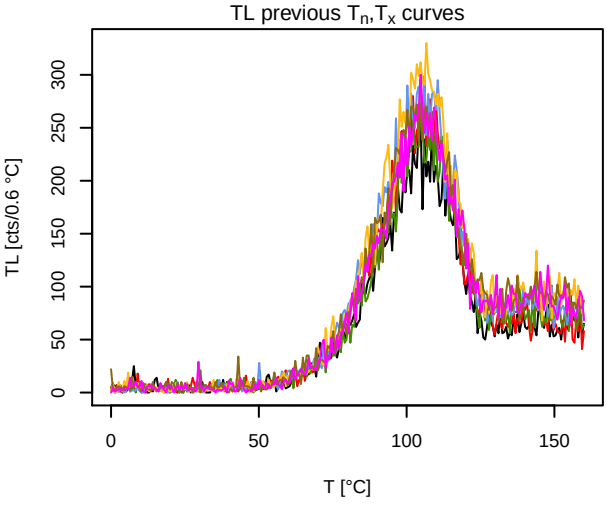

USL
Record: 14
1800
1400
1000
600
0
20
40
60
80
100

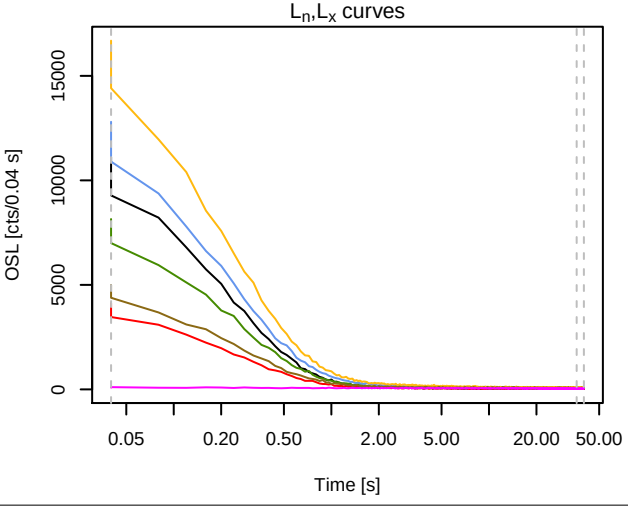

USER
Record: 14
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14

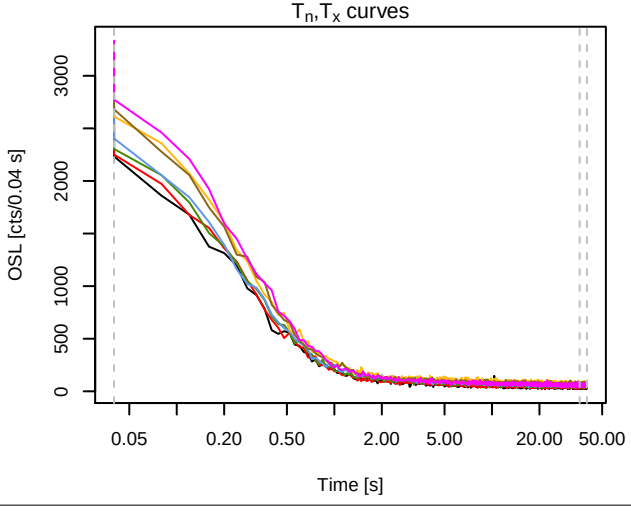

IR−RF
D_e = 623.25 [600.63 ; 635.8]
RF_nat
RF_reg
IR−RF [cts/1.3 s]
1.4e+03
1.6e+03
1.8e+03
2.0e+03
E
0
100
200
300
400
500
600
700
Time [s]


IR−RF
De = 610.17 [567.19 ; 653.15]
RF_nat
RF_reg
IR−RF [cts/1.3 s]
1.4e+03
1.6e+03
1.8e+03
2.0e+03
E
0
100
200
300
400
500
600
700
610.17
Time [s]



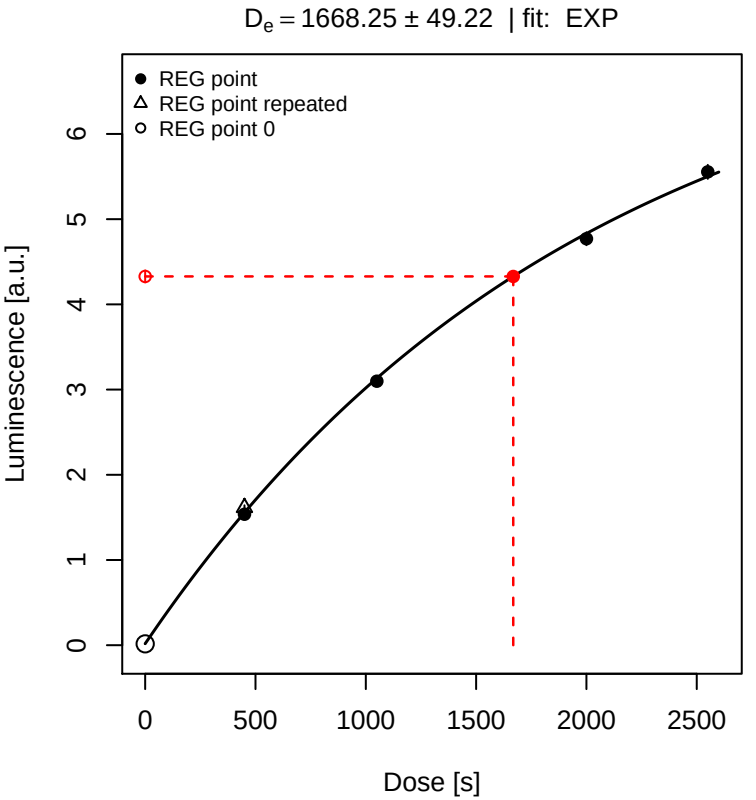


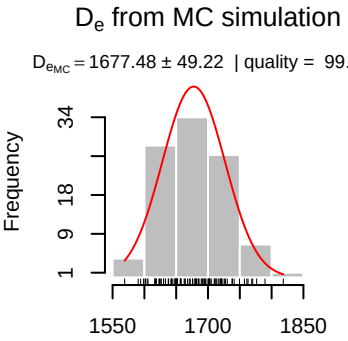


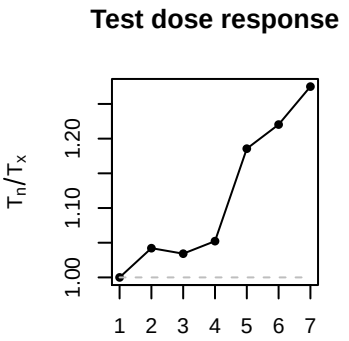


Natural (0) | R1 (450) | R2 (1050) | R3 (2000) | R4 (2550) | R5 (450) | R0 (0)

Growth curve



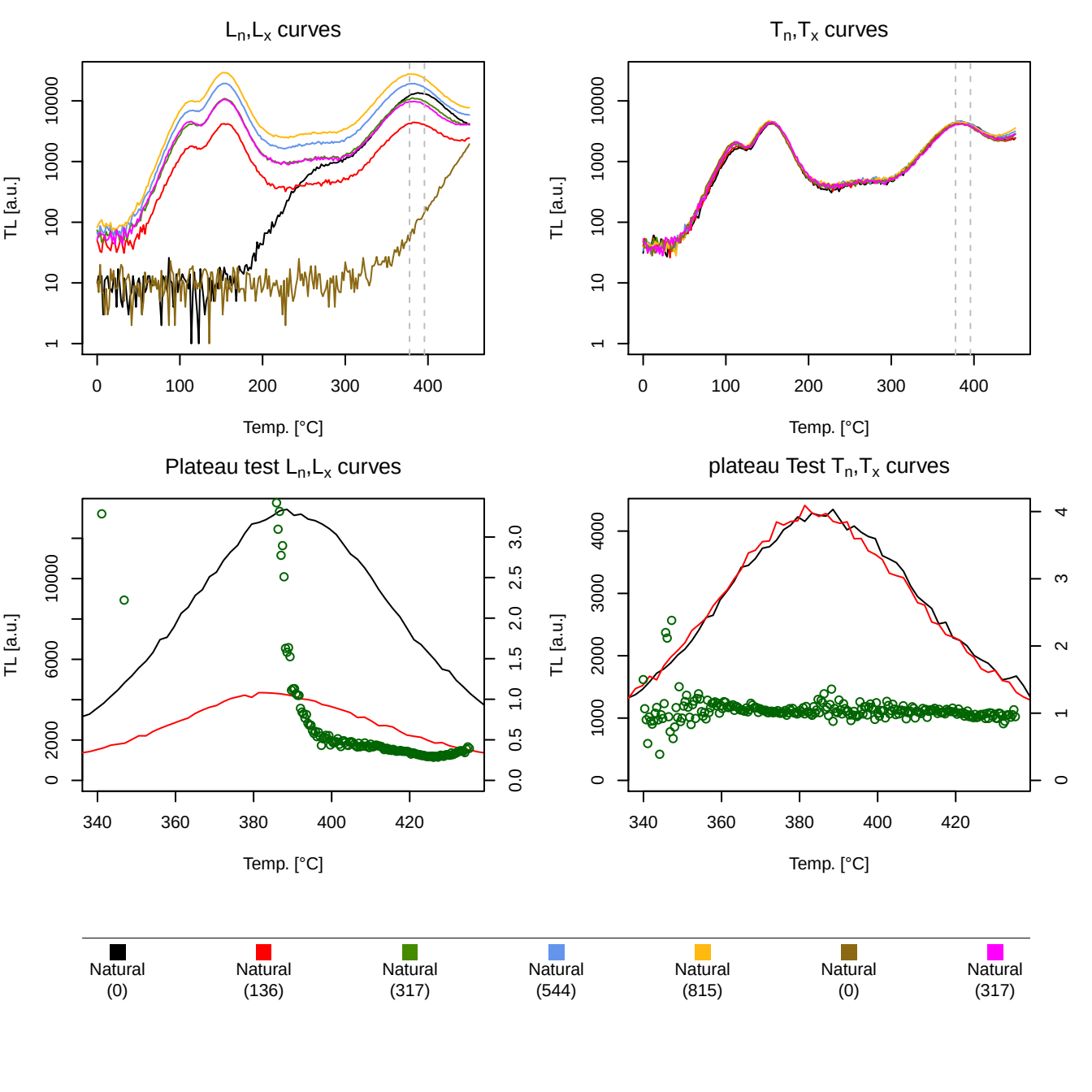


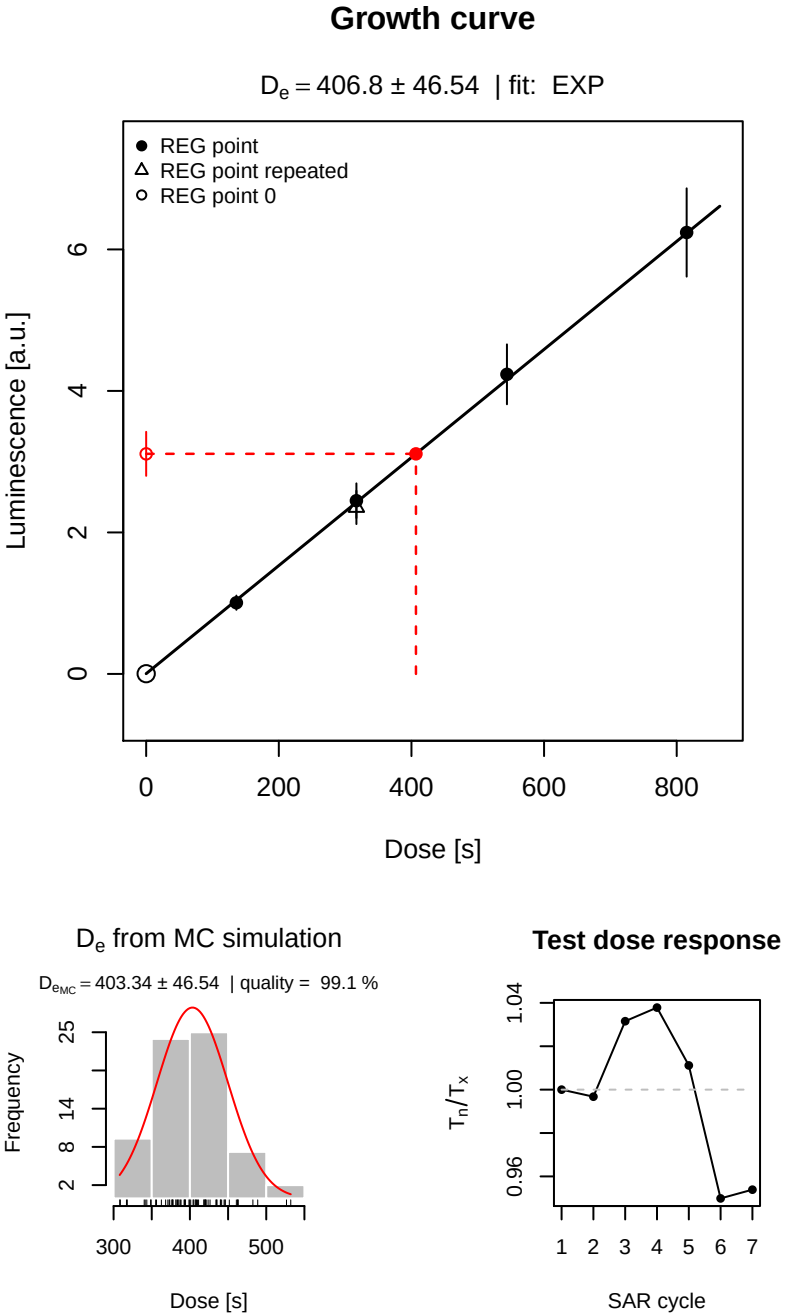


Rejection criteria

IRSL

help("analyse_SAR.CWOSL")

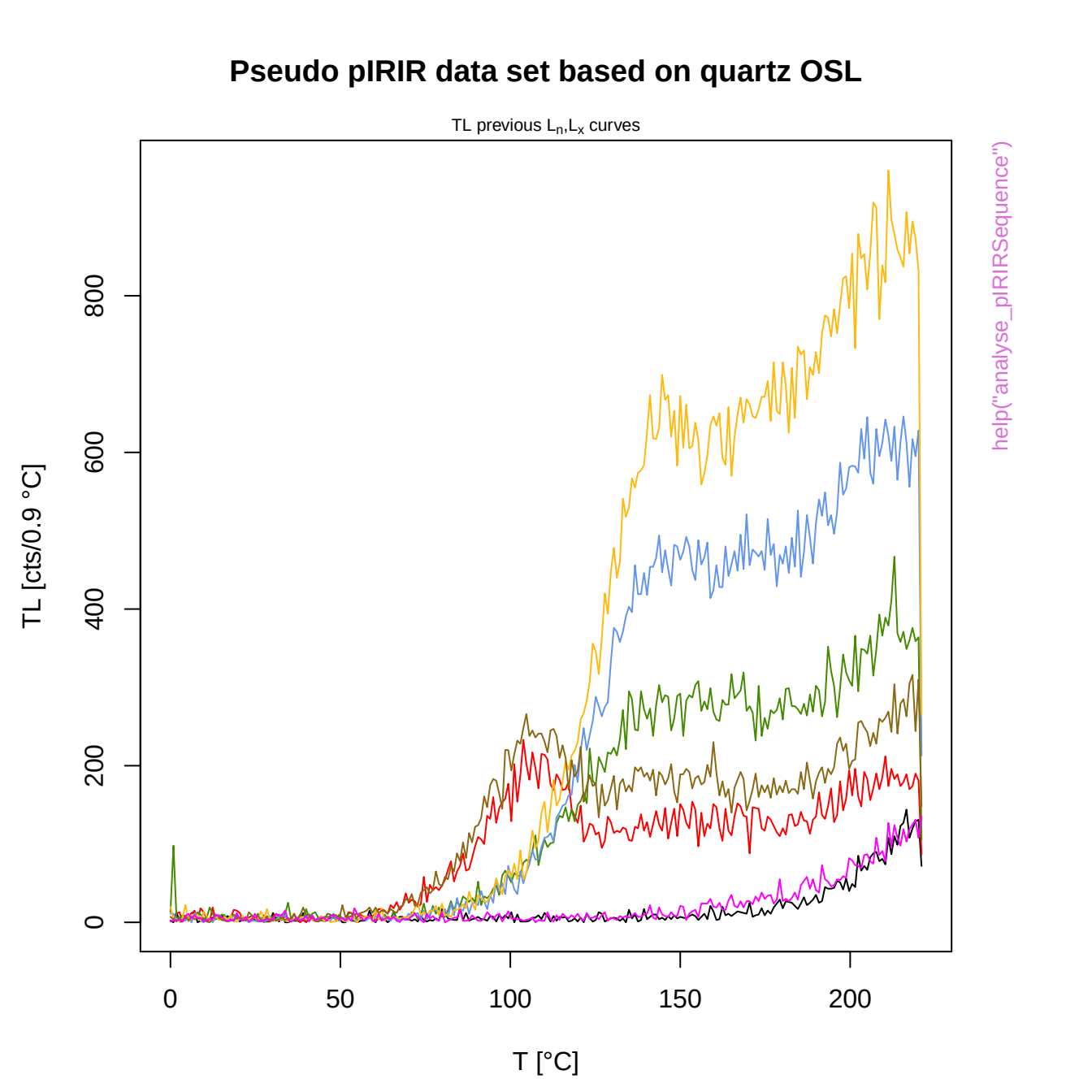

L_n,L_x curves
TL [a.u.]
1
10
100
1000
10000
0
100
200
300
400
Temp. [°C]
T_n,T_x curves
TL [a.u.]
1
10
100
1000
10000
0
100
200
300
400
Temp. [°C]
Plateau test L_n,L_x curves
TL [a.u.]
0
2000
6000
10000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
340
360
380
400
420
Temp. [°C]
plateau Test T_n,T_x curves
TL [a.u.]
0
1000
2000
3000
4000
0
1
2
3
4
340
360
380
400
420
Temp. [°C]
Natural (0)
Natural (136)
Natural (317)
Natural (544)
Natural (815)
Natural (0)
Natural (317)

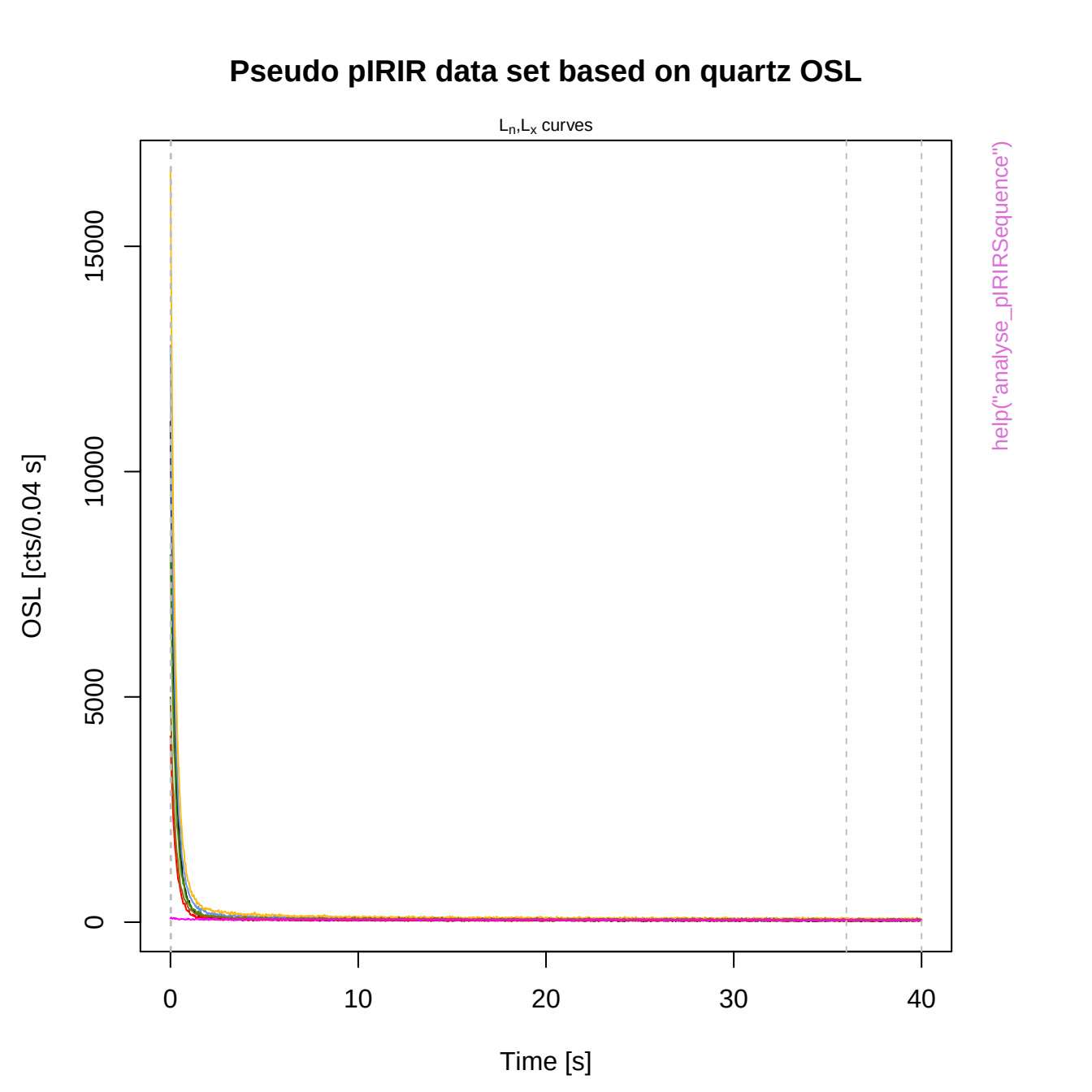

Growth curve
$D_e = 406.8 \pm 46.54$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
2
4
6
0
200
400
600
800
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 403.34 \pm 46.54$ | quality = 99.1 %
Frequency
2
8
14
25
300
400
500
Dose [s]
n = 100, valid fits = 67
Test dose response
T_n/T_x
0.96
1.00
1.04
1
2
3
4
5
6
7
SAR cycle

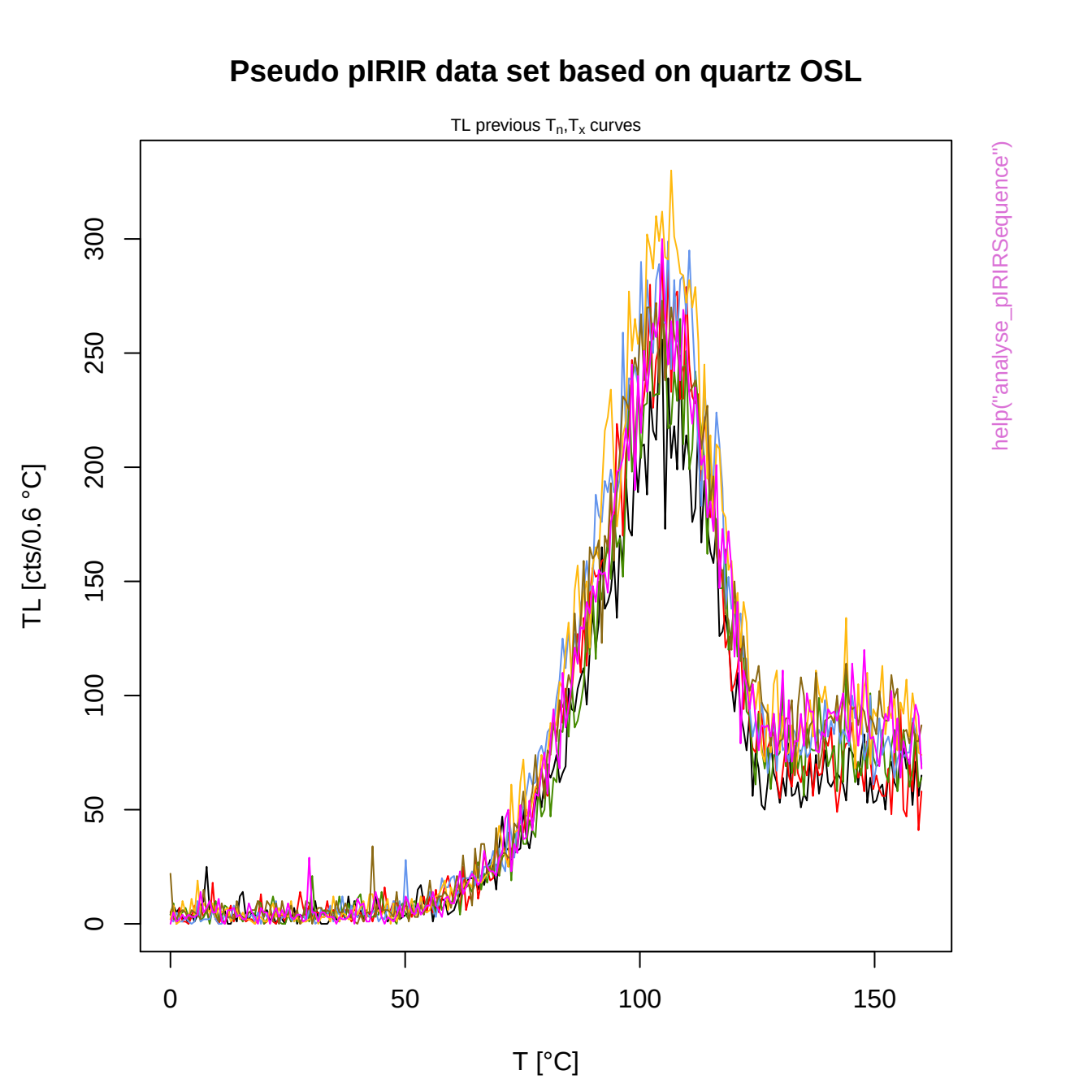
Pseudo pIRIR data set based on quartz OSL

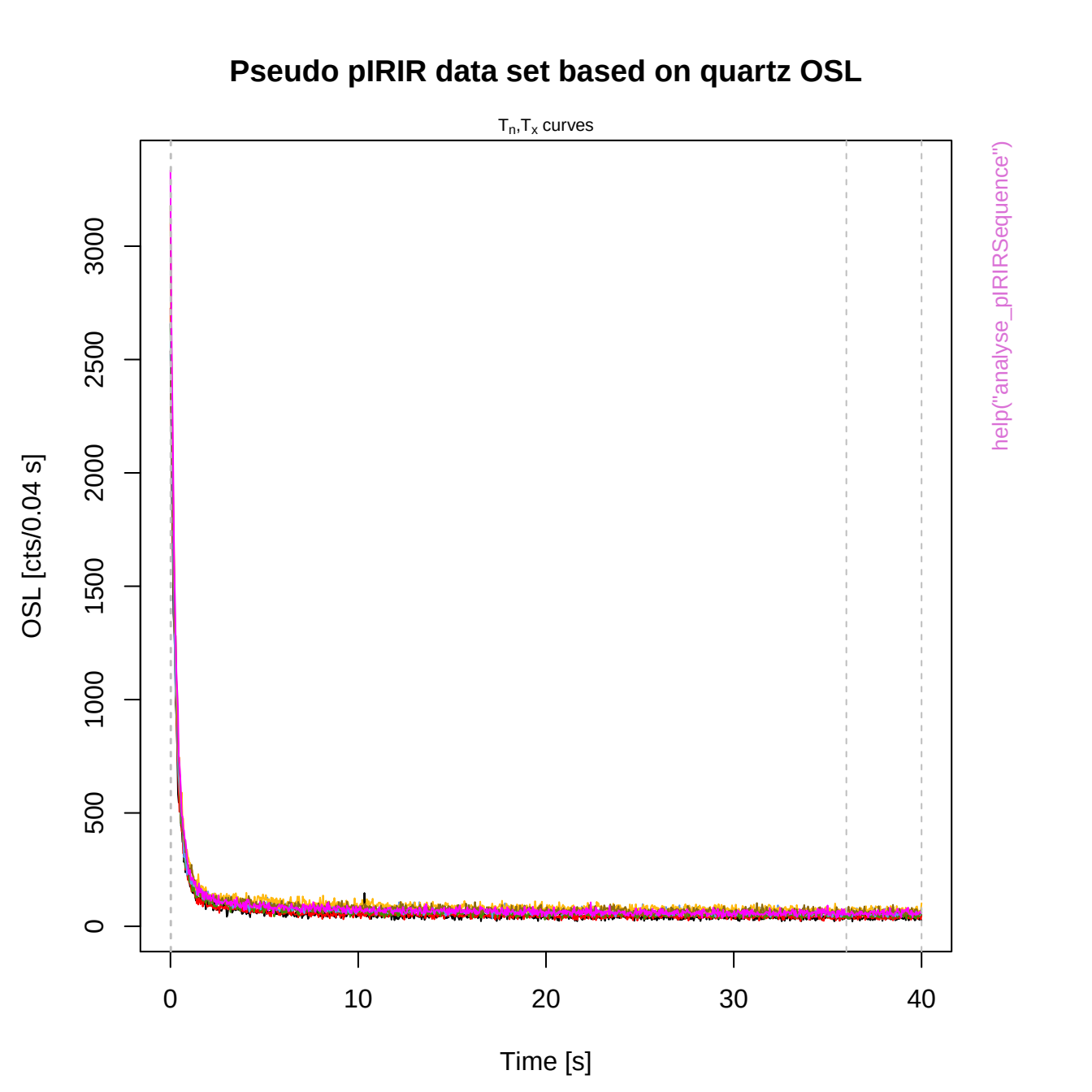
help("analyse_pIRIRSequence")

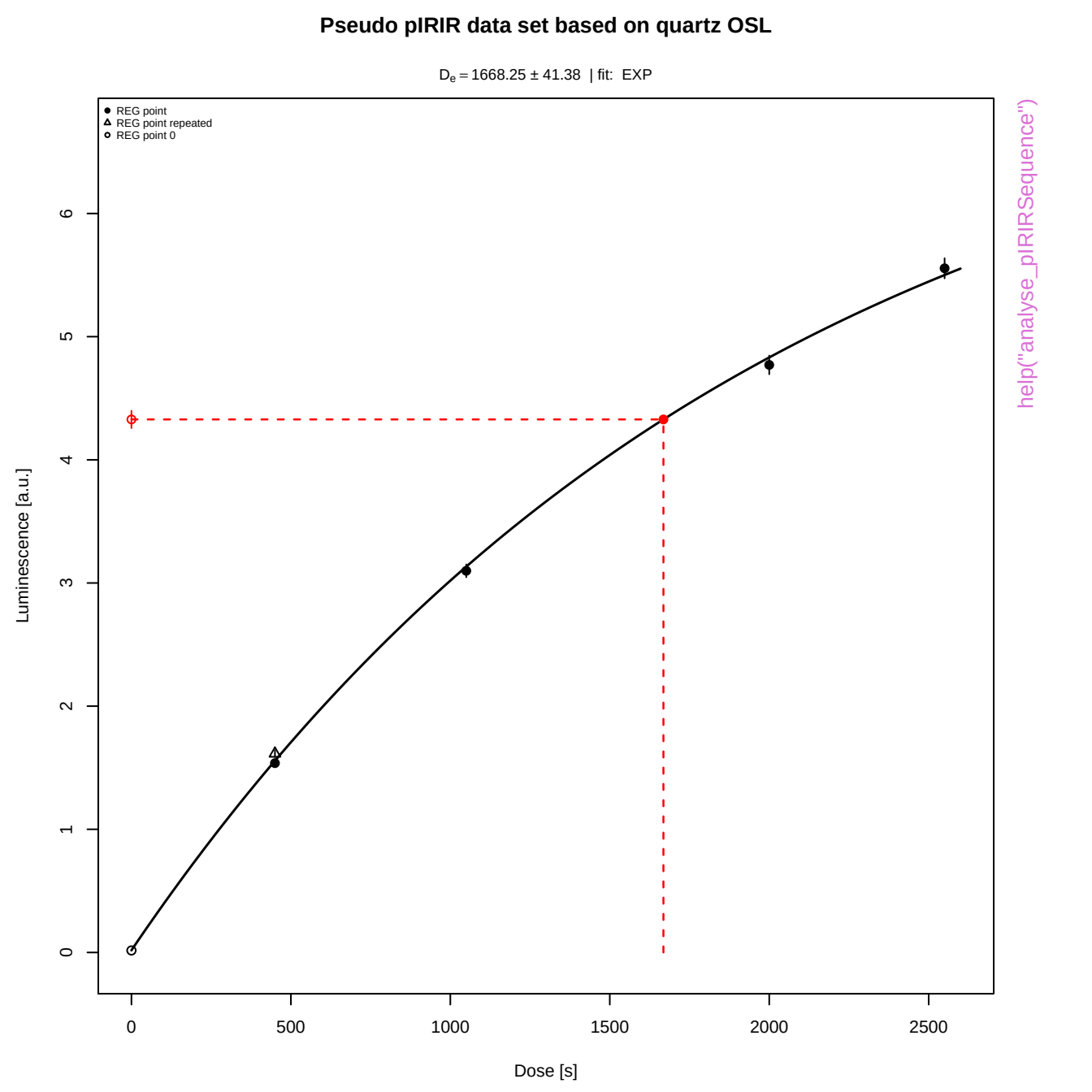
TL
pseudoIRSL1
pseudoIRSL2

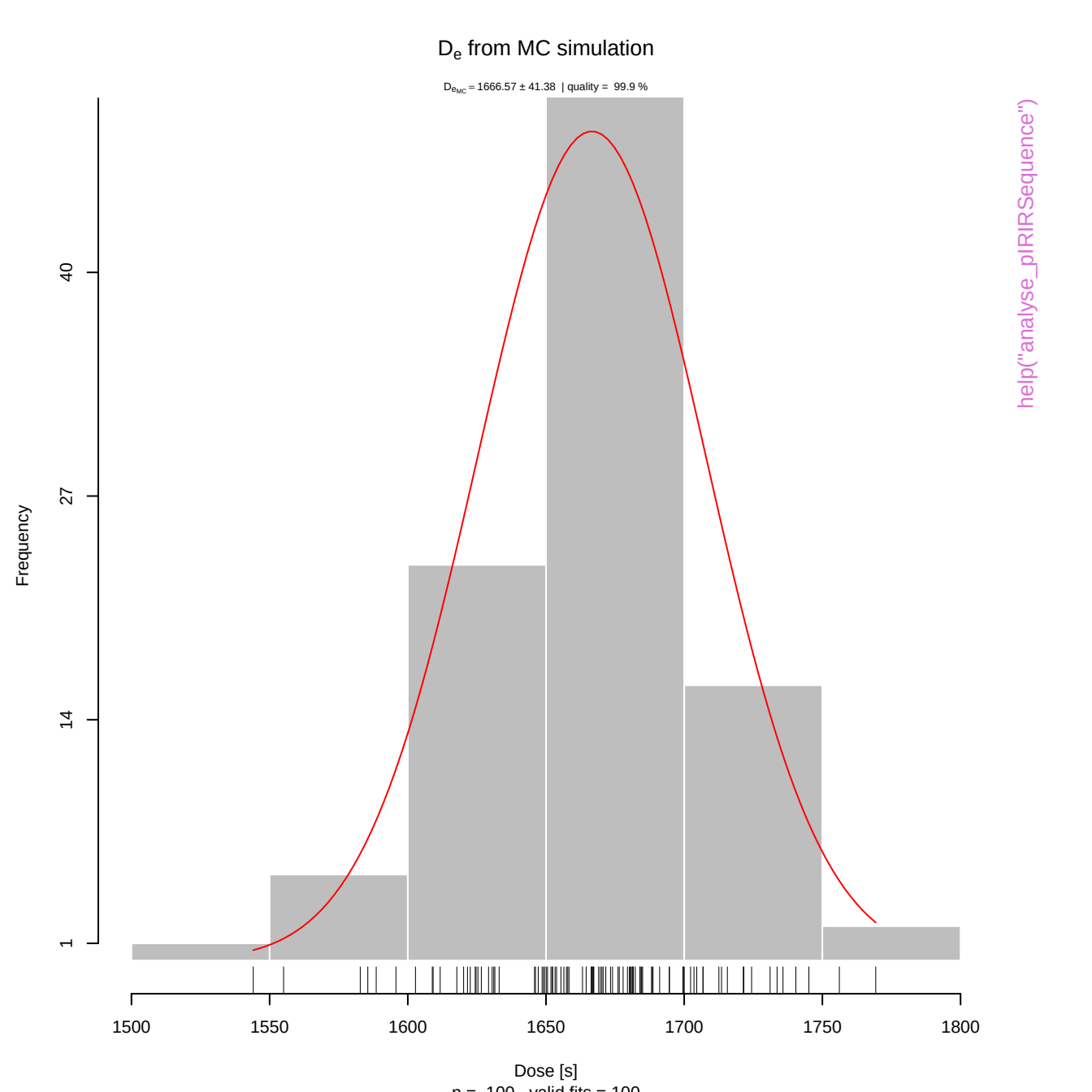

Pseudo pIRIR data set based on quartz OSL
TL previous L_n,L_x curves
TL [cts/0.9 °C]
0
200
400
600
800
0
50
100
150
200
T [°C]
help("analyse_pIRIRSequence")

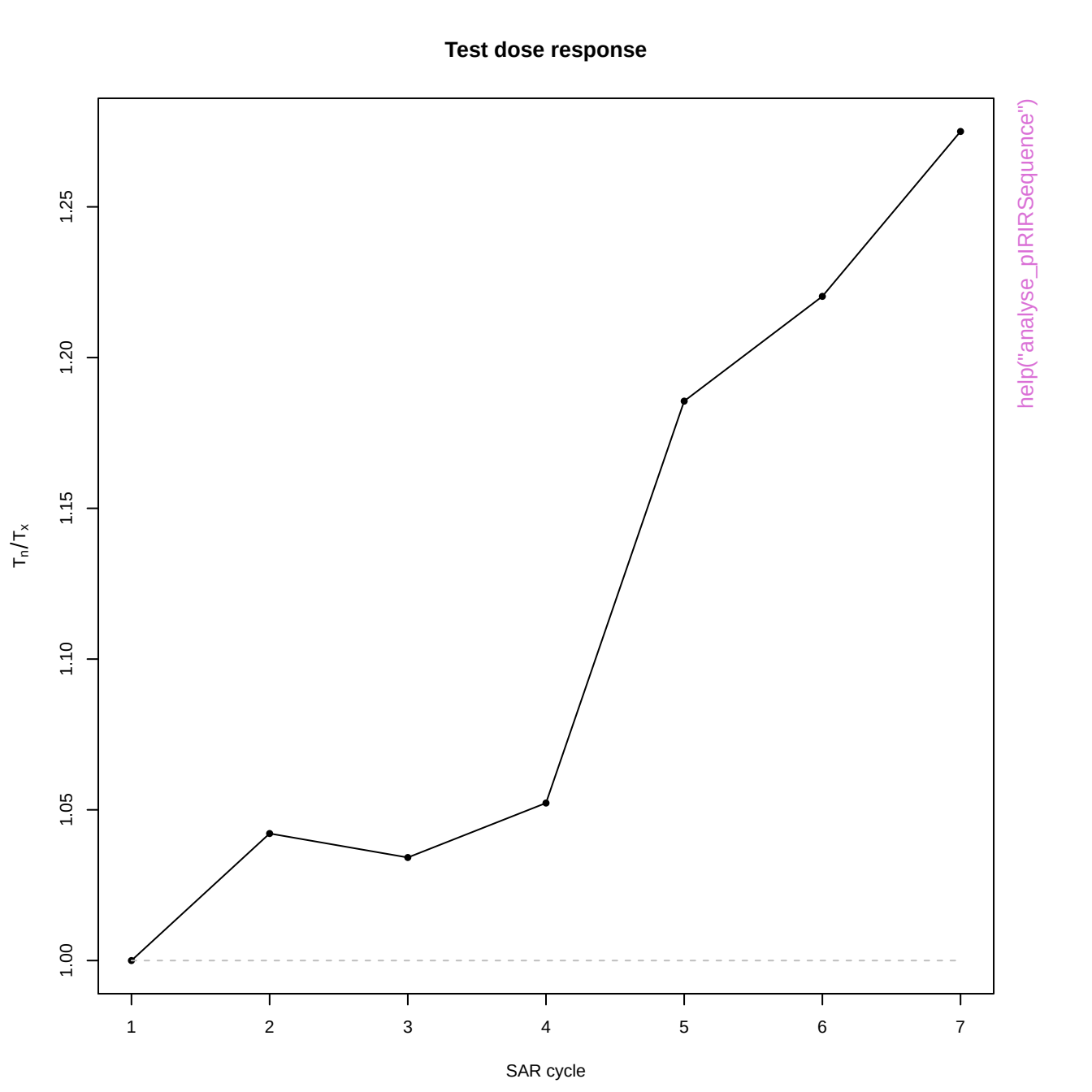

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]
help("analyse_pIRIRSequence")

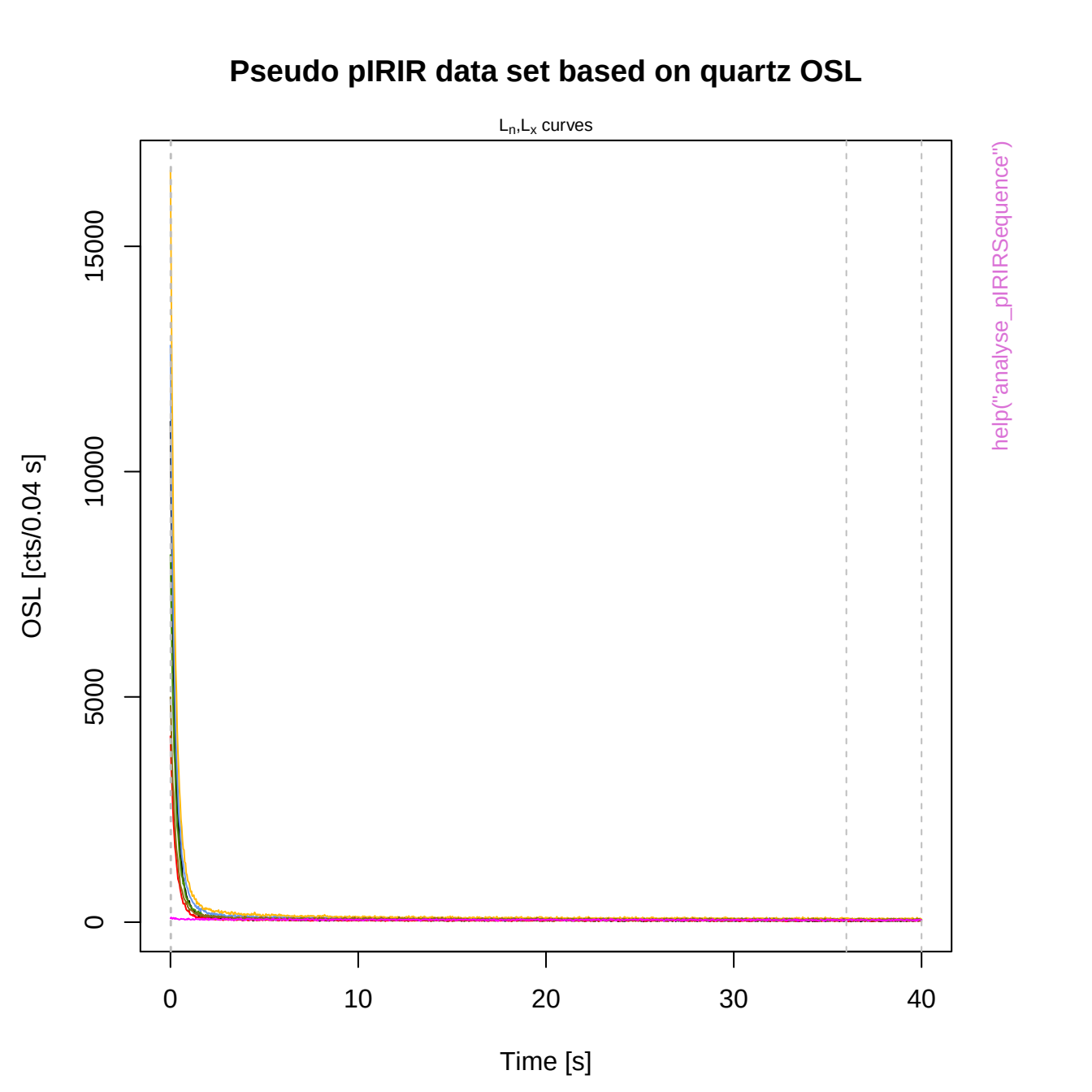

Pseudo pIRIR data set based on quartz OSL
TL previous T_n,T_x curves
TL [cts/0.6 °C]
0
50
100
150
200
250
300
T [°C]
0
50
100
150
help("analyse_pIRIRSequence")

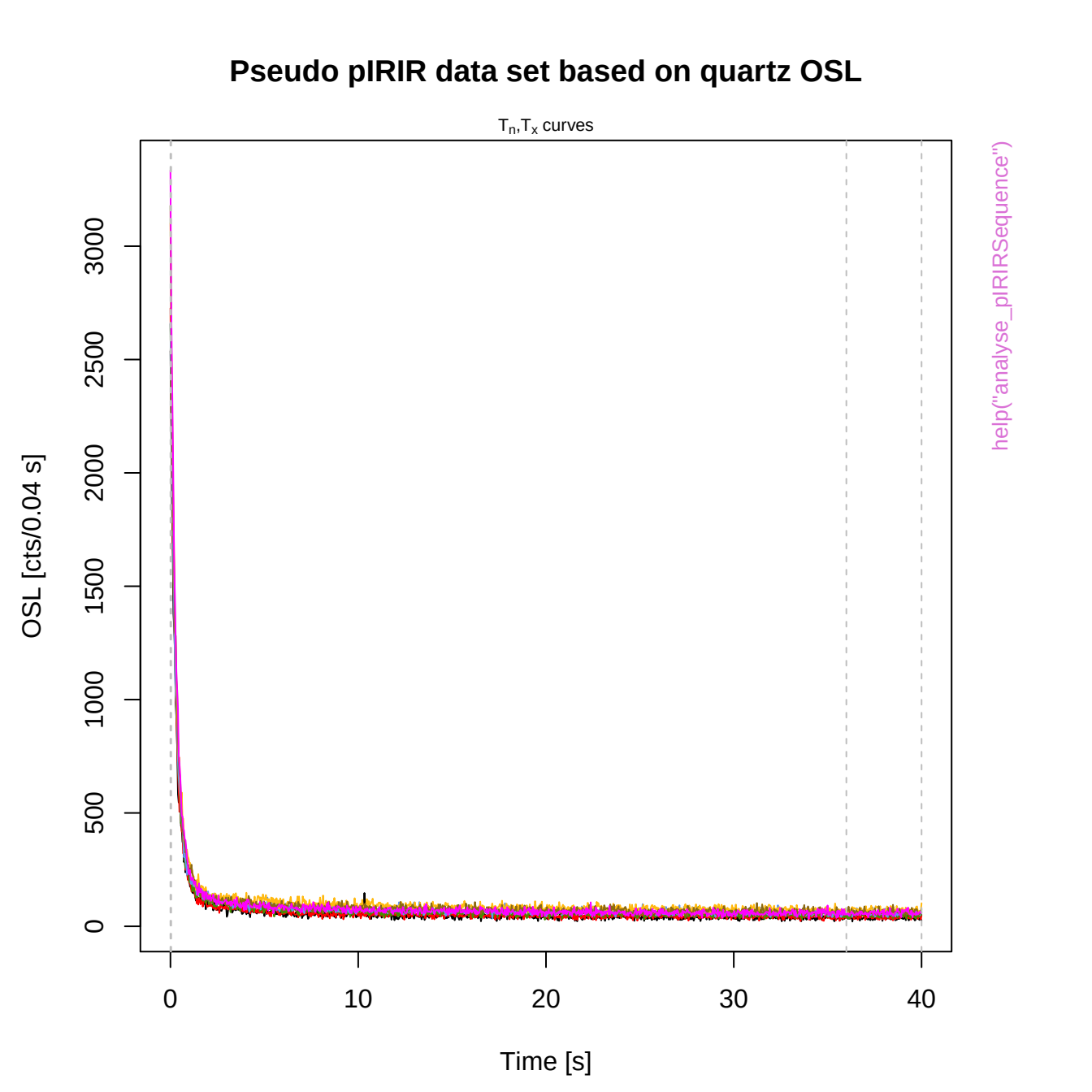

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
0
10
20
30
40
Time [s]
help("analyse_pIRIRSequence")


Pseudo pIRIR data set based on quartz OSL
De = 1668.25 ± 41.38 | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
Dose [s]
help("analyse_pIRIRSequence")

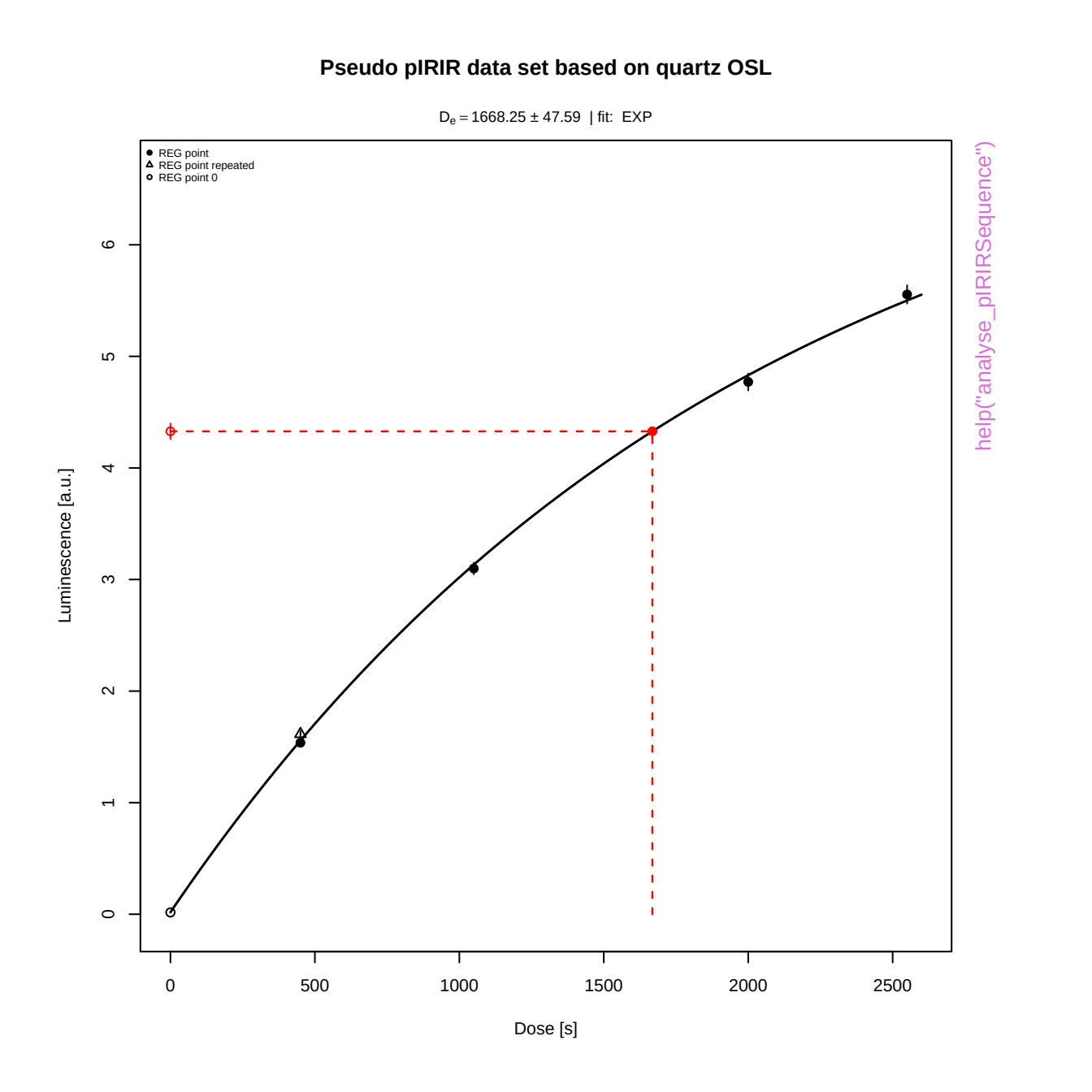

D$_e$ from MC simulation
$D_{e_{MC}}$ = 1666.57 ± 41.38 | quality = 99.9 %
help("analyse_pIRIRSequence")
Frequency
1
14
27
40
1500
1550
1600
1650
1700
1750
1800
Dose [s]
n = 100, valid fits = 100

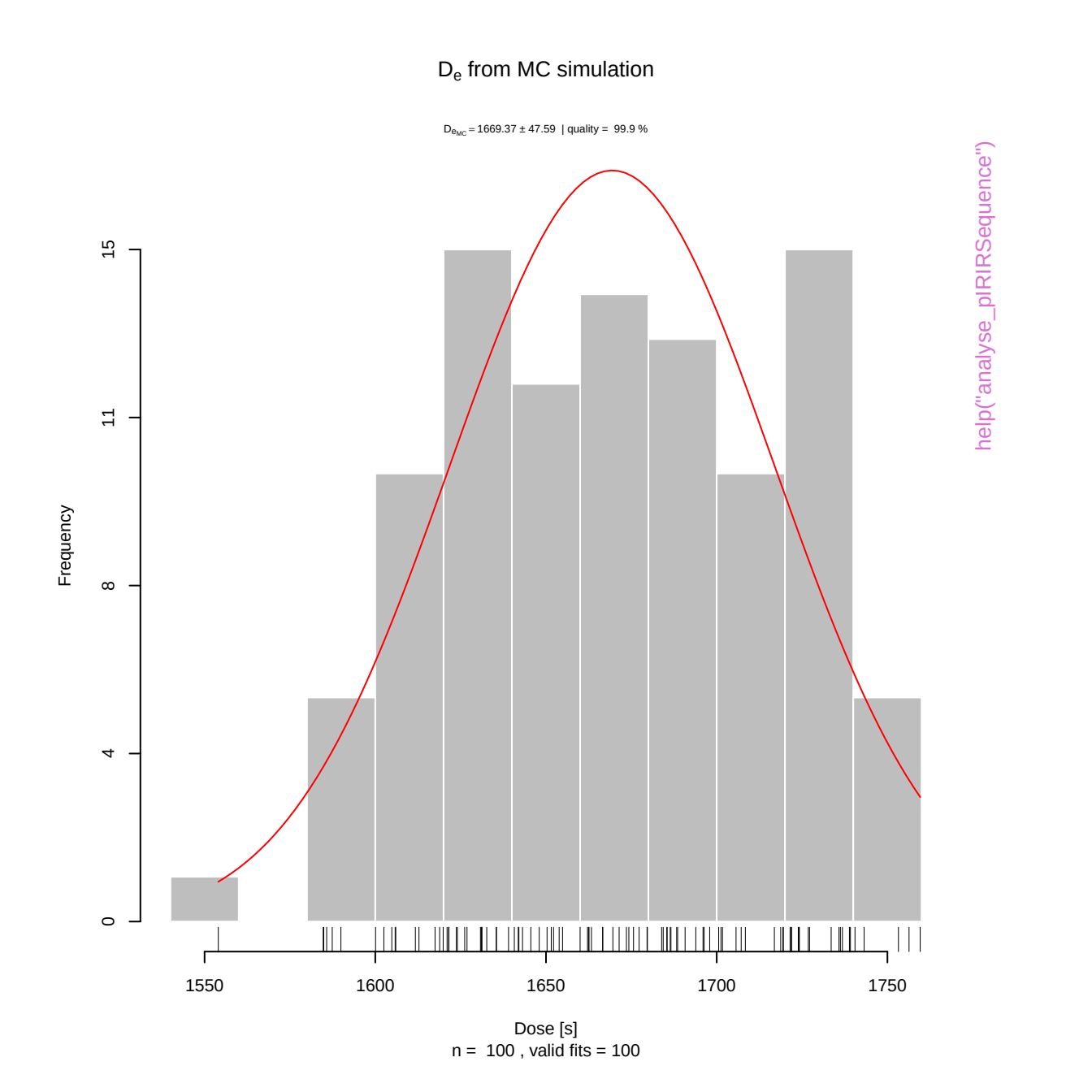

Test dose response
help("analyse_plRIRSequence")
T_n/T_x
1.00
1.05
1.10
1.15
1.20
1.25
1
2
3
4
5
6
7
SAR cycle

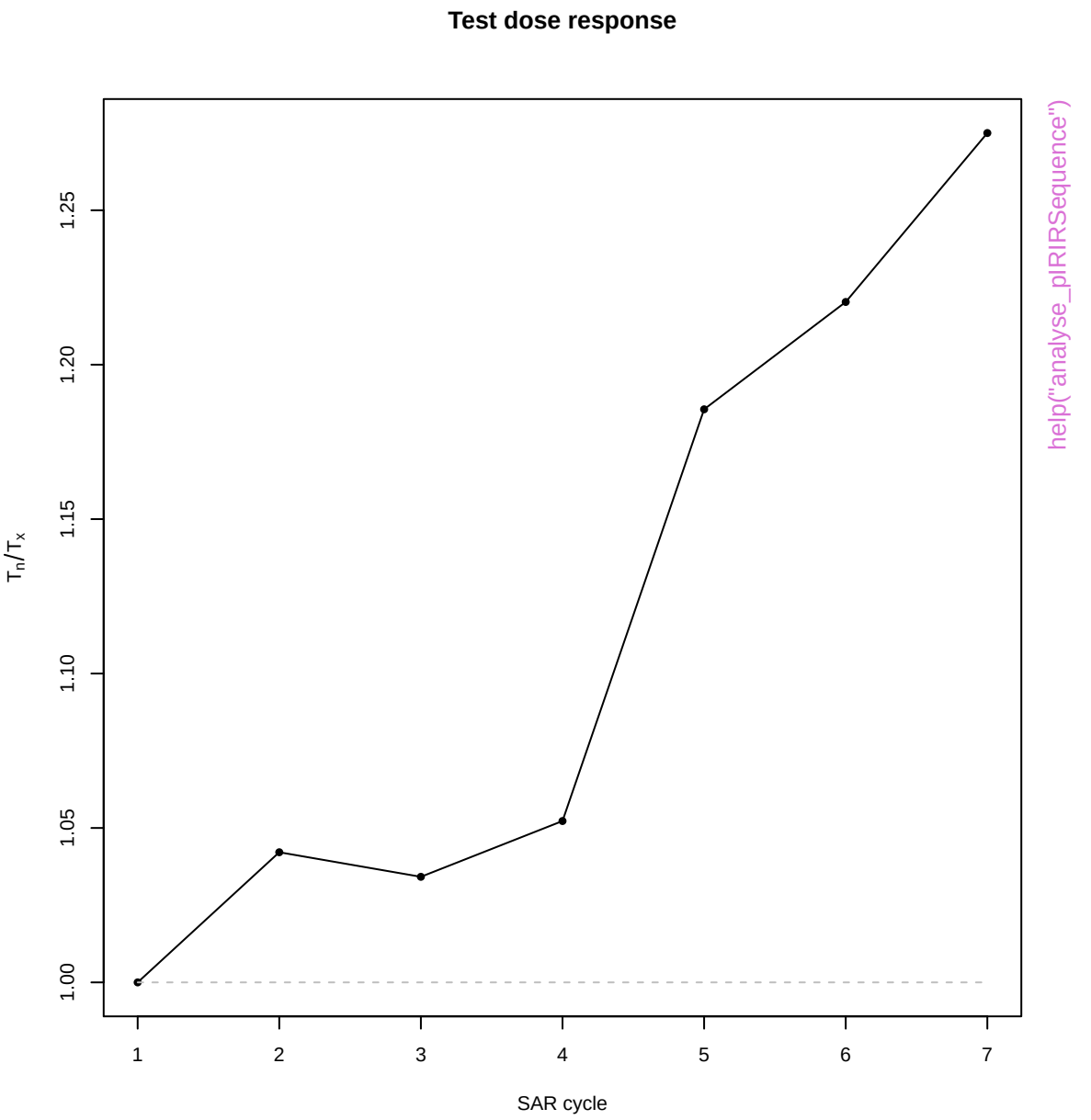

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]
help("analyse_pIRIRSequence")

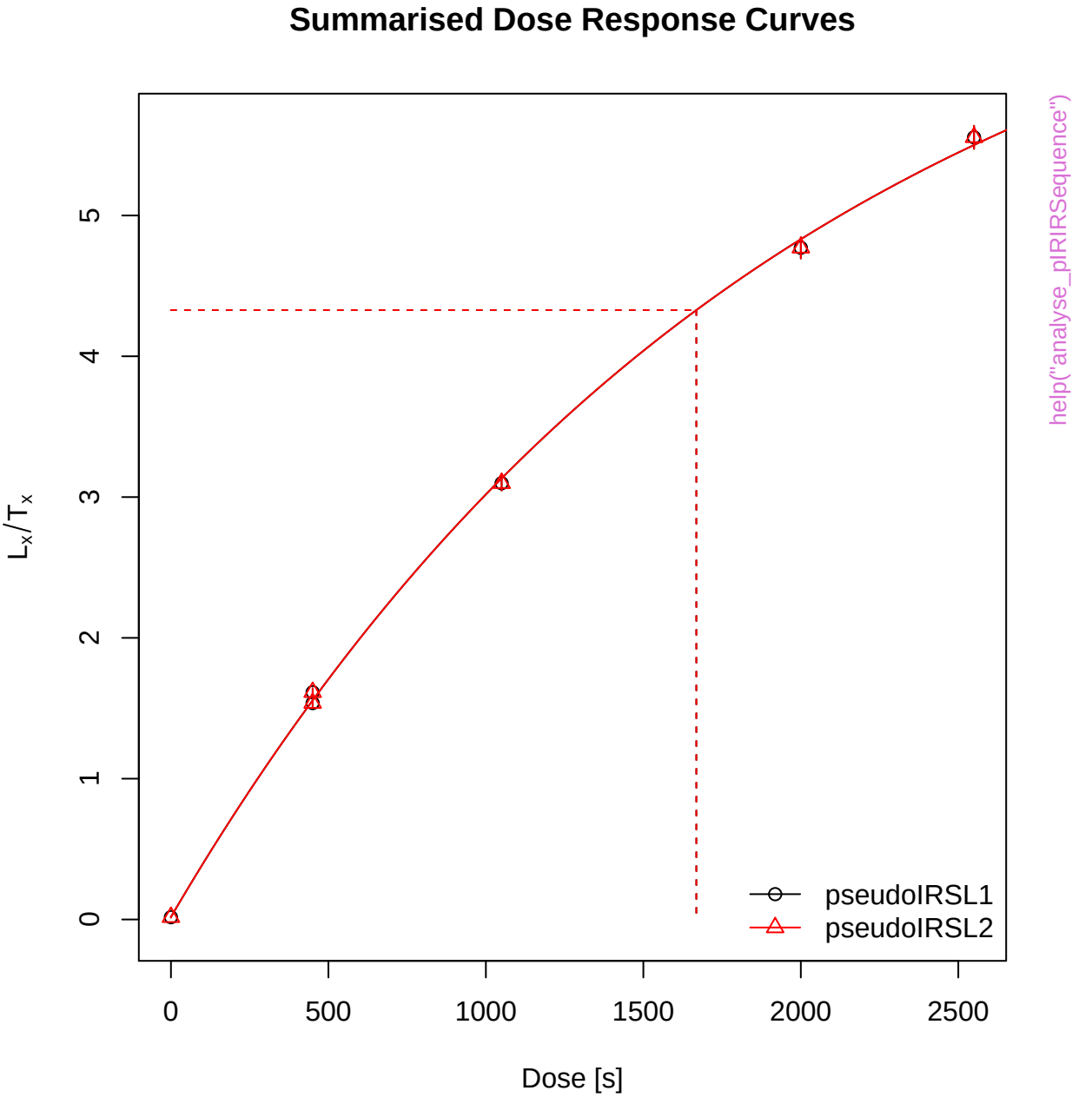

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
0
10
20
30
40
Time [s]
help("analyse_pIRIRSequence")

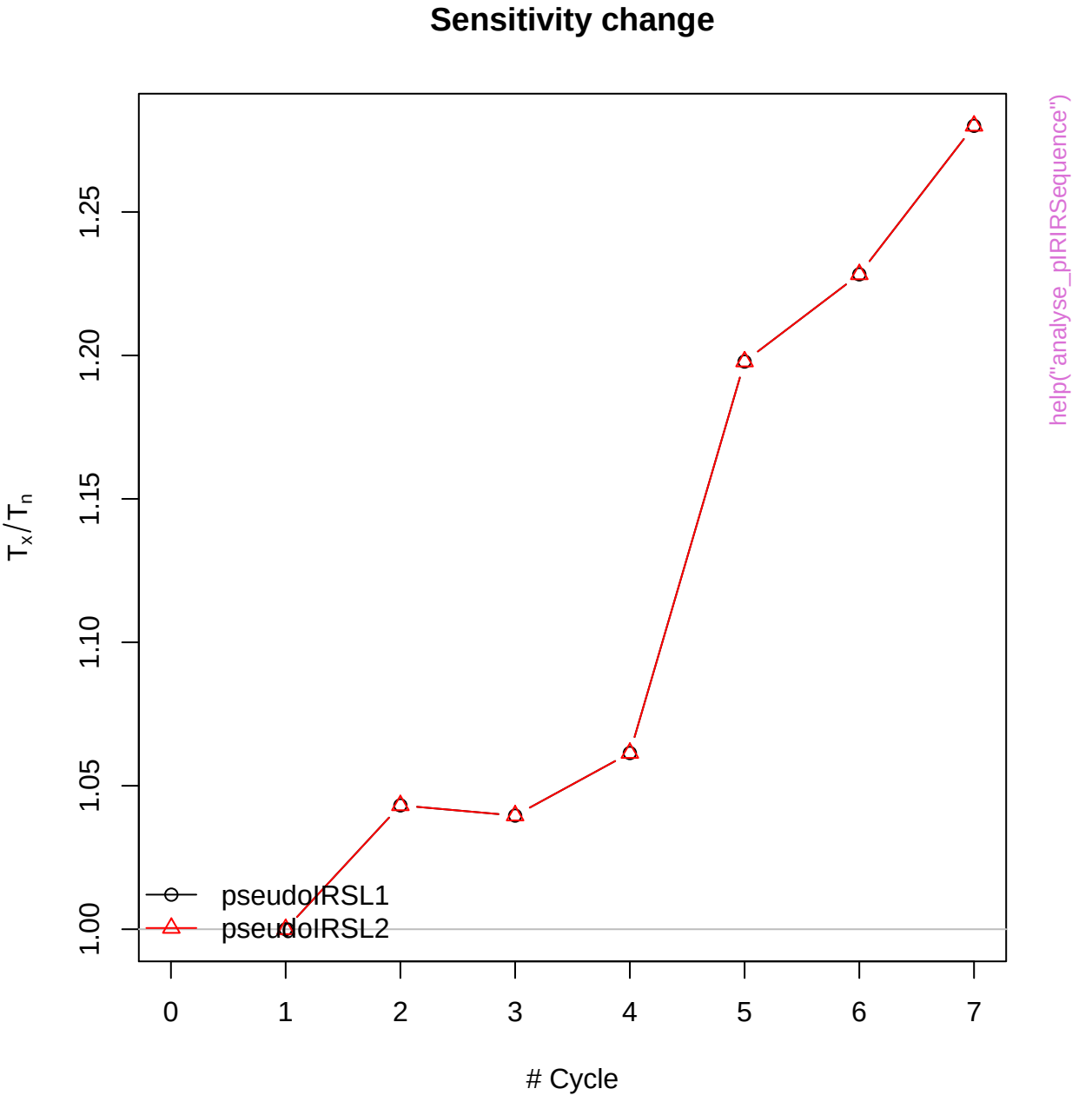
help("analyse_plRIRSequence")

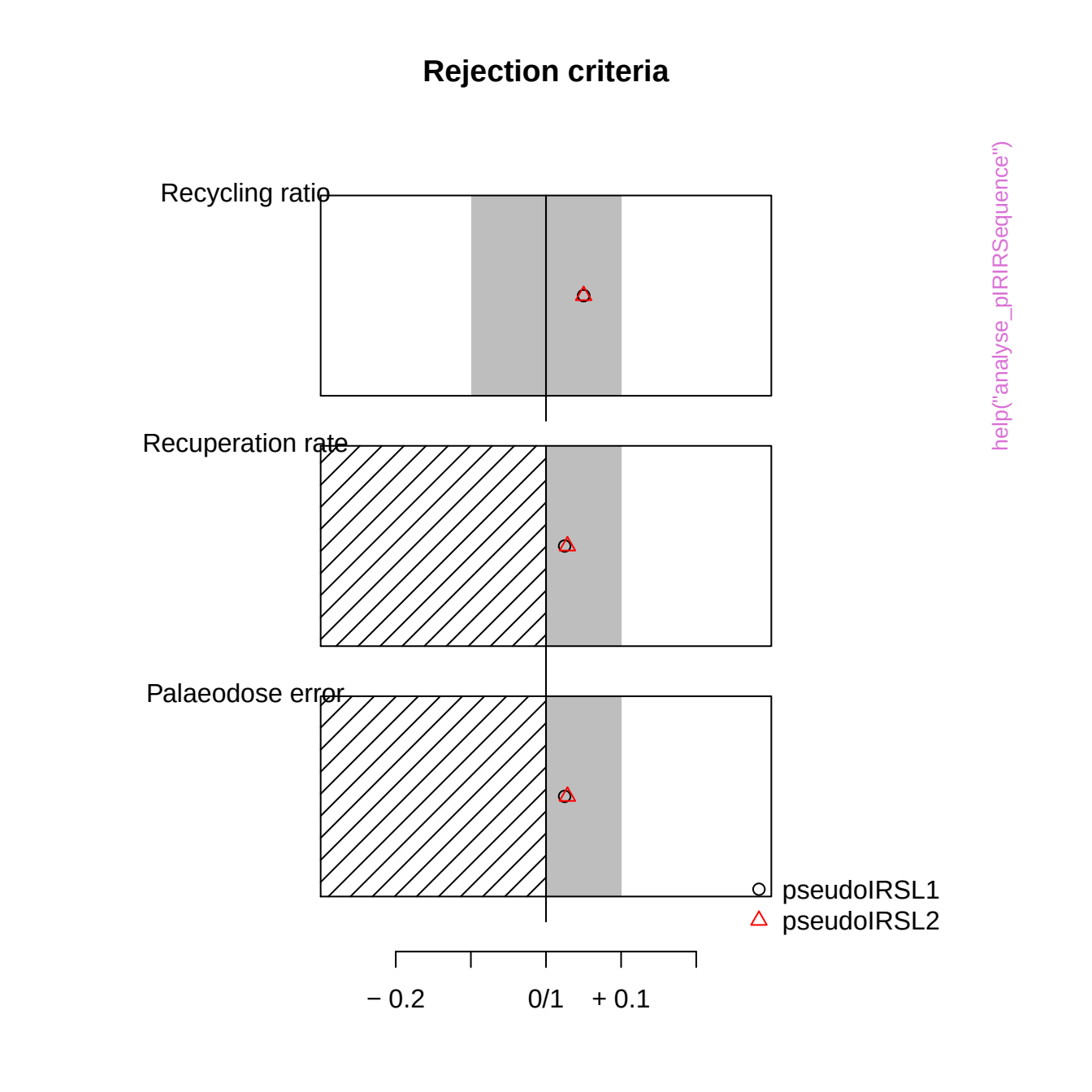

Pseudo pIRIR data set based on quartz OSL
De = 1668.25 ± 47.59 | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
Dose [s]
0
500
1000
1500
2000
2500
1
2
3
4
5
6
help("analyse_pIRIRSequence")

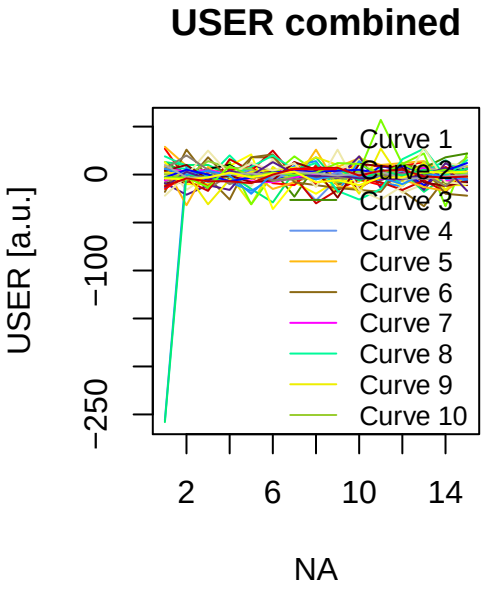

D_e from MC simulation
D_eMC = 1669.37 ± 47.59 | quality = 99.9 %
help("analyse_pIRIRSequence")
Frequency
0
4
8
11
15
1550
1600
1650
1700
1750
Dose [s]
n = 100 , valid fits = 100

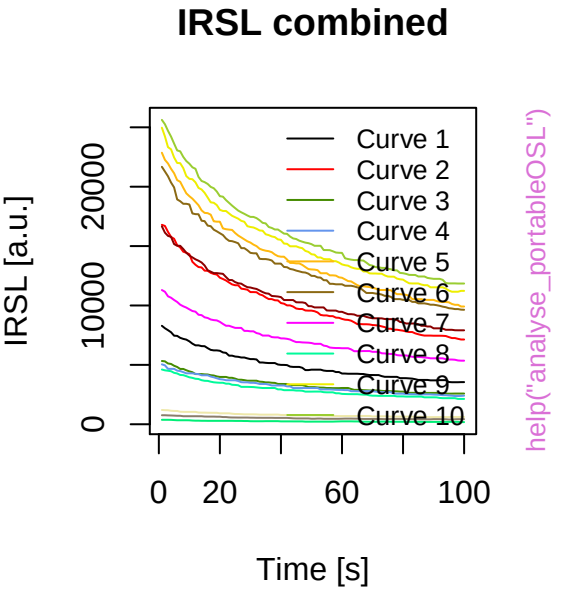

Test dose response
T_n/T_x
1.00
1.05
1.10
1.15
1.20
1.25
1
2
3
4
5
6
7
SAR cycle
help("analyse_pIRIRSequence")

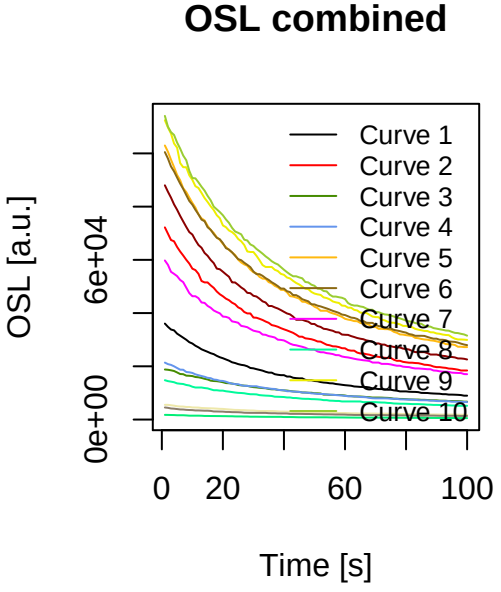

Summarised Dose Response Curves
help("analyse_pIRIRSequence")
L_x/T_x
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose [s]
pseudoIRSL1
pseudoIRSL2

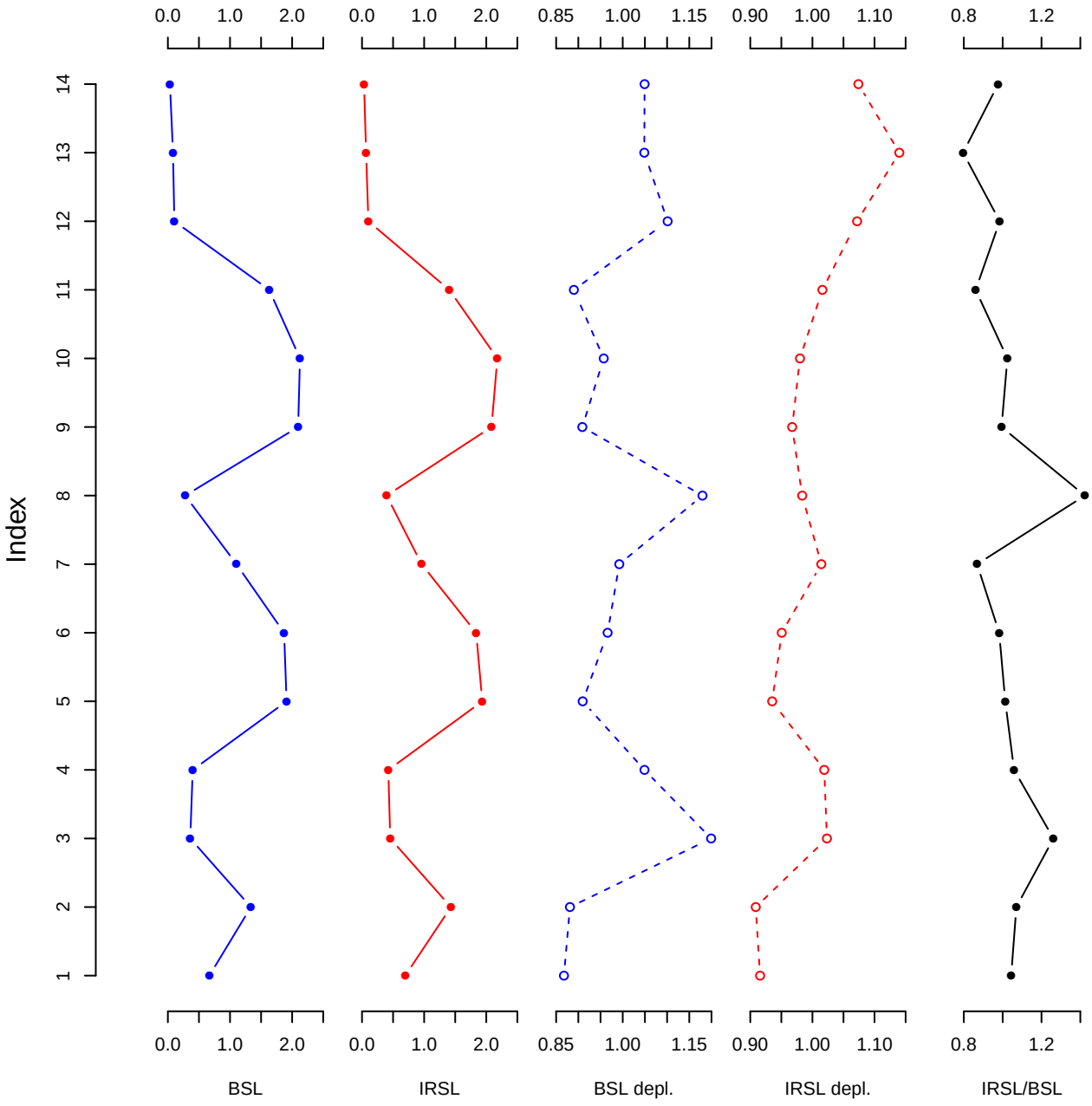

Sensitivity change
help("analyse_pIRIRSequence")
T_x/T_n
1.00
1.05
1.10
1.15
1.20
1.25
0
1
2
3
4
5
6
7
Cycle
pseudoIRSL1
pseudoIRSL2

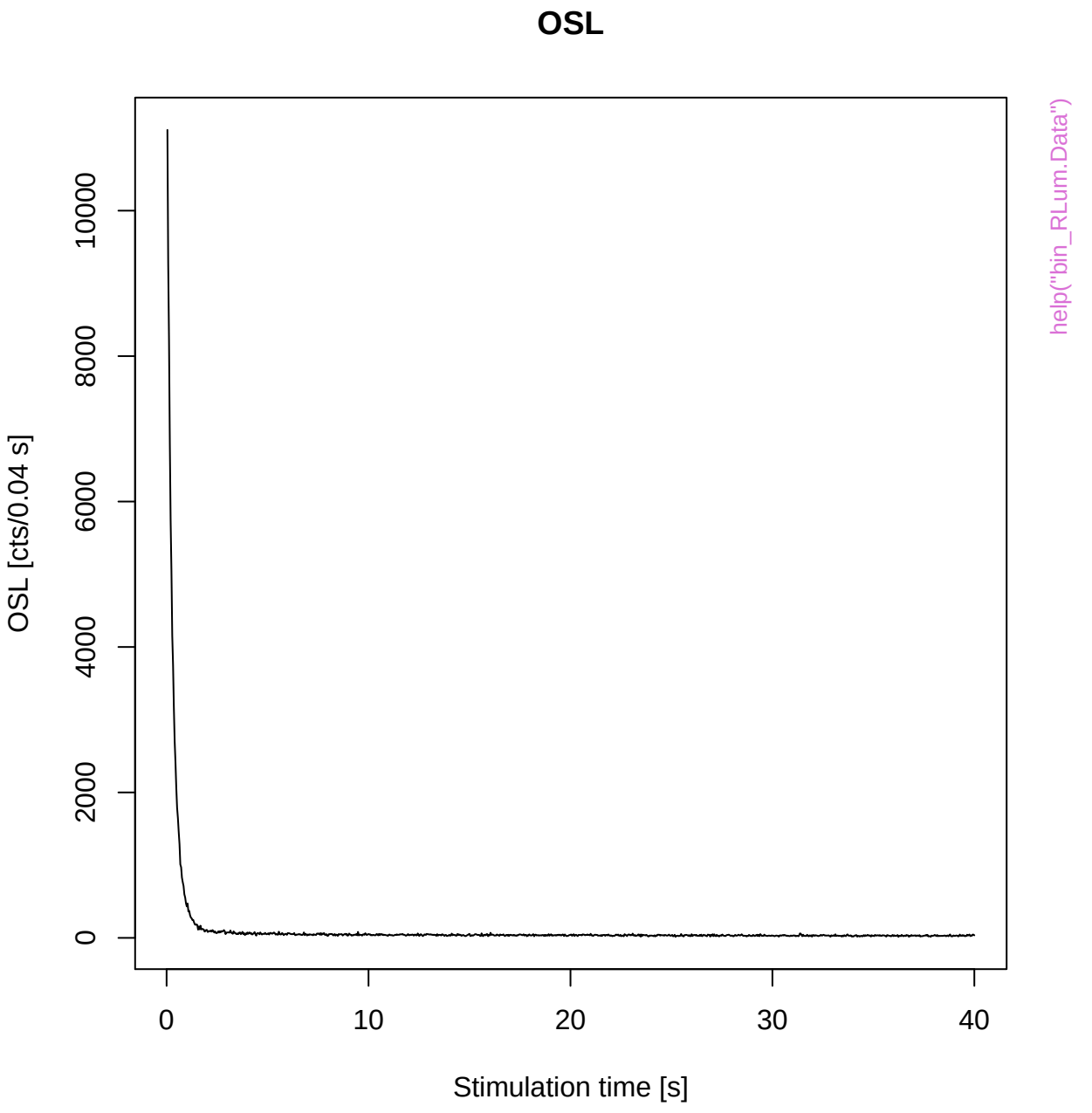

Rejection criteria
Recycling ratio
Recuperation rate
Palaeodose error
pseudoIRSL1
pseudoIRSL2
− 0.2
0/1
+ 0.1
help("analyse_pIRIRSequence")

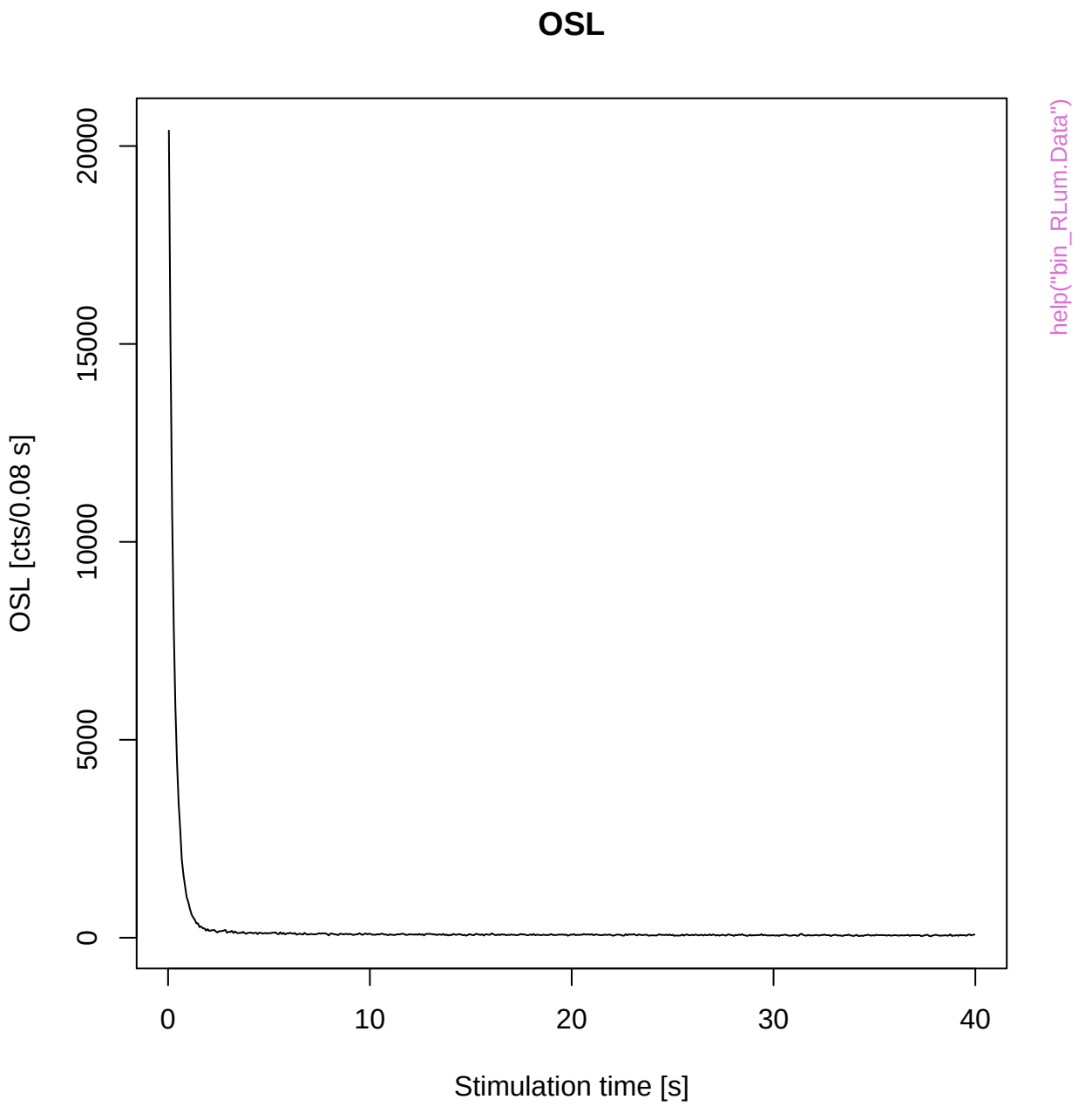

USER combined
USER [a.u.]
0
−100
−250
2
6
10
14
NA
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10

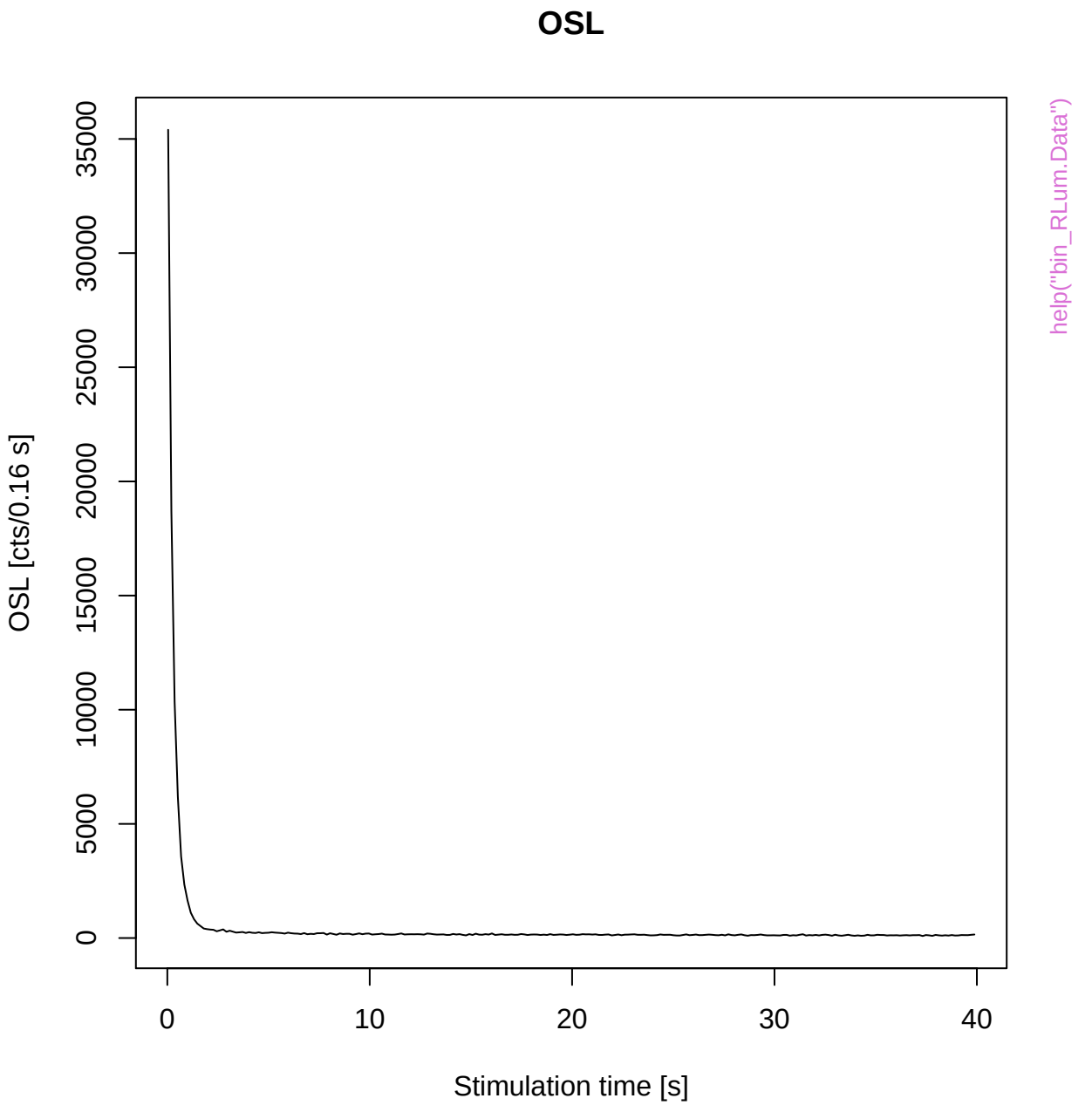

IRSL combined
IRSL [a.u.]
0
10000
20000
0
20
60
100
Time [s]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
help("analyse_portableOSL")

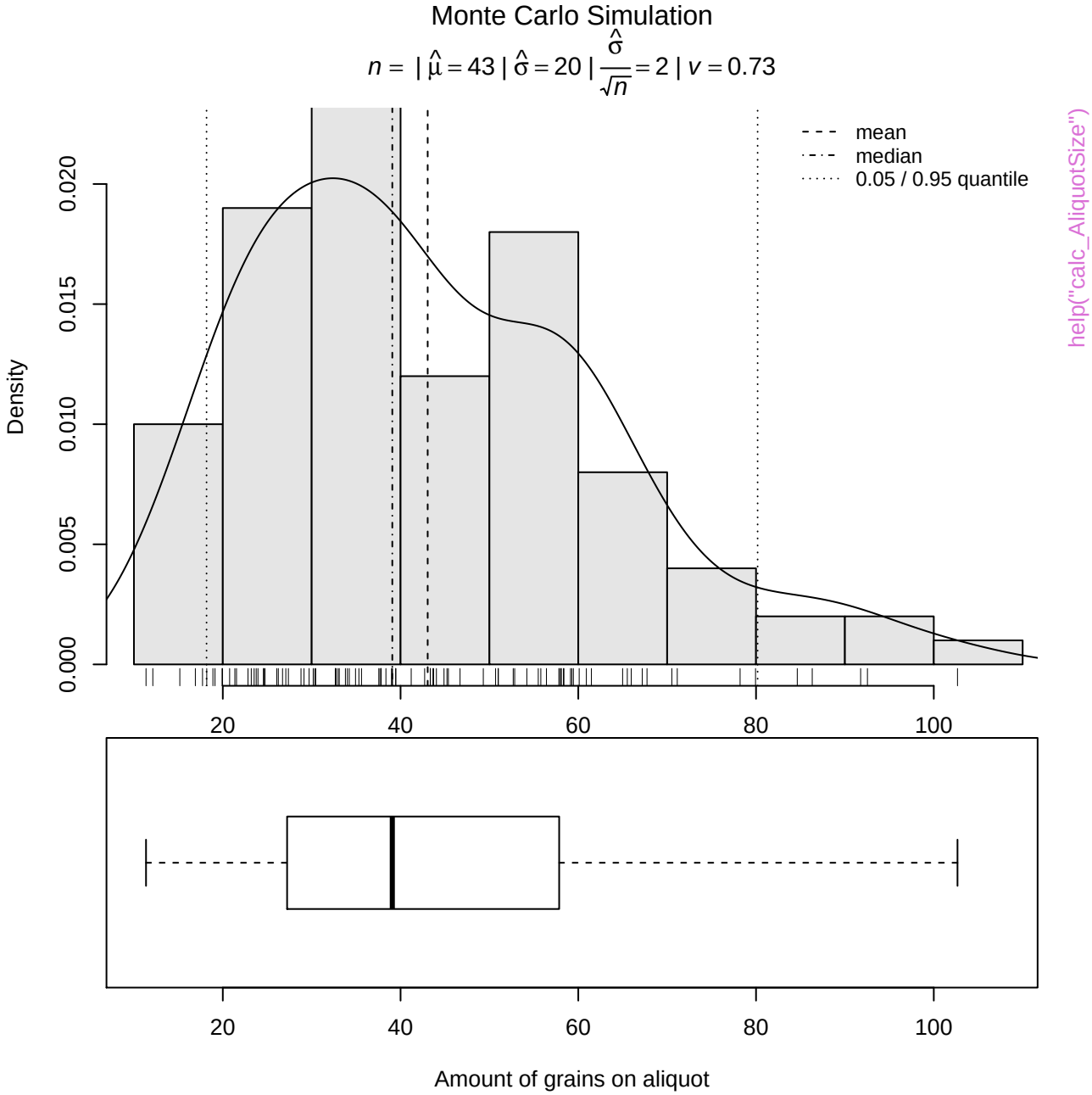

OSL combined
OSL [a.u.]
0e+00
6e+04
0
20
60
100
Time [s]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10

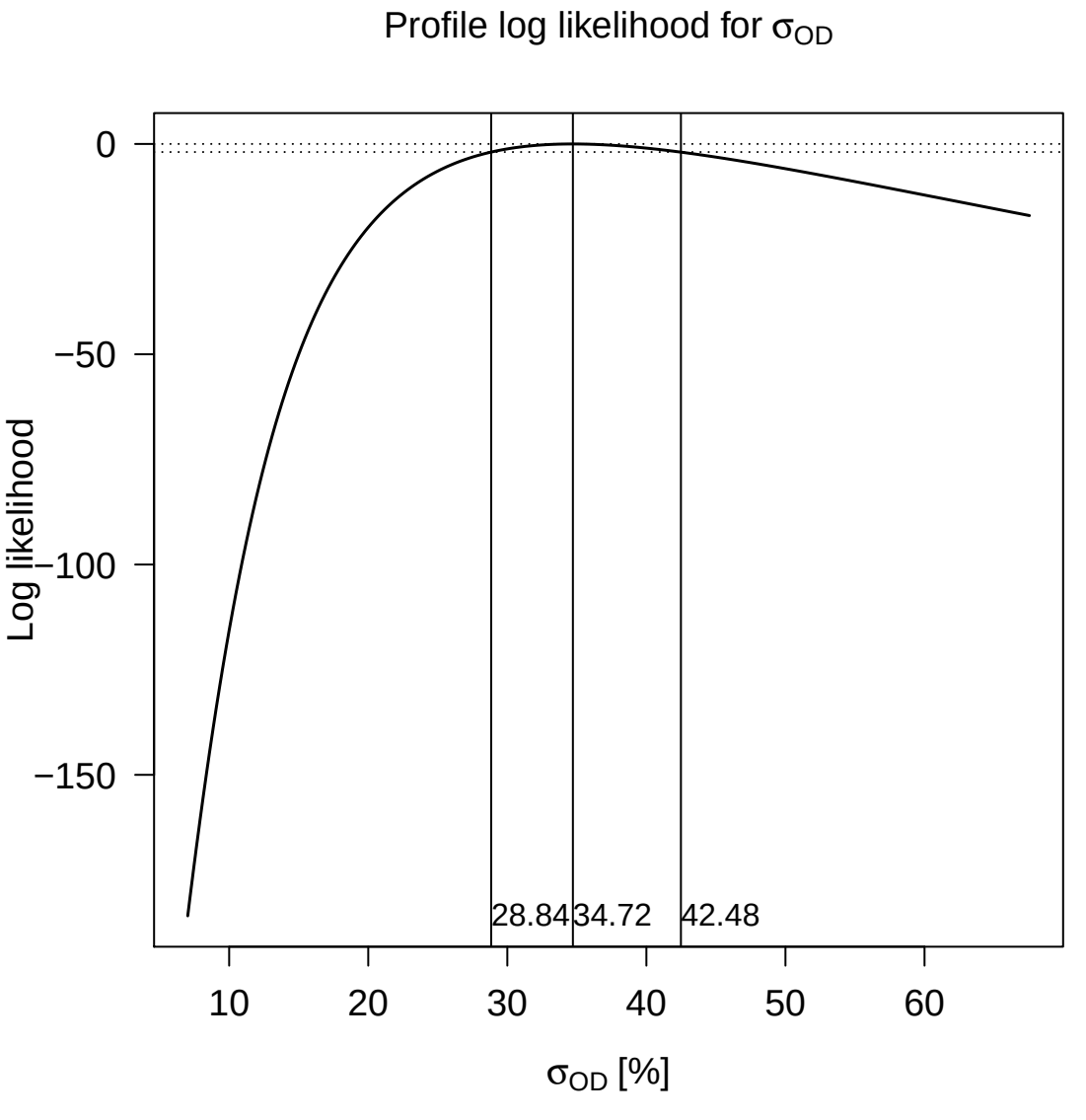

Index
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0.0
1.0
2.0
BSL
IRSL
0.85
1.00
1.15
BSL depl.
0.90
1.10
IRSL depl.
0.8
1.2
IRSL/BSL
help("analyse_portableOSL")

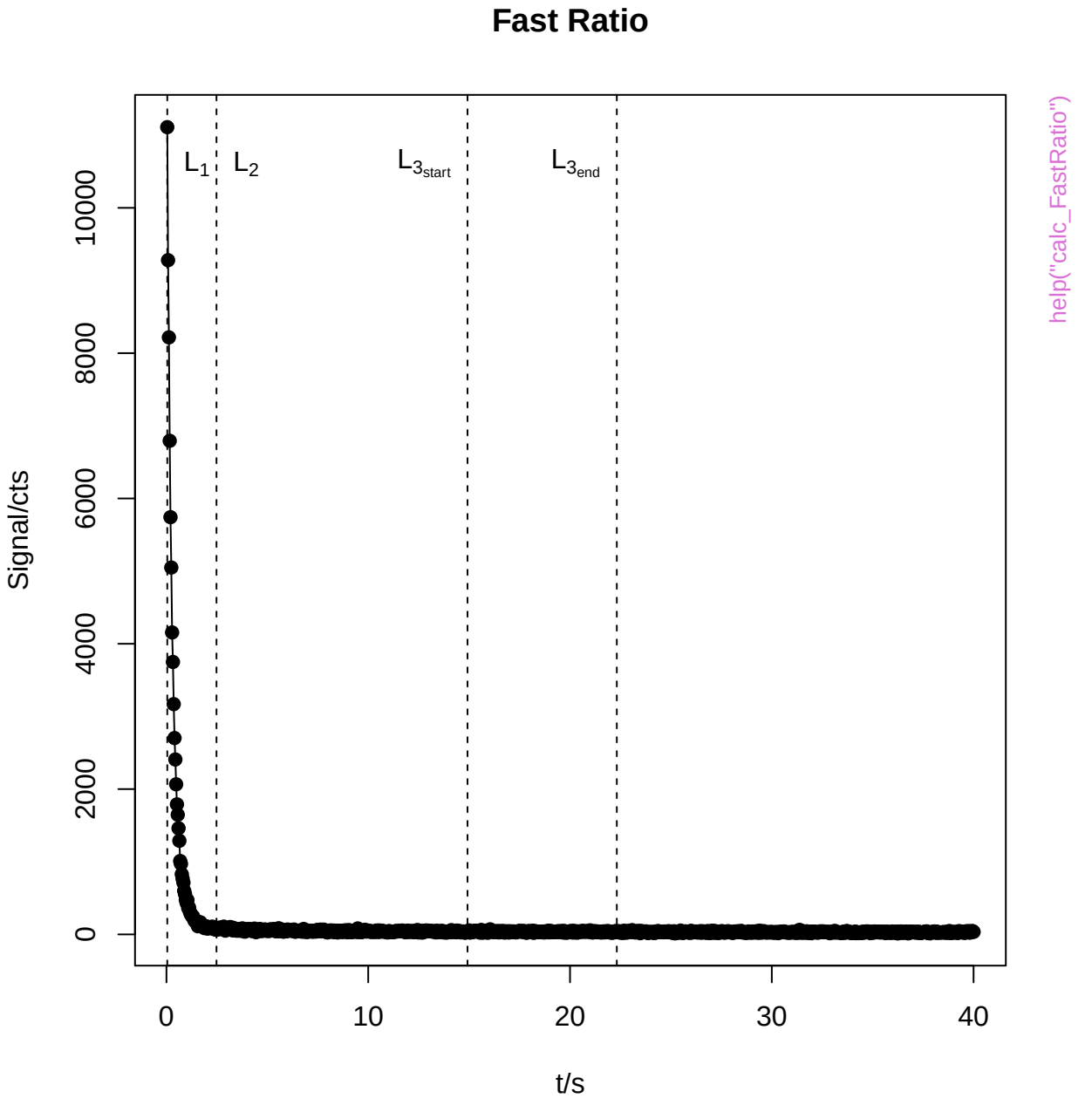

OSL
OSL [cts/0.04 s]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

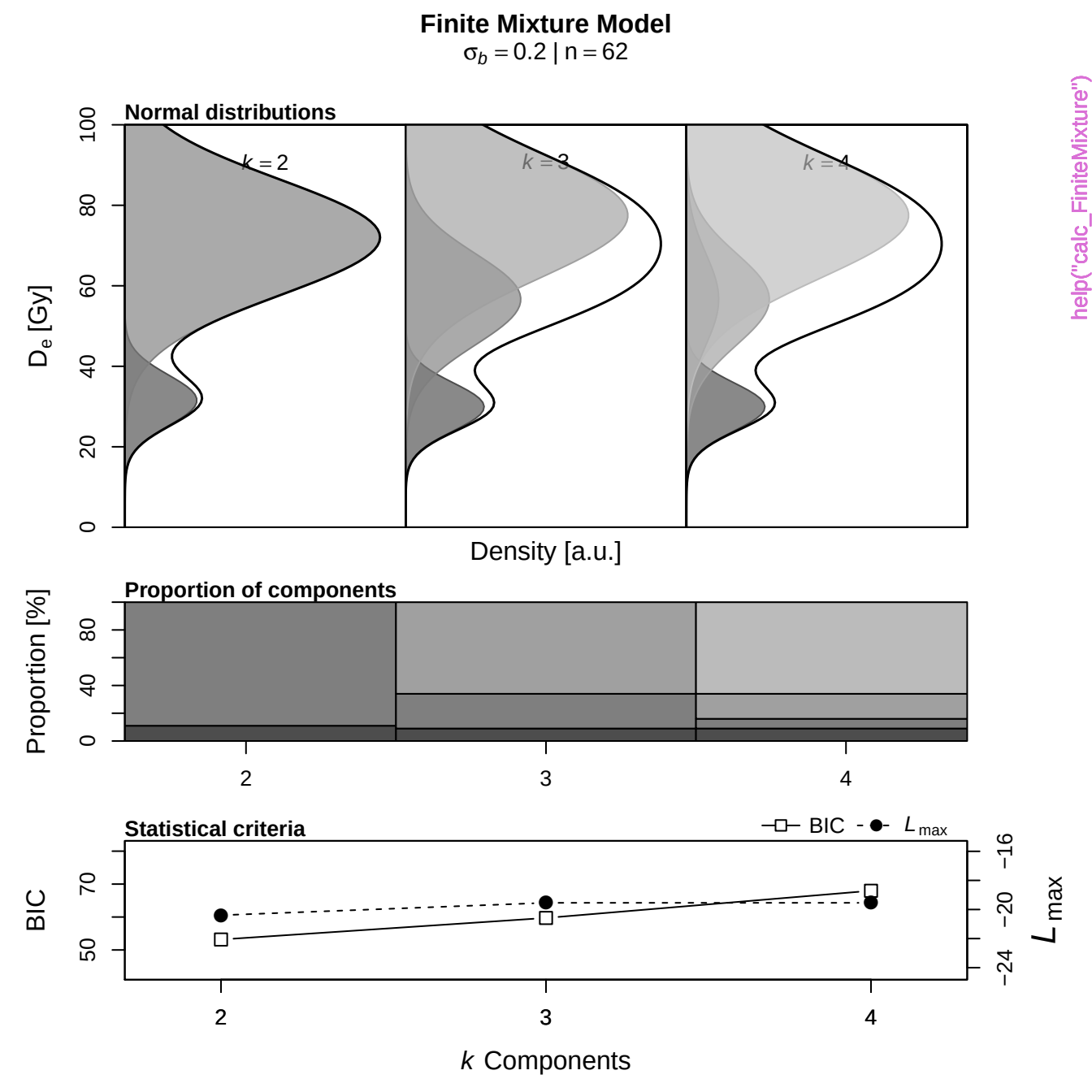

OSL
OSL [cts/0.08 s]
0
5000
10000
15000
20000
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

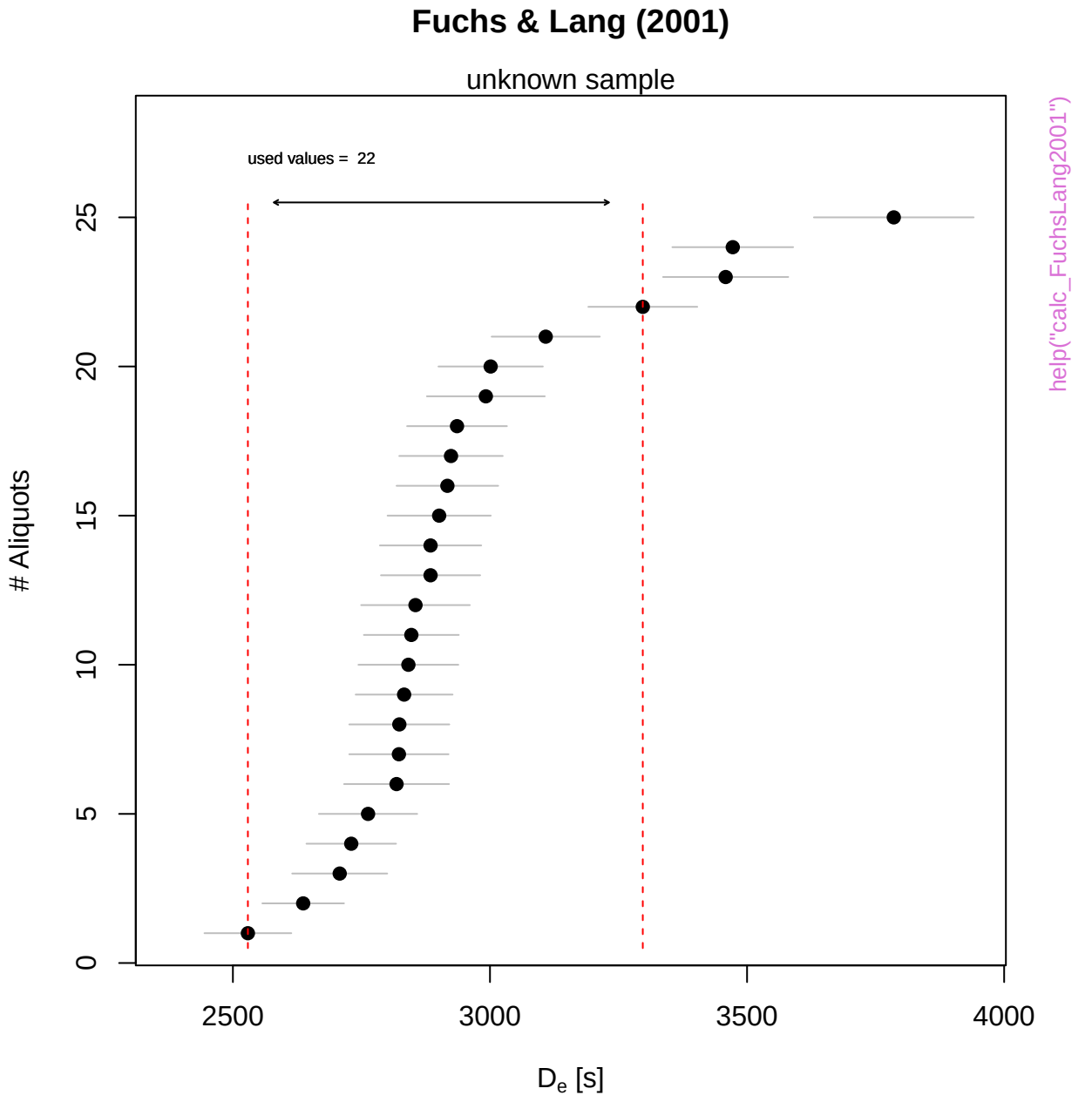

OSL
OSL [cts/0.16 s]
0
5000
10000
15000
20000
25000
30000
35000
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

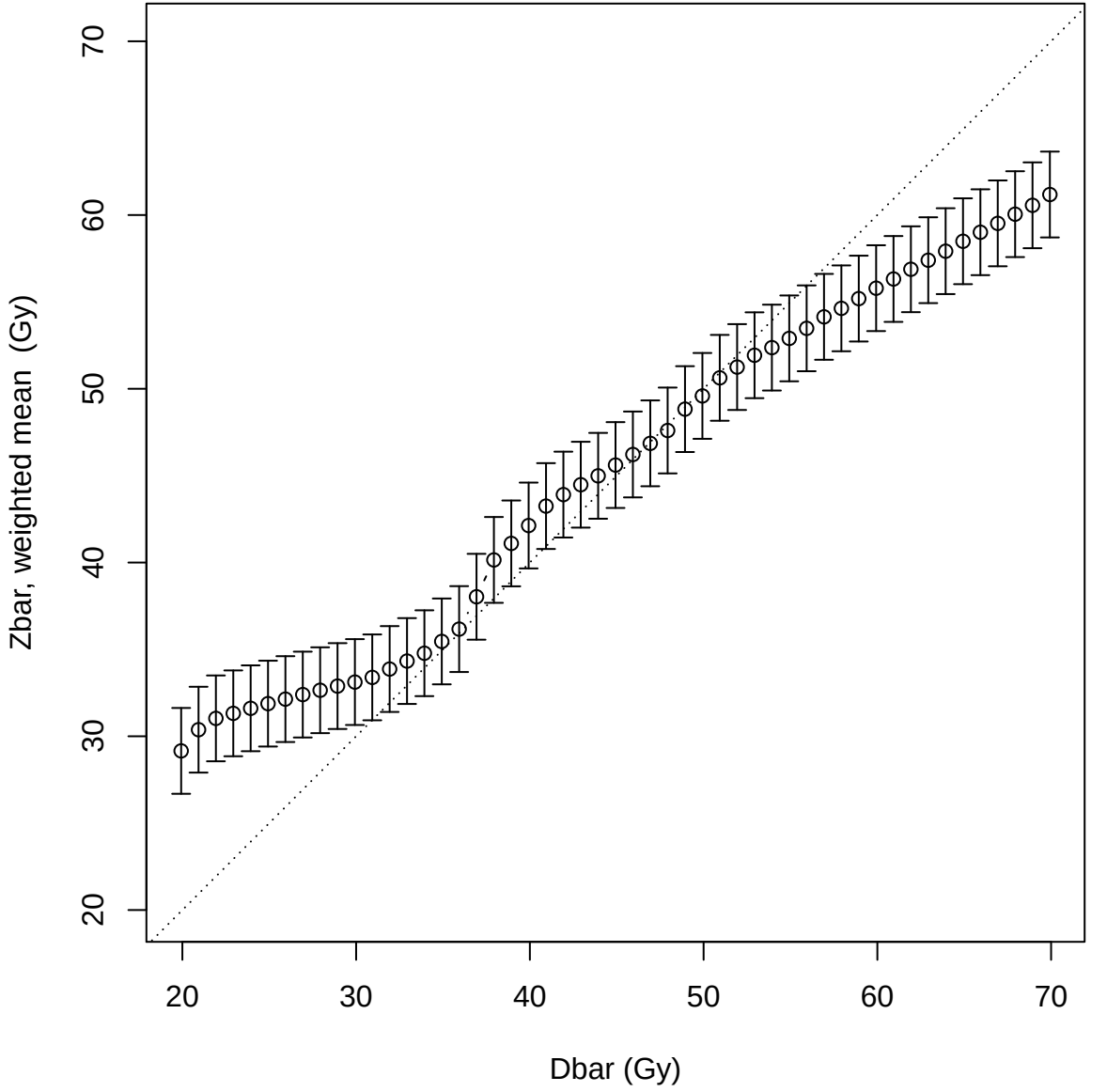

Monte Carlo Simulation
$n = \ | \hat{\mu} = 43 \ | \ \hat{\sigma} = 20 \ | \ \frac{\hat{\sigma}}{\sqrt{n}} = 2 \ | \ v = 0.73$
mean
median
0.05 / 0.95 quantile
help("calc_AliquotSize")
Density
0.000
0.005
0.010
0.015
0.020
20
40
60
80
100
Amount of grains on aliquot

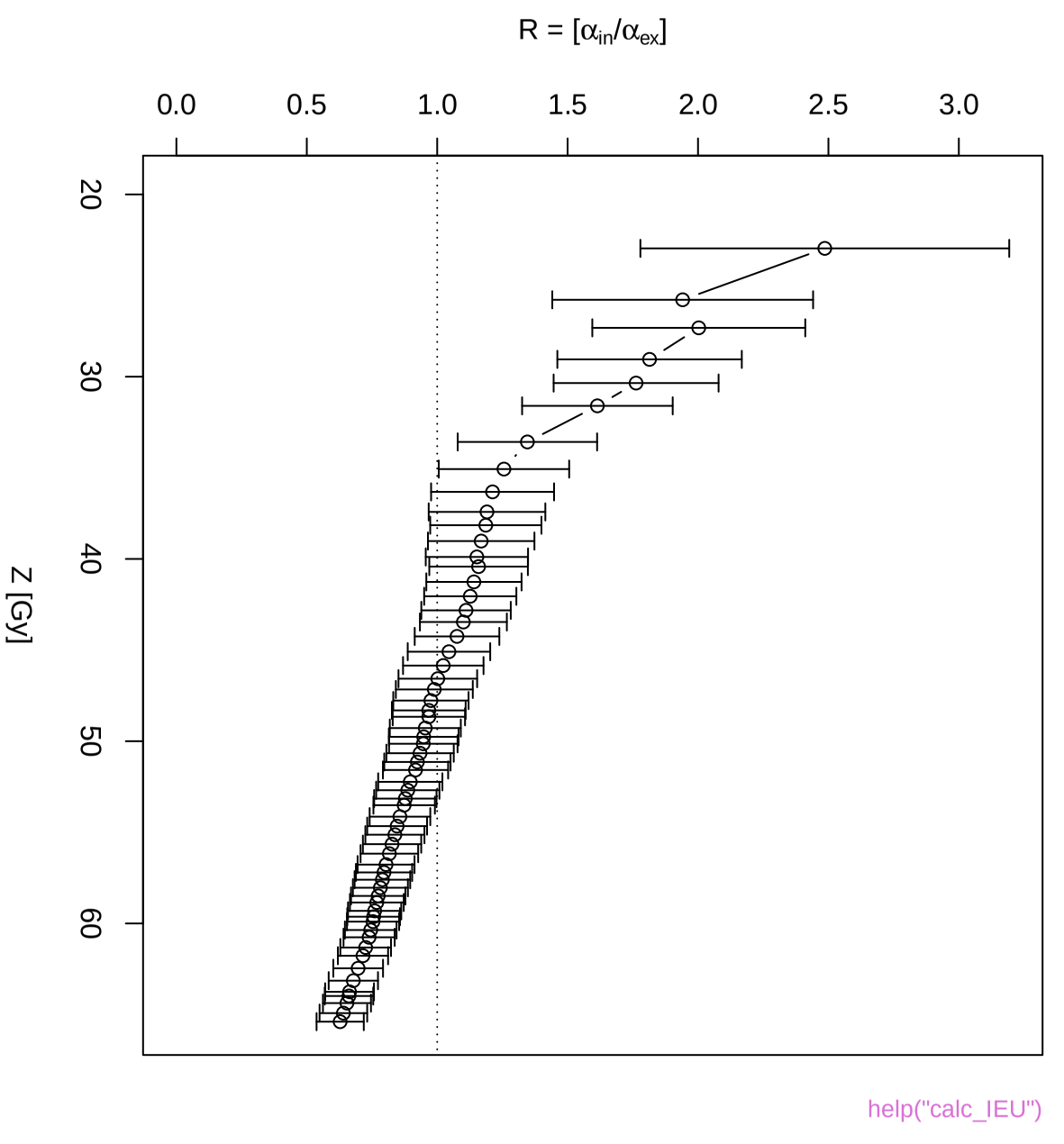

Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]


Fast Ratio
L1
L2
L3start
L3end
Signal/cts
0
2000
4000
6000
8000
10000
0
10
20
30
40
t/s
help("calc_FastRatio")


Finite Mixture Model
σb = 0.2 | n = 62
Normal distributions
k = 2
k = 3
k = 4
De [Gy]
0
20
40
60
80
100
Density [a.u.]
Proportion of components
Proportion [%]
0
40
80
2
3
4
Statistical criteria
BIC
Lmax
BIC
70
50
−16
−20
−24
2
3
4
k Components
help("calc_FiniteMixture")


Fuchs & Lang (2001)
unknown sample
used values = 22
Aliquots
0
5
10
15
20
25
2500
3000
3500
4000
D_e [s]
help("calc_FuchsLang2001")


Zbar, weighted mean (Gy)
20
30
40
50
60
70
Dbar (Gy)
20
30
40
50
60
70
help("calc_IEU")

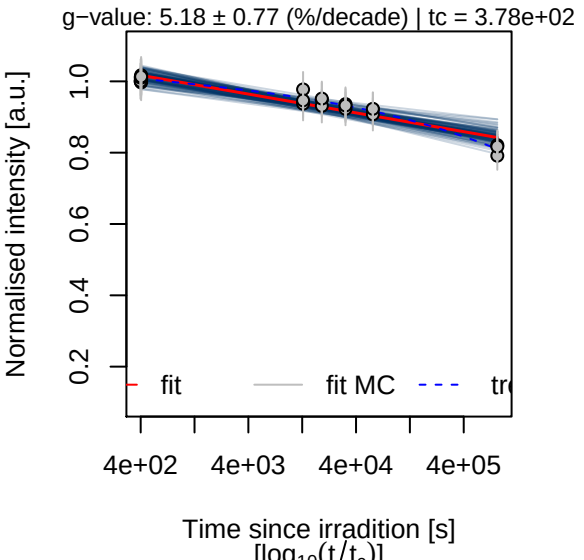

R = [α_in/α_ex]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Z [Gy]
20
30
40
50
60
help("calc_IEU")

No L_x curves detected

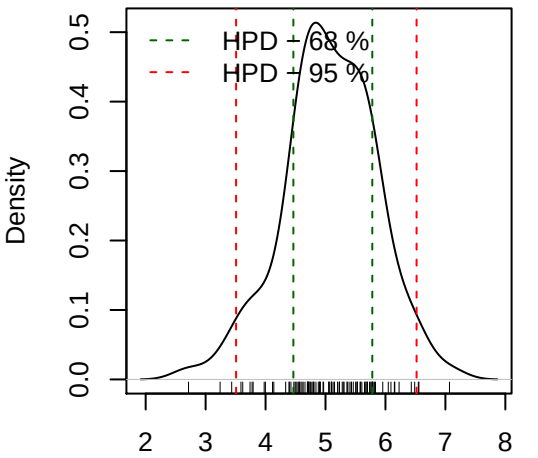
No T_x curves detected

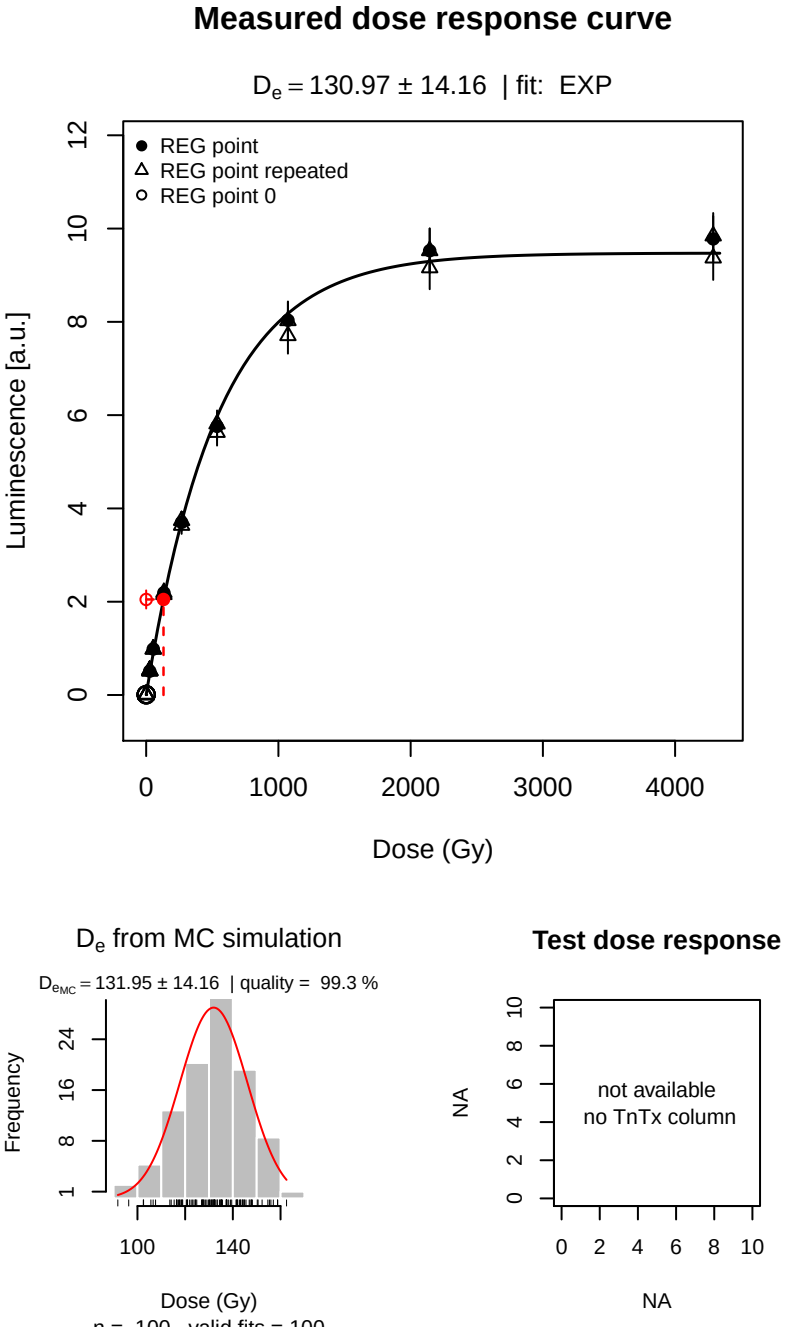
help("calc_Kars2008")

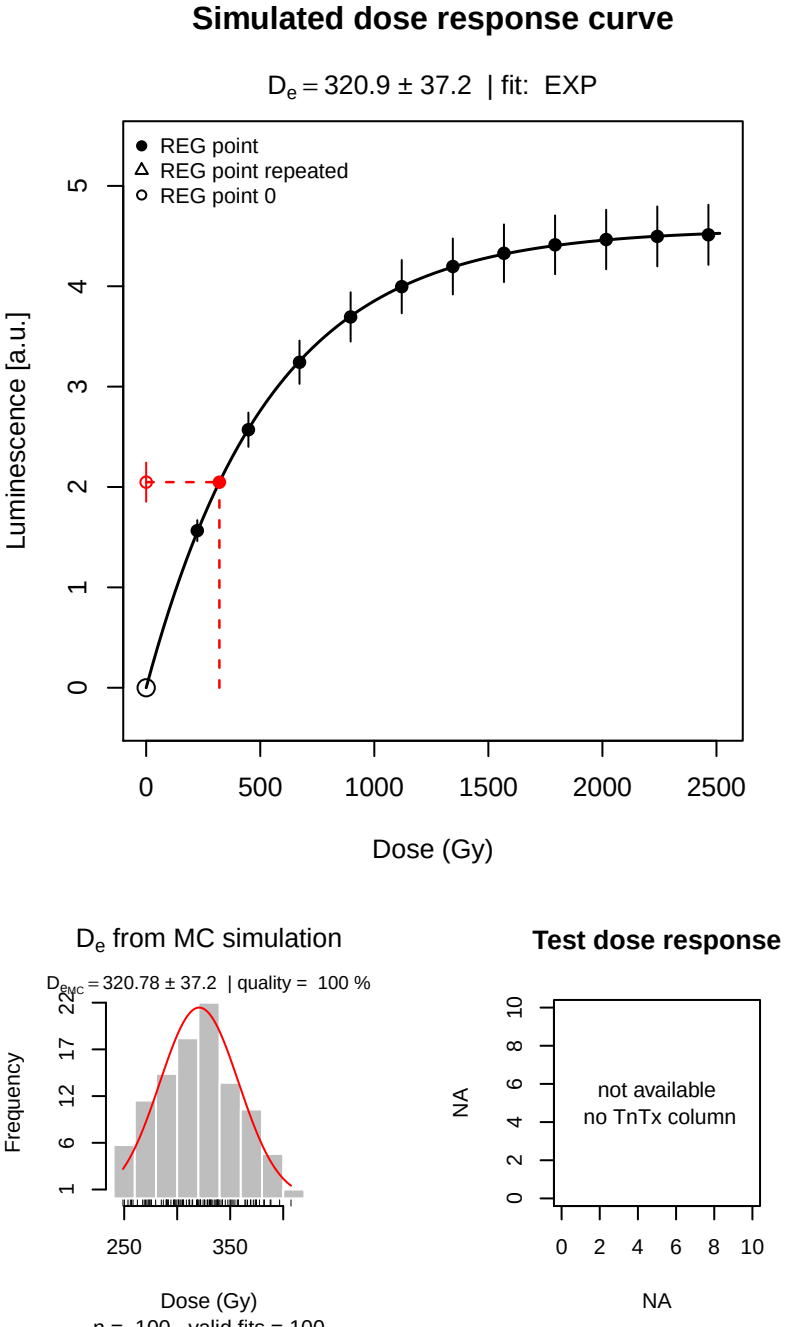
Signal Fading

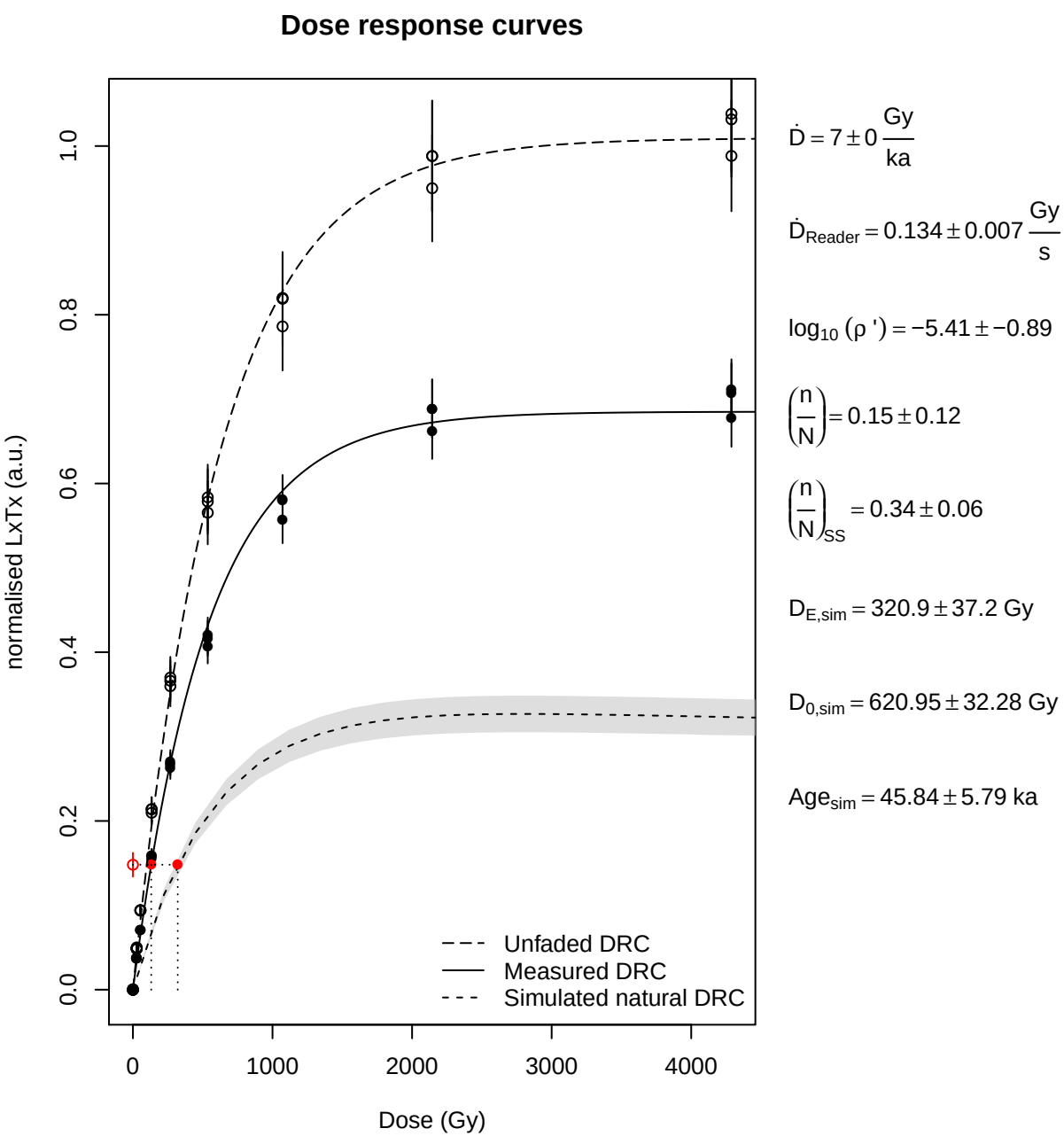


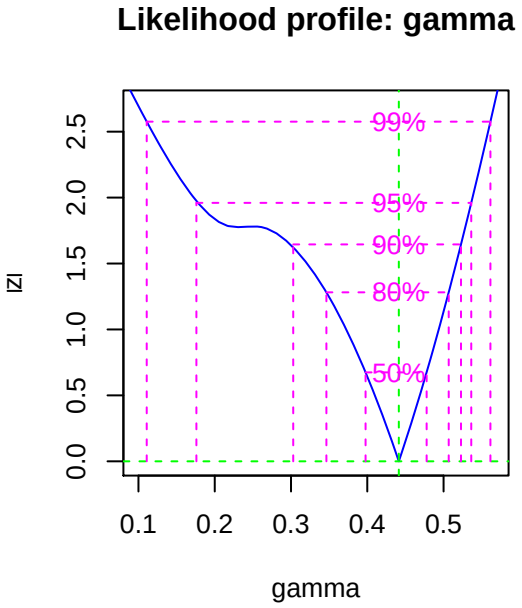
Density: g−values (%/decade)

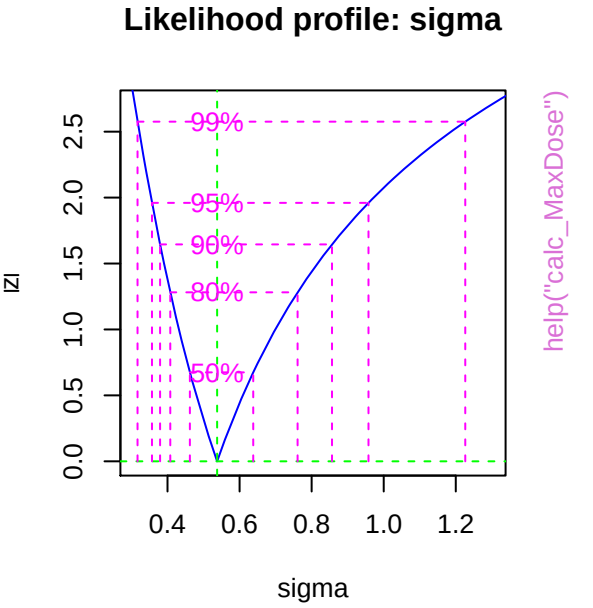


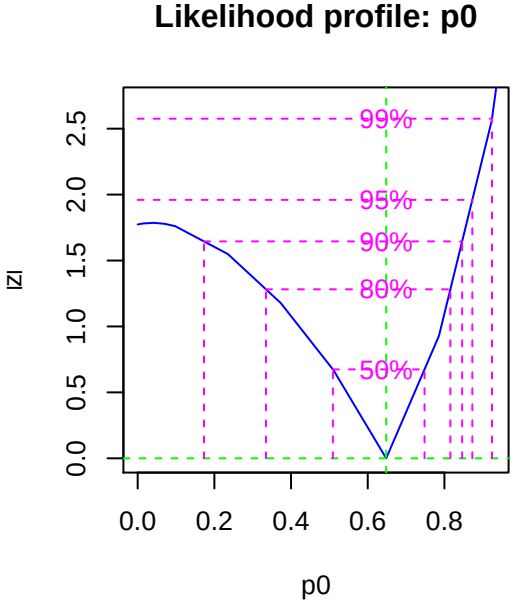

Measured dose response curve
De = 130.97 ± 14.16 | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
2
4
6
8
10
12
0
1000
2000
3000
4000
Dose (Gy)
De from MC simulation
DeMC = 131.95 ± 14.16 | quality = 99.3 %
Frequency
1
8
16
24
100
140
Dose (Gy)
n = 100, valid fits = 100
Test dose response
NA
0
2
4
6
8
10
not available
no TnTx column
NA

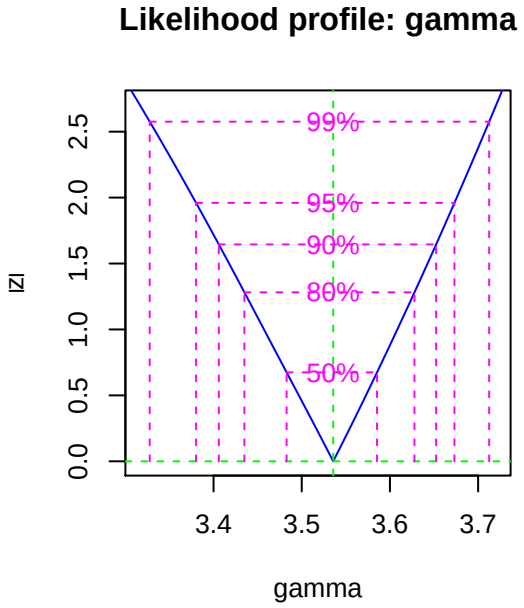

Simulated dose response curve
De = 320.9 ± 37.2 | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose (Gy)
De from MC simulation
DeMC = 320.78 ± 37.2 | quality = 100 %
Frequency
1
6
12
17
22
250
350
Dose (Gy)
n = 100 valid fits = 100
Test dose response
NA
0
2
4
6
8
10
not available
no TnTx column
NA

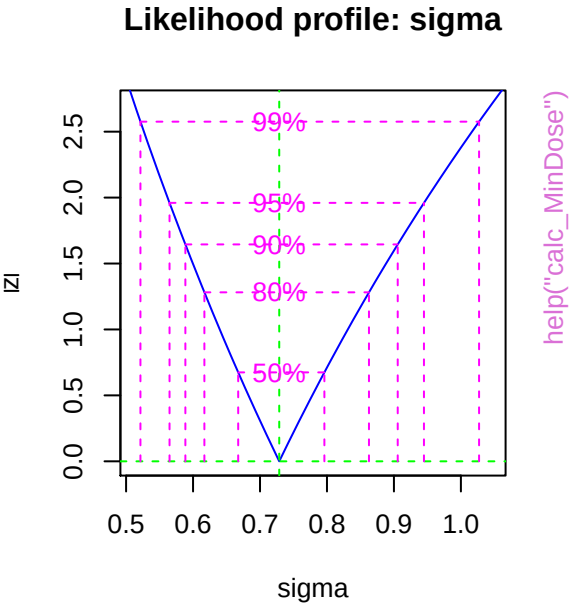

Dose response curves
normalised LxTx (a.u.)
0.0
0.2
0.4
0.6
0.8
1.0
0
1000
2000
3000
4000
Dose (Gy)
Unfaded DRC
Measured DRC
Simulated natural DRC
$\dot{D} = 7 \pm 0 \frac{Gy}{ka}$
$\dot{D}_{Reader} = 0.134 \pm 0.007 \frac{Gy}{s}$
$\log_{10}(\rho') = -5.41 \pm -0.89$
$\left(\frac{n}{N}\right) = 0.15 \pm 0.12$
$\left(\frac{n}{N}\right)_{SS} = 0.34 \pm 0.06$
$D_{E,sim} = 320.9 \pm 37.2$ Gy
$D_{0,sim} = 620.95 \pm 32.28$ Gy
$Age_{sim} = 45.84 \pm 5.79$ ka
help("calc_Kars2008")

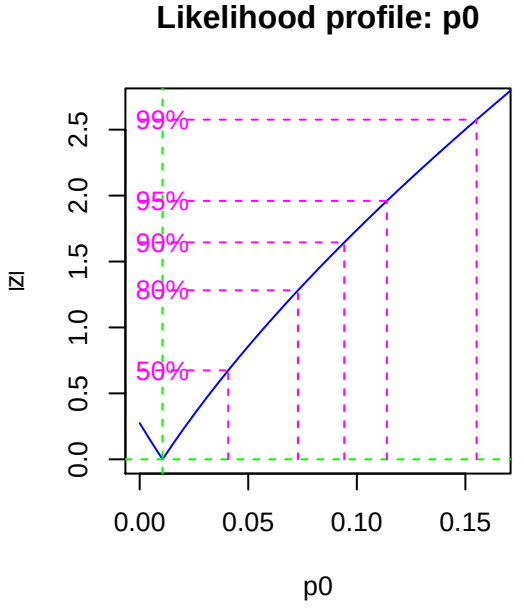

Likelihood profile: gamma
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.1
0.2
0.3
0.4
0.5
gamma

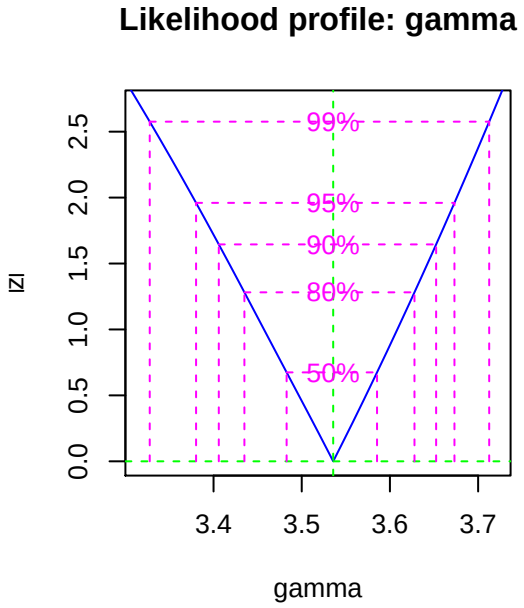

Likelihood profile: sigma
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.4
0.6
0.8
1.0
1.2
sigma
help("calc_MaxDose")

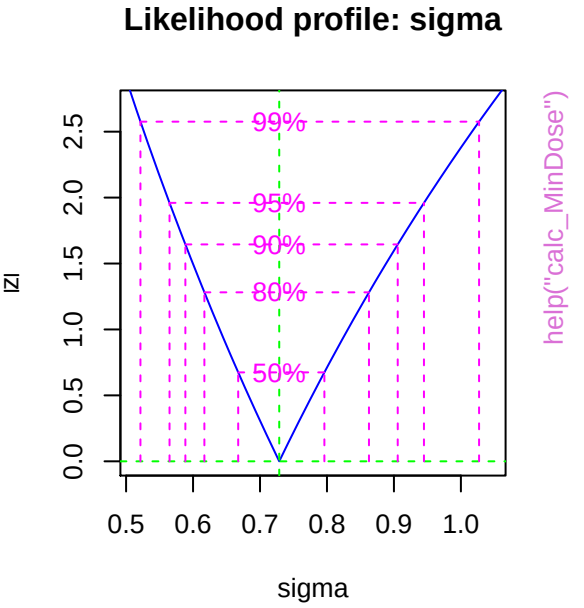

Likelihood profile: p0
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.0
0.2
0.4
0.6
0.8
p0

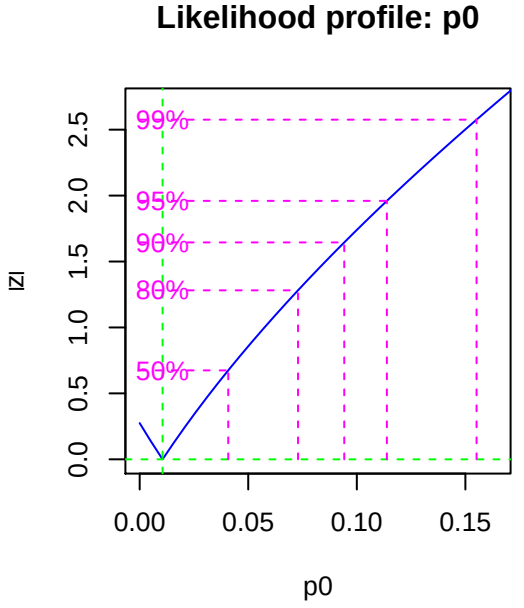

Likelihood profile: gamma
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
3.4
3.5
3.6
3.7
gamma

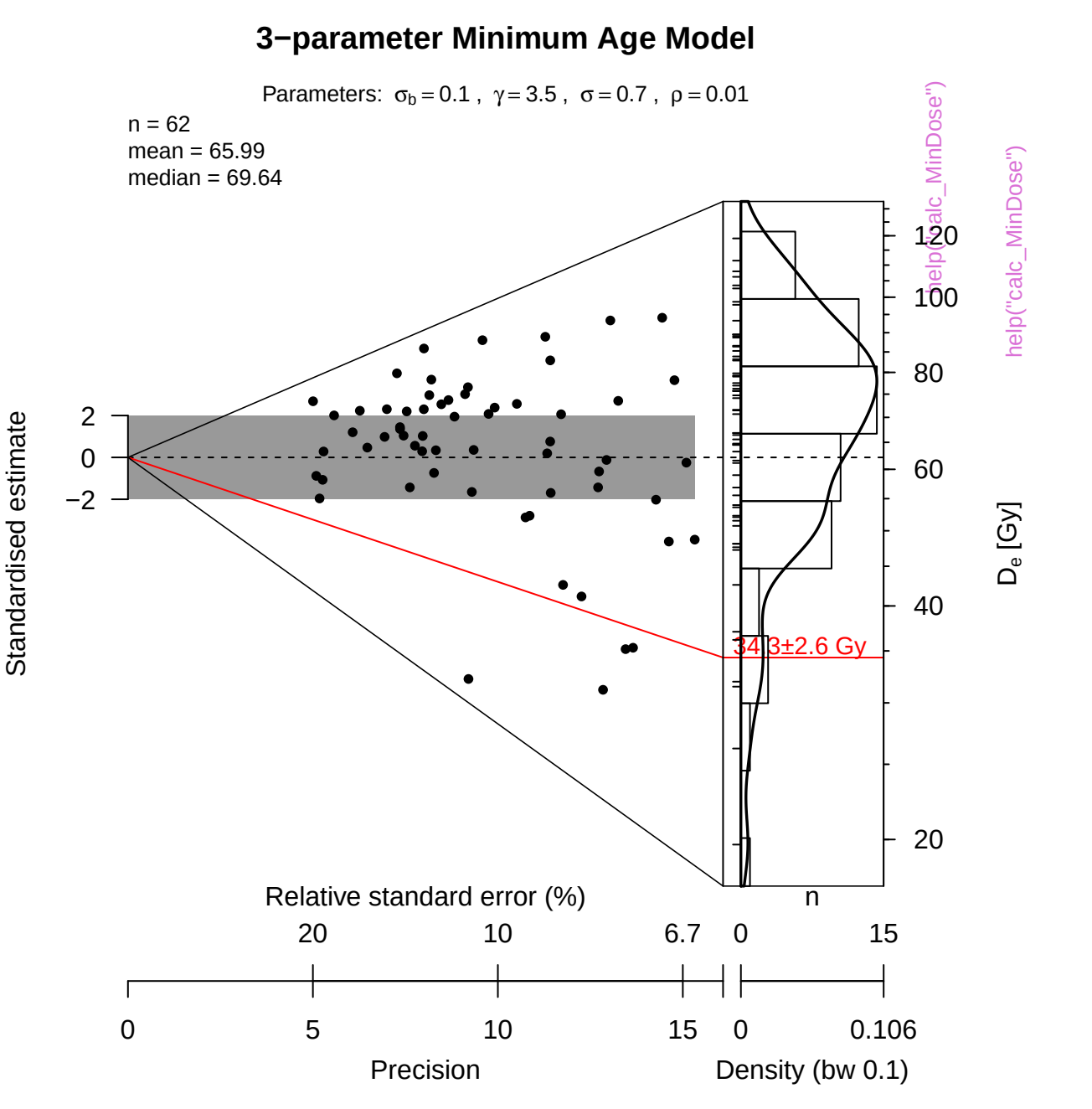

Likelihood profile: sigma
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.5
0.6
0.7
0.8
0.9
1.0
sigma
help("calc_MinDose")

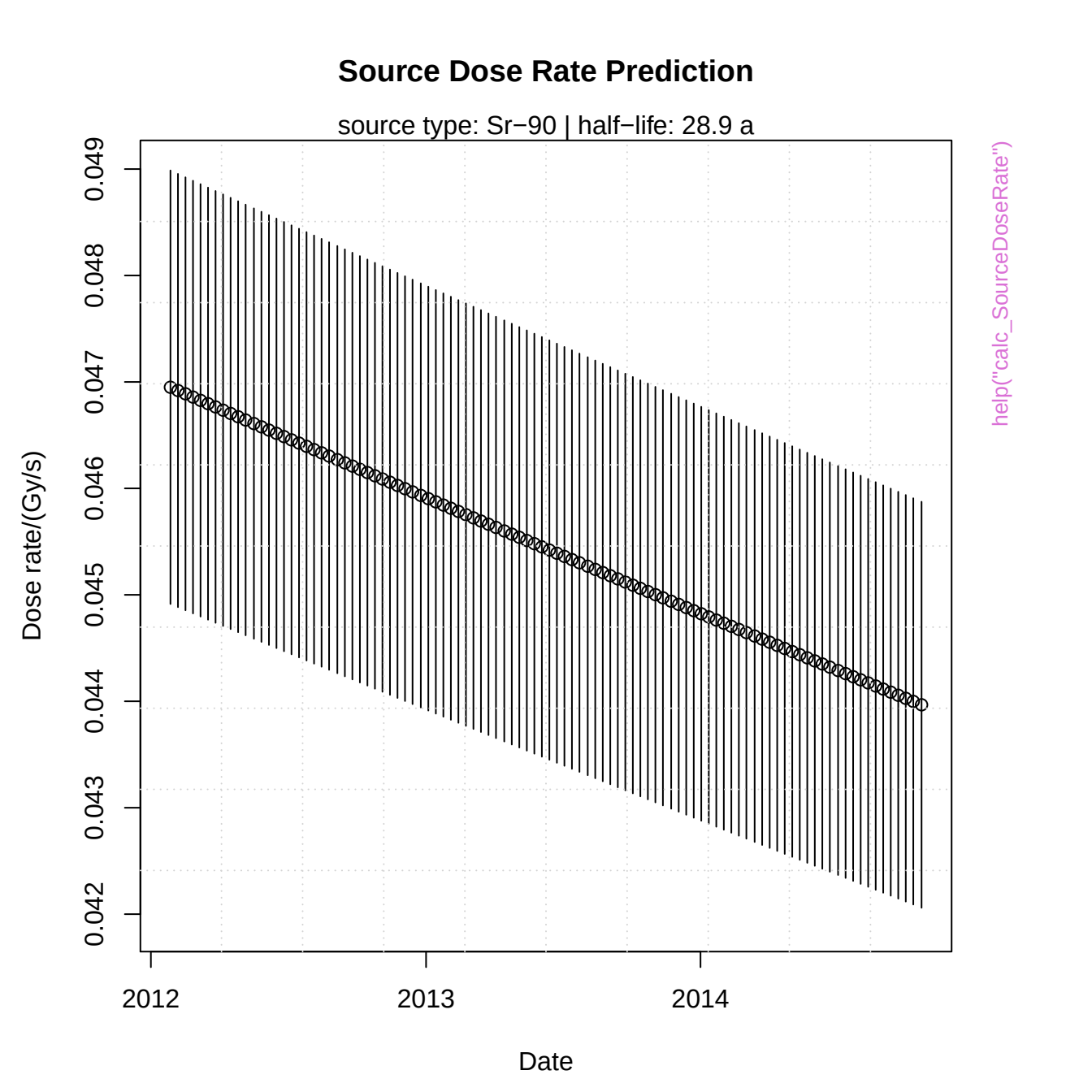

Likelihood profile: p0
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.00
0.05
0.10
0.15
p0

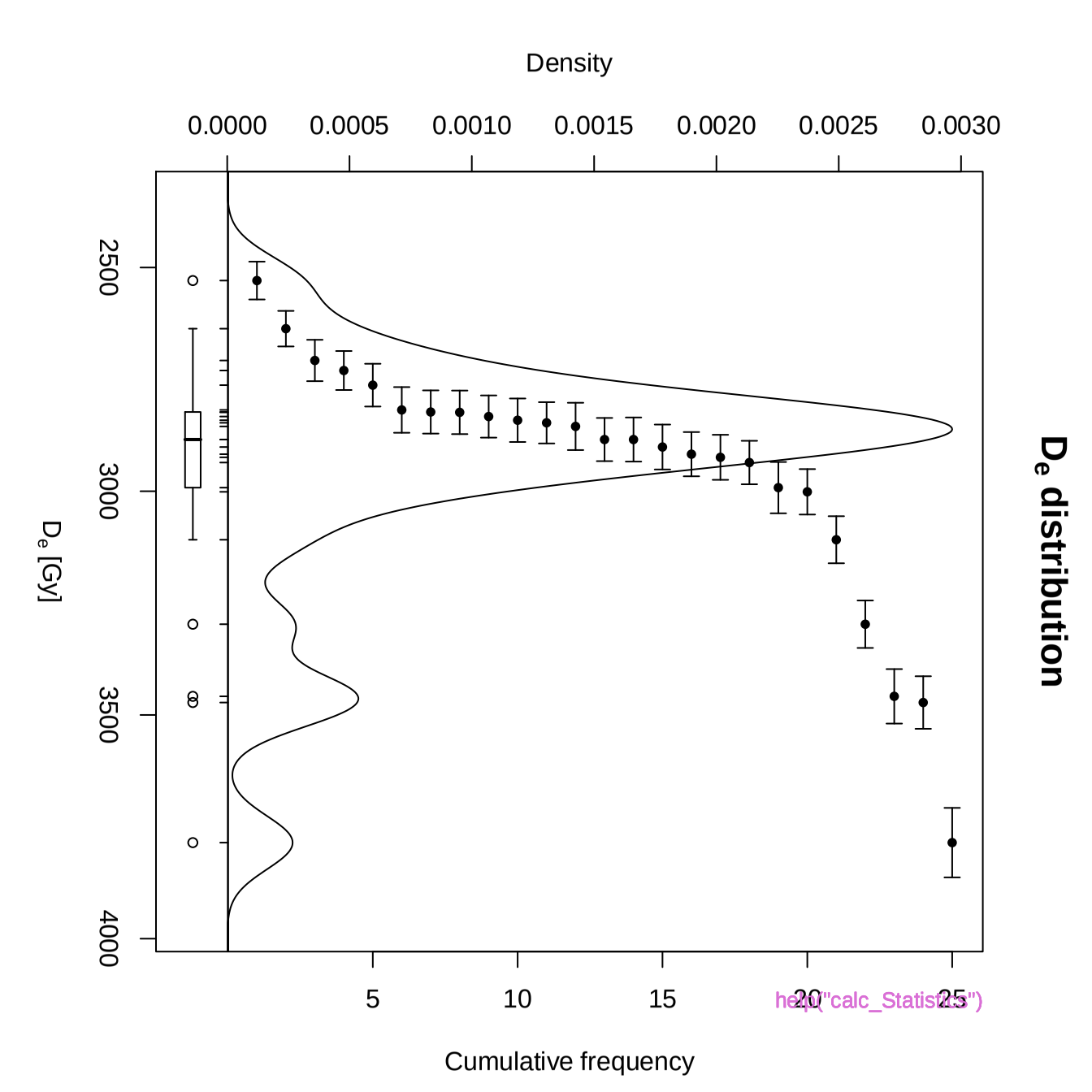

Likelihood profile: gamma
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
3.4
3.5
3.6
3.7
gamma

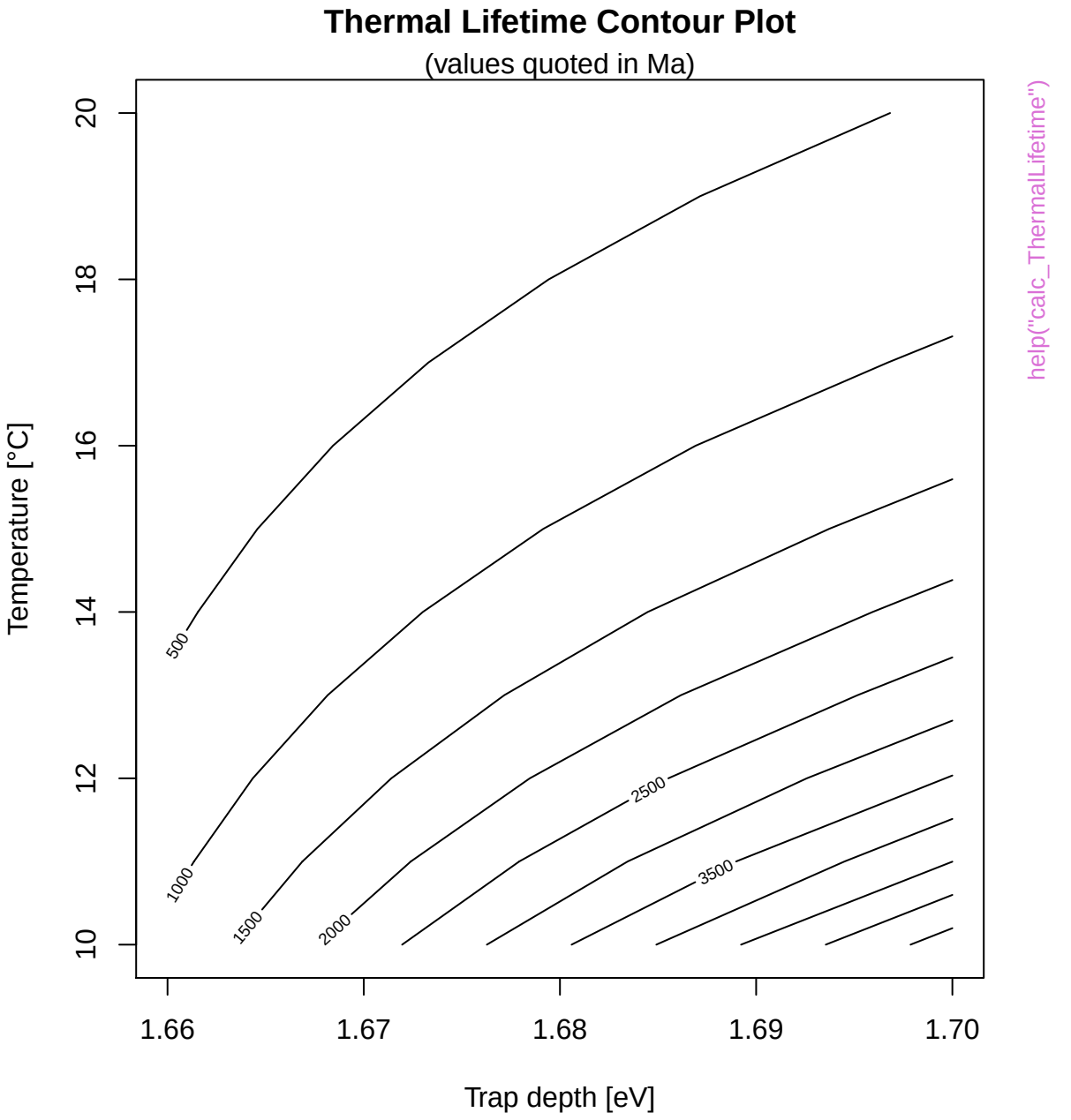

Likelihood profile: sigma
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.5
0.6
0.7
0.8
0.9
1.0
sigma
help("calc_MinDose")

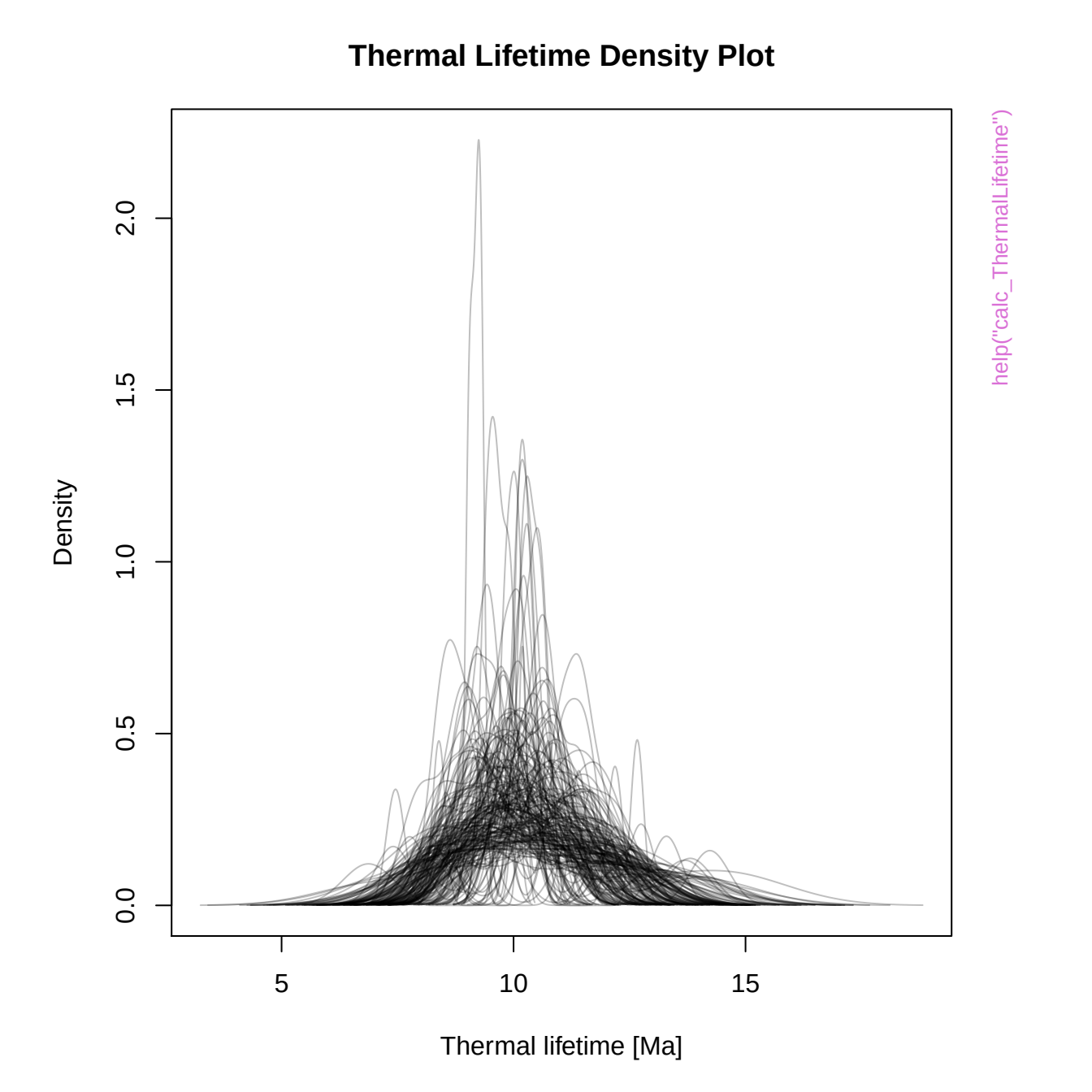

Likelihood profile: p0
|Z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
0.00
0.05
0.10
0.15
p0

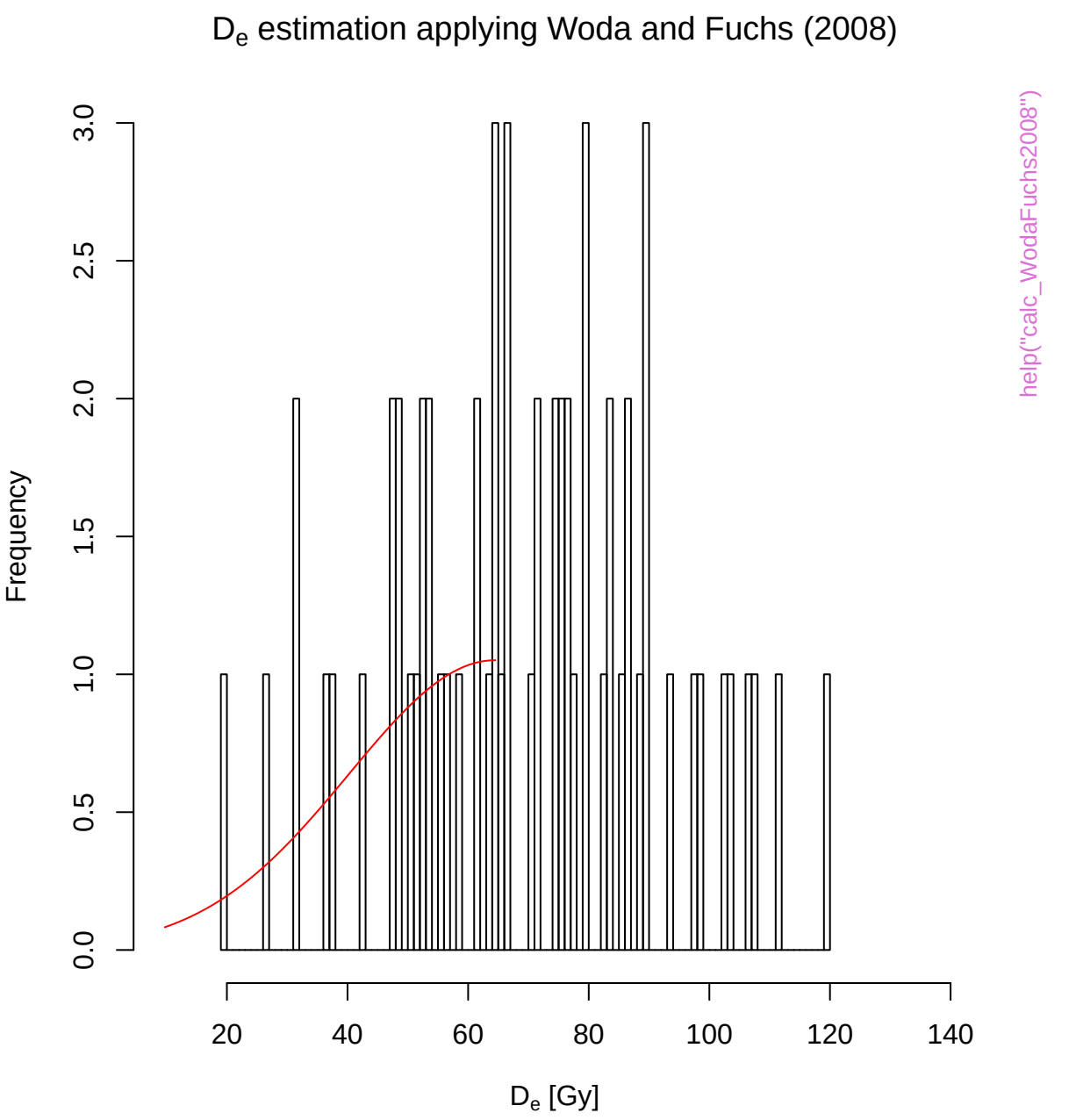

3−parameter Minimum Age Model
Parameters: σb = 0.1 , γ = 3.5 , σ = 0.7 , ρ = 0.01
n = 62
mean = 65.99
median = 69.64
Standardised estimate
2
0
−2
34.3±2.6 Gy
De [Gy]
120
100
80
60
40
20
n
help("calc_MinDose")
Relative standard error (%)
20
10
6.7
0
15
0
5
10
15
0
0.106
Precision
Density (bw 0.1)

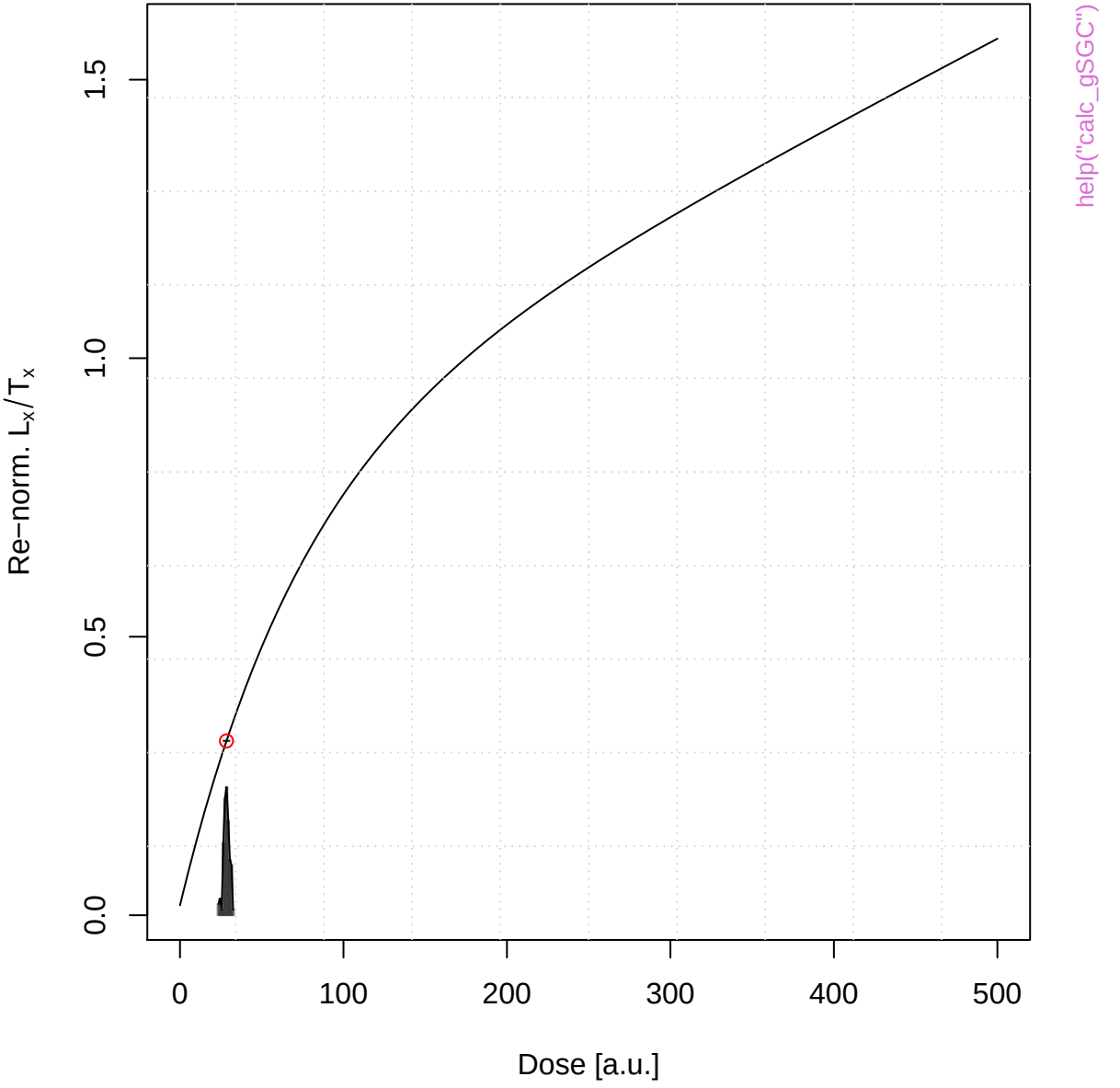

Source Dose Rate Prediction
source type: Sr−90 | half−life: 28.9 a
Dose rate/(Gy/s)
0.042
0.043
0.044
0.045
0.046
0.047
0.048
0.049
2012
2013
2014
Date
help("calc_SourceDoseRate")

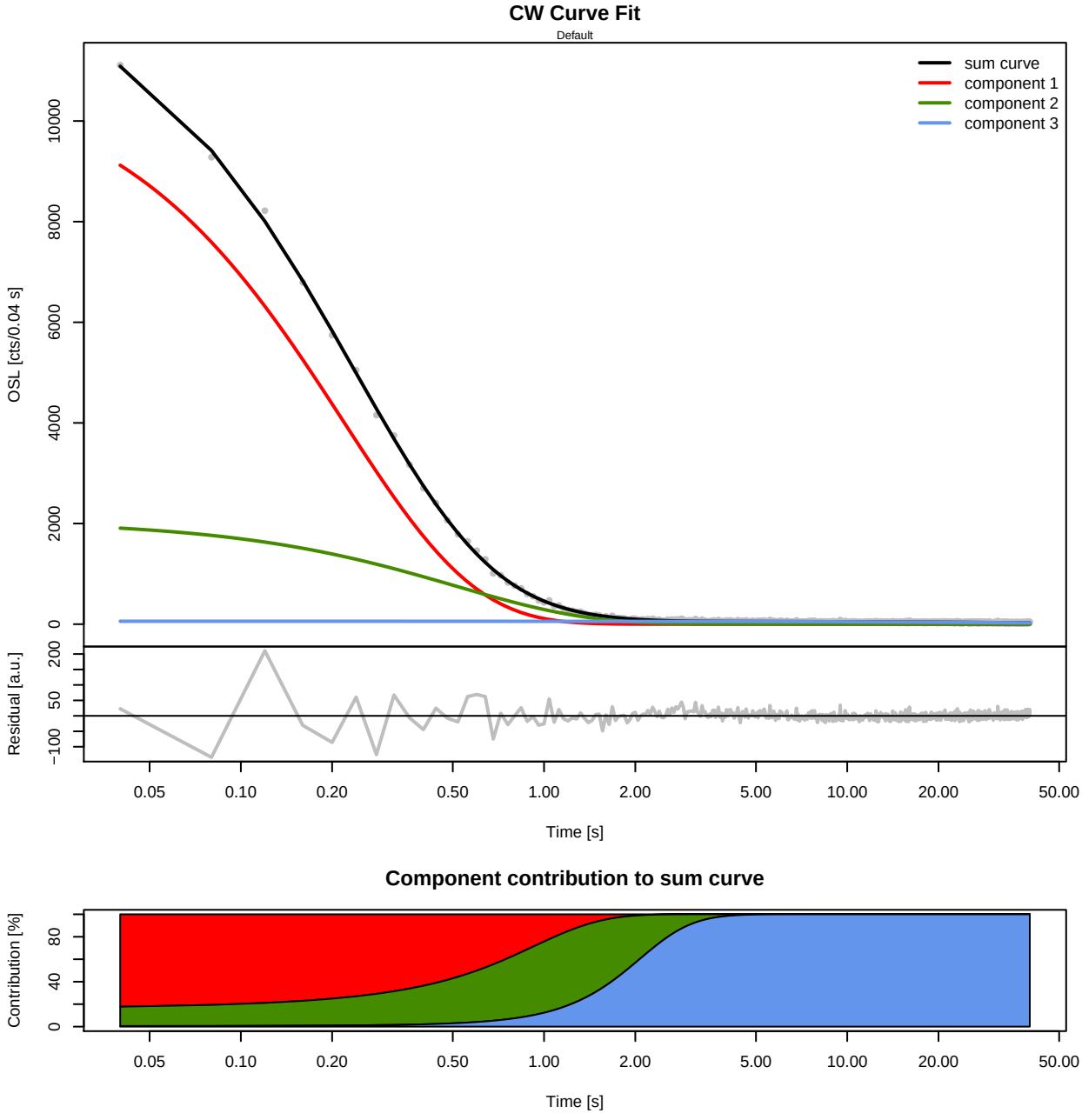

Density
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
2500
3000
3500
4000
De [Gy]
5
10
15
20
25
Cumulative frequency
De distribution
help("calc_Statistics")

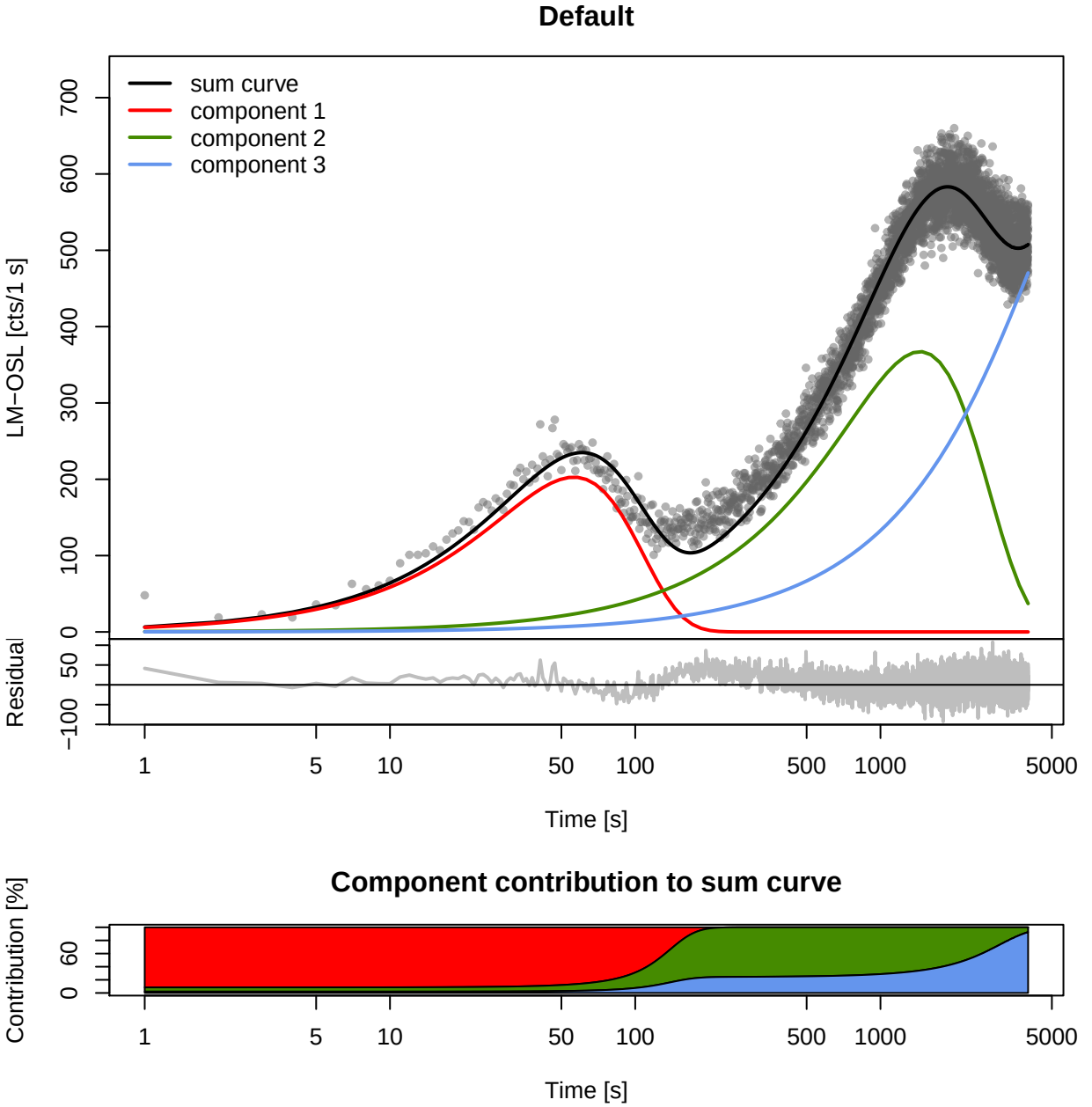

Thermal Lifetime Contour Plot
(values quoted in Ma)
Temperature [°C]
10
12
14
16
18
20
1.66
1.67
1.68
1.69
1.70
Trap depth [eV]
500
1000
1500
2000
2500
3500
help("calc_ThermalLifetime")

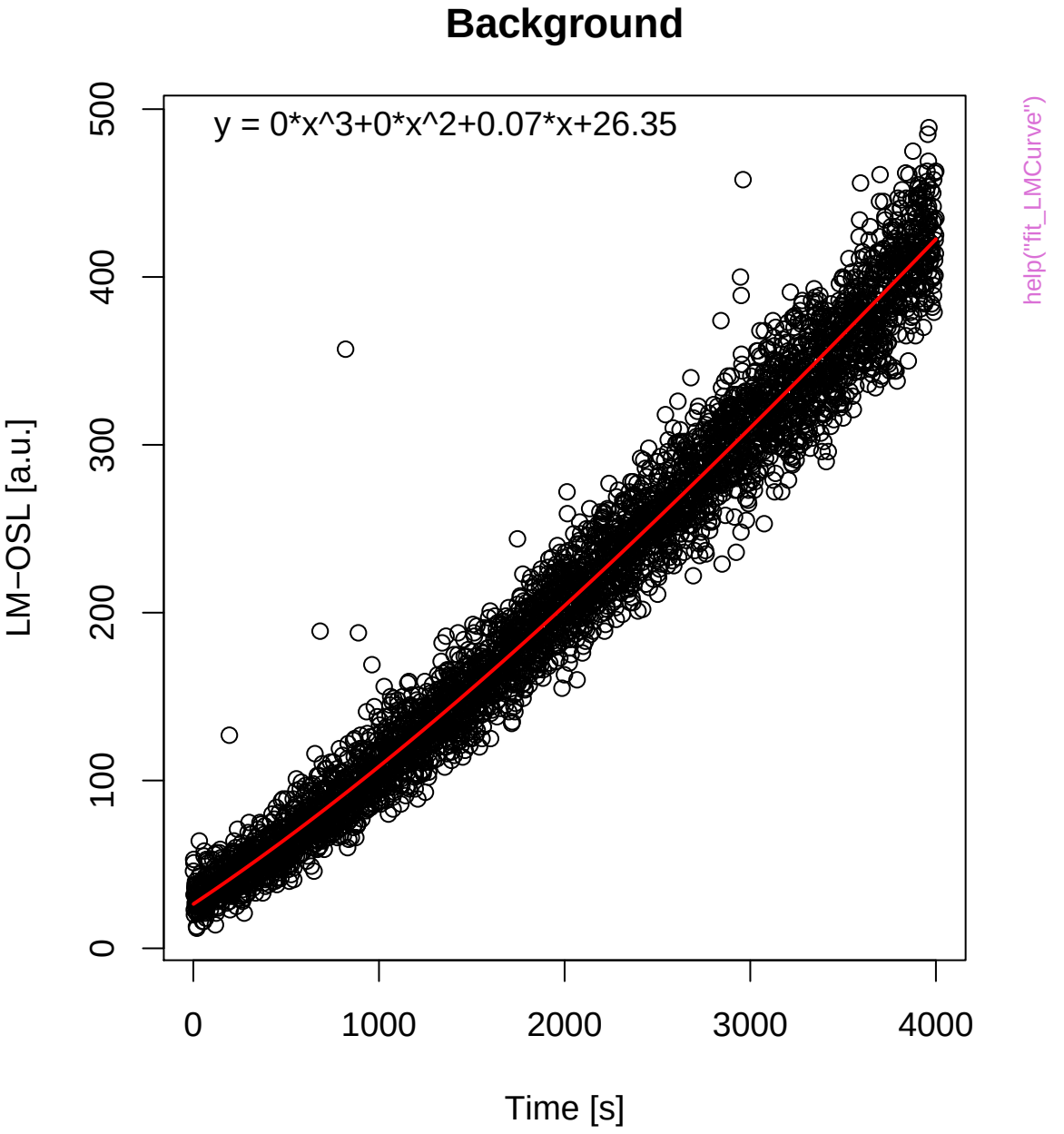

Thermal Lifetime Density Plot
help("calc_ThermalLifetime")
Density
0.0
0.5
1.0
1.5
2.0
5
10
15
Thermal lifetime [Ma]

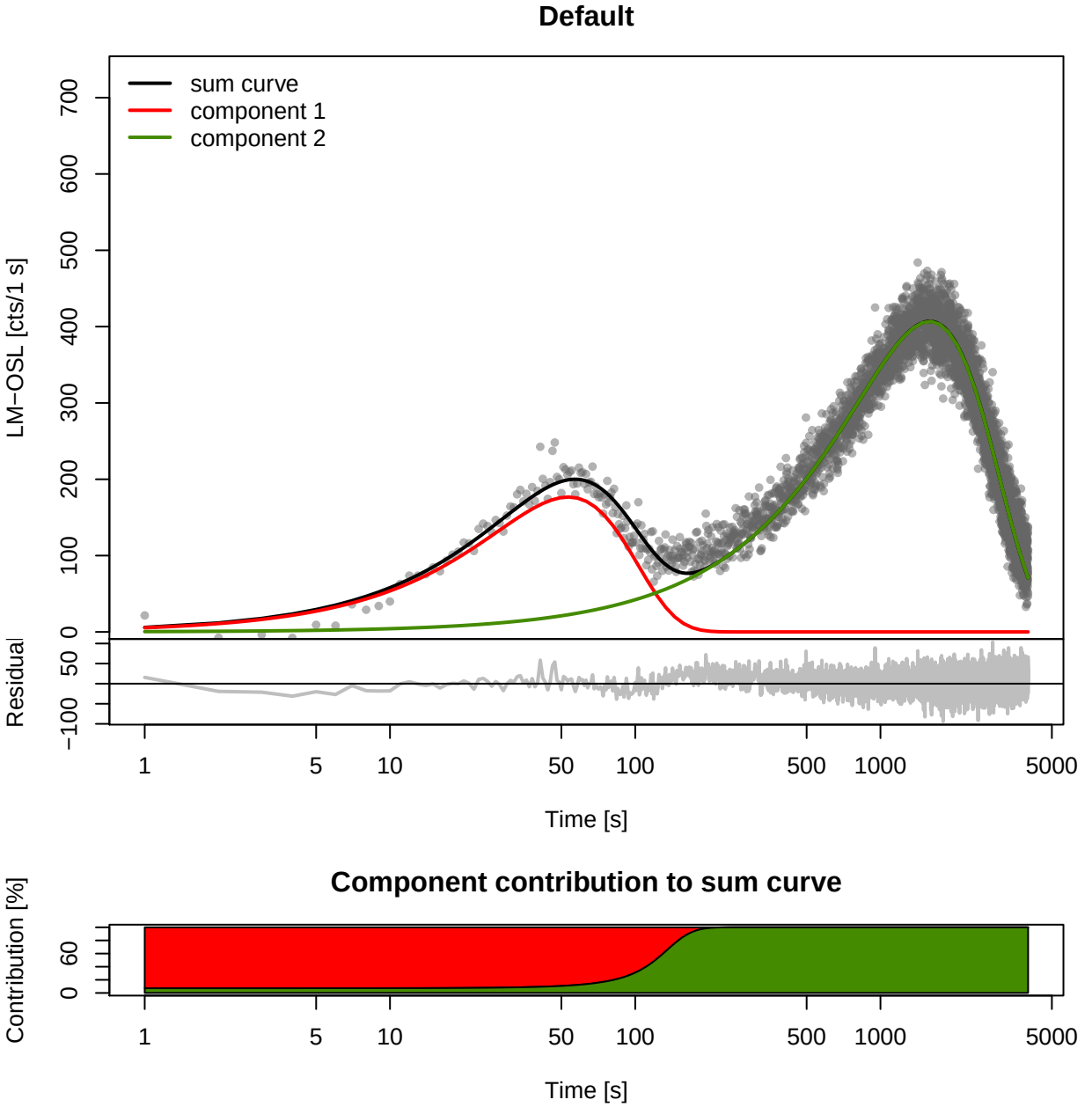

De estimation applying Woda and Fuchs (2008)
Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
20
40
60
80
100
120
140
De [Gy]
help("calc_WodaFuchs2008")

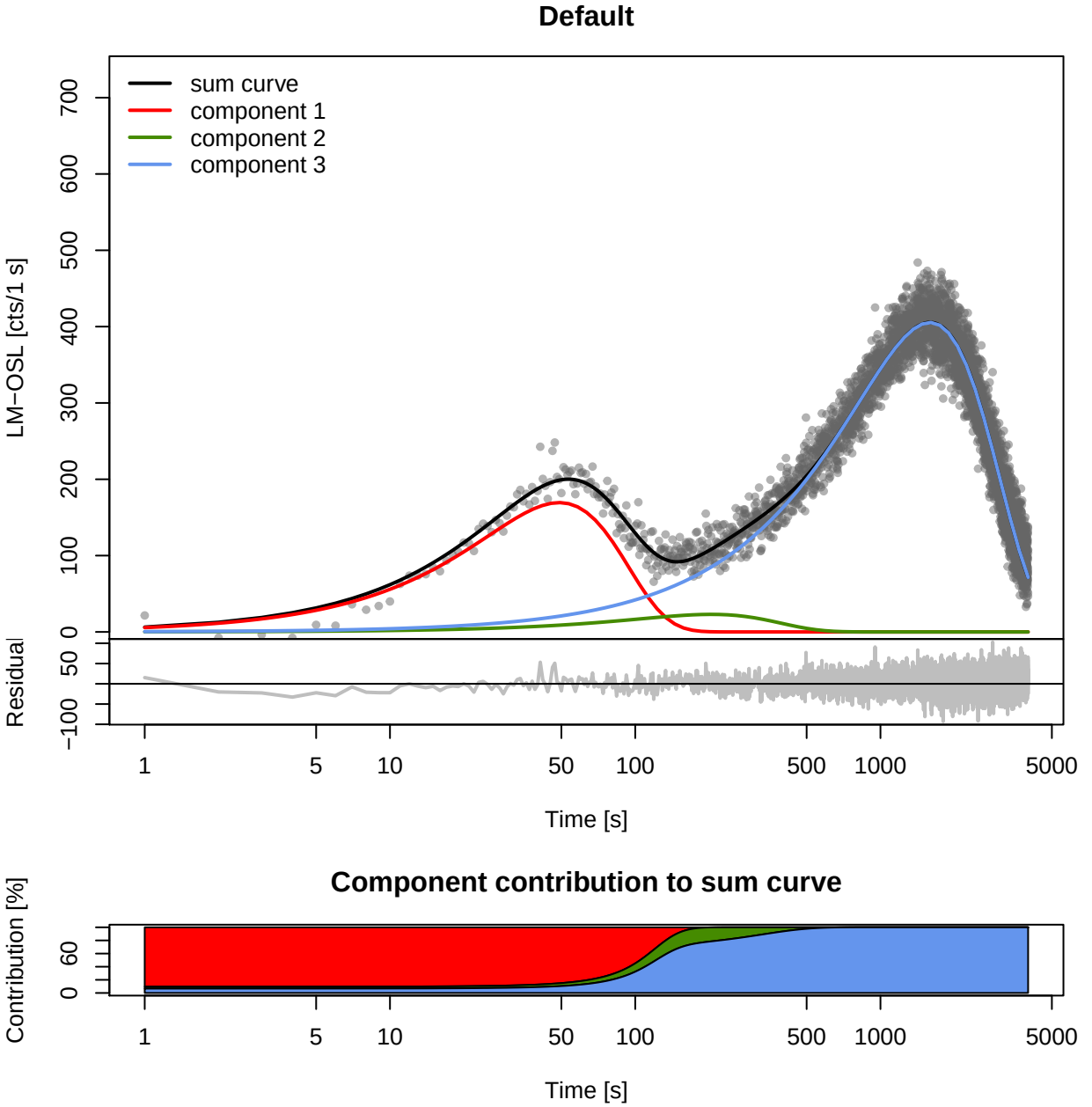

gSGC and resulting De
Re−norm. L_x/T_x
0.0
0.5
1.0
1.5
0
100
200
300
400
500
Dose [a.u.]
help("calc_gSGC")

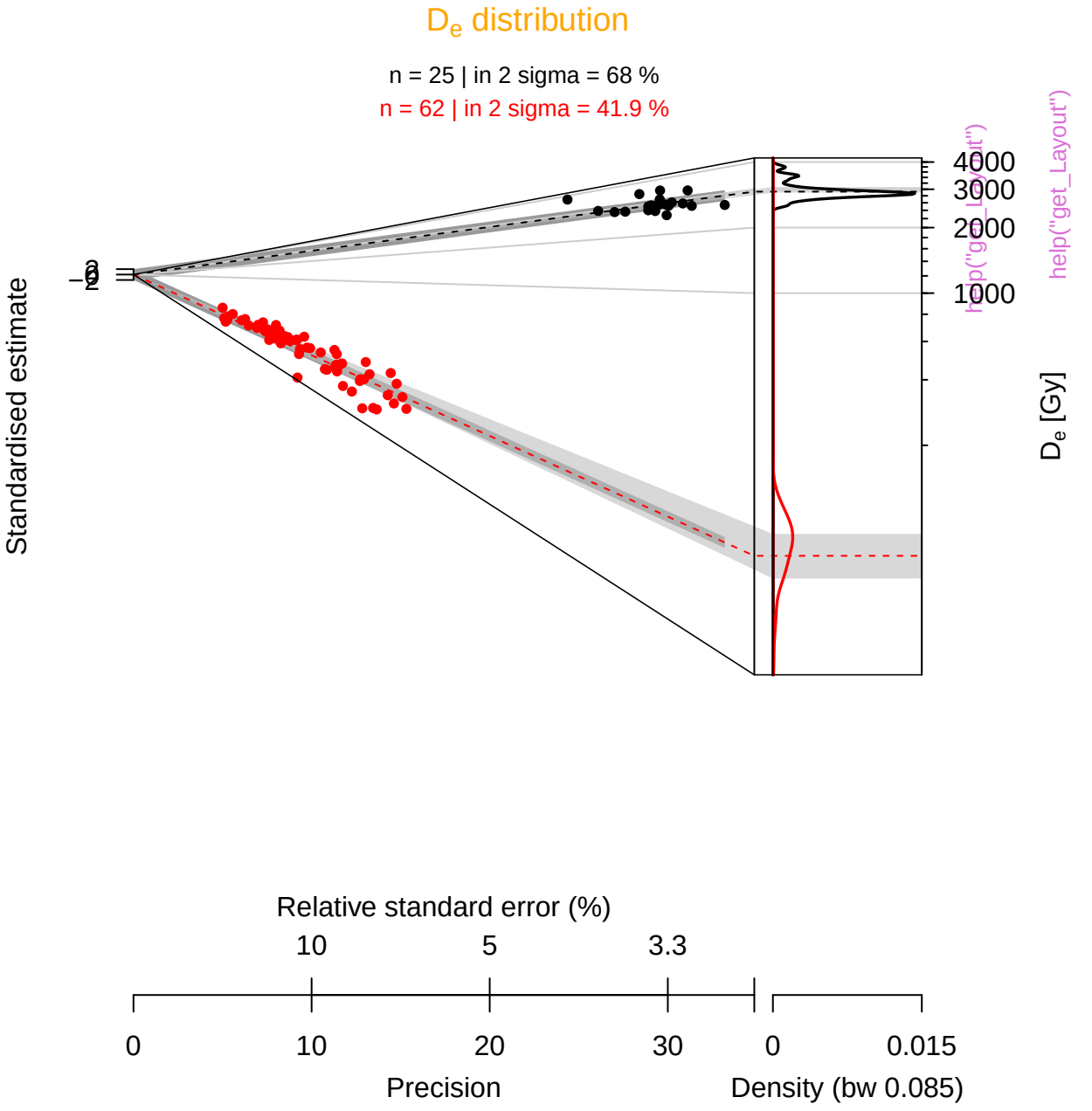

CW Curve Fit
Default
sum curve
component 1
component 2
component 3
OSL [cts/0.04 s]
Residual [a.u.]
Time [s]
Component contribution to sum curve
Contribution [%]
Time [s]


Default
sum curve
component 1
component 2
component 3
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
−100
50
0
1
5
10
50
100
500
1000
5000
Time [s]
Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

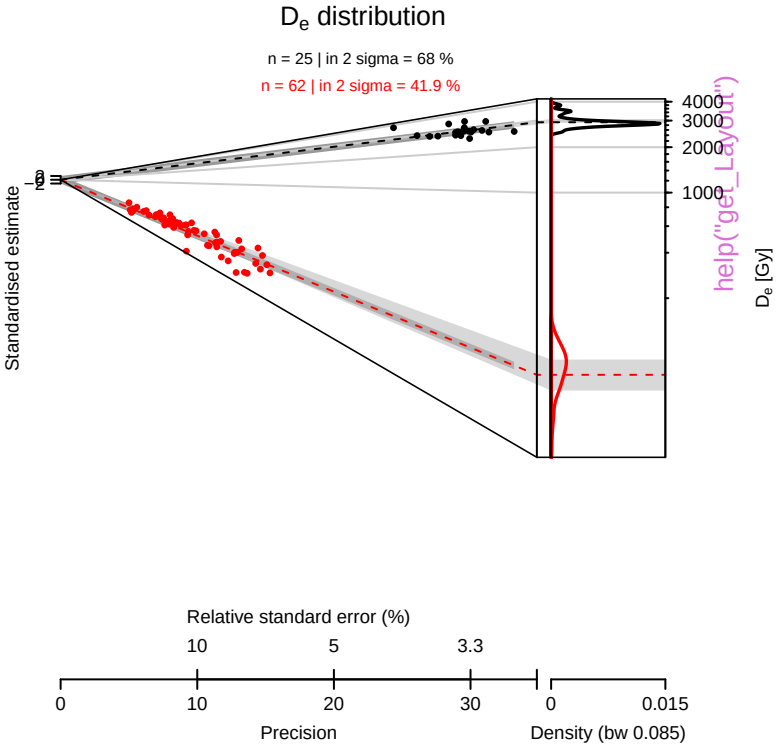

Background
y = 0*x^3+0*x^2+0.07*x+26.35
LM−OSL [a.u.]
0
100
200
300
400
500
0
1000
2000
3000
4000
Time [s]
help("fit_LMCurve")

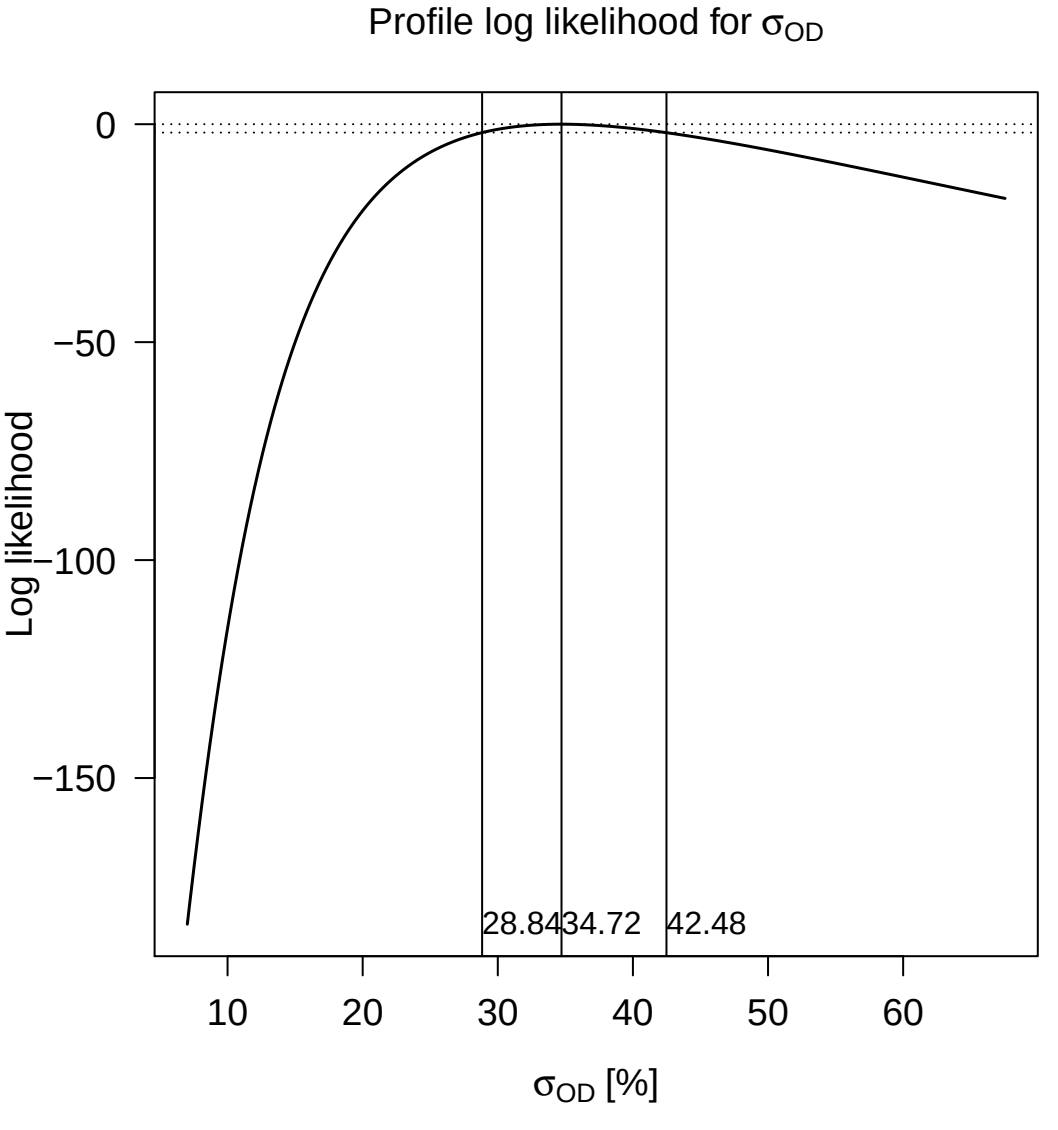

Default
sum curve
component 1
component 2
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
−100
50
0
1
5
10
50
100
500
1000
5000
Time [s]
Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

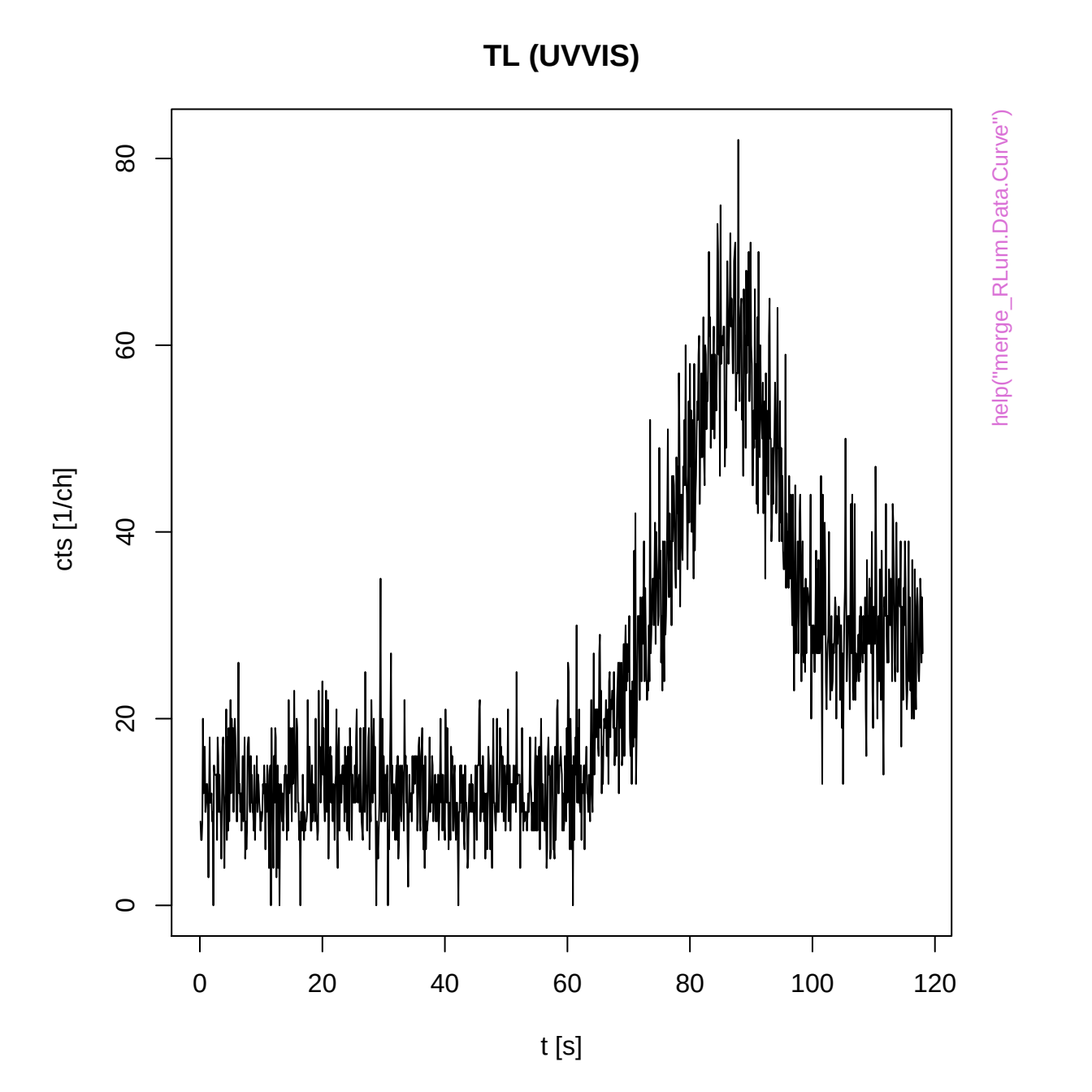

Default
sum curve
component 1
component 2
component 3
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
−100
50
0
1
5
10
50
100
500
1000
5000
Time [s]
Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

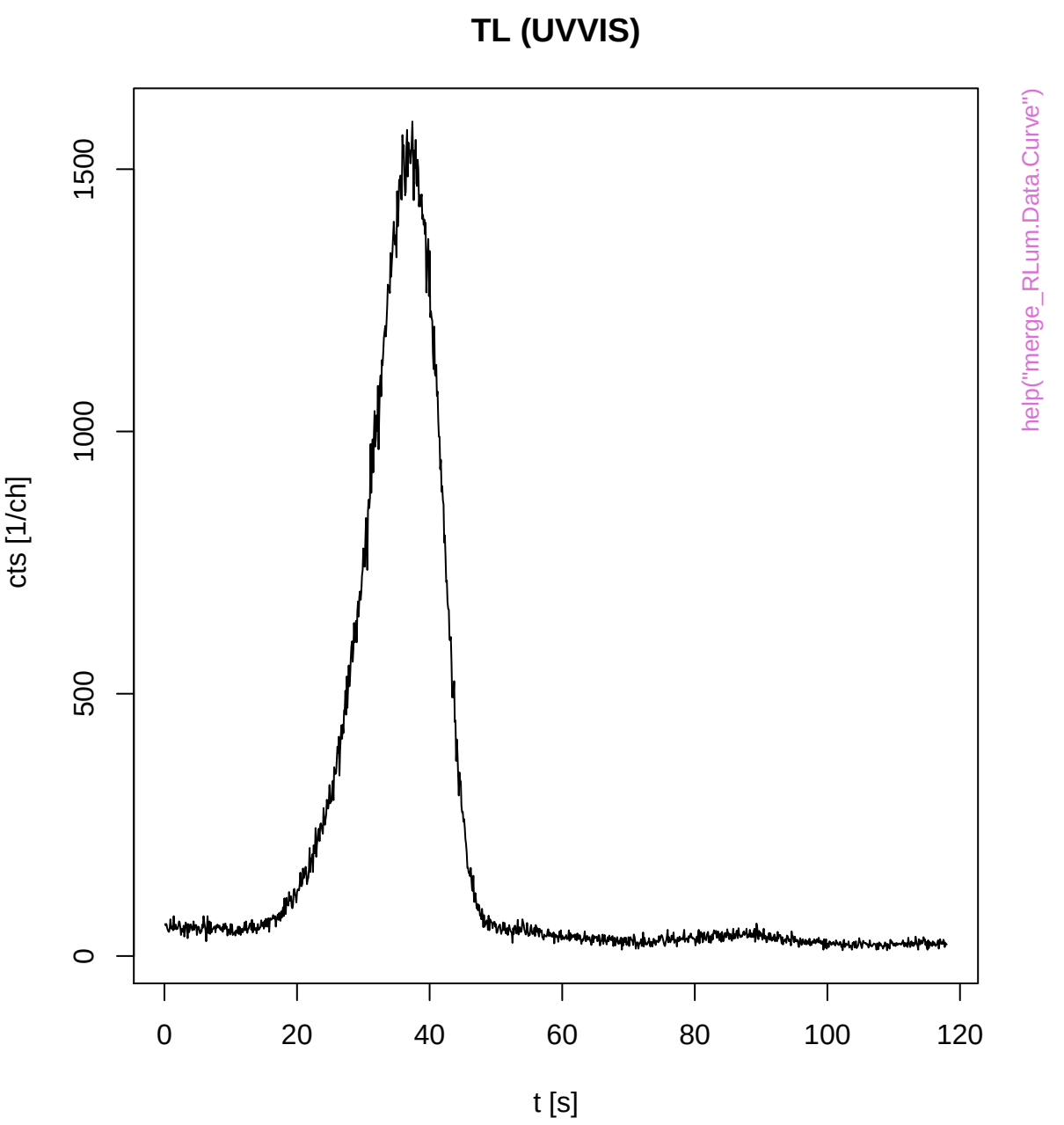

De distribution
n = 25 | in 2 sigma = 68 %
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
De [Gy]
4000
3000
2000
1000
help("get_Layout")
help("get_Layout")
Relative standard error (%)
10
5
3.3
0
10
20
30
0
0.015
Precision
Density (bw 0.085)

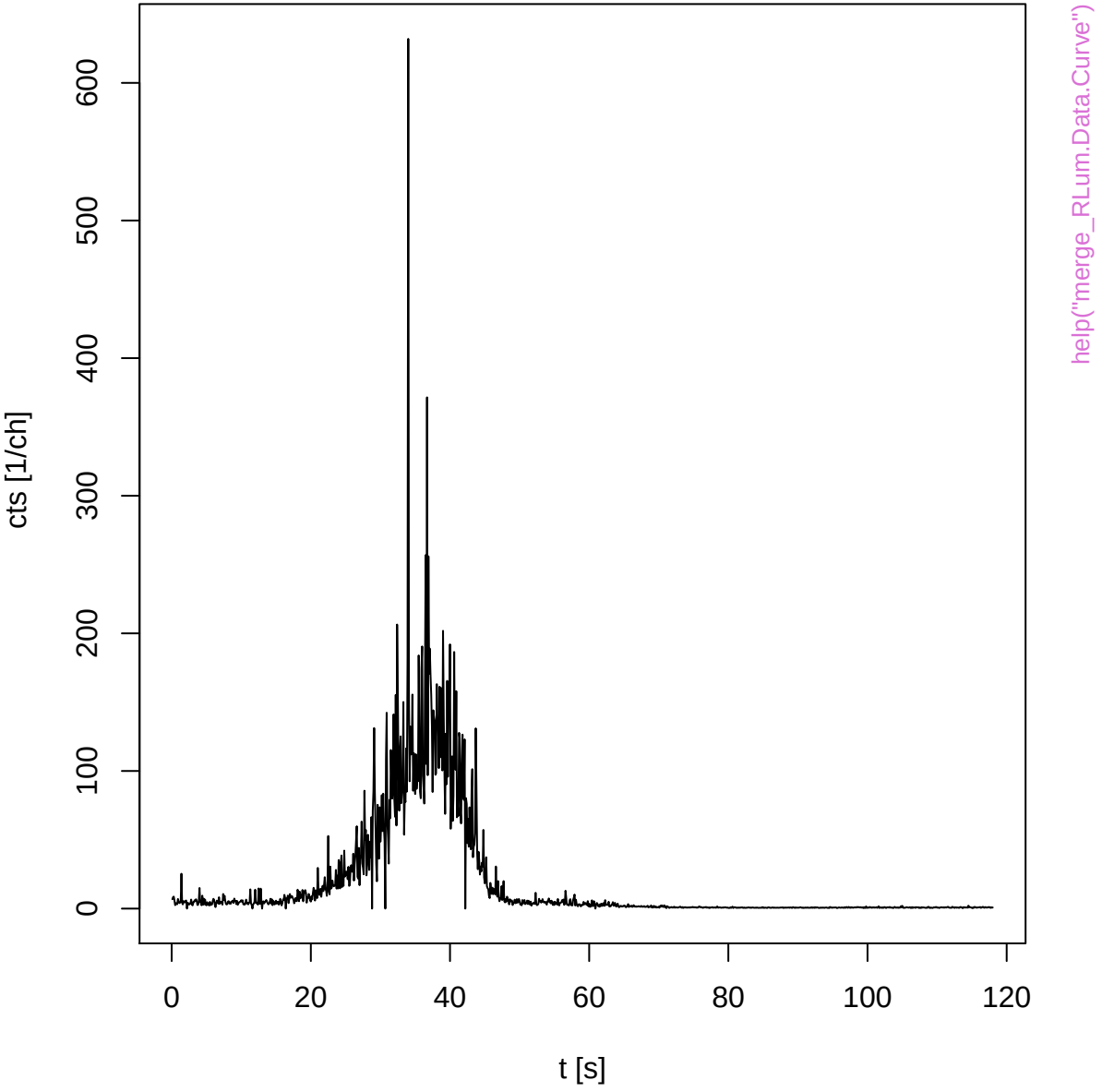
help("get_Layout")

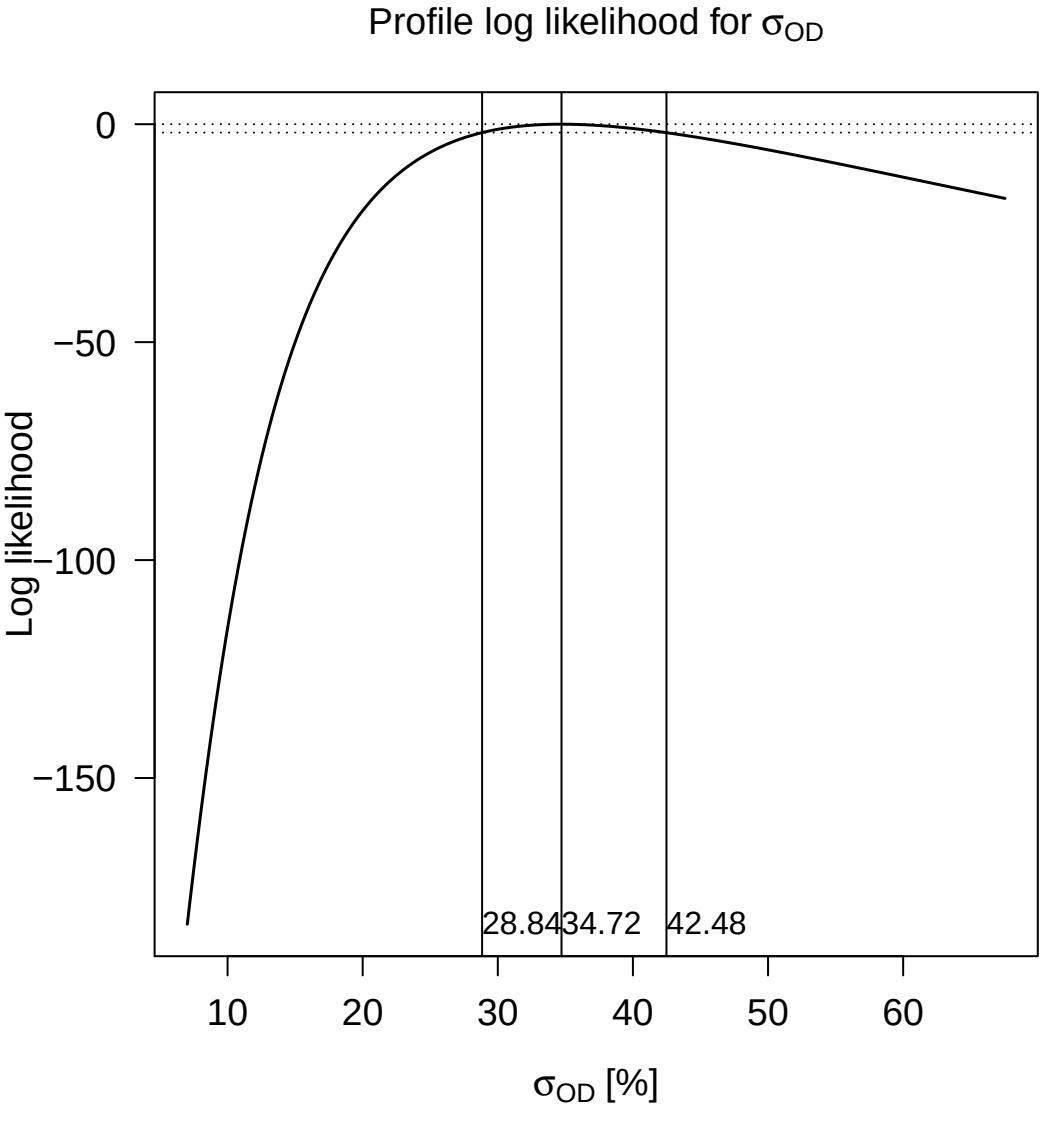


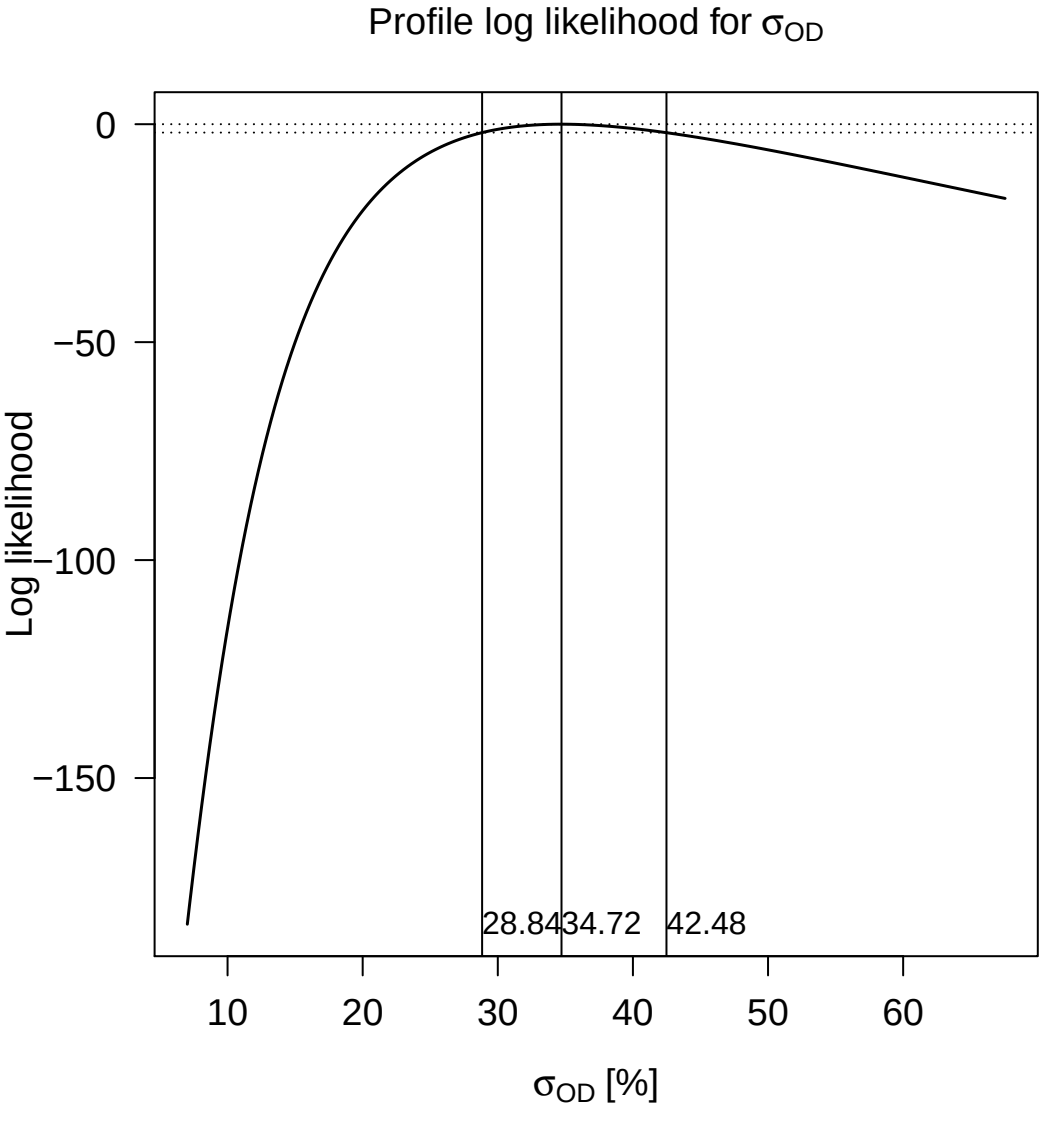

Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]

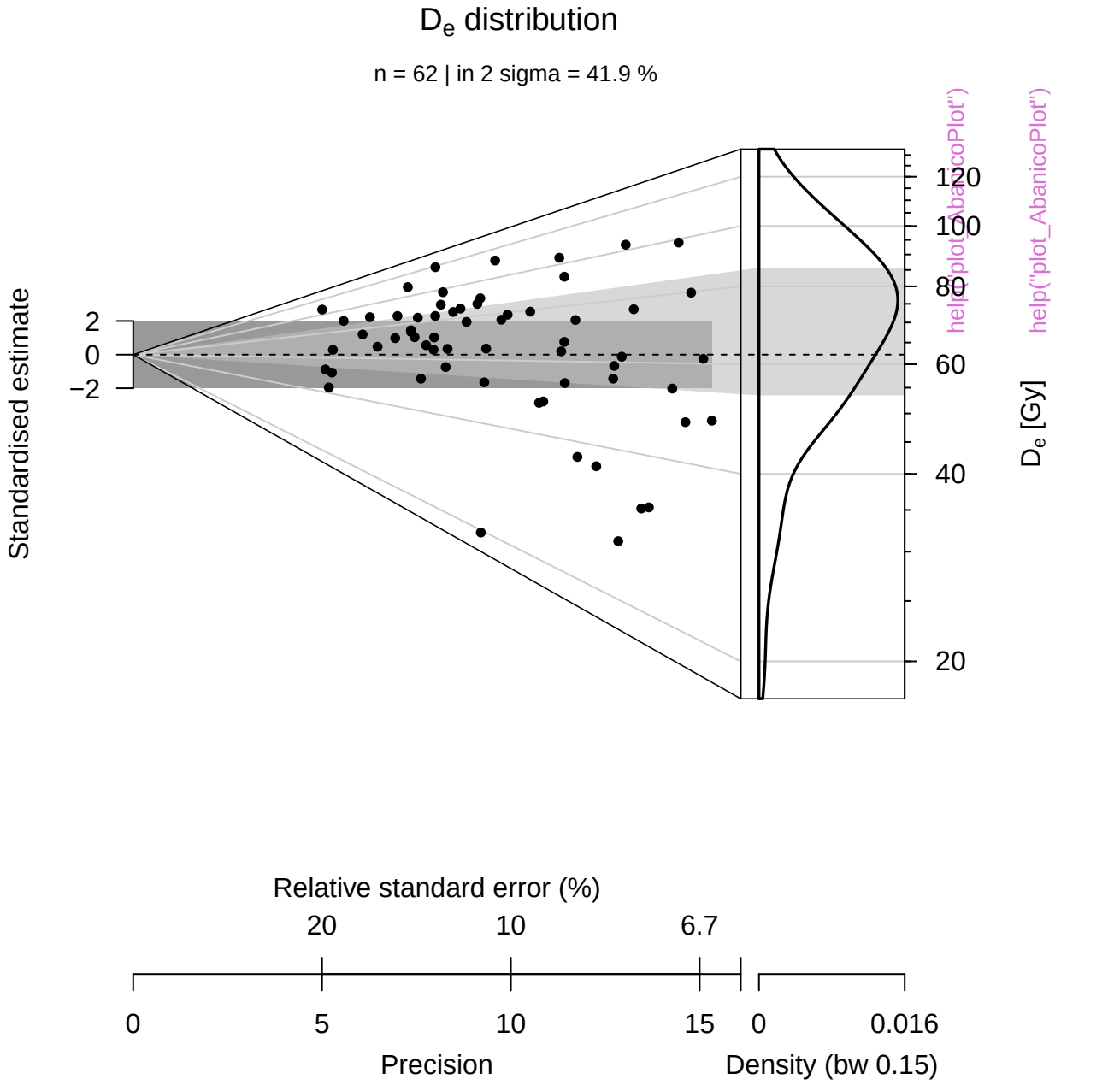

TL (UVVIS)
cts [1/ch]
0
20
40
60
80
0
20
40
60
80
100
120
t [s]
help("merge_RLum.Data.Curve")

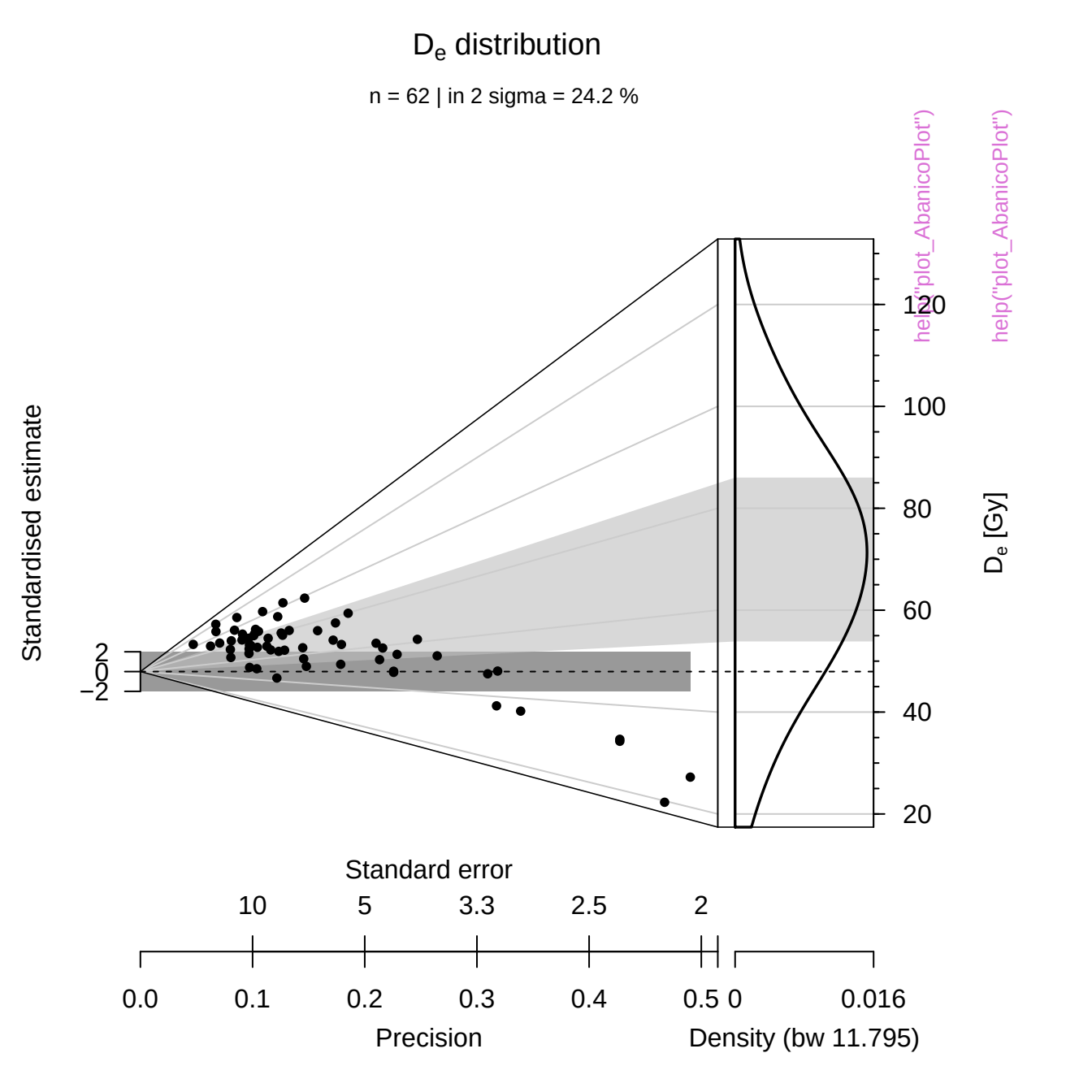

TL (UVVIS)
cts [1/ch]
0
500
1000
1500
0
20
40
60
80
100
120
t [s]
help("merge_RLum.Data.Curve")

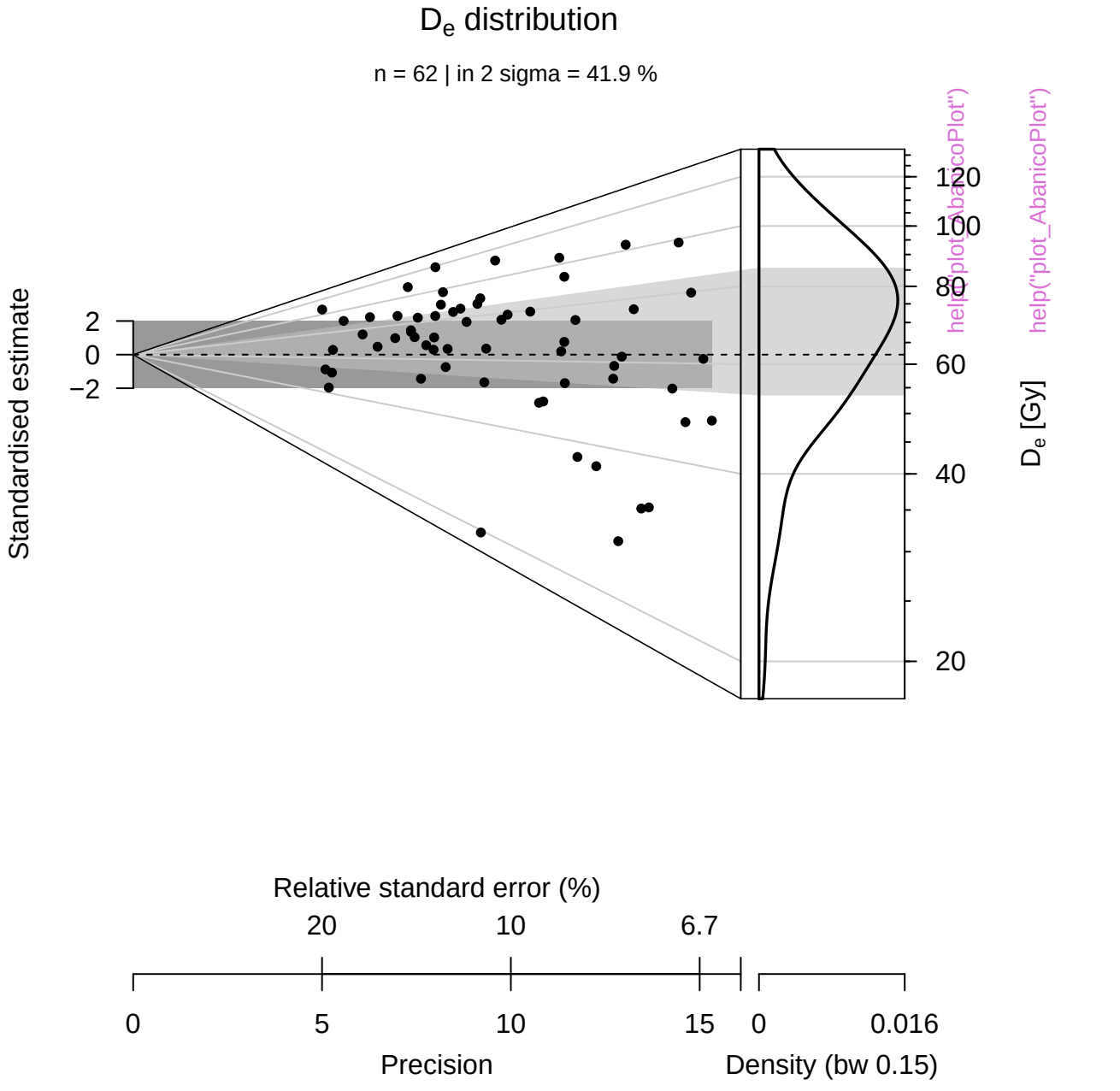

TL (UVVIS)
cts [1/ch]
0
100
200
300
400
500
600
t [s]
0
20
40
60
80
100
120
help("merge_RLum.Data.Curve")

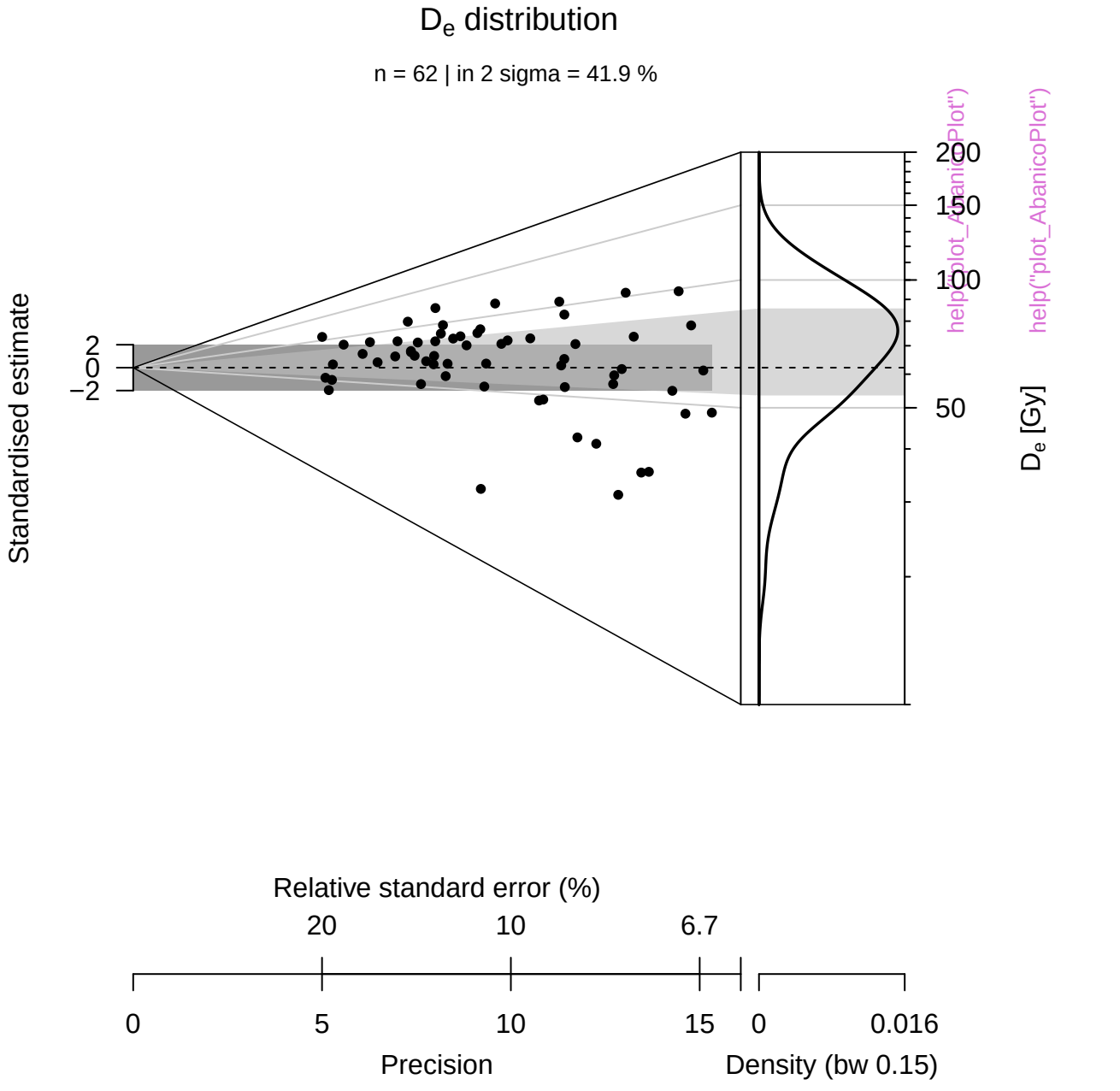

Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]

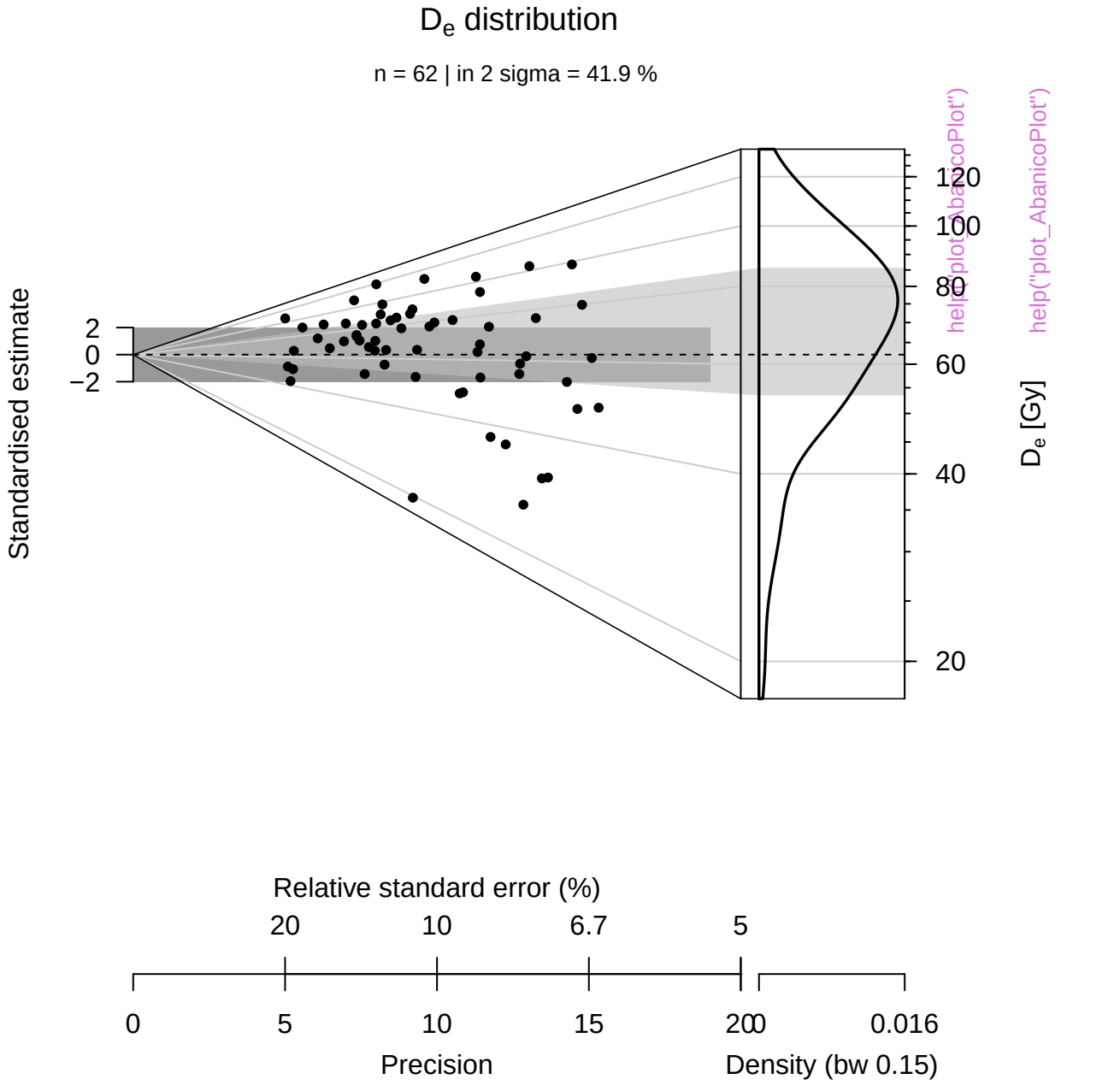

Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]

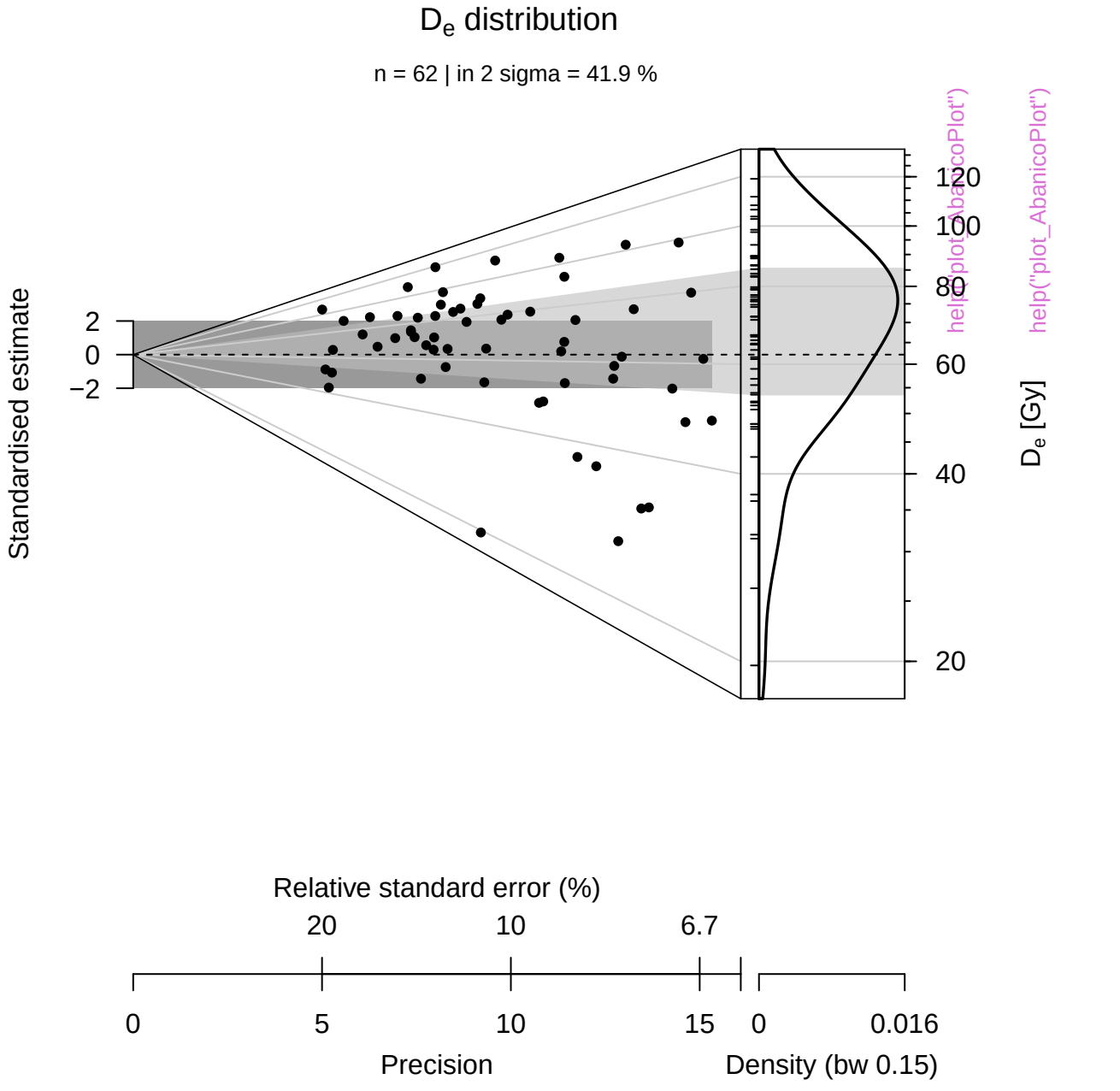

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

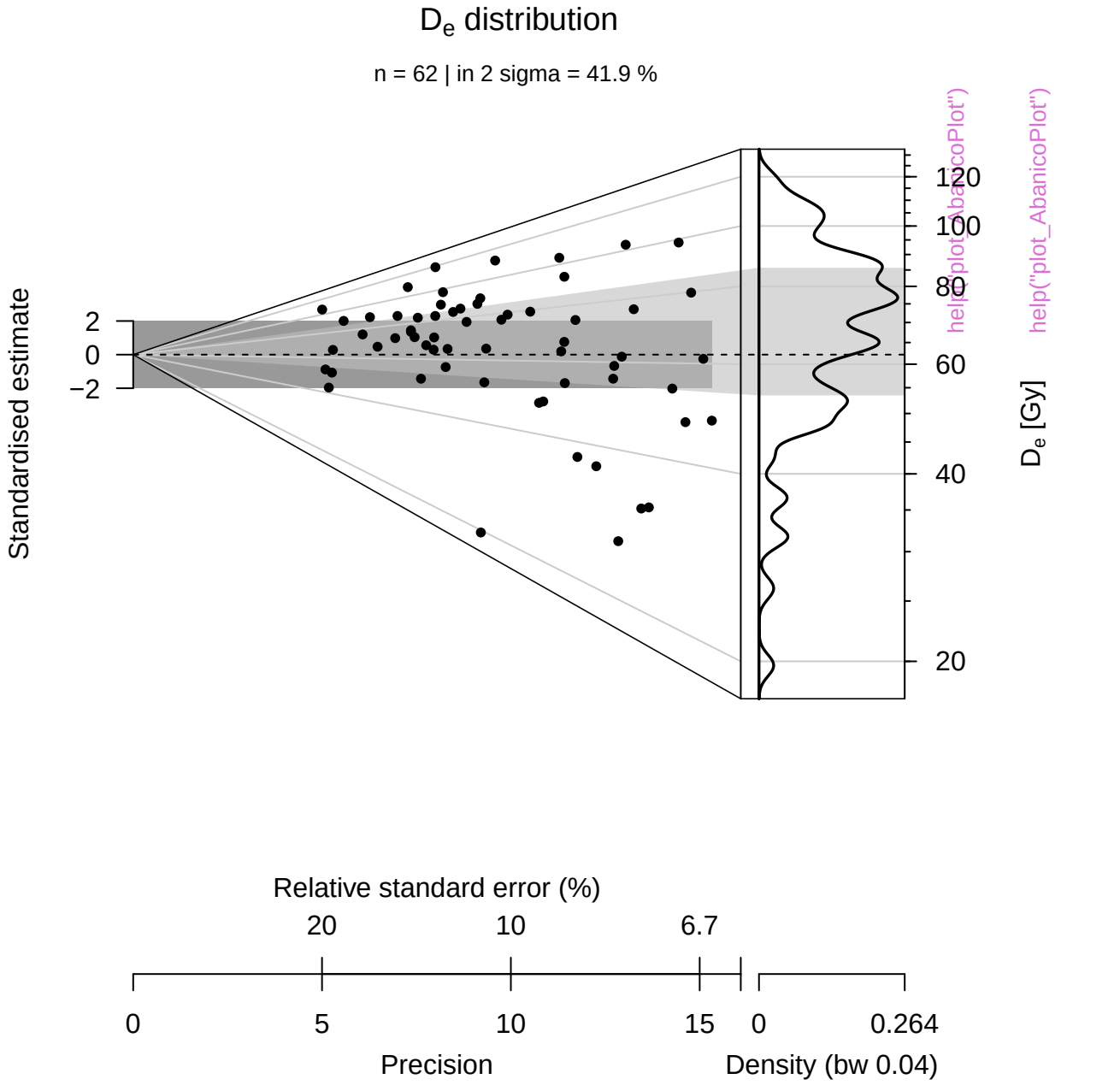

De distribution
n = 62 | in 2 sigma = 24.2 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
Standard error
10
5
3.3
2.5
2
0.0
0.1
0.2
0.3
0.4
0.5
0
0.016
Precision
Density (bw 11.795)

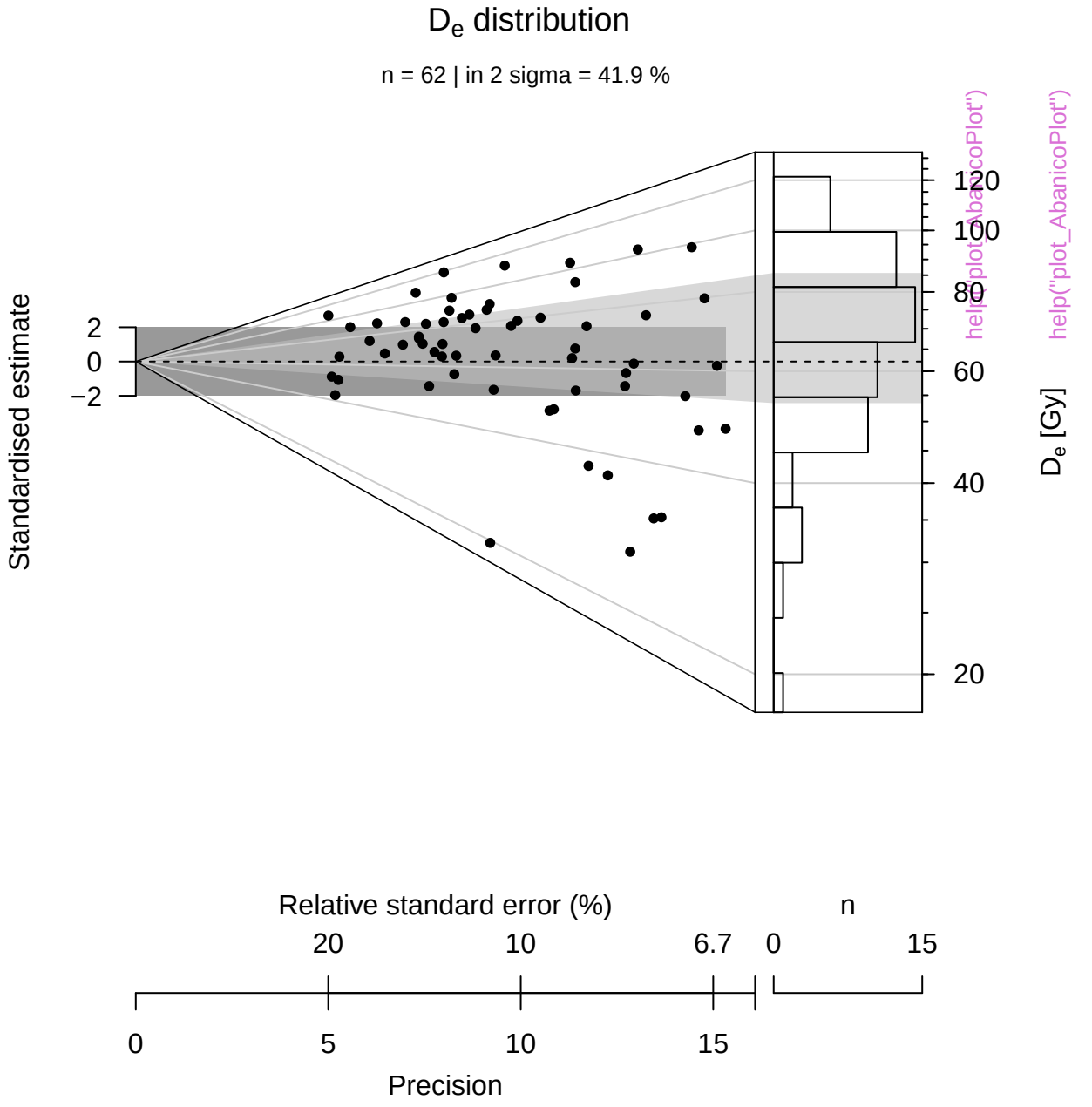

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

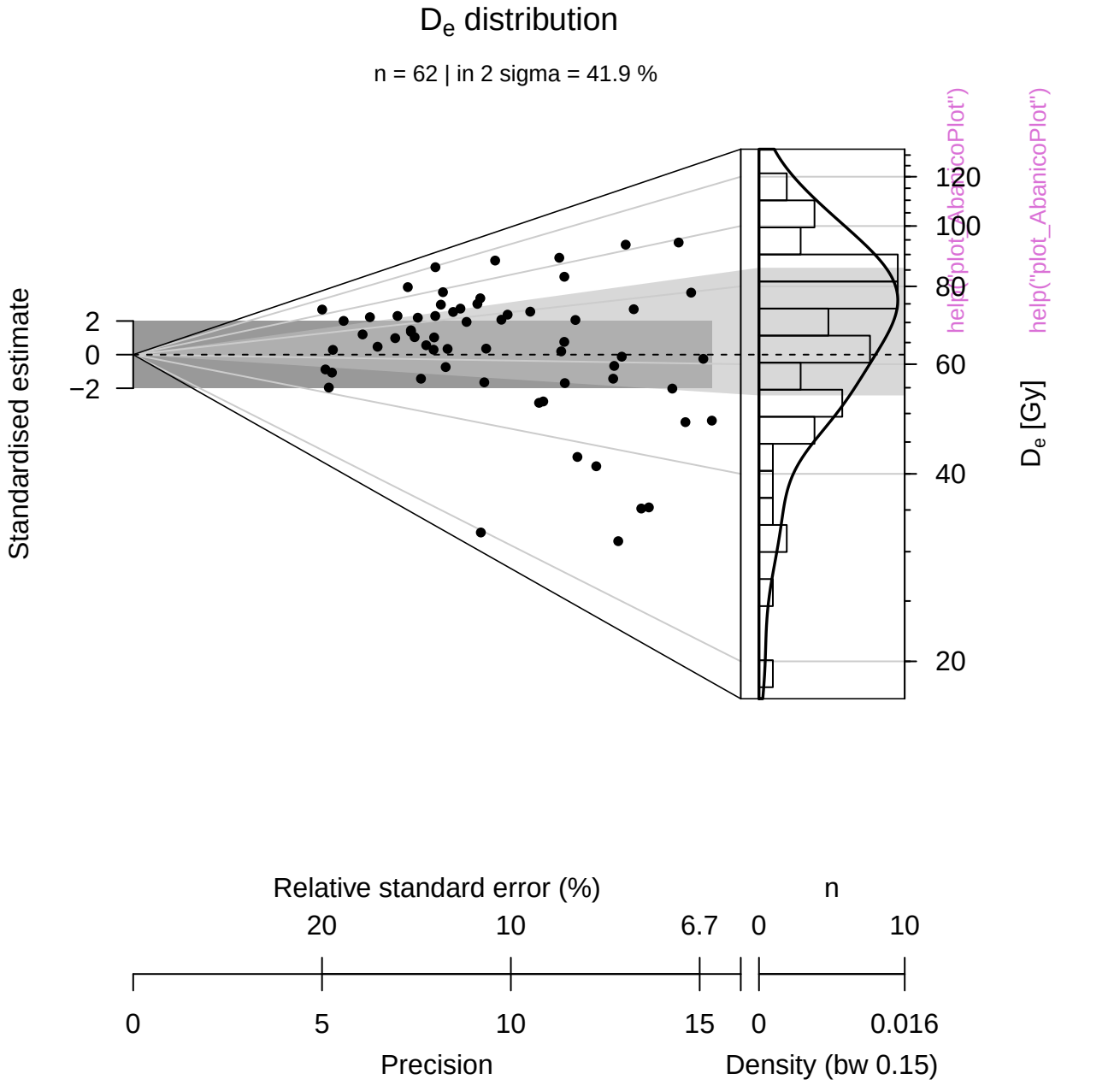

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
200
150
100
50
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

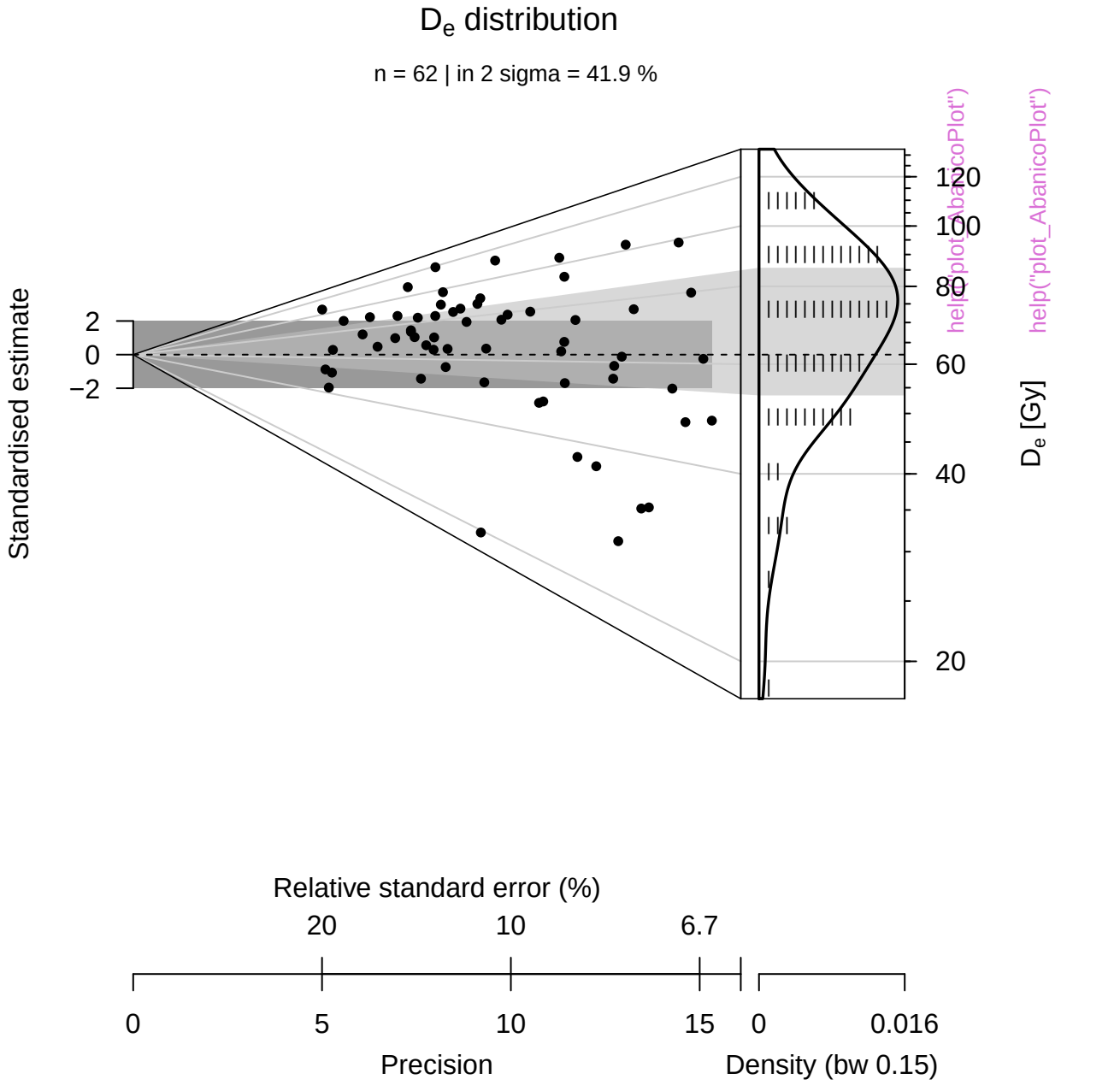

D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
5
0
5
10
15
20
0
0.016
Precision
Density (bw 0.15)

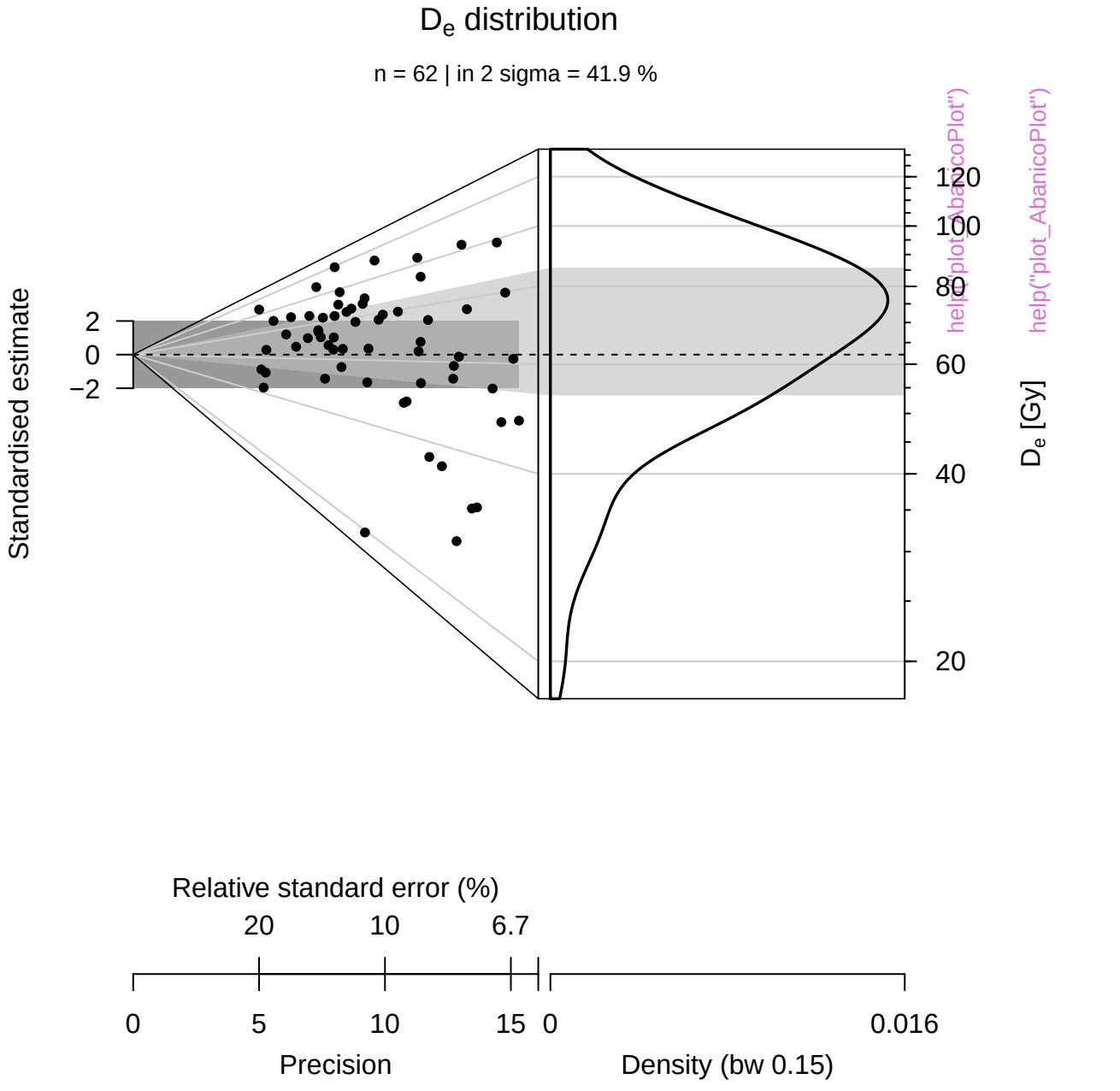

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

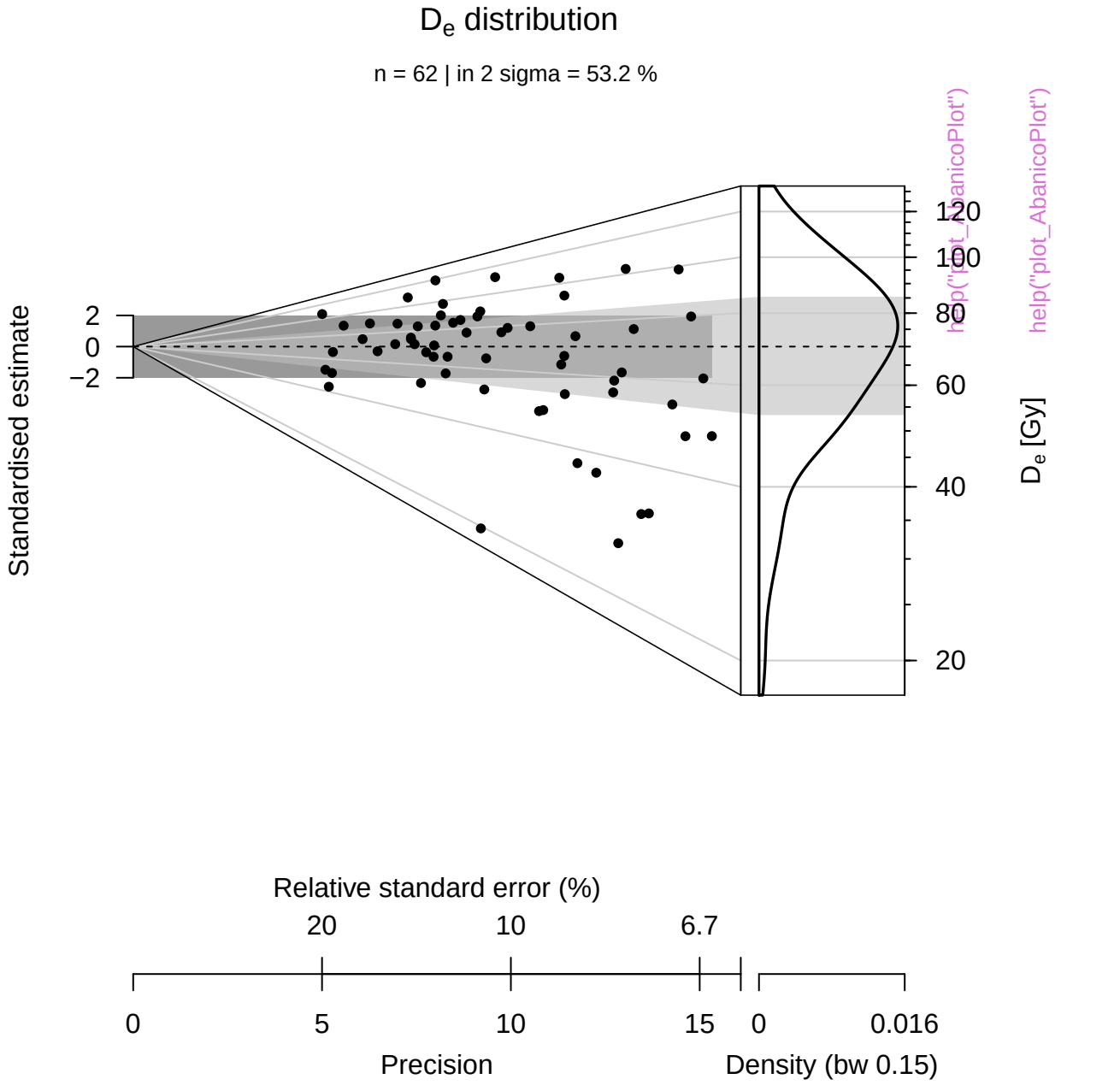

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.264
Density (bw 0.04)

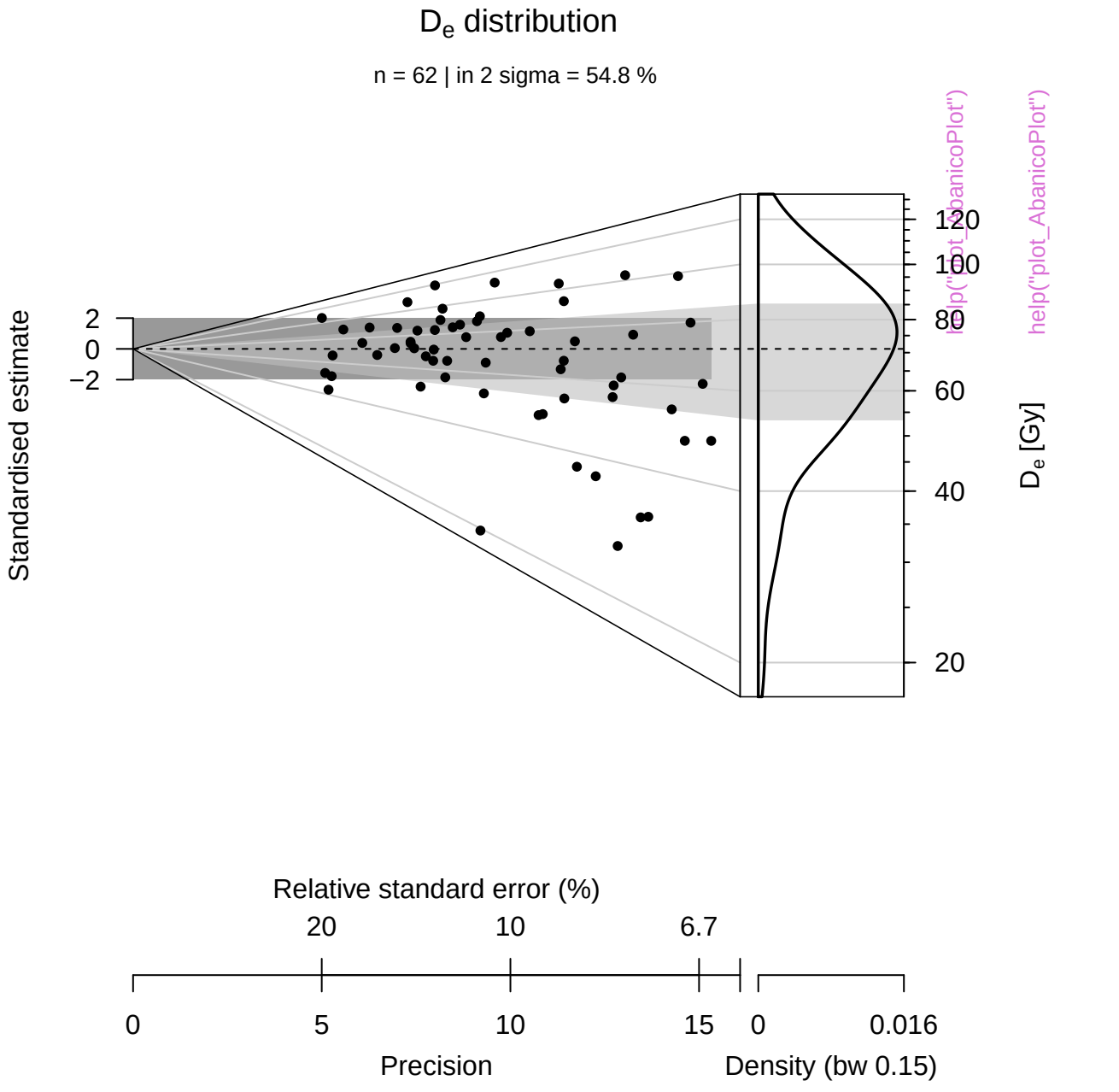

D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
15
n
0
5
10
15
Precision

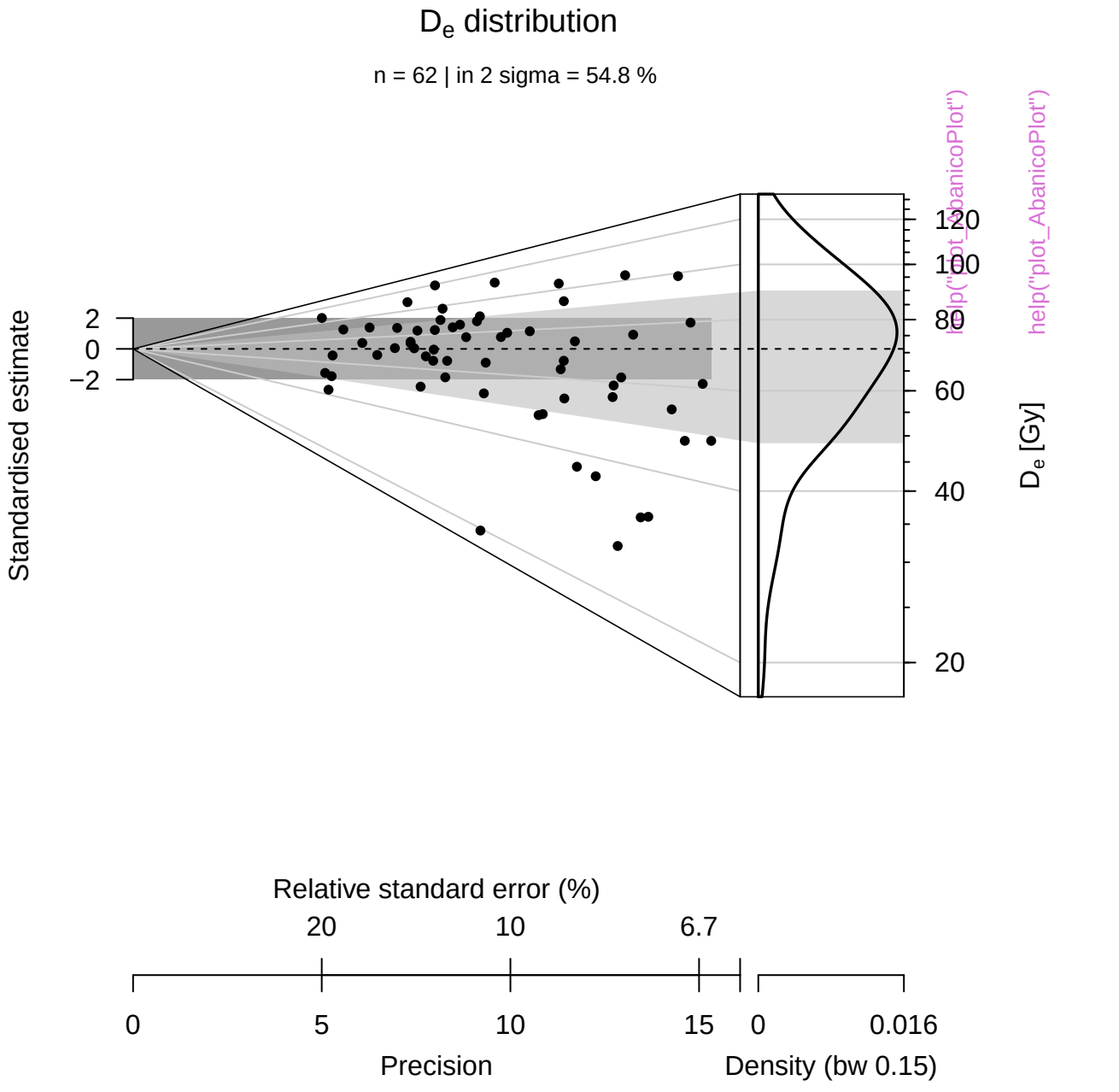

D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
n
0
10
0
0.016
Density (bw 0.15)

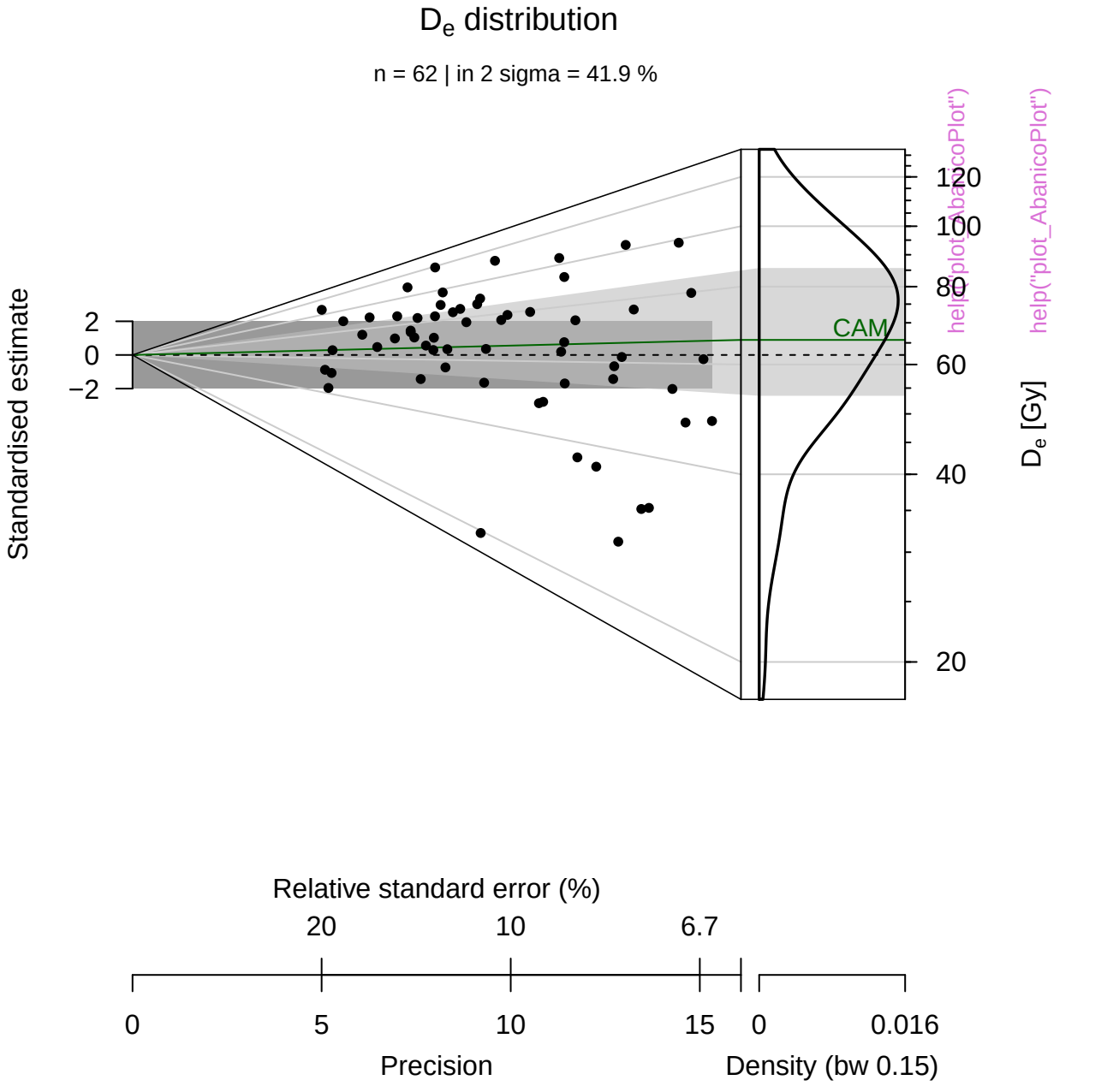

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

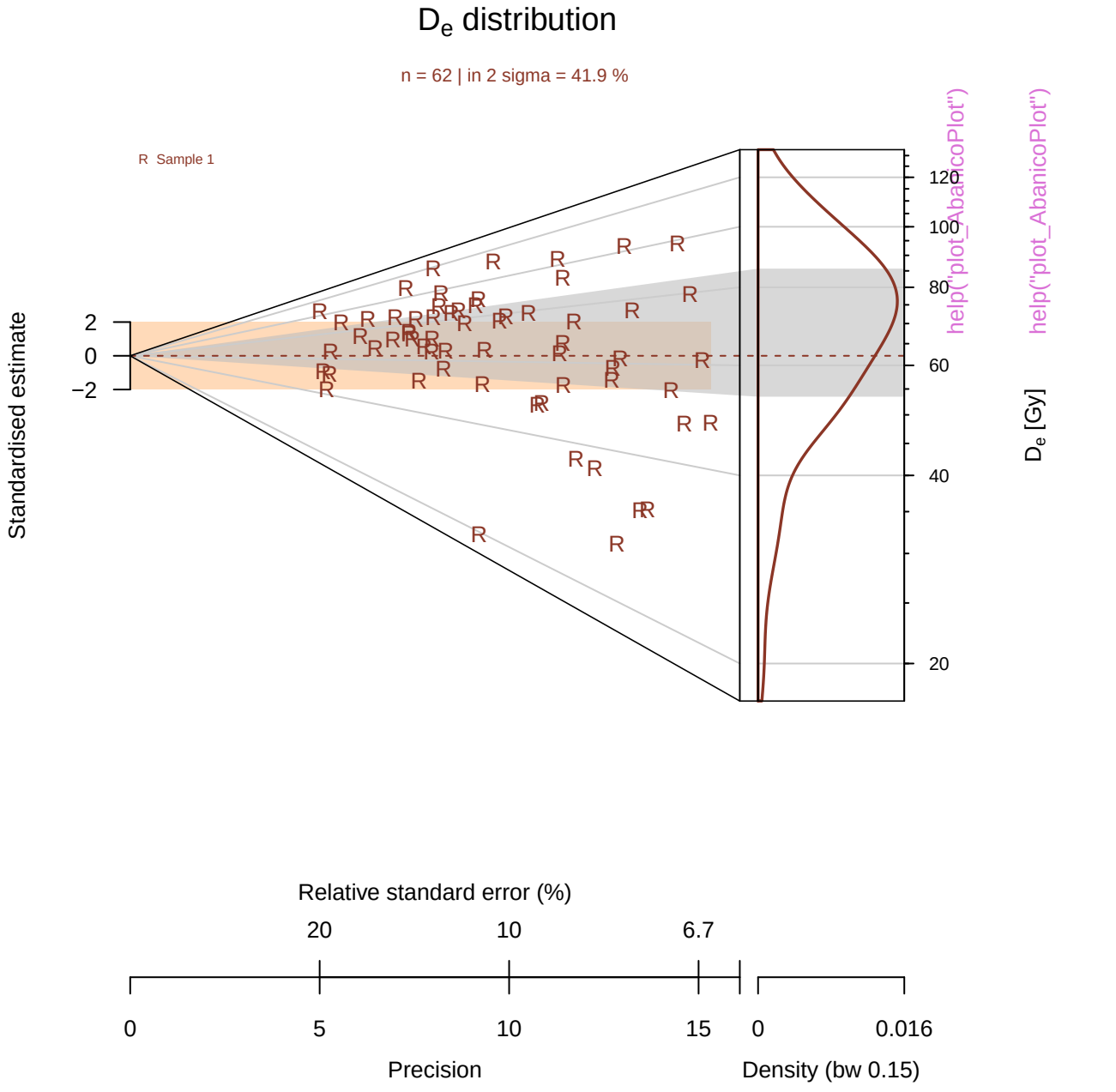

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

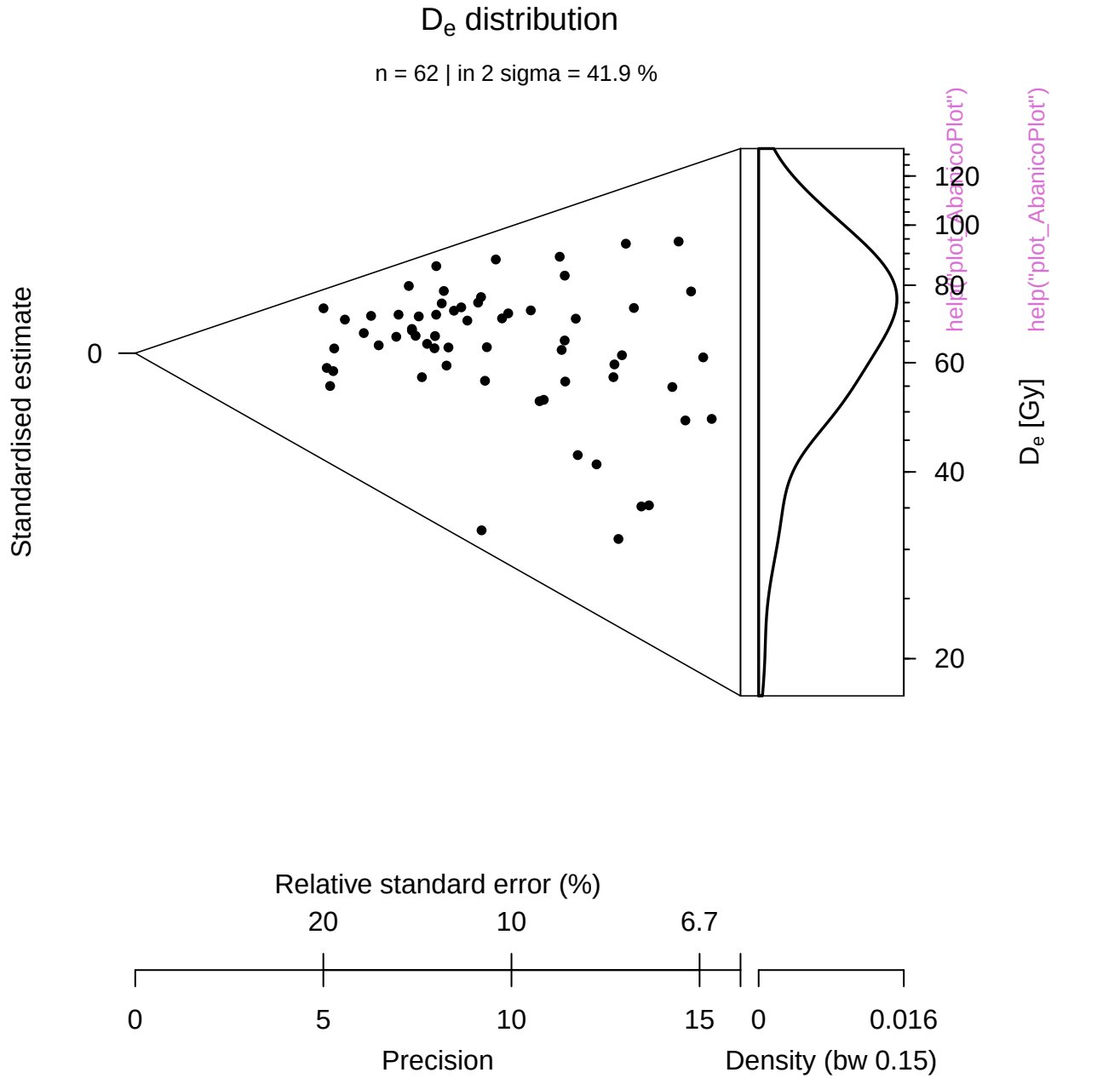

De distribution
n = 62 | in 2 sigma = 53.2 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

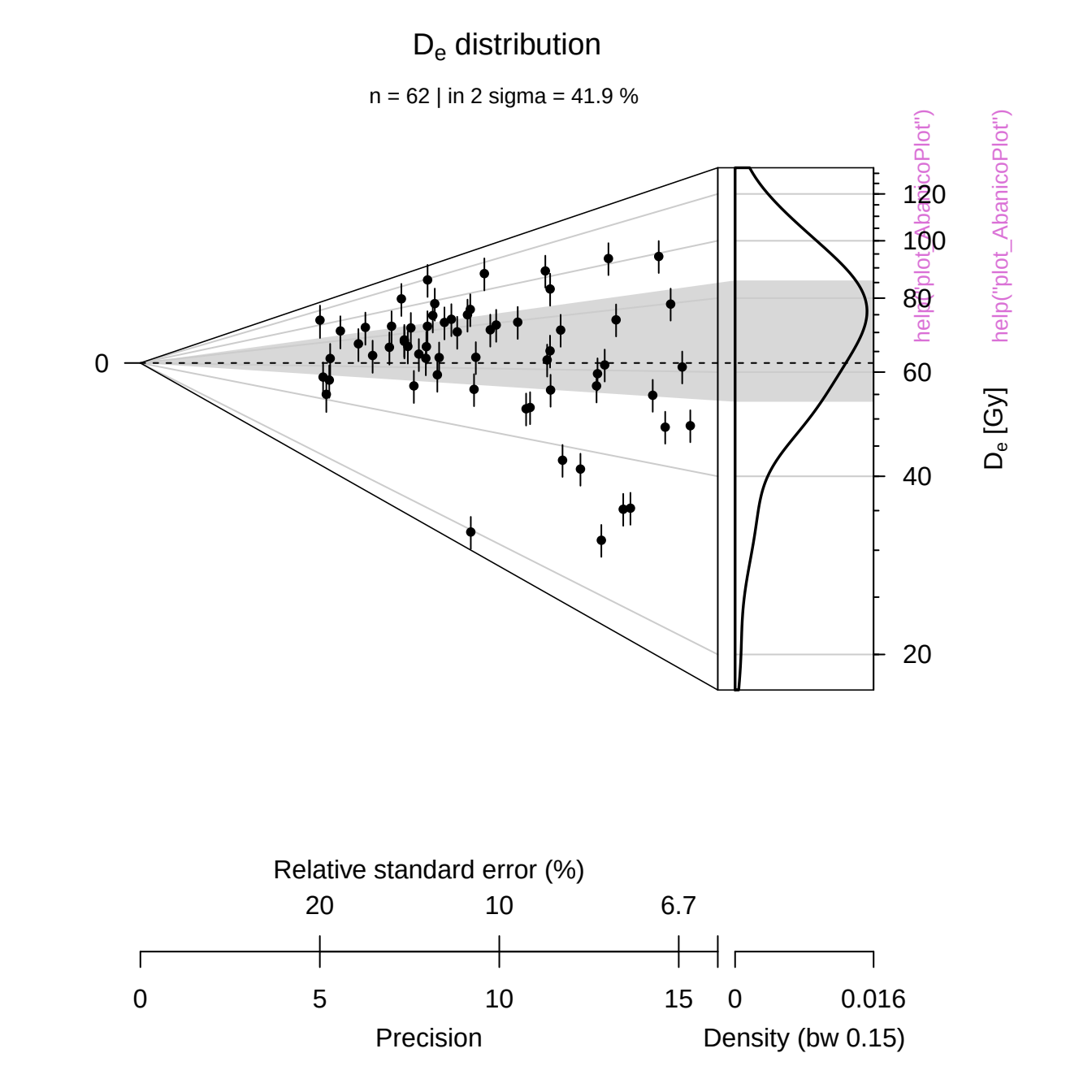

De distribution
n = 62 | in 2 sigma = 54.8 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

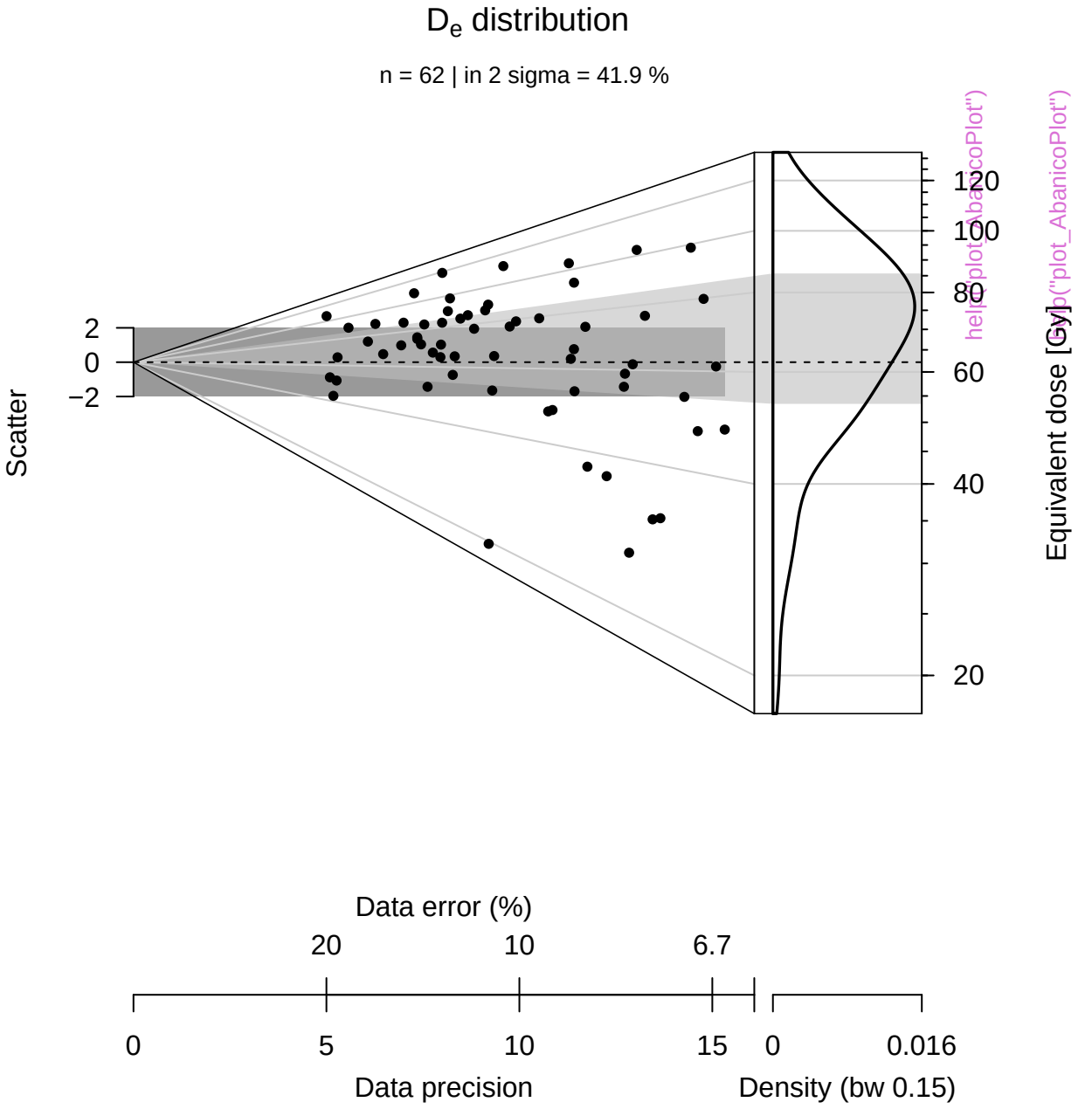

De distribution
n = 62 | in 2 sigma = 54.8 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

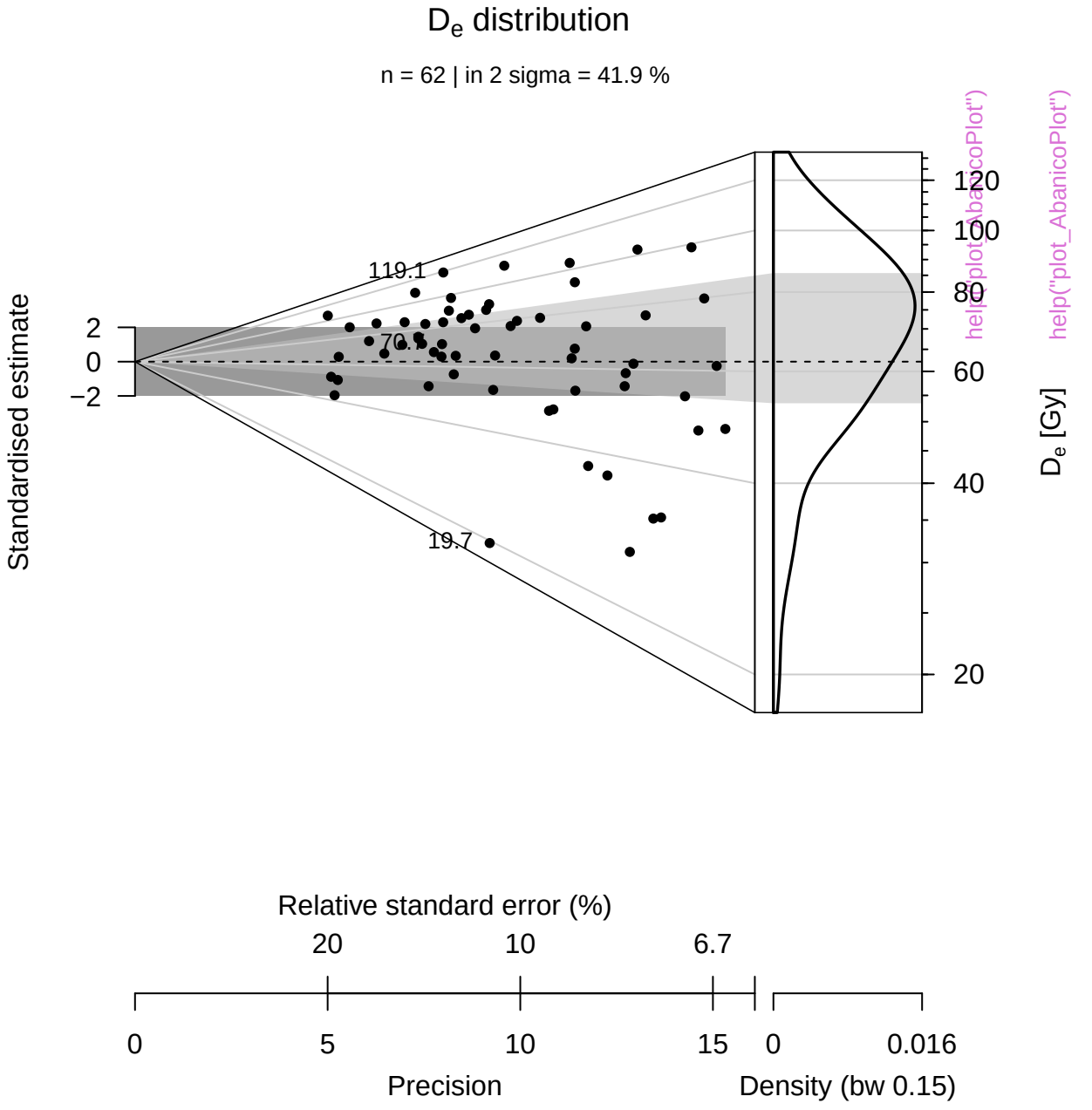

D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
CAM
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

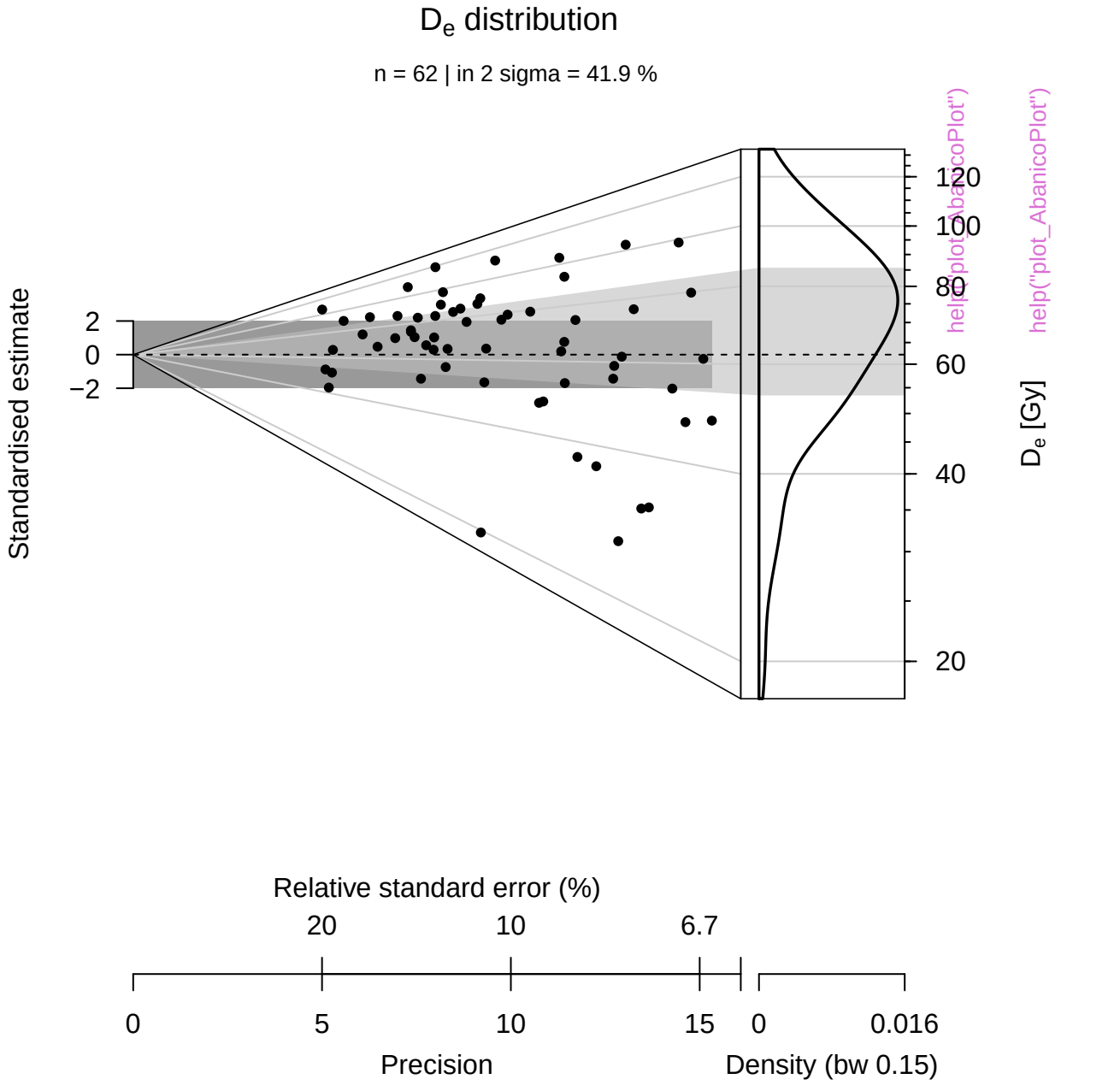

De distribution
n = 62 | in 2 sigma = 41.9 %
R Sample 1
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

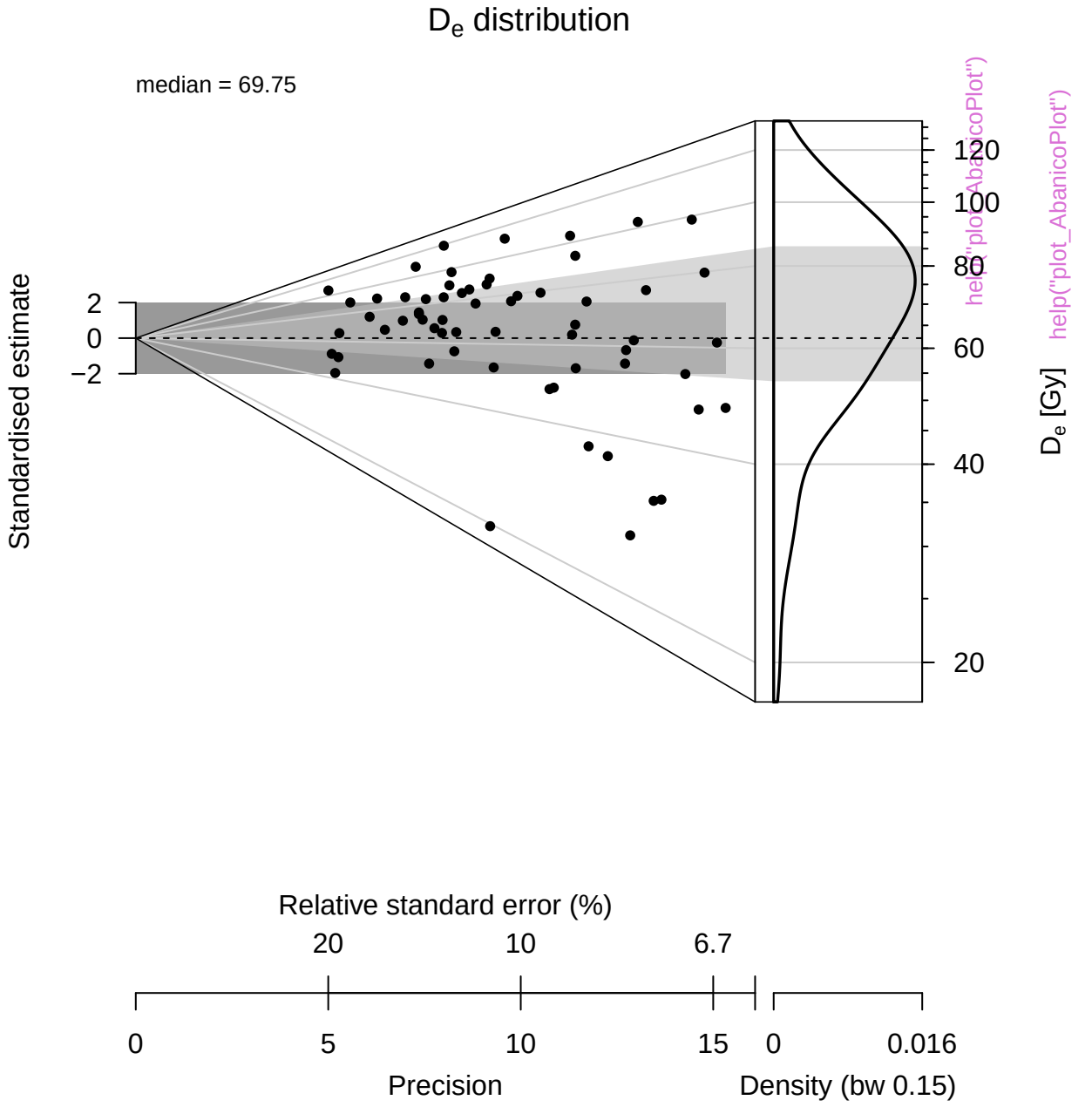

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
0
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

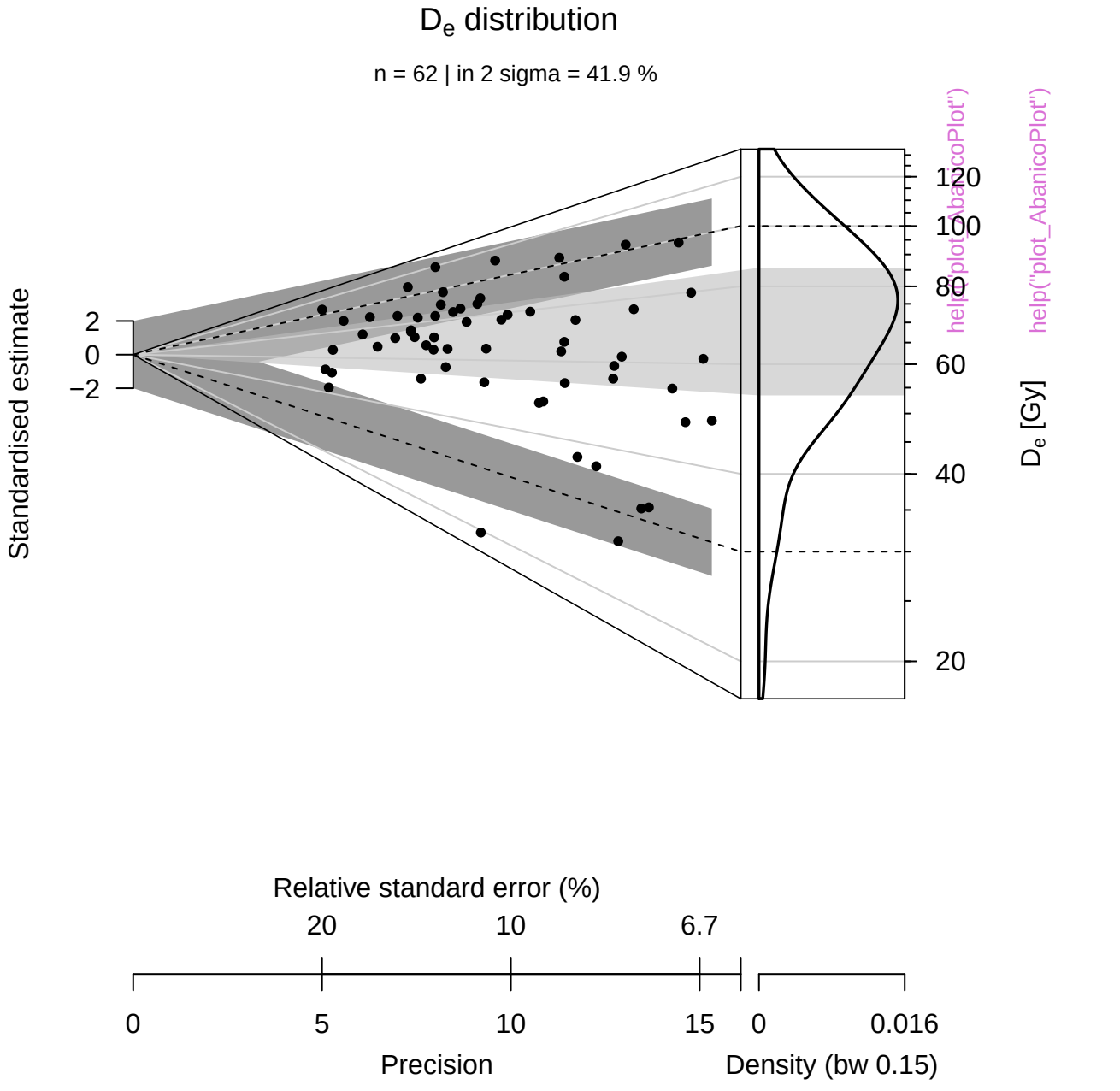

De distribution
n = 62 | in 2 sigma = 41.9 %
0
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

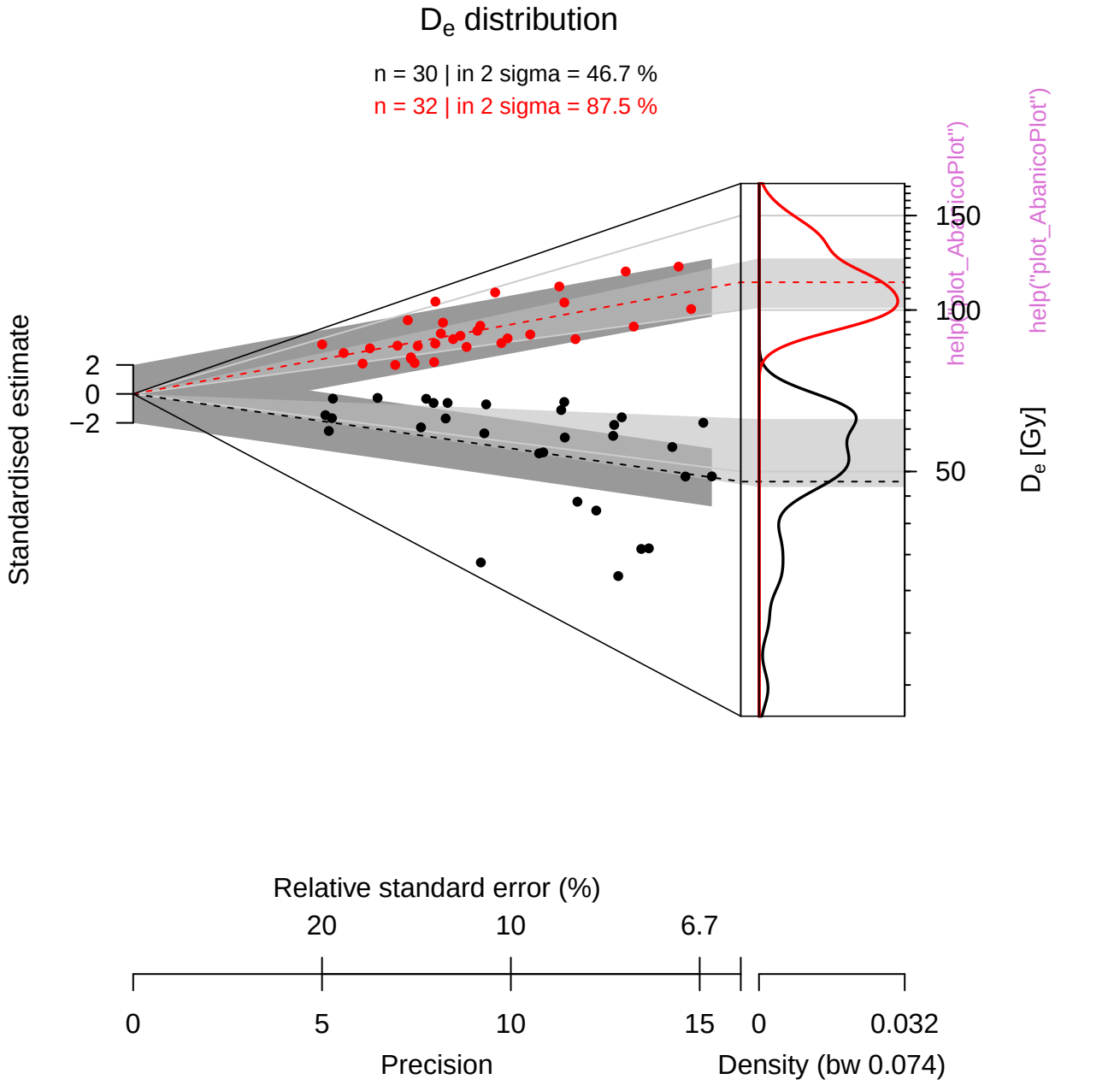

De distribution
n = 62 | in 2 sigma = 41.9 %
Scatter
2
0
−2
Equivalent dose [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
Data error (%)
20
10
6.7
0
5
10
15
Data precision
0
0.016
Density (bw 0.15)

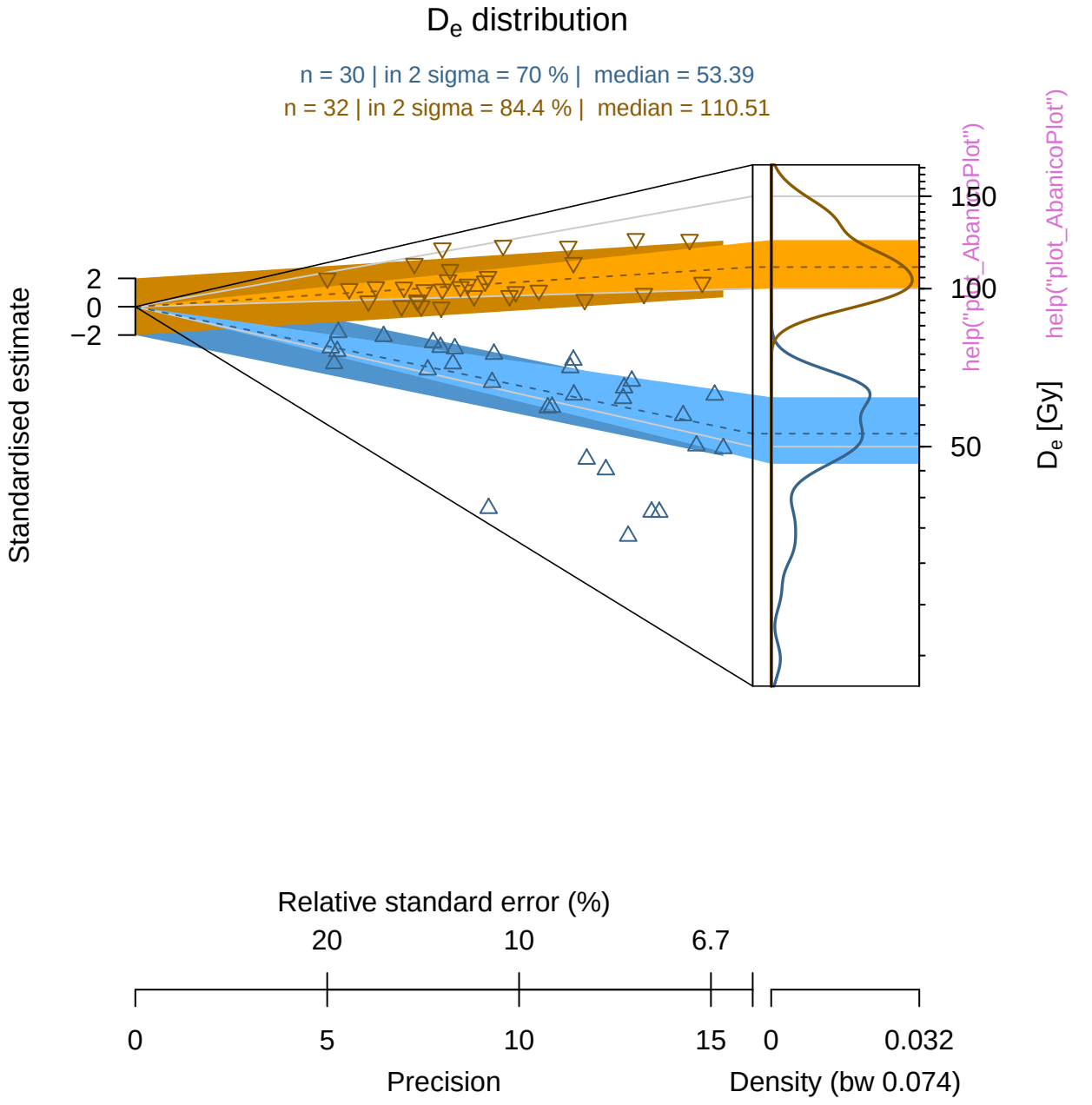

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
119.1
70.1
19.7
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

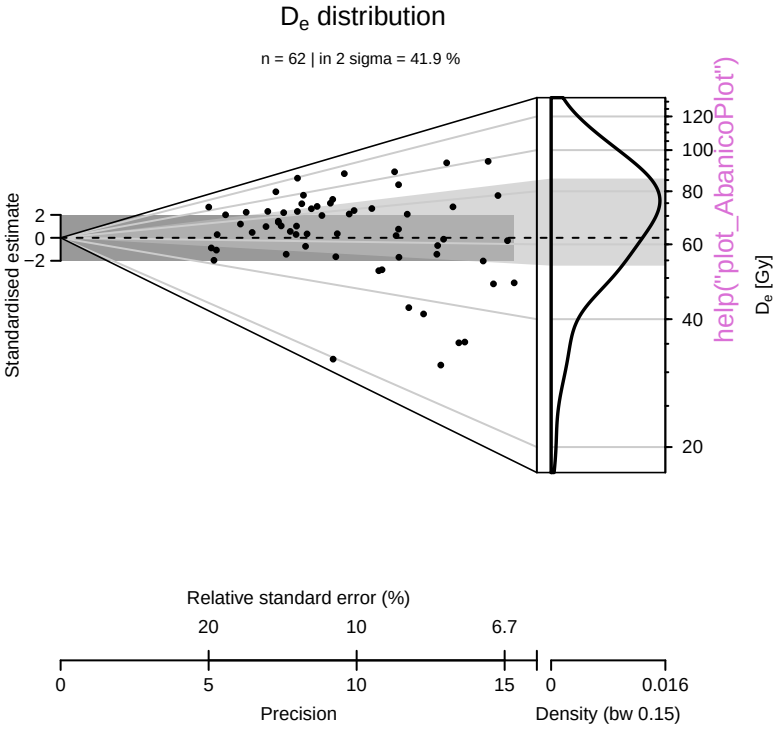

De distribution
median = 69.75
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

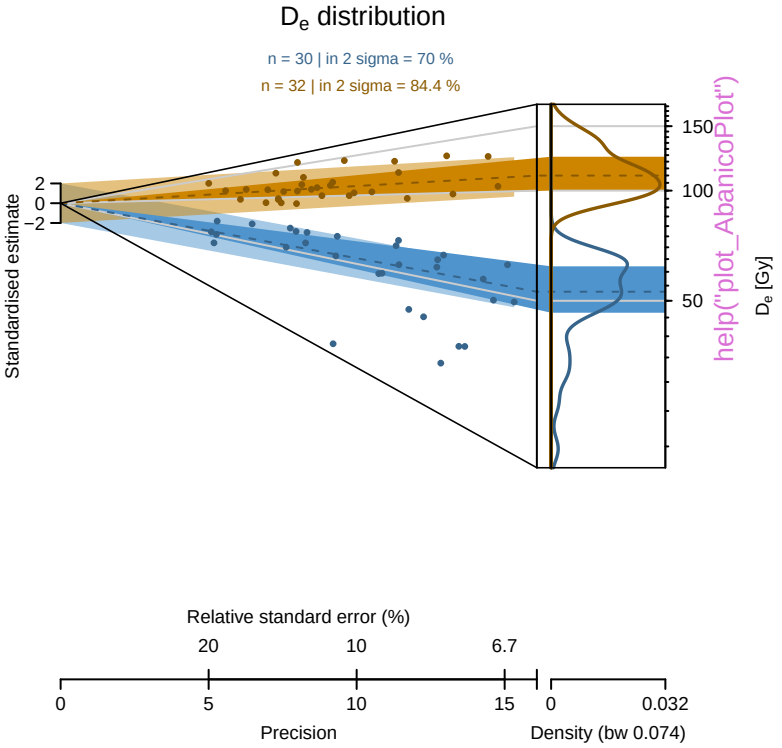

De distribution
n = 30 | in 2 sigma = 46.7 %
n = 32 | in 2 sigma = 87.5 %
Standardised estimate
2
0
−2
150
100
50
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.032
Precision
Density (bw 0.074)

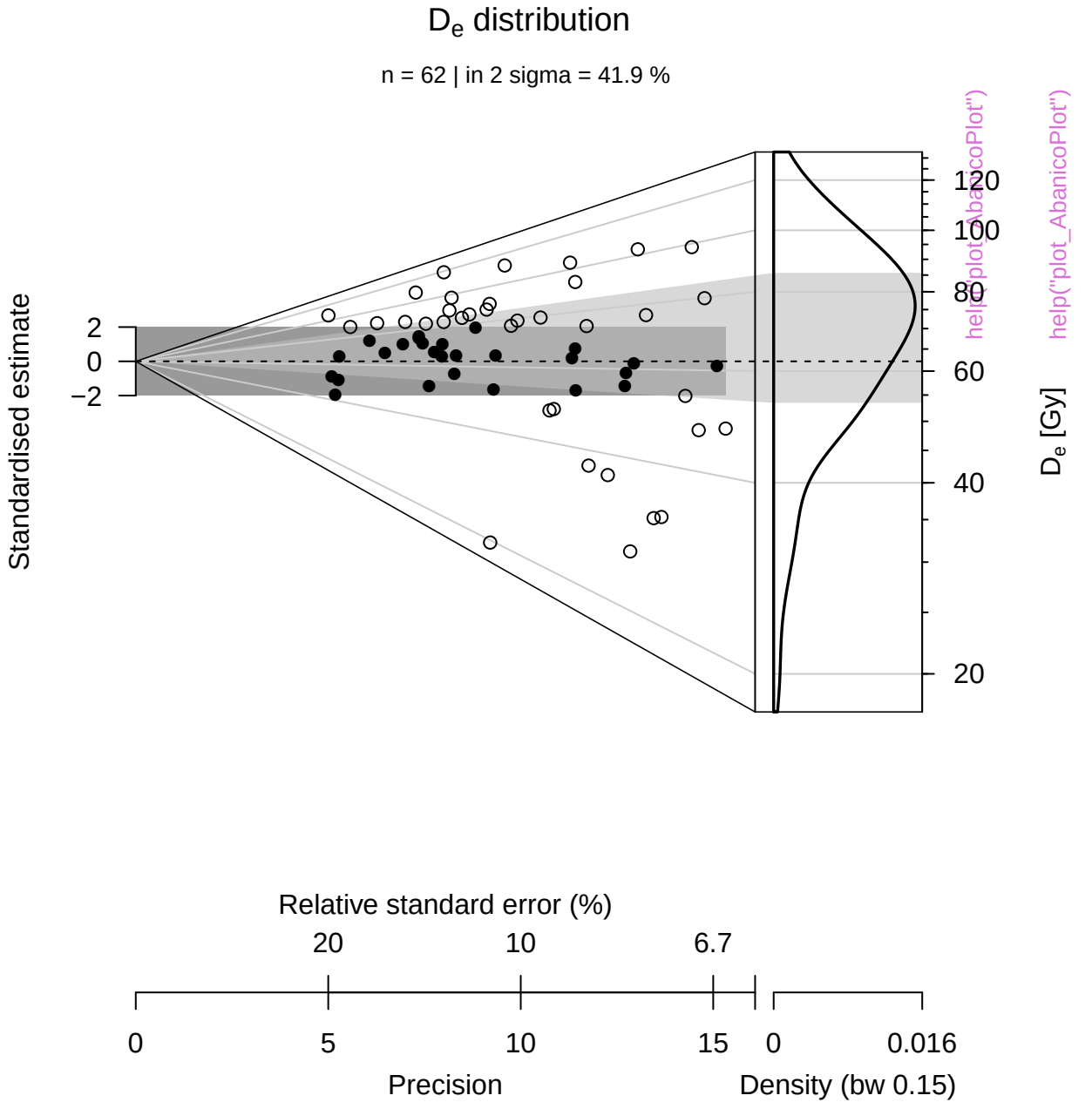

D$_e$ distribution
n = 30 | in 2 sigma = 70 % | median = 53.39
n = 32 | in 2 sigma = 84.4 % | median = 110.51
Standardised estimate
2
0
−2
150
100
50
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.032
Precision
Density (bw 0.074)

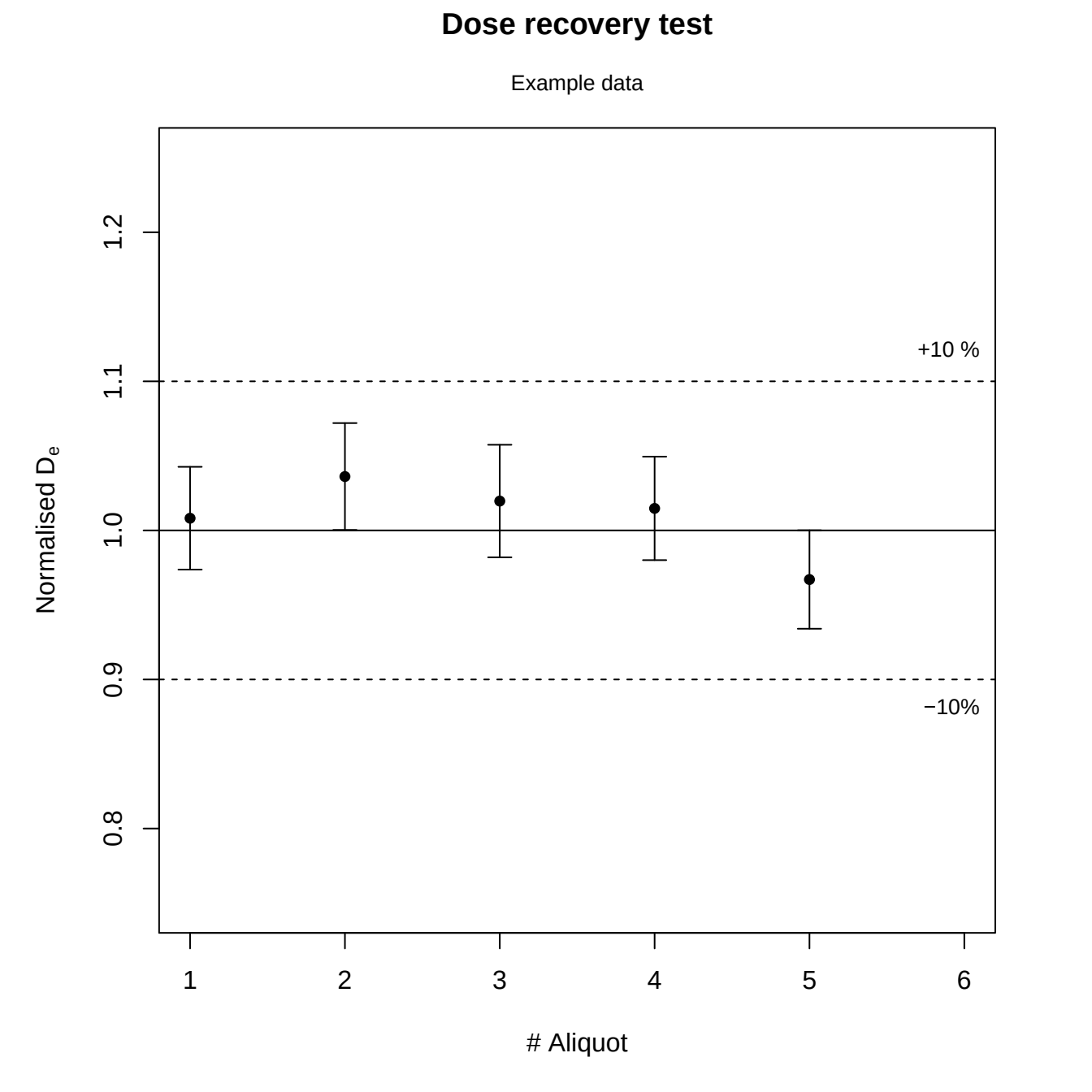
help("plot_AbanicoPlot")

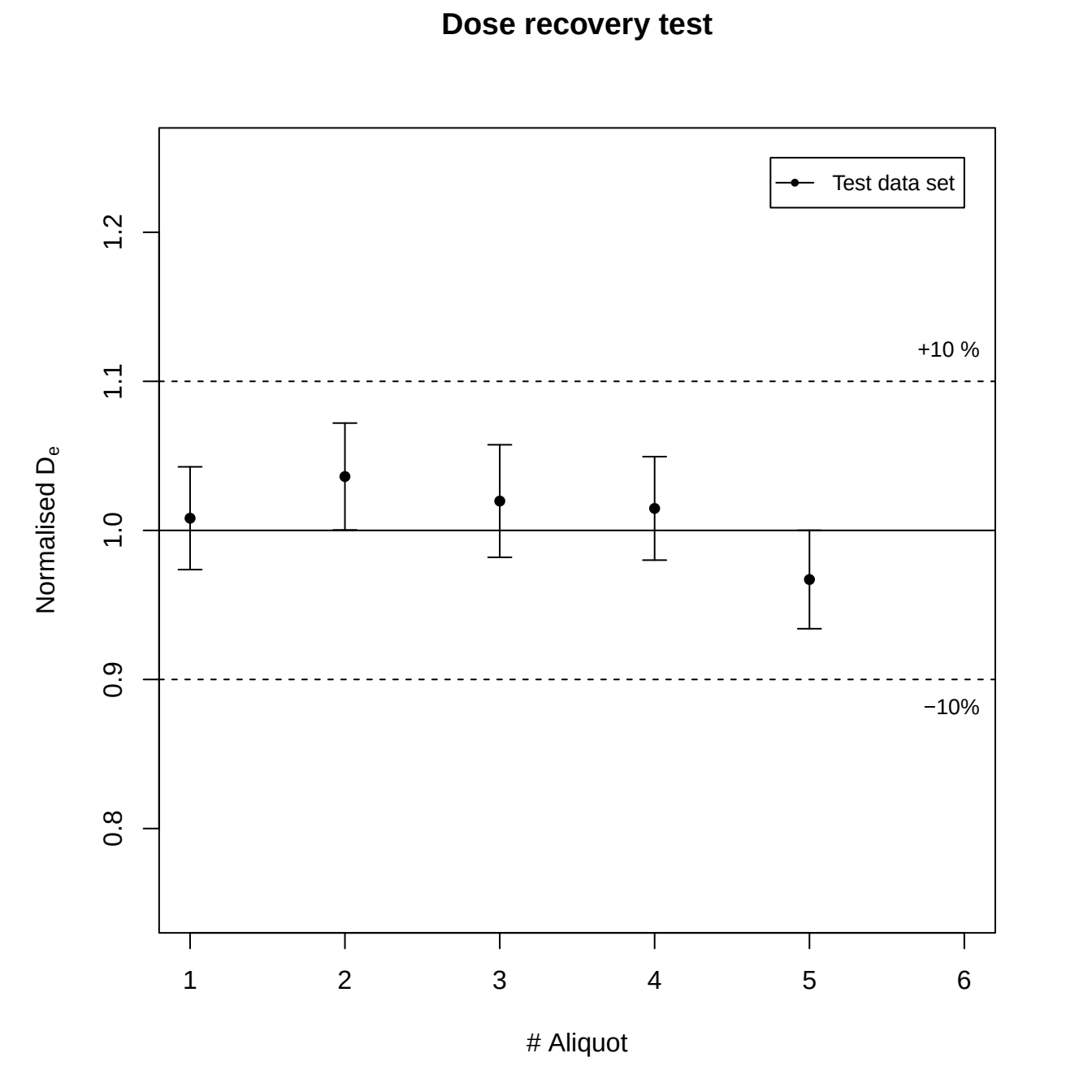


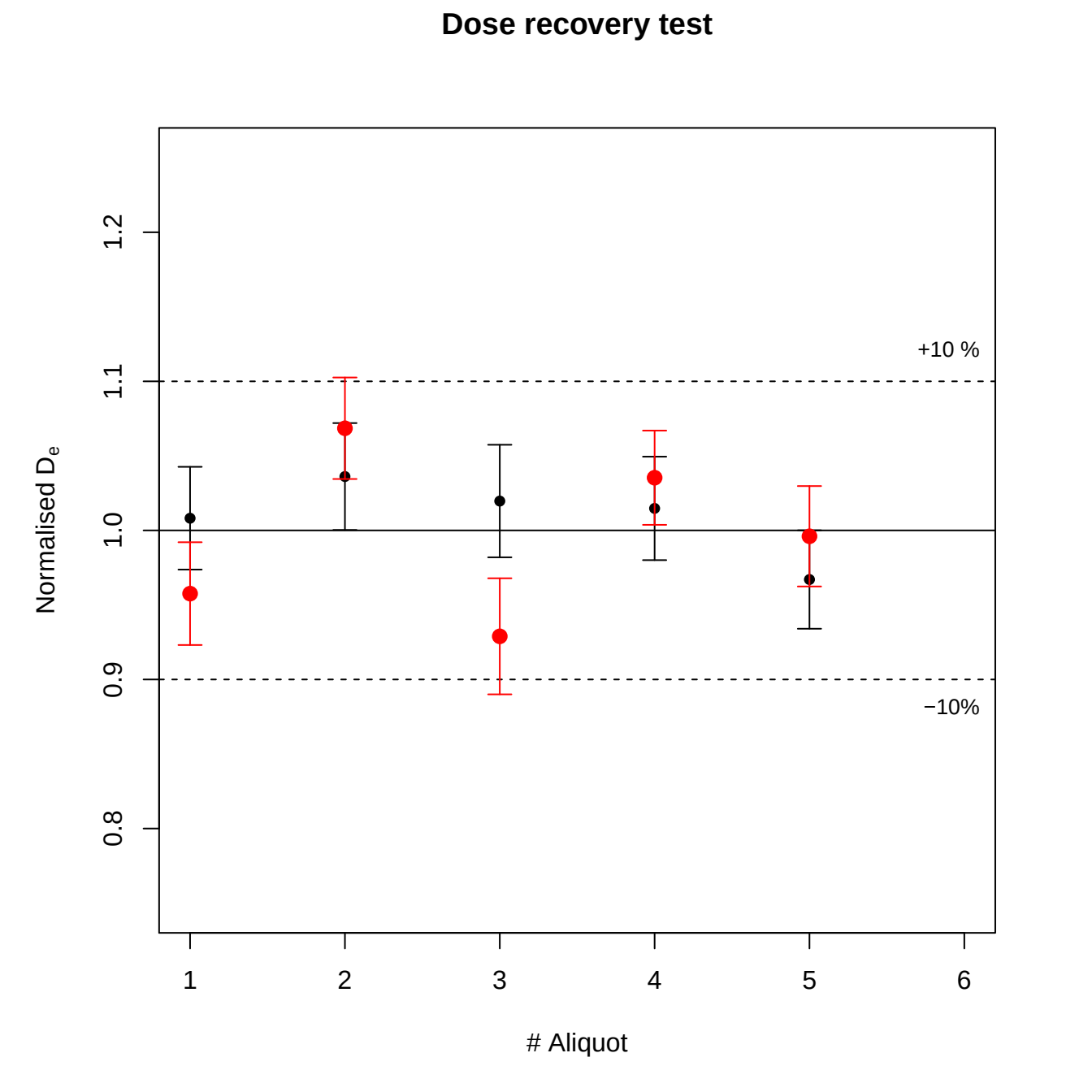
help("plot_AbanicoPlot")

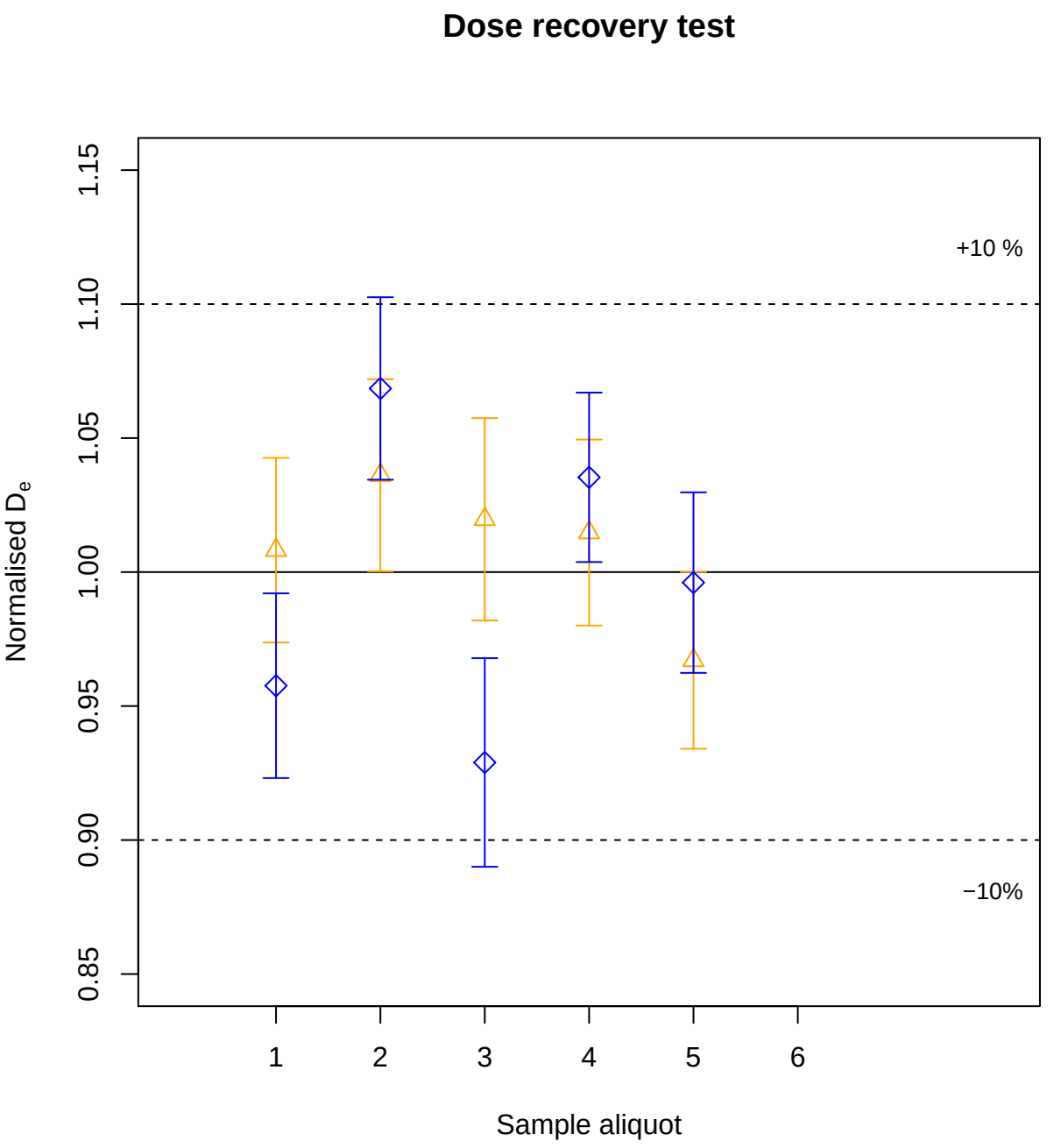


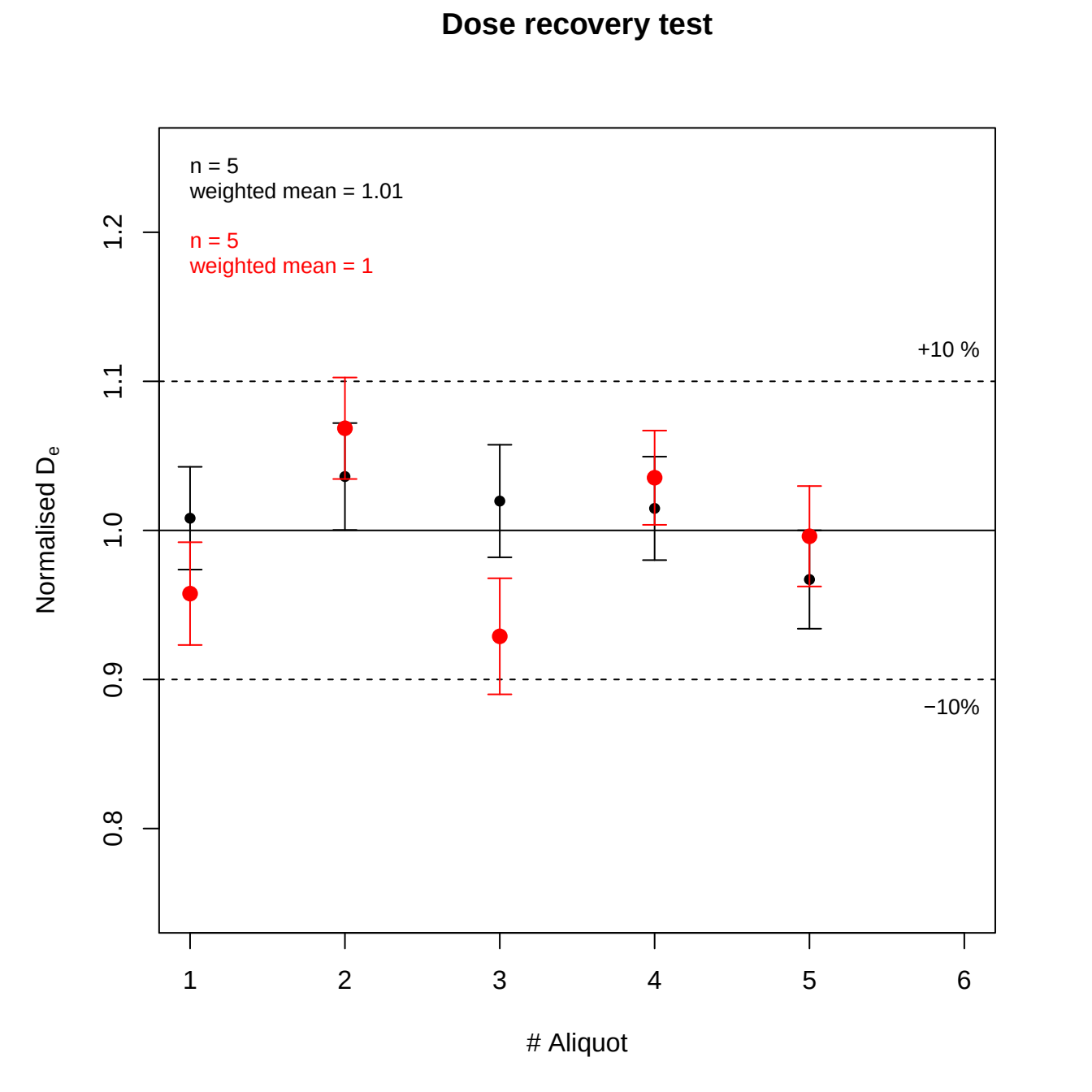

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

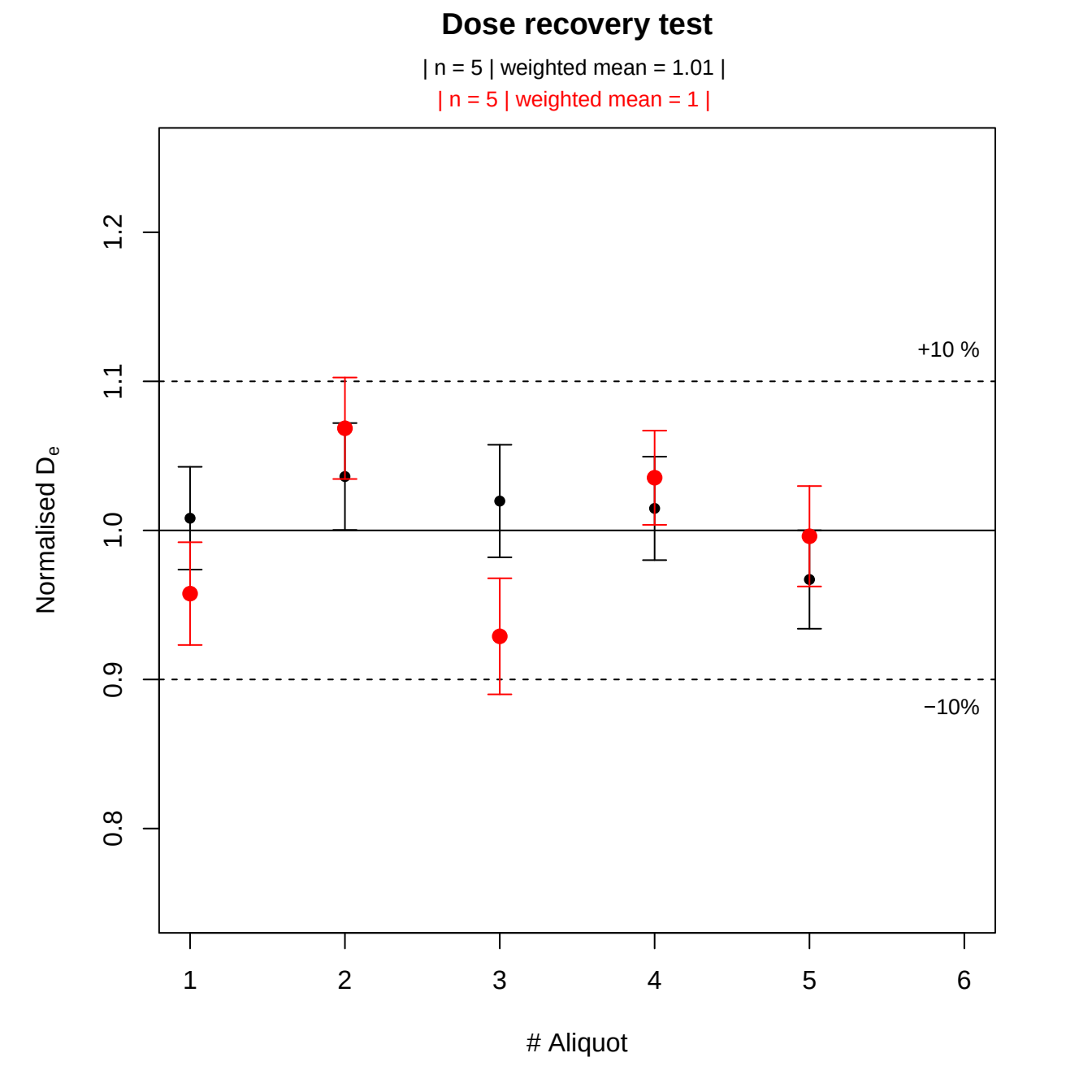

Dose recovery test
Example data
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
1
2
3
4
5
6
Aliquot

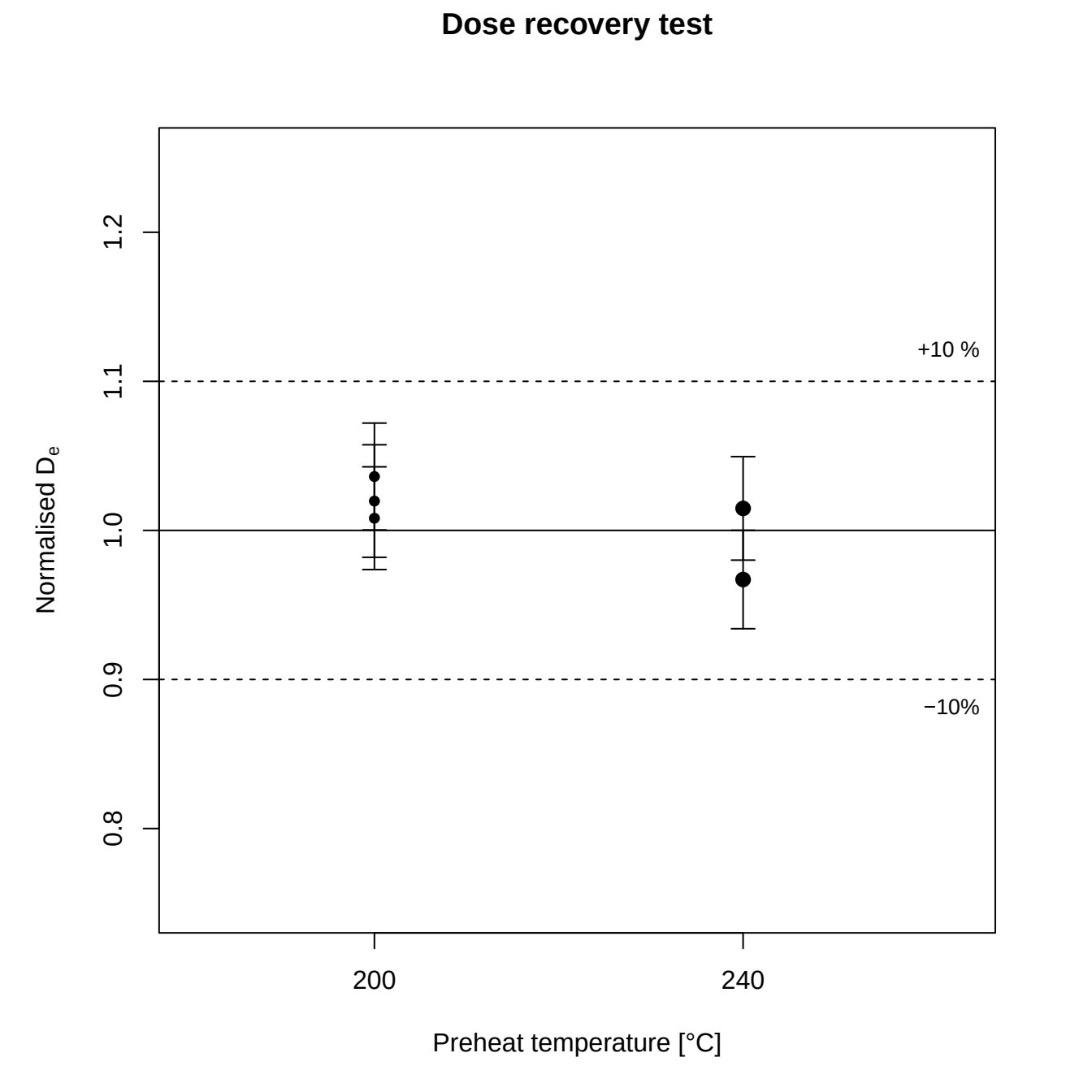

Dose recovery test
Test data set
+10 %
−10%
Normalised D_e
1.2
1.1
1.0
0.9
0.8
1
2
3
4
5
6
Aliquot

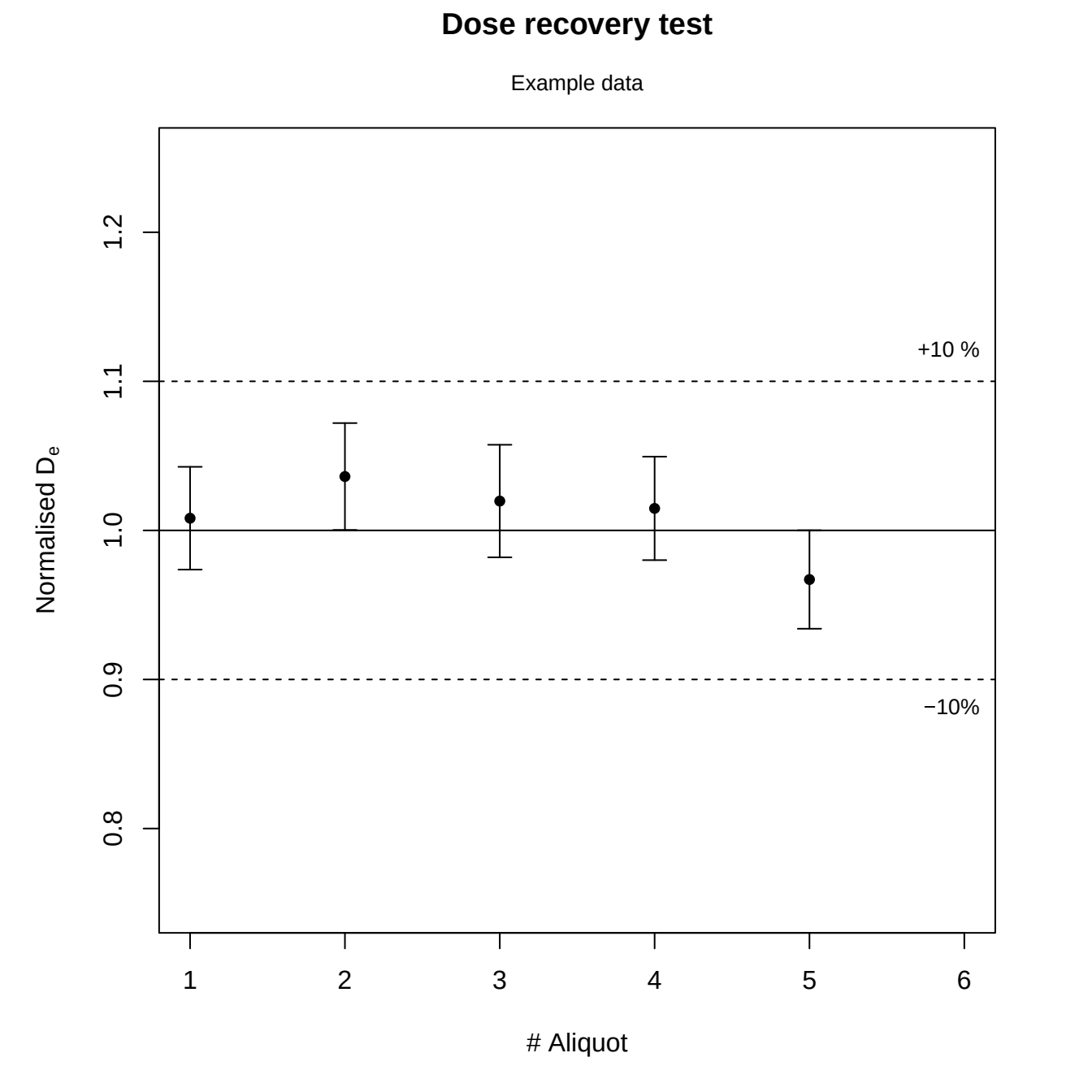

Dose recovery test
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
1
2
3
4
5
6
Aliquot

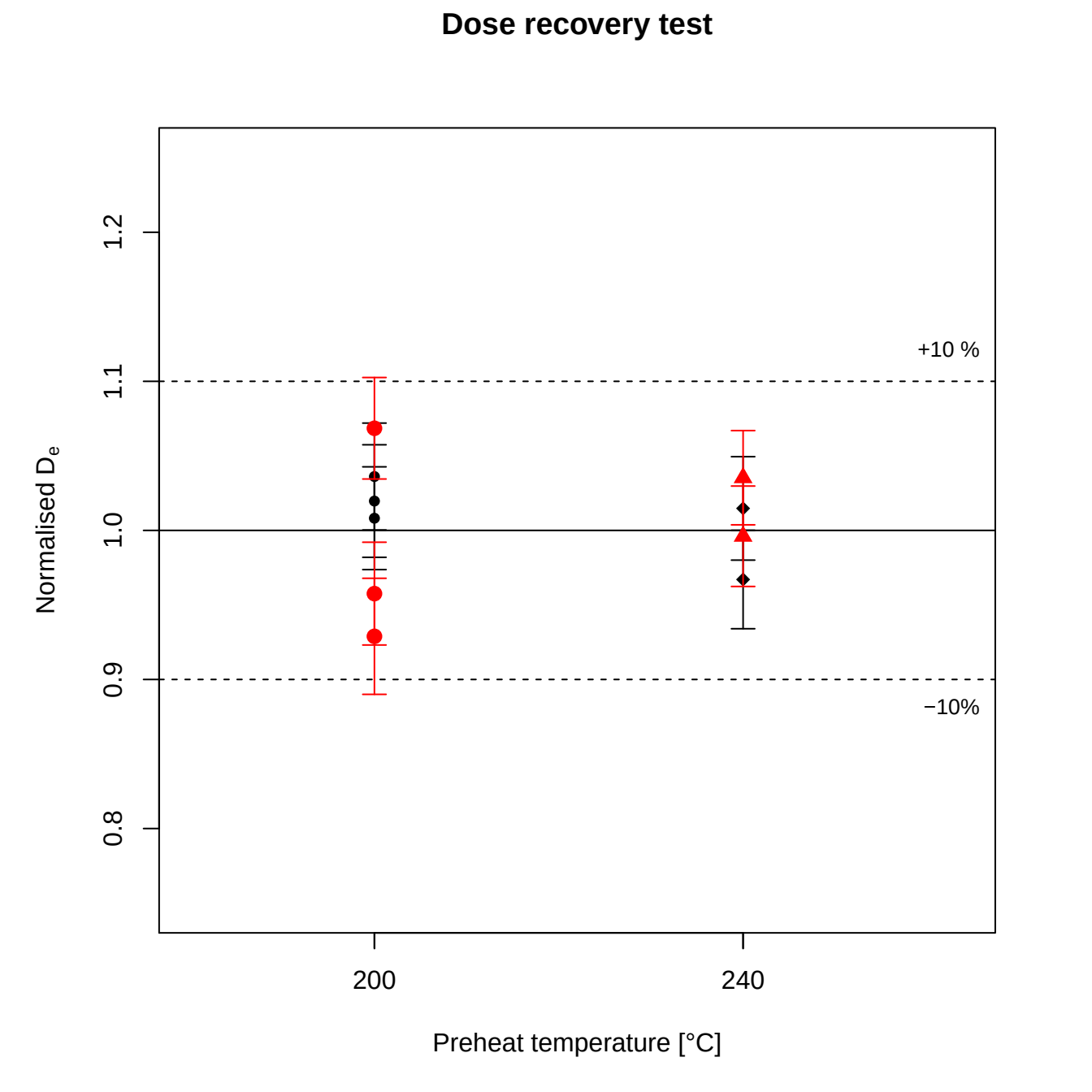

Dose recovery test
Normalised D_e
0.85
0.90
0.95
1.00
1.05
1.10
1.15
+10 %
−10%
1
2
3
4
5
6
Sample aliquot

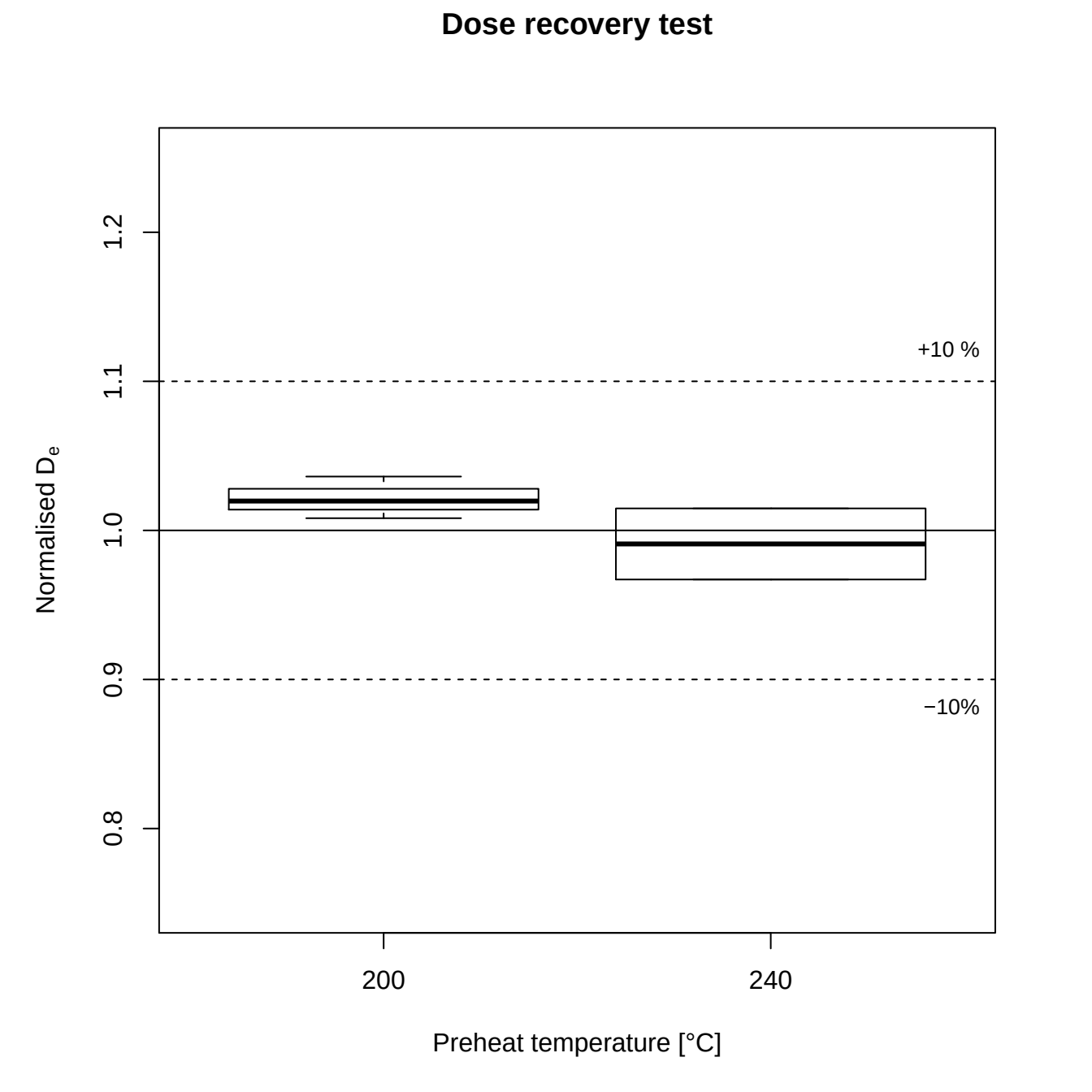

Dose recovery test
n = 5
weighted mean = 1.01
n = 5
weighted mean = 1
+10 %
−10%
Normalised D_e
0.8
0.9
1.0
1.1
1.2
1
2
3
4
5
6
Aliquot

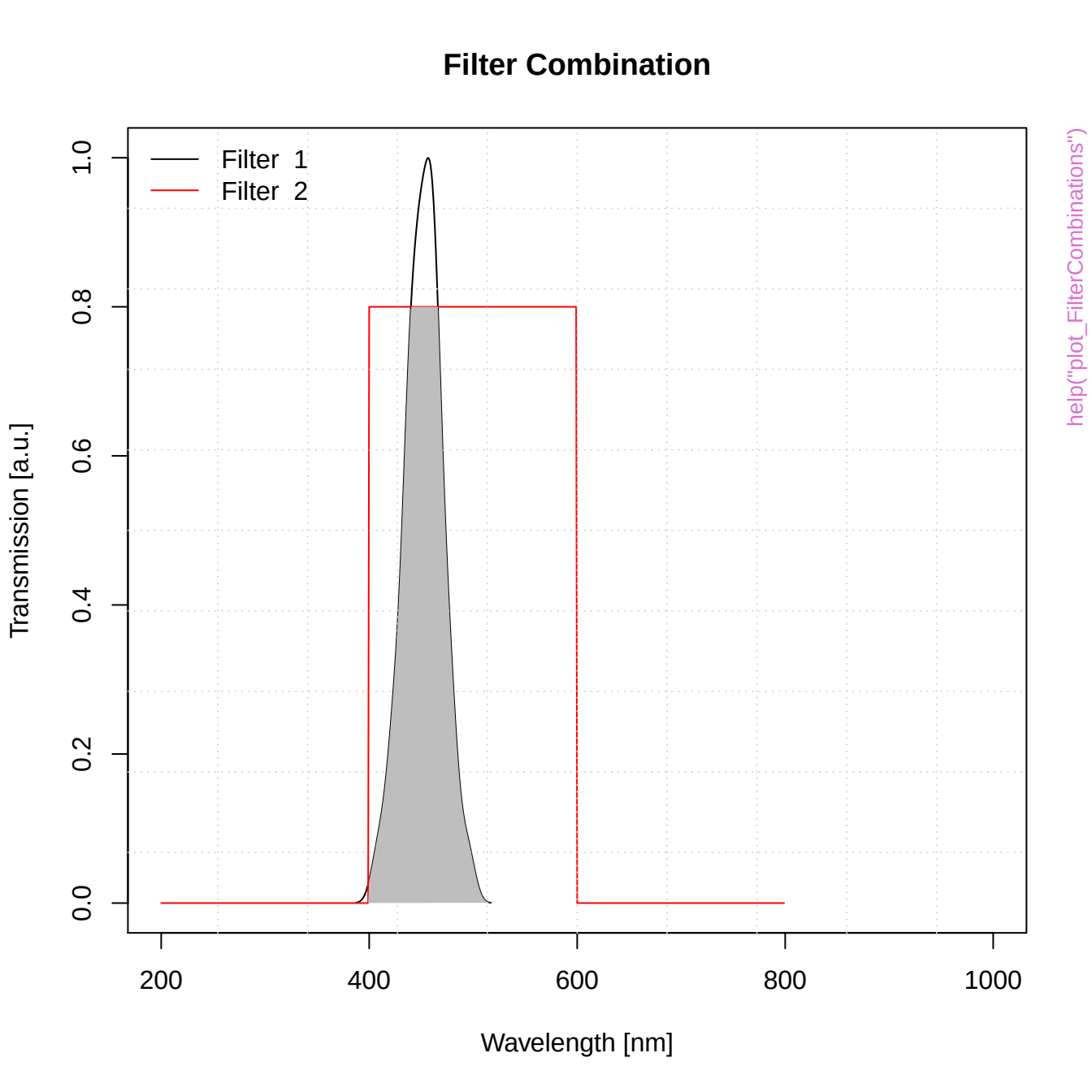

Dose recovery test
| n = 5 | weighted mean = 1.01 |
| n = 5 | weighted mean = 1 |
+10 %
−10%
Normalised D_e
0.8
0.9
1.0
1.1
1.2
1
2
3
4
5
6
Aliquot

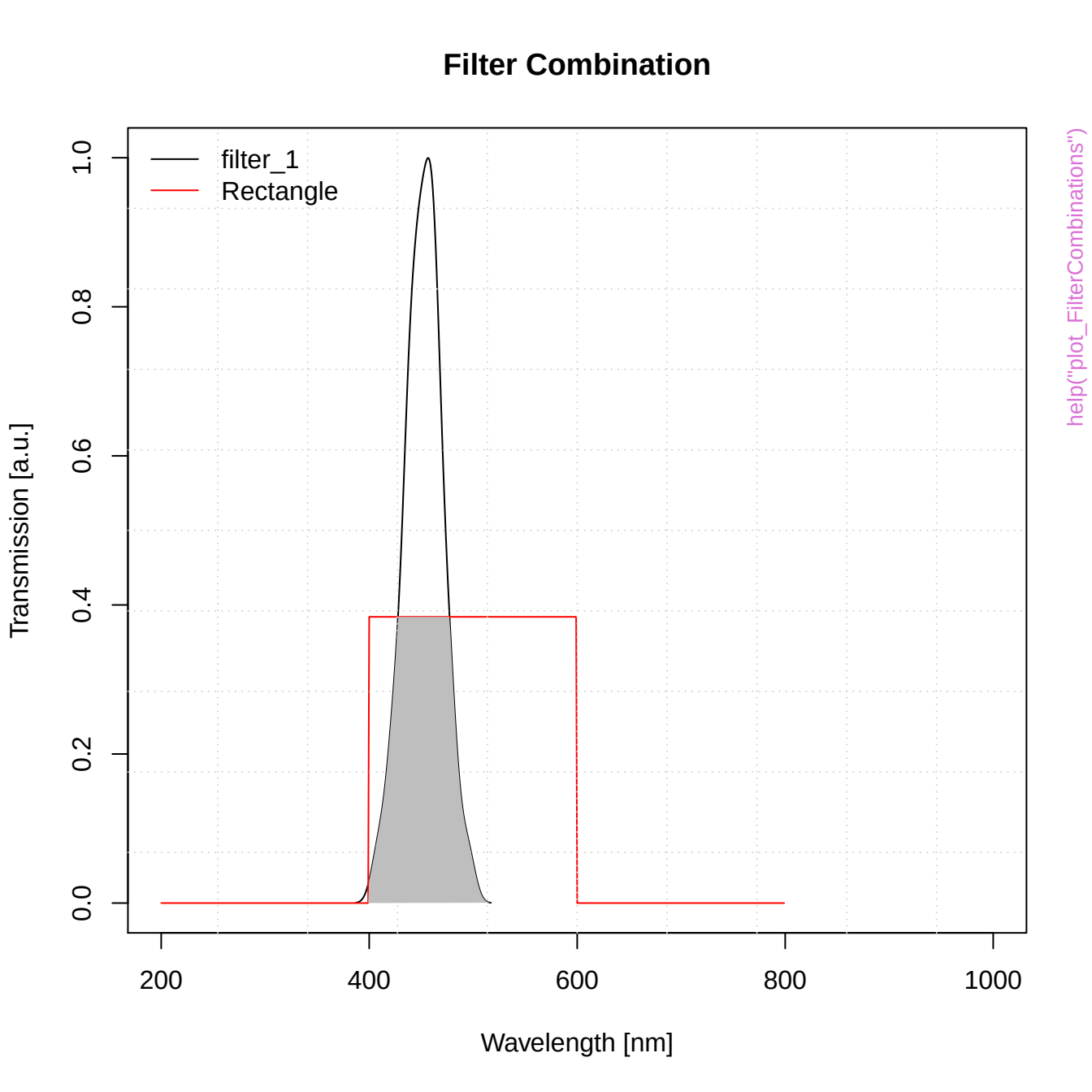

Dose recovery test
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
200
240
Preheat temperature [°C]

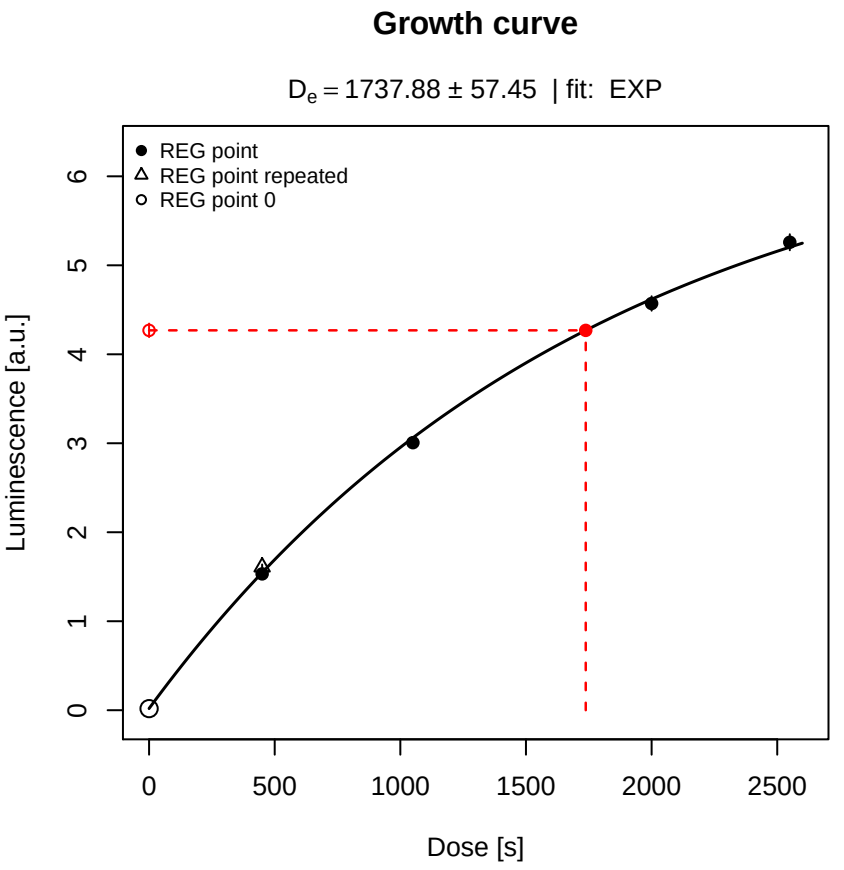

Dose recovery test
Example data
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
1
2
3
4
5
6
Aliquot

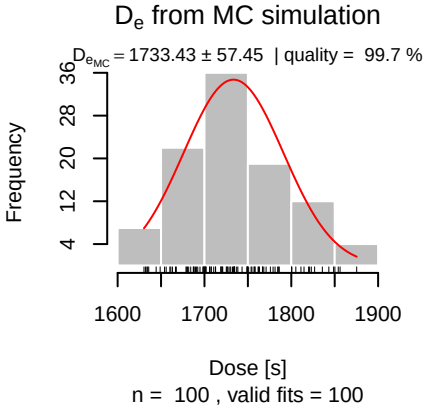

Dose recovery test
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
200
240
Preheat temperature [°C]

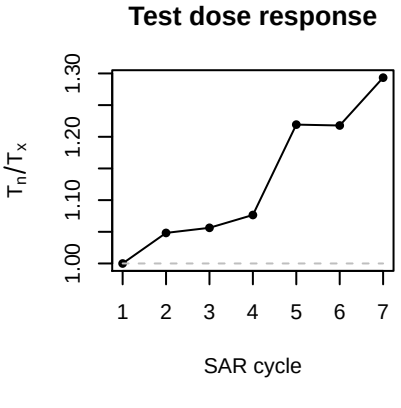

Dose recovery test
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
200
240
Preheat temperature [°C]

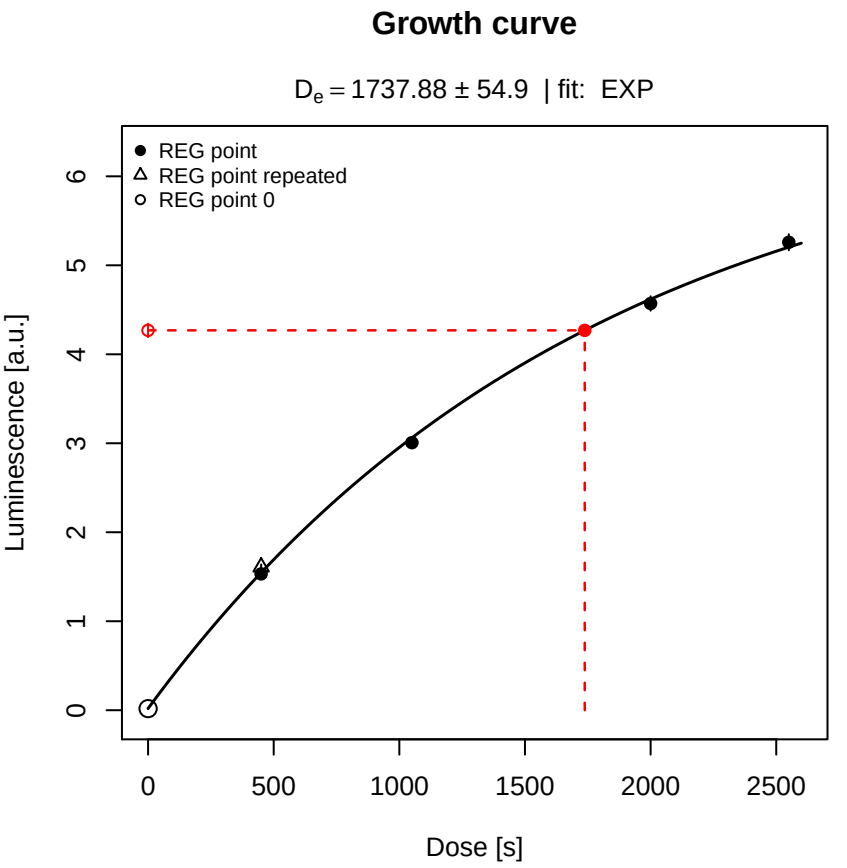

Filter Combination
Filter 1
Filter 2
Transmission [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
200
400
600
800
1000
Wavelength [nm]
help("plot_FilterCombinations")

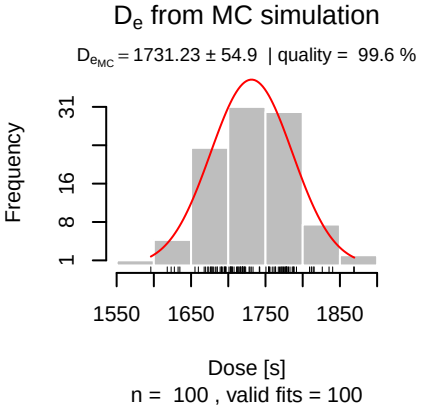

Filter Combination
filter_1
Rectangle
Transmission [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
200
400
600
800
1000
Wavelength [nm]
help("plot_FilterCombinations")

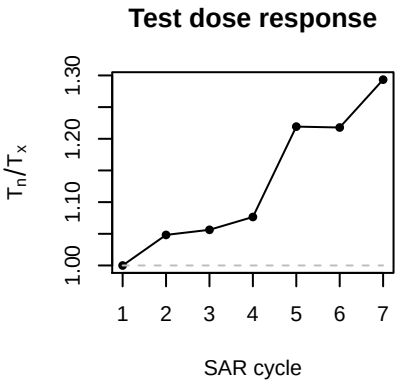

Growth curve
$D_e = 1737.88 \pm 57.45$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]

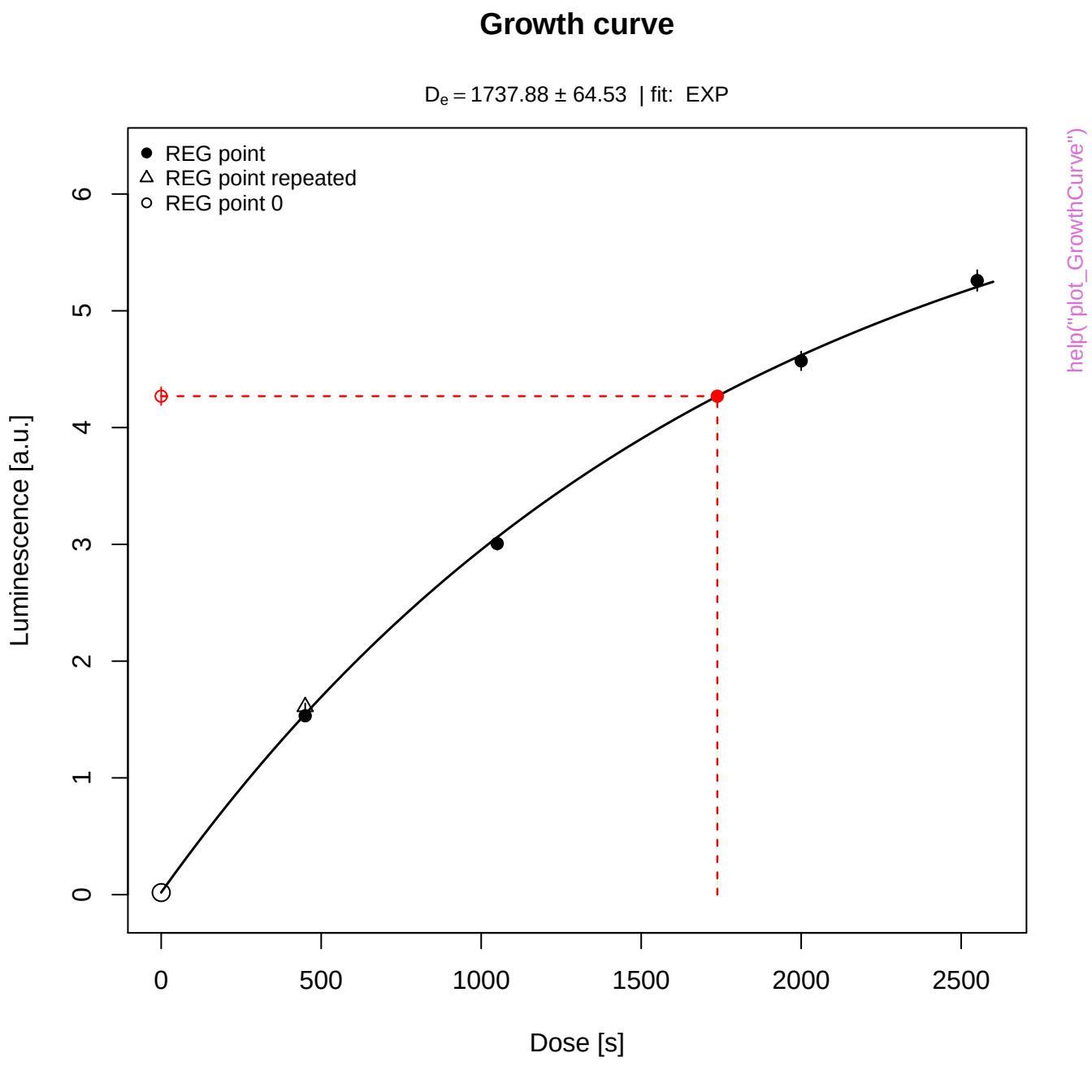

D_e from MC simulation
$D_{e_{MC}} = 1733.43 \pm 57.45$ | quality = 99.7 %
Frequency
4
12
20
28
36
1600
1700
1800
1900
Dose [s]
n = 100 , valid fits = 100

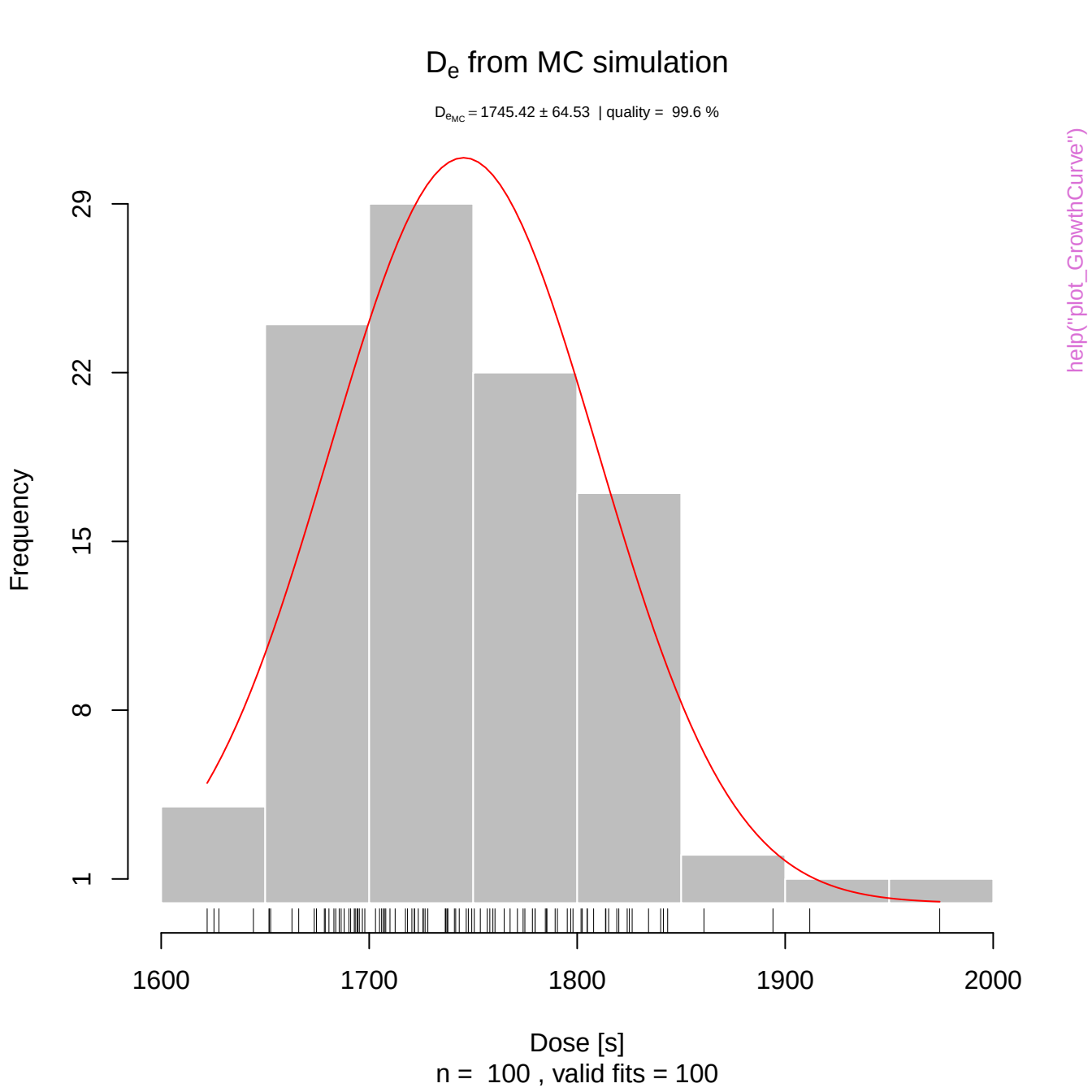

Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

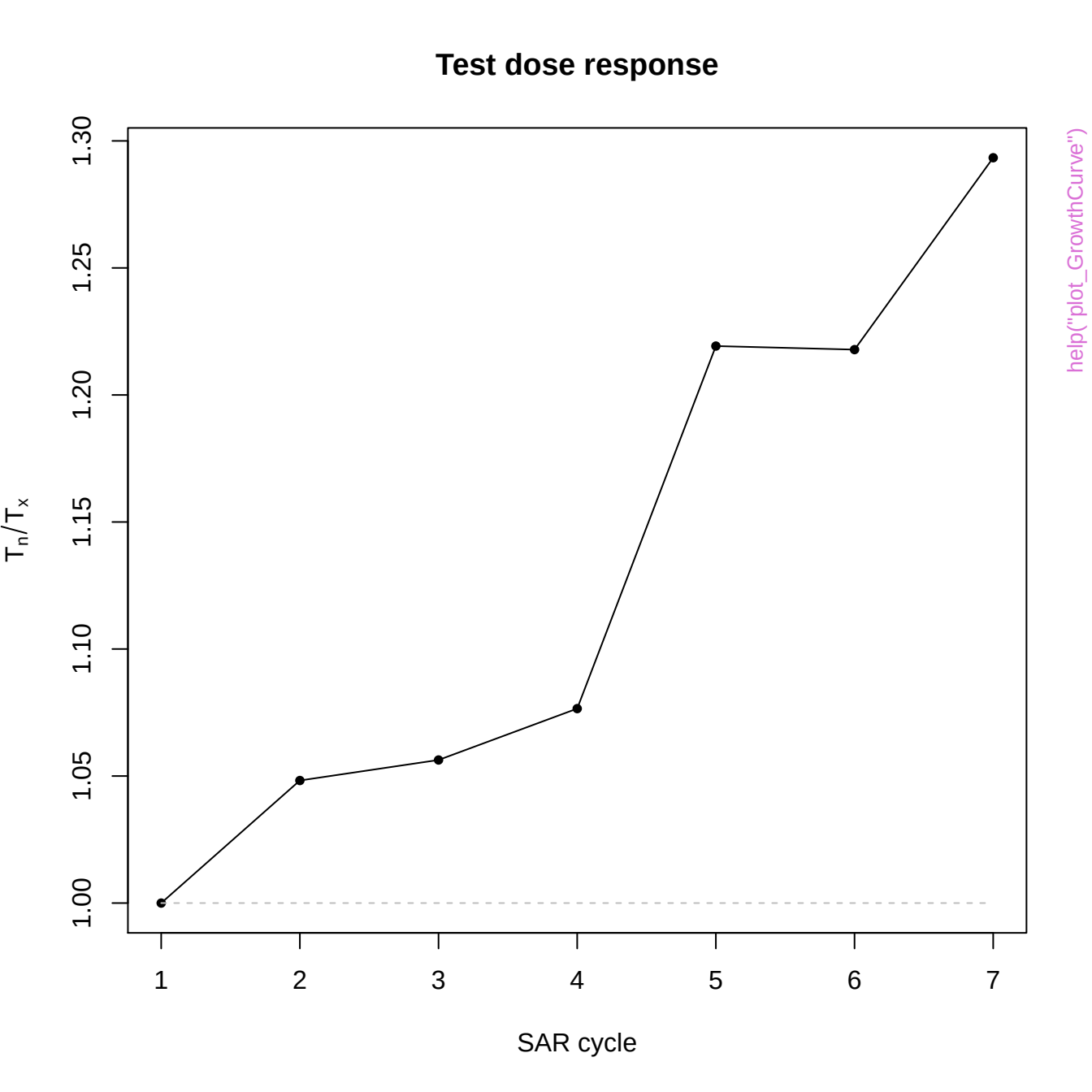

Growth curve
$D_e = 1737.88 \pm 54.9$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]

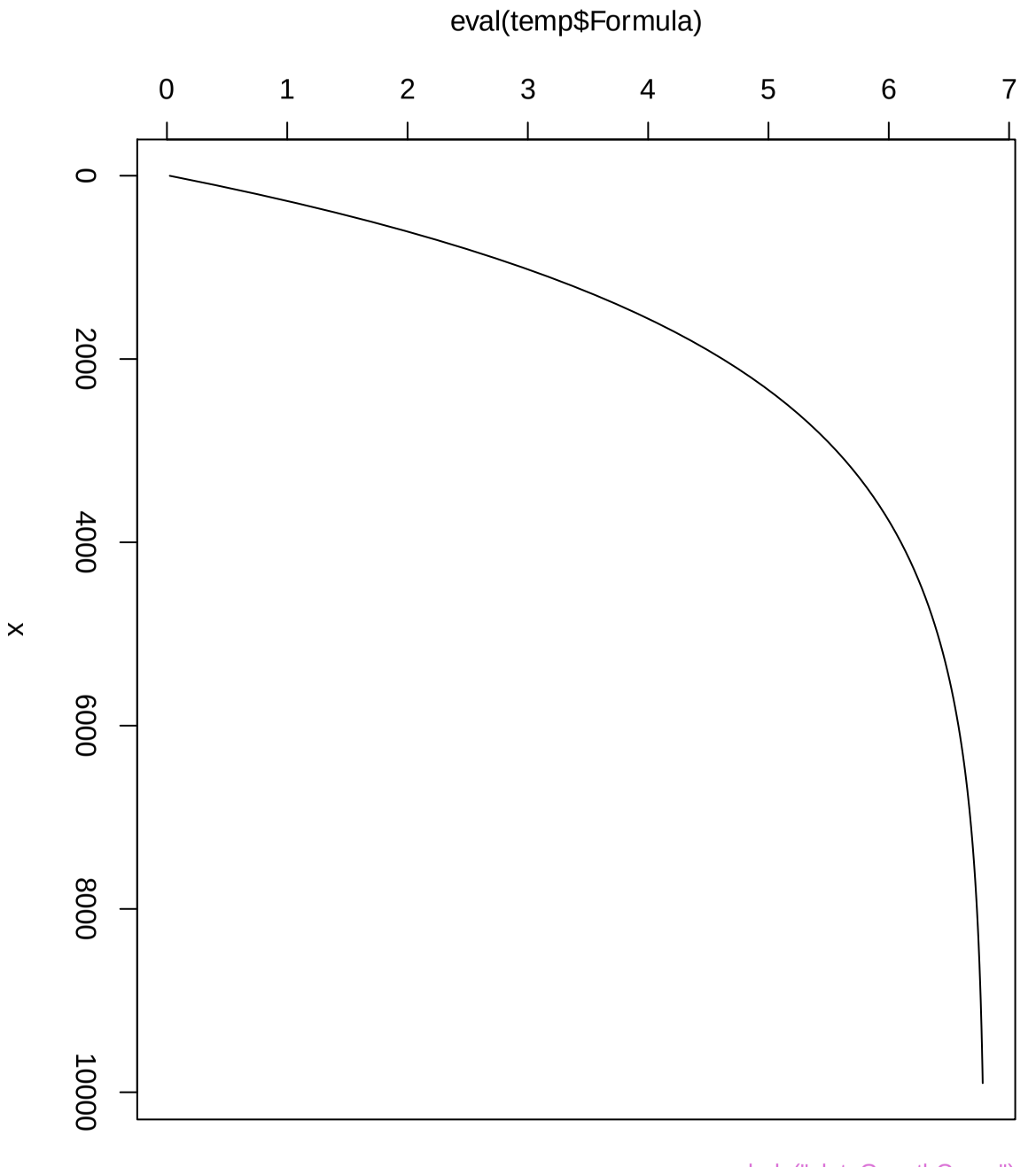

D_e from MC simulation
$D_{e_{MC}} = 1731.23 \pm 54.9$ | quality = 99.6 %
Frequency
1
8
16
31
1550
1650
1750
1850
Dose [s]
n = 100 , valid fits = 100

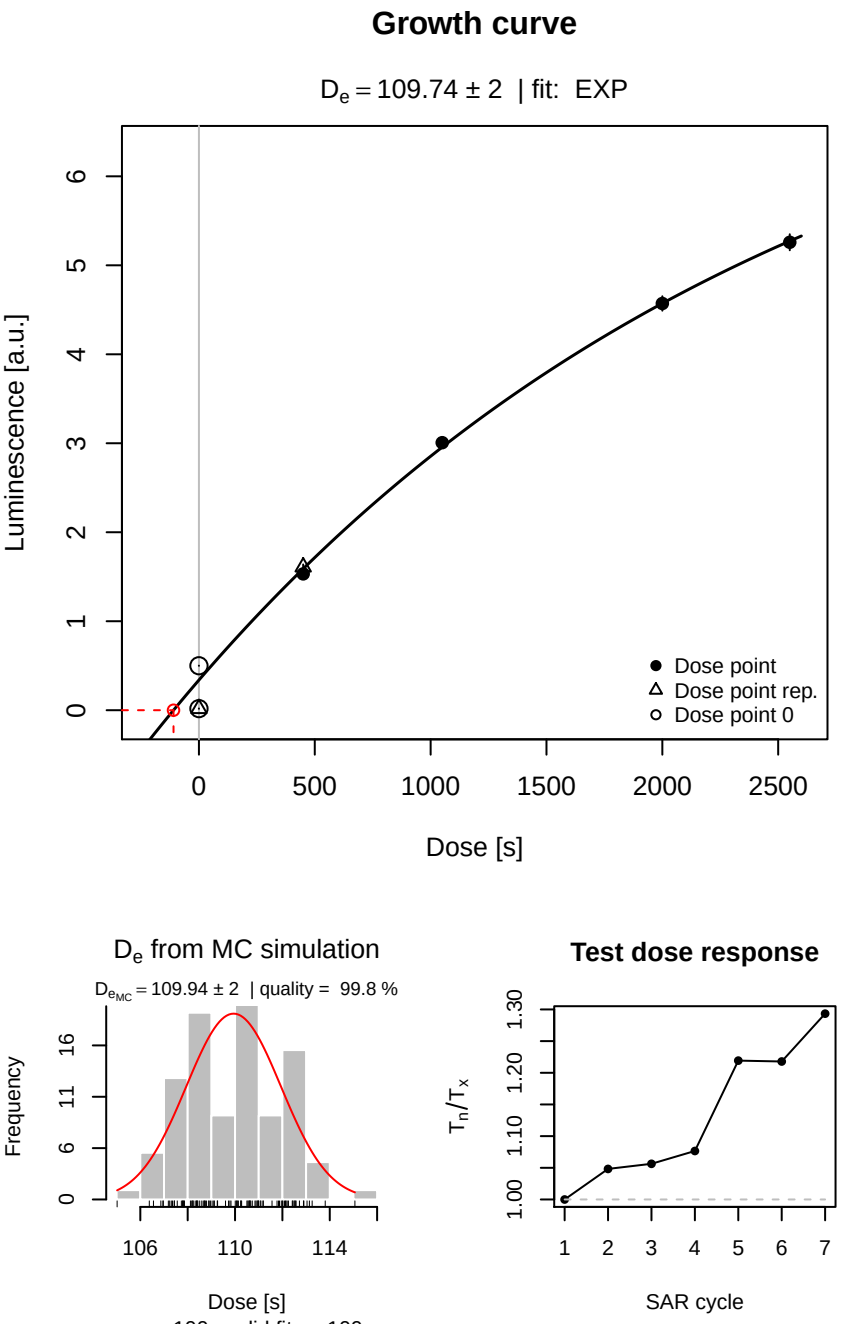

Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

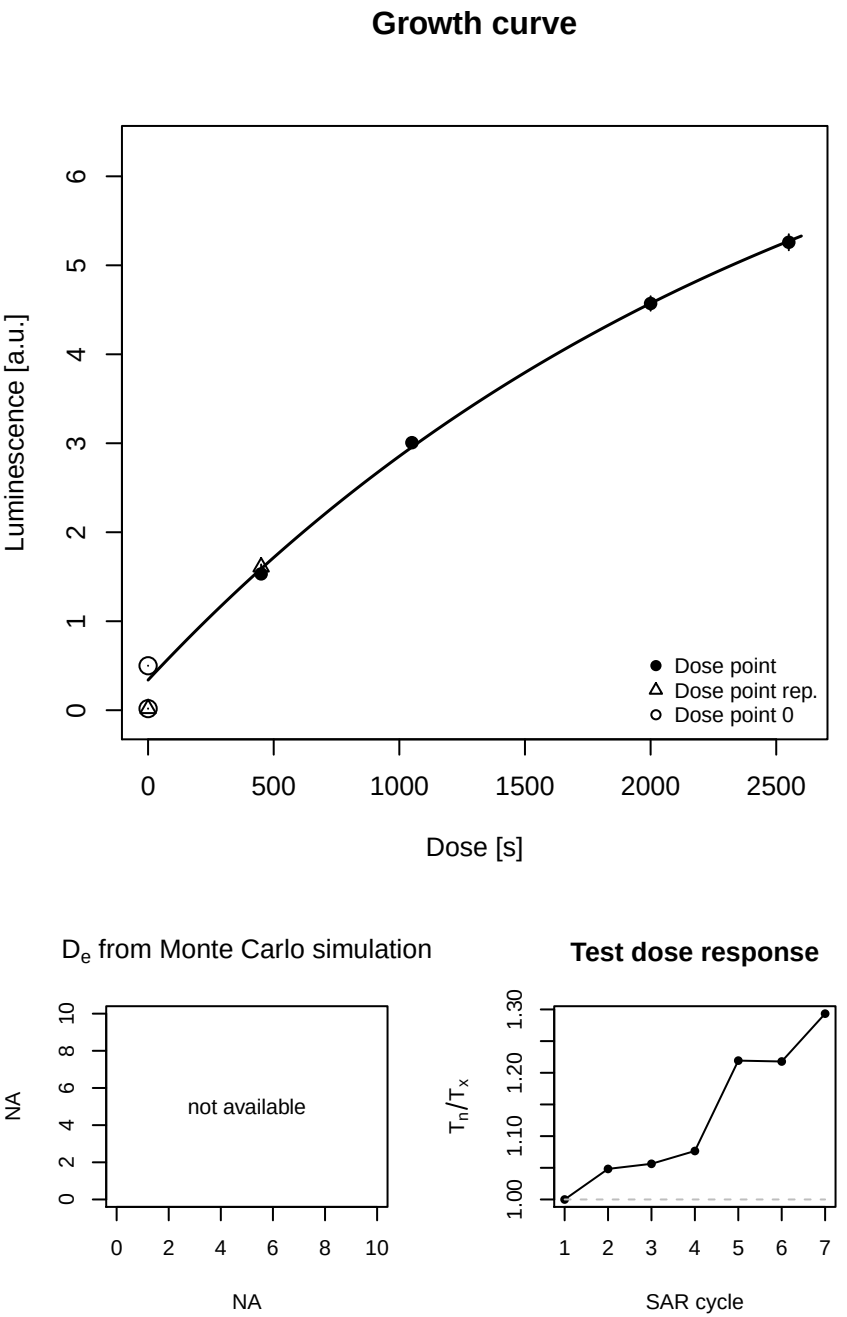

Growth curve
$D_e = 1737.88 \pm 64.53$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
help("plot_GrowthCurve")

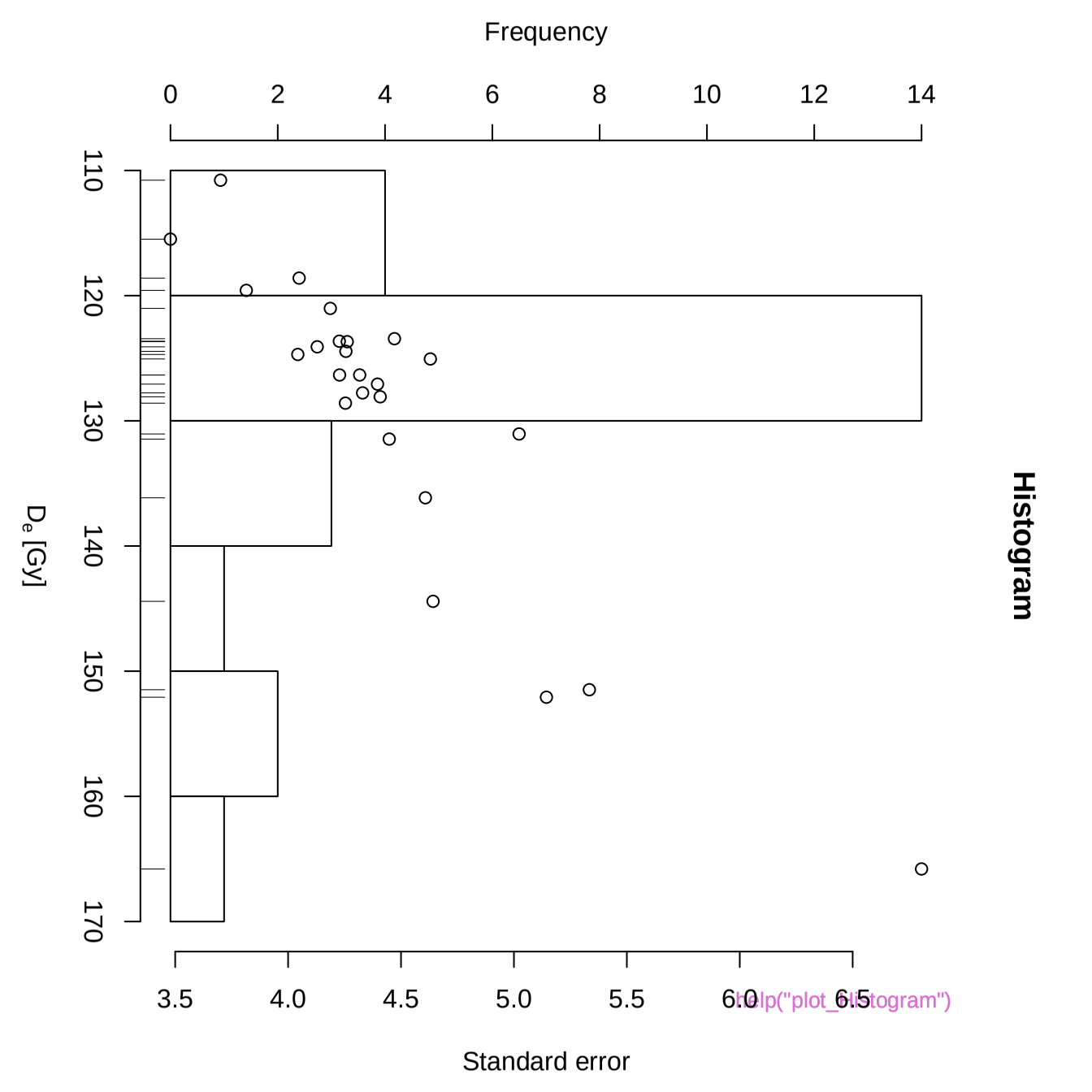

De from MC simulation
DeMC = 1745.42 ± 64.53 | quality = 99.6 %
help("plot_GrowthCurve")
Frequency
1
8
15
22
29
1600
1700
1800
1900
2000
Dose [s]
n = 100 , valid fits = 100

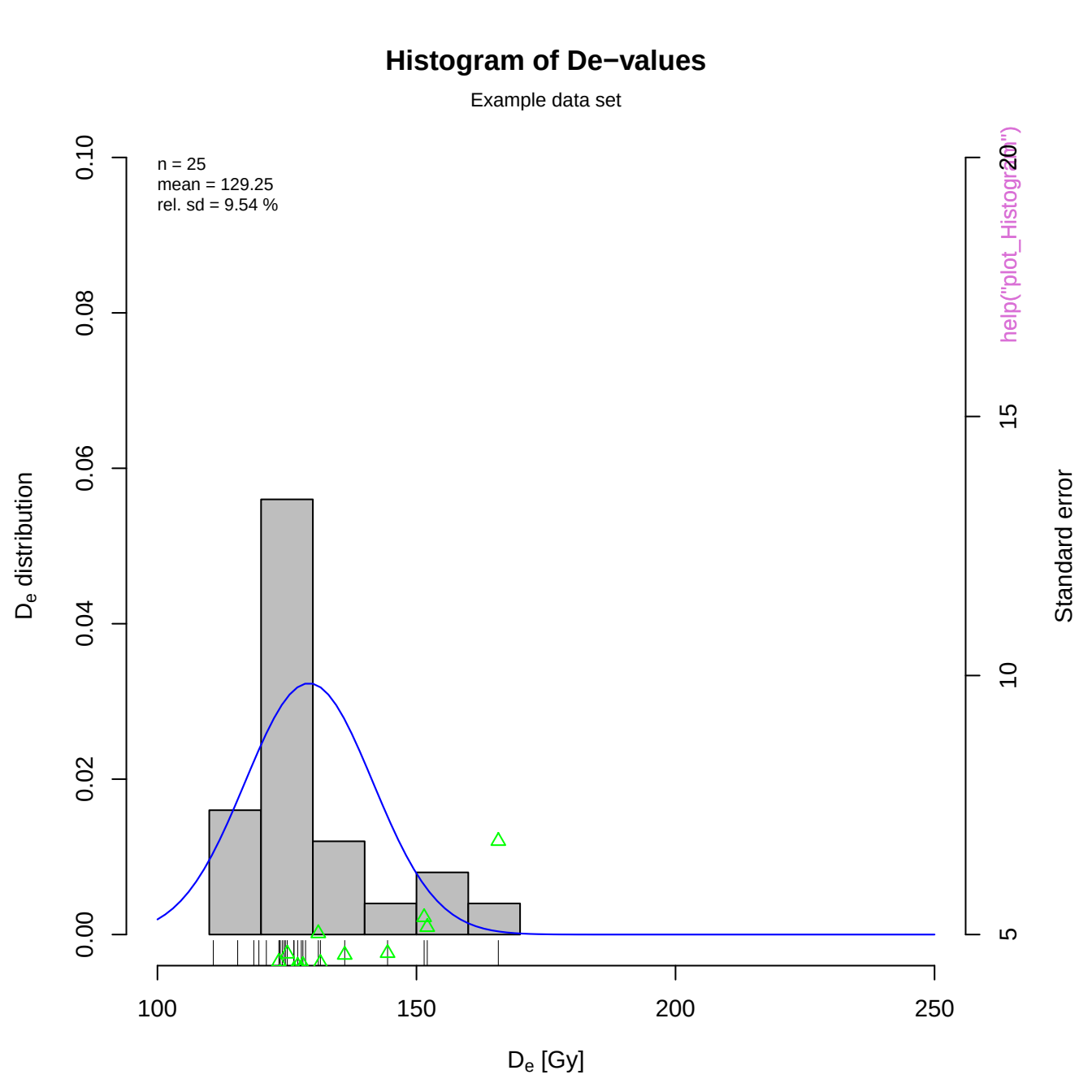

Test dose response
1.30
1.25
1.20
1.15
1.10
1.05
1.00
T_n/T_x
1
2
3
4
5
6
7
SAR cycle
help("plot_GrowthCurve")

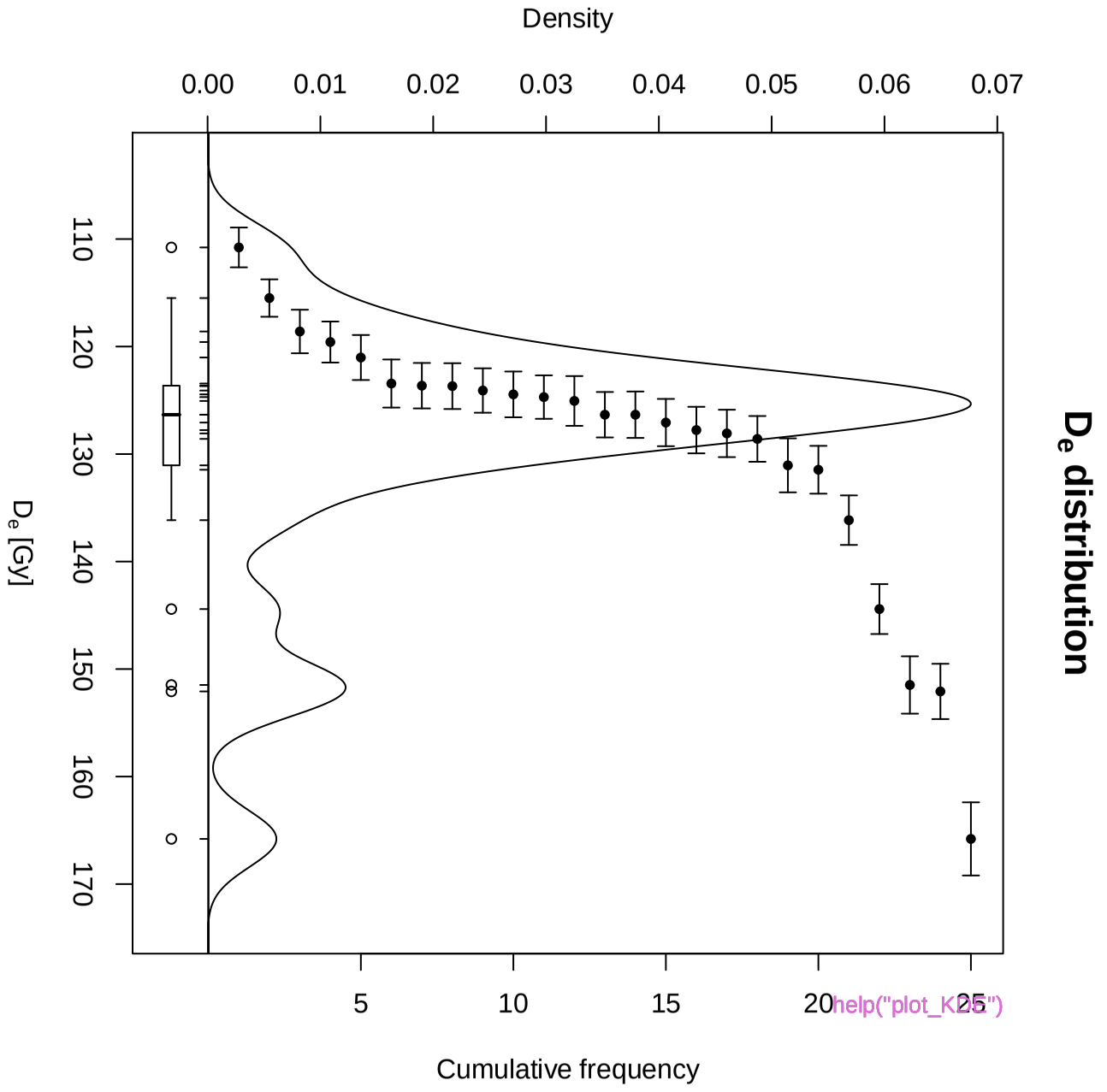

eval(temp$Formula)
0
1
2
3
4
5
6
7
x
0
2000
4000
6000
8000
10000
help("plot_GrowthCurve")

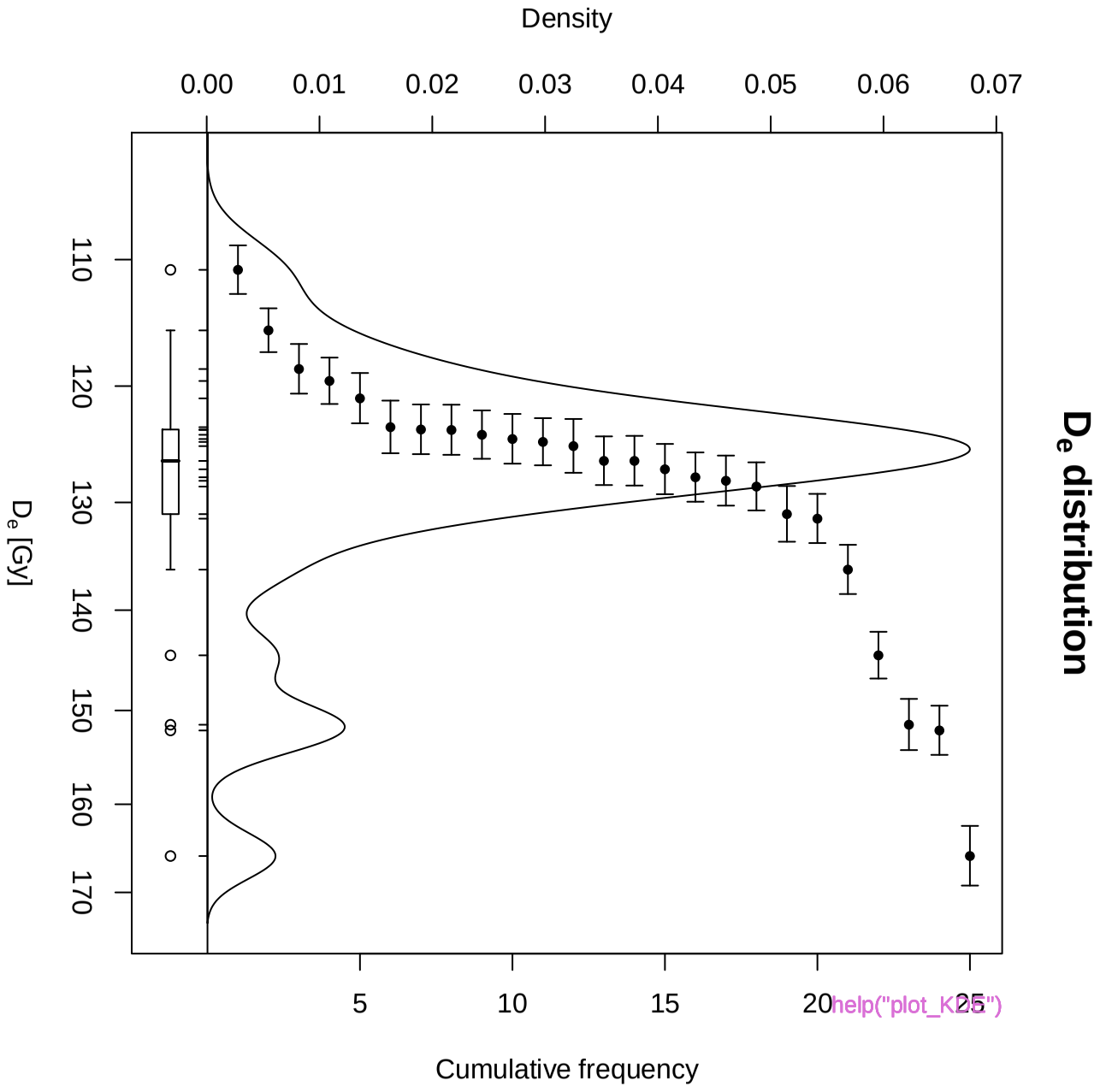

Growth curve
$D_e = 109.74 \pm 2$ | fit: EXP
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
Dose point
Dose point rep.
Dose point 0
D_e from MC simulation
$D_{e_{MC}} = 109.94 \pm 2$ | quality = 99.8 %
Frequency
0
6
11
16
106
110
114
Dose [s]
n = 100 , valid fits = 100
Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

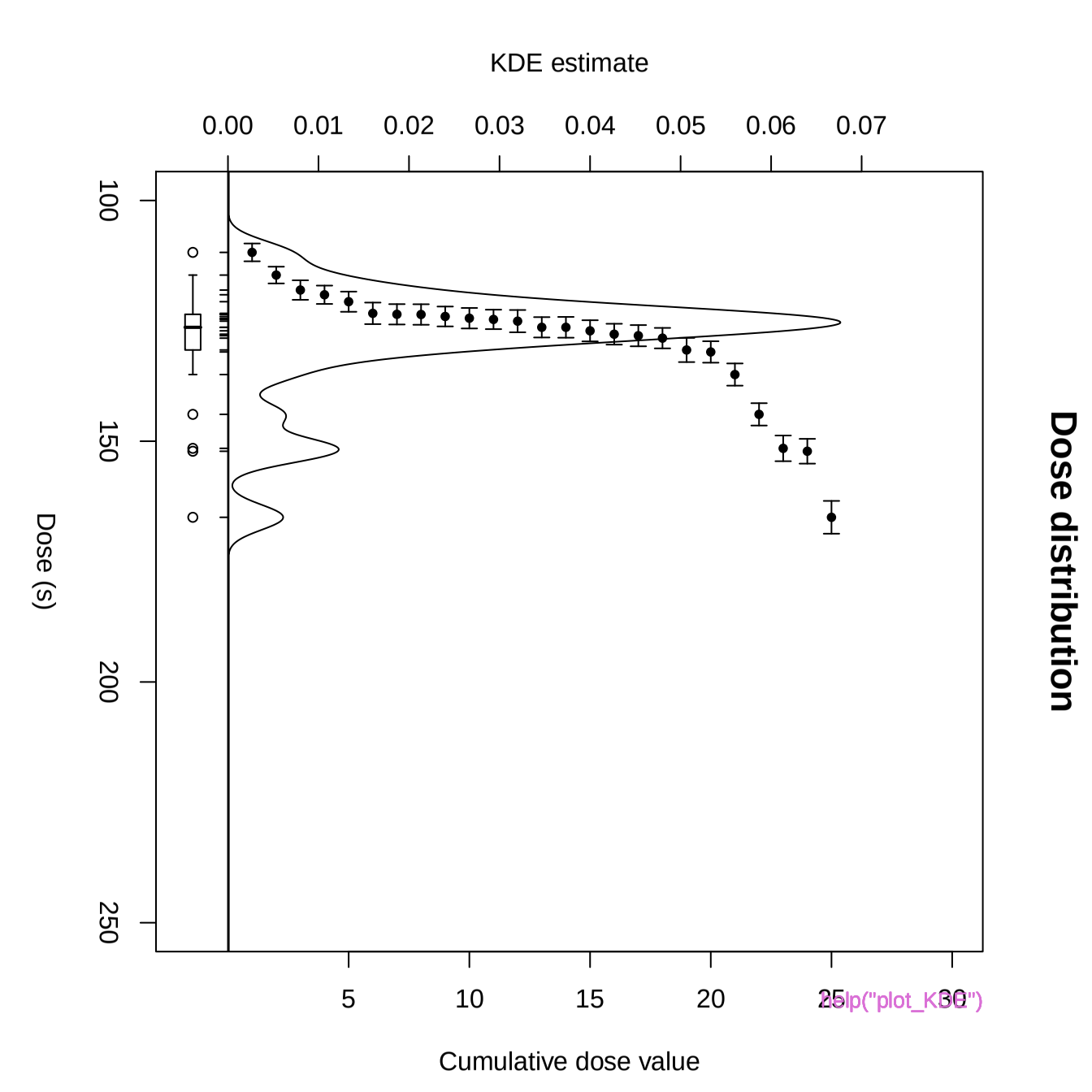

Growth curve
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
Dose point
Dose point rep.
Dose point 0
De from Monte Carlo simulation
NA
0
2
4
6
8
10
not available
NA
Test dose response
Tn/Tx
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

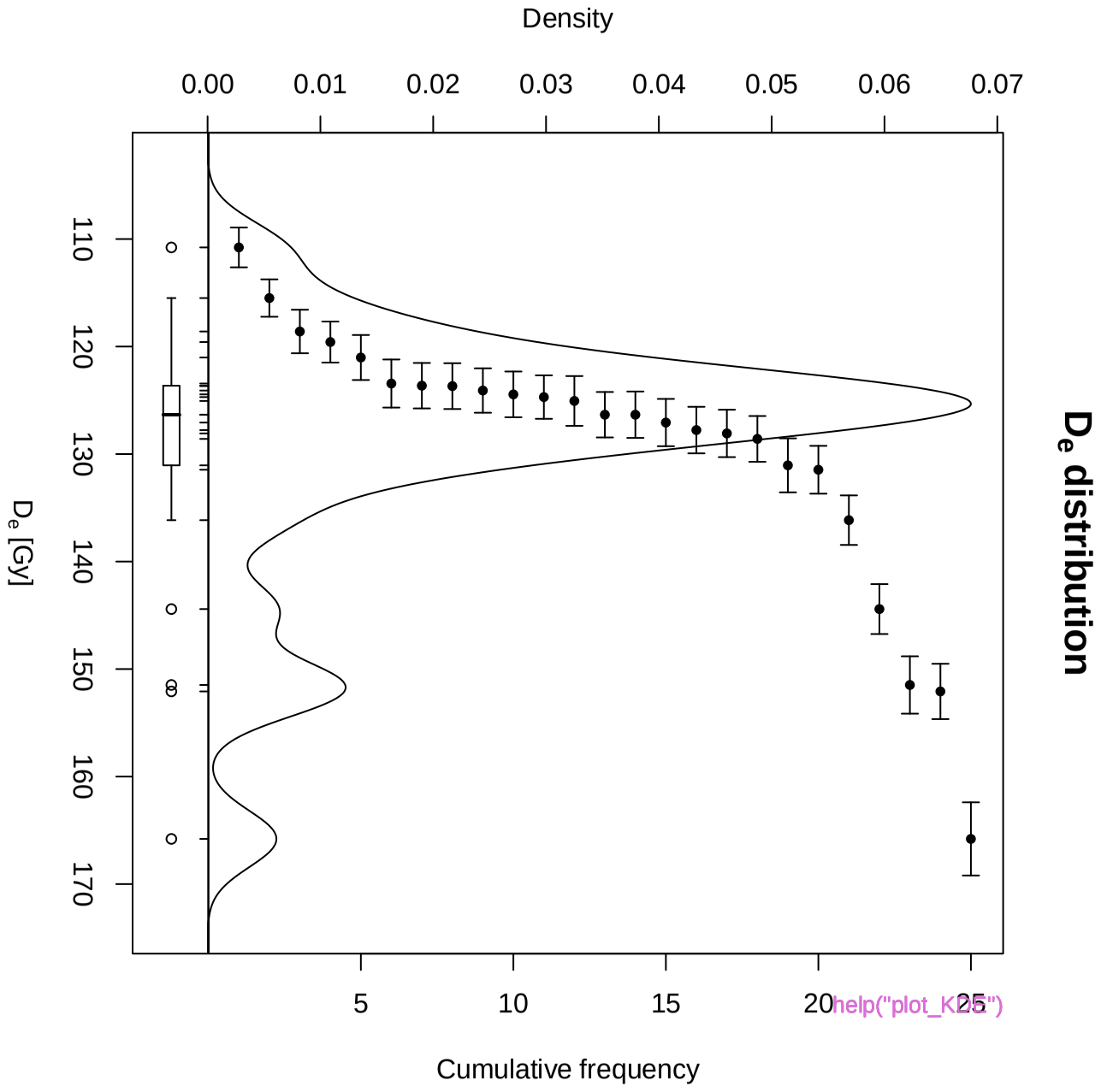

Frequency
0
2
4
6
8
10
12
14
110
120
130
140
150
160
170
De [Gy]
Histogram
3.5
4.0
4.5
5.0
5.5
6.0
6.5
Standard error
help("plot_histogram")

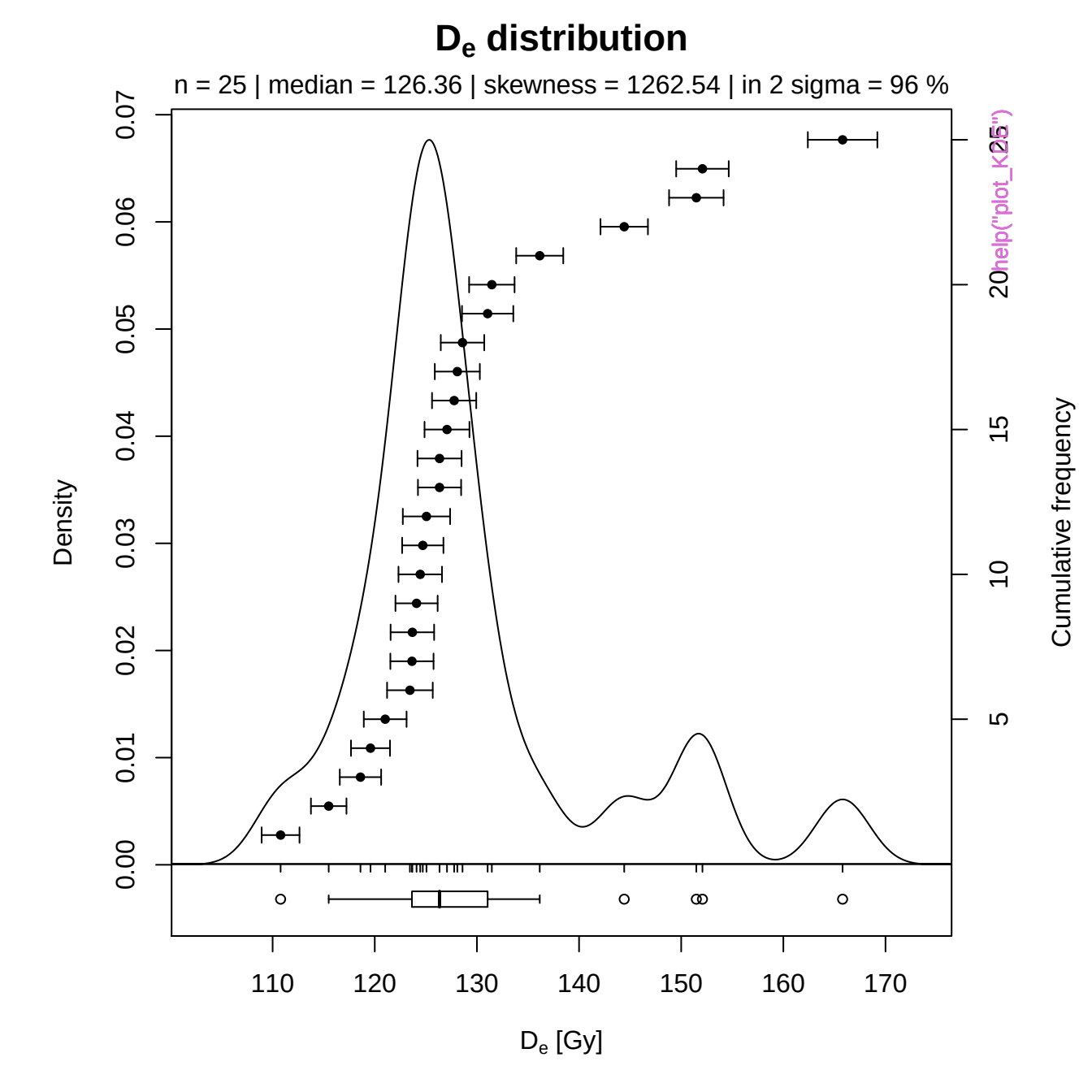

Histogram of De−values
Example data set
n = 25
mean = 129.25
rel. sd = 9.54 %
De distribution
0.00
0.02
0.04
0.06
0.08
0.10
Standard error
5
10
15
20
help("plot_Histogram")
100
150
200
250
De [Gy]

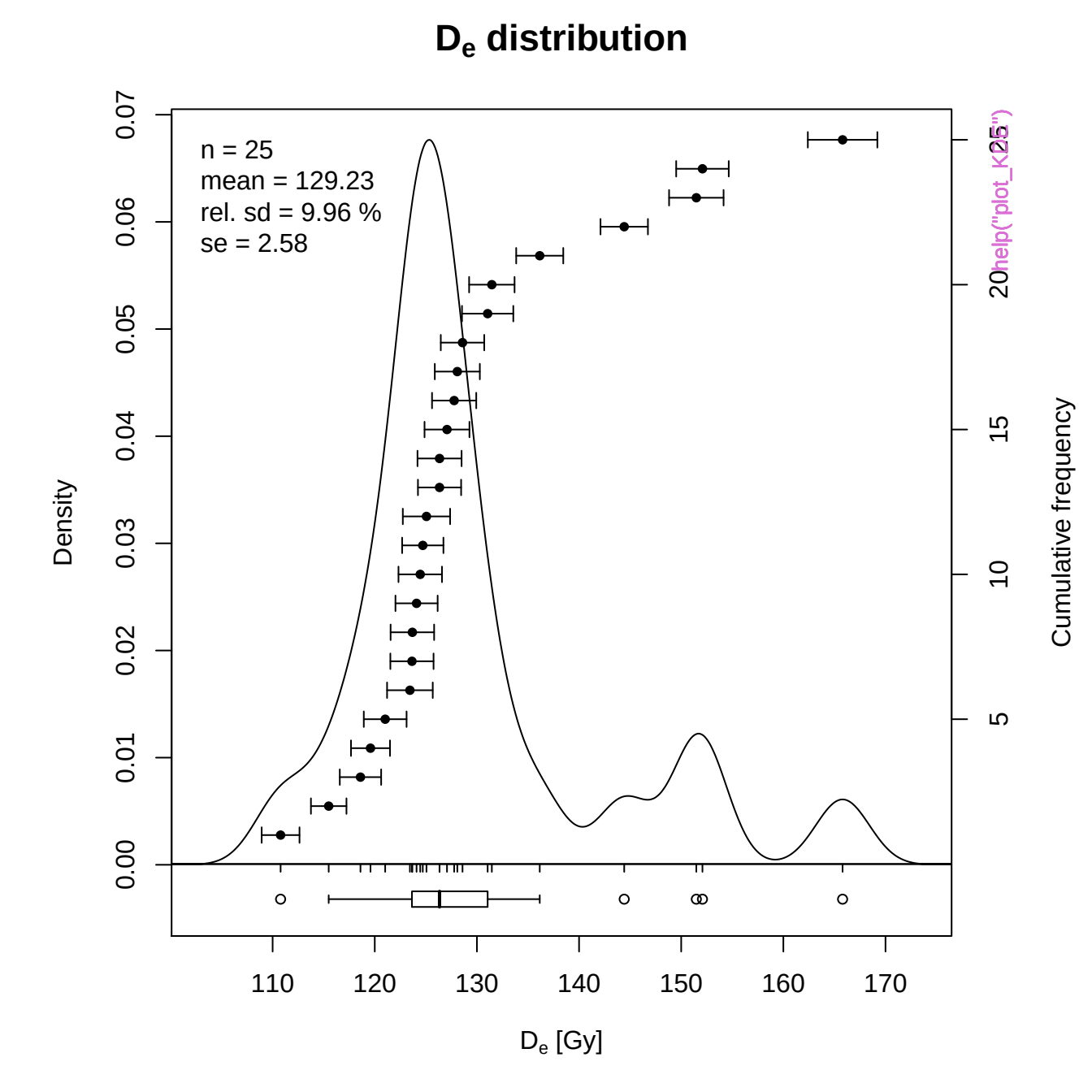

Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
De distribution
De [Gy]
110
120
130
140
150
160
170
5
10
15
20
25
Cumulative frequency
help("plot_KDE")

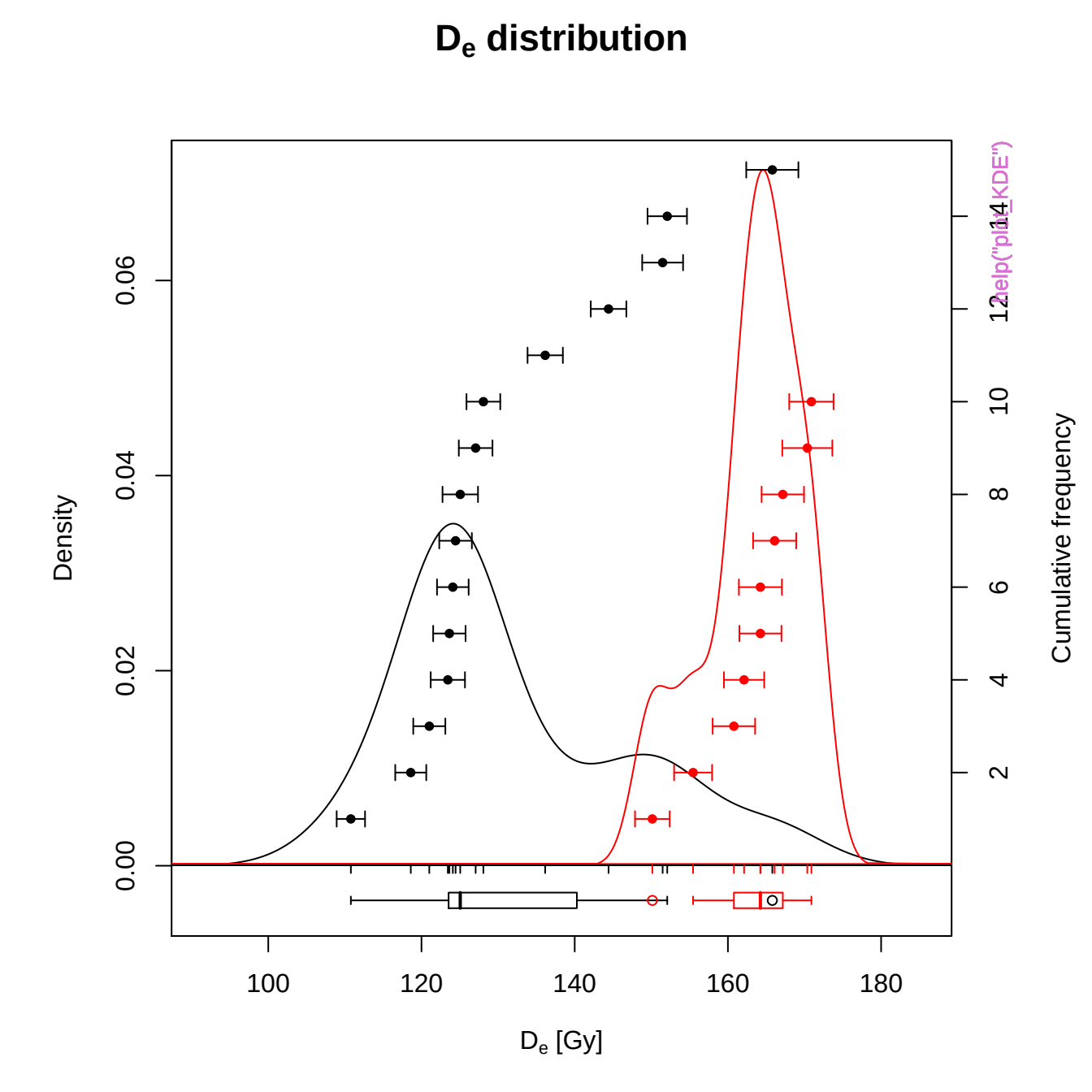

Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
De distribution
De [Gy]
110
120
130
140
150
160
170
5
10
15
20
25
Cumulative frequency
help("plot_KDE")

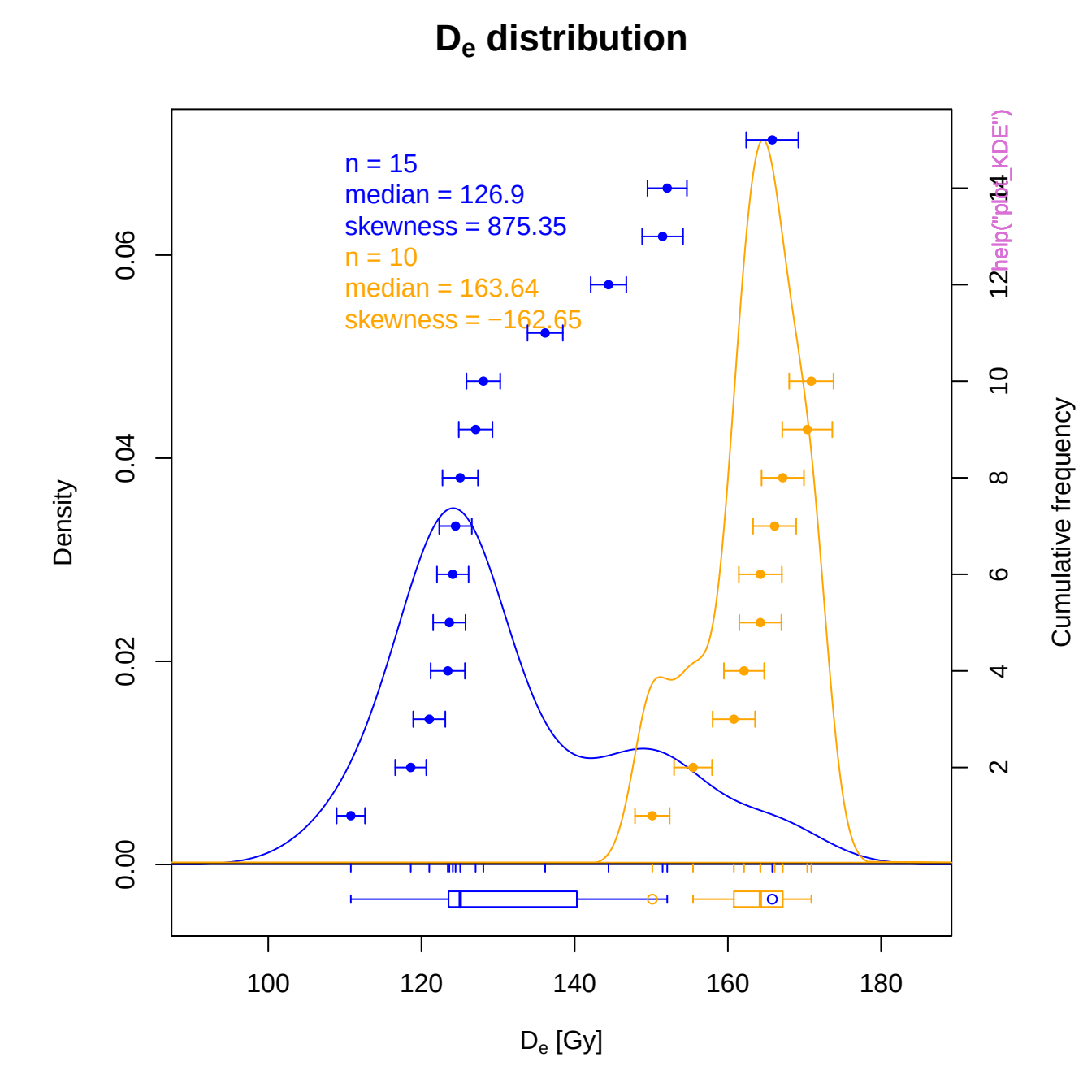

KDE estimate
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Dose distribution
Dose (s)
100
150
200
250
5
10
15
20
25
30
Cumulative dose value
help("plot_KDE")

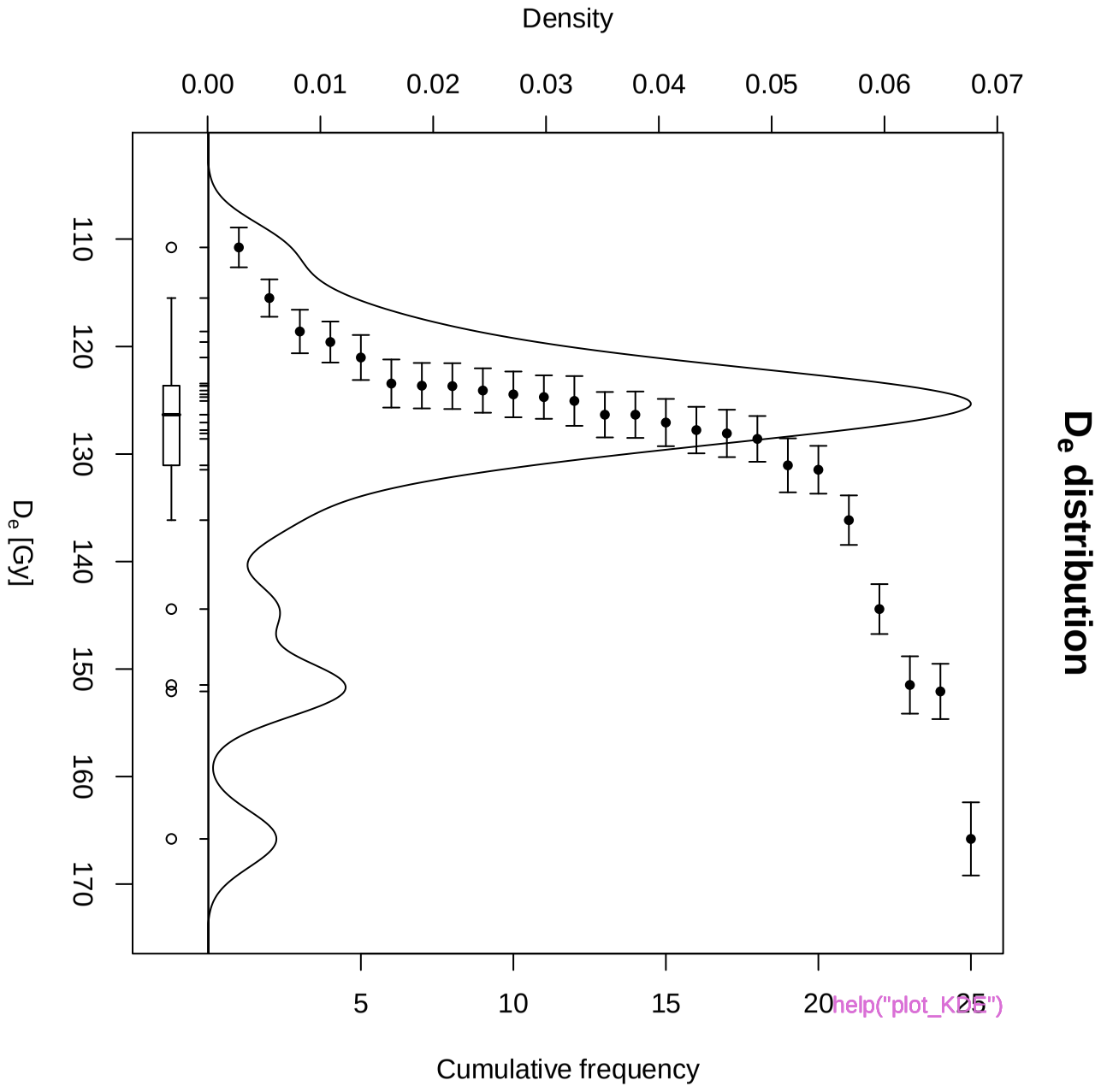

Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
De distribution
De [Gy]
110
120
130
140
150
160
170
5
10
15
20
25
Cumulative frequency
help("plot_KDE")

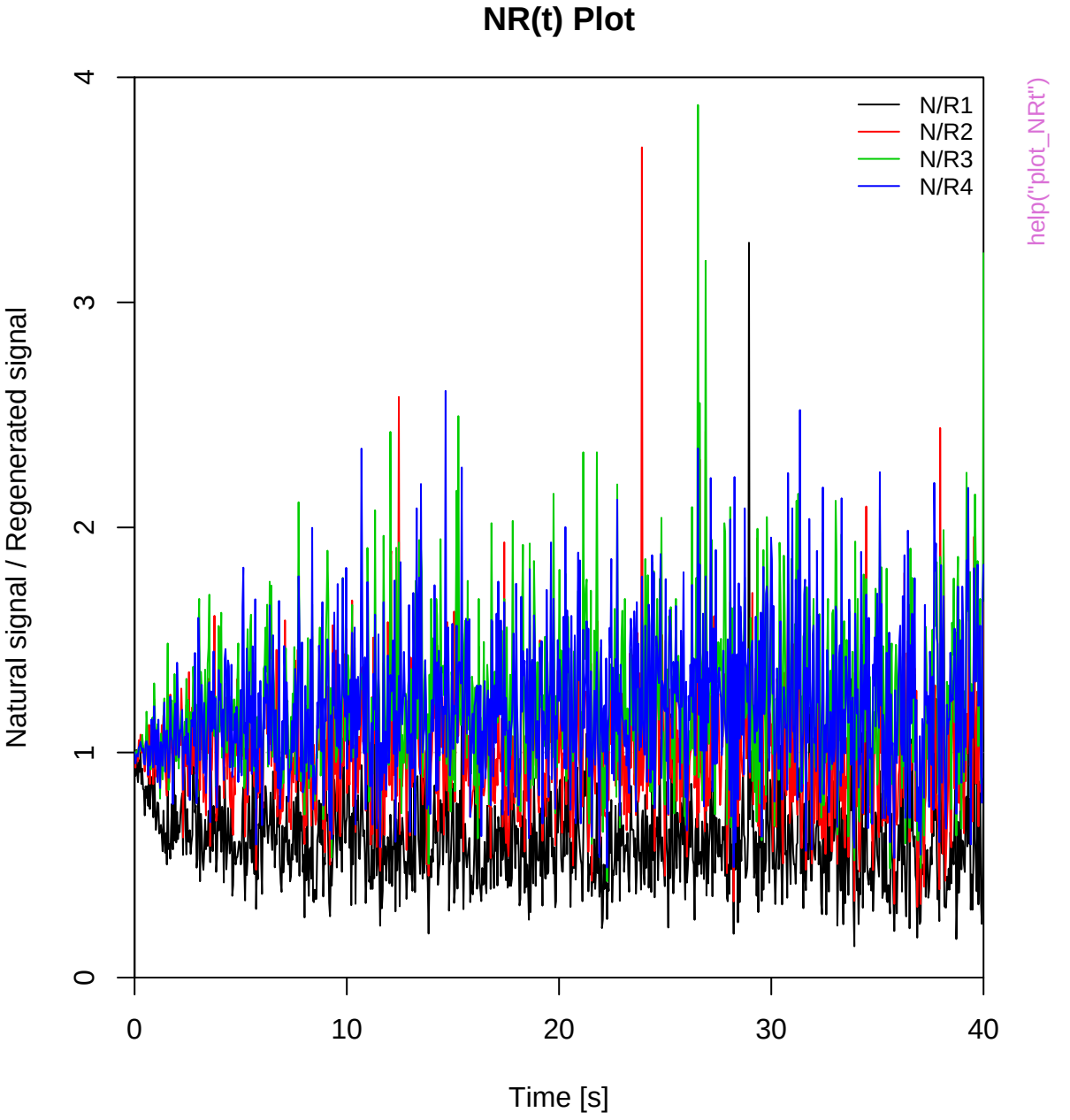

De distribution
n = 25 | median = 126.36 | skewness = 1262.54 | in 2 sigma = 96 %
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
De [Gy]

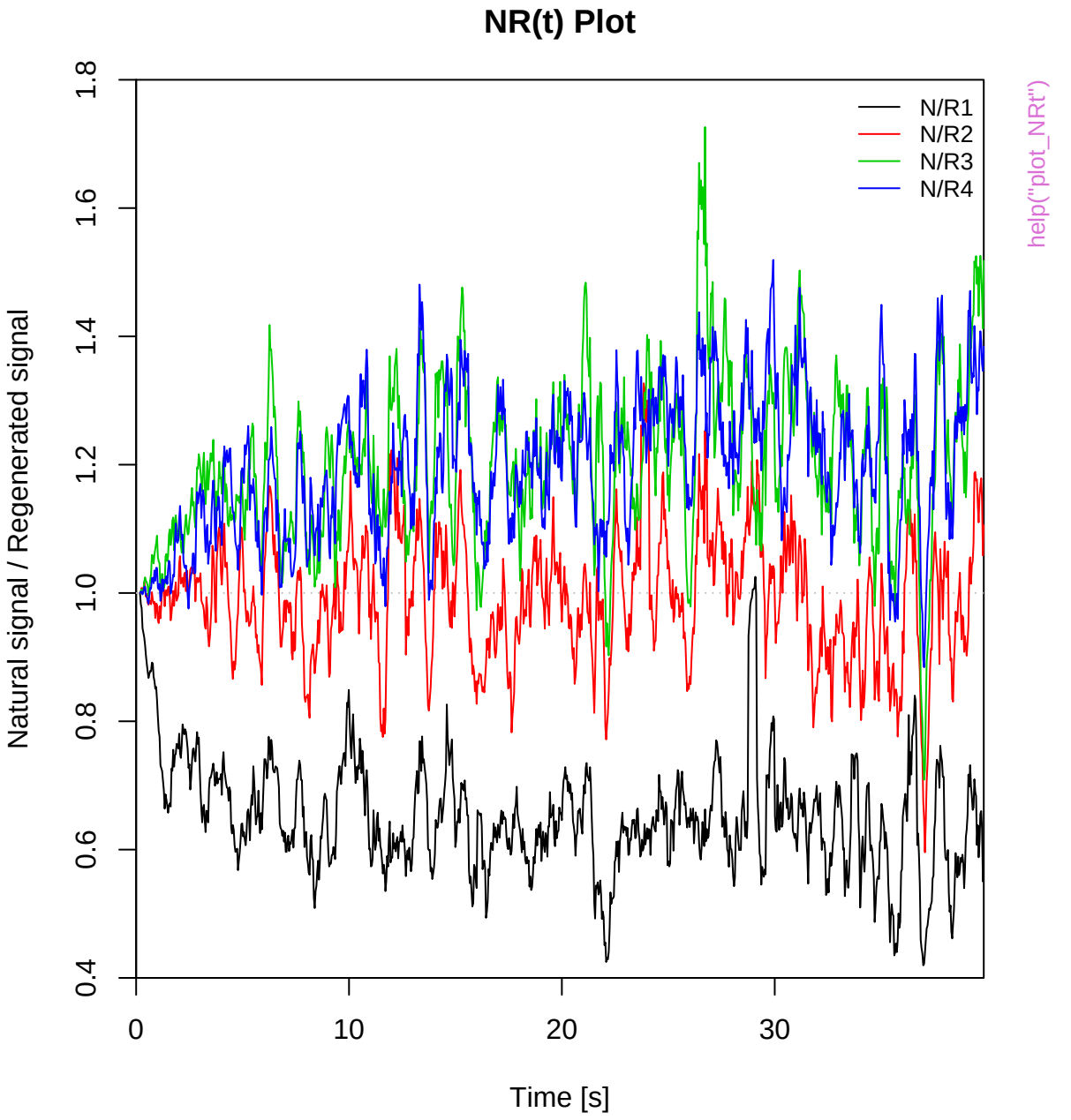

D$_e$ distribution
n = 25
mean = 129.23
rel. sd = 9.96 %
se = 2.58
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D$_e$ [Gy]

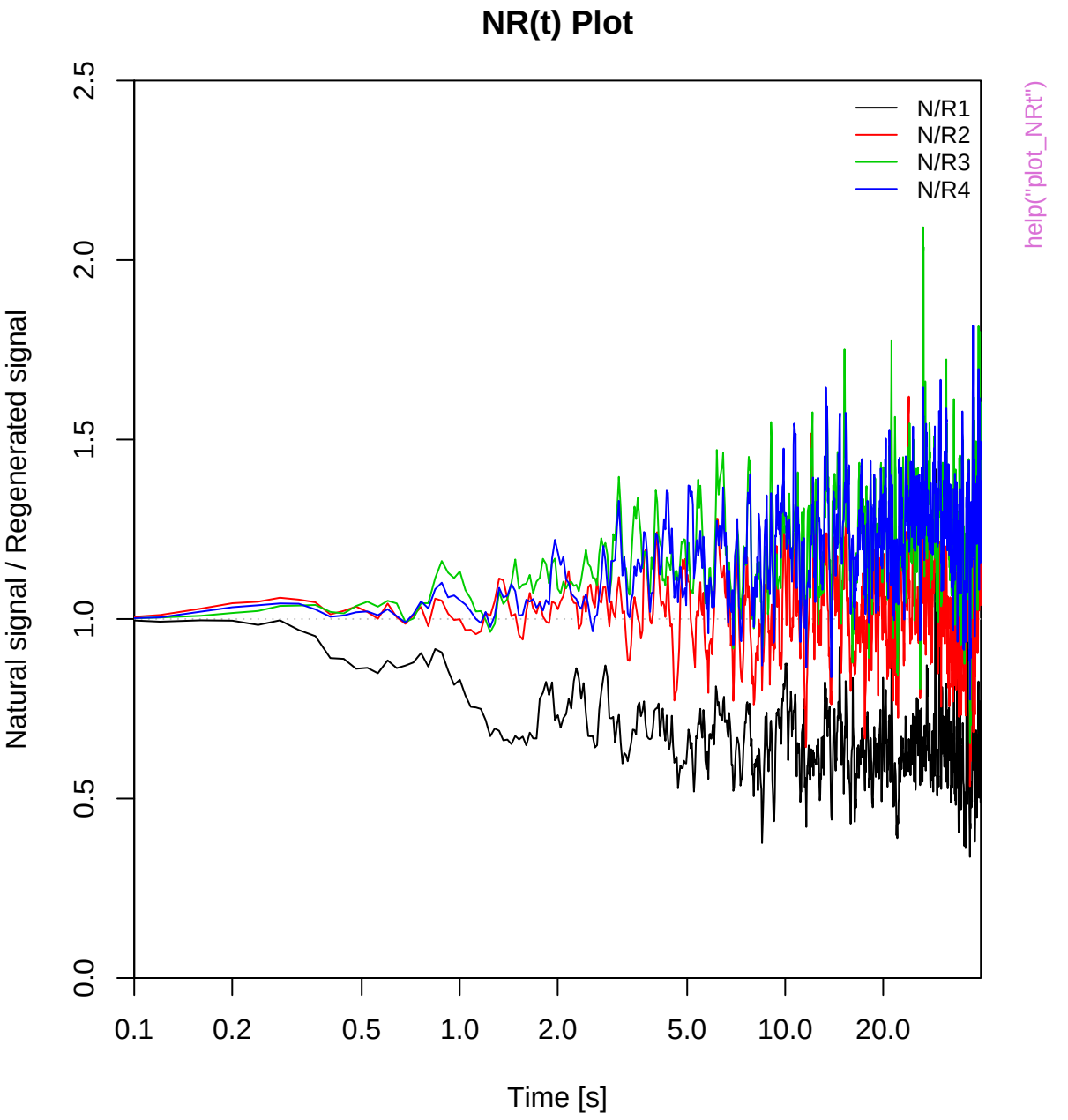

D_e distribution
Density
0.00
0.02
0.04
0.06
Cumulative frequency
2
4
6
8
10
12
14
help("plot_KDE")
100
120
140
160
180
D_e [Gy]

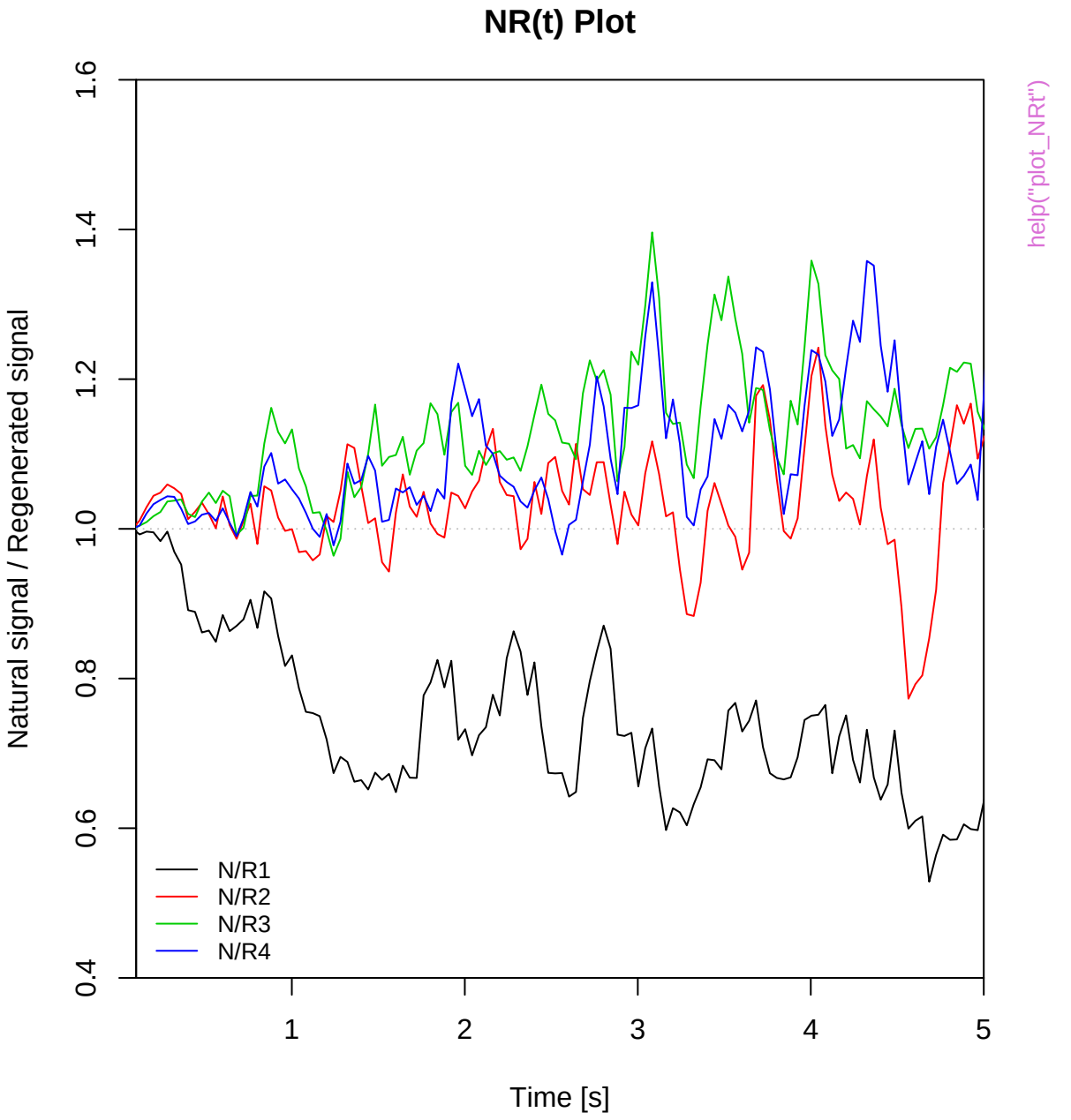

D$_e$ distribution
n = 15
median = 126.9
skewness = 875.35
n = 10
median = 163.64
skewness = −162.65
Density
0.00
0.02
0.04
0.06
Cumulative frequency
2
4
6
8
10
12
14
help("plot_KDE")
100
120
140
160
180
D$_e$ [Gy]

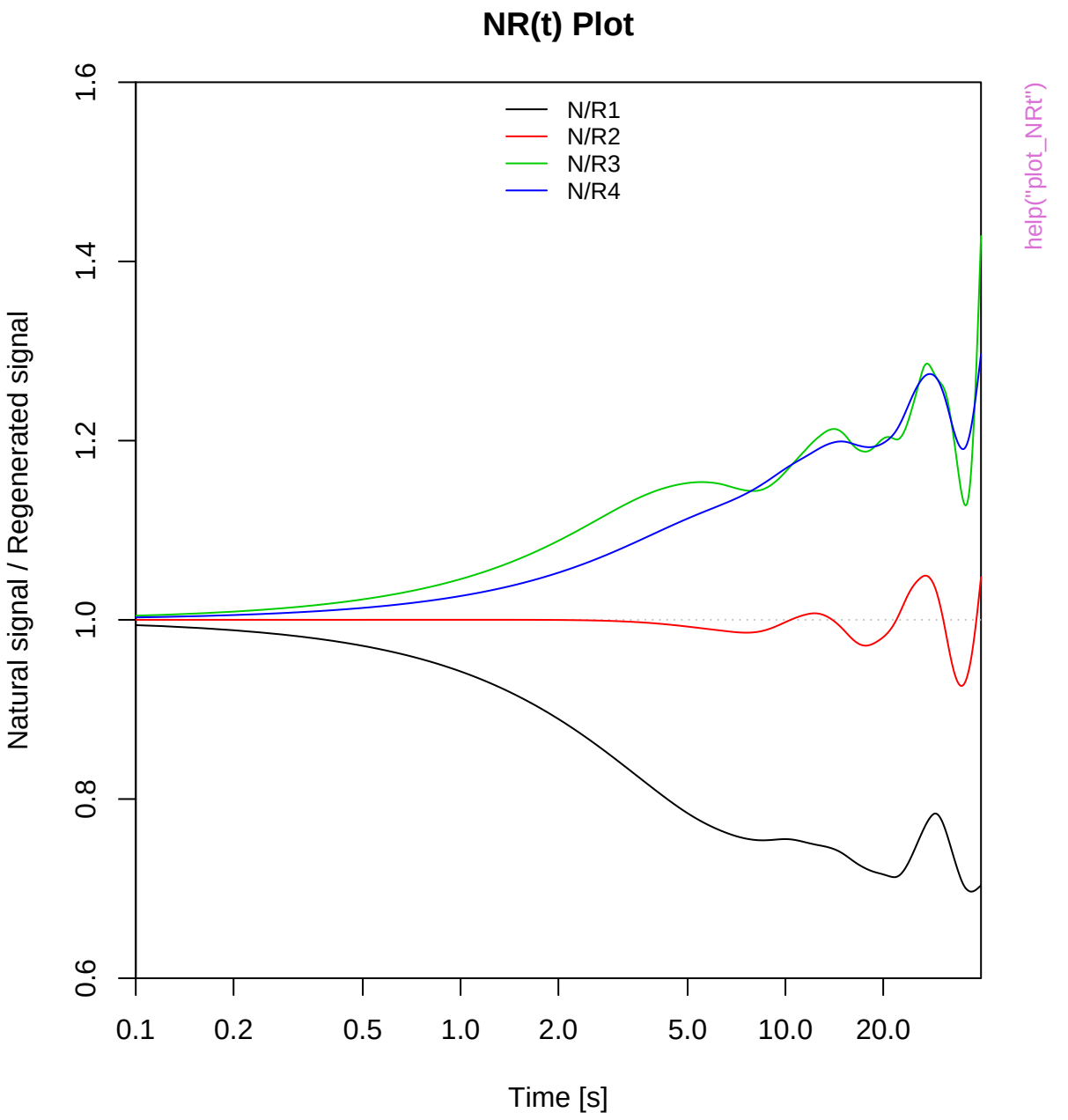

Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
De distribution
De [Gy]
110
120
130
140
150
160
170
5
10
15
20
25
Cumulative frequency
help("plot_KDE")

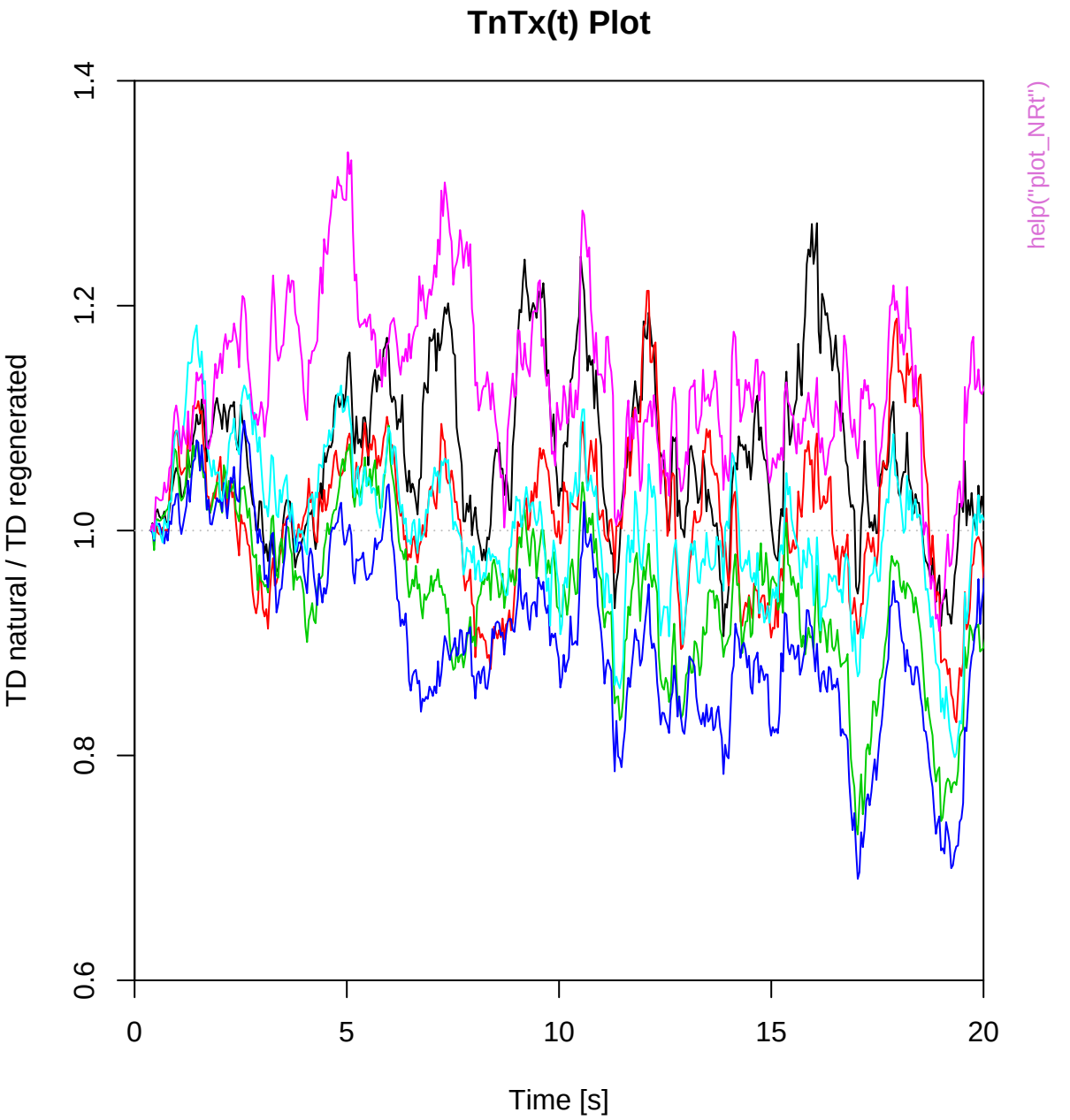

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0
1
2
3
4
0
10
20
30
40
Time [s]

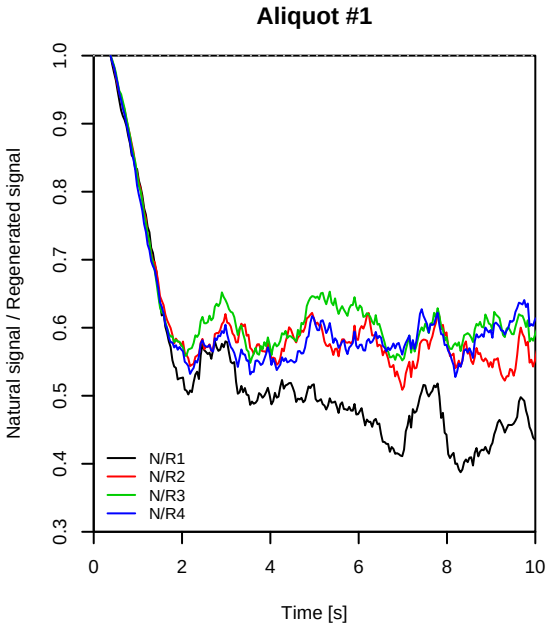

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0
10
20
30
Time [s]

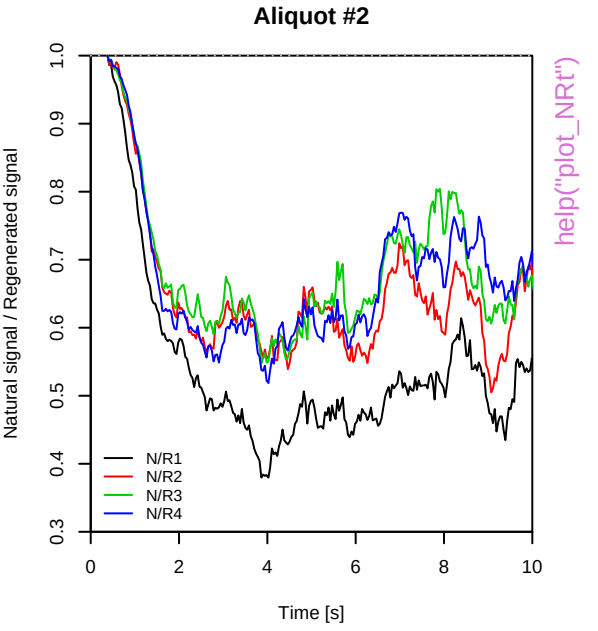

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0.0
0.5
1.0
1.5
2.0
2.5
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0
Time [s]

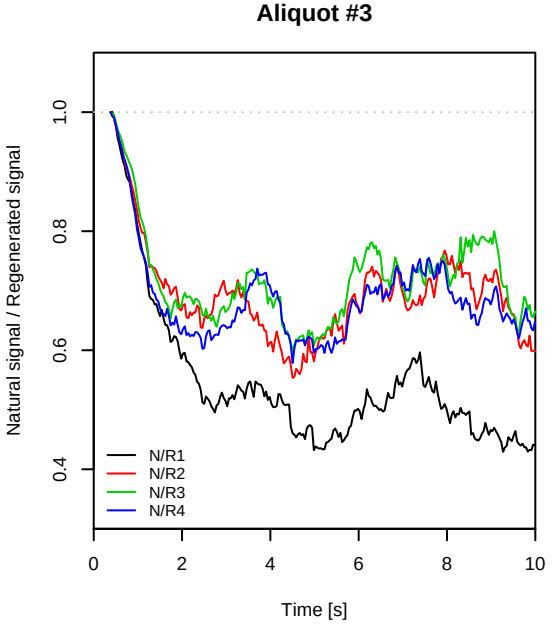

NR(t) Plot
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

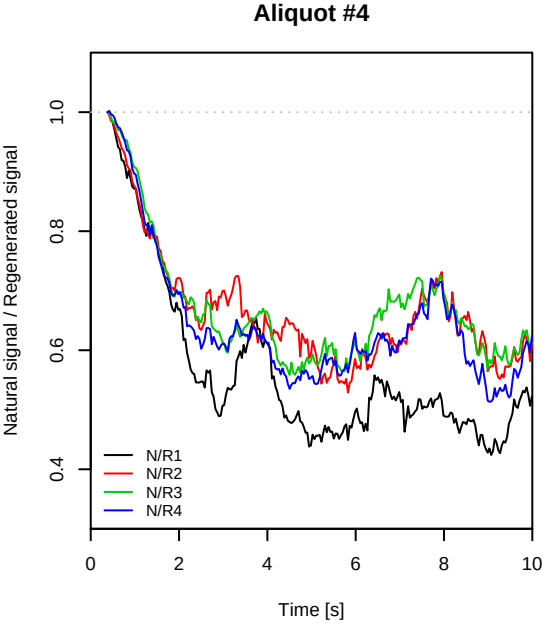

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
1.6
1.4
1.2
1.0
0.8
0.6
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0
Time [s]

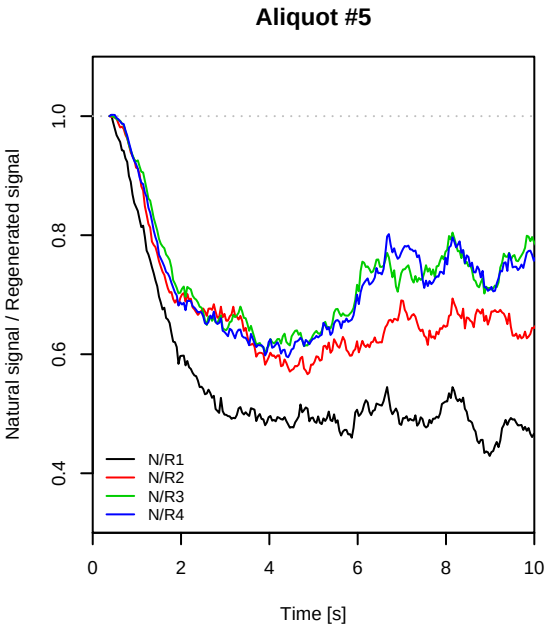

TnTx(t) Plot
TD natural / TD regenerated
Time [s]
0.6
0.8
1.0
1.2
1.4
0
5
10
15
20
help("plot_NRt")

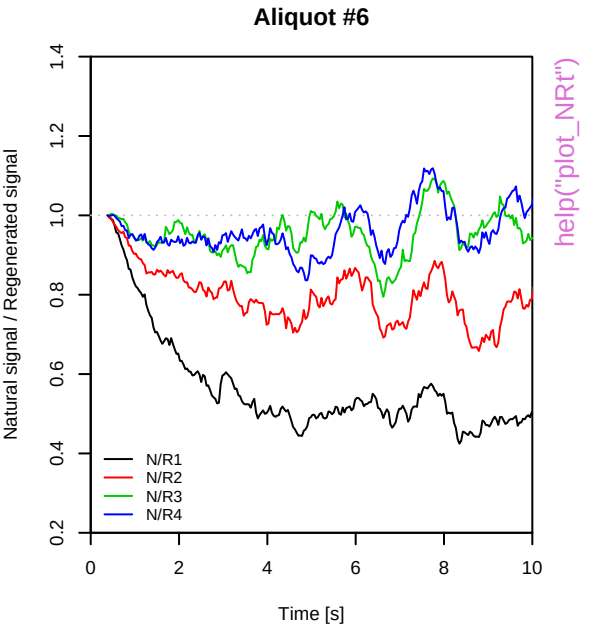

Aliquot #1
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

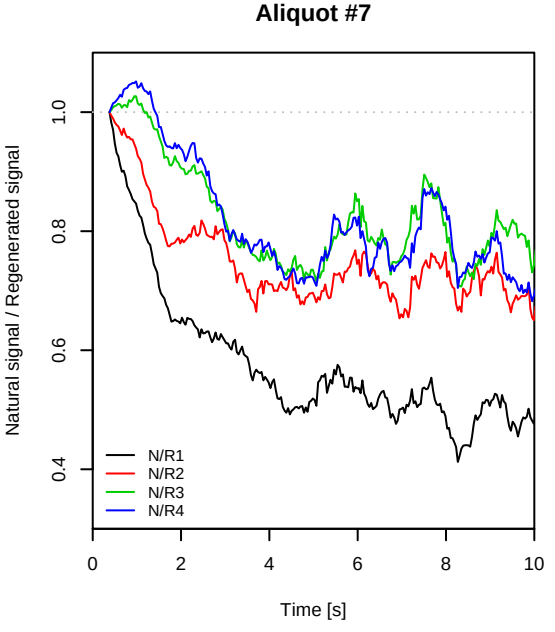

Aliquot #2
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

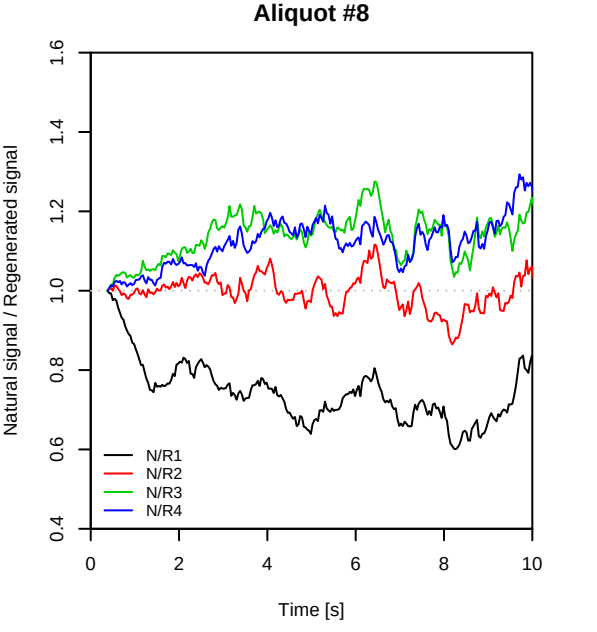

Aliquot #3
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

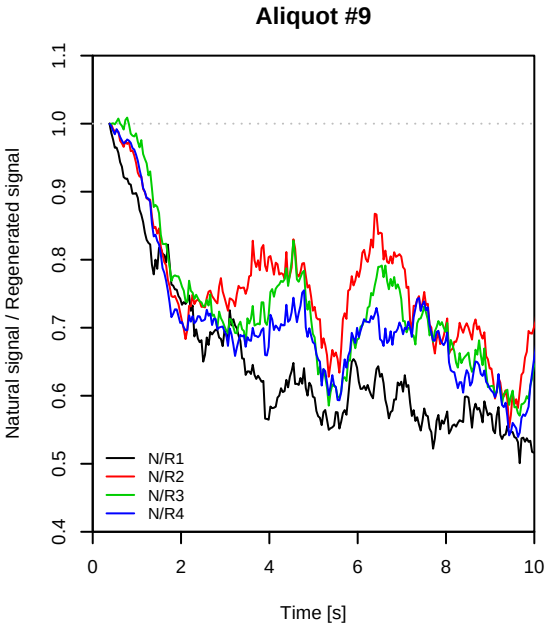

Aliquot #4
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

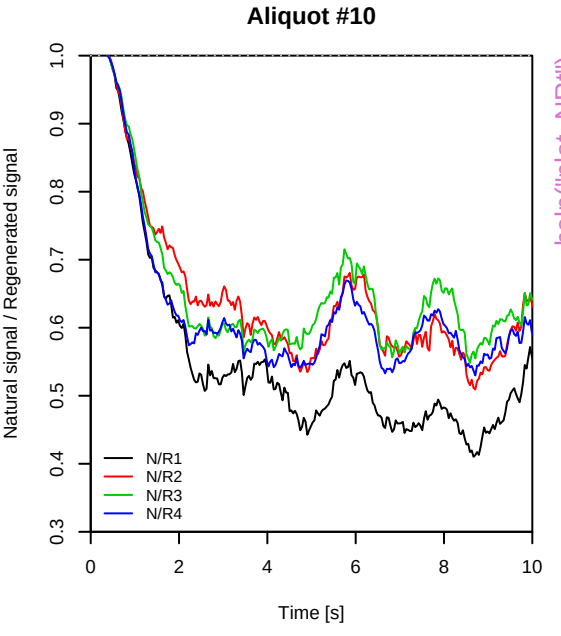

Aliquot #5
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4


Aliquot #6
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

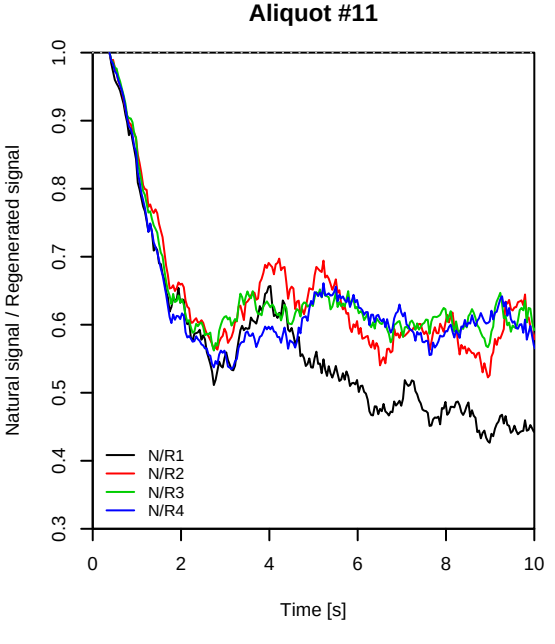

Aliquot #7
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

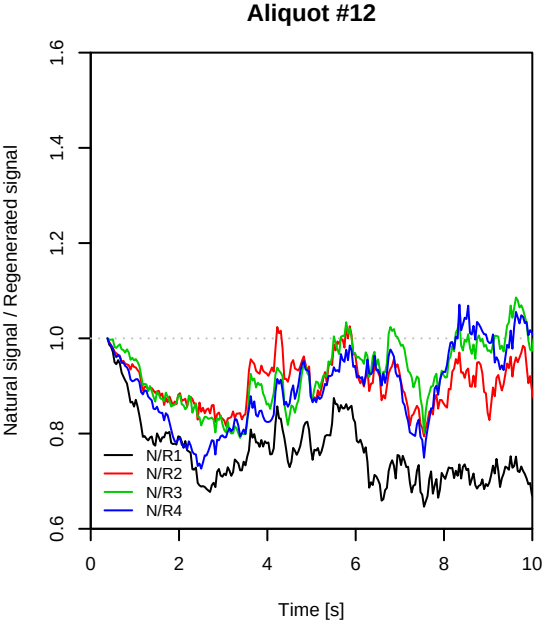

Aliquot #8
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

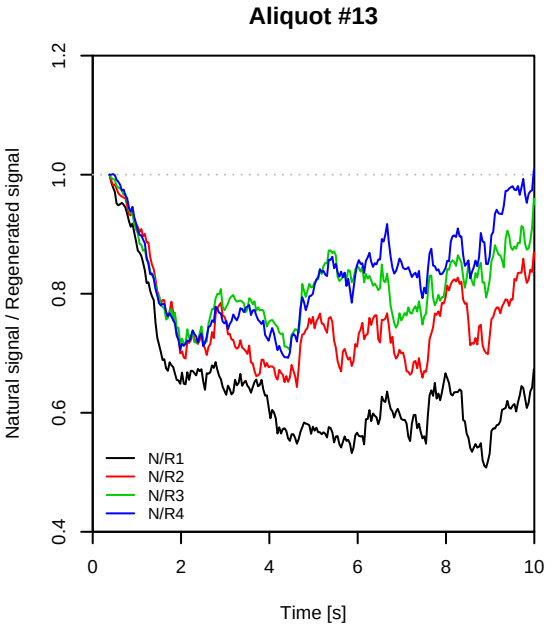


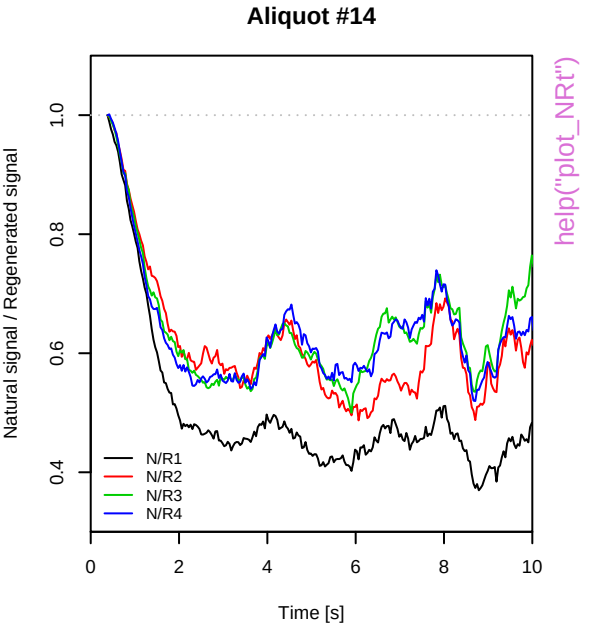


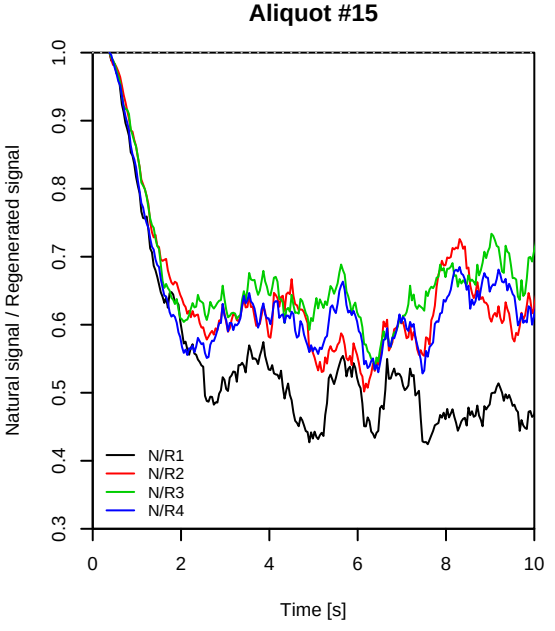
help("plot_NRt")

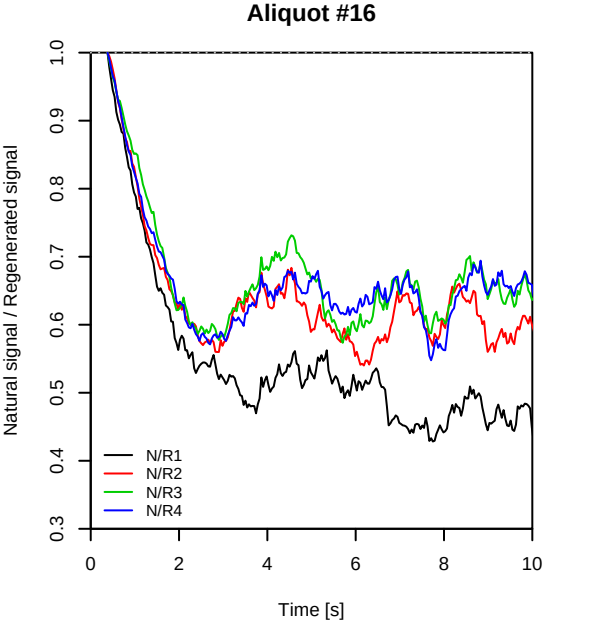


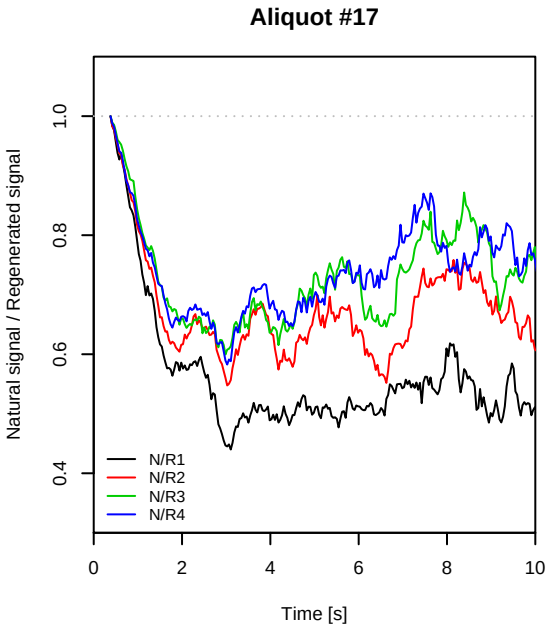


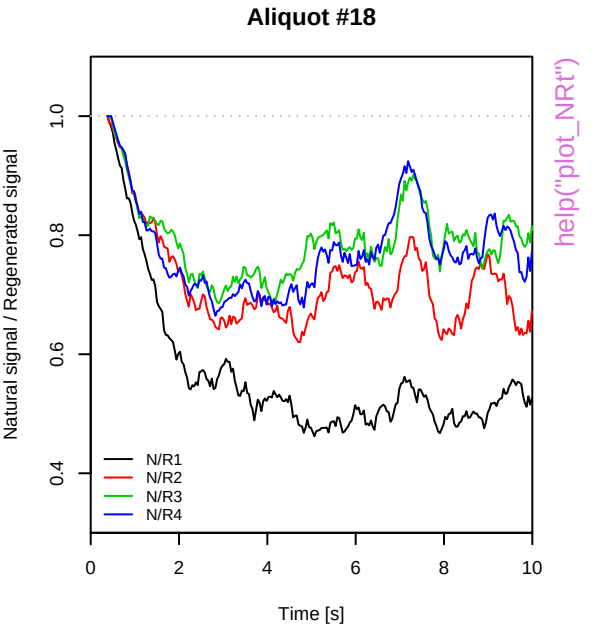

Aliquot #13
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

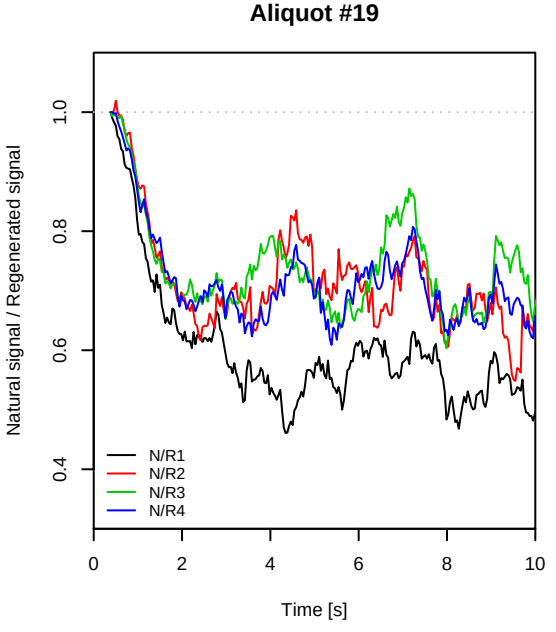

Aliquot #14
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

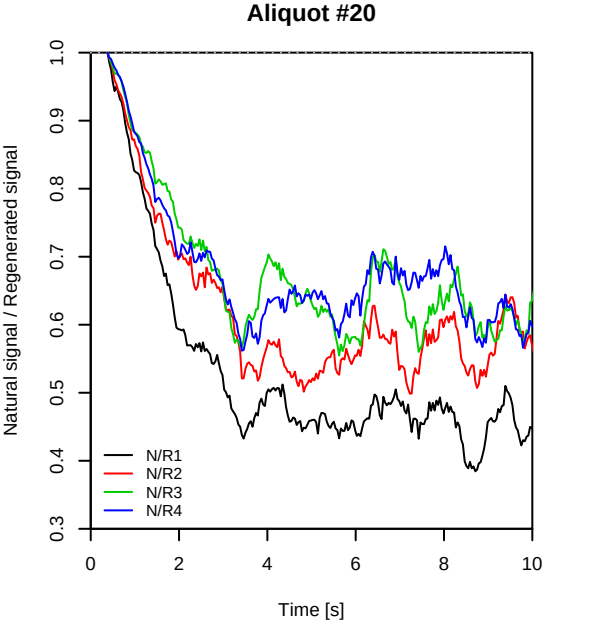

Aliquot #15
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

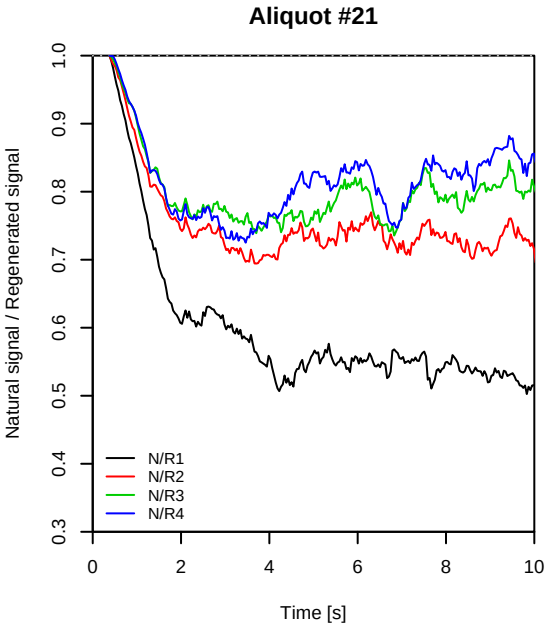

Aliquot #16
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

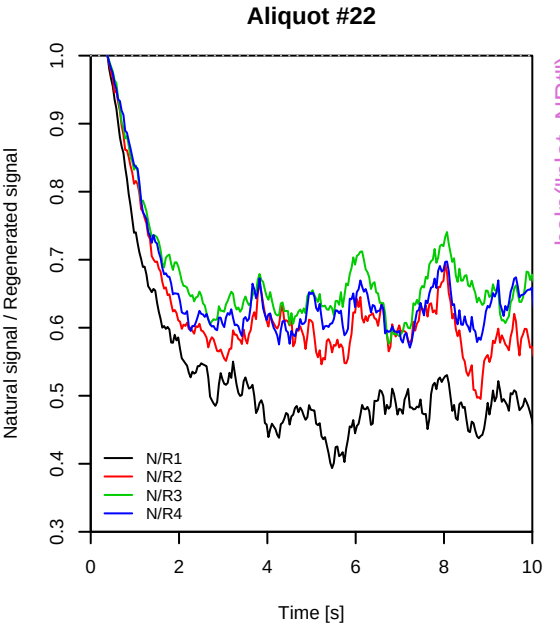

Aliquot #17
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4


Aliquot #18
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

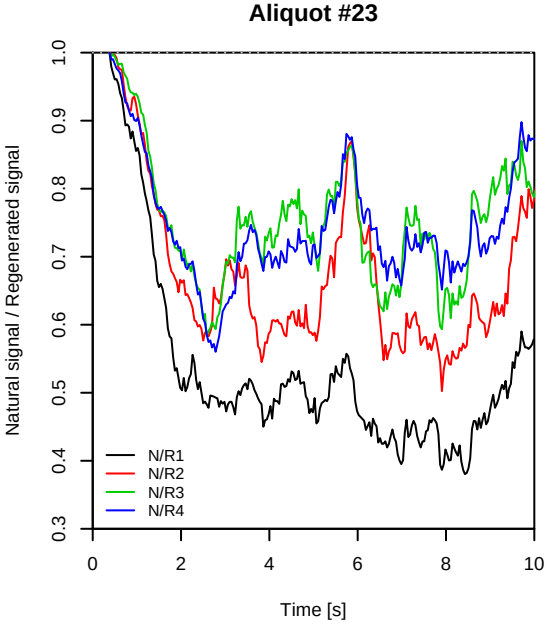

Aliquot #19
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

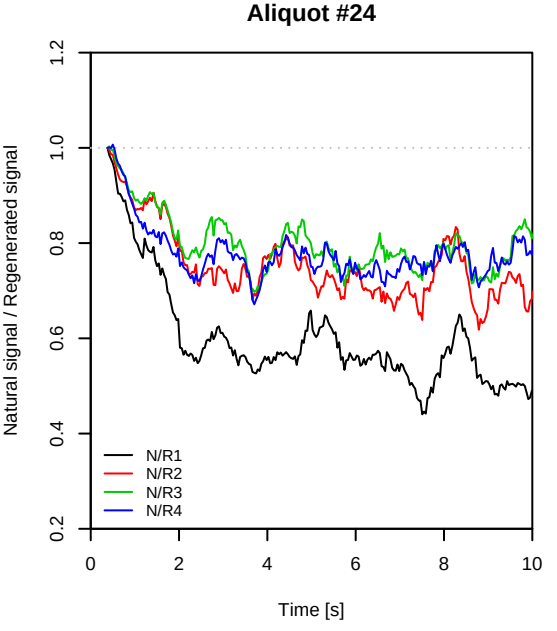

Aliquot #20
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4

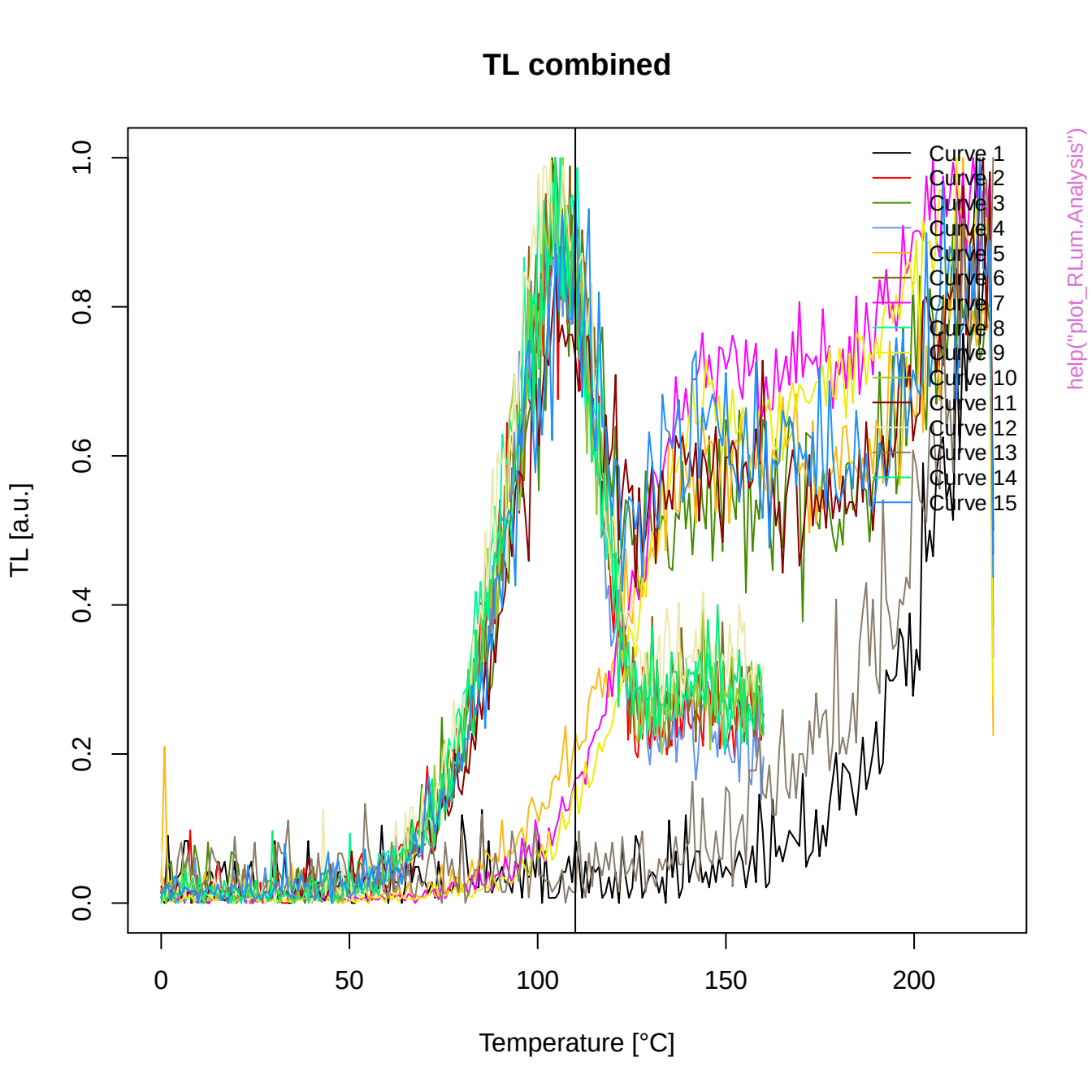


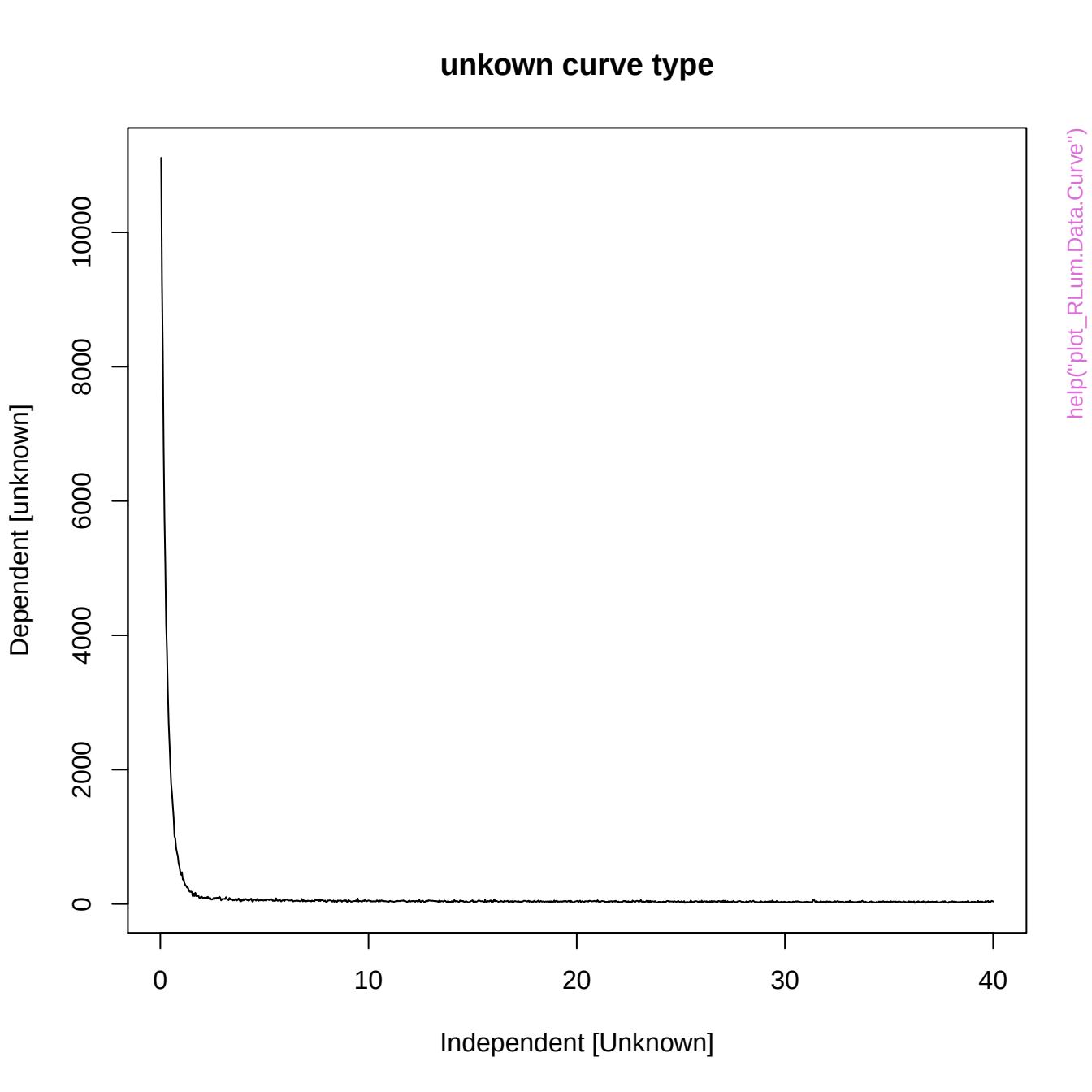


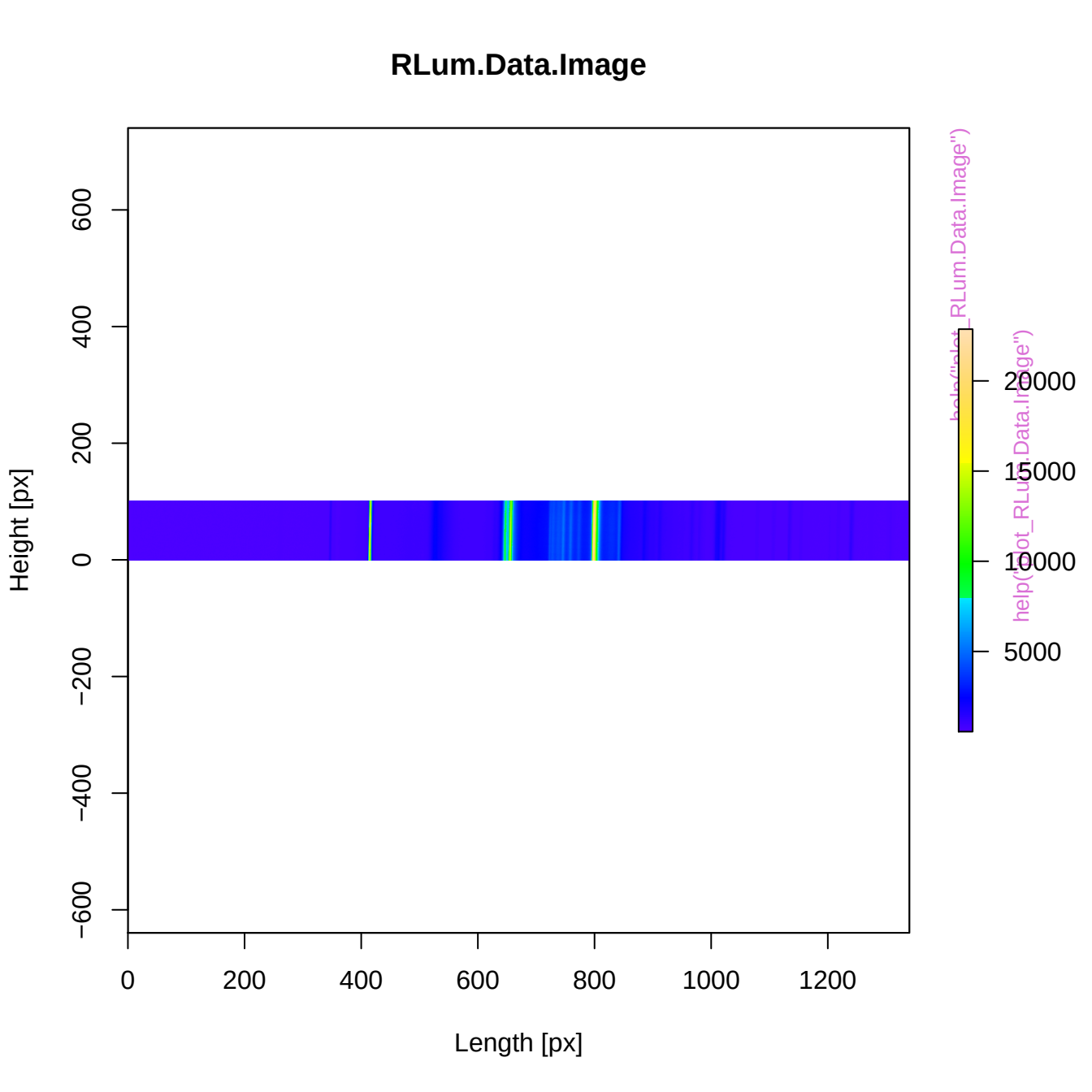
help("plot_NRt")

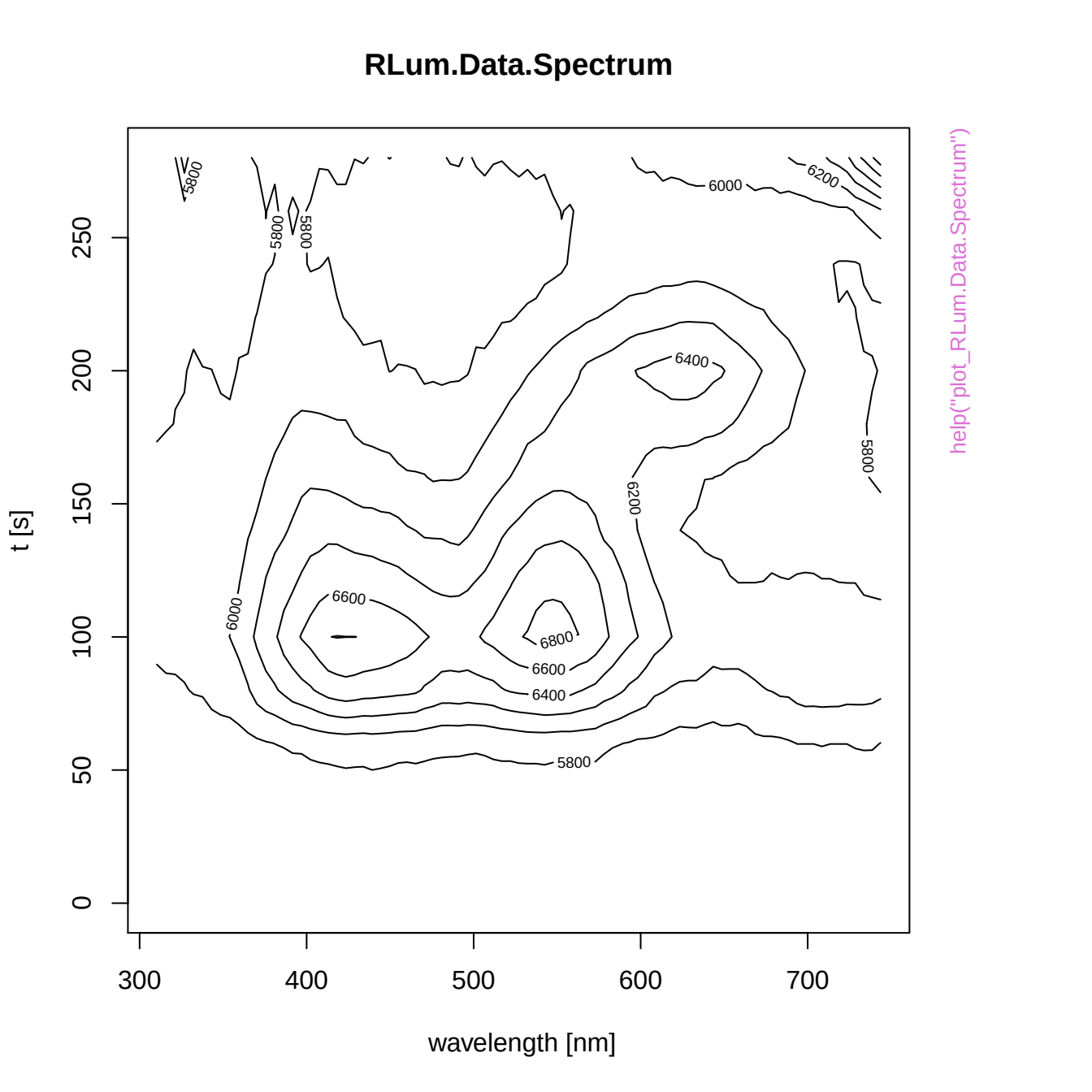




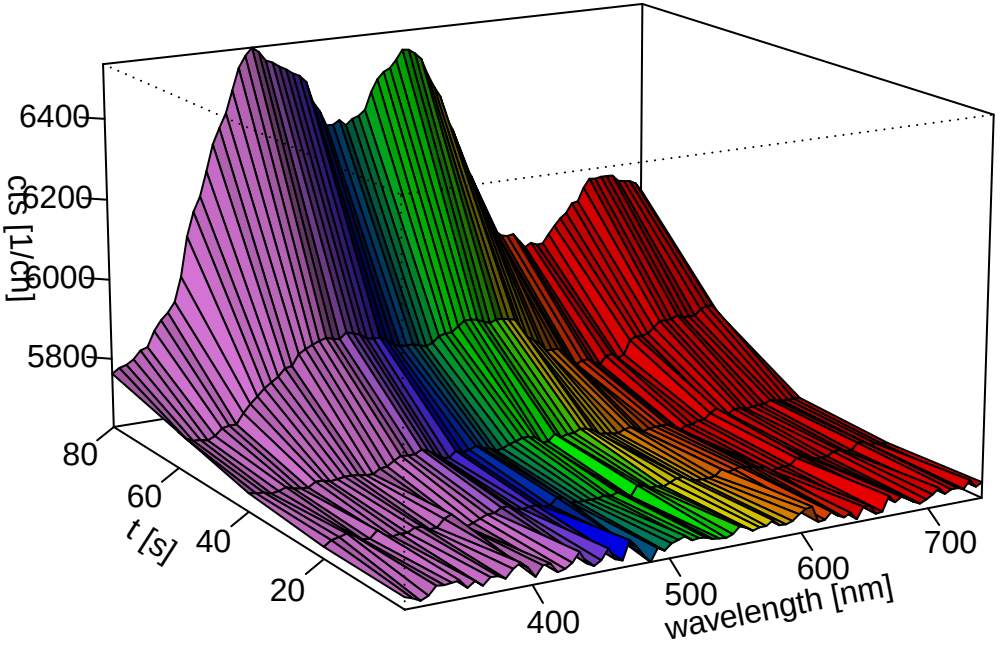

TL combined
TL [a.u.]
Temperature [°C]
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
Curve 11
Curve 12
Curve 13
Curve 14
Curve 15
help("plot_RLum.Analysis")


unkown curve type
Dependent [unknown]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Independent [Unknown]
help("plot_RLum.Data.Curve")

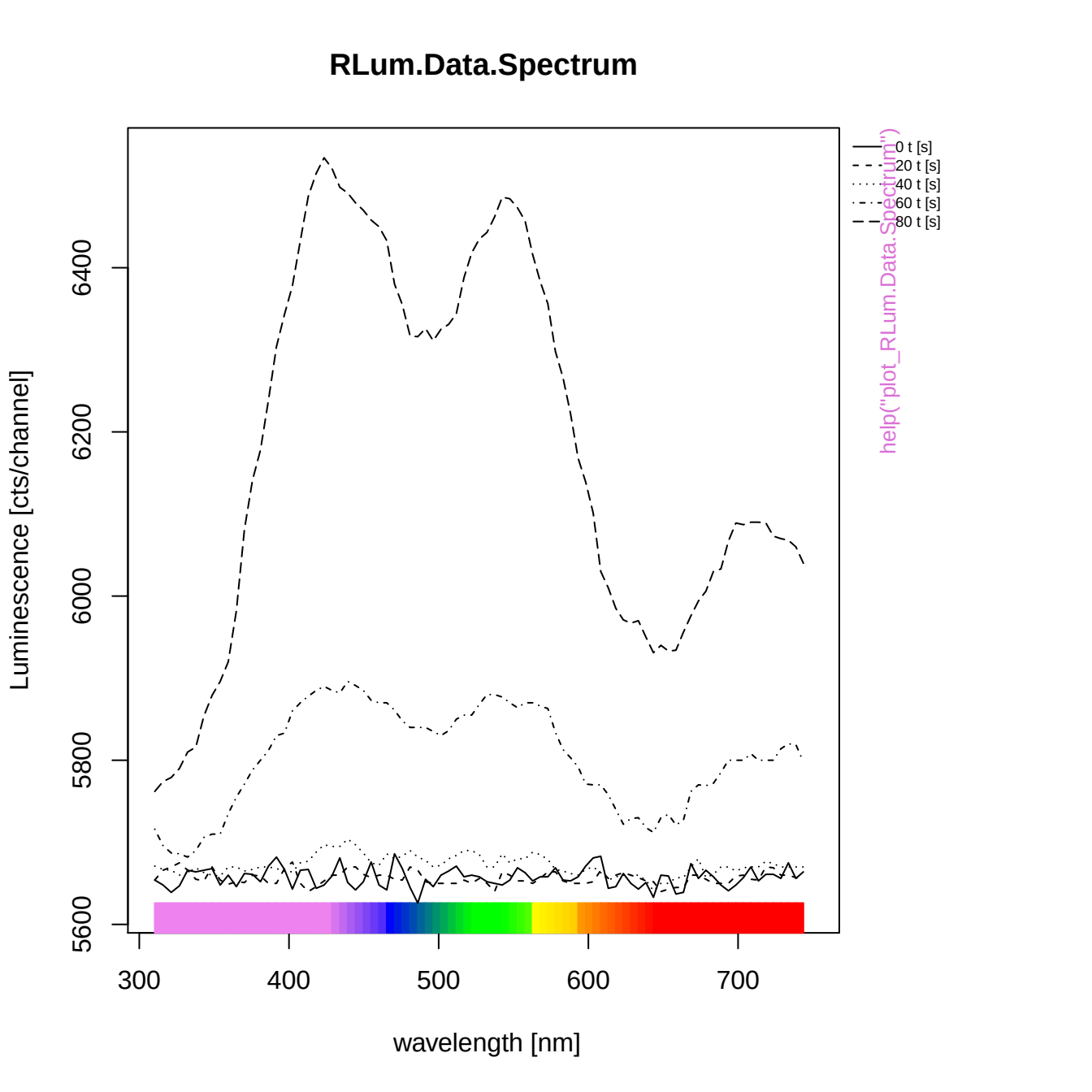

RLum.Data.Image
Height [px]
600
400
200
0
−200
−400
−600
0
200
400
600
800
1000
1200
Length [px]
20000
15000
10000
5000

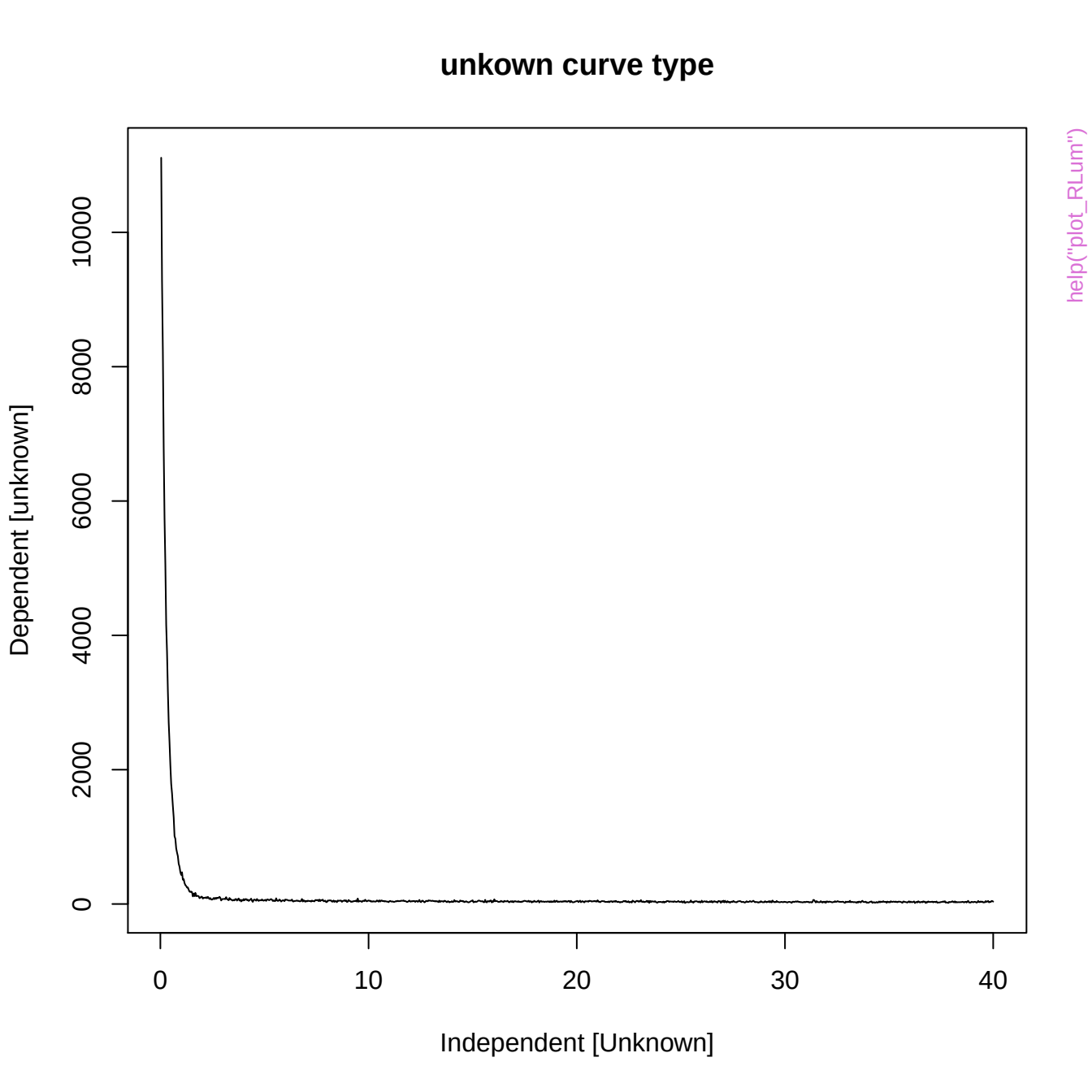

RLum.Data.Spectrum
t [s]
0
50
100
150
200
250
300
400
500
600
700
wavelength [nm]
5800
6000
6200
6400
6600
6800
help("plot_RLum.Data.Spectrum")

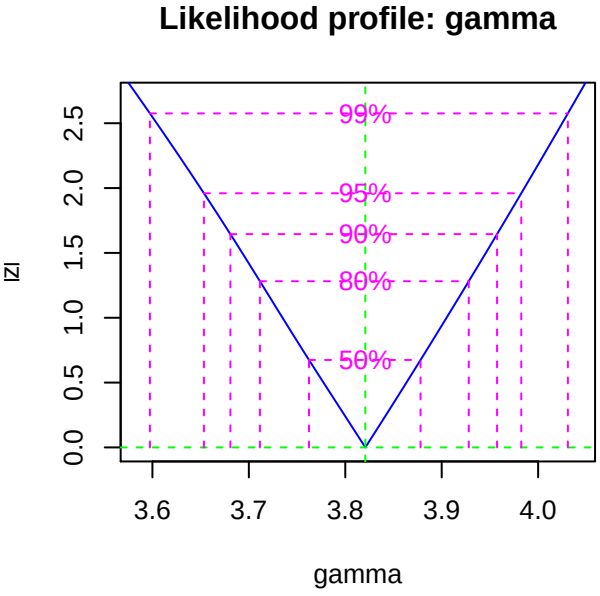
RLum.Data.Spectrum

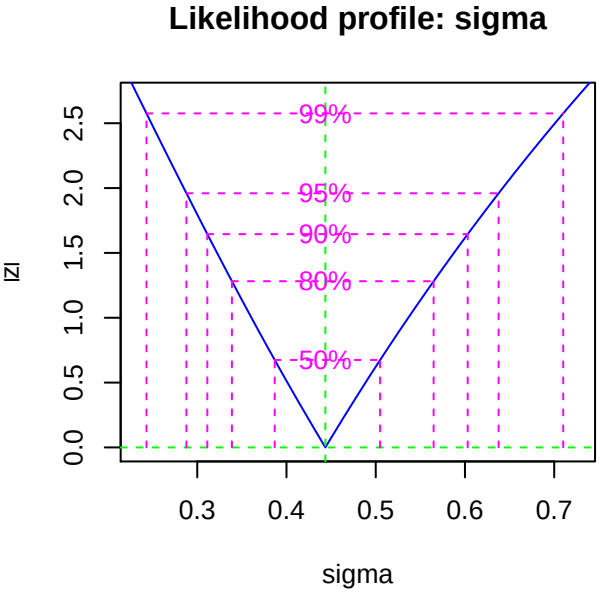


help("plot_RLum.Data.Spectrum")

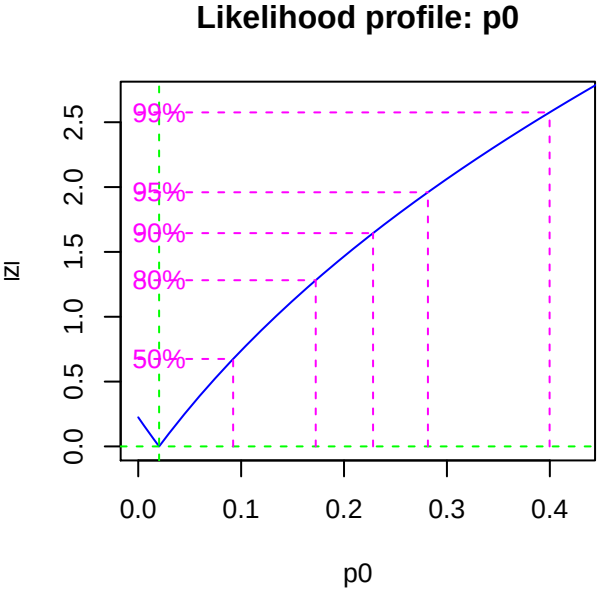

RLum.Data.Spectrum
0 t [s]
20 t [s]
40 t [s]
60 t [s]
80 t [s]
help("plot_RLum.Data.Spectrum")
Luminescence [cts/channel]
5600
5800
6000
6200
6400
300
400
500
600
700
wavelength [nm]

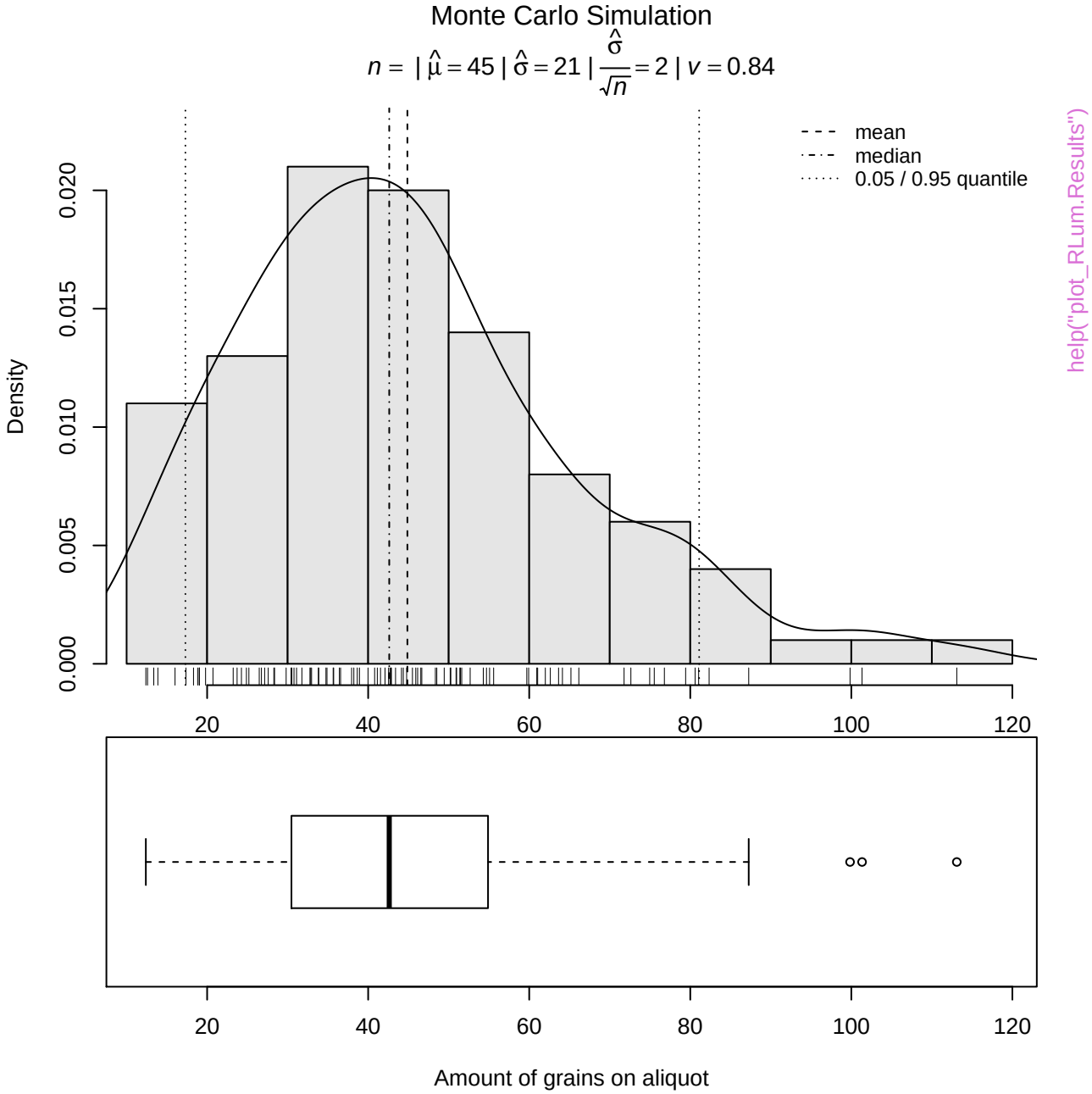

unkown curve type
Dependent [unknown]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Independent [Unknown]
help("plot_RLum")

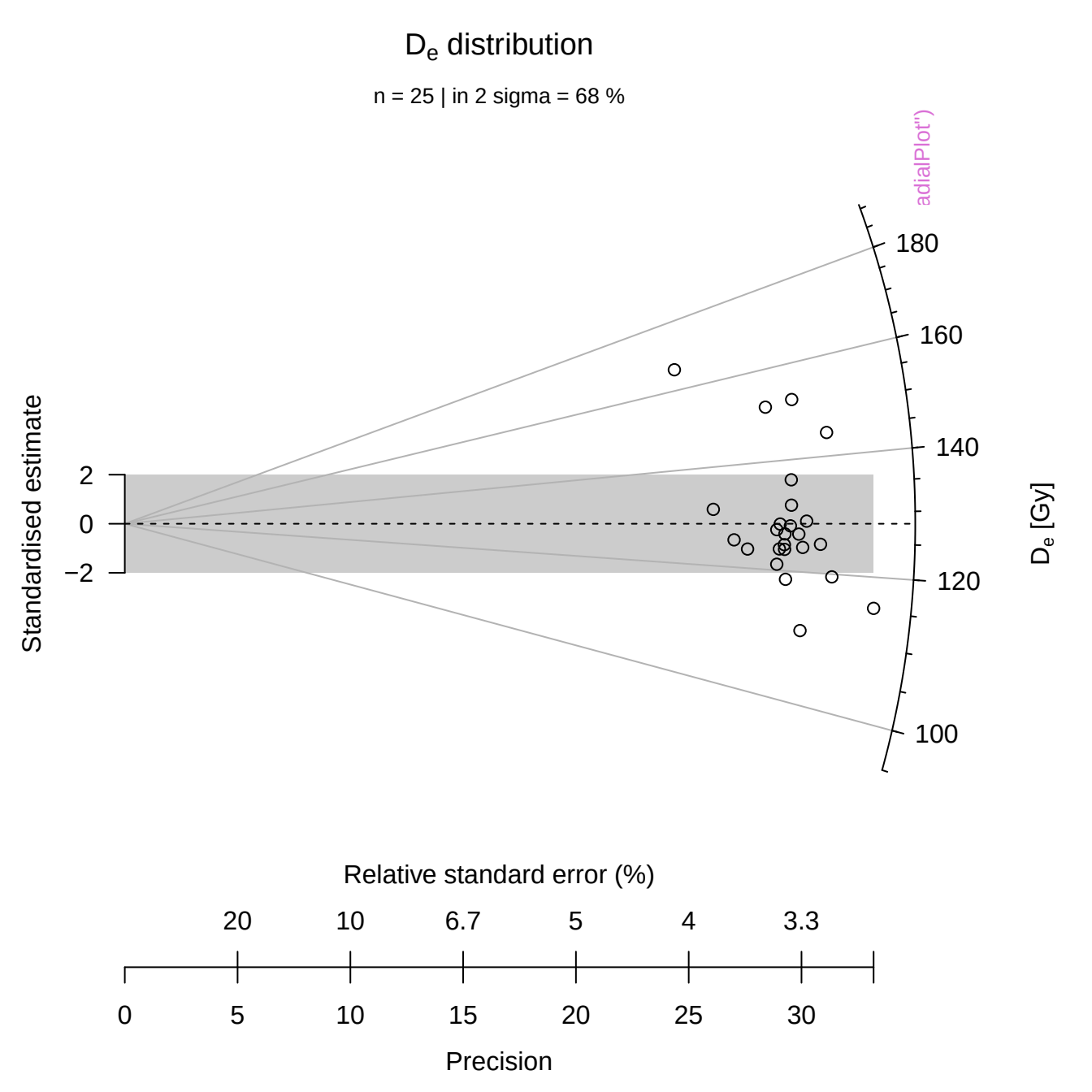


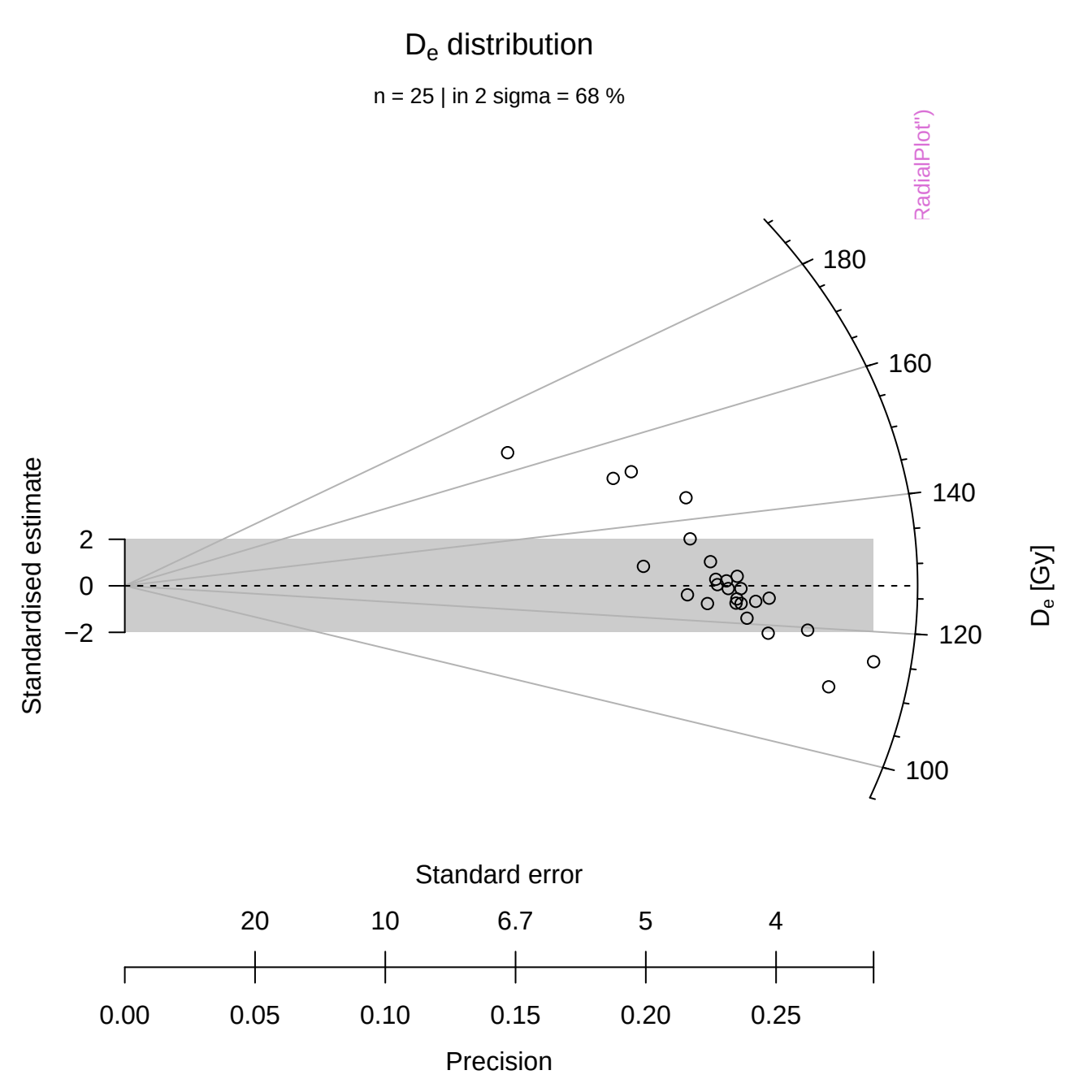


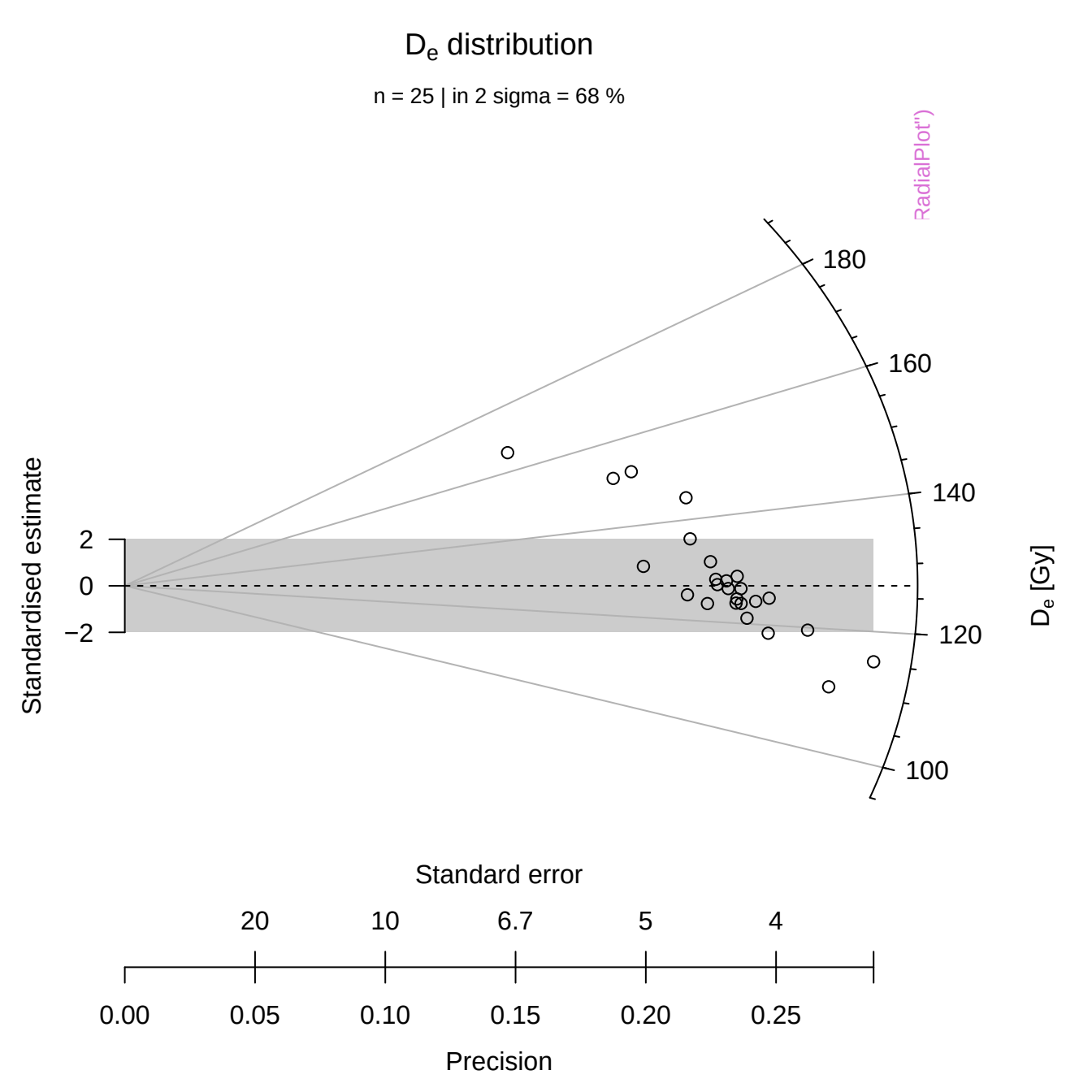
help("plot_RLum.Results")

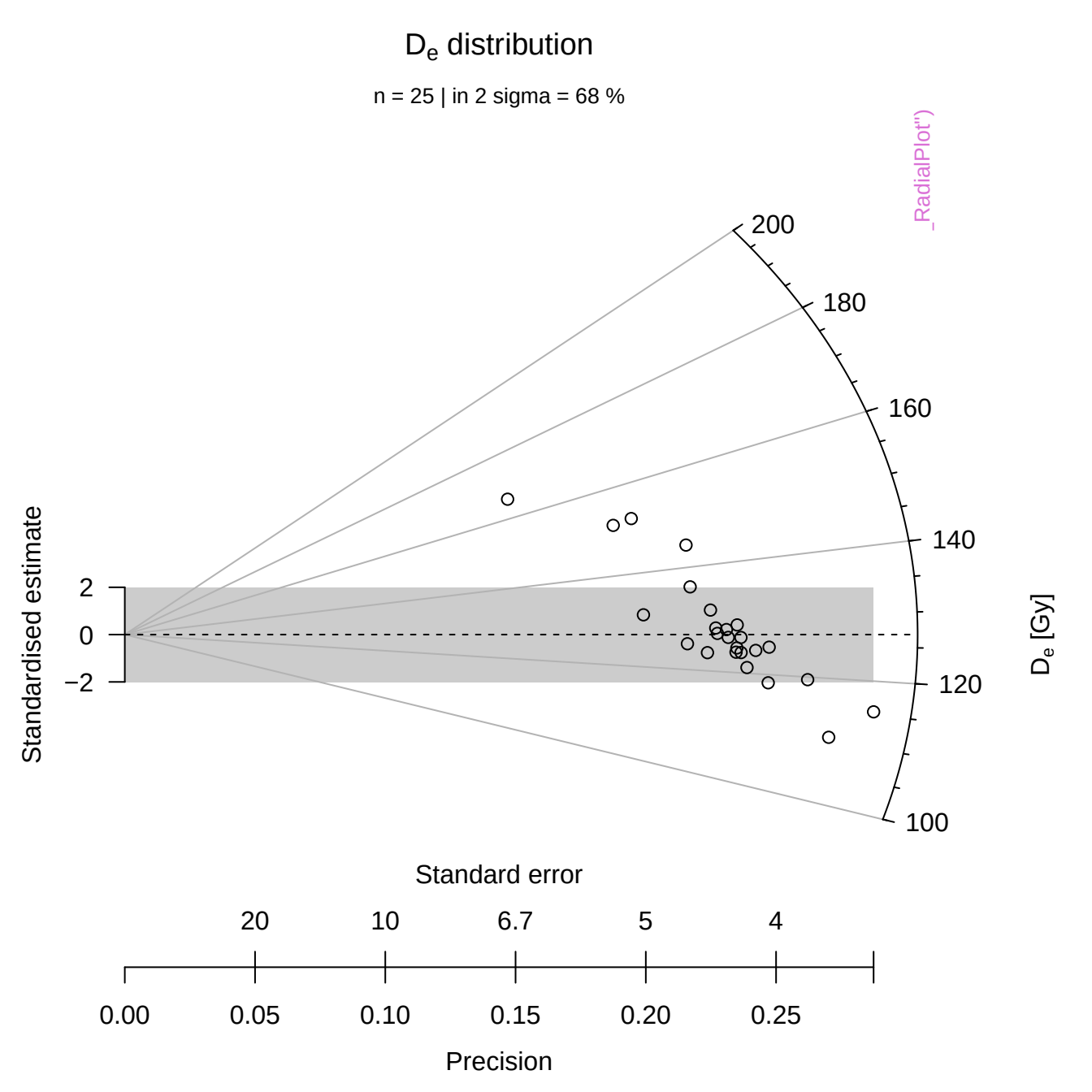


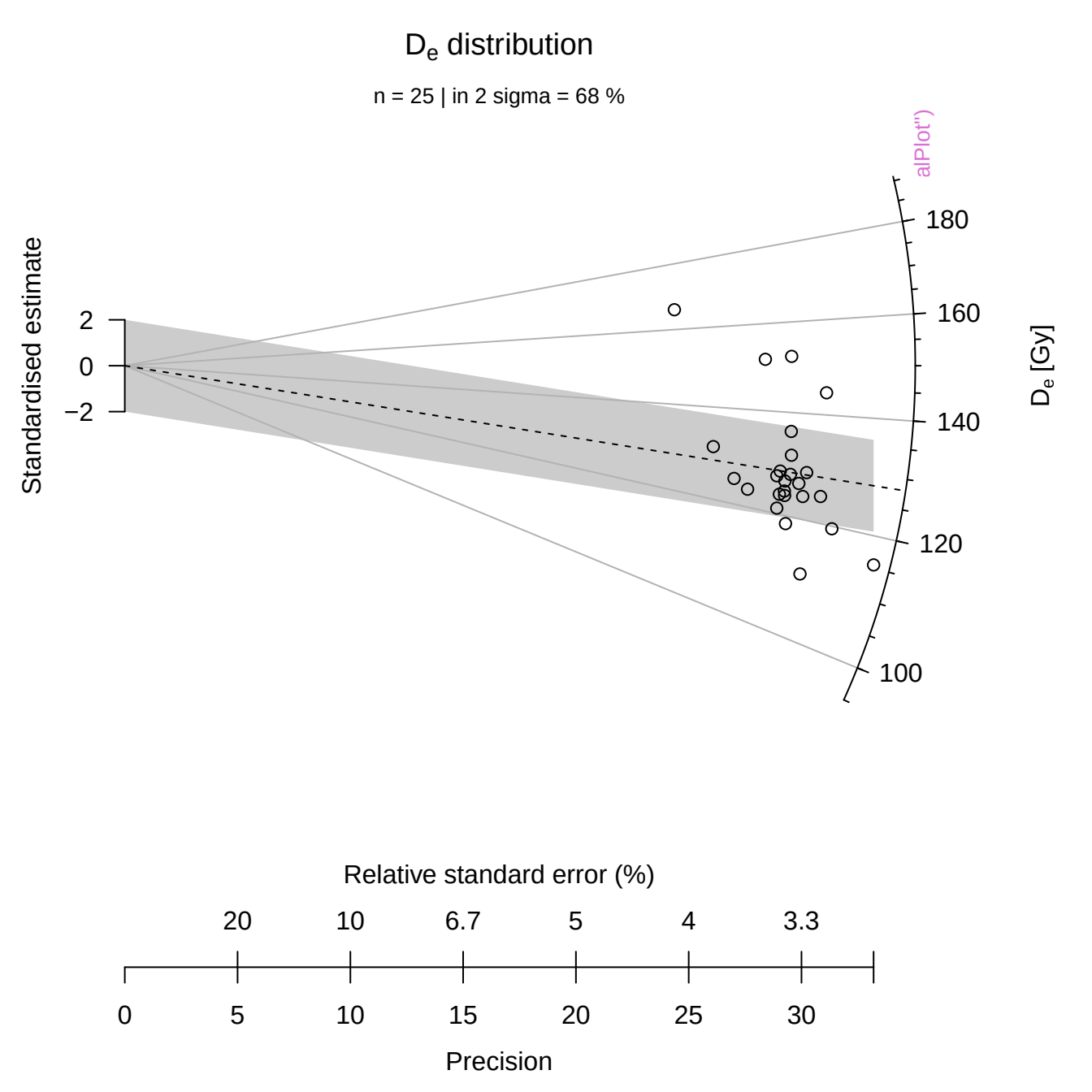

Monte Carlo Simulation
$n = \ | \hat{\mu} = 45 \ | \ \hat{\sigma} = 21 \ | \ \frac{\hat{\sigma}}{\sqrt{n}} = 2 \ | \ v = 0.84$
mean
median
0.05 / 0.95 quantile
help("plot_RLum.Results")
Density
0.000
0.005
0.010
0.015
0.020
20
40
60
80
100
120
Amount of grains on aliquot

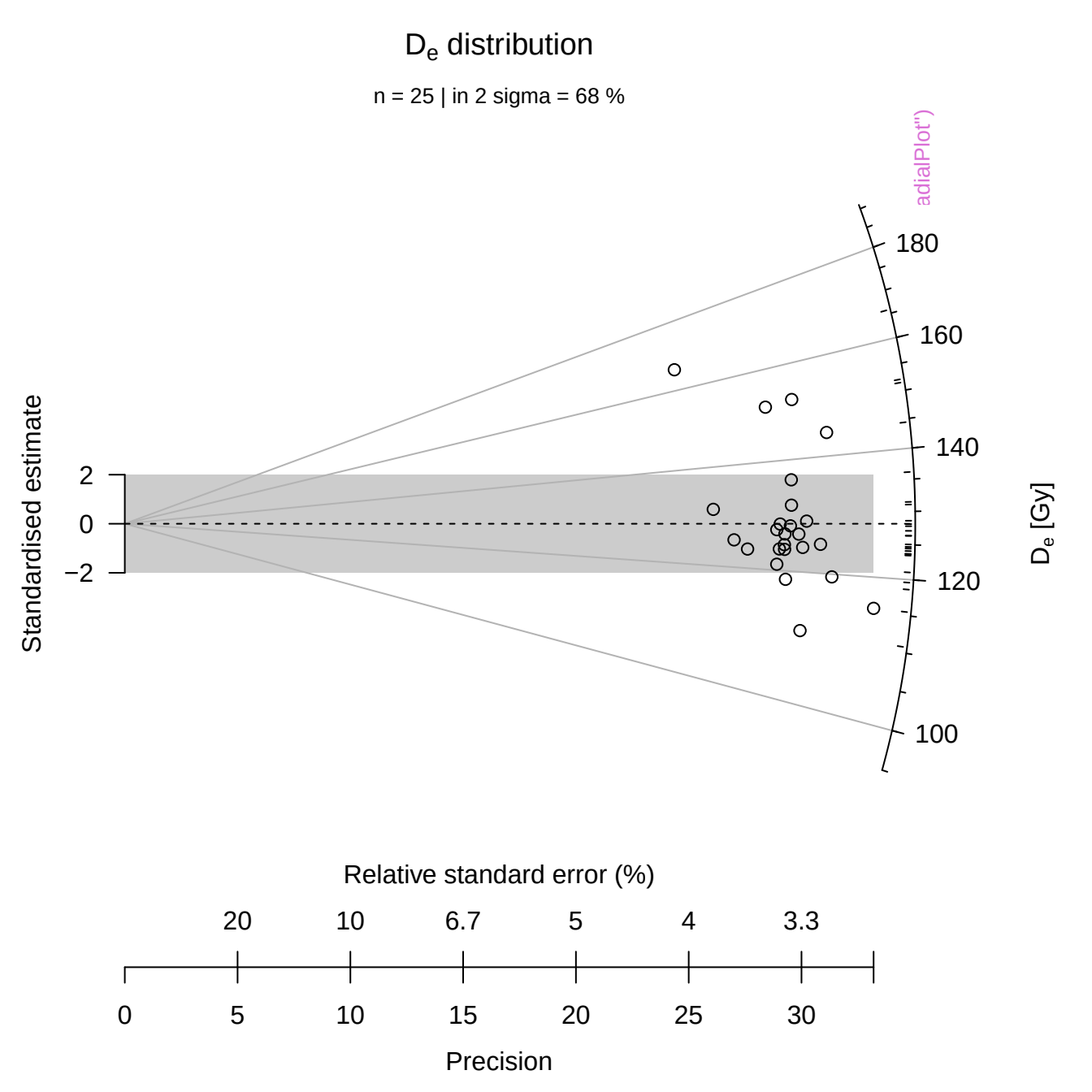

De distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

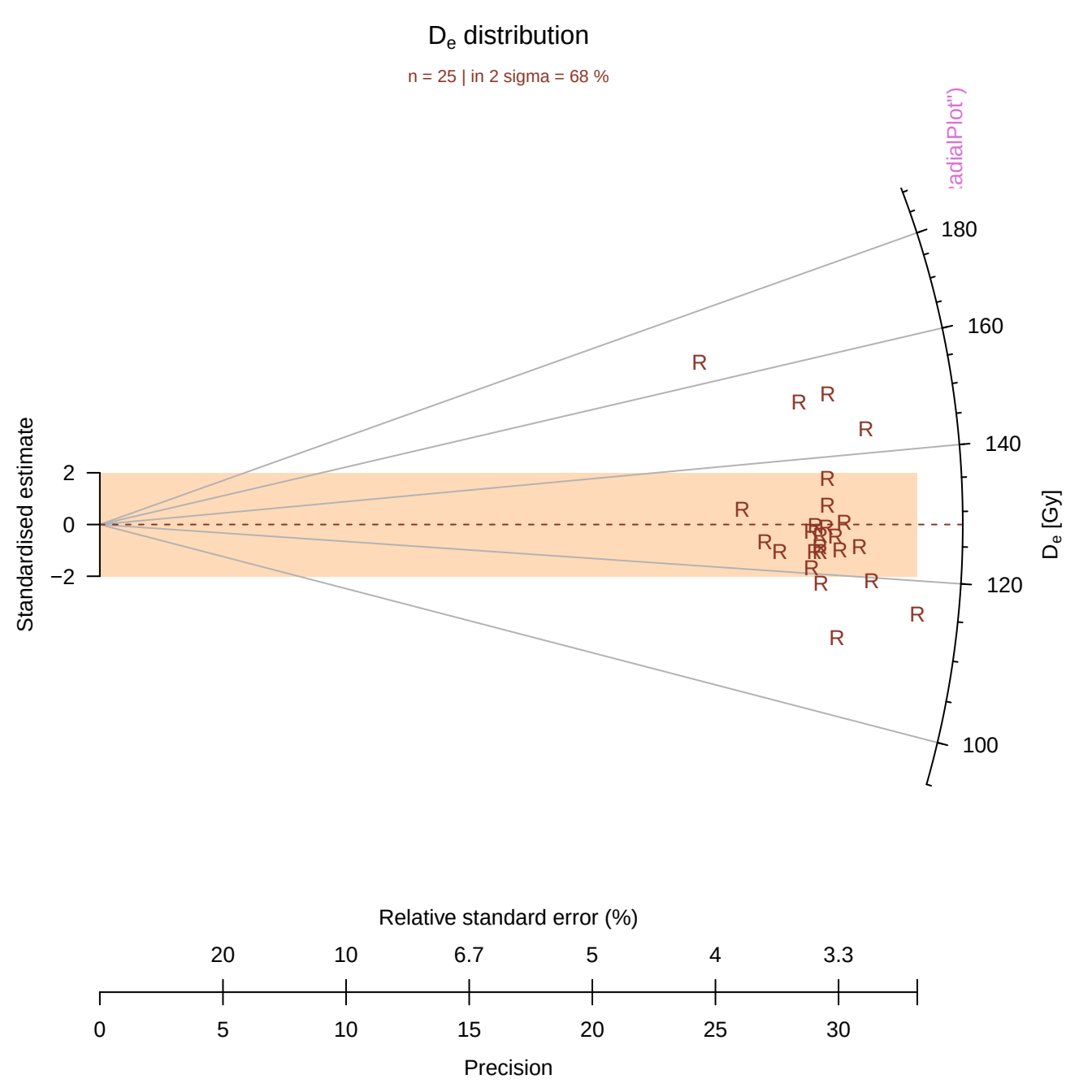

De distribution
n = 25 | in 2 sigma = 68 %
RadialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision

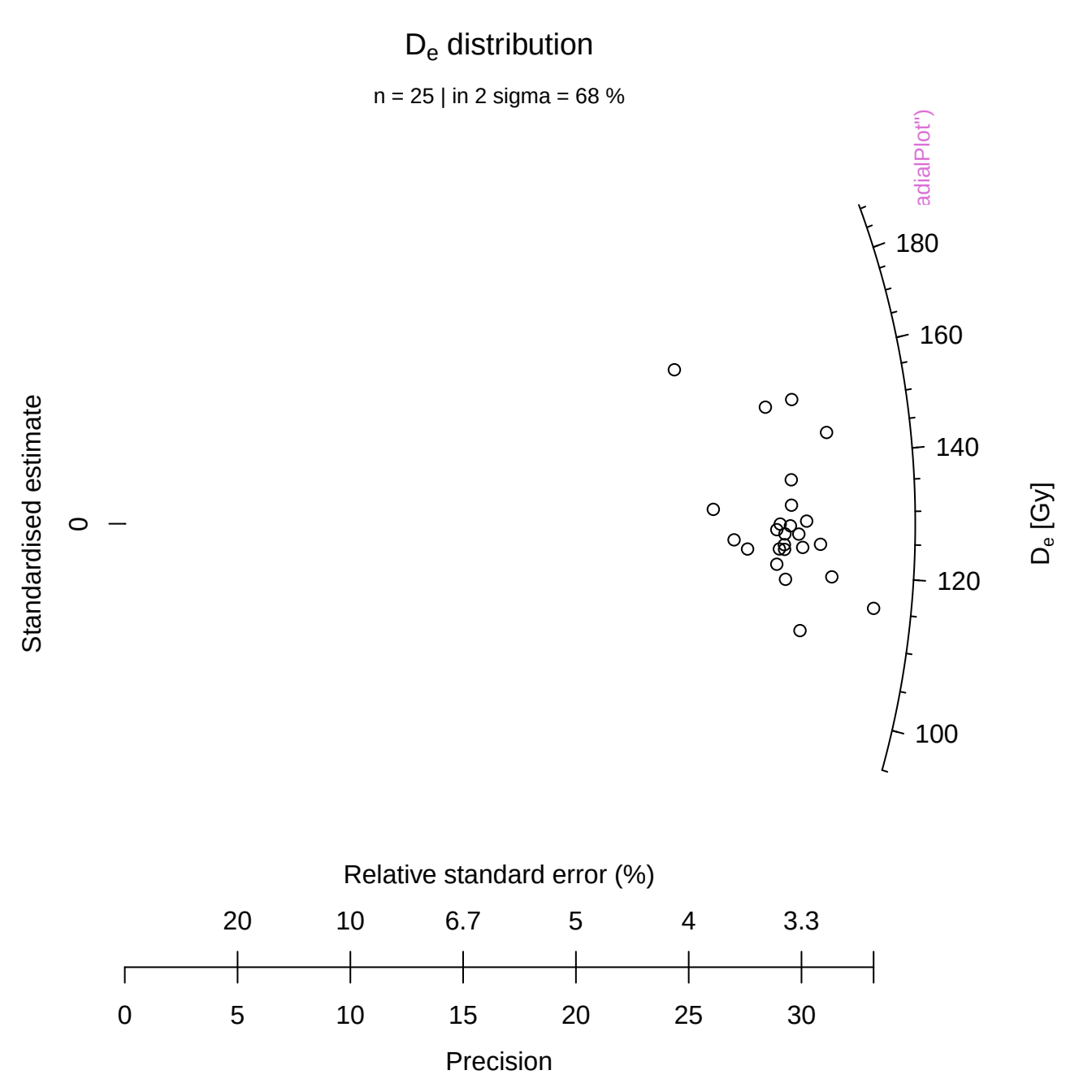

De distribution
n = 25 | in 2 sigma = 68 %
RadialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision

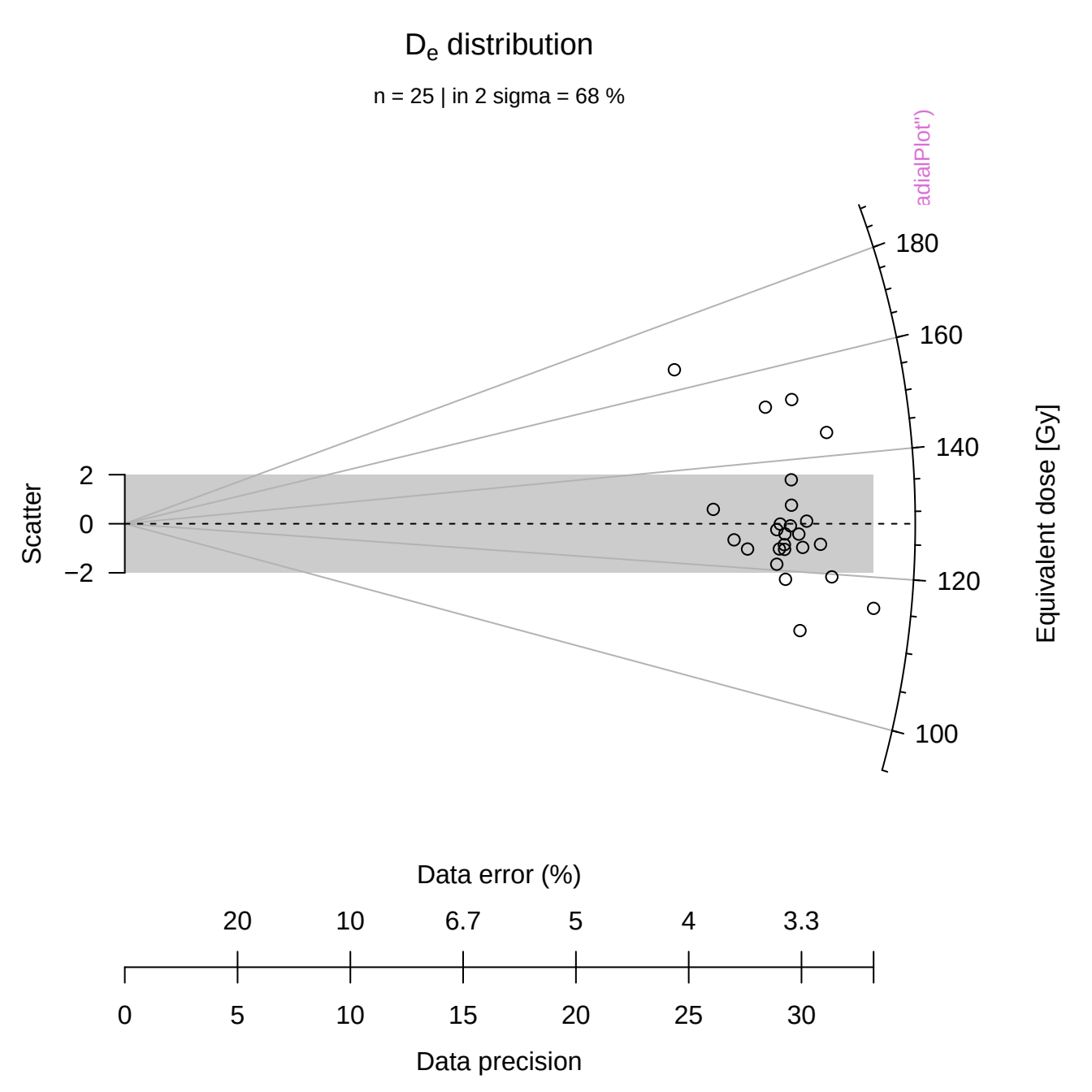

De distribution
n = 25 | in 2 sigma = 68 %
_RadialPlot")
200
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision

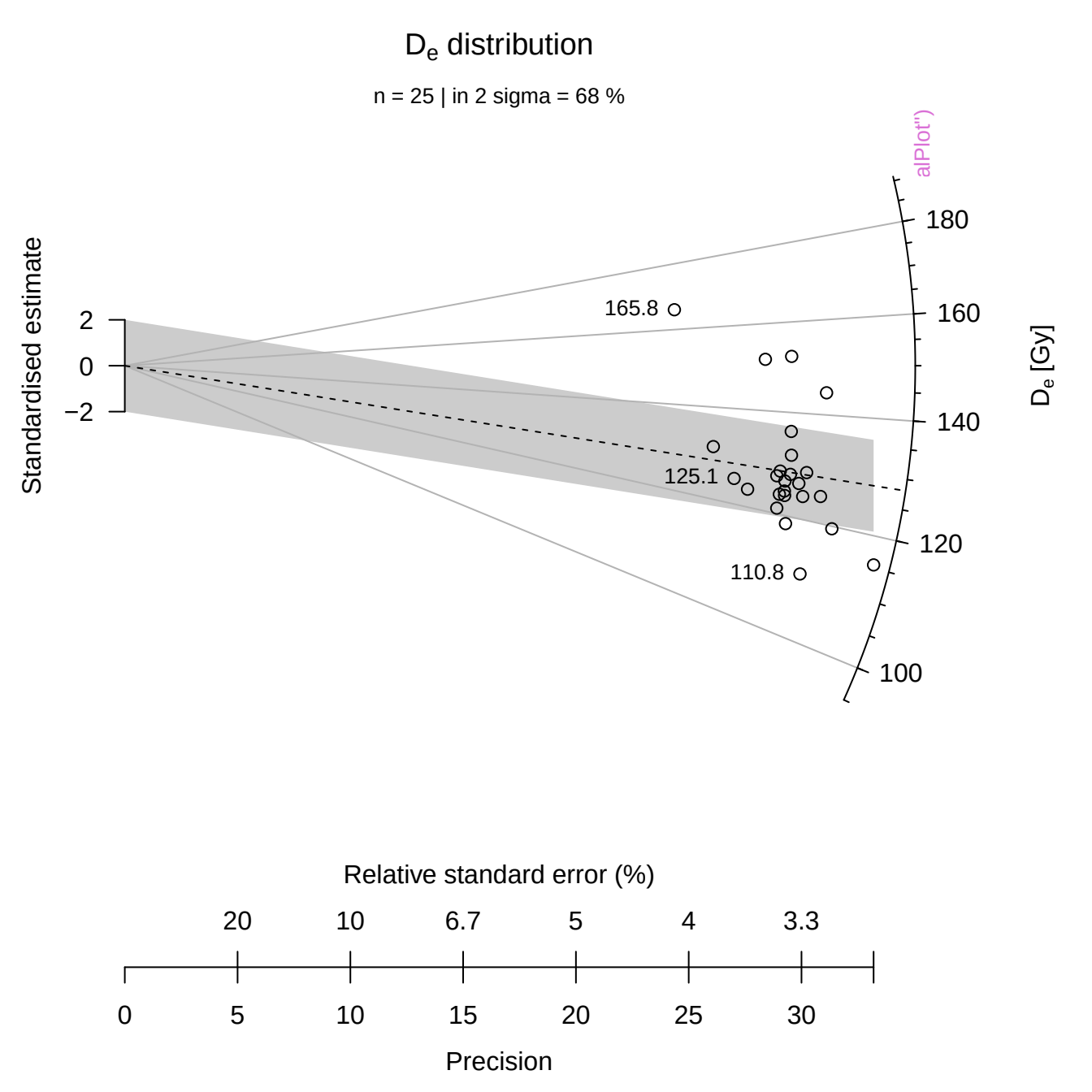

De distribution
n = 25 | in 2 sigma = 68 %
Standardised estimate
2
0
−2
De [Gy]
180
160
140
120
100
alPlot")
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

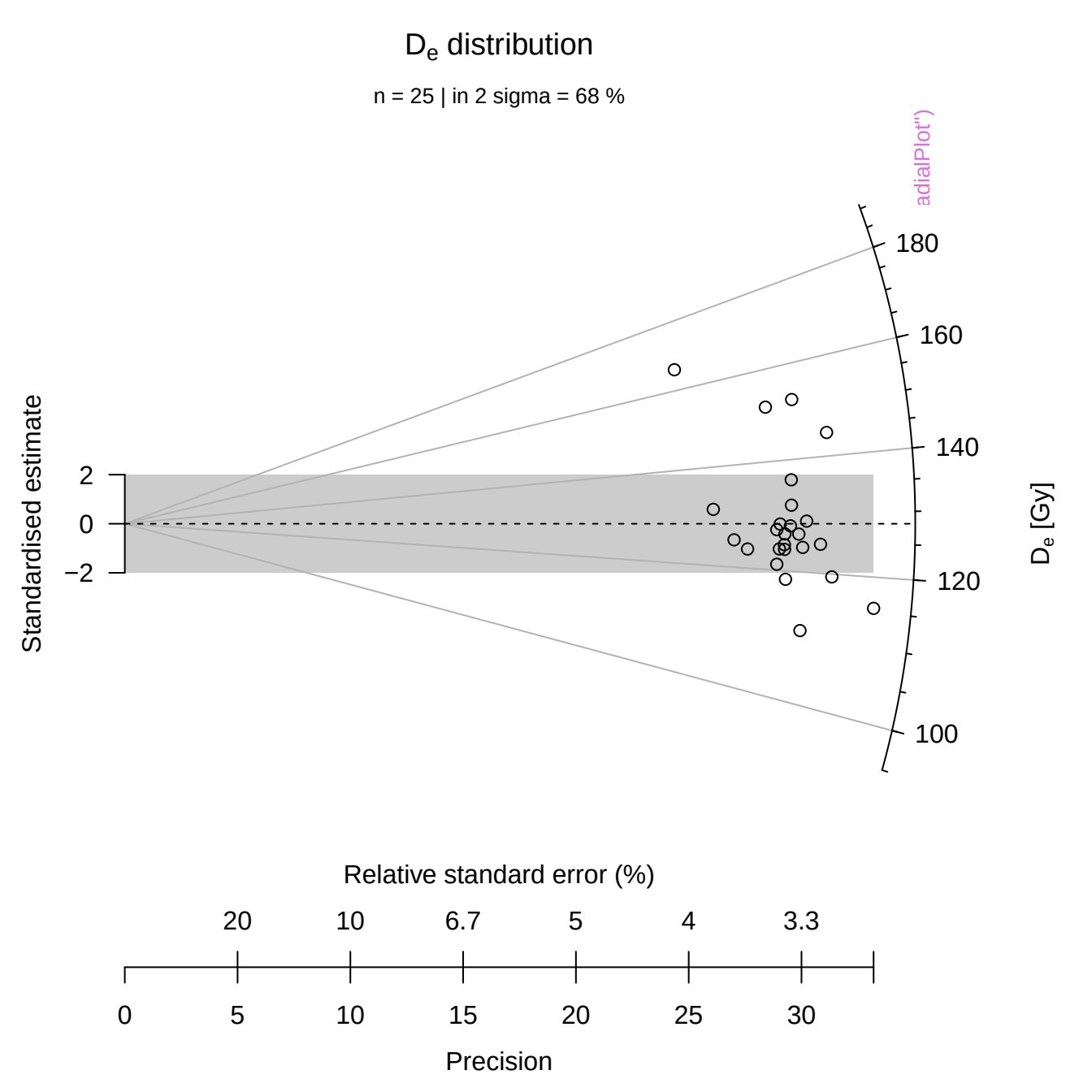

De distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

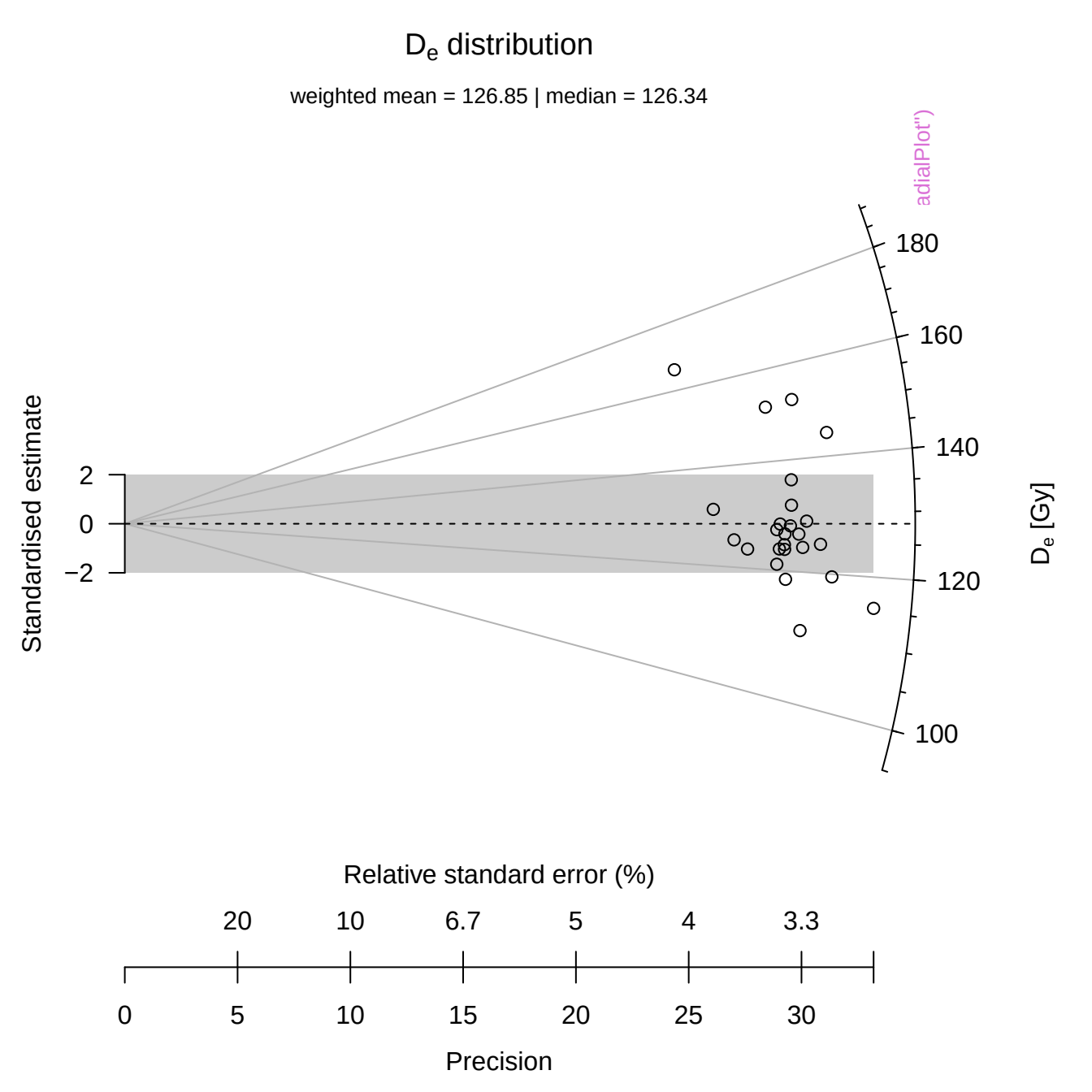

De distribution
n = 25 | in 2 sigma = 68 %
'radialPlot')
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

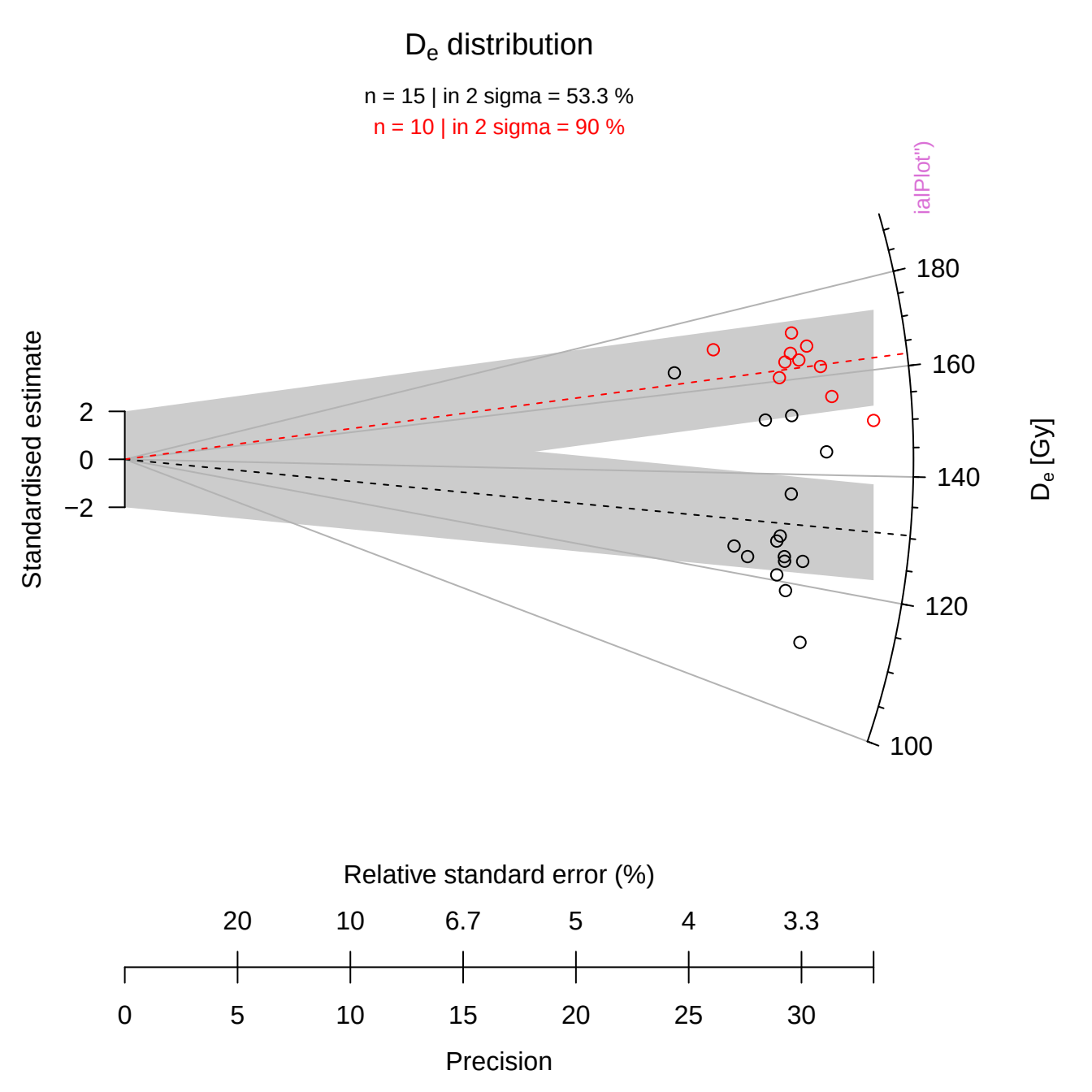

De distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
0
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

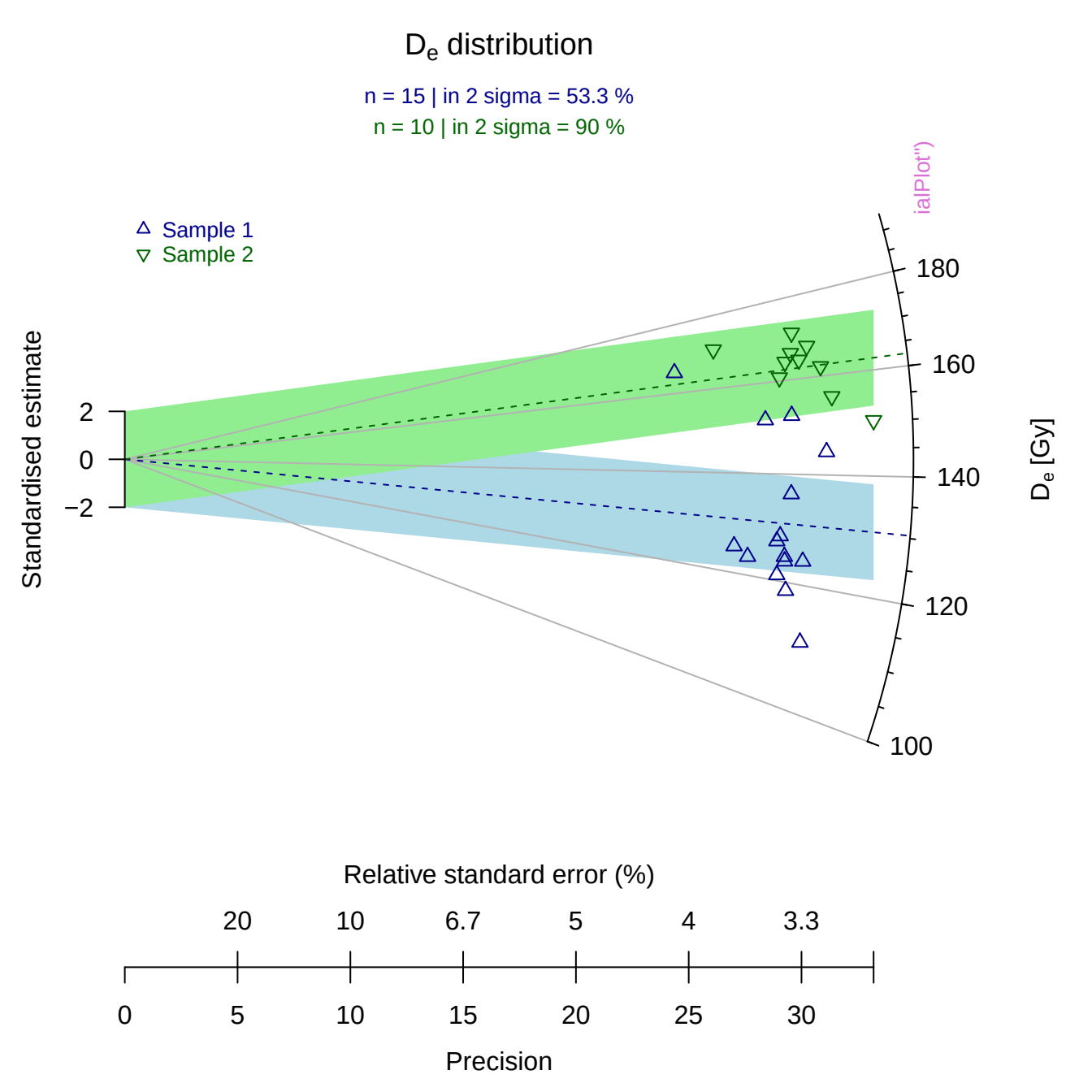

De distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
180
160
140
120
100
Equivalent dose [Gy]
Scatter
2
0
−2
Data error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Data precision

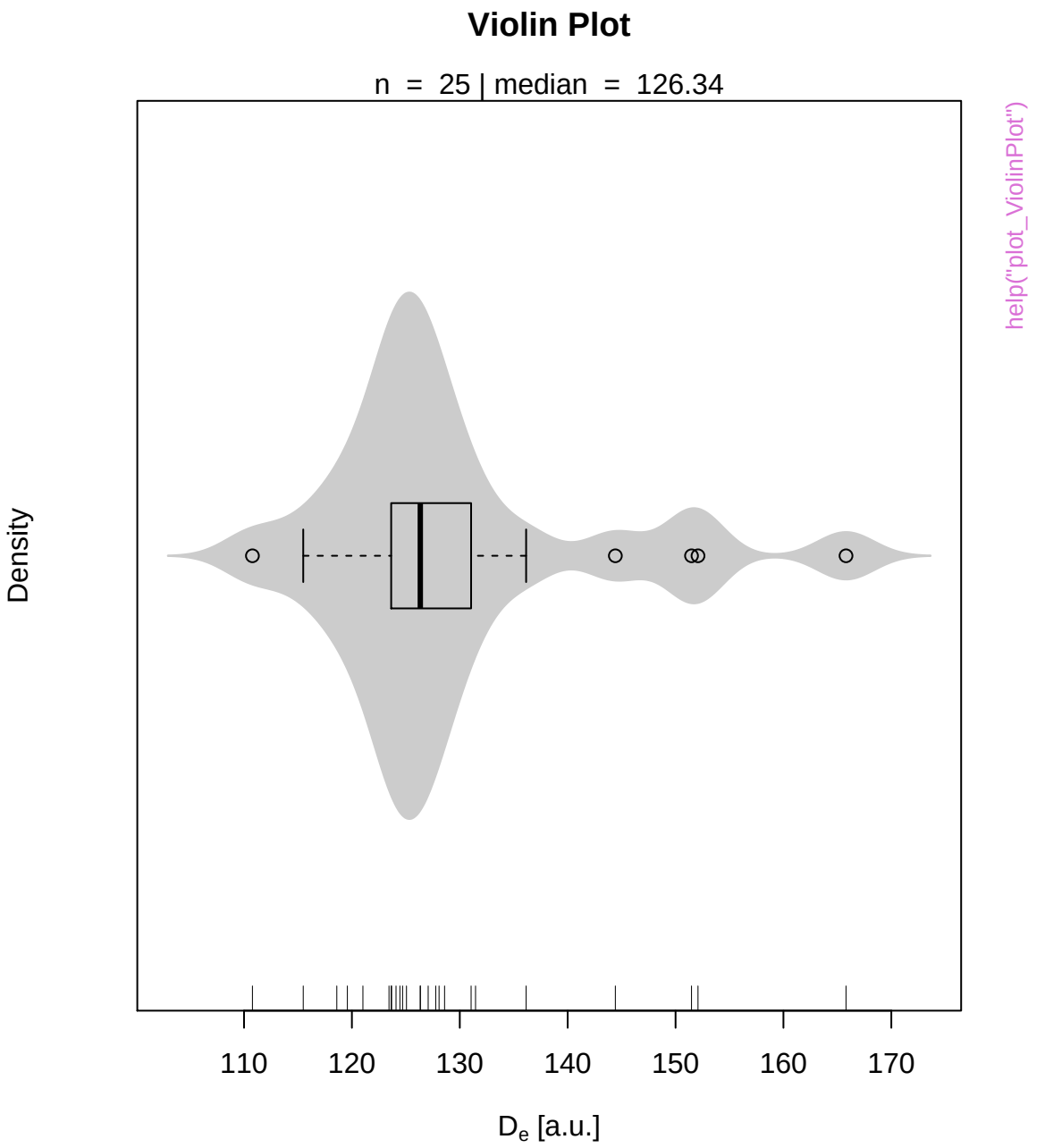

De distribution
n = 25 | in 2 sigma = 68 %
Standardised estimate
2
0
−2
165.8
125.1
110.8
180
160
140
120
100
De [Gy]
alPlot")
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

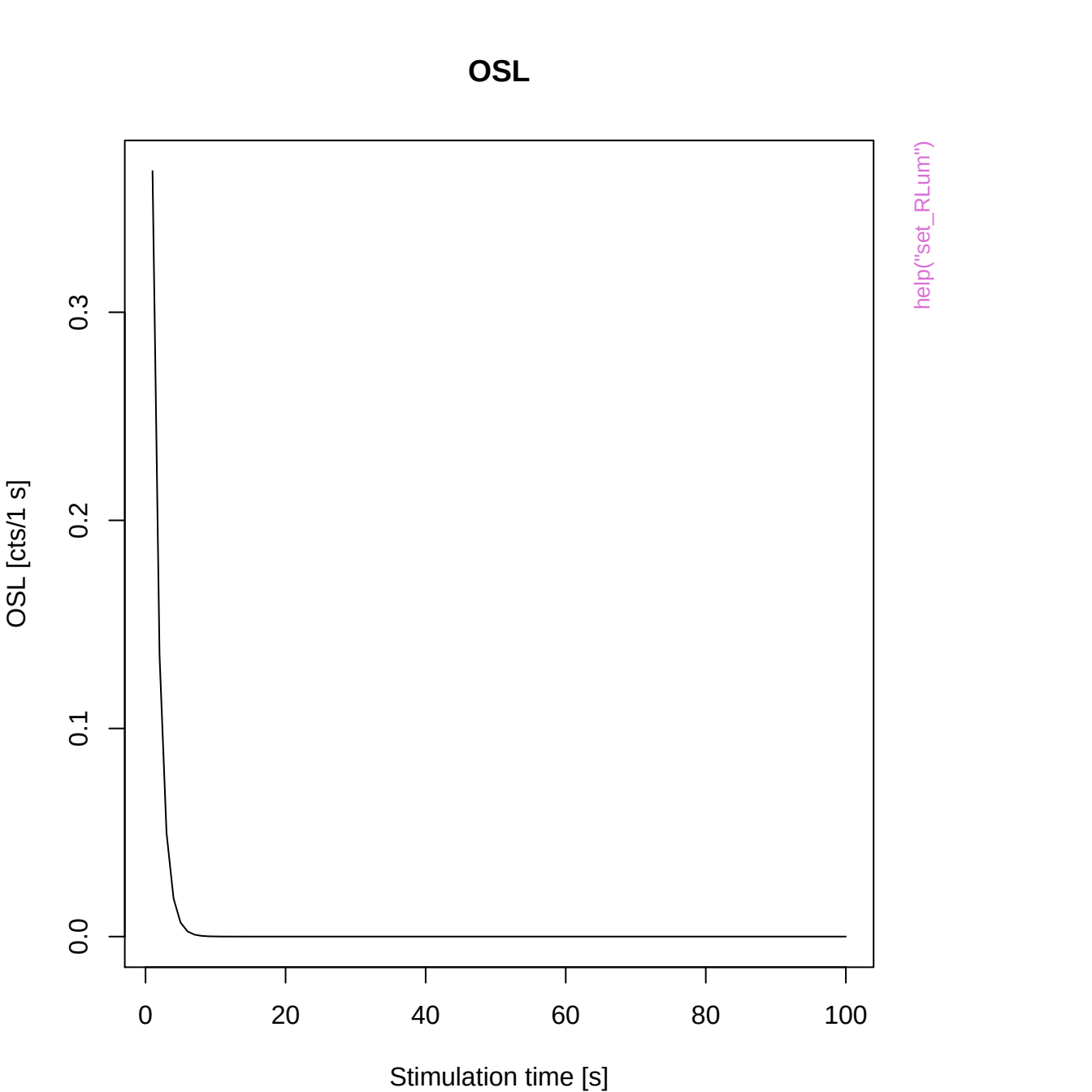

De distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

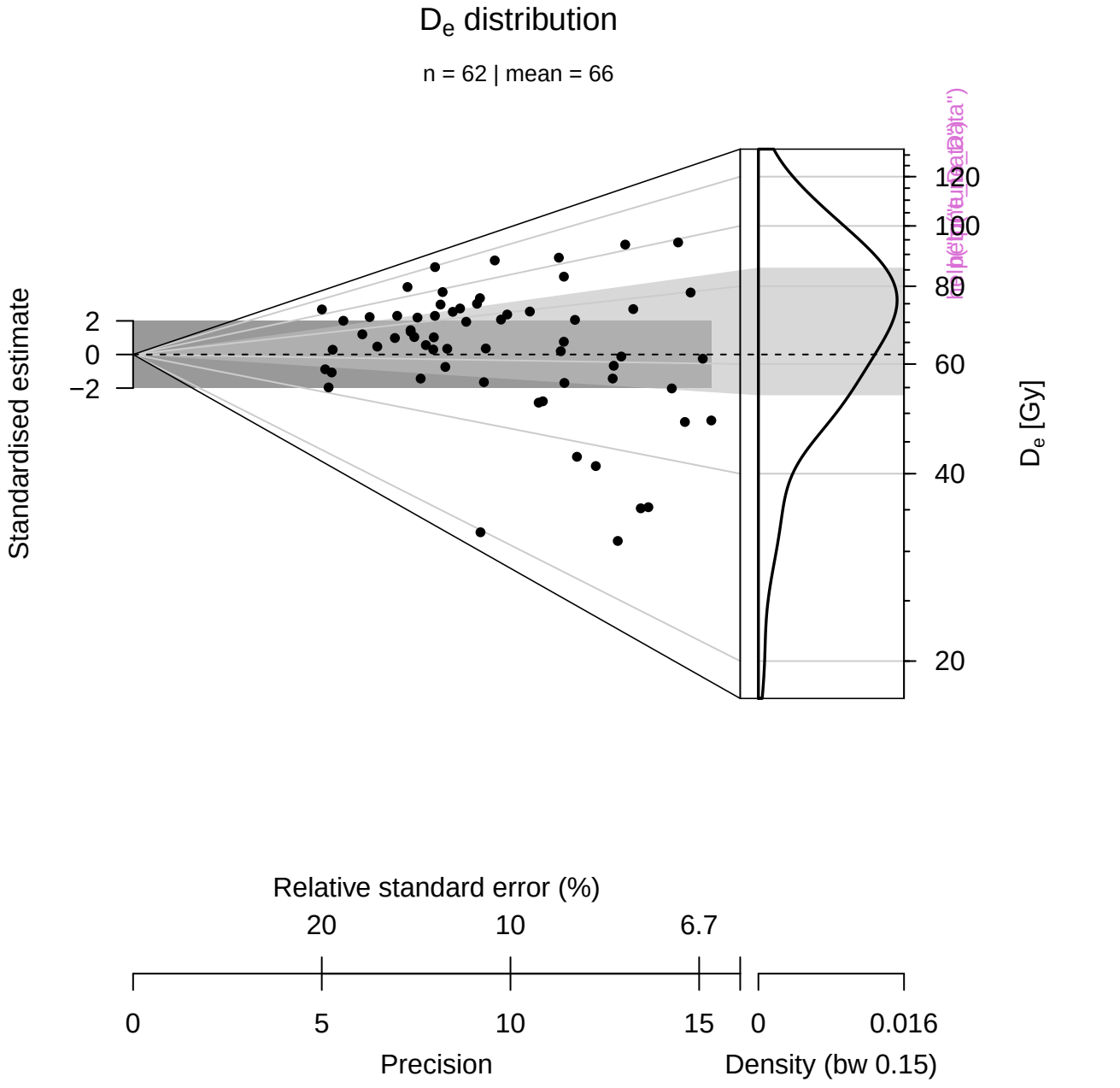

De distribution
weighted mean = 126.85 | median = 126.34
adialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

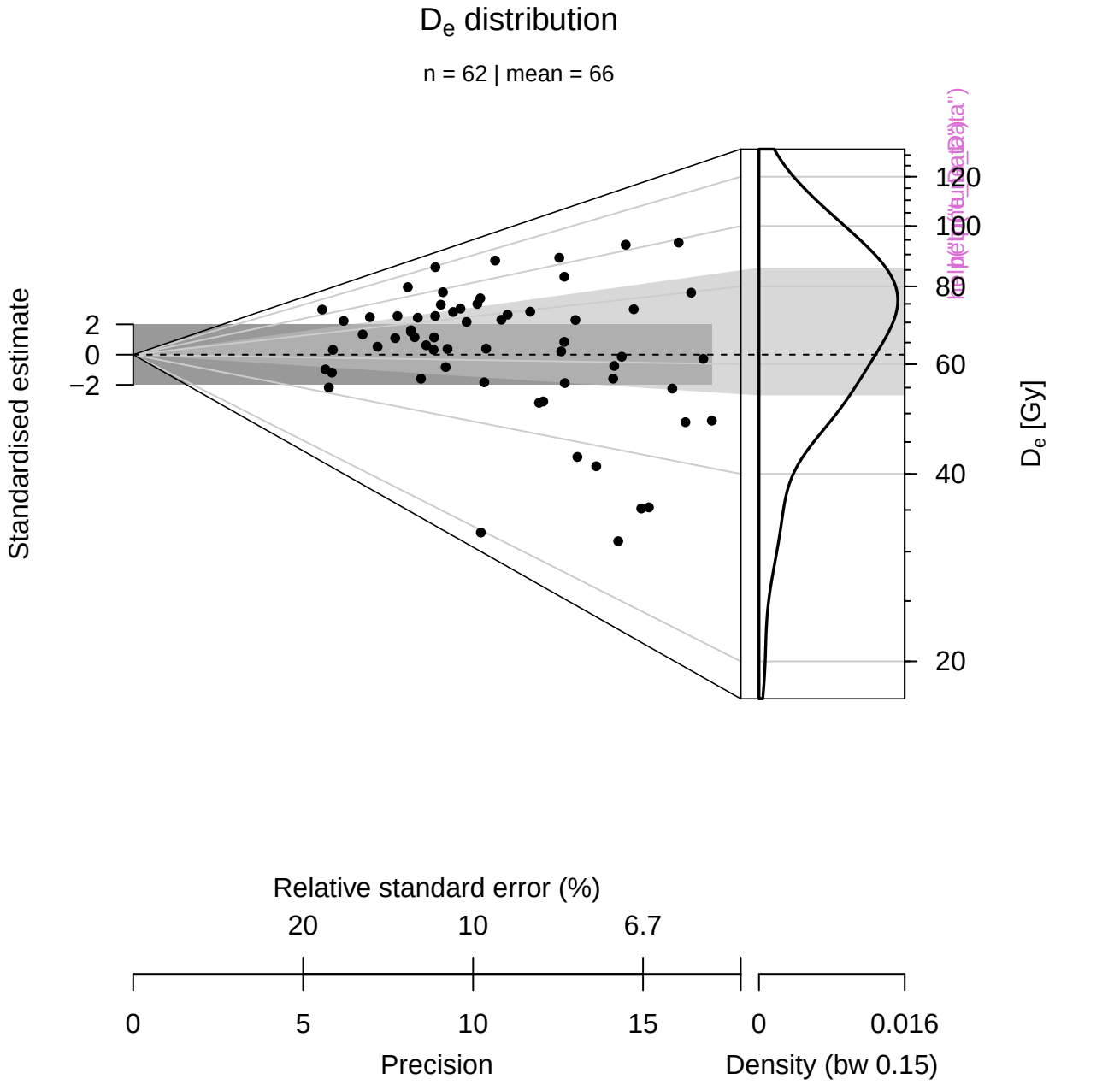

De distribution
n = 15 | in 2 sigma = 53.3 %
n = 10 | in 2 sigma = 90 %
ialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
De [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision


D$_e$ distribution
n = 15 | in 2 sigma = 53.3 %
n = 10 | in 2 sigma = 90 %
Sample 1
Sample 2
Standardised estimate
2
0
−2
180
160
140
120
100
D$_e$ [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision


Violin Plot
n = 25 | median = 126.34
help("plot_ViolinPlot")
Density
110
120
130
140
150
160
170
De [a.u.]


OSL
OSL [cts/1 s]
0.0
0.1
0.2
0.3
0
20
40
60
80
100
Stimulation time [s]
help("set_RLum")


De distribution
n = 62 | mean = 66
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


De distribution
n = 62 | mean = 66
Standardised estimate
2
0
−2
De [Gy]
120
100
80
60
40
20
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)