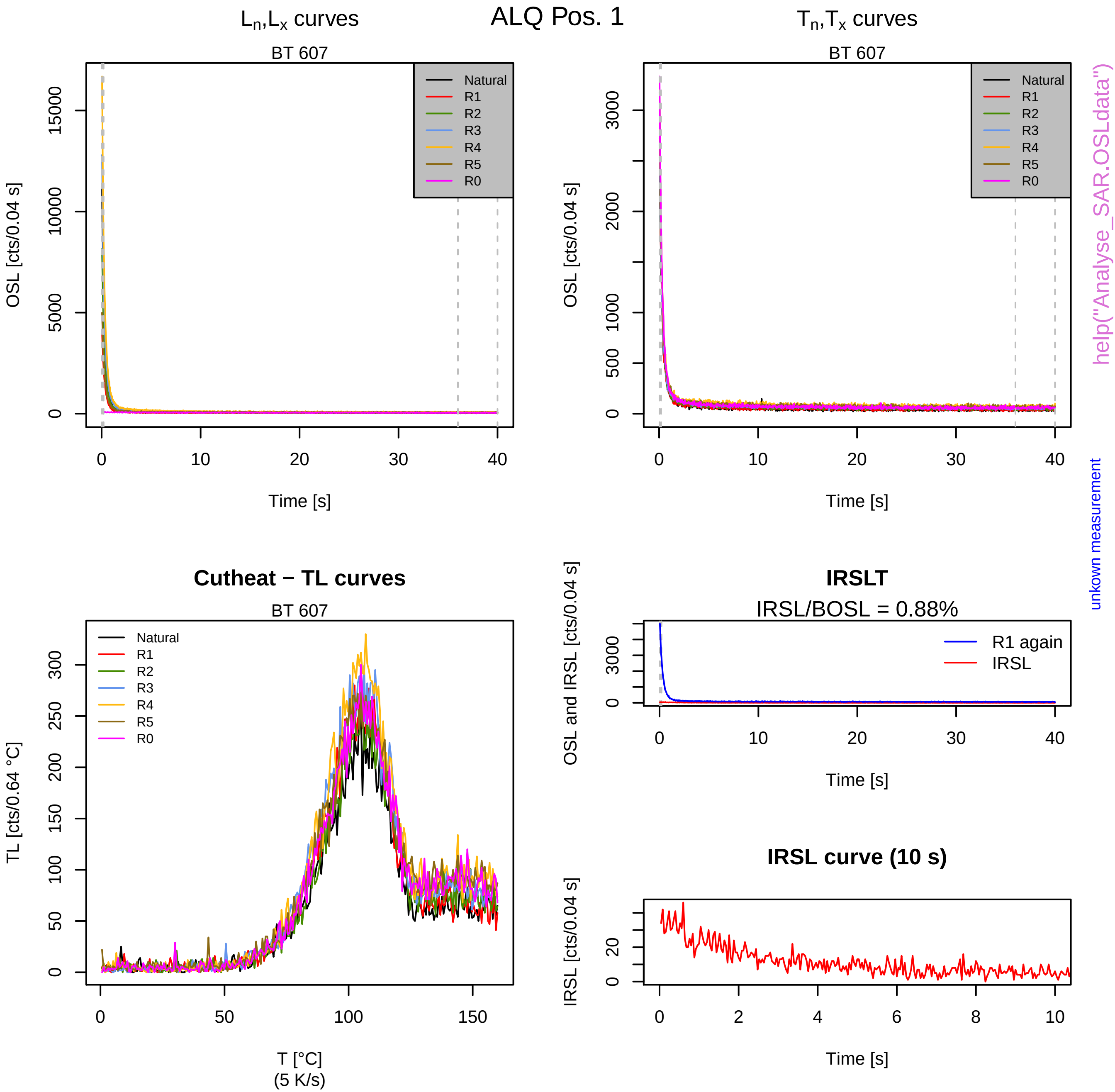
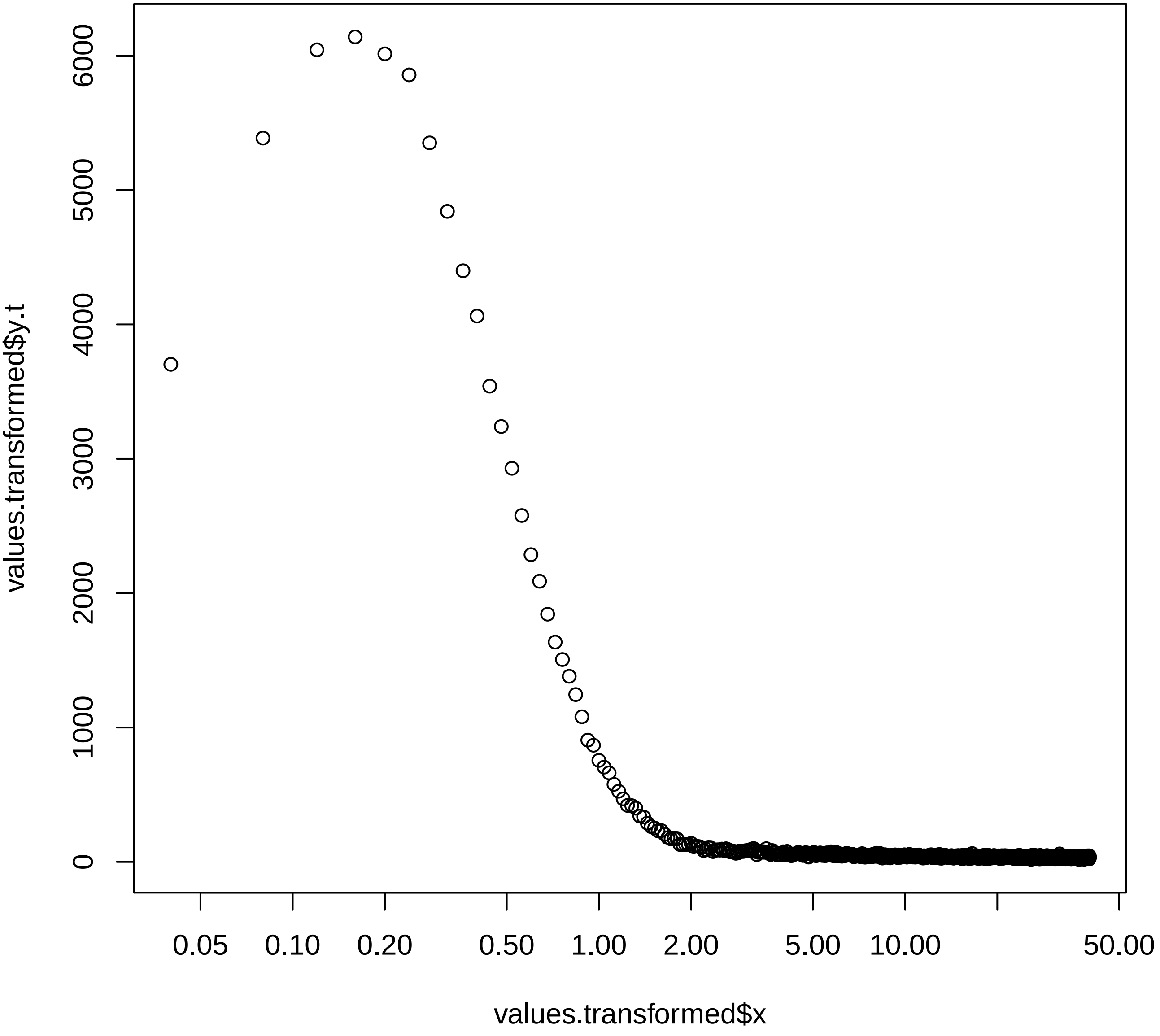

ALQ Pos. 1
Ln,Lx curves
BT 607
OSL [cts/0.04 s]
0
5000
10000
15000
Natural
R1
R2
R3
R4
R5
R0
0
10
20
30
40
Time [s]
Tn,Tx curves
BT 607
OSL [cts/0.04 s]
0
500
1000
2000
3000
Natural
R1
R2
R3
R4
R5
R0
0
10
20
30
40
Time [s]
help("Analyse_SAR.OSLdata")
unkown measurement
Cutheat − TL curves
BT 607
TL [cts/0.64 °C]
0
50
100
150
200
250
300
Natural
R1
R2
R3
R4
R5
R0
0
50
100
150
T [°C]
(5 K/s)
IRSLT
IRSL/BOSL = 0.88%
OSL and IRSL [cts/0.04 s]
0
3000
R1 again
IRSL
0
10
20
30
40
Time [s]
IRSL curve (10 s)
IRSL [cts/0.04 s]
0
20
0
2
4
6
8
10
Time [s]



help("CW2pHMi")

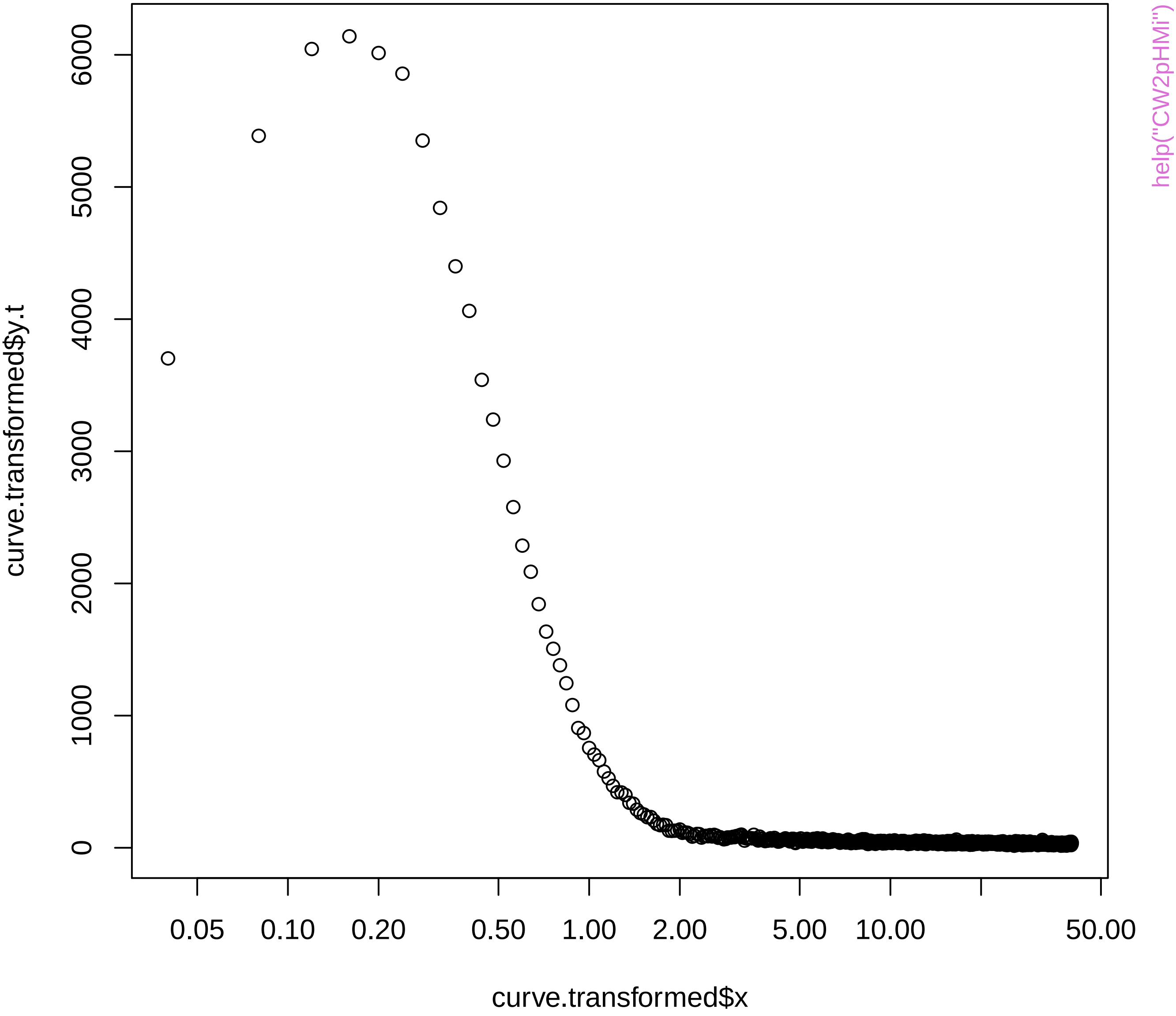
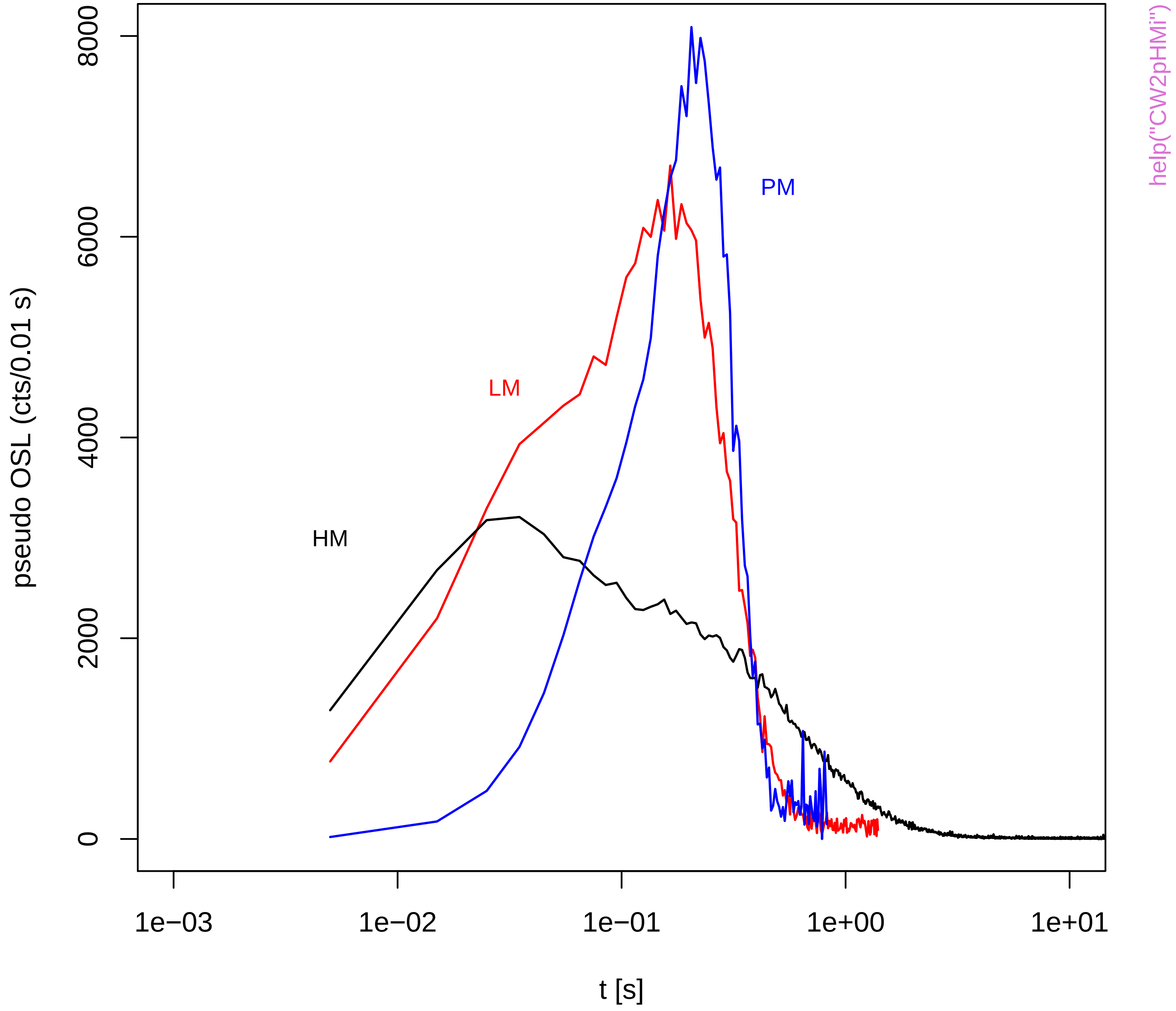
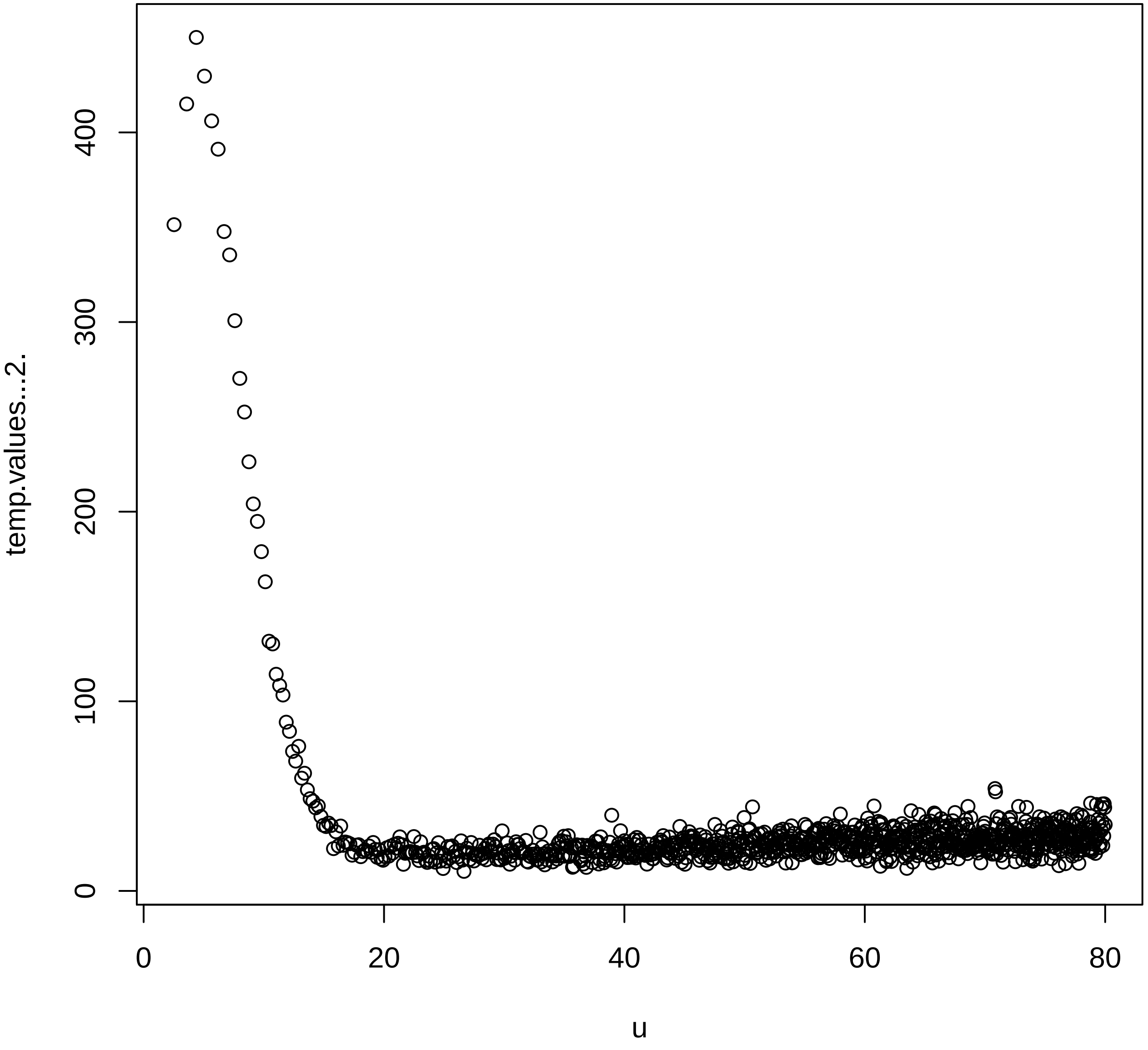
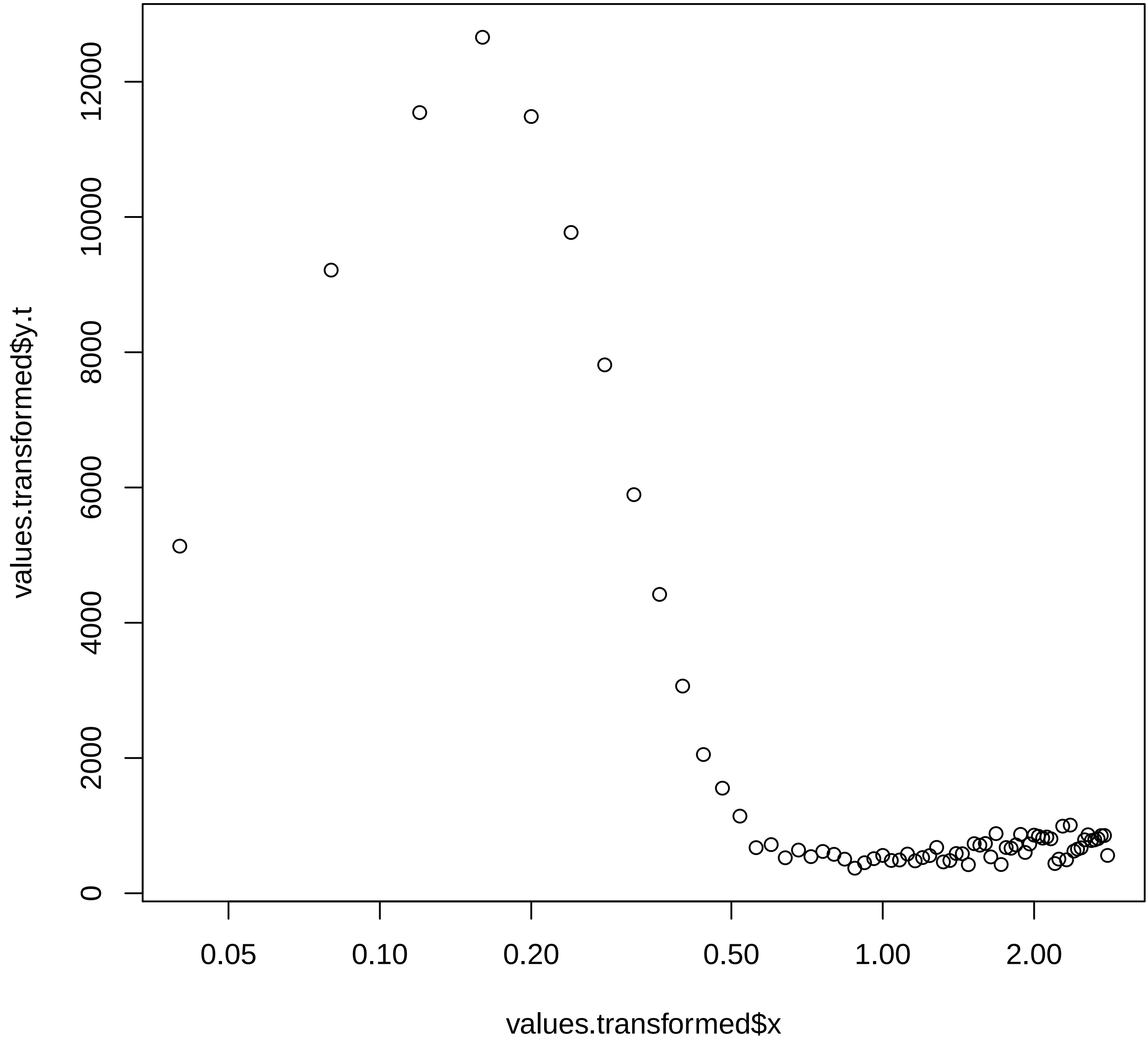

help("CW2pHMi")
6000
5000
4000
3000
2000
1000
0
curve.transformed$y.t
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
50.00
curve.transformed$x

Fig. 4 − Bos & Wallinga (2012)





help("CW2pLM")



help("CW2pLMi")

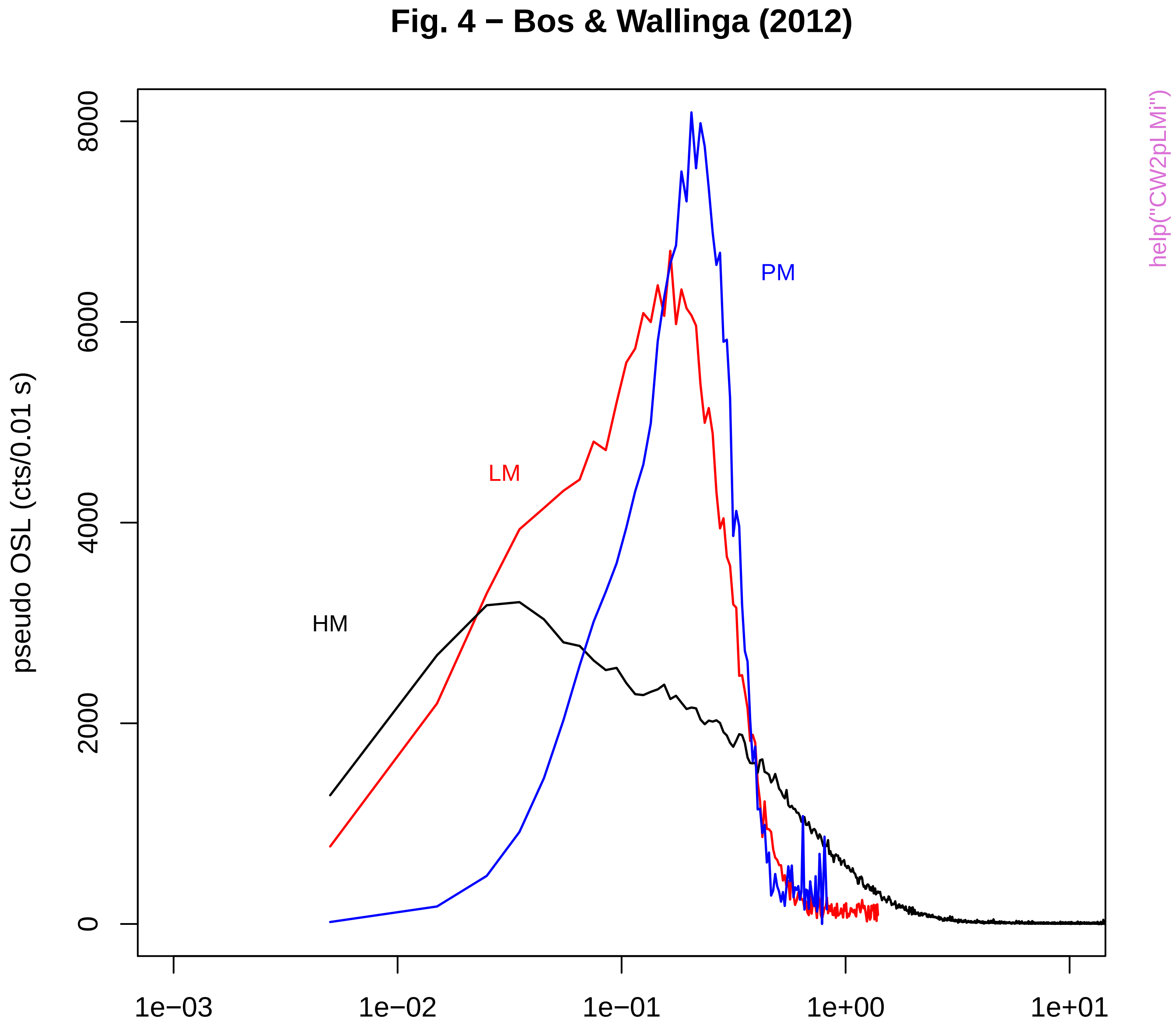


Fig. 4 − Bos & Wallinga (2012)
pseudo OSL (cts/0.01 s)
t [s]
0
2000
4000
6000
8000
1e−03
1e−02
1e−01
1e+00
1e+01
HM
LM
PM
help("CW2pLMi")

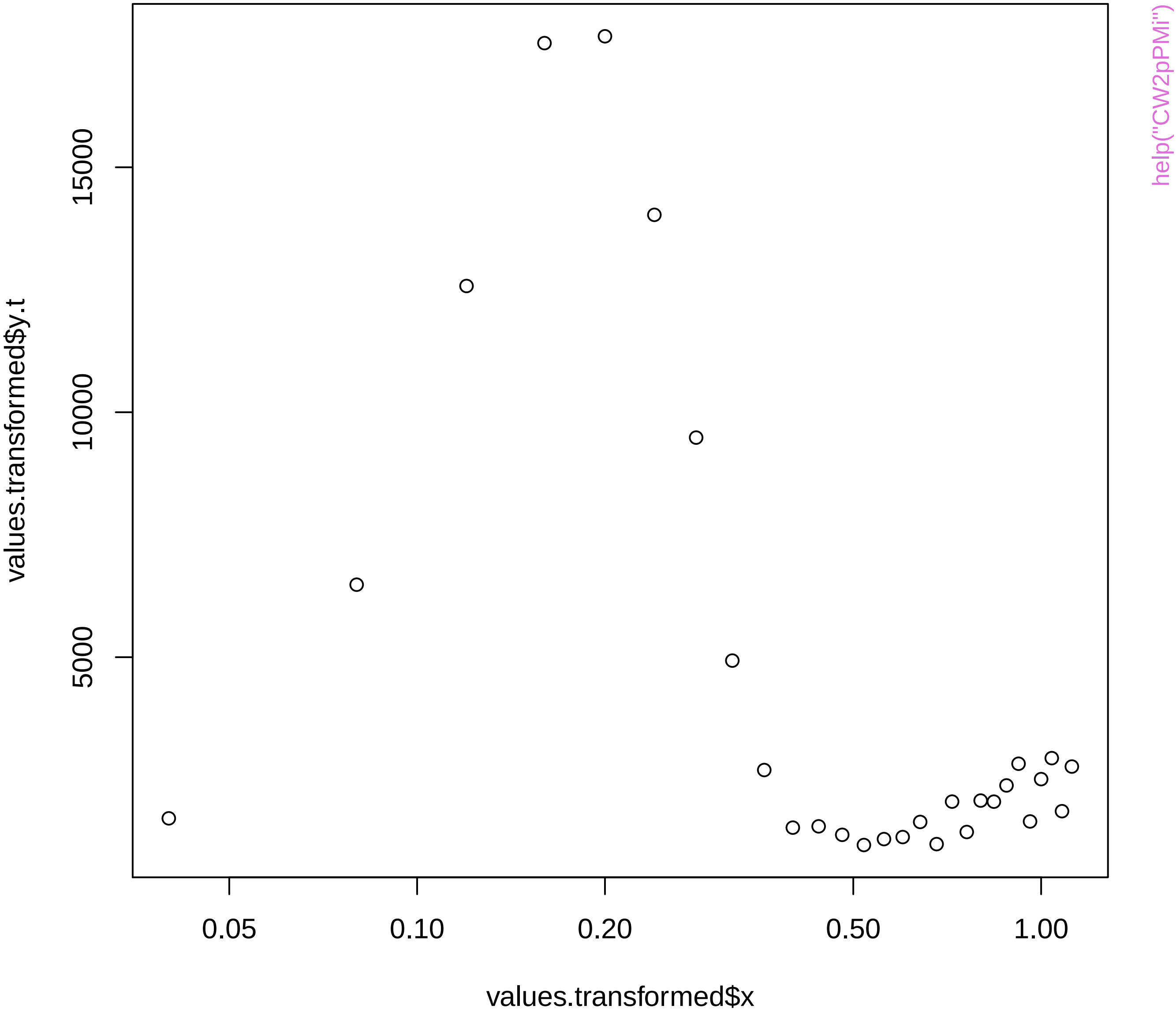
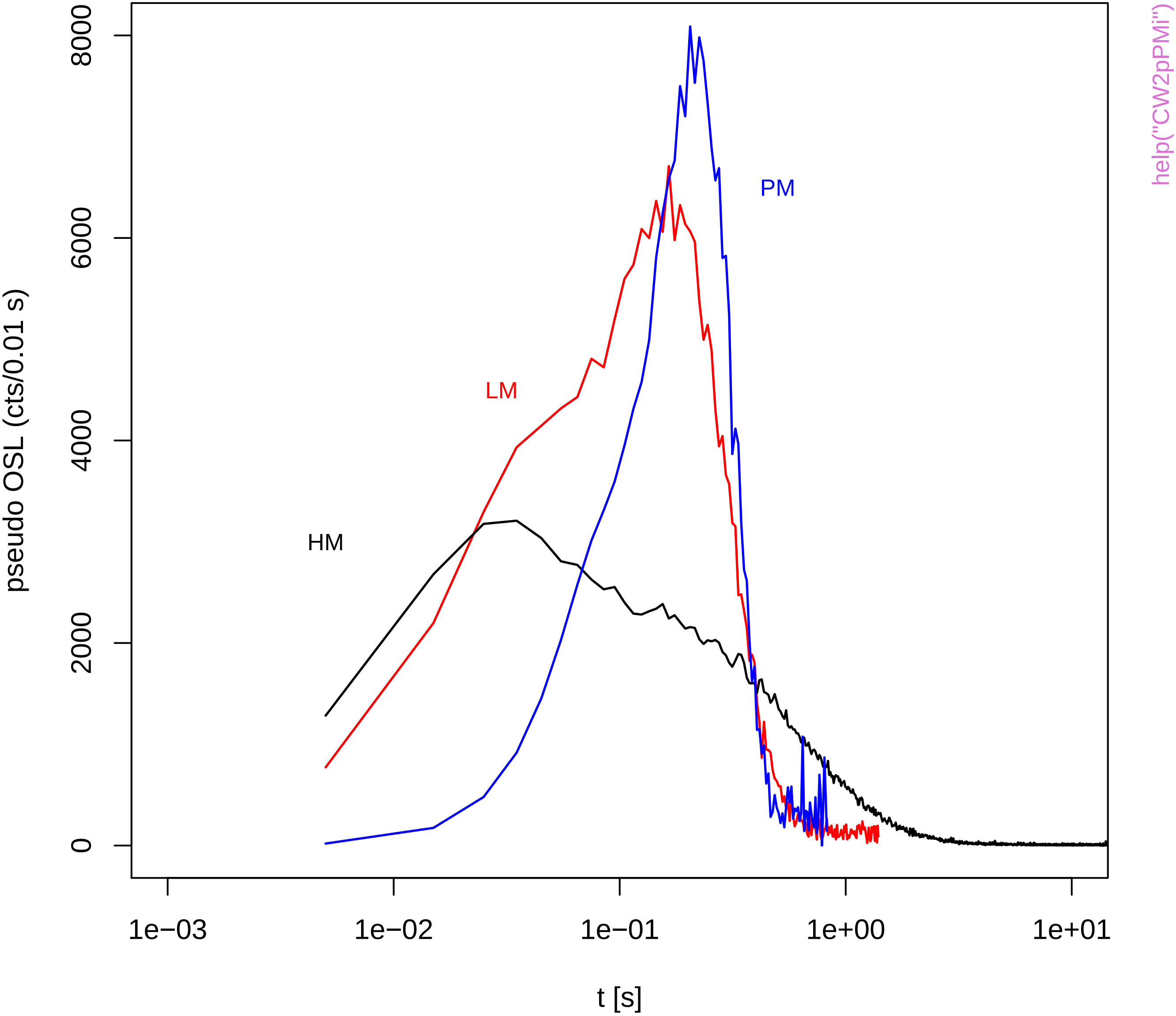
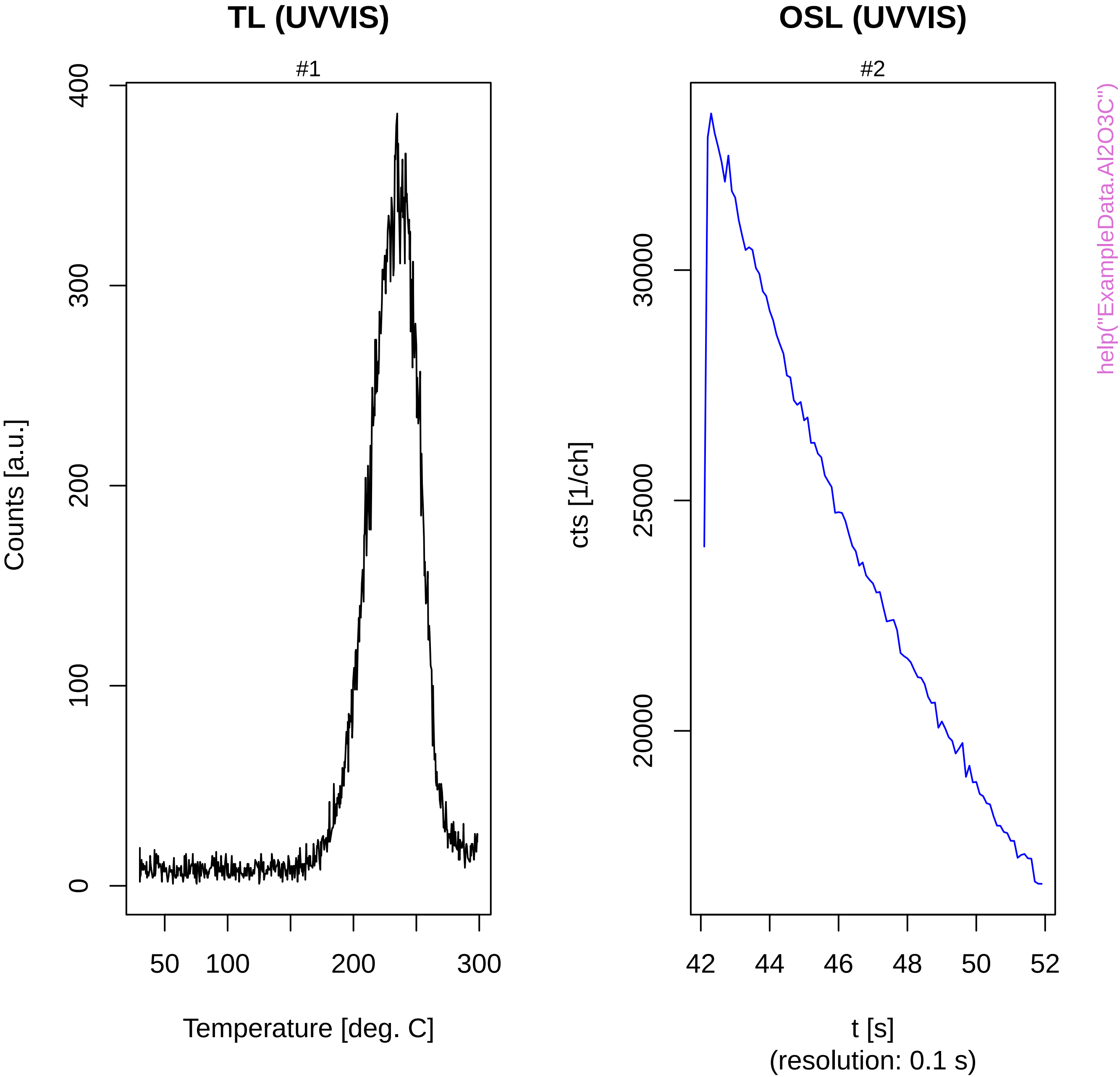
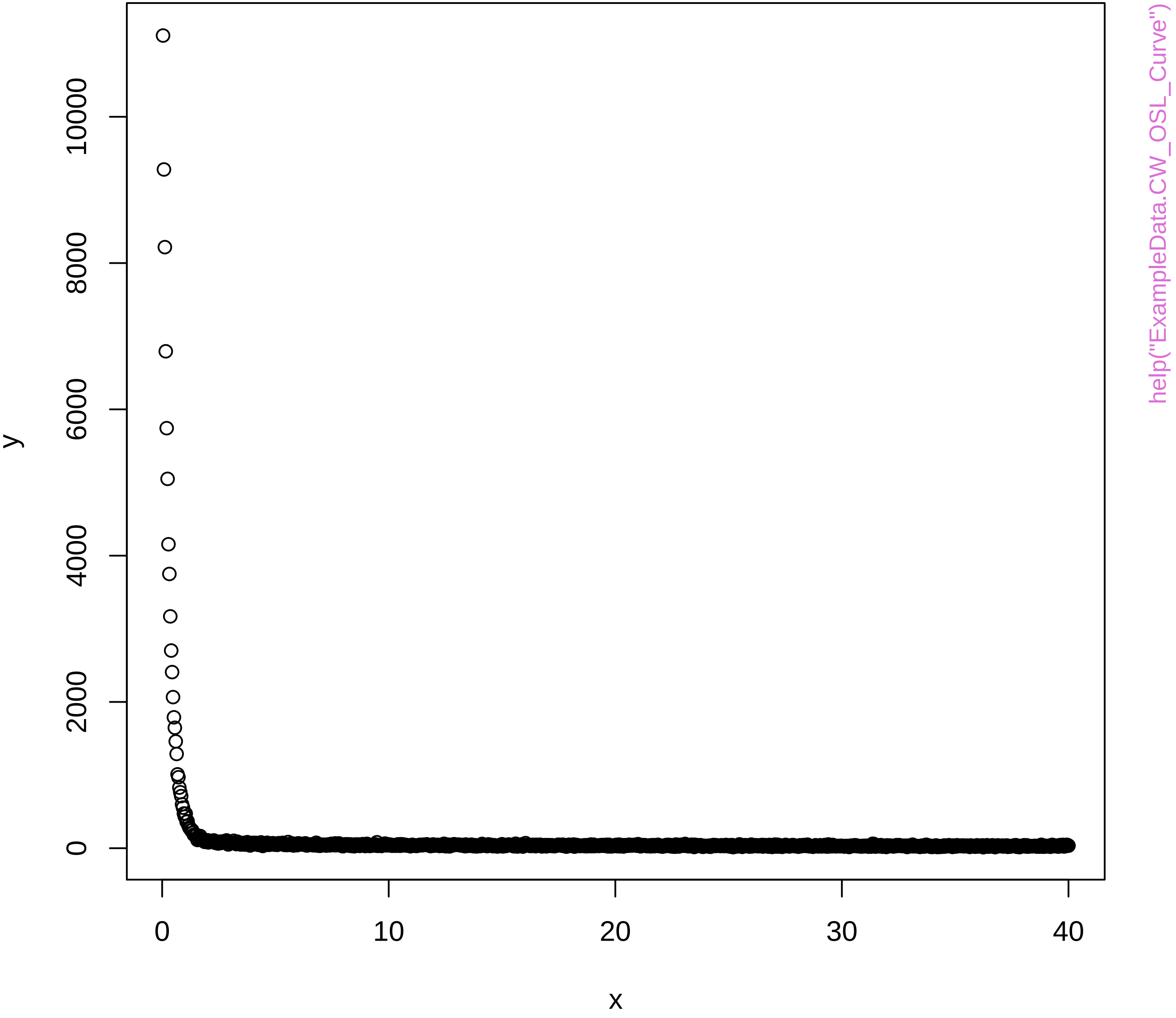
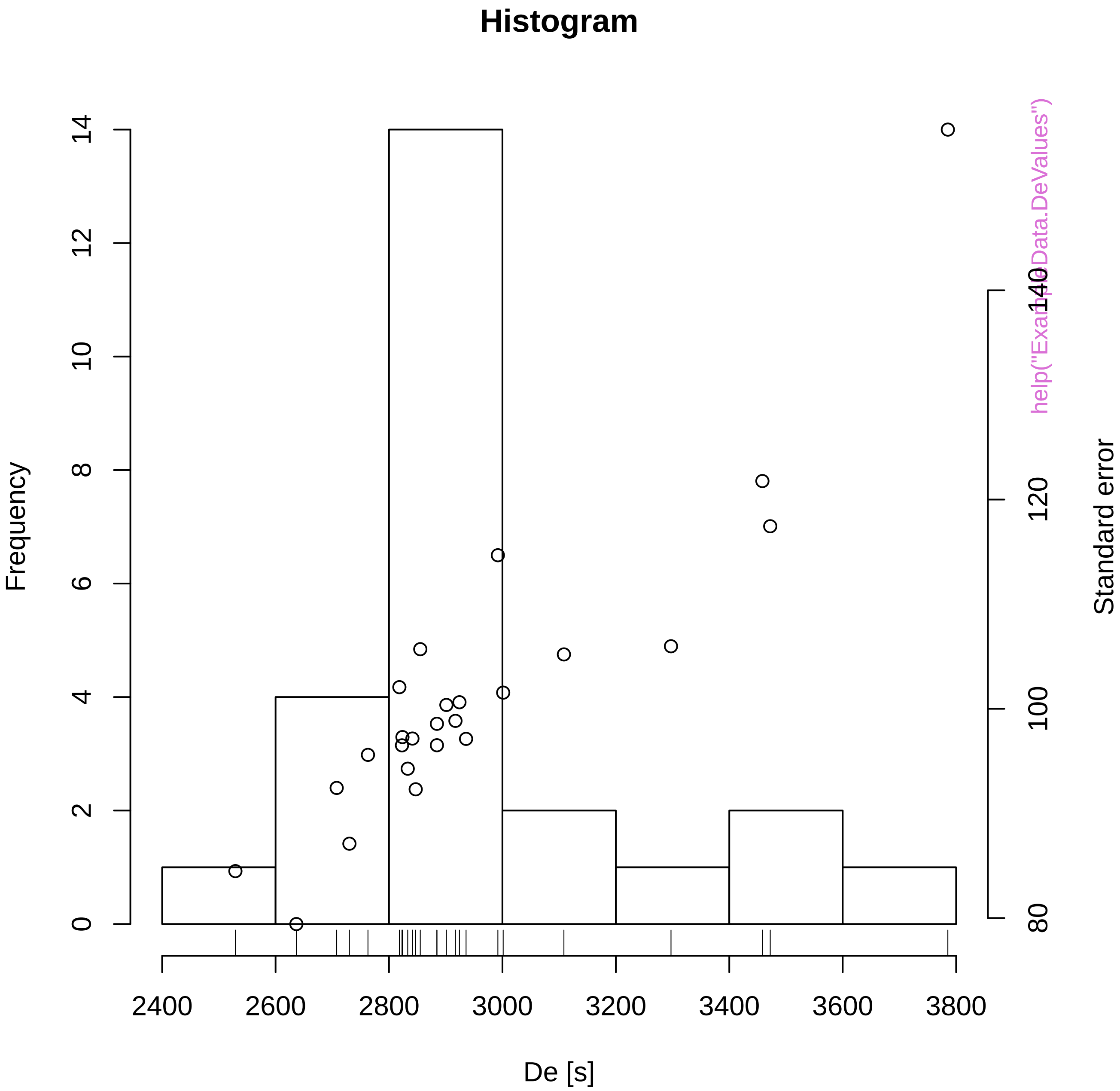

15000
10000
5000
values.transformed$y.t
0.05
0.10
0.20
0.50
1.00
values.transformed$x
help("CW2pPMi")

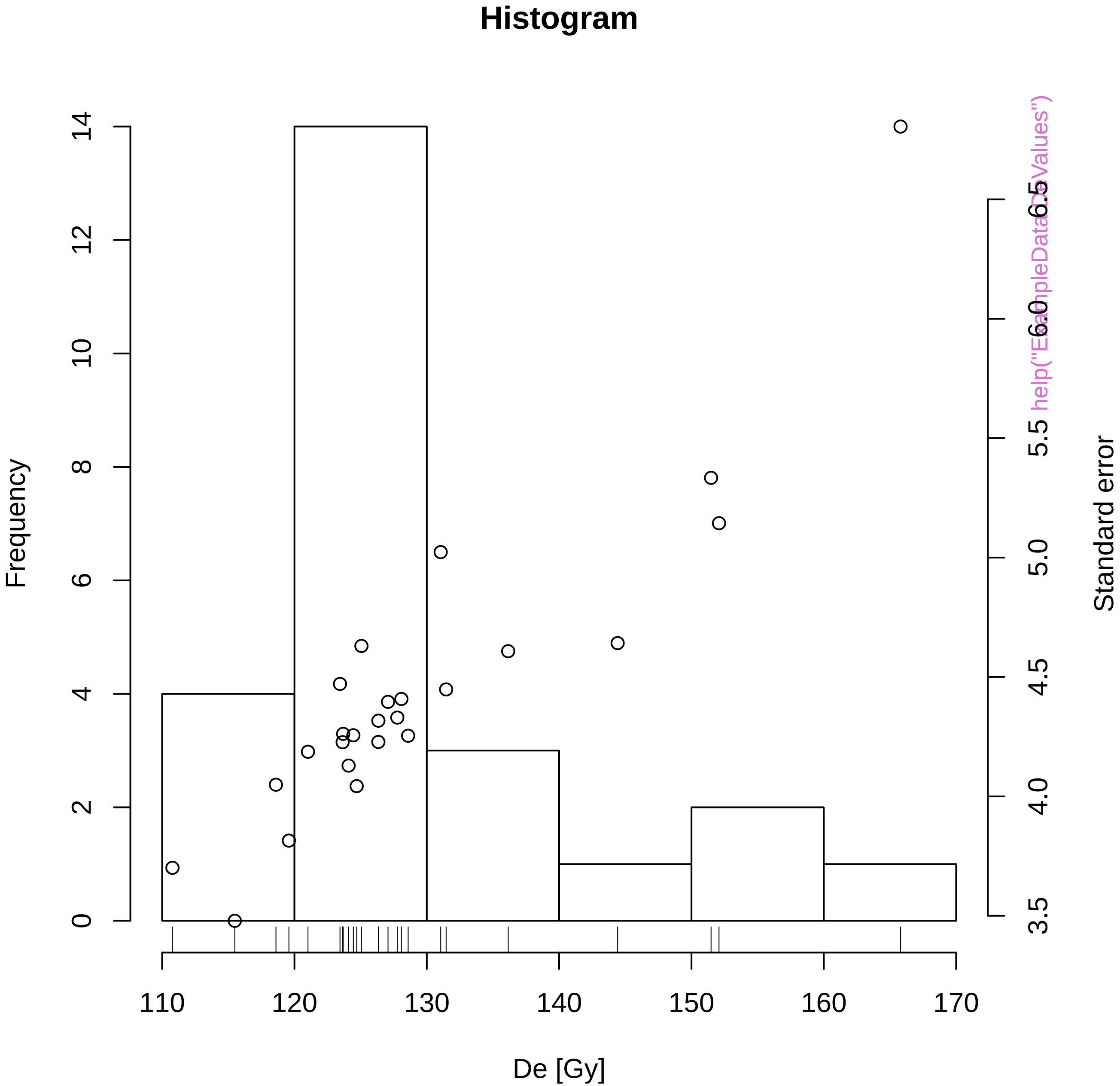
Fig. 4 − Bos & Wallinga (2012)

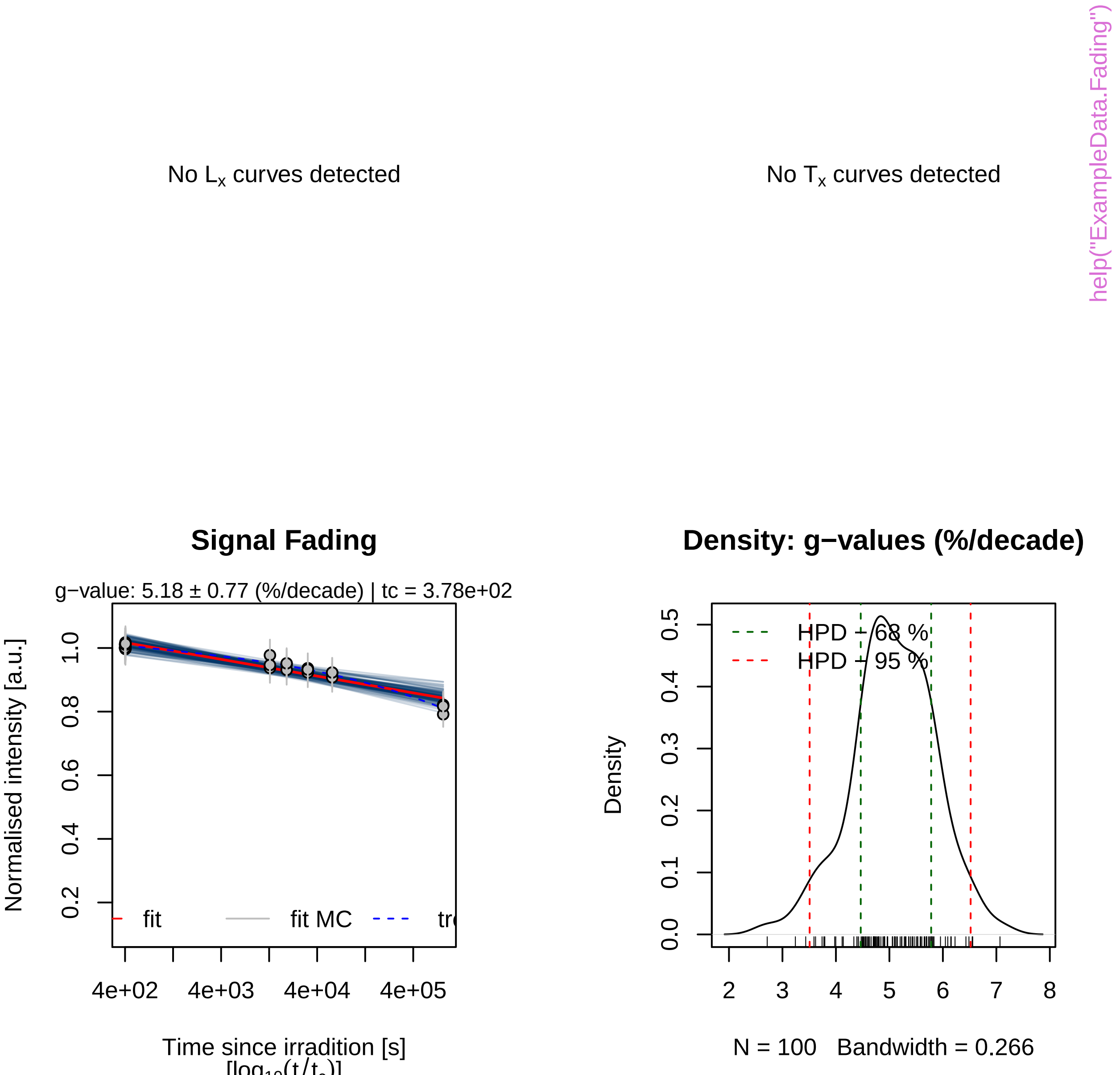


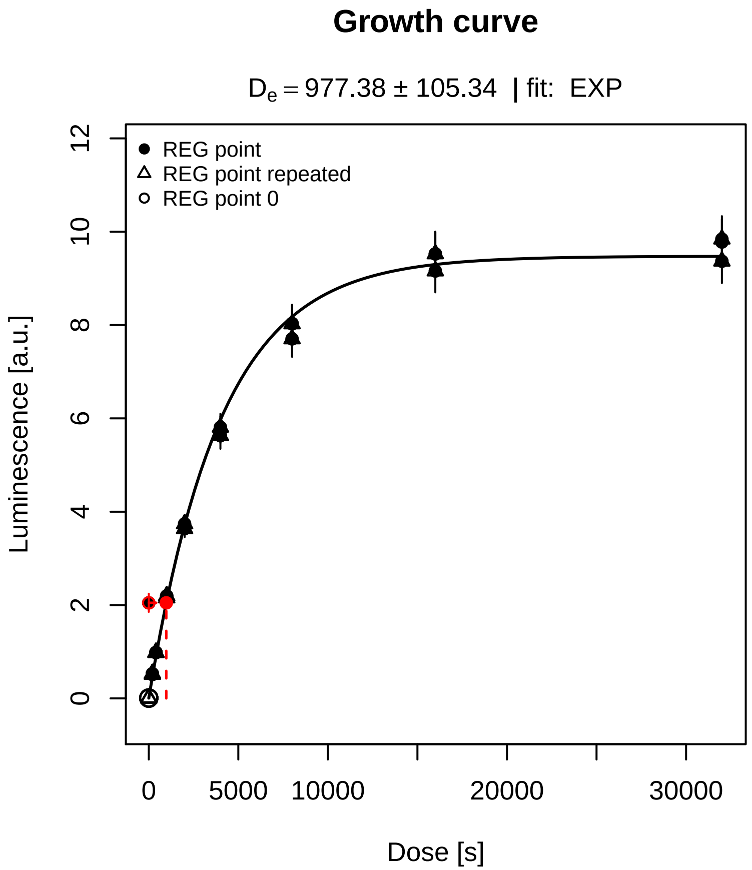

TL (UVVIS)
#1
Counts [a.u.]
0
100
200
300
400
50
100
200
300
Temperature [deg. C]
OSL (UVVIS)
#2
cts [1/ch]
20000
25000
30000
42
44
46
48
50
52
t [s]
(resolution: 0.1 s)
help("ExampleData.Al2O3C")

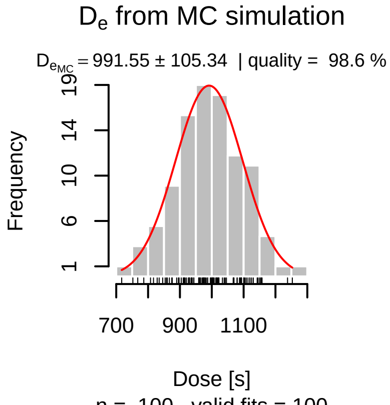

y
0
2000
4000
6000
8000
10000
x
0
10
20
30
40
help("ExampleData.CW_OSL_Curve")

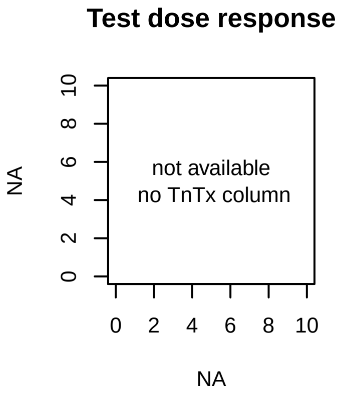

Histogram
Frequency
0
2
4
6
8
10
12
14
De [s]
2400
2600
2800
3000
3200
3400
3600
3800
Standard error
80
100
120
140
help("ExampleData.DeValues")

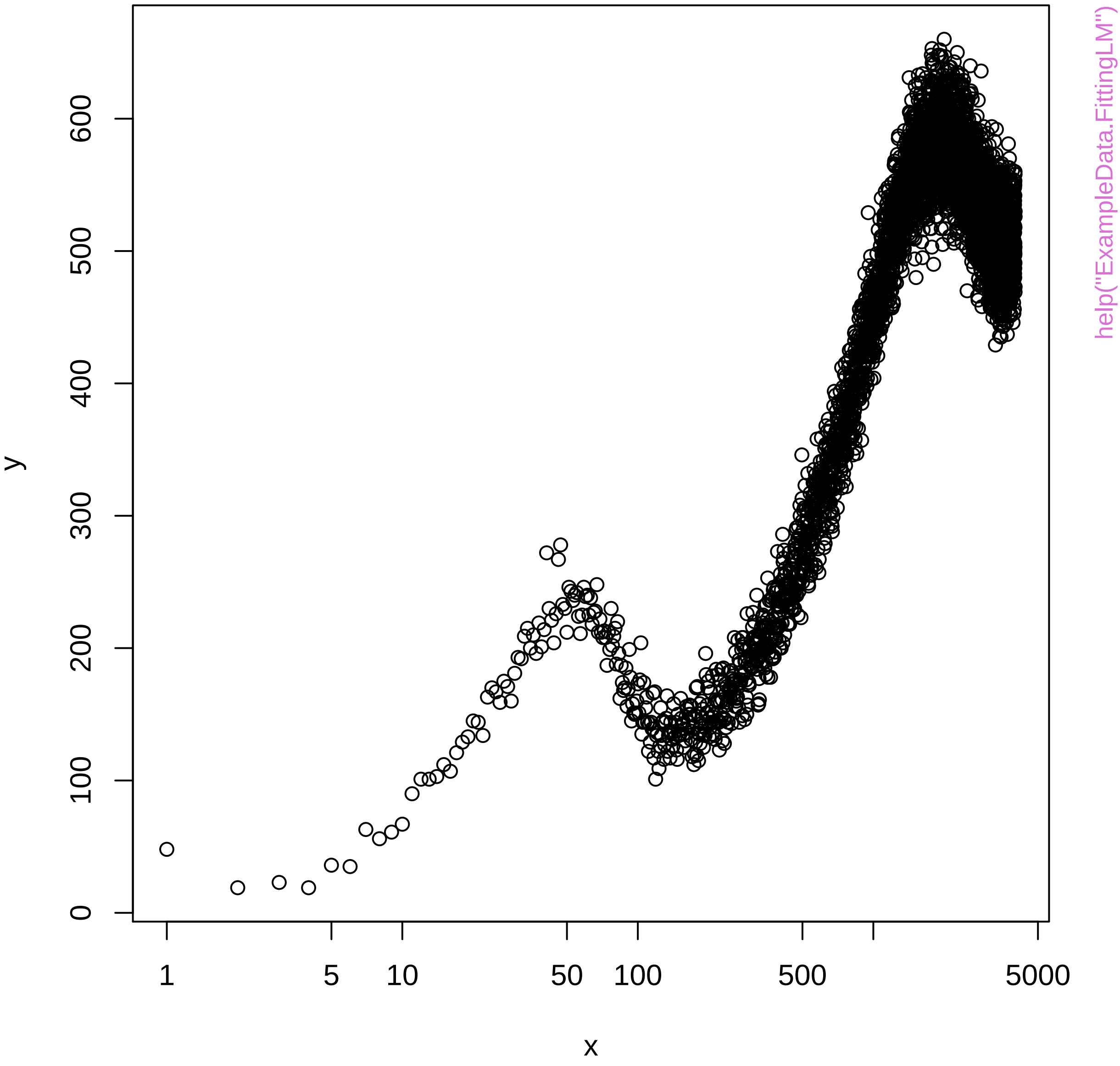

Histogram
Frequency
0
2
4
6
8
10
12
14
110
120
130
140
150
160
170
De [Gy]
Standard error
3.5
4.0
4.5
5.0
5.5
6.0
6.5
help("ExampleData.DeValues")

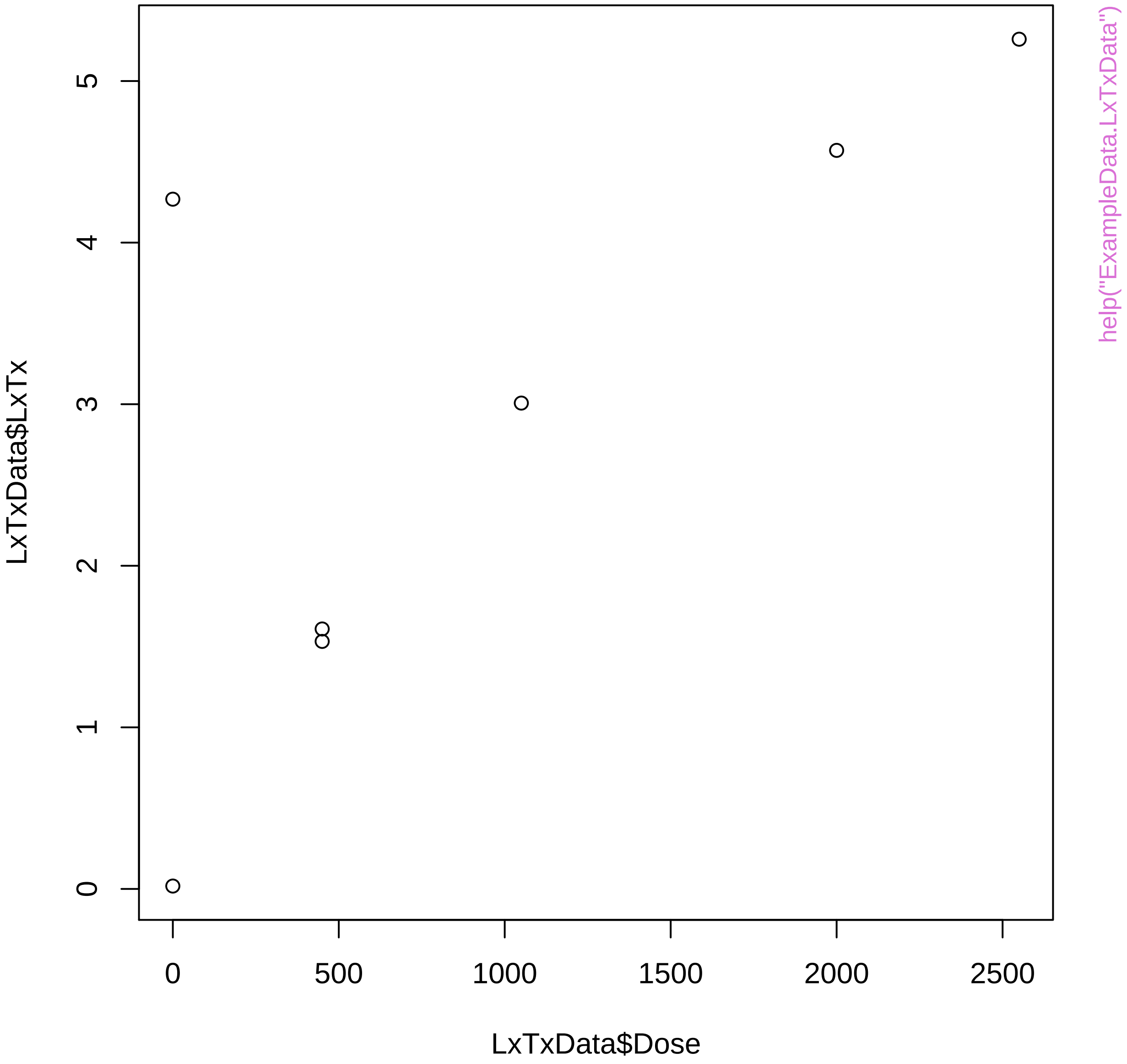

No L_x curves detected
No T_x curves detected
help("ExampleData.Fading")
Signal Fading
g−value: 5.18 ± 0.77 (%/decade) | tc = 3.78e+02
Normalised intensity [a.u.]
0.2
0.4
0.6
0.8
1.0
fit
fit MC
tr
4e+02
4e+03
4e+04
4e+05
Time since irradition [s]
[log10(t/tc)]
Density: g−values (%/decade)
Density
0.0
0.1
0.2
0.3
0.4
0.5
HPD − 68 %
HPD − 95 %
2
3
4
5
6
7
8
N = 100 Bandwidth = 0.266

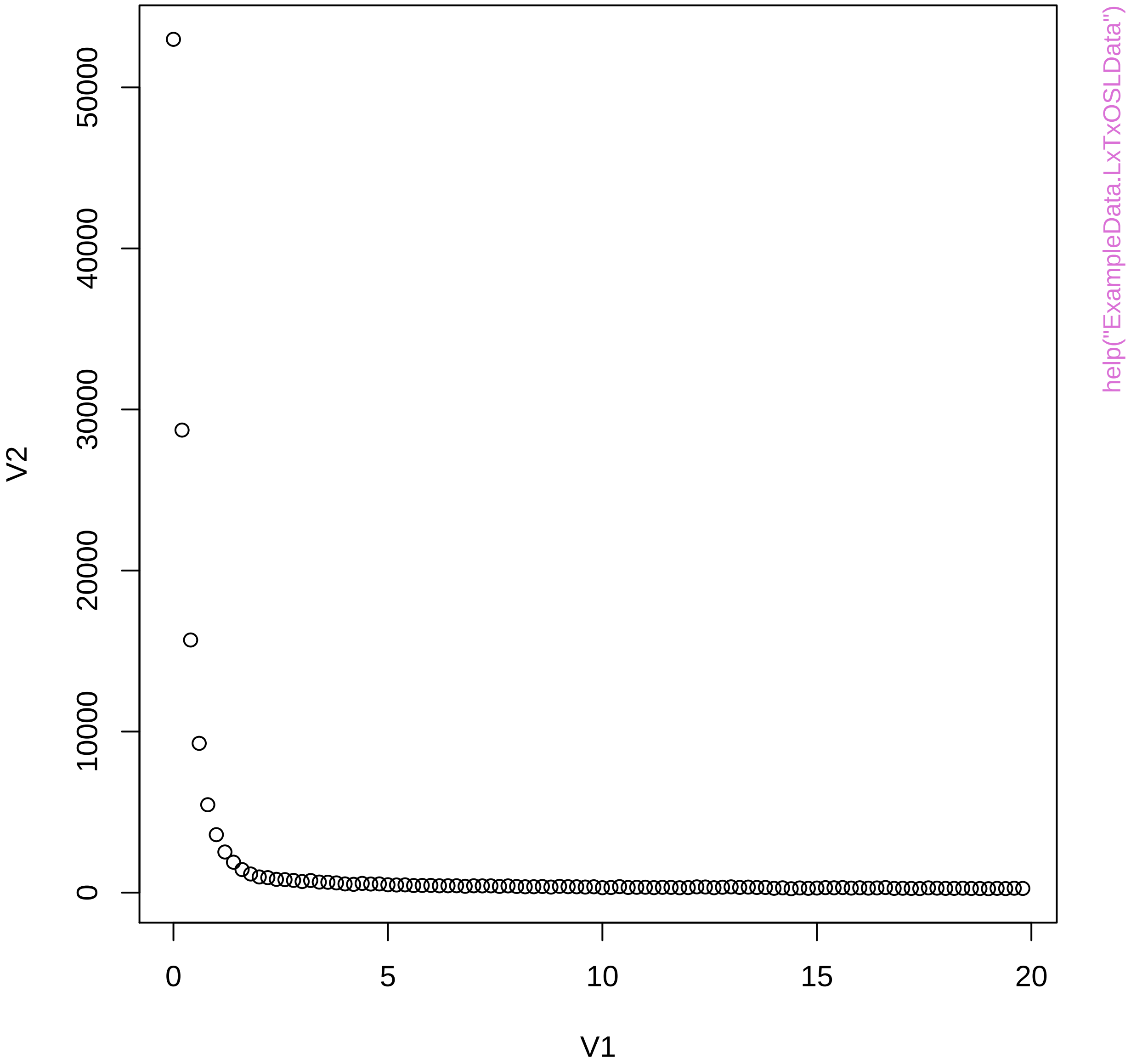

Growth curve
$D_e = 977.38 \pm 105.34$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
2
4
6
8
10
12
0
5000
10000
20000
30000
Dose [s]

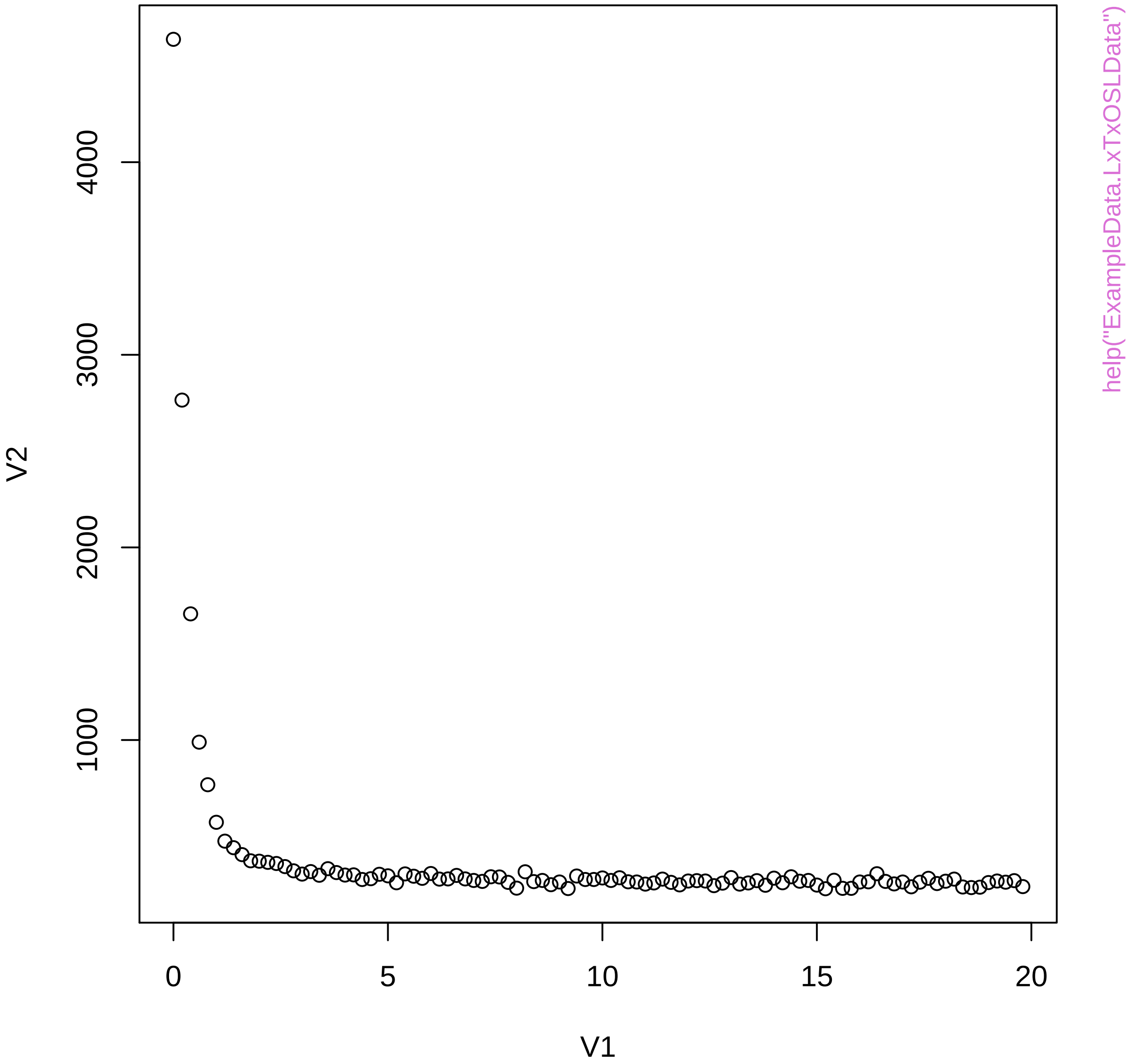

D_e from MC simulation
$D_{e_{MC}} = 991.55 \pm 105.34$ | quality = 98.6 %
Frequency
1
6
10
14
19
700
900
1100
Dose [s]
n = 100 , valid fits = 100

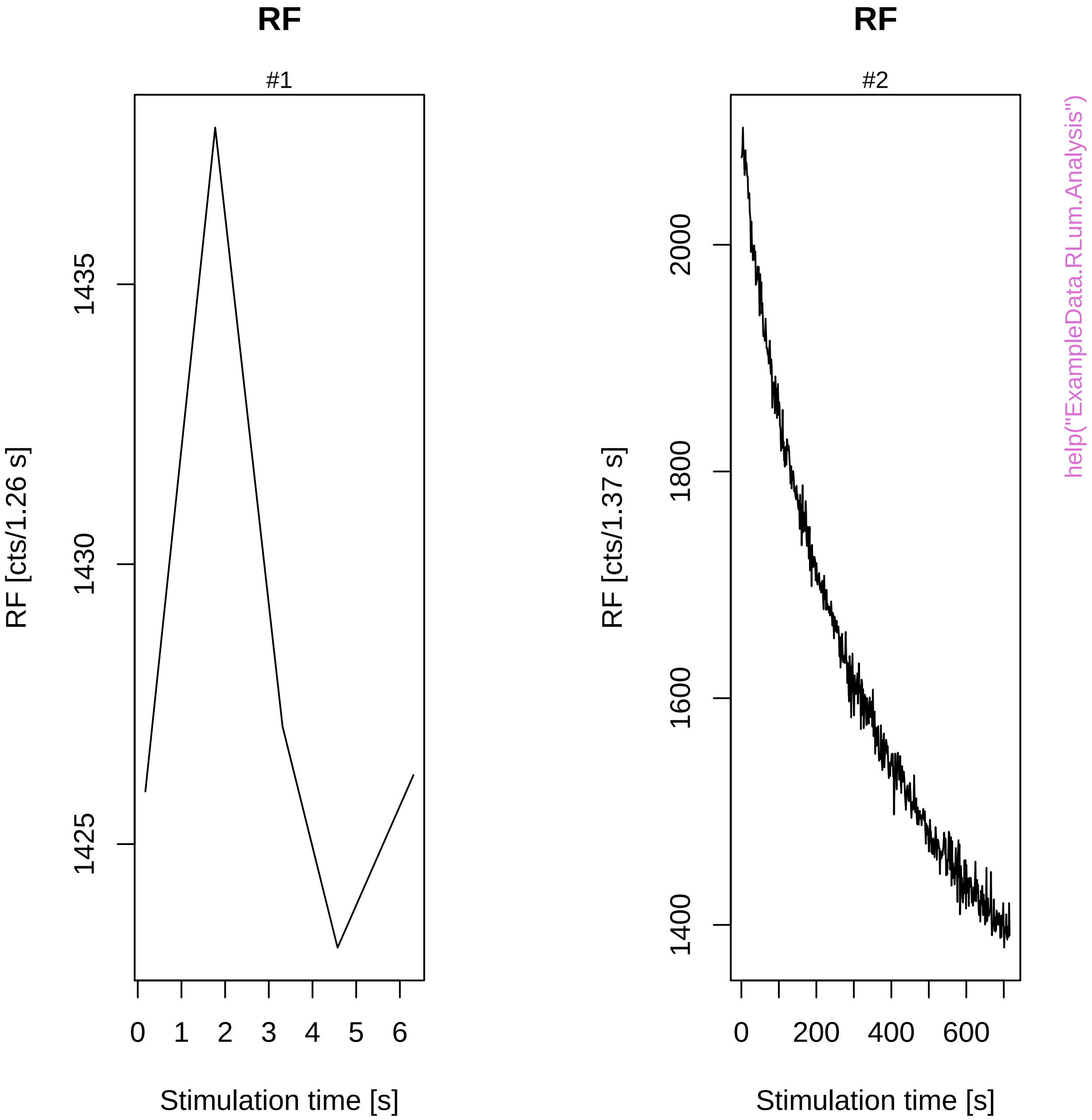

Test dose response
not available
no TnTx column
NA
0
2
4
6
8
10
0
2
4
6
8
10
NA

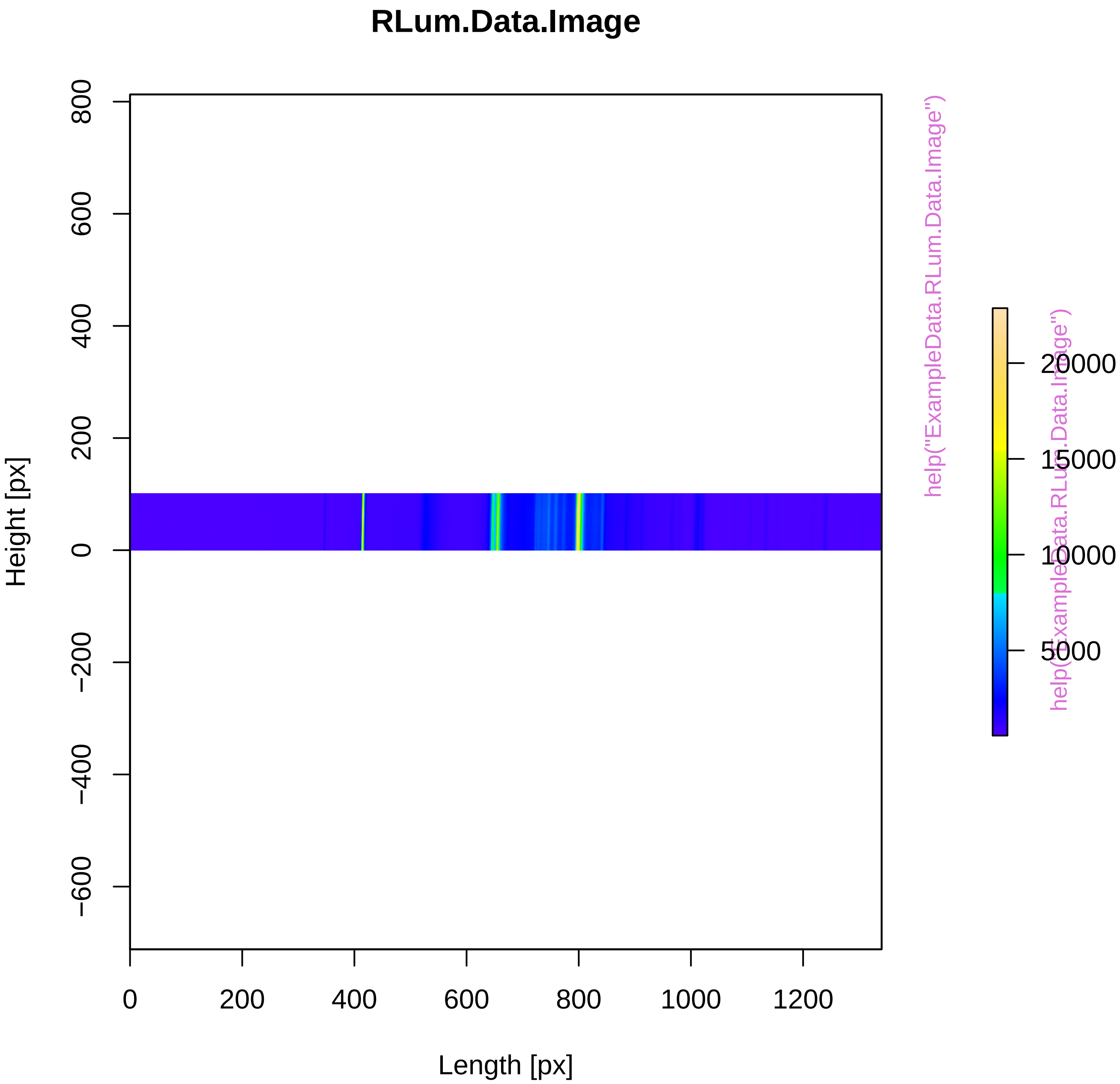

help("ExampleData.FittingLM")
y
0
100
200
300
400
500
600
x
1
5
10
50
100
500
5000

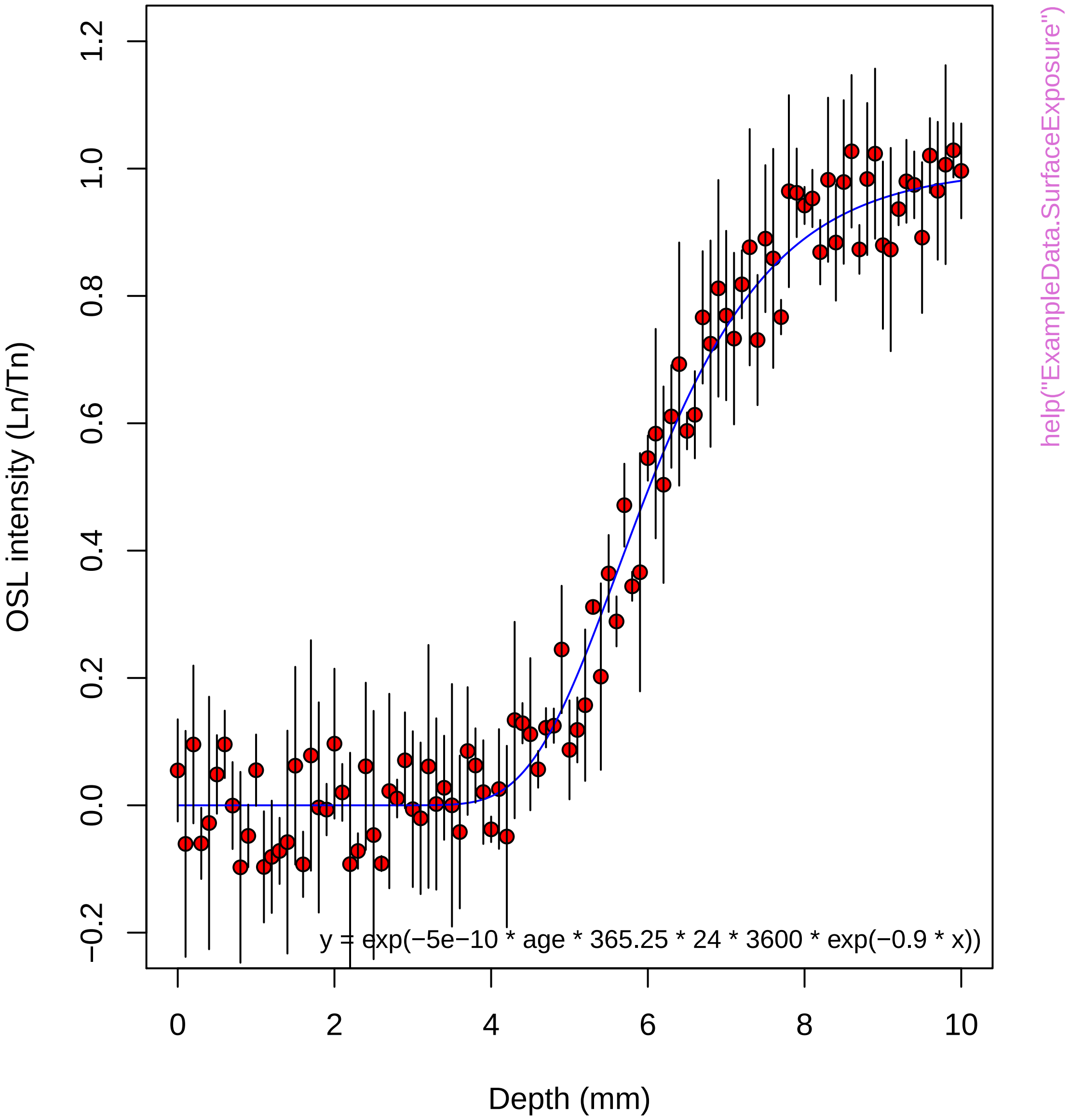

0
1
2
3
4
5
LxTxData$LxTx
0
500
1000
1500
2000
2500
LxTxData$Dose
help("ExampleData.LxTxData")

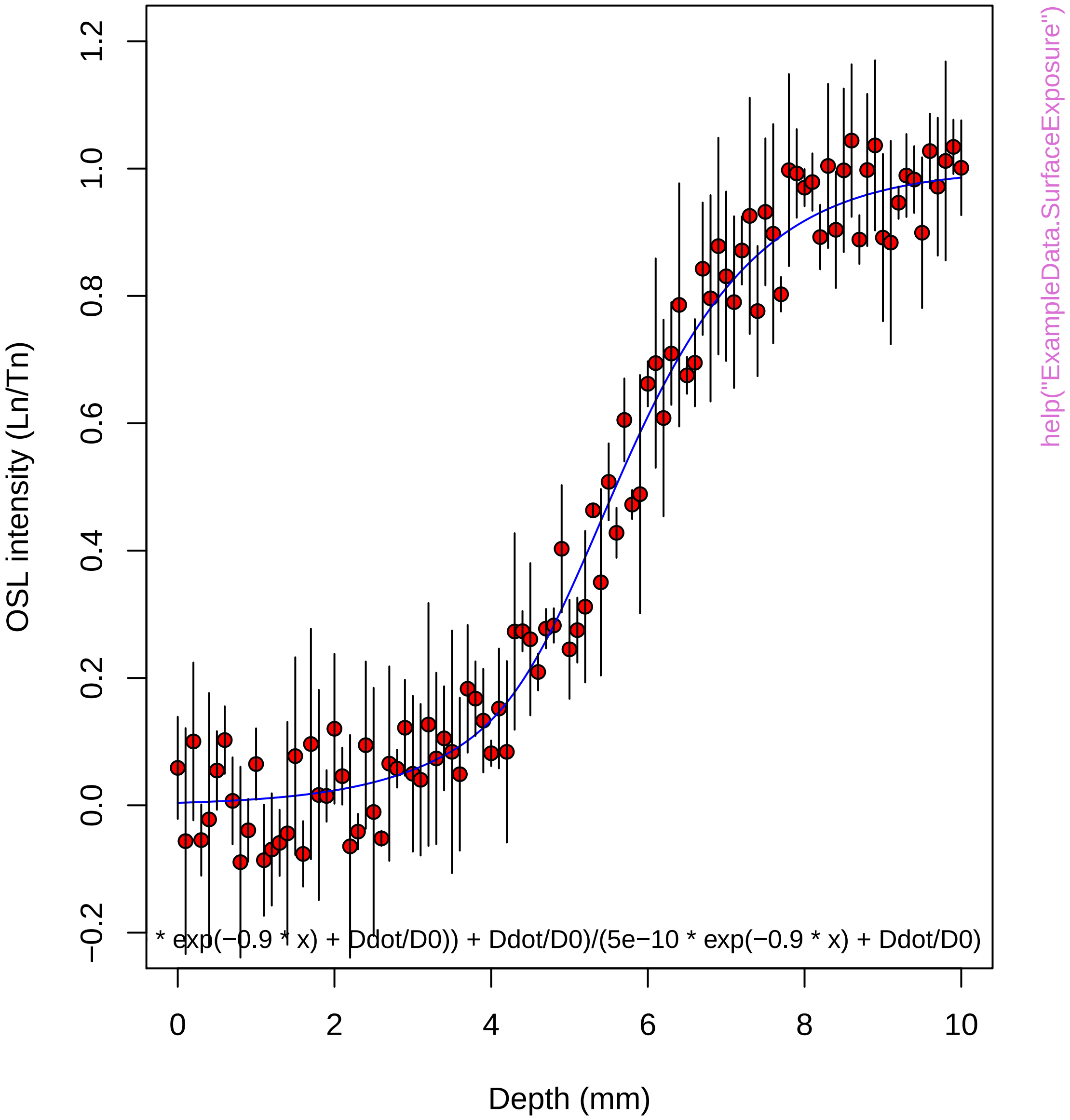

0
10000
20000
30000
40000
50000
V2
0
5
10
15
20
V1
help("ExampleData.LxTxOSLData")

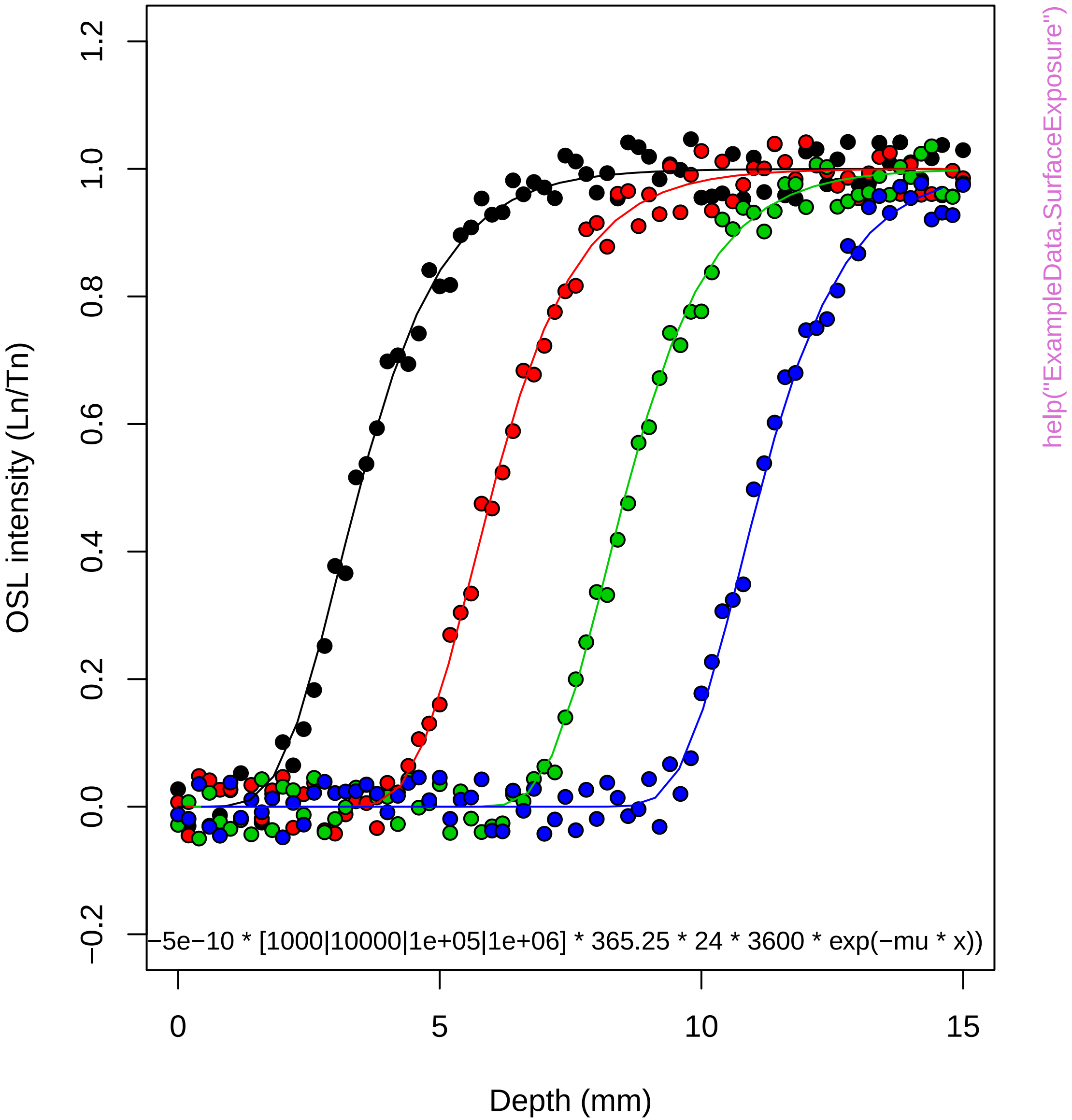

4000
3000
2000
1000
V2
0
5
10
15
20
V1
help("ExampleData.LxTxOSLData")

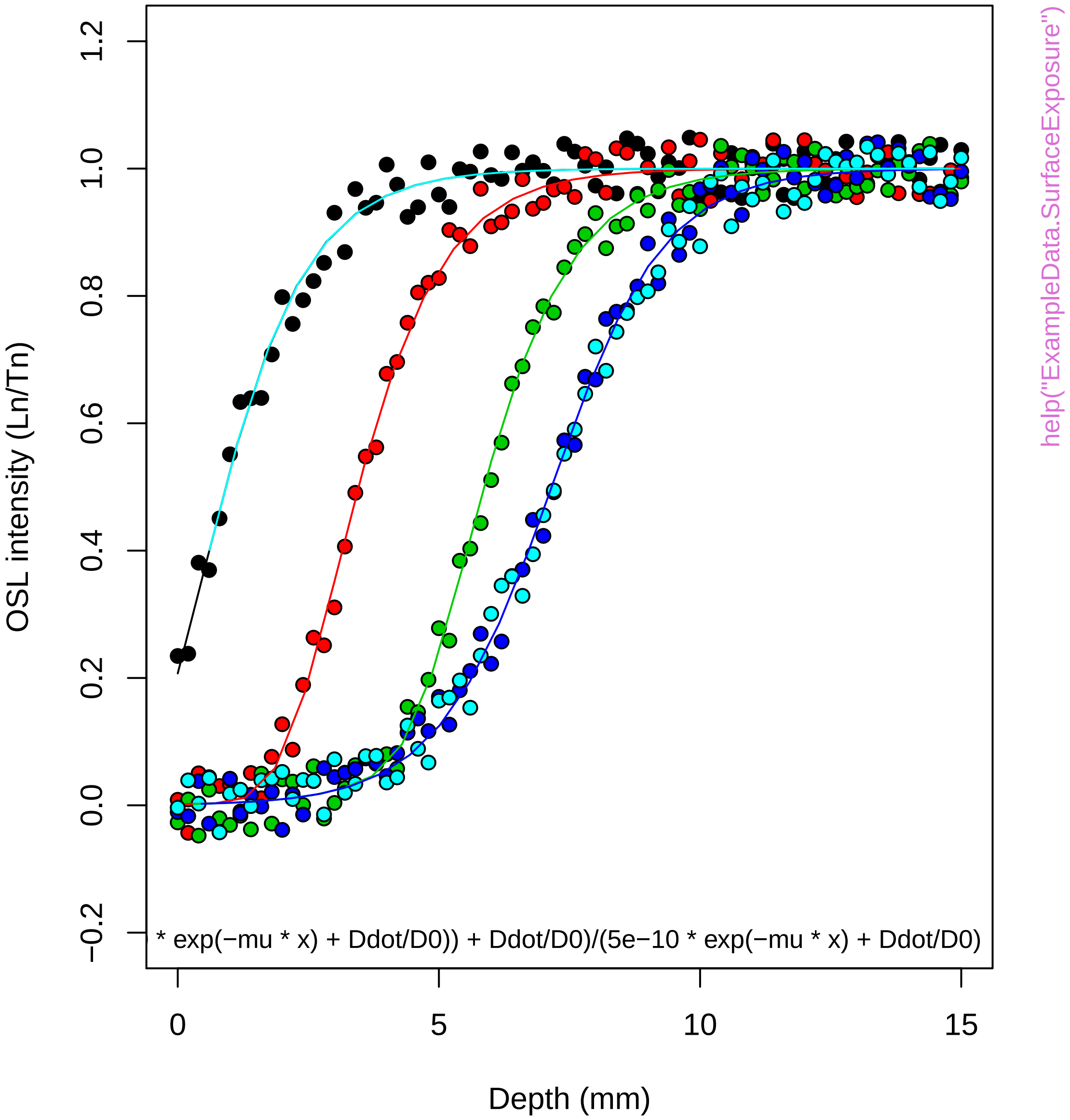

RF
#1
RF [cts/1.26 s]
1425
1430
1435
0
1
2
3
4
5
6
Stimulation time [s]
RF
#2
RF [cts/1.37 s]
1400
1600
1800
2000
0
200
400
600
Stimulation time [s]
help("ExampleData.RLum.Analysis")

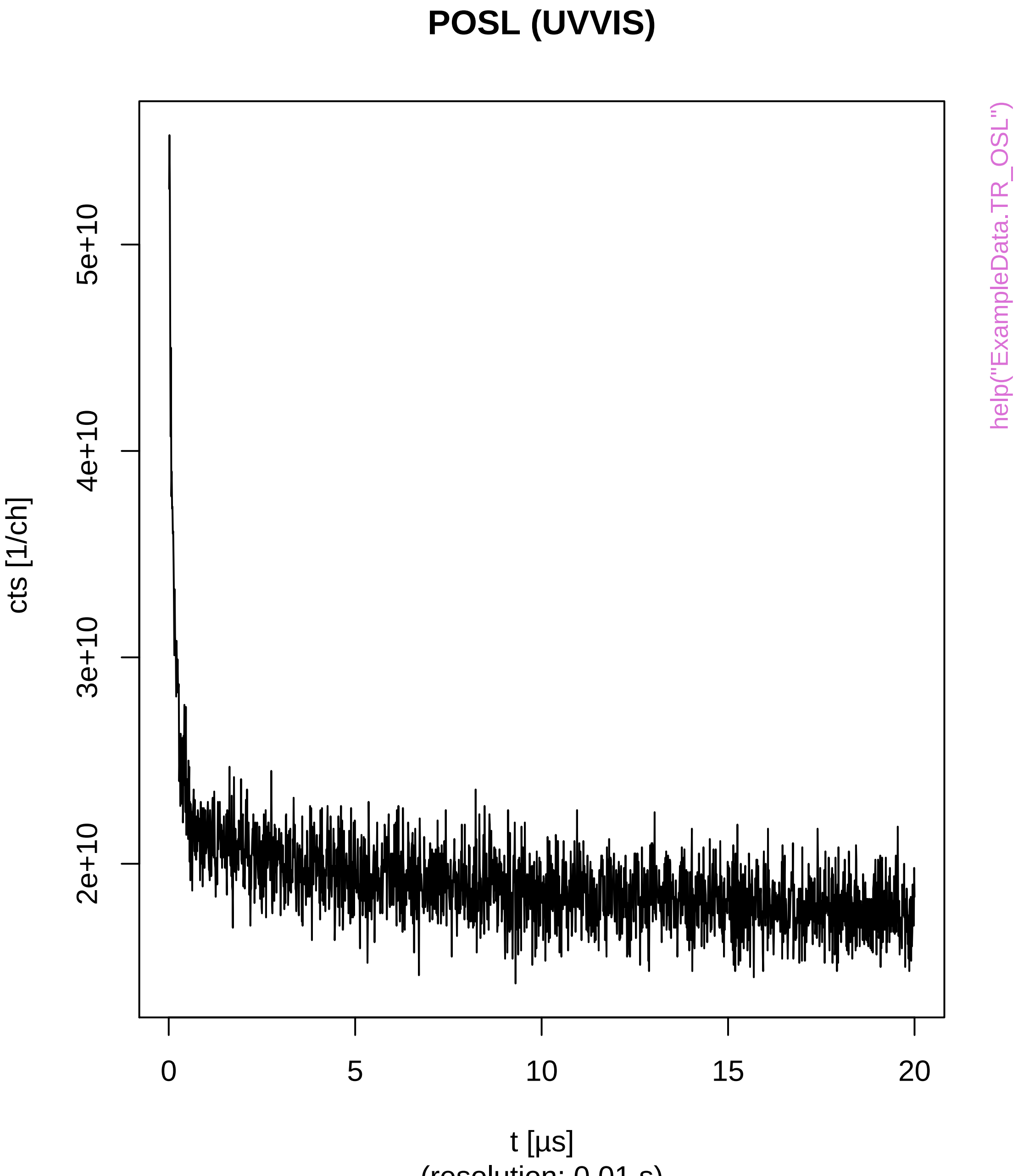

RLum.Data.Image
Height [px]
800
600
400
200
0
−200
−400
−600
Length [px]
0
200
400
600
800
1000
1200
help("ExampleData.RLum.Data.Image")
help("ExampleData.RLum.Data.Image")
20000
15000
10000
5000

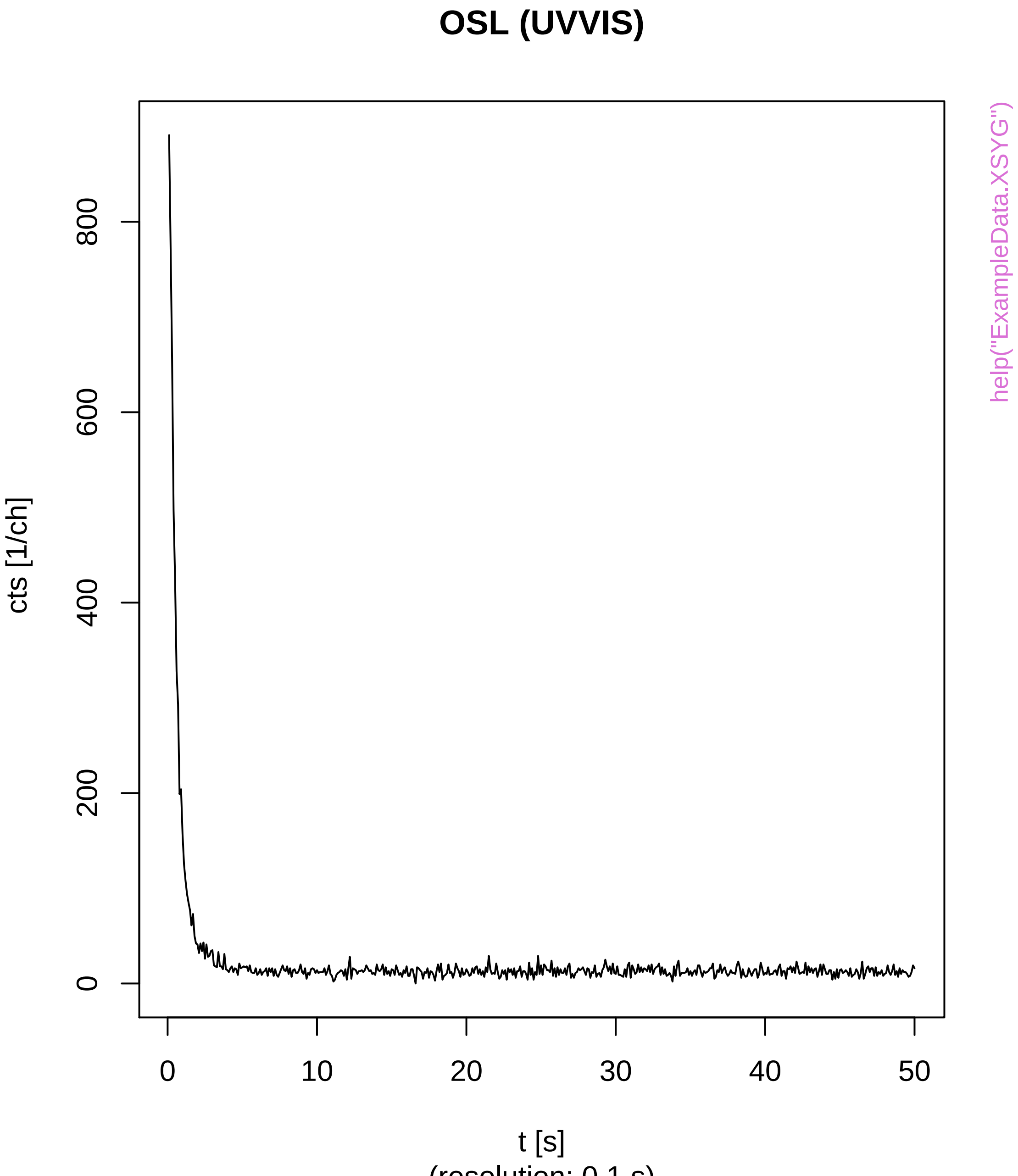

OSL intensity (Ln/Tn)
Depth (mm)
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
2
4
6
8
10
y = exp(−5e−10 * age * 365.25 * 24 * 3600 * exp(−0.9 * x))
help("ExampleData.SurfaceExposure")

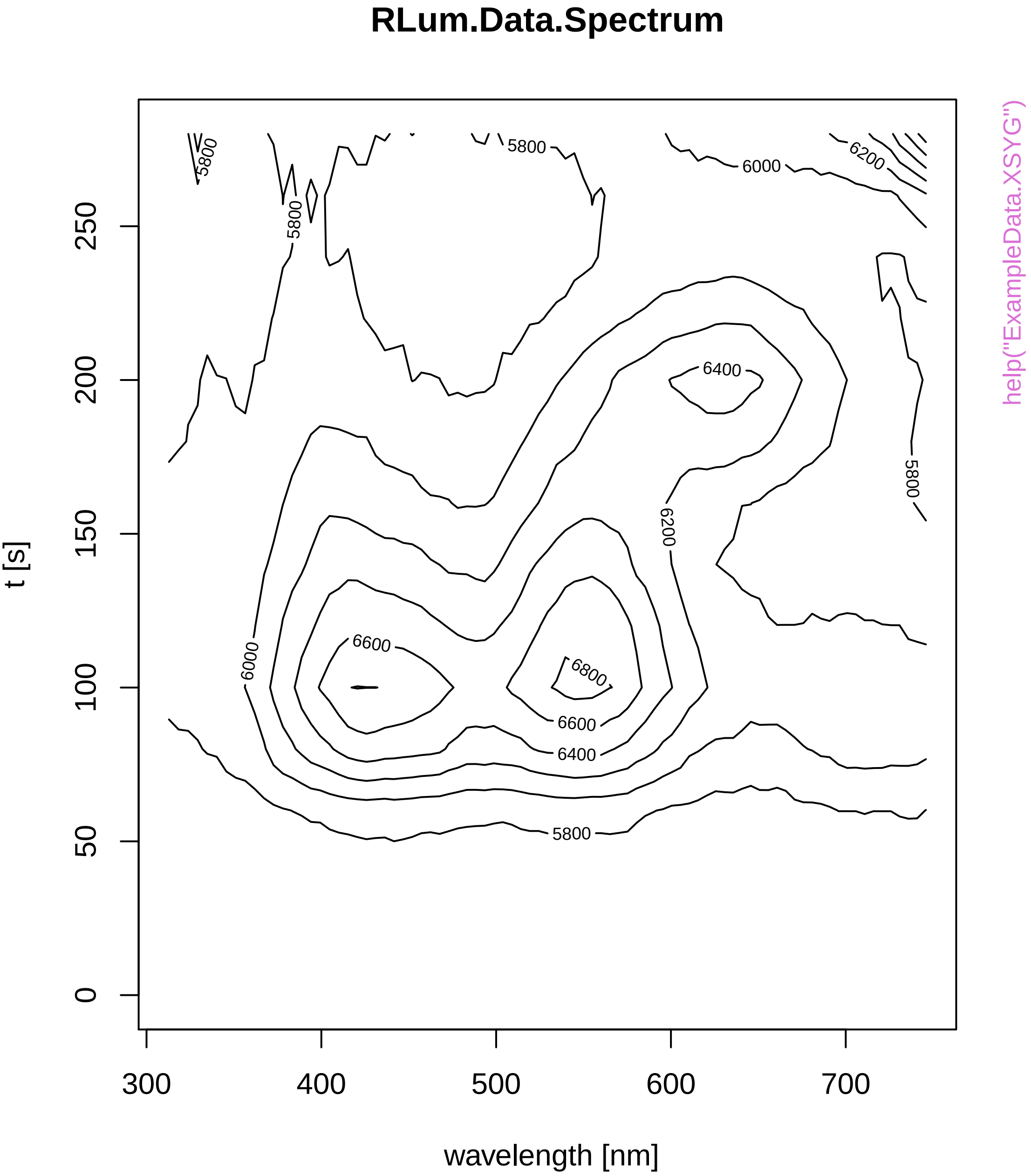

* exp(−0.9 * x) + Ddot/D0)) + Ddot/D0)/(5e−10 * exp(−0.9 * x) + Ddot/D0)
OSL intensity (Ln/Tn)
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
2
4
6
8
10
Depth (mm)
help("ExampleData.SurfaceExposure")

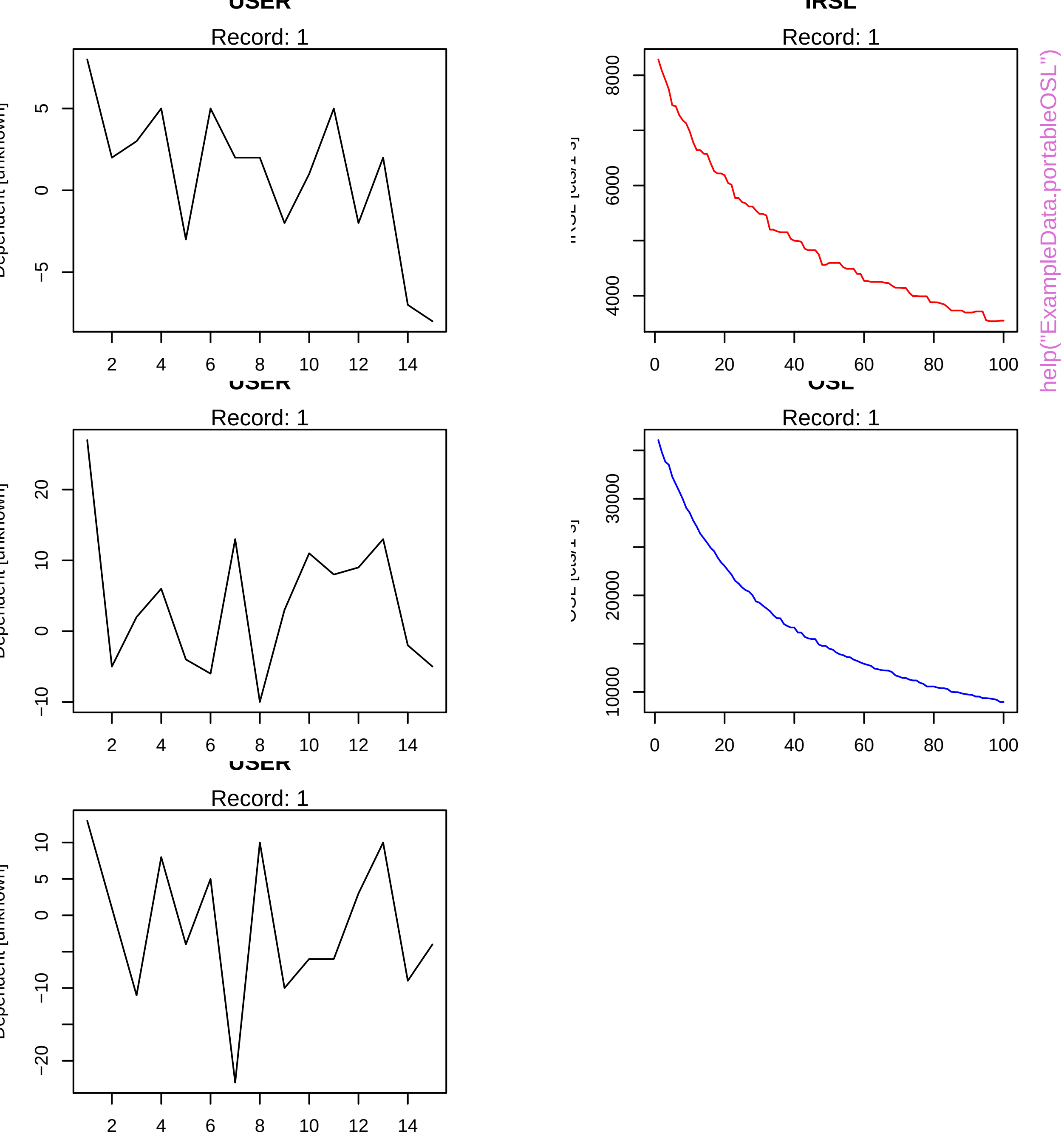

OSL intensity (Ln/Tn)
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Depth (mm)
0
5
10
15
−5e−10 * [1000|10000|1e+05|1e+06] * 365.25 * 24 * 3600 * exp(−mu * x))
help("ExampleData.SurfaceExposure")

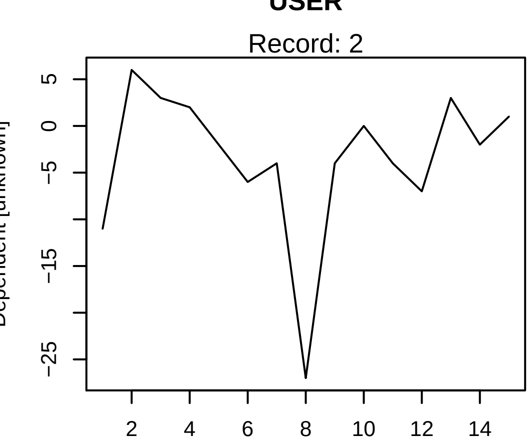

OSL intensity (Ln/Tn)
Depth (mm)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
0
5
10
15
* exp(−mu * x) + Ddot/D0)) + Ddot/D0)/(5e−10 * exp(−mu * x) + Ddot/D0)
help("ExampleData.SurfaceExposure")

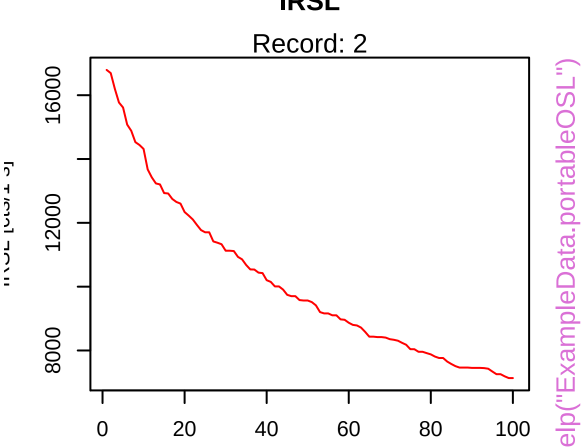

POSL (UVVIS)
cts [1/ch]
5e+10
4e+10
3e+10
2e+10
0
5
10
15
20
t [µs]
(resolution: 0.01 s)
help("ExampleData.TR_OSL")

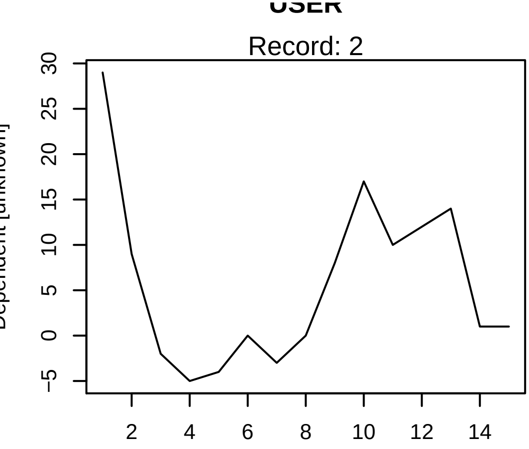

OSL (UVVIS)
help("ExampleData.XSYG")
cts [1/ch]
0
200
400
600
800
0
10
20
30
40
50
t [s]
(resolution: 0.1 s)

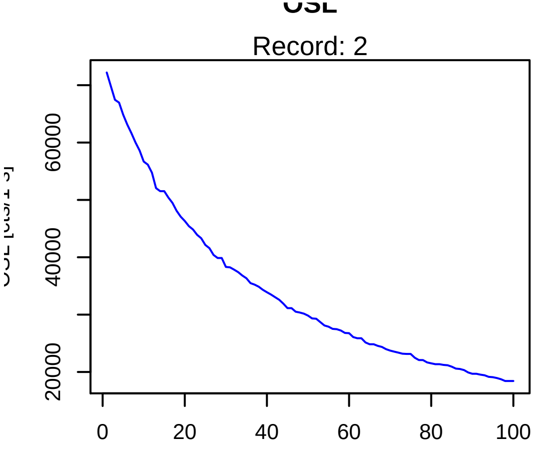

RLum.Data.Spectrum
t [s]
0
50
100
150
200
250
wavelength [nm]
300
400
500
600
700
5800
6000
6200
6400
6600
6800
help("ExampleData.XSYG")

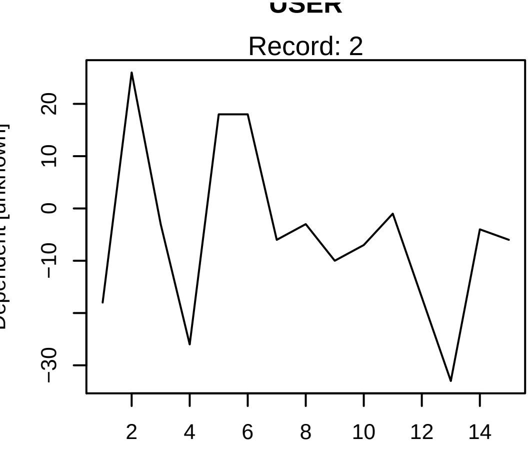

USER
Record: 1
Dependent [unknown]
5
0
−5
2
4
6
8
10
12
14
IRSL
Record: 1
IRSL [cts/1 s]
8000
6000
4000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 1
Dependent [unknown]
20
10
0
−10
2
4
6
8
10
12
14
OSL
Record: 1
OSL [cts/1 s]
30000
20000
10000
0
20
40
60
80
100
USER
Record: 1
Dependent [unknown]
10
5
0
−10
−20
2
4
6
8
10
12
14

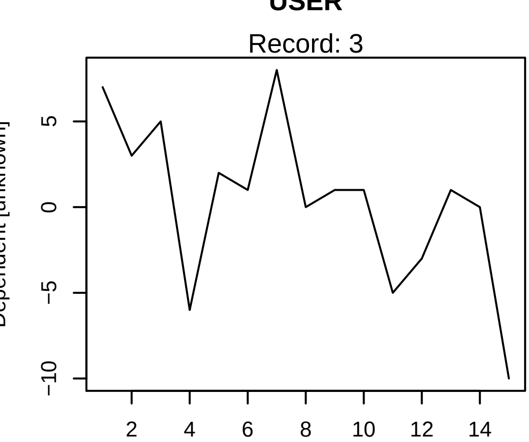

USER
Record: 2
Dependent [unknown]
5
0
−5
−15
−25
2
4
6
8
10
12
14

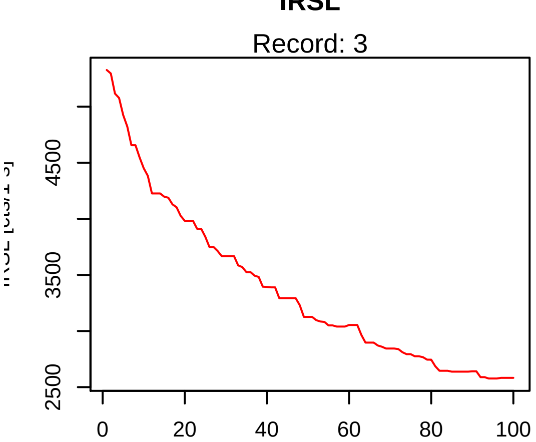

IRSL
Record: 2
16000
12000
8000
0
20
40
60
80
100
help("ExampleData.portableOSL")


USER
Record: 2
Dependent [unknown]
30
25
20
15
10
5
0
−5
2
4
6
8
10
12
14

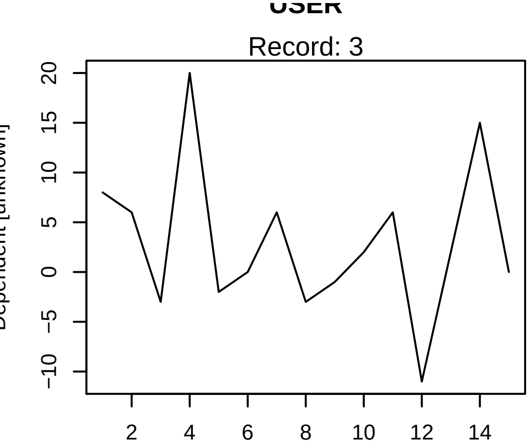

OSL
Record: 2
60000
40000
20000
0
20
40
60
80
100

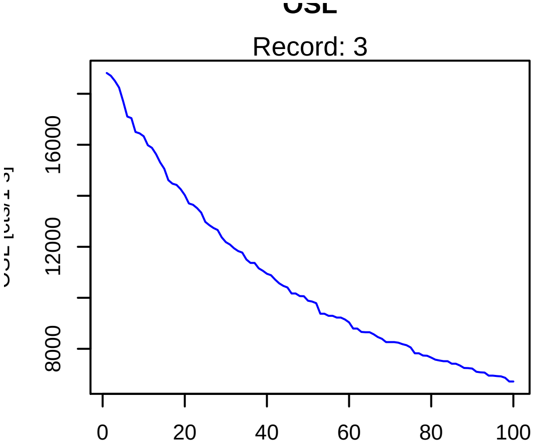

USER
Record: 2
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14

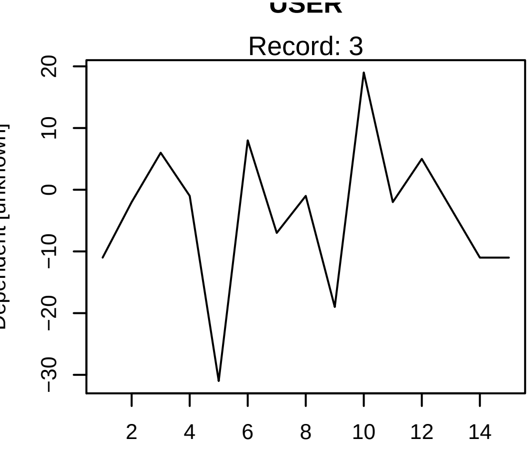


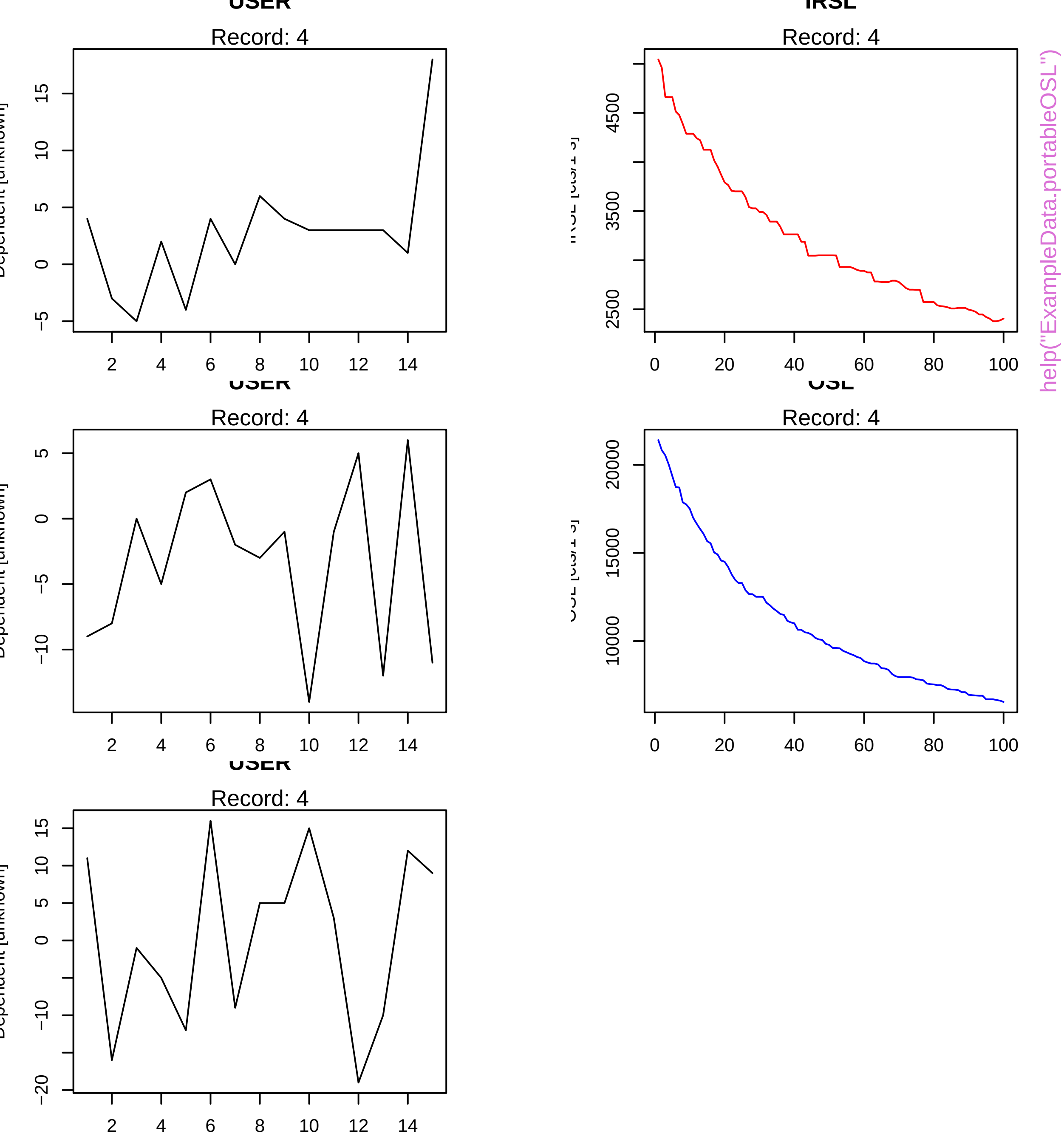


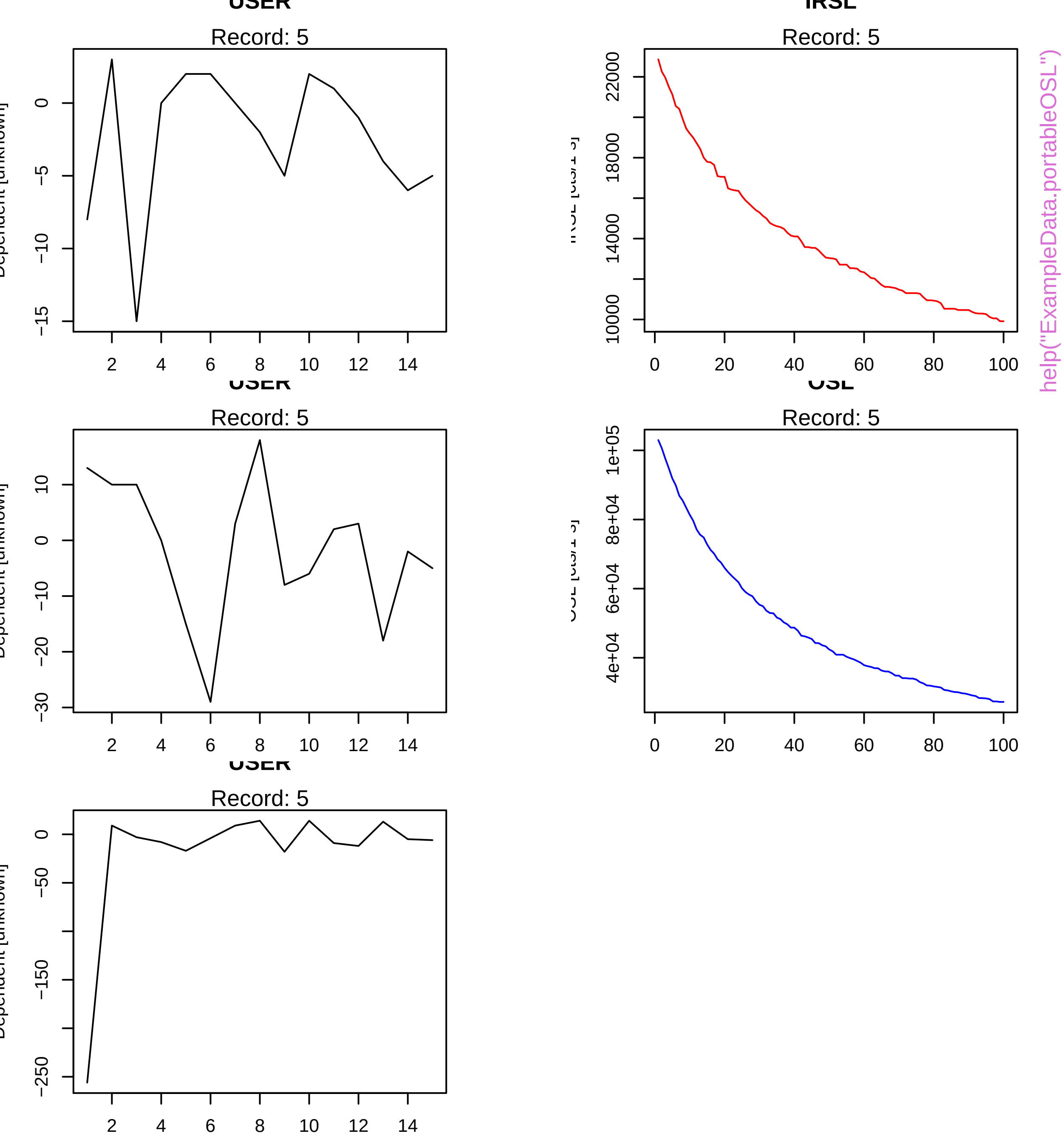
help("ExampleData.portableOSL")

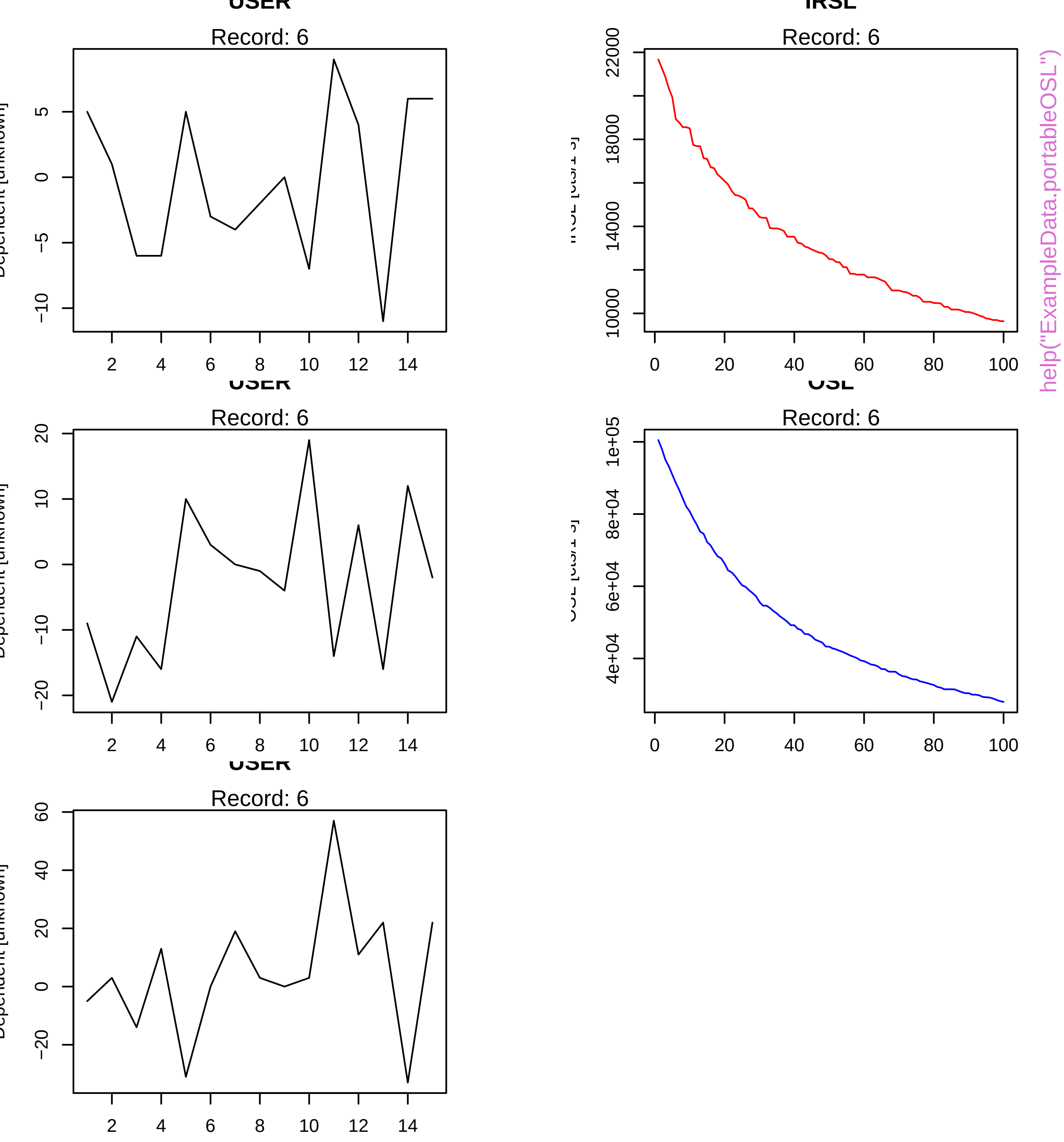


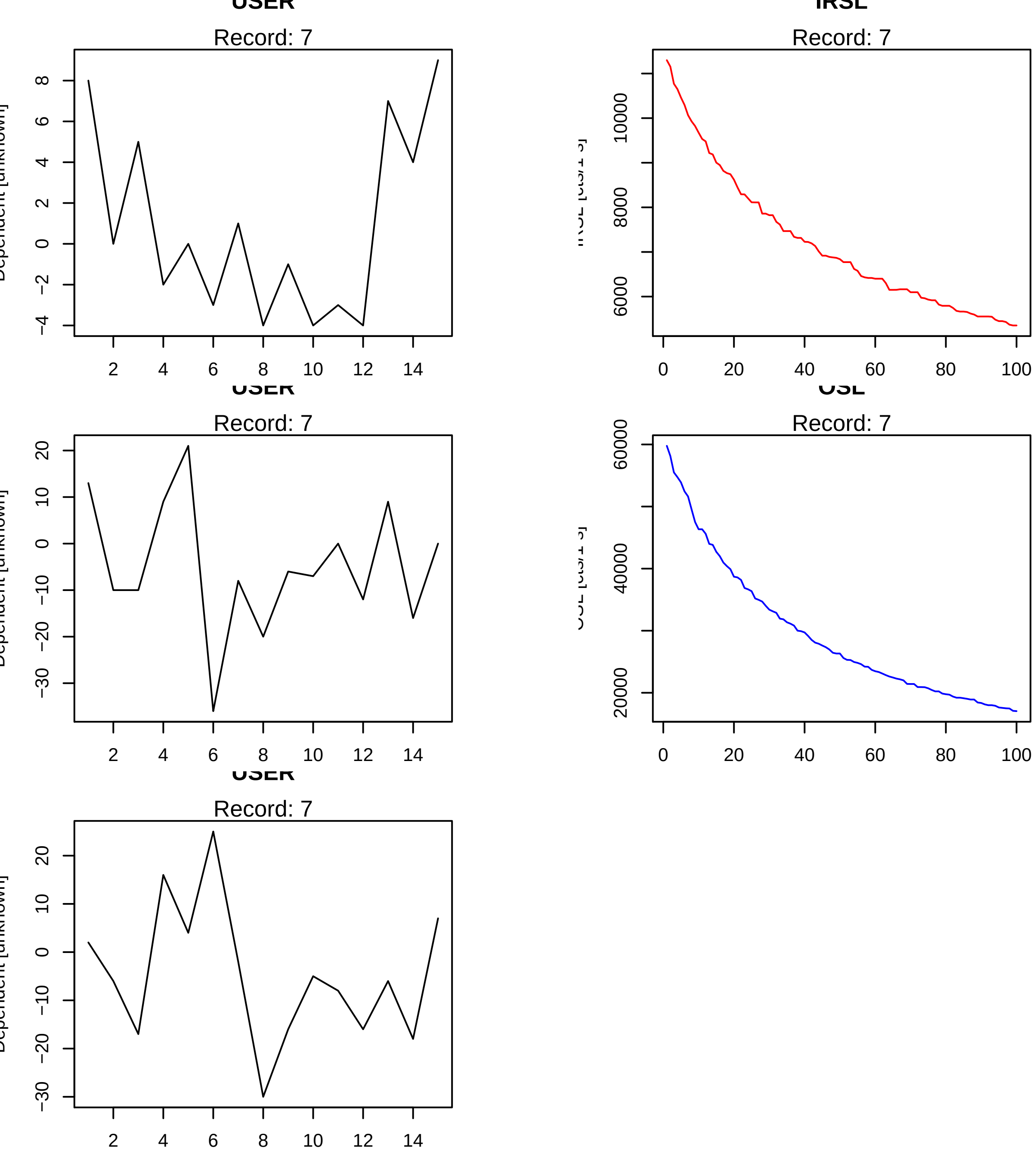




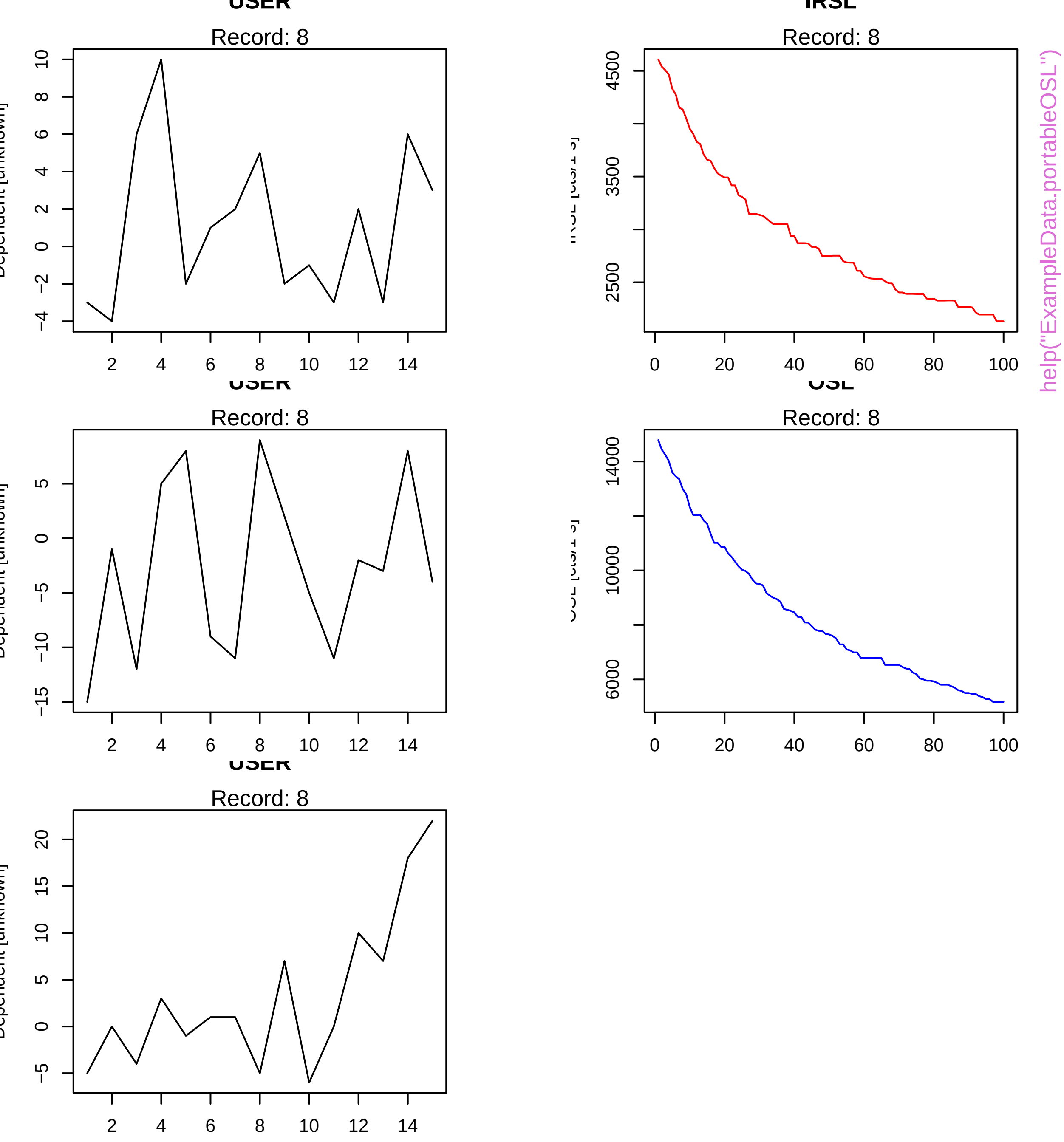

USER
Record: 4
Dependent [unknown]
IRSL
Record: 4
OSL
Record: 4
help("ExampleData.portableOSL")
−5
0
5
10
15
2
4
6
8
10
12
14
2500
3500
4500
0
20
40
60
80
100
−10
10000
15000
20000
−20

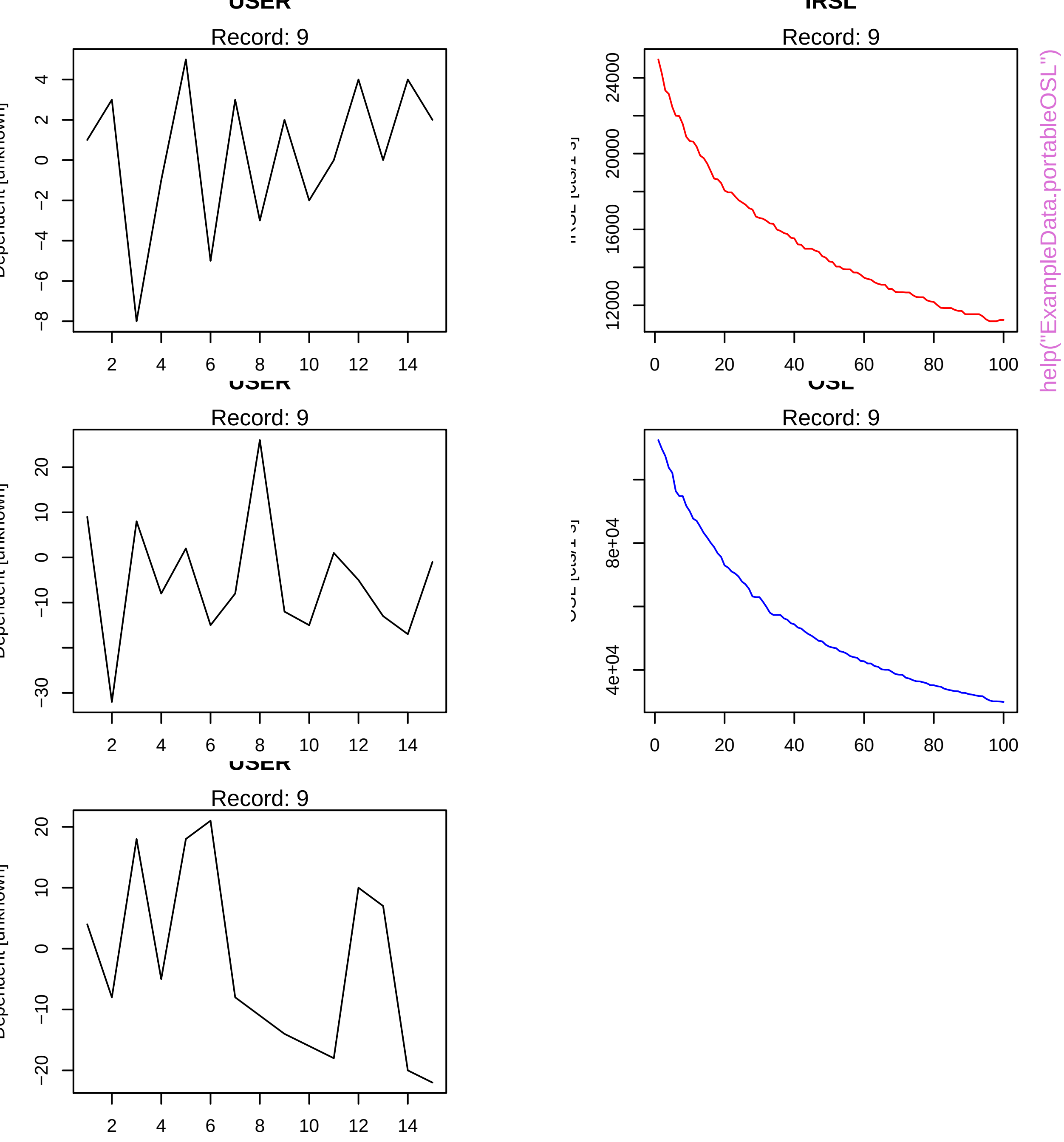

USER
Record: 5
Dependent [unknown]
0
−5
−10
−15
2
4
6
8
10
12
14
IRSL
Record: 5
IRSL [cts/1 s]
22000
18000
14000
10000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 5
Dependent [unknown]
10
0
−10
−20
−30
2
4
6
8
10
12
14
OSL
Record: 5
OSL [cts/1 s]
1e+05
8e+04
6e+04
4e+04
0
20
40
60
80
100
USER
Record: 5
Dependent [unknown]
0
−50
−150
−250
2
4
6
8
10
12
14

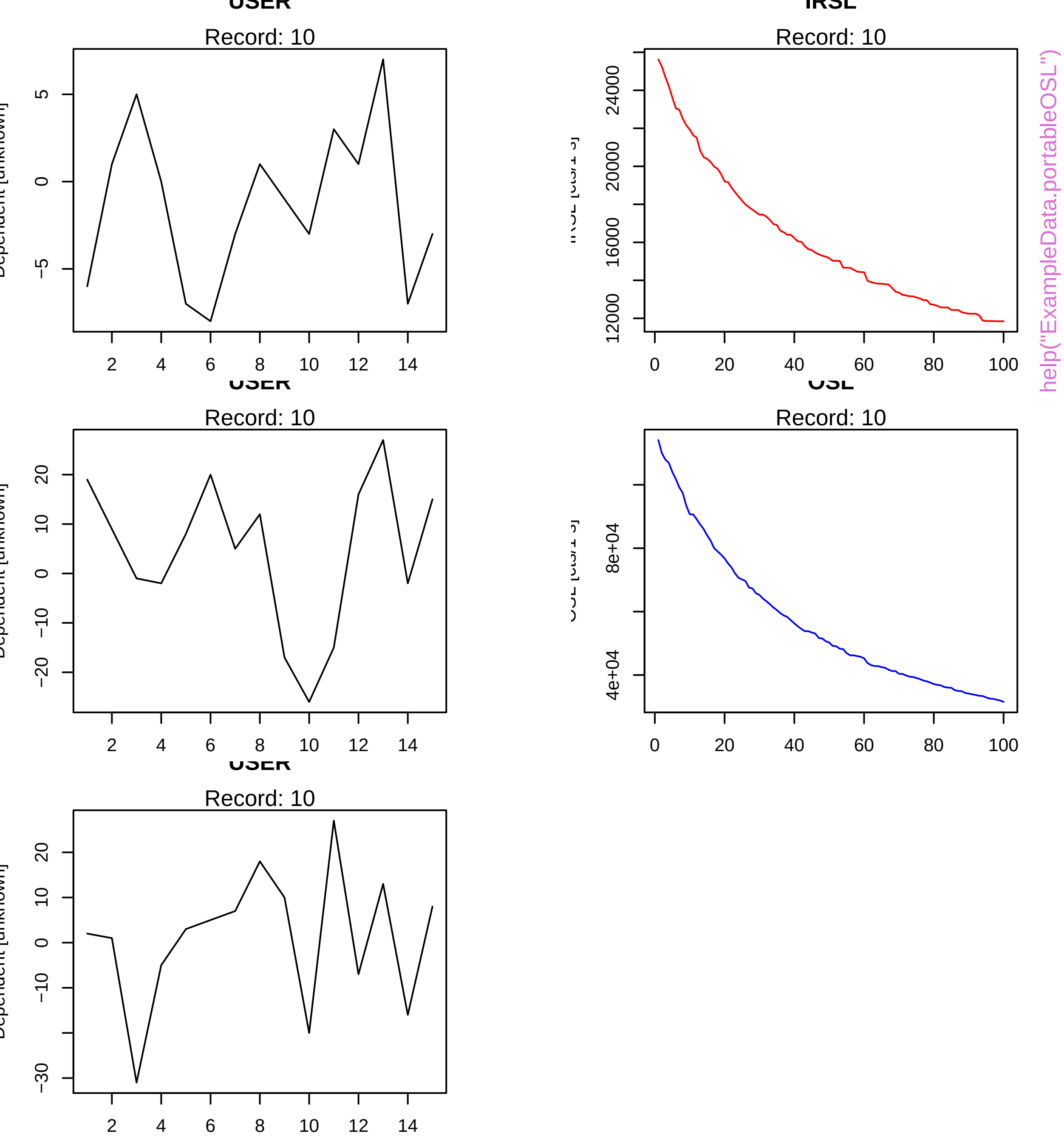

USER
Record: 6
Dependent [unknown]
IRSL
Record: 6
IRSL [cts/0.1 s]
help("ExampleData.portableOSL")
USER
Record: 6
Dependent [unknown]
OSL
Record: 6
OSL [cts/0.1 s]
USER
Record: 6
Dependent [unknown]
22000
18000
14000
10000
1e+05
8e+04
6e+04
4e+04
0
20
40
60
80
100
2
4
6
8
10
12
14

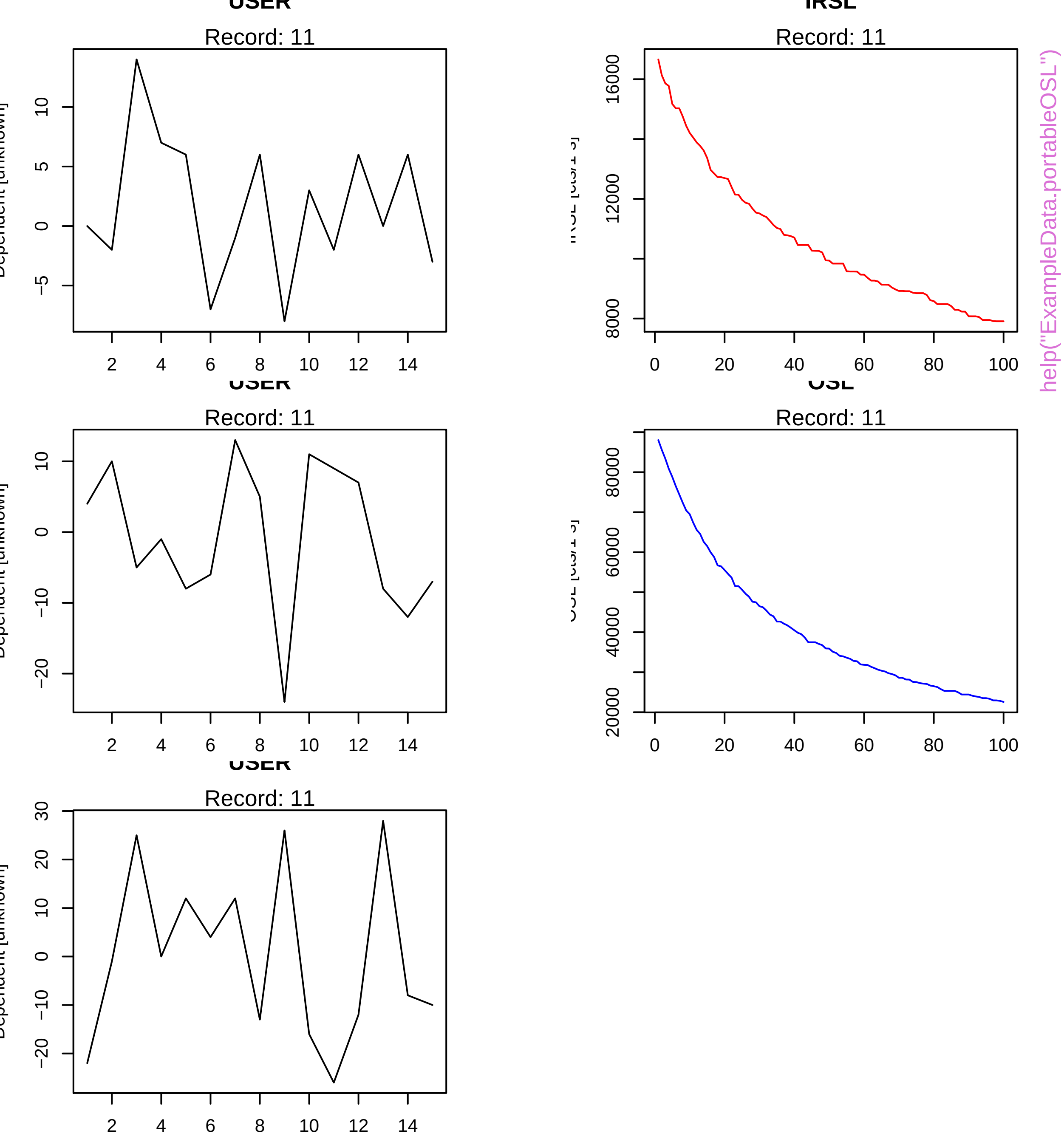


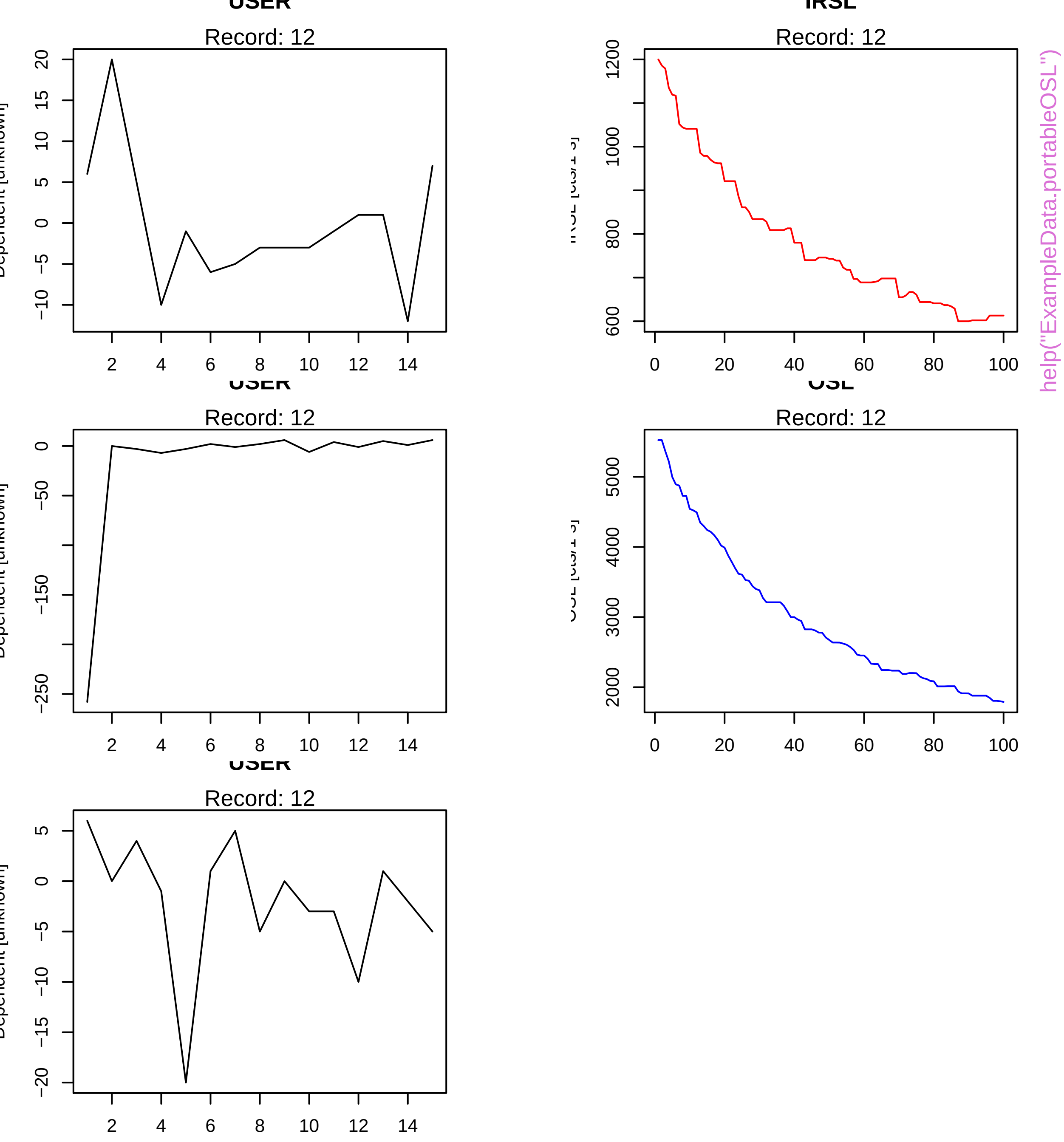
help("ExampleData.portableOSL")

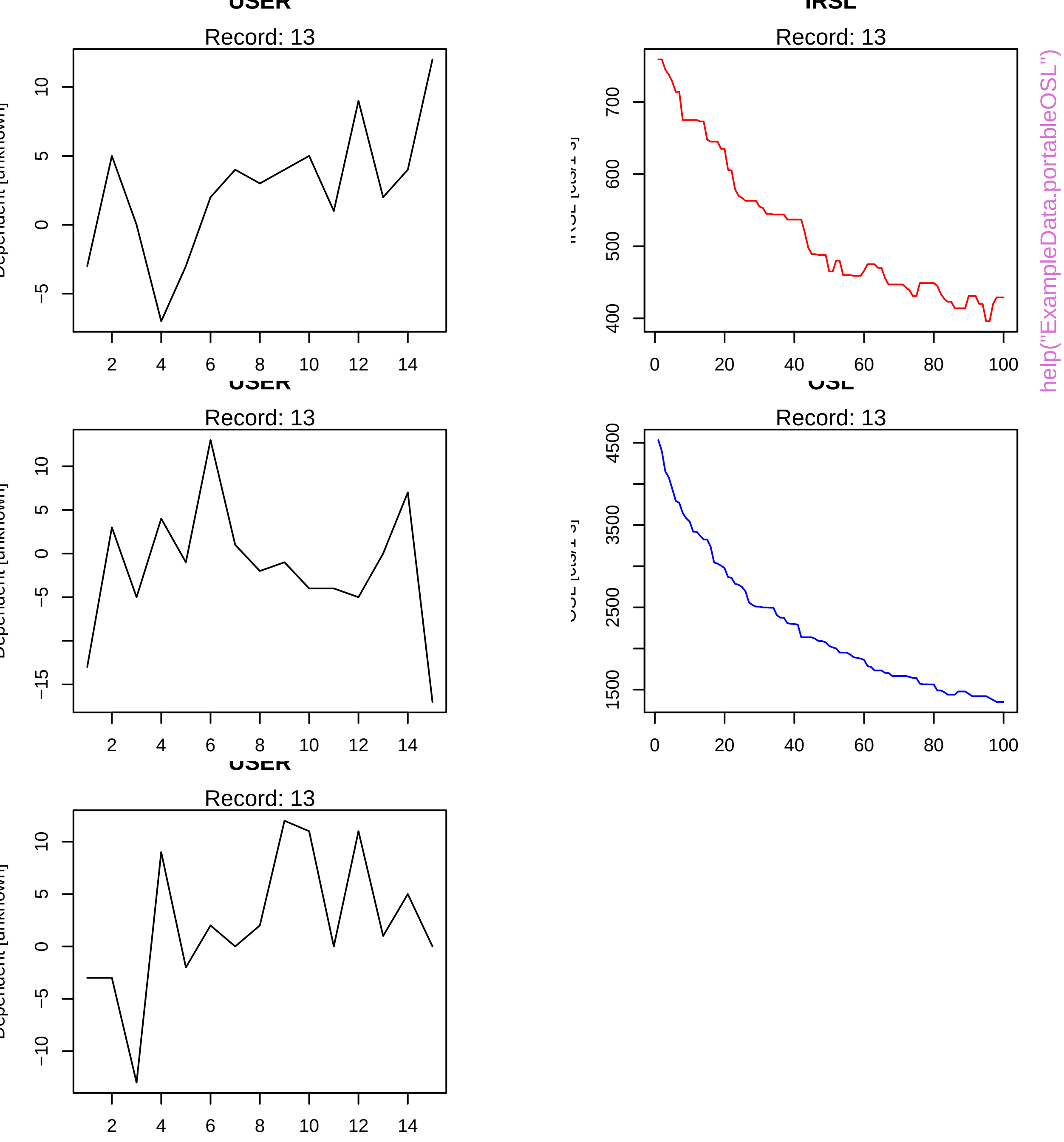

USER
Record: 8
Dependent [unknown]
−4
−2
0
2
4
6
8
10
2
4
6
8
10
12
14
IRSL
Record: 8
IRSL [cts/1 s]
2500
3500
4500
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 8
Dependent [unknown]
−15
−10
−5
0
5
2
4
6
8
10
12
14
OSL
Record: 8
OSL [cts/1 s]
6000
10000
14000
0
20
40
60
80
100
USER
Record: 8
Dependent [unknown]
−5
0
5
10
15
20
2
4
6
8
10
12
14

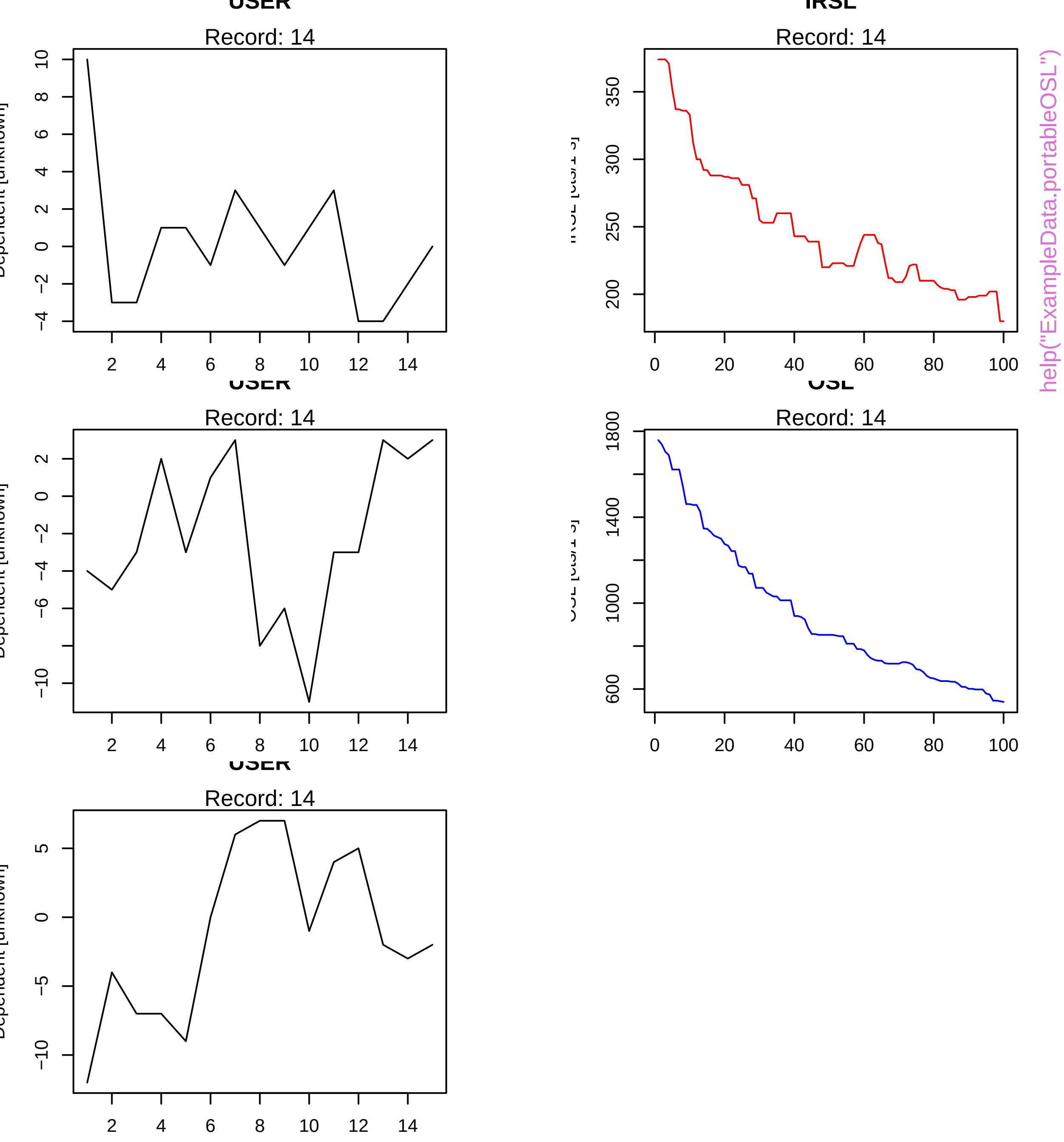

USER
Record: 9
Dependent [unknown]
4
2
0
−2
−4
−6
−8
2
4
6
8
10
12
14
IRSL
Record: 9
IRSL [cts/1 s]
24000
20000
16000
12000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 9
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14
OSL
Record: 9
OSL [cts/1 s]
8e+04
4e+04
0
20
40
60
80
100
USER
Record: 9
Dependent [unknown]
20
10
0
−10
−20
2
4
6
8
10
12
14

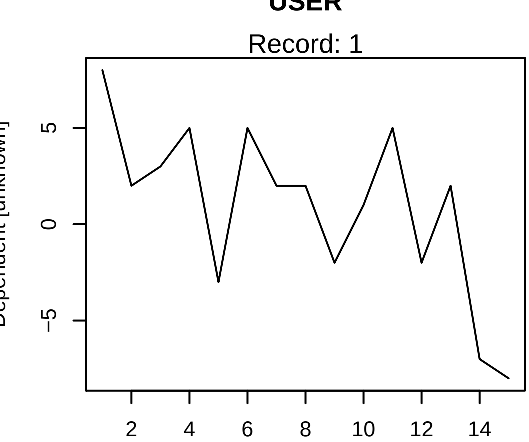

USER
Record: 10
Dependent [unknown]
5
0
−5
2
4
6
8
10
12
14
IRSL
Record: 10
24000
20000
16000
12000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 10
Dependent [unknown]
20
10
0
−10
−20
2
4
6
8
10
12
14
OSL
Record: 10
8e+04
4e+04
0
20
40
60
80
100
USER
Record: 10
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14

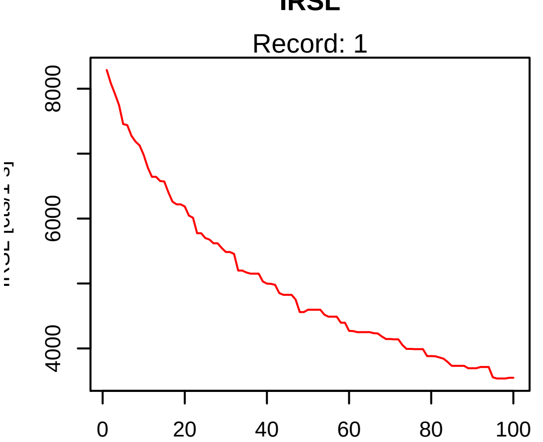

USER
Record: 11
Dependent [unknown]
−5
0
5
10
2
4
6
8
10
12
14
IRSL
Record: 11
8000
12000
16000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 11
Dependent [unknown]
−20
−10
0
10
2
4
6
8
10
12
14
OSL
Record: 11
20000
40000
60000
80000
0
20
40
60
80
100
USER
Record: 11
Dependent [unknown]
−20
−10
0
10
20
30
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
IRSL [cts/1 s]
1200
1000
800
600
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 12
Dependent [unknown]
0
−50
−150
−250
2
4
6
8
10
12
14
OSL
Record: 12
OSL [cts/1 s]
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

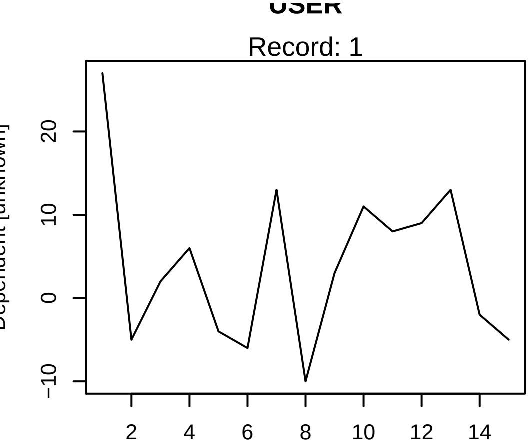

USER
Record: 13
Dependent [unknown]
IRSL
Record: 13
IRSL [cts/1 s]
help("ExampleData.portableOSL")
USER
Record: 13
Dependent [unknown]
OSL
Record: 13
OSL [cts/1 s]
USER
Record: 13
Dependent [unknown]

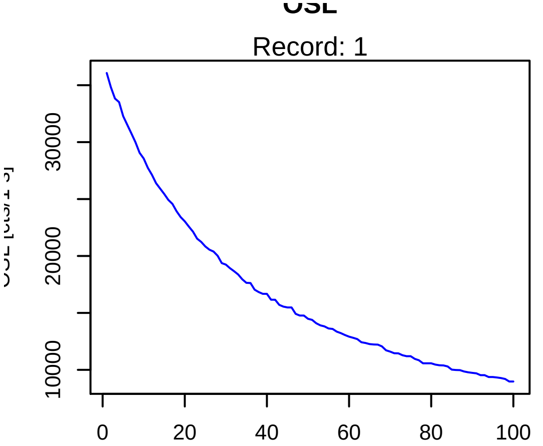

USER
Record: 14
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 14
350
300
250
200
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 14
Dependent [unknown]
2
0
−2
−4
−6
−10
2
4
6
8
10
12
14
OSL
Record: 14
1800
1400
1000
600
0
20
40
60
80
100
USER
Record: 14
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14

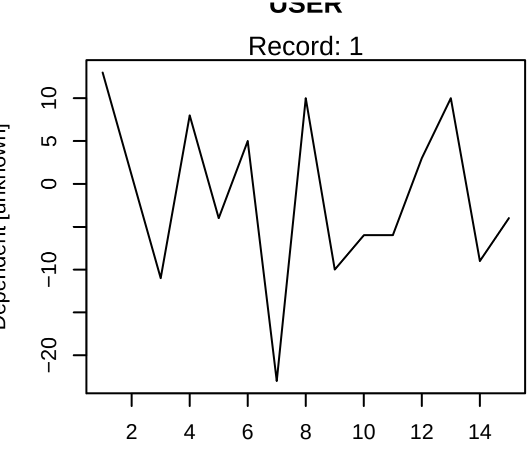


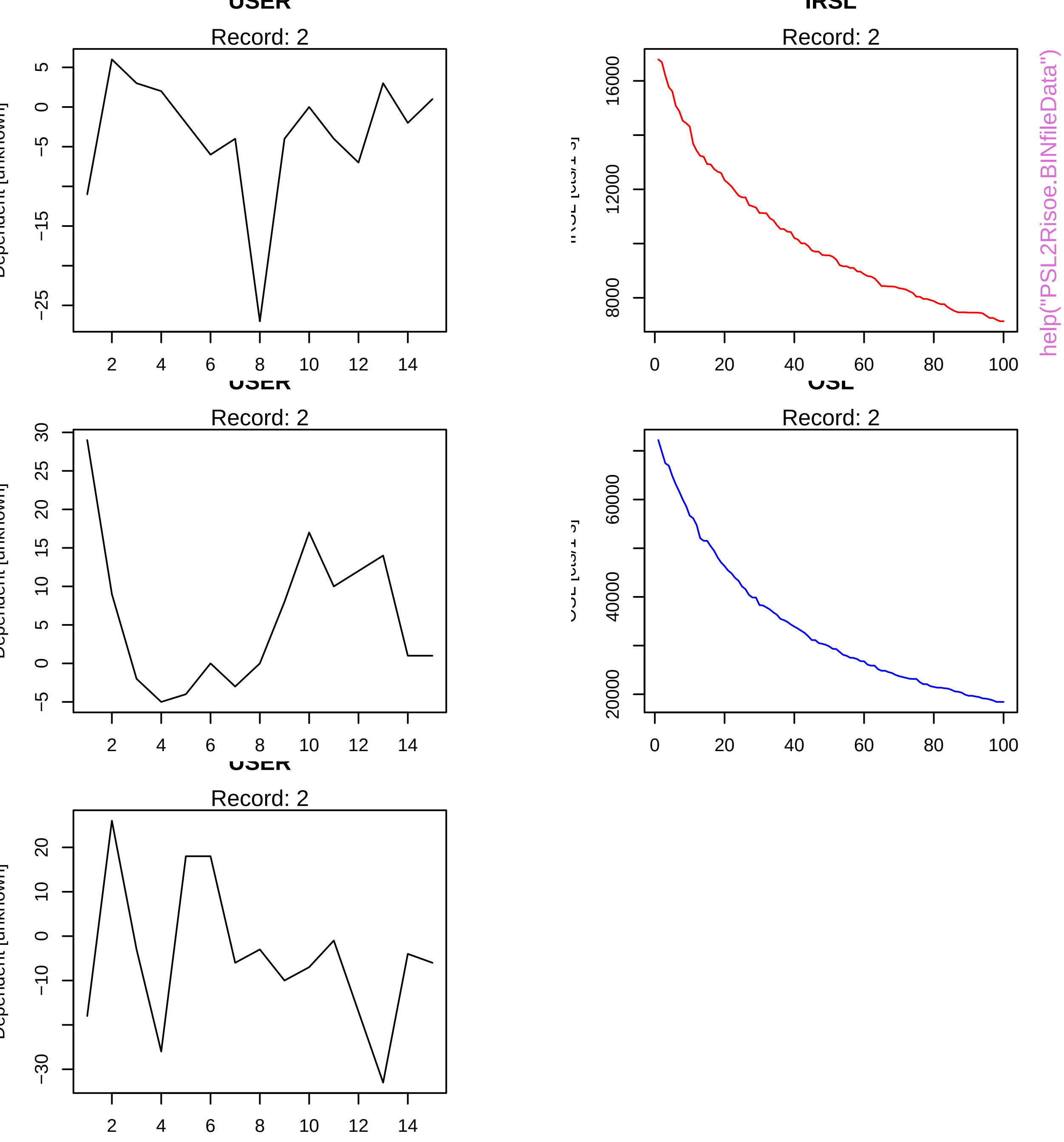


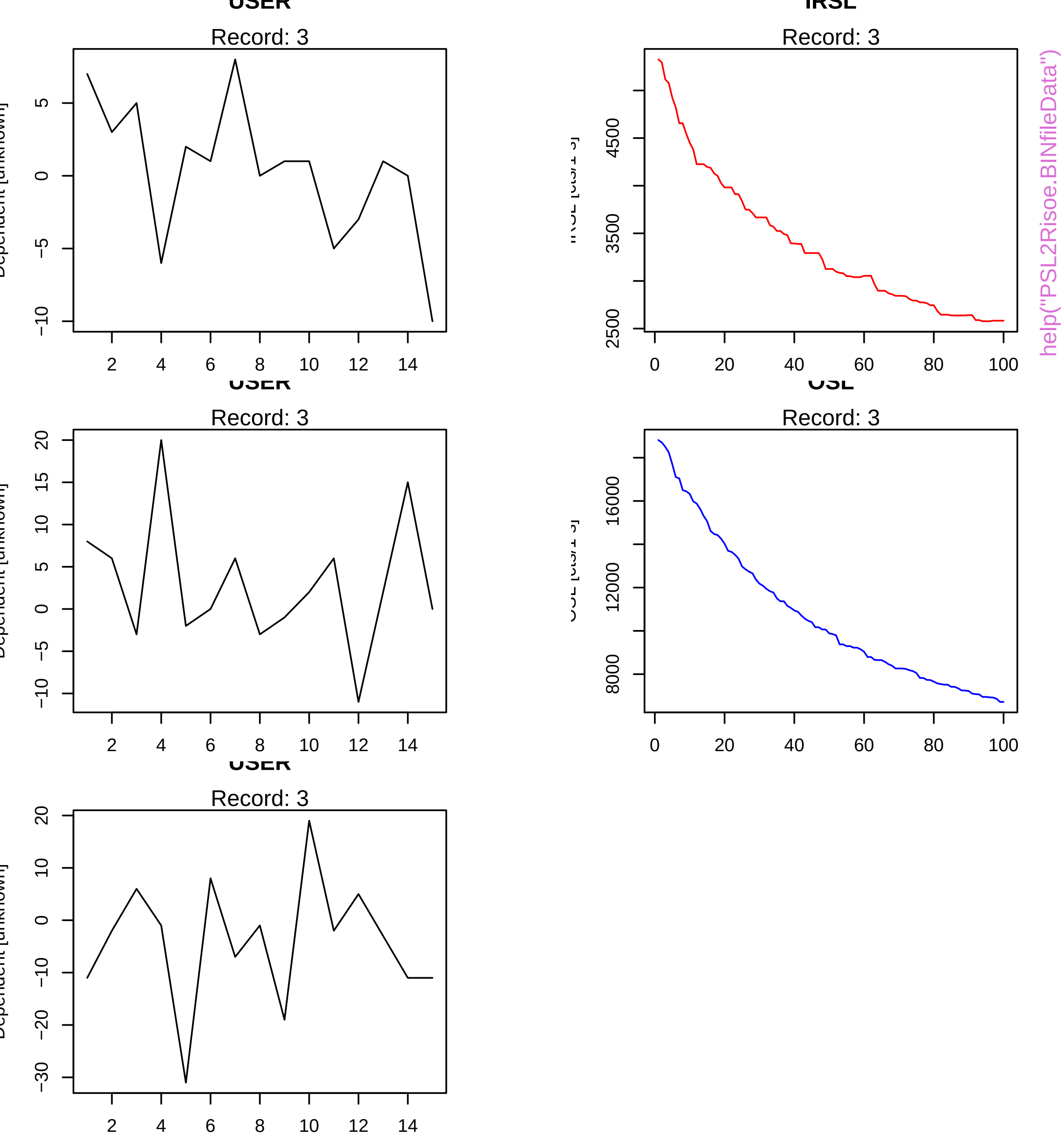
help("PSL2Risoe.BINfileData")

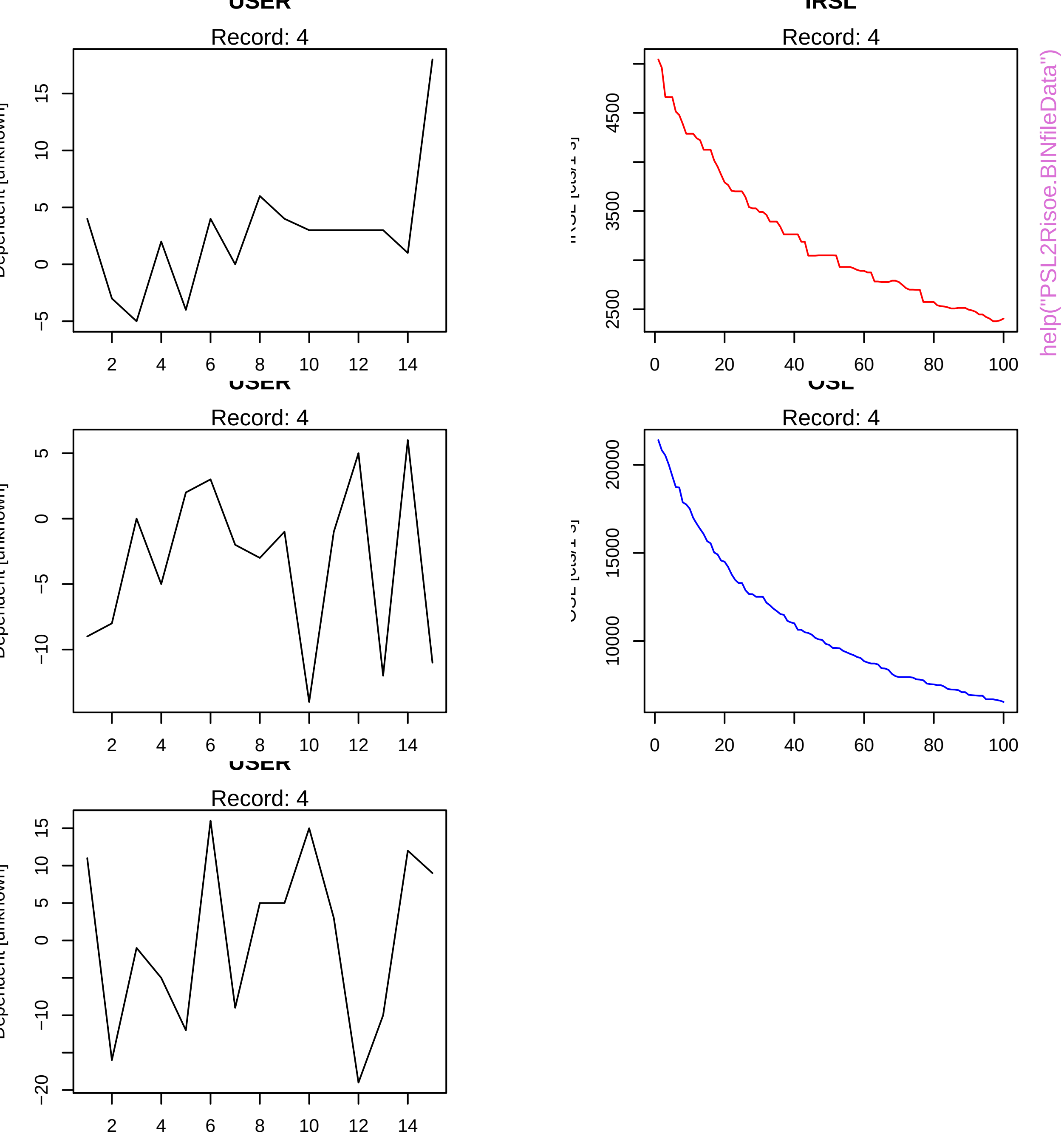


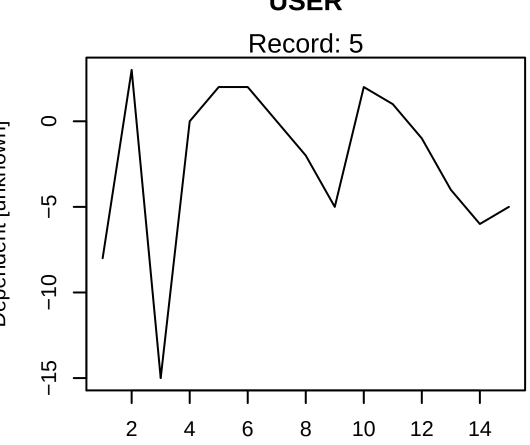


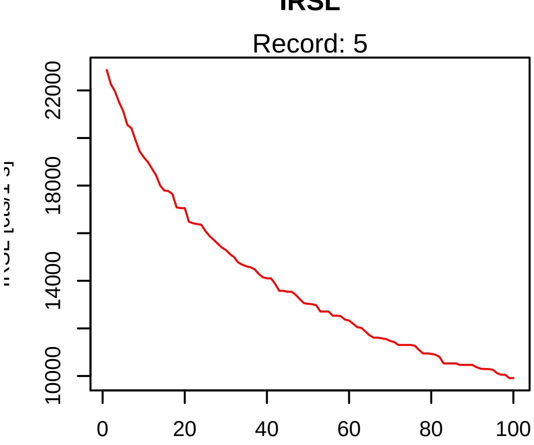



USER
Record: 2
Dependent [unknown]
5
0
−5
−15
−25
2
4
6
8
10
12
14
IRSL
Record: 2
16000
12000
8000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 2
Dependent [unknown]
30
25
20
15
10
5
0
−5
2
4
6
8
10
12
14
OSL
Record: 2
60000
40000
20000
0
20
40
60
80
100
USER
Record: 2
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14

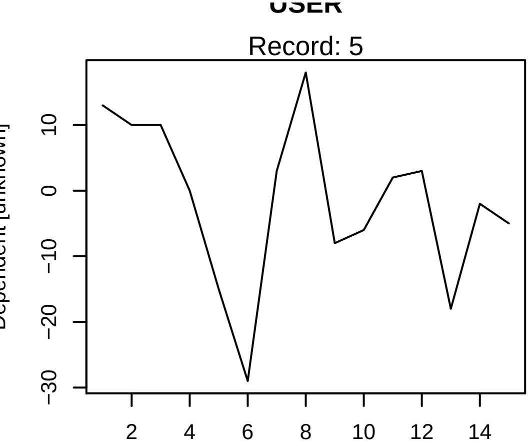

USER
Record: 3
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14
IRSL
Record: 3
4500
3500
2500
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 3
Dependent [unknown]
20
15
10
5
0
−5
−10
2
4
6
8
10
12
14
OSL
Record: 3
16000
12000
8000
0
20
40
60
80
100
USER
Record: 3
Dependent [unknown]
20
10
0
−10
−20
−30
2
4
6
8
10
12
14

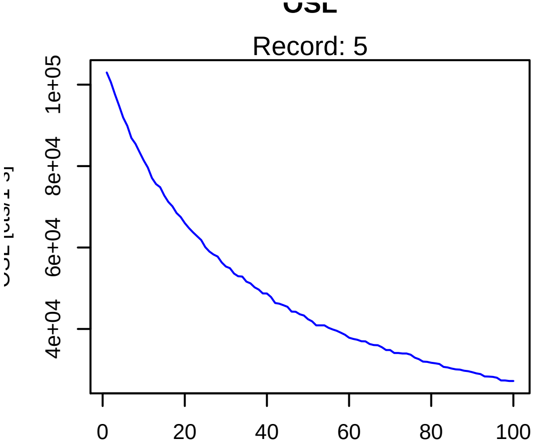

USER
Record: 4
Dependent [unknown]
−5
0
5
10
15
2
4
6
8
10
12
14
IRSL
Record: 4
2500
3500
4500
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 4
Dependent [unknown]
−10
−5
0
5
2
4
6
8
10
12
14
OSL
Record: 4
10000
15000
20000
0
20
40
60
80
100
USER
Record: 4
Dependent [unknown]
−20
−10
0
5
10
15
2
4
6
8
10
12
14

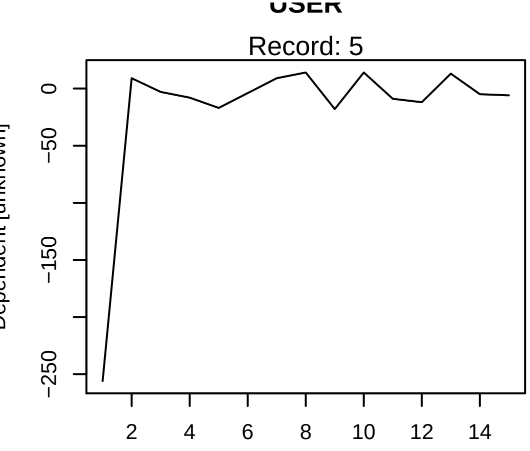


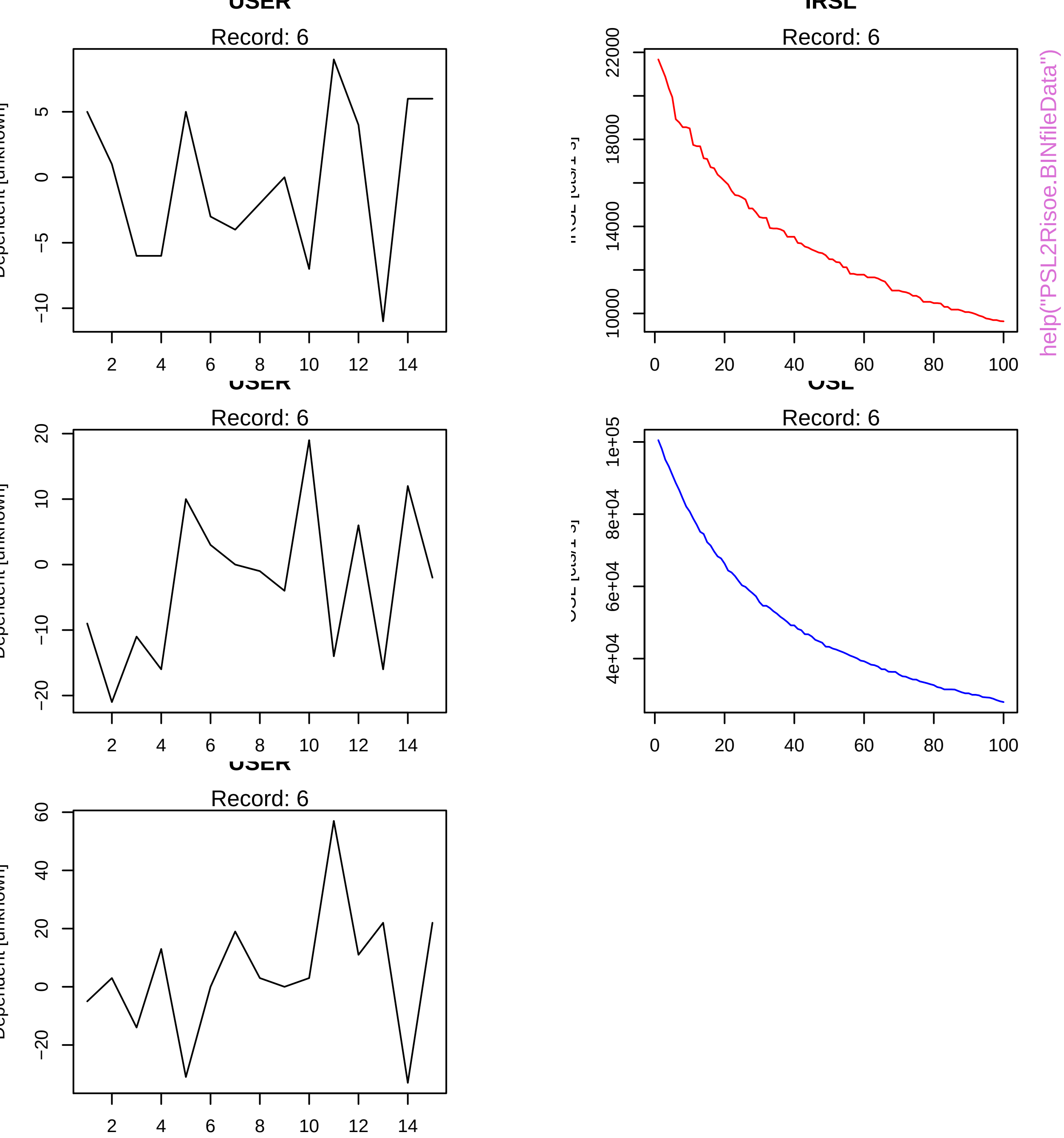


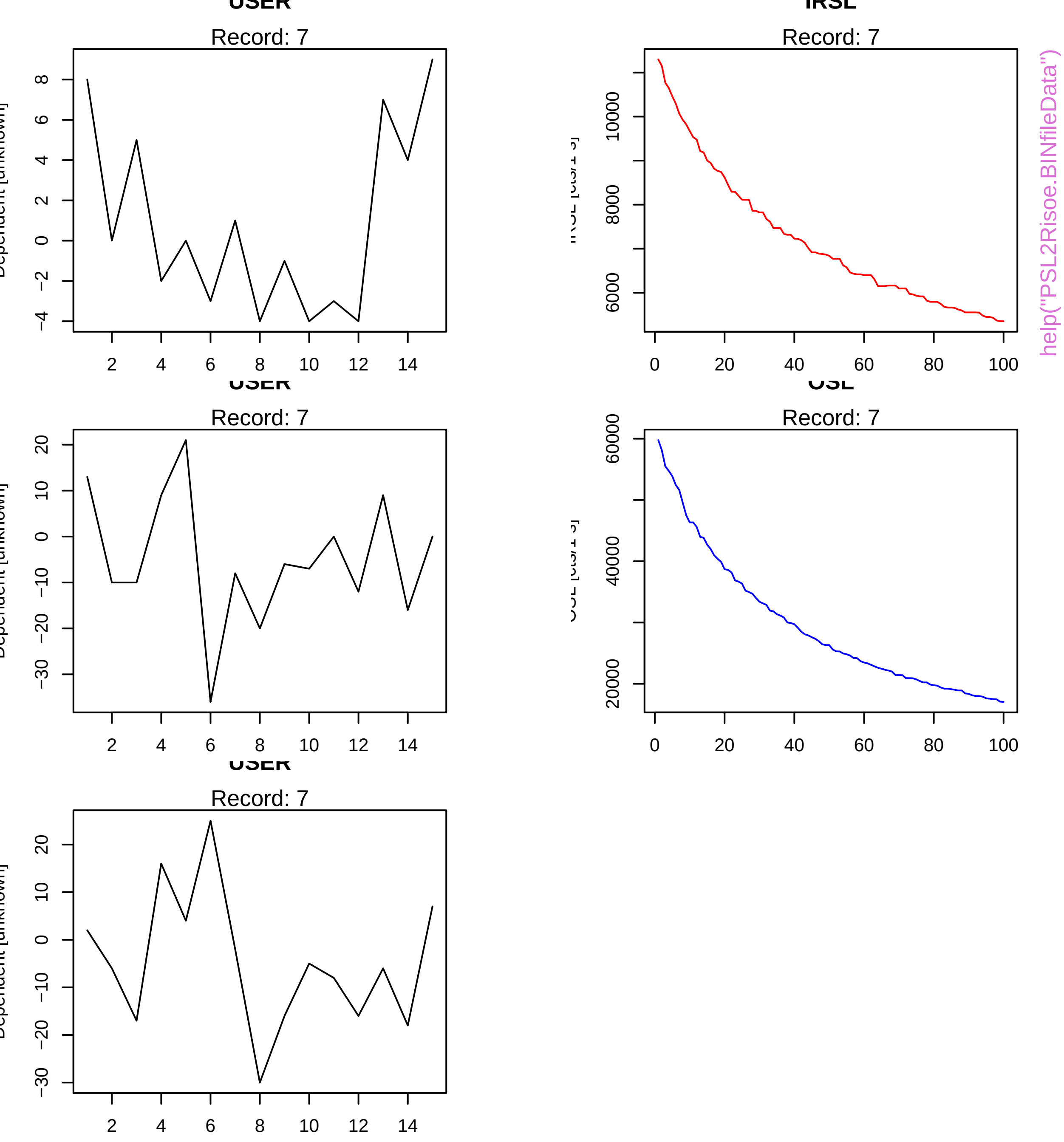
help("PSL2Risoe.BINfileData")

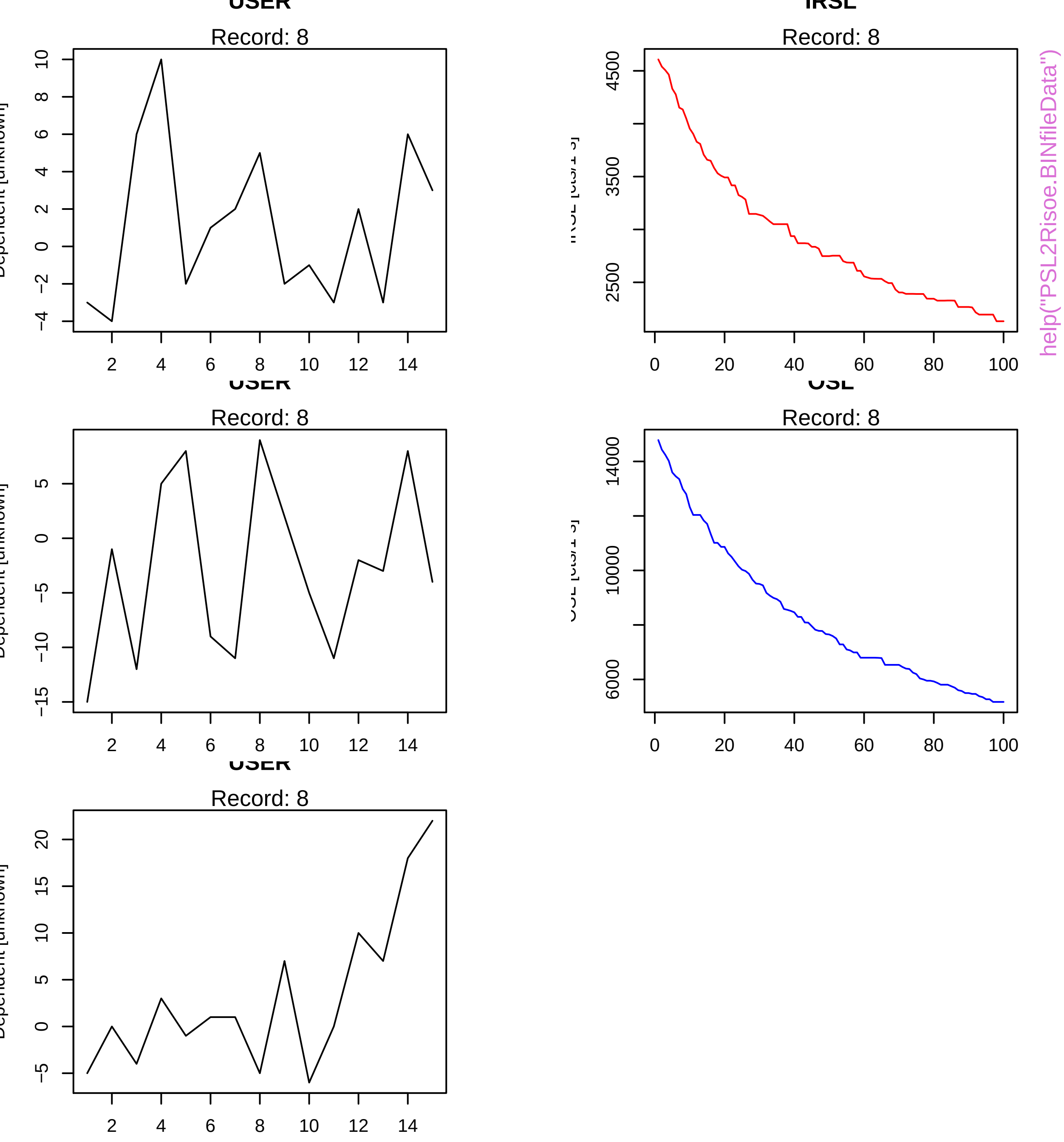


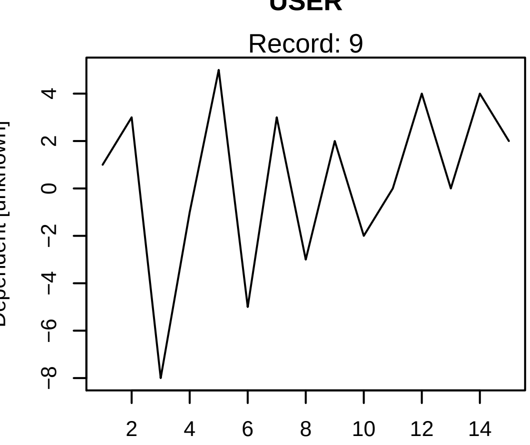


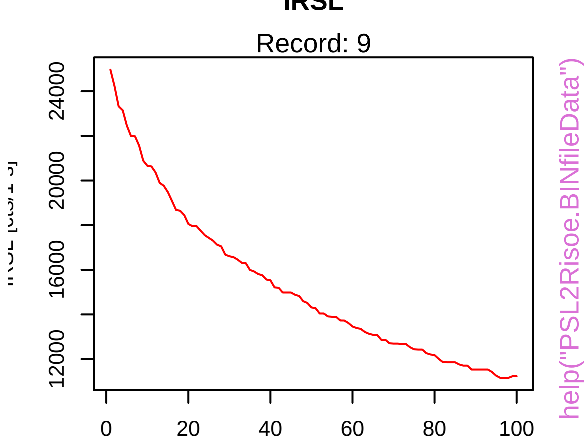


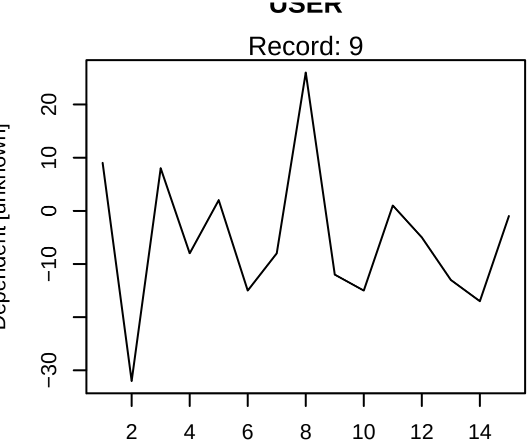

USER
Record: 6
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14
IRSL
Record: 6
22000
18000
14000
10000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 6
Dependent [unknown]
20
10
0
−10
−20
2
4
6
8
10
12
14
OSL
Record: 6
1e+05
8e+04
6e+04
4e+04
0
20
40
60
80
100
USER
Record: 6
Dependent [unknown]
60
40
20
0
−20
2
4
6
8
10
12
14

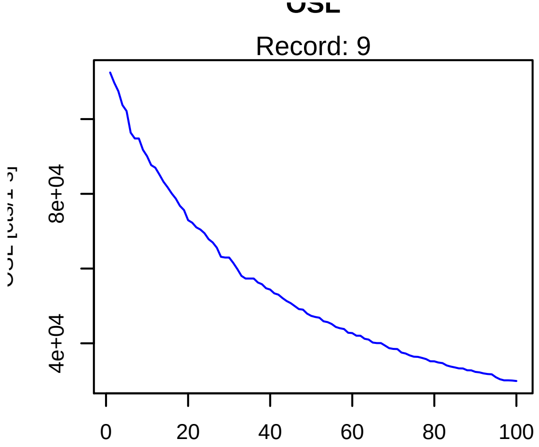

USER
Record: 7
Dependent [unknown]
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 7
IRSL [cts/1 s]
10000
8000
6000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 7
Dependent [unknown]
20
10
0
−10
−20
−30
2
4
6
8
10
12
14
OSL
Record: 7
OSL [cts/1 s]
60000
40000
20000
0
20
40
60
80
100
USER
Record: 7
Dependent [unknown]
20
10
0
−10
−20
−30
2
4
6
8
10
12
14

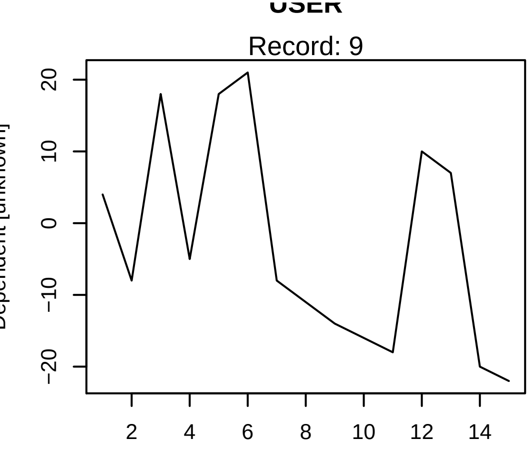

USER
Record: 8
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
Dependent [unknown]
IRSL
Record: 8
4500
3500
2500
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 8
5
0
−5
−10
−15
2
4
6
8
10
12
14
Dependent [unknown]
OSL
Record: 8
14000
10000
6000
0
20
40
60
80
100
USER
Record: 8
20
15
10
5
0
−5
2
4
6
8
10
12
14
Dependent [unknown]

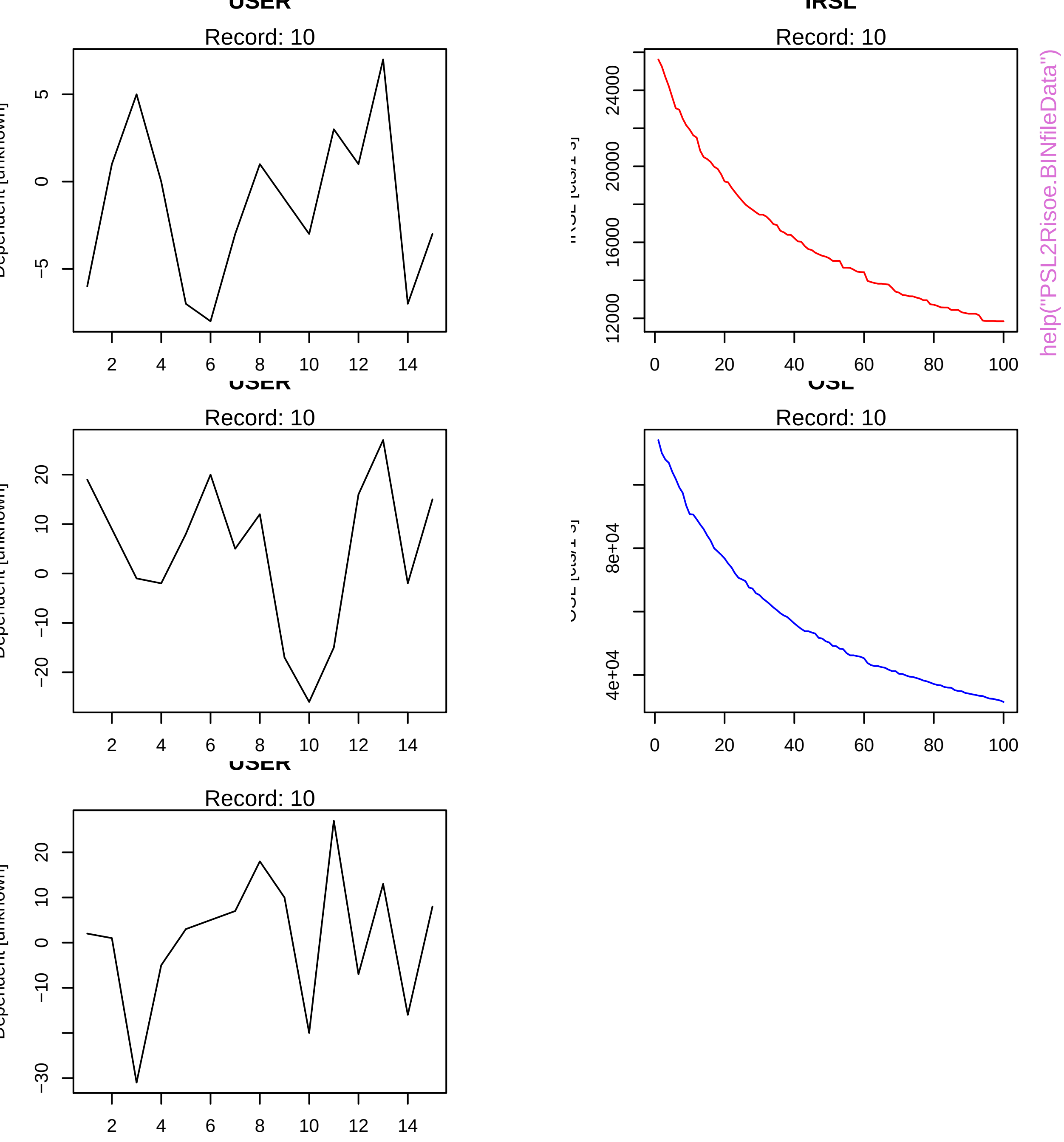

USER
Record: 9
4
2
0
−2
−4
−6
−8
2
4
6
8
10
12
14

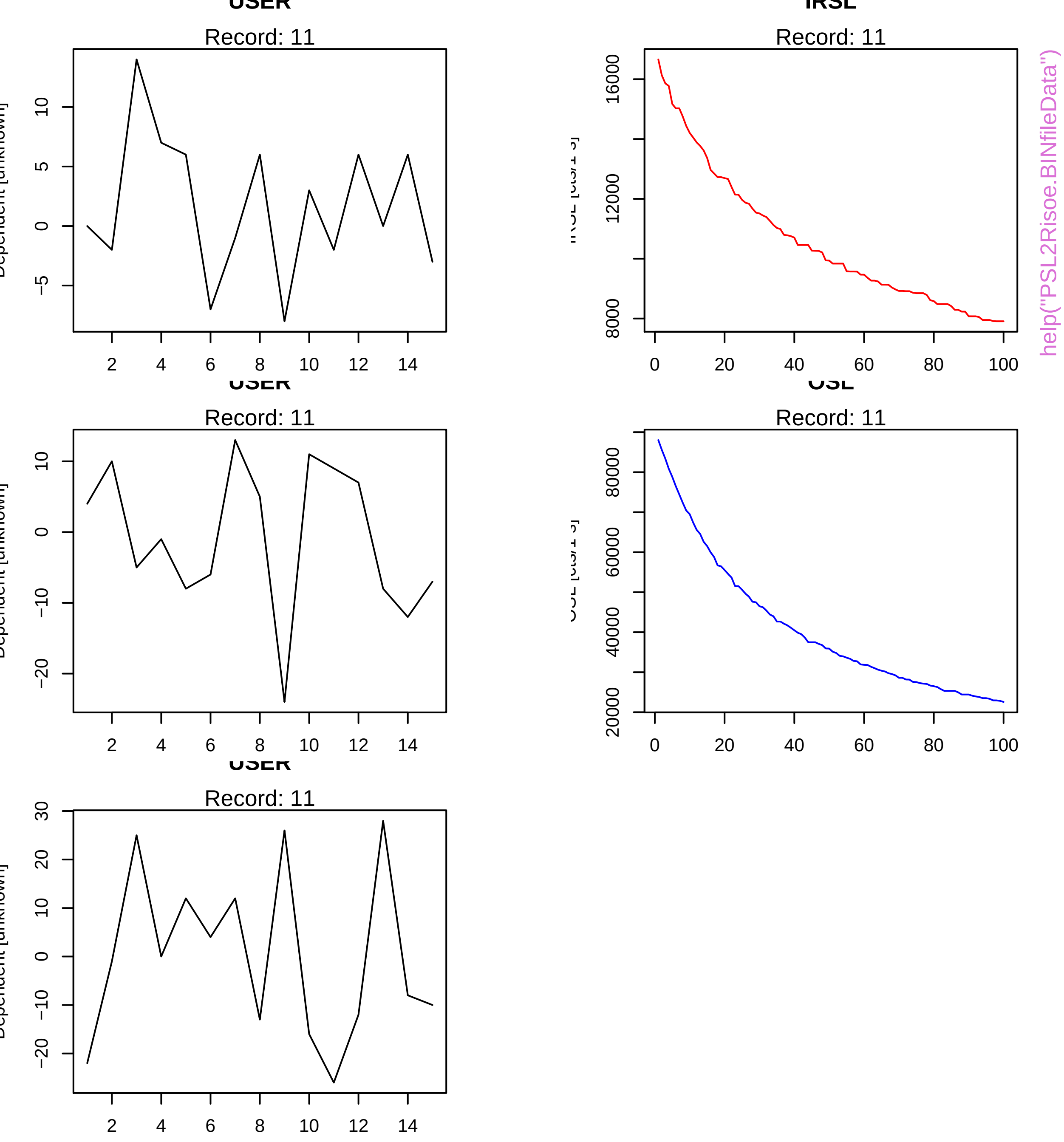

IRSL
Record: 9
24000
20000
16000
12000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")

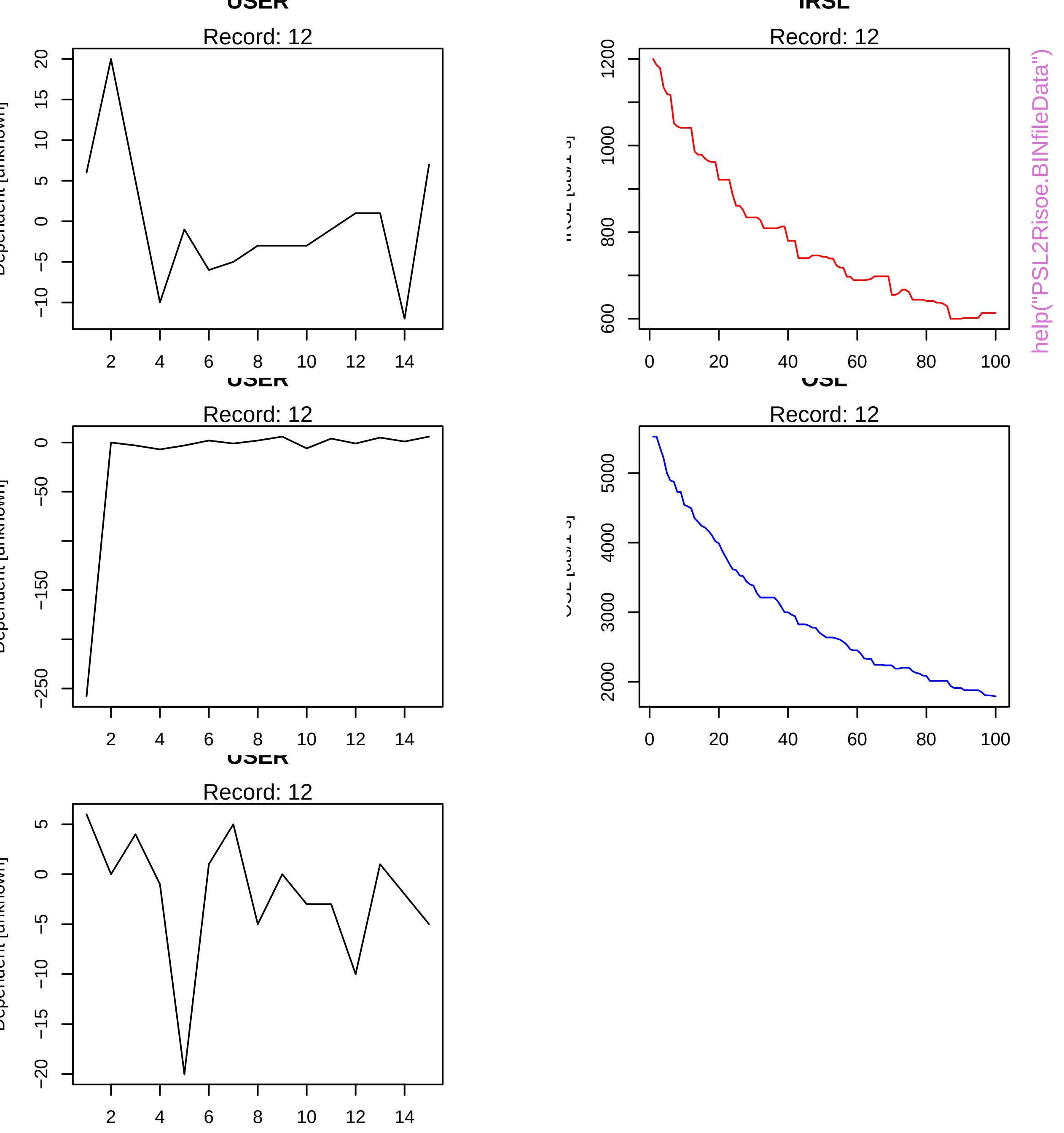

USER
Record: 9
20
10
0
−10
−30
2
4
6
8
10
12
14

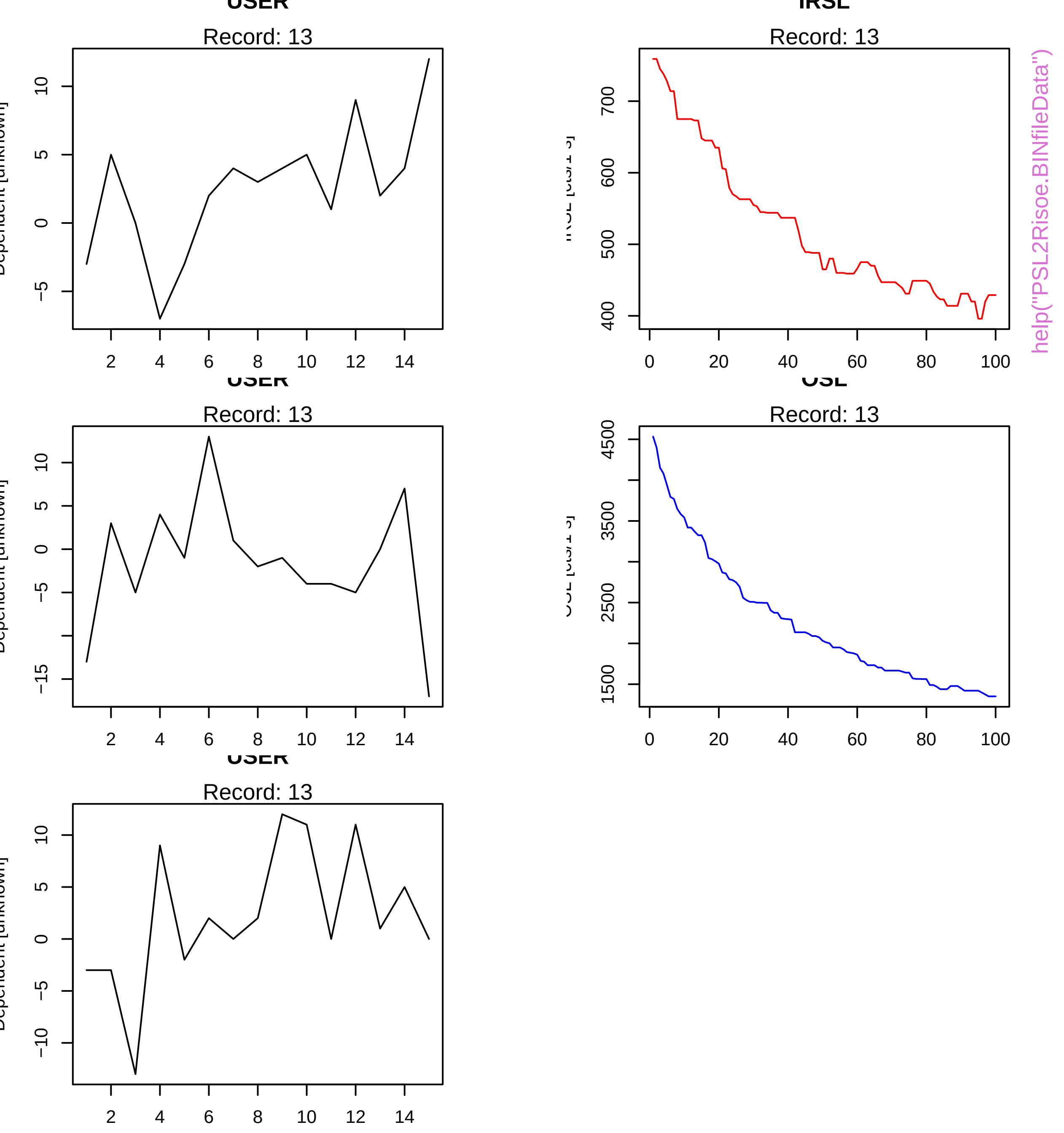

OSL
Record: 9
8e+04
4e+04
0
20
40
60
80
100

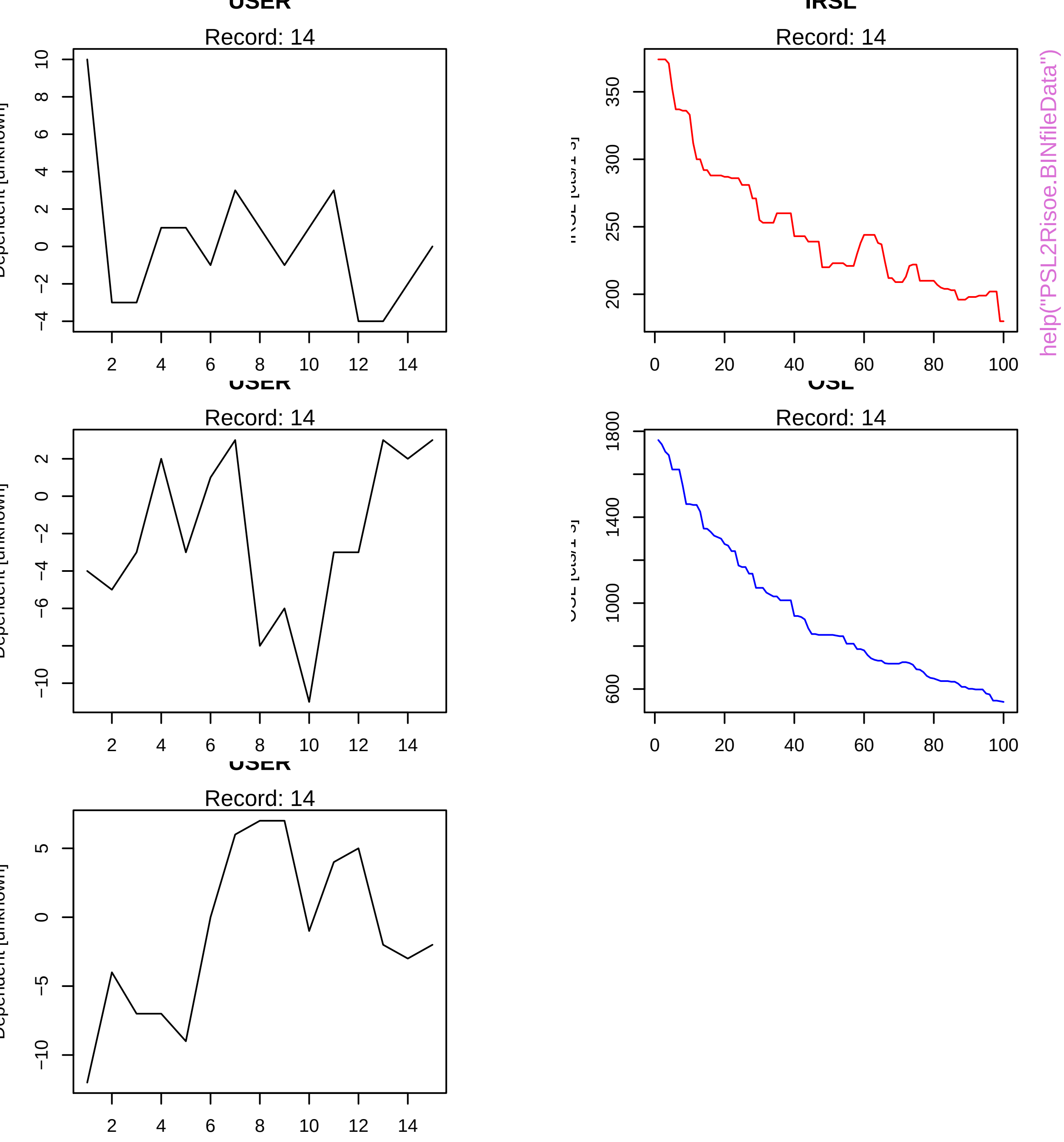

USER
Record: 9
20
10
0
−10
−20
2
4
6
8
10
12
14


USER
Record: 10
Dependent [unknown]
5
0
−5
2
4
6
8
10
12
14
IRSL
Record: 10
24000
20000
16000
12000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 10
Dependent [unknown]
20
10
0
−10
−20
2
4
6
8
10
12
14
OSL
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

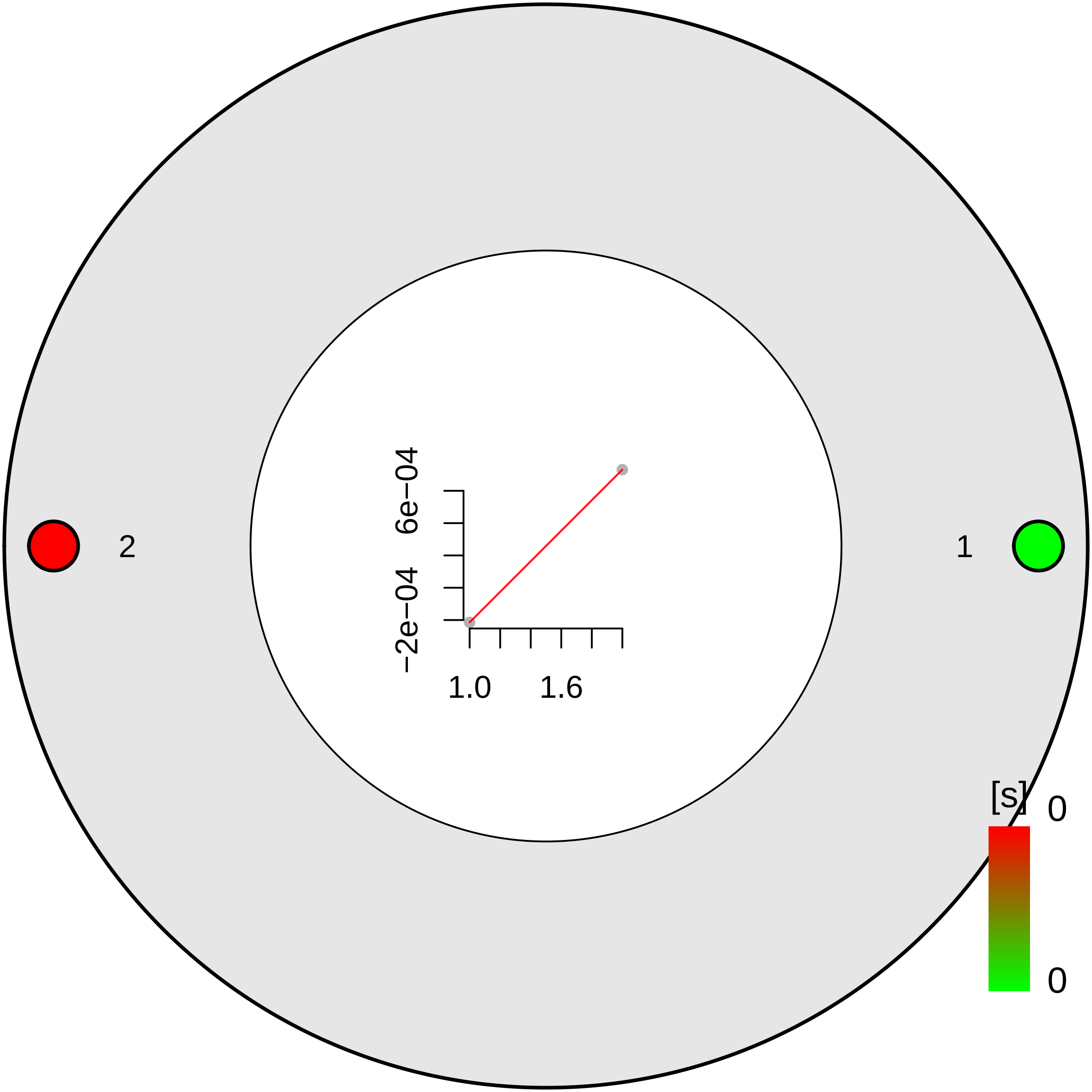

USER
Record: 11
Dependent [unknown]
−5
0
5
10
2
4
6
8
10
12
14
IRSL
Record: 11
8000
12000
16000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 11
Dependent [unknown]
−20
−10
0
10
2
4
6
8
10
12
14
OSL
Record: 11
20000
40000
60000
80000
0
20
40
60
80
100
USER
Record: 11
Dependent [unknown]
−20
−10
0
10
20
30
2
4
6
8
10
12
14

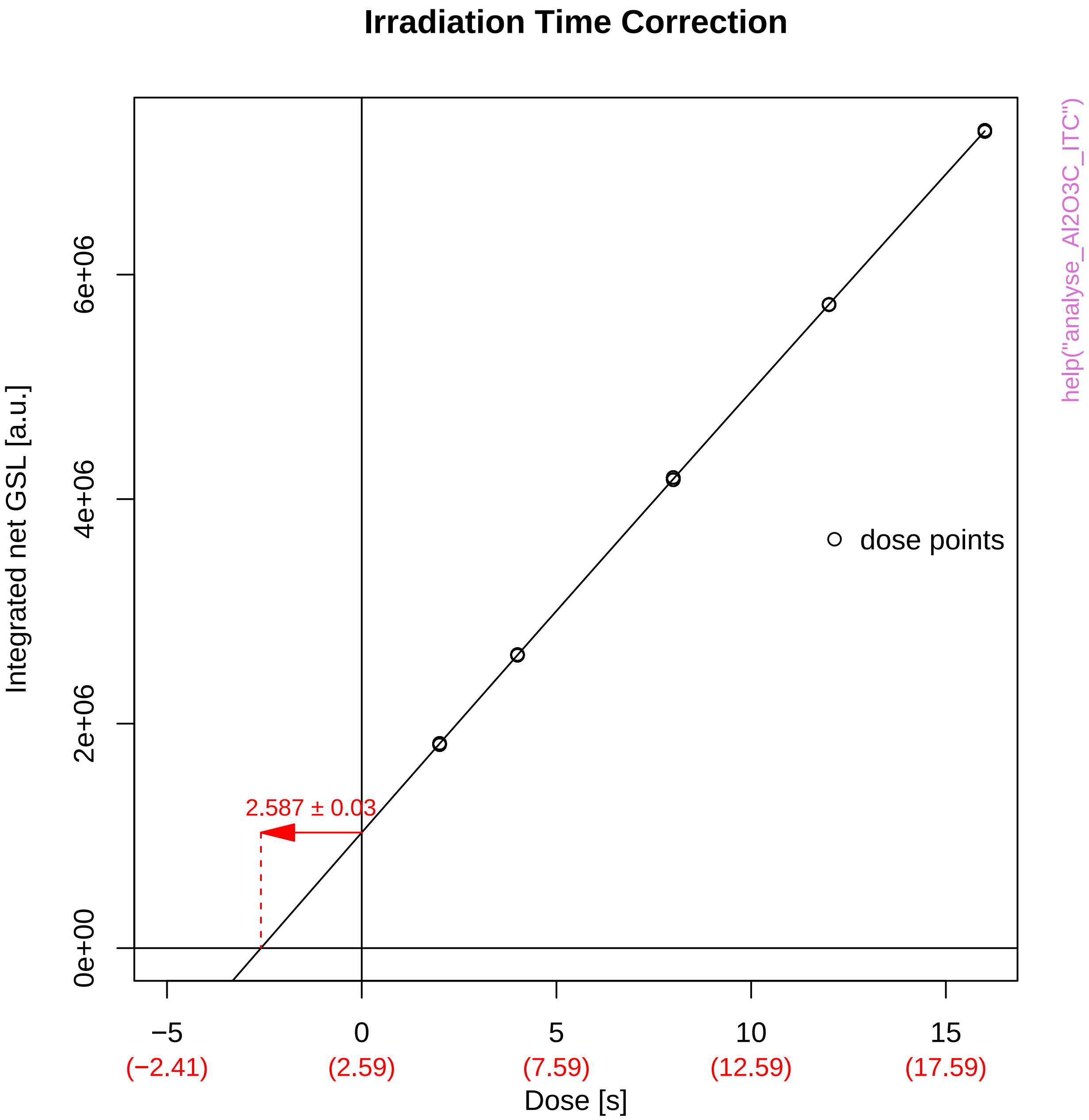

USER
Record: 12
Dependent [unknown]
20
15
10
5
0
−5
−10
2
4
6
8
10
12
14
IRSL
Record: 12
IRSL [cts/1 s]
1200
1000
800
600
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 12
Dependent [unknown]
0
−50
−150
−250
2
4
6
8
10
12
14
OSL
Record: 12
OSL [cts/1 s]
5000
4000
3000
2000
0
20
40
60
80
100
USER
Record: 12
Dependent [unknown]
5
0
−5
−10
−15
−20
2
4
6
8
10
12
14

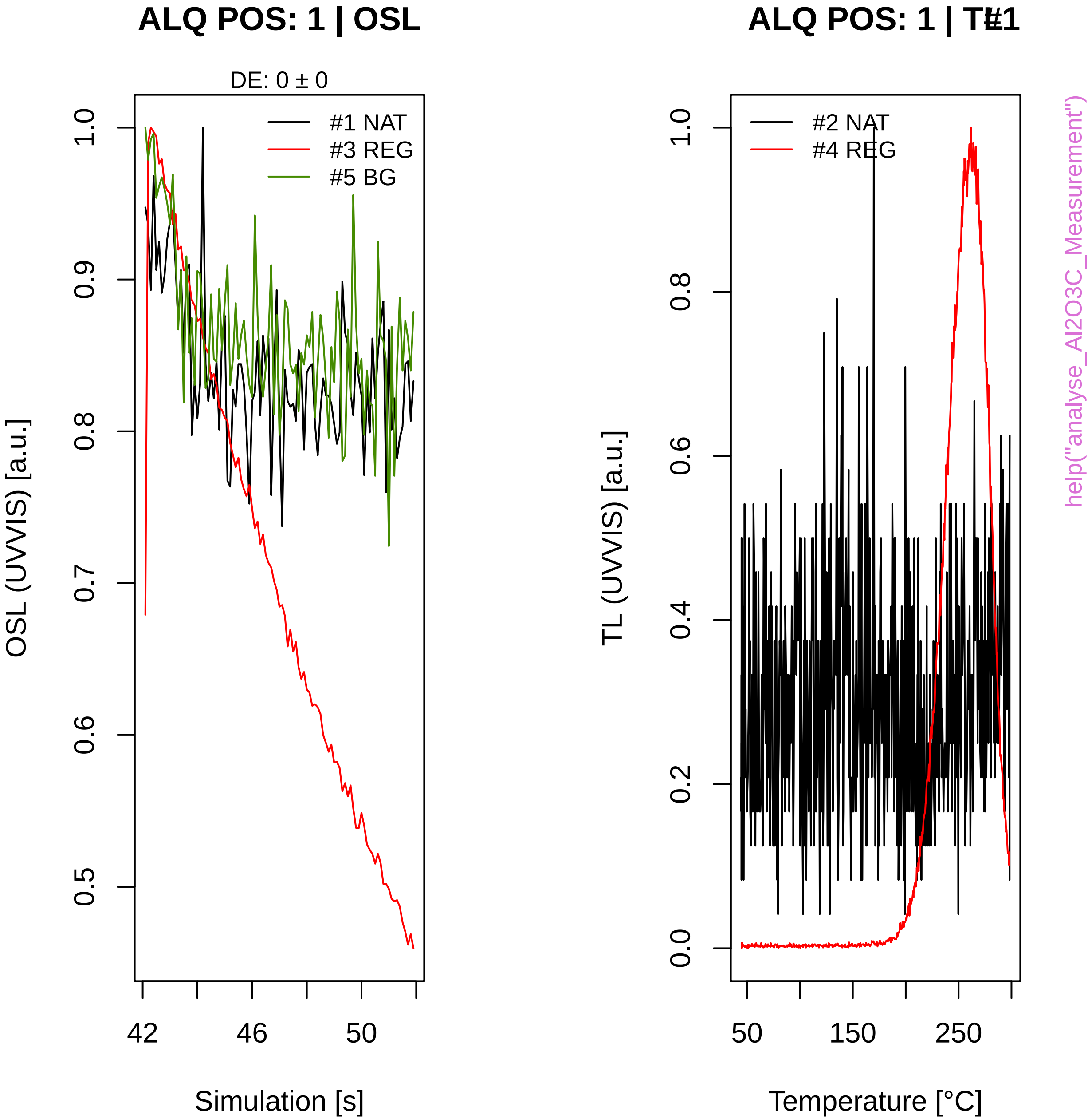

USER
Record: 13
Dependent [unknown]
IRSL
Record: 13
IRSL [cts/1 s]
USER
Record: 13
Dependent [unknown]
OSL
Record: 13
OSL [cts/1 s]
USER
Record: 13
Dependent [unknown]
help("PSL2Risoe.BINfileData")

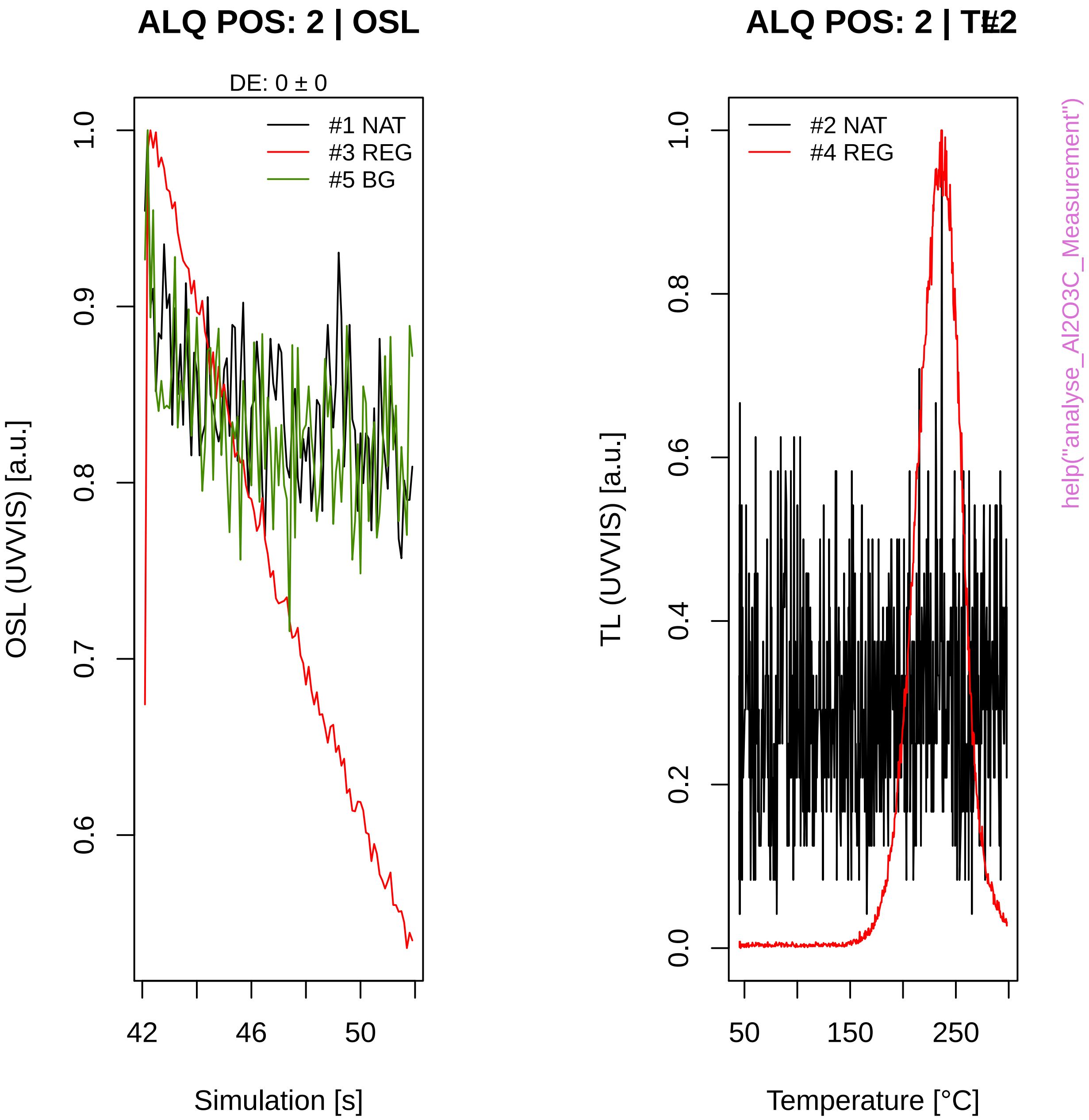

USER
Record: 14
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 14
350
300
250
200
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 14
Dependent [unknown]
2
0
−2
−4
−6
−10
2
4
6
8
10
12
14
OSL
Record: 14
1800
1400
1000
600
0
20
40
60
80
100
USER
Record: 14
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14

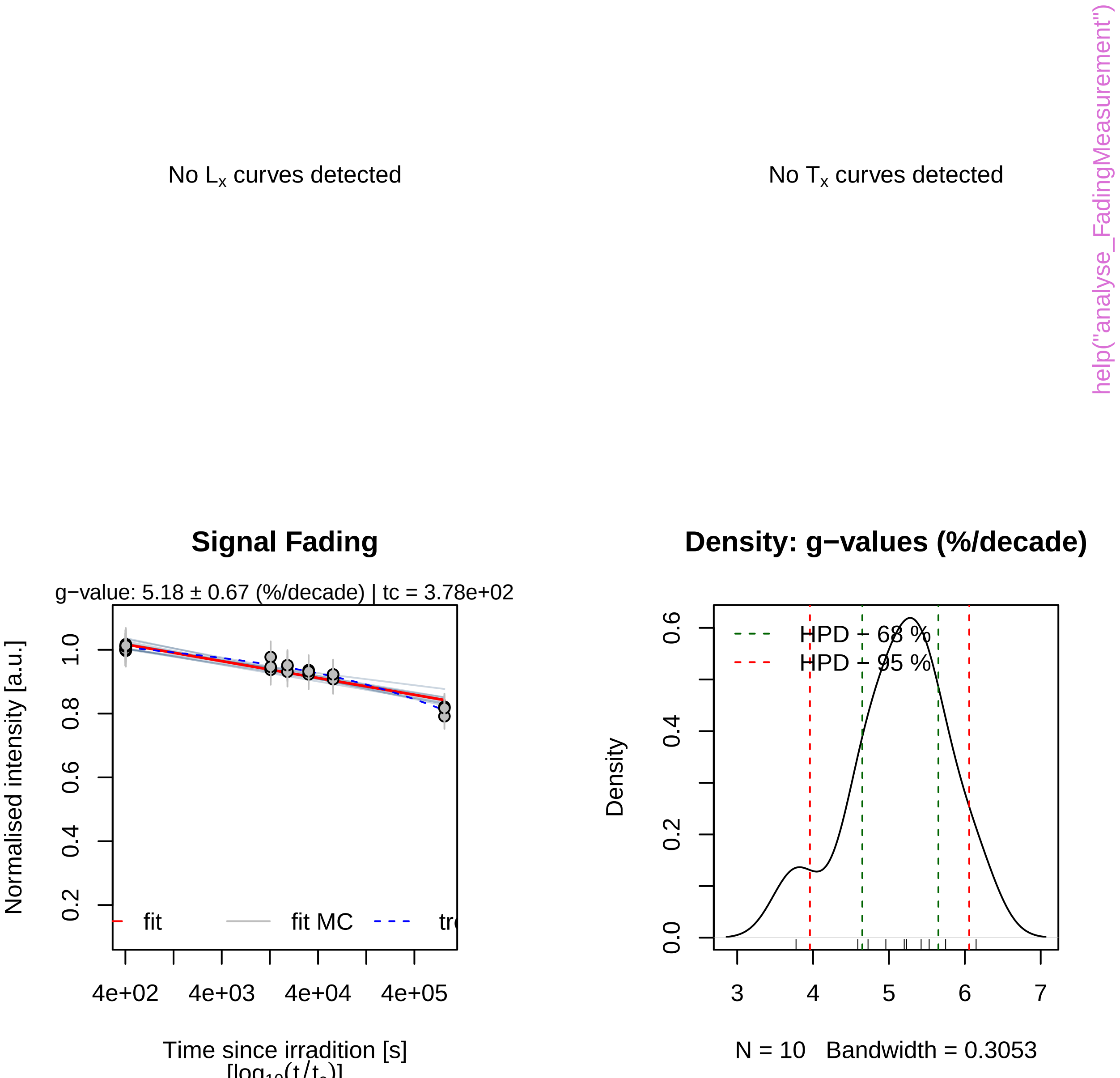
Sample Carousel Crosstalk

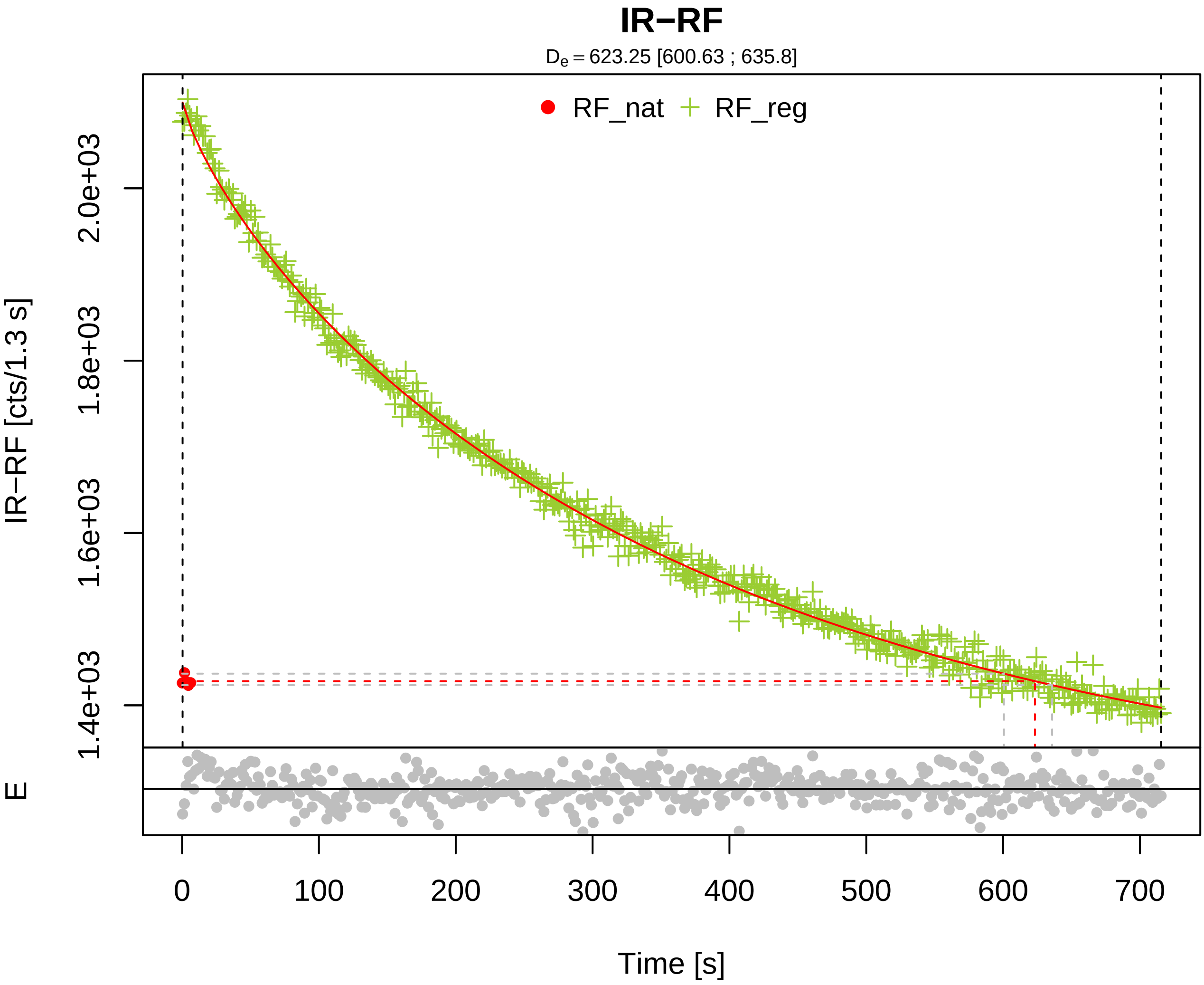



Irradiation Time Correction
Integrated net GSL [a.u.]
0e+00
2e+06
4e+06
6e+06
Dose [s]
−5
0
5
10
15
(−2.41)
(2.59)
(7.59)
(12.59)
(17.59)
2.587 ± 0.03
dose points
help("analyse_Al2O3C_ITC")

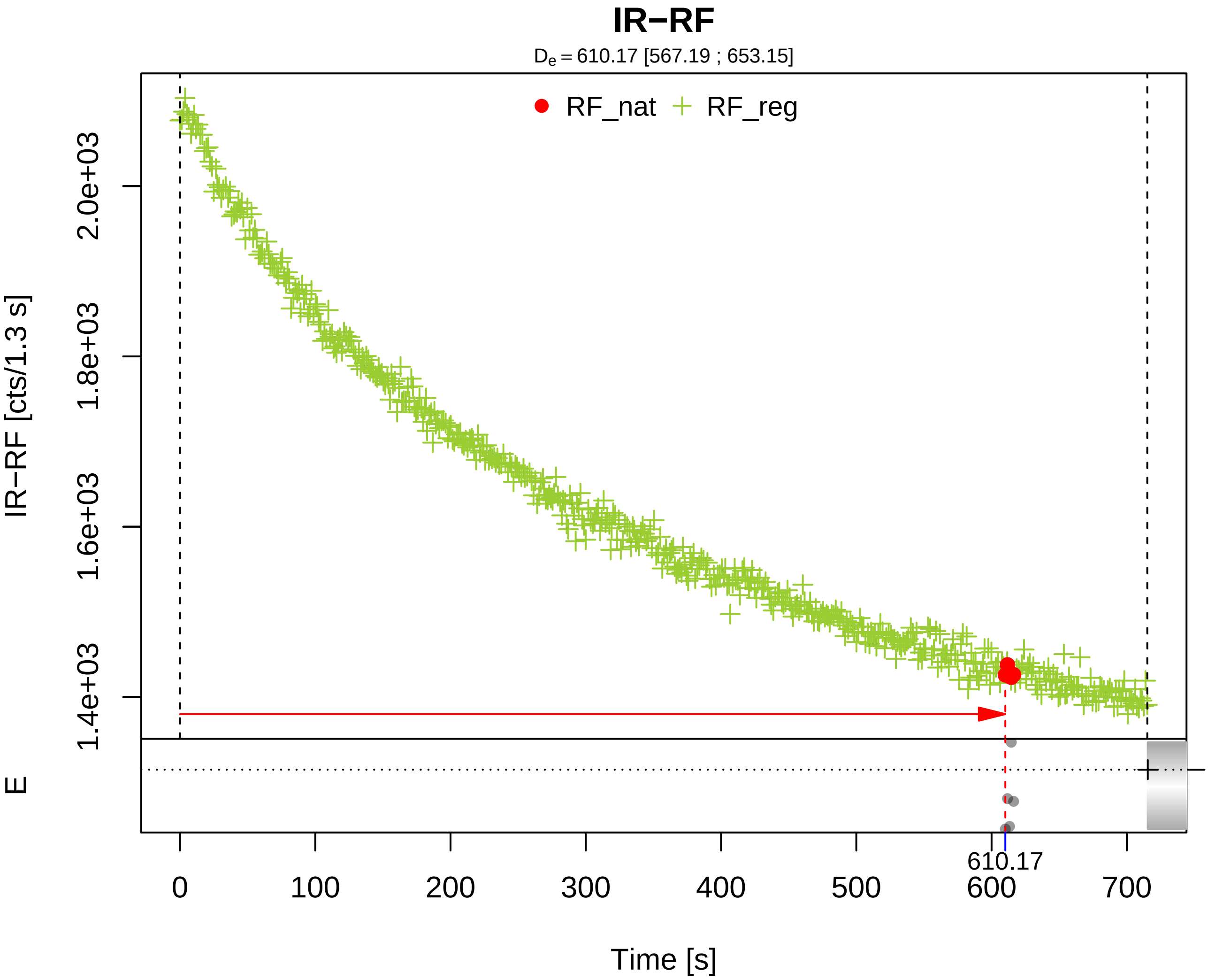

ALQ POS: 1 | OSL
DE: 0 ± 0
#1 NAT
#3 REG
#5 BG
OSL (UVVIS) [a.u.]
1.0
0.9
0.8
0.7
0.6
0.5
42
46
50
Simulation [s]
ALQ POS: 1 | TL#1
#2 NAT
#4 REG
TL (UVVIS) [a.u.]
1.0
0.8
0.6
0.4
0.2
0.0
50
150
250
Temperature [°C]
help("analyse_Al2O3C_Measurement")

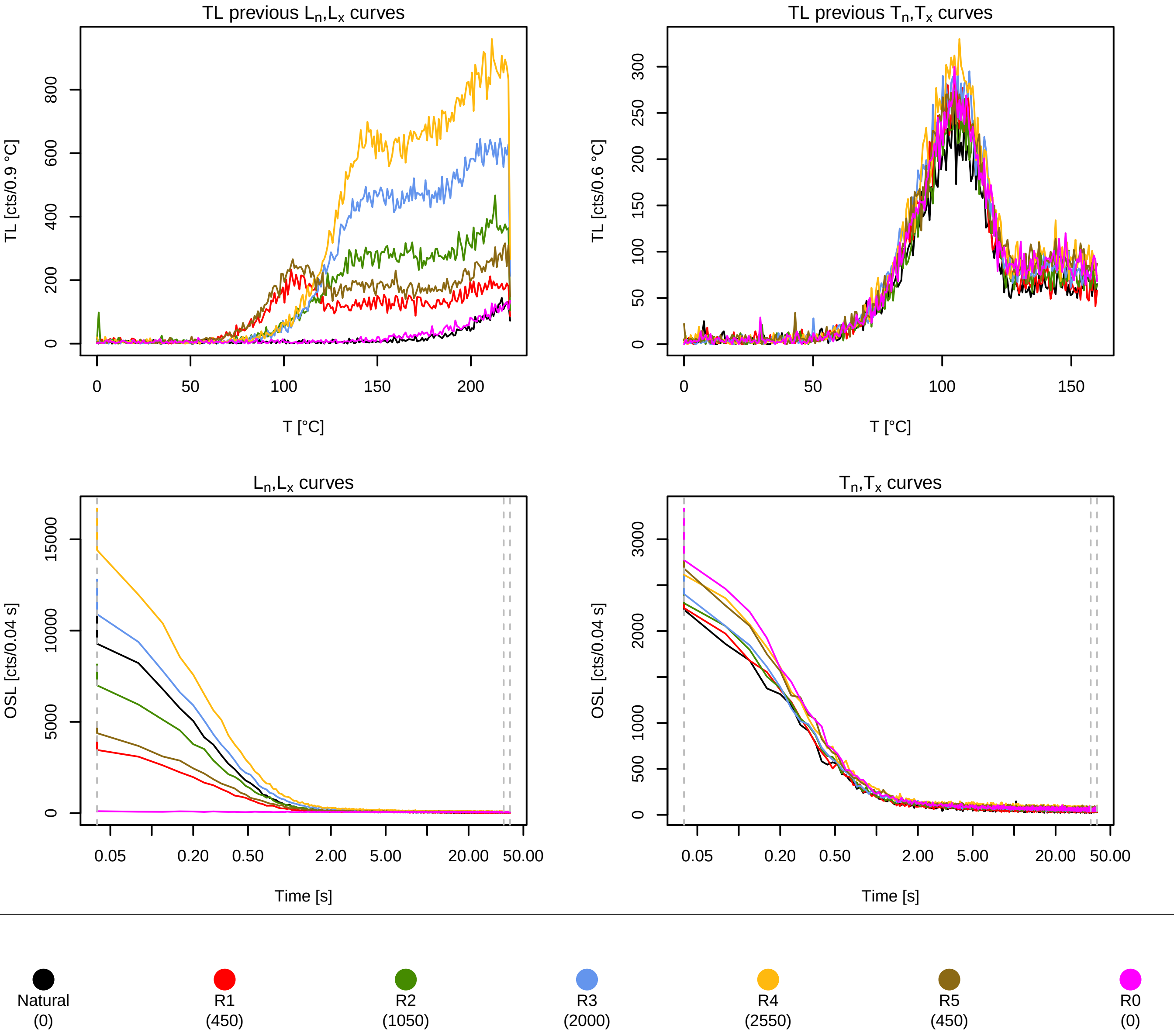

ALQ POS: 2 | OSL
DE: 0 ± 0
#1 NAT
#3 REG
#5 BG
OSL (UVVIS) [a.u.]
1.0
0.9
0.8
0.7
0.6
42
46
50
Simulation [s]
ALQ POS: 2 | TL#2
#2 NAT
#4 REG
TL (UVVIS) [a.u.]
1.0
0.8
0.6
0.4
0.2
0.0
50
150
250
Temperature [°C]
help("analyse_Al2O3C_Measurement")


No L_x curves detected
No T_x curves detected
help("analyse_FadingMeasurement")
Signal Fading
g−value: 5.18 ± 0.67 (%/decade) | tc = 3.78e+02
Normalised intensity [a.u.]
0.2
0.4
0.6
0.8
1.0
fit
fit MC
tr
4e+02
4e+03
4e+04
4e+05
Time since irradition [s]
[$\log_{10}(t/t_c)$]
Density: g−values (%/decade)
HPD − 68 %
HPD − 95 %
Density
0.0
0.2
0.4
0.6
3
4
5
6
7
N = 10 Bandwidth = 0.3053

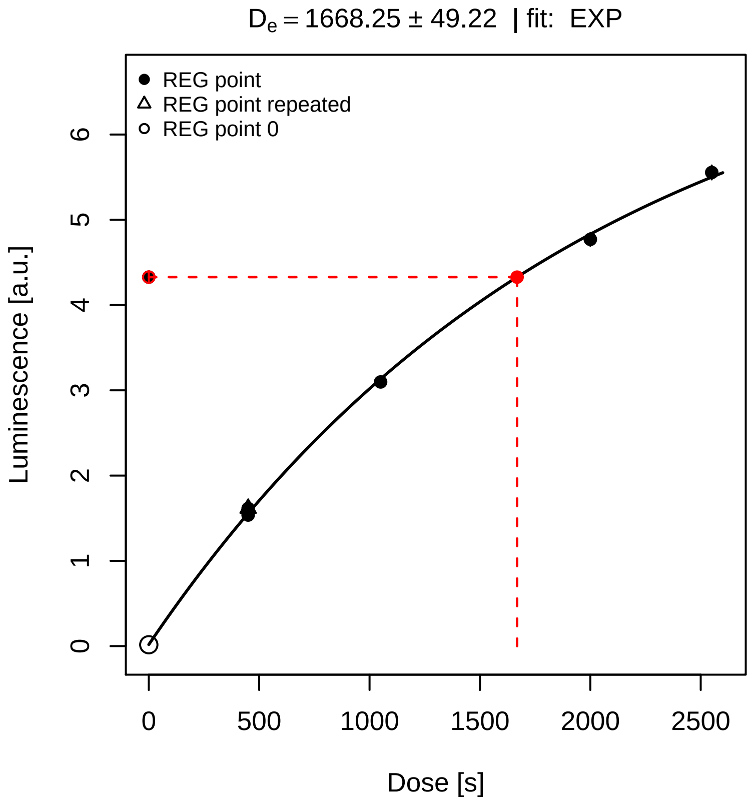


IR−RF
$D_e = 623.25$ [600.63 ; 635.8]
● RF_nat + RF_reg
2.0e+03
1.8e+03
1.6e+03
1.4e+03
IR−RF [cts/1.3 s]
E
0
100
200
300
400
500
600
700
Time [s]

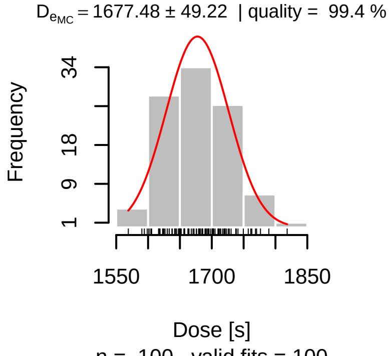

IR−RF
D_e = 610.17 [567.19 ; 653.15]
RF_nat
RF_reg
IR−RF [cts/1.3 s]
2.0e+03
1.8e+03
1.6e+03
1.4e+03
E
610.17
0
100
200
300
400
500
600
700
Time [s]


TL previous L_n,L_x curves
TL [cts/0.9 °C]
0
200
400
600
800
0
50
100
150
200
T [°C]
TL previous T_n,T_x curves
TL [cts/0.6 °C]
0
50
100
150
200
250
300
0
50
100
150
T [°C]
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0.05
0.20
0.50
2.00
5.00
20.00
50.00
Time [s]
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
2000
3000
0.05
0.20
0.50
2.00
5.00
20.00
50.00
Time [s]
Natural (0)
R1 (450)
R2 (1050)
R3 (2000)
R4 (2550)
R5 (450)
R0 (0)

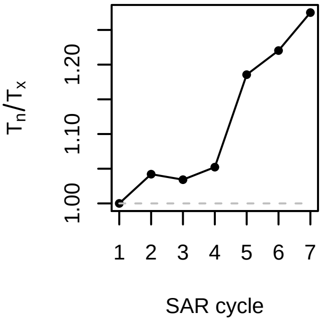
Growth curve

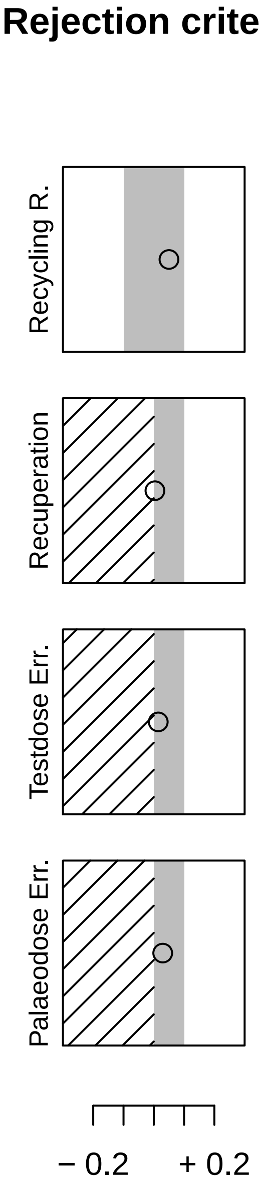


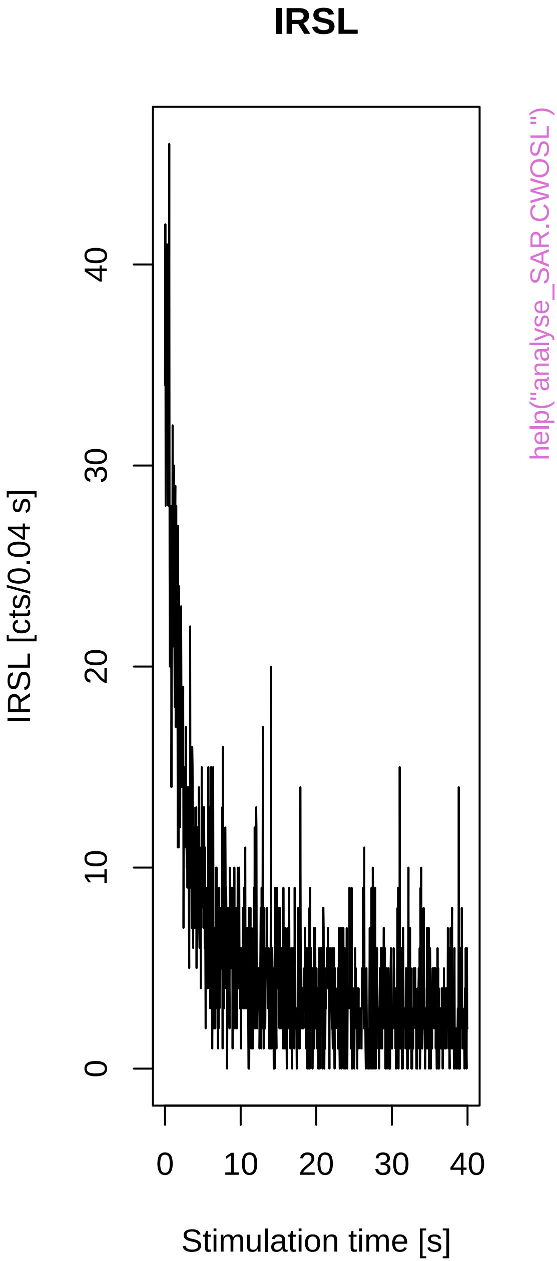
D_e from MC simulation

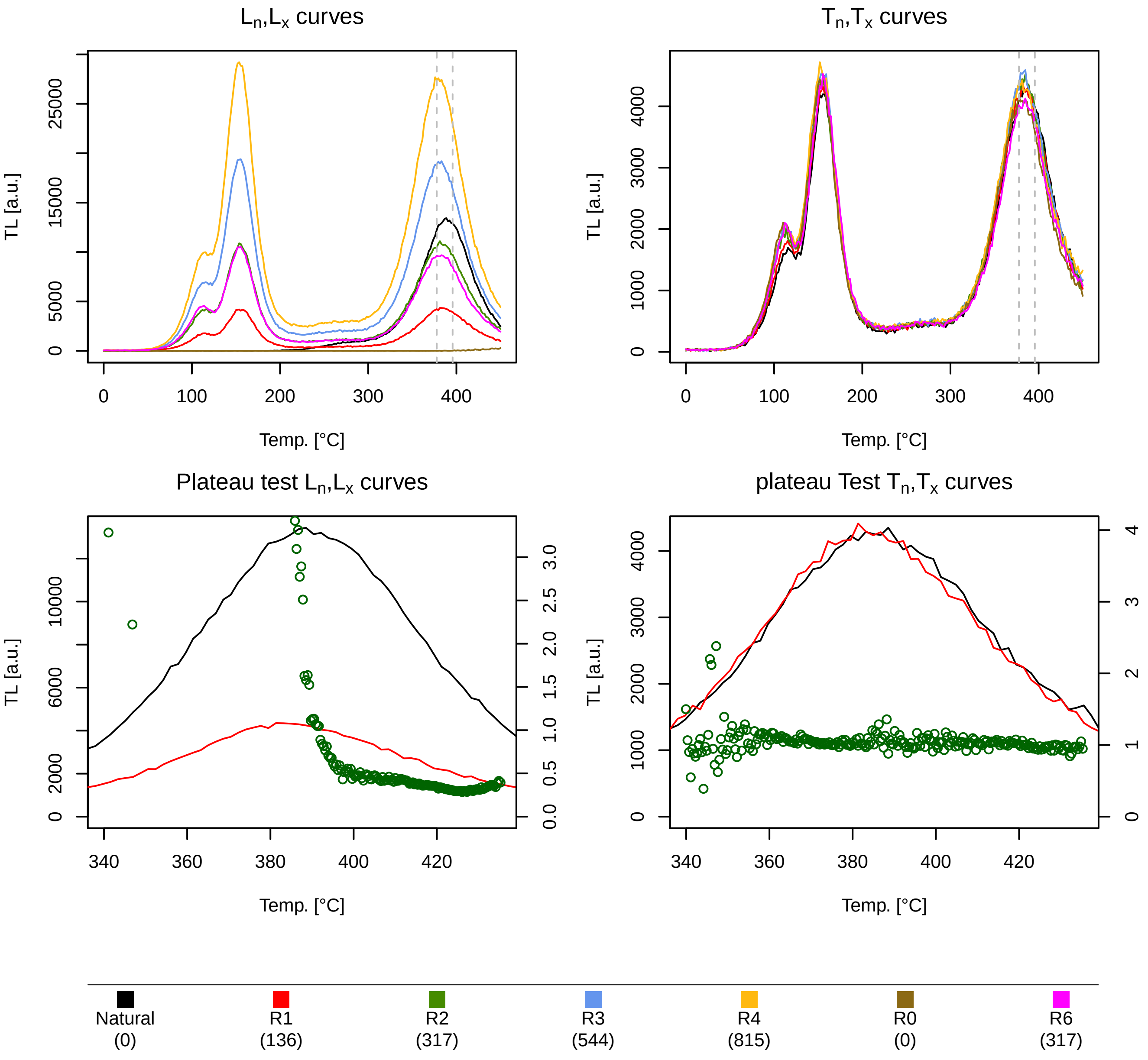


Test dose response

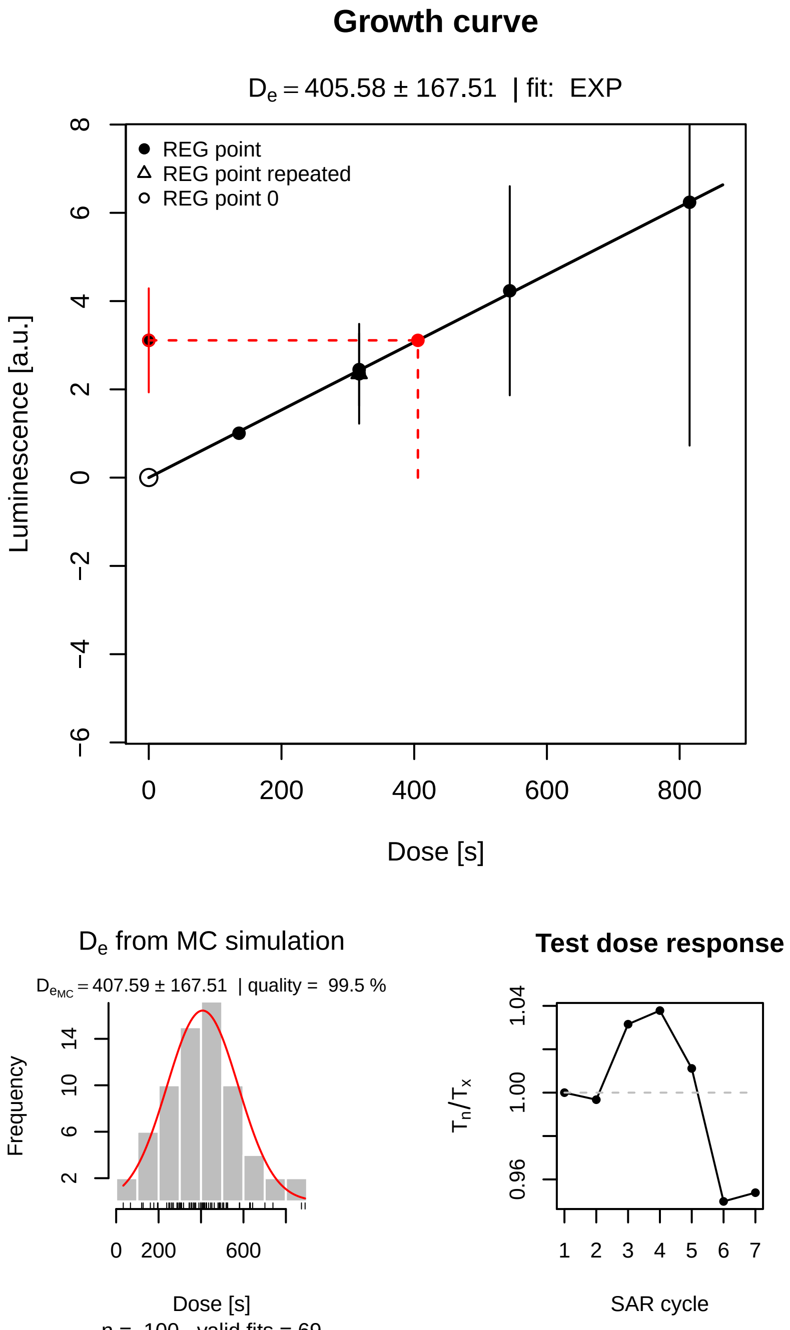



Rejection criteria
Recycling R.
Recuperation
Testdose Err.
Palaeodose Err.
− 0.2
+ 0.2


IRSL
IRSL [cts/0.04 s]
0
10
20
30
40
Stimulation time [s]
0
10
20
30
40
help("analyse_SAR.CWOSL")



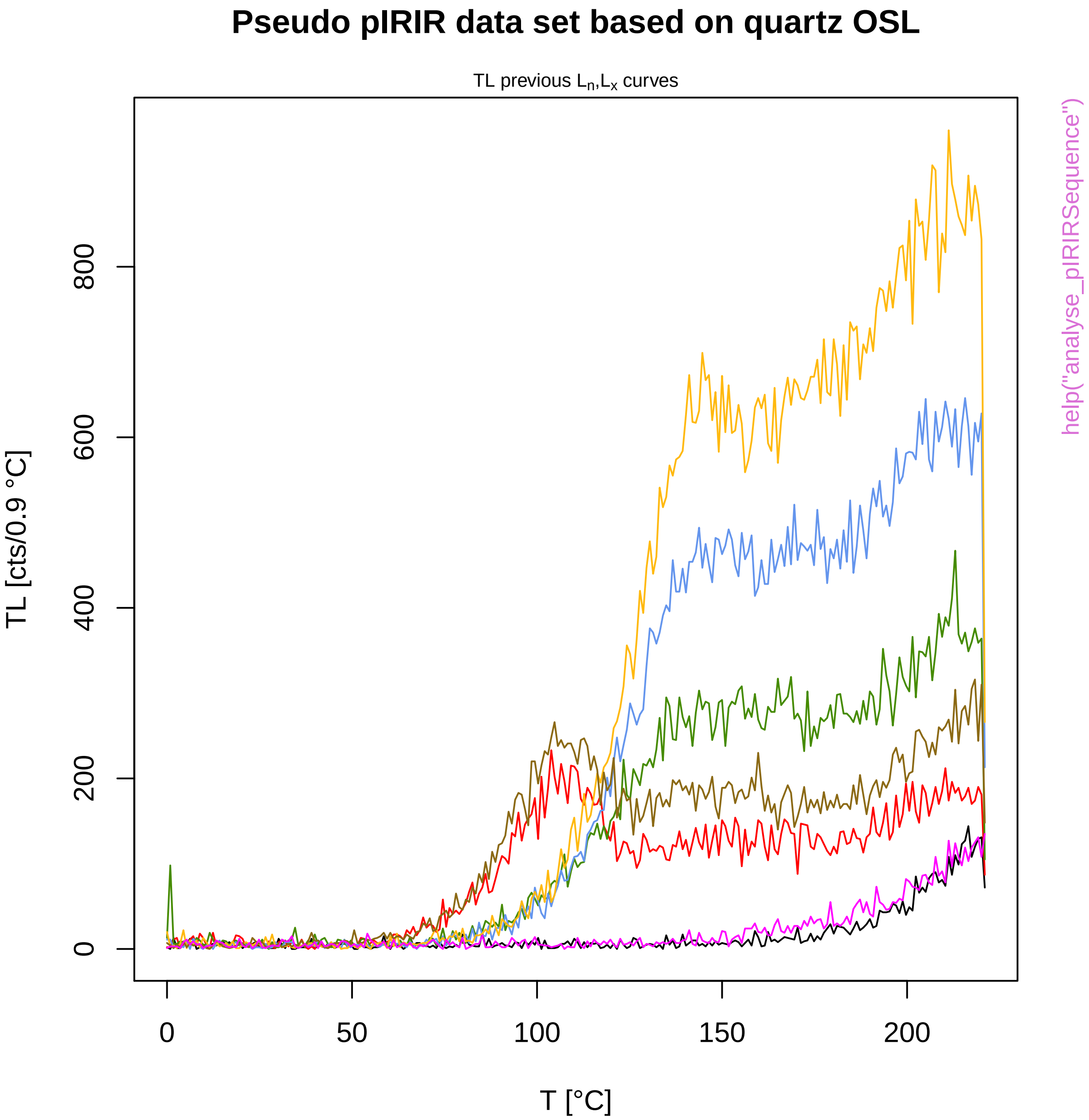
L_n,L_x curves
T_n,T_x curves
Plateau test L_n,L_x curves
plateau Test T_n,T_x curves
TL [a.u.]
Temp. [°C]
0
5000
15000
25000
1000
2000
3000
4000
100
200
300
400
6000
10000
340
360
380
420
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1
2
3
4
Natural (0)
R1 (136)
R2 (317)
R3 (544)
R4 (815)
R0 (0)
R6 (317)


Growth curve
$D_e = 405.58 \pm 167.51$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
8
6
4
2
0
−2
−4
−6
0
200
400
600
800
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 407.59 \pm 167.51$ | quality = 99.5 %
Frequency
2
6
10
14
0
200
600
Dose [s]
n = 100 | valid fits = 69
Test dose response
T_n/T_x
0.96
1.00
1.04
1
2
3
4
5
6
7
SAR cycle

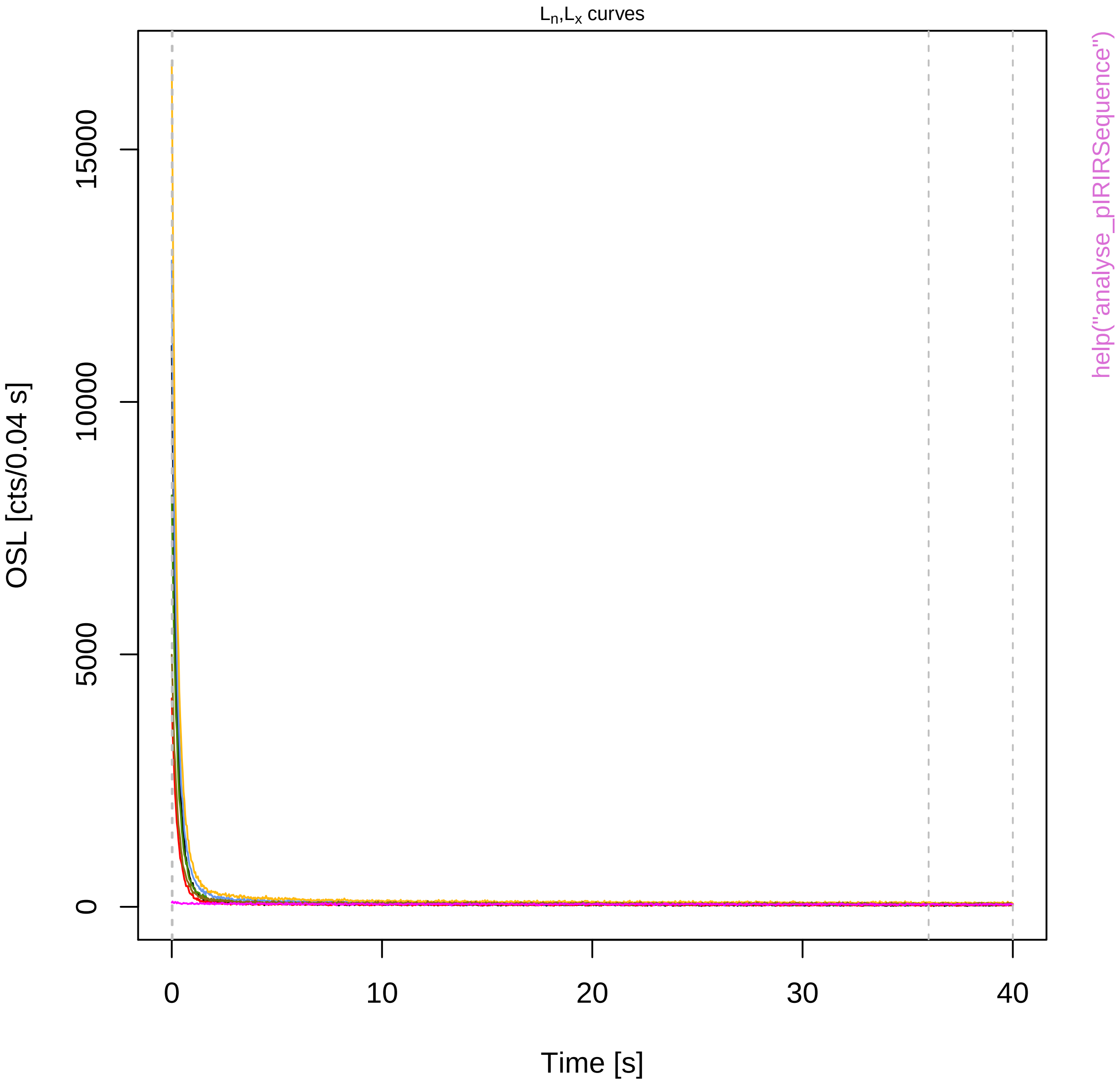
Pseudo pIRIR data set based on quartz OSL

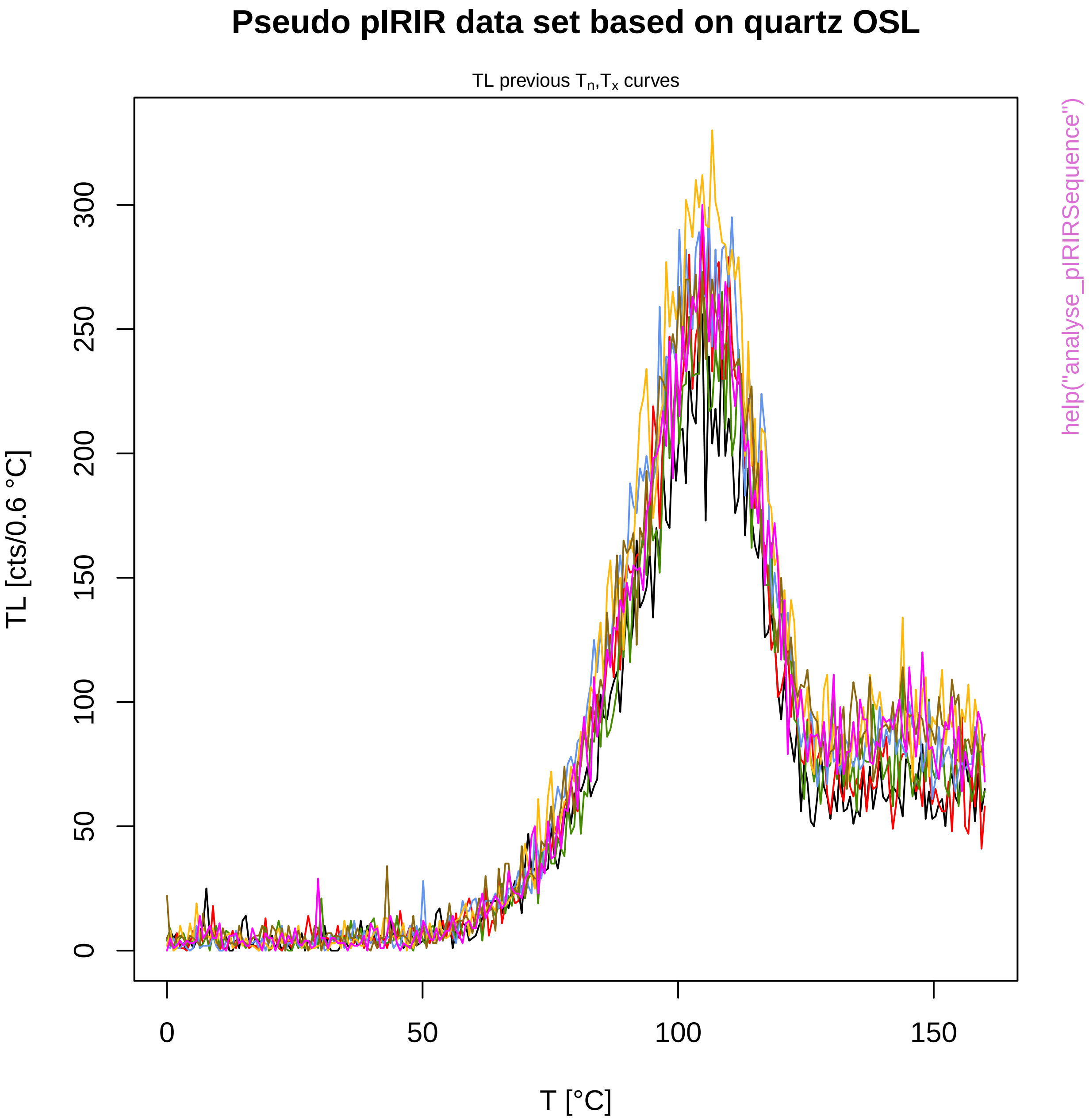
help("analyse_pIRIRSequence")

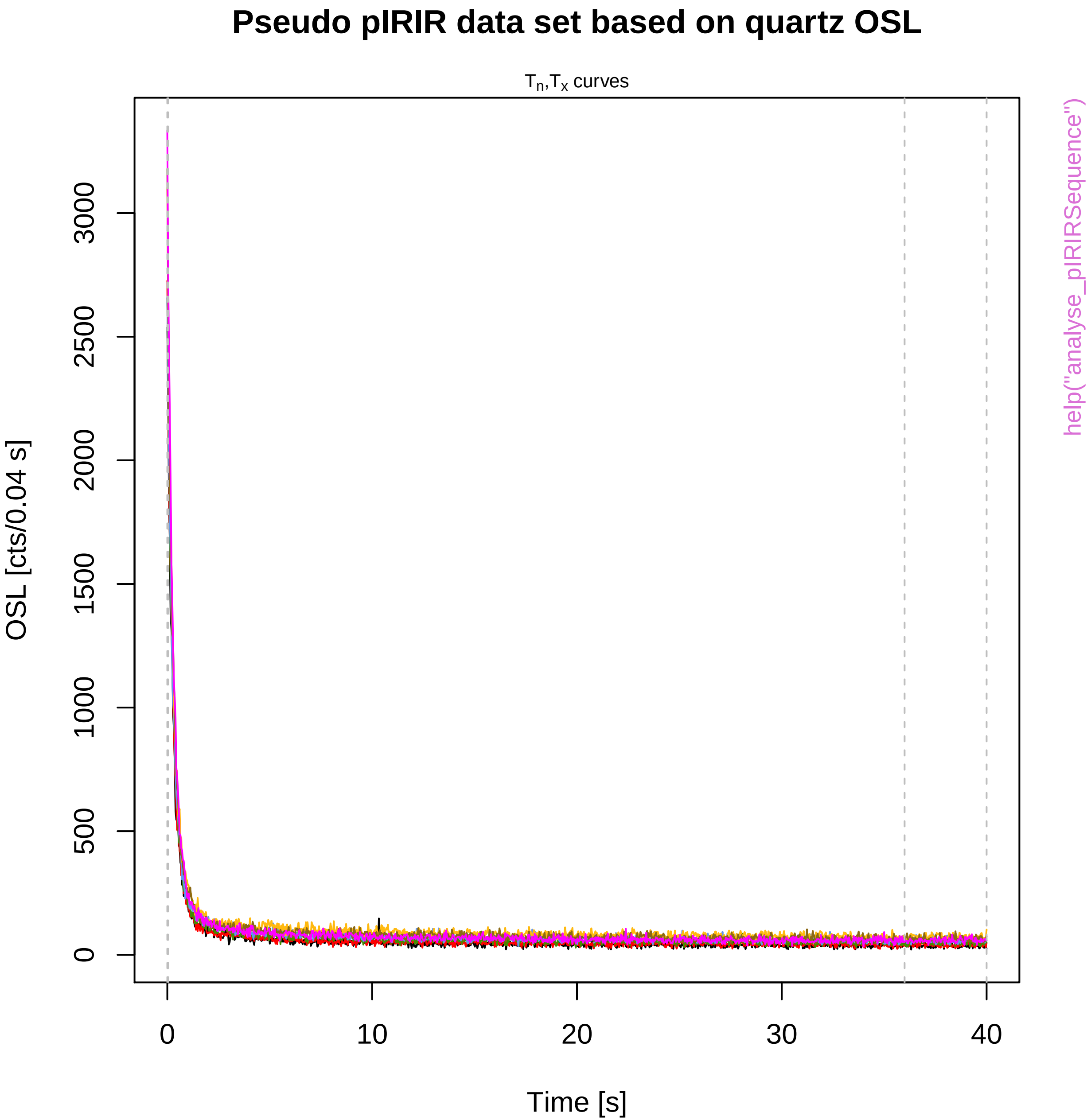
TL
pseudoIRSL1
pseudoIRSL2

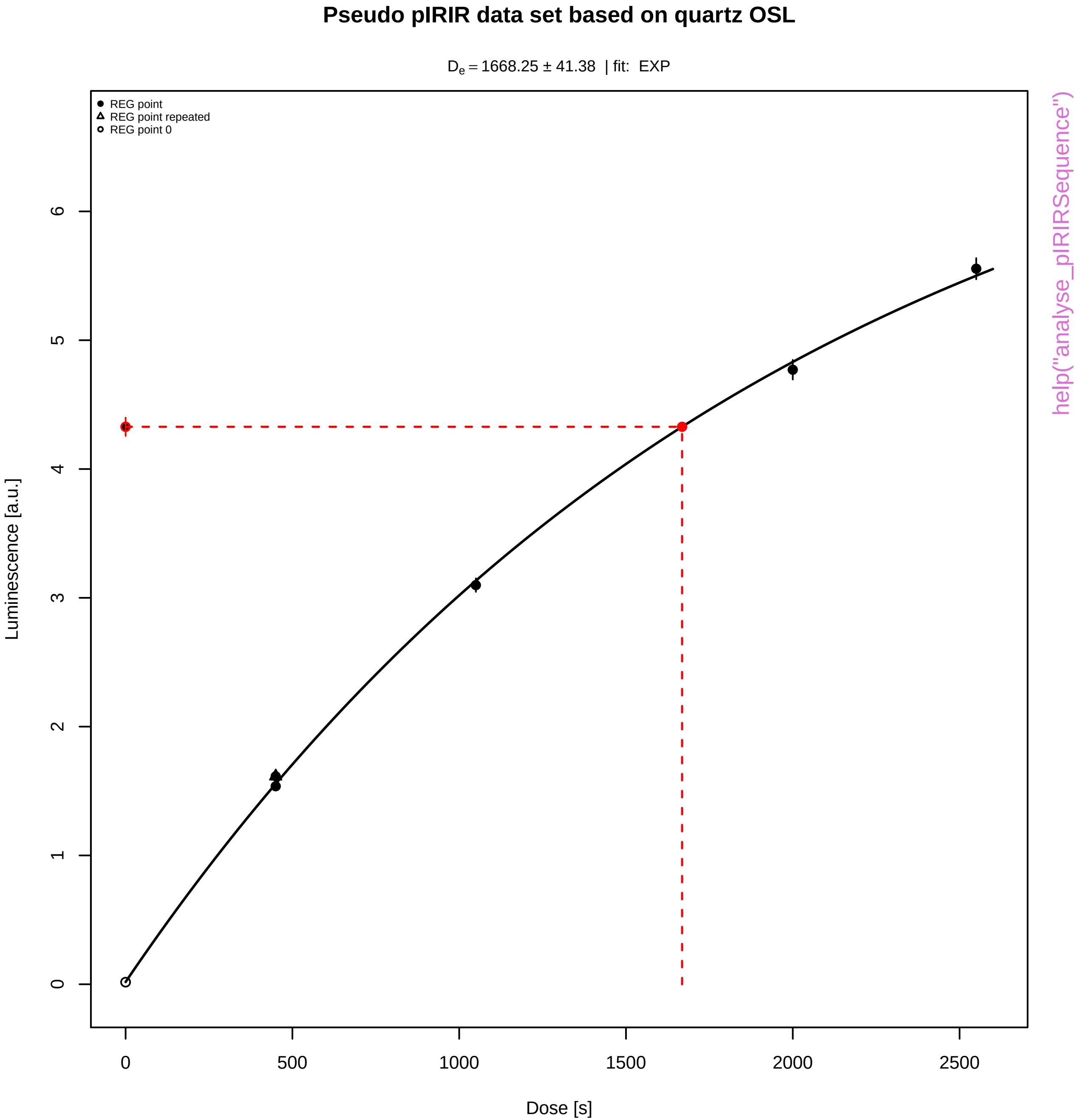

Pseudo pIRIR data set based on quartz OSL
TL previous L$_n$,L$_x$ curves
TL [cts/0.9 °C]
0
200
400
600
800
0
50
100
150
200
T [°C]
help("analyse_pIRIRSequence")

Pseudo pIRIR data set based on quartz OSL

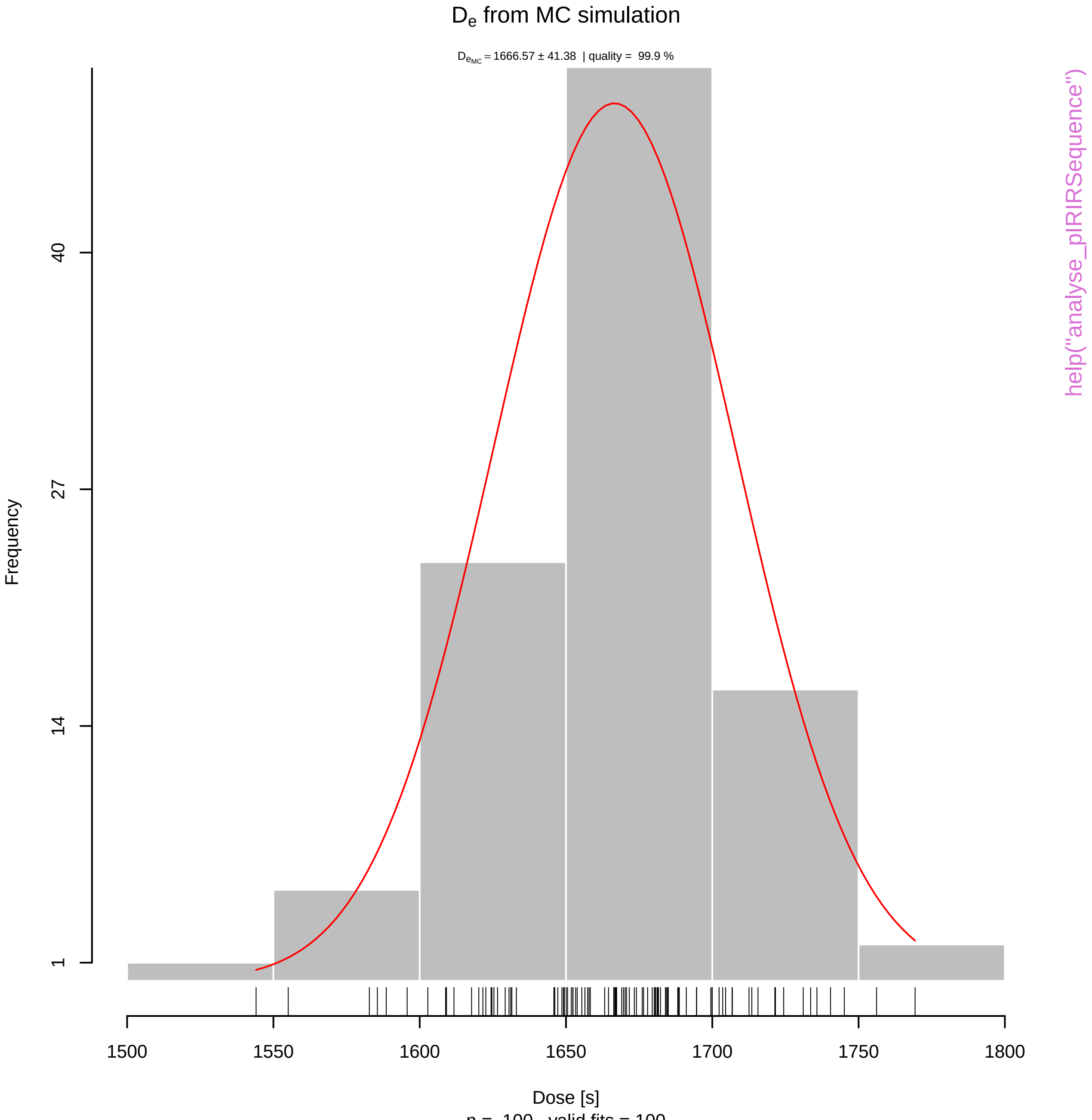


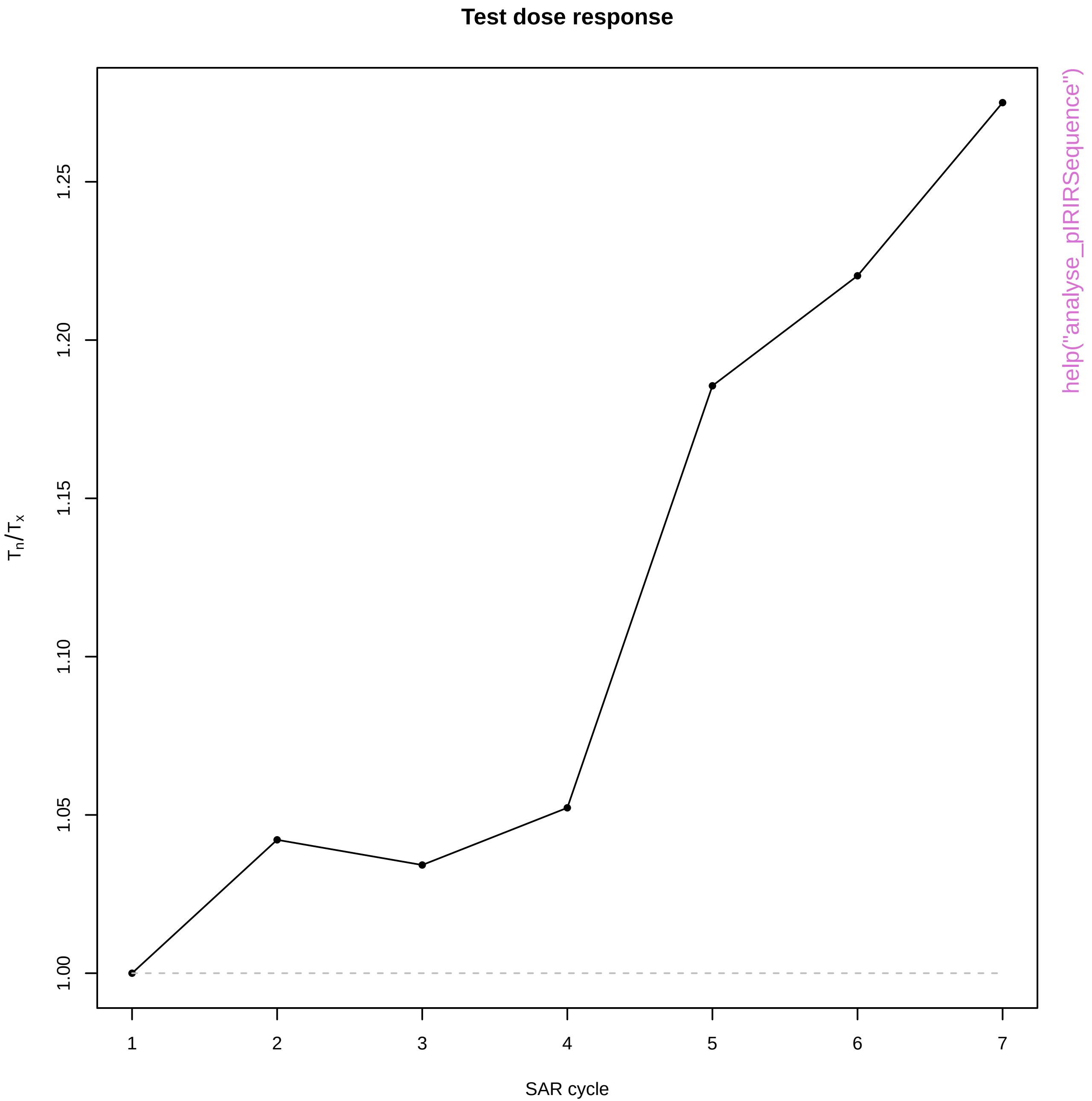

Pseudo pIRIR data set based on quartz OSL
TL previous T_n,T_x curves
TL [cts/0.6 °C]
0
50
100
150
200
250
300
T [°C]
0
50
100
150
help("analyse_pIRIRSequence")

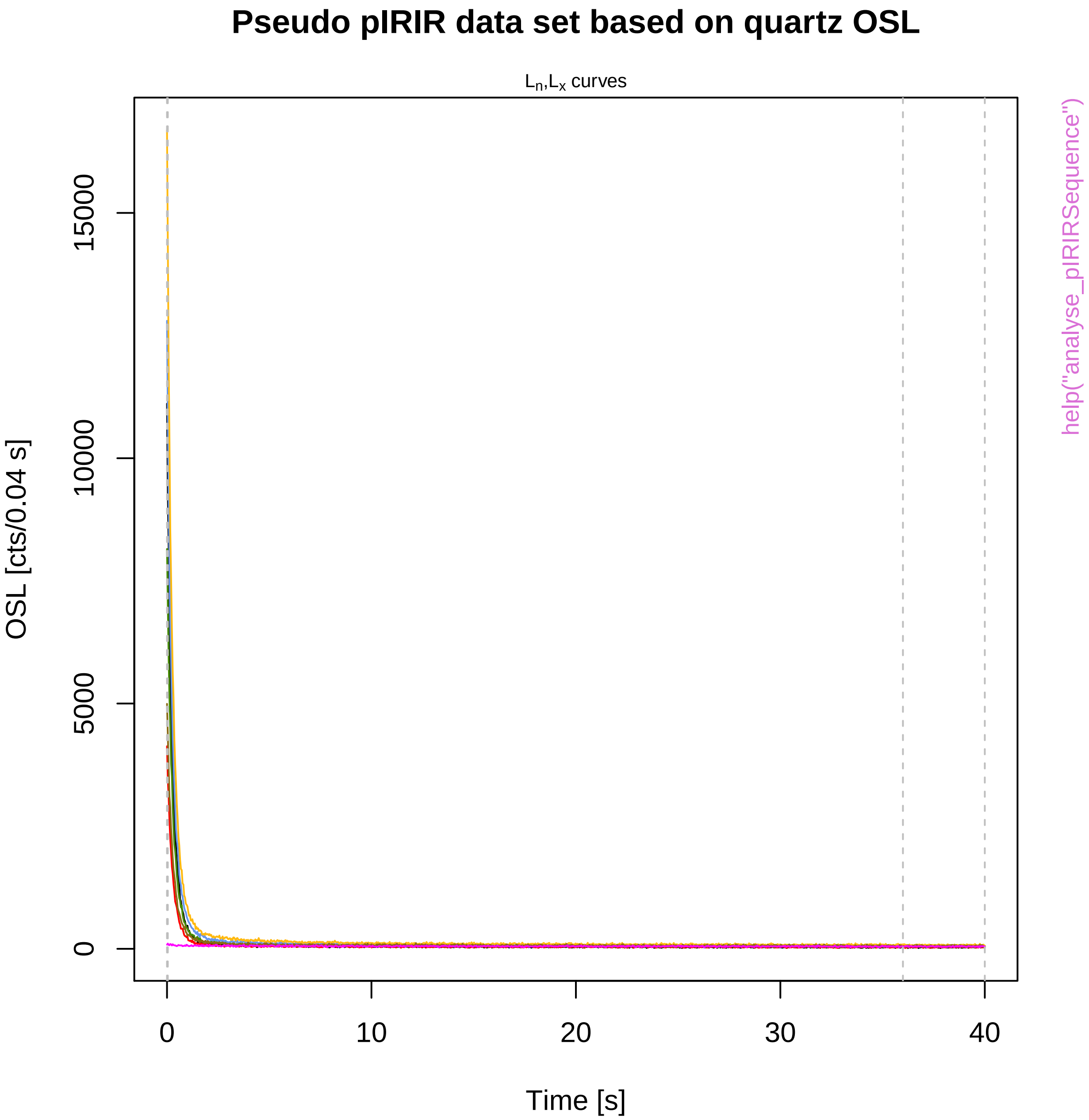

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
Time [s]
0
10
20
30
40
help("analyse_pIRIRSequence")



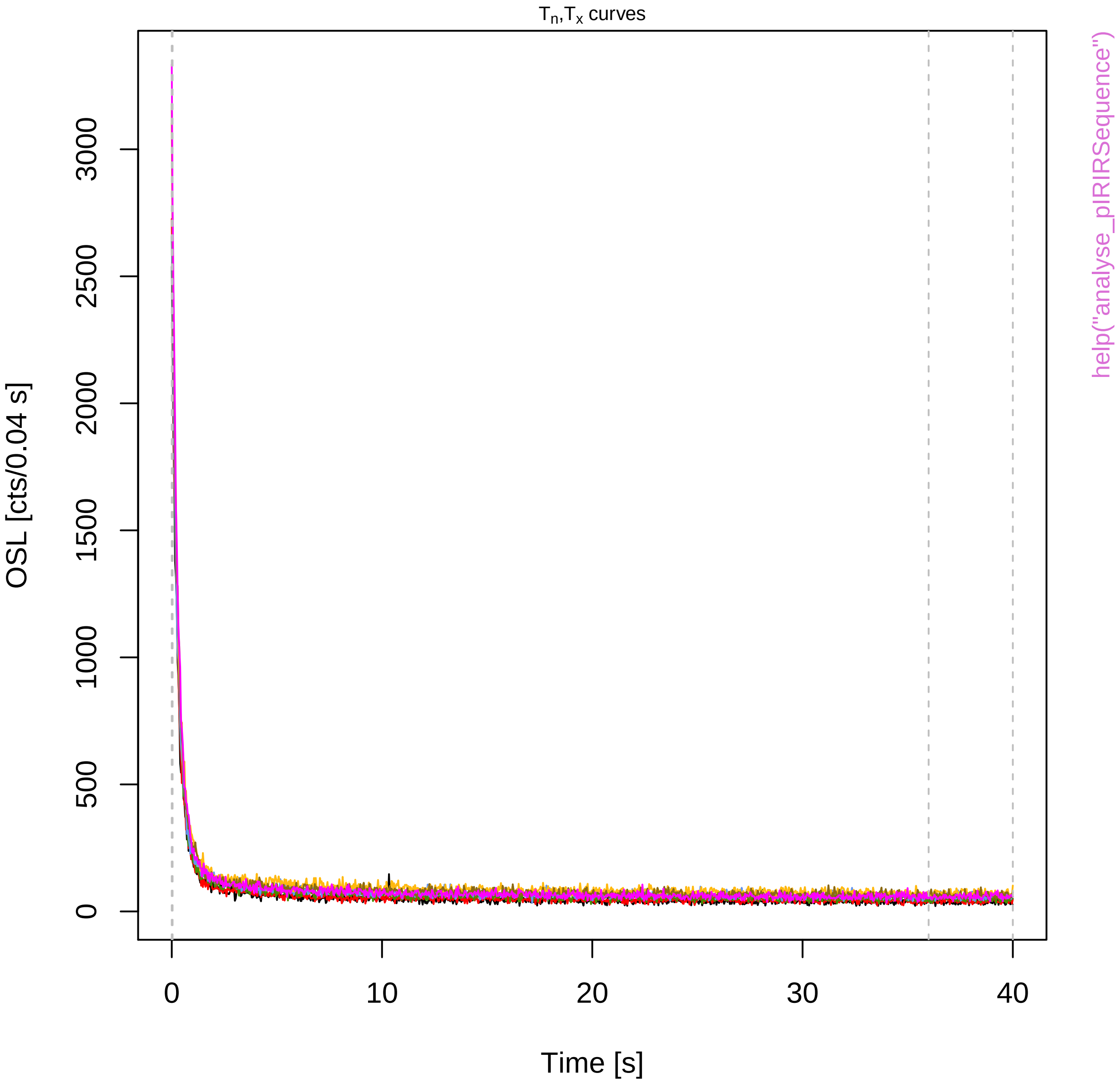
Pseudo pIRIR data set based on quartz OSL

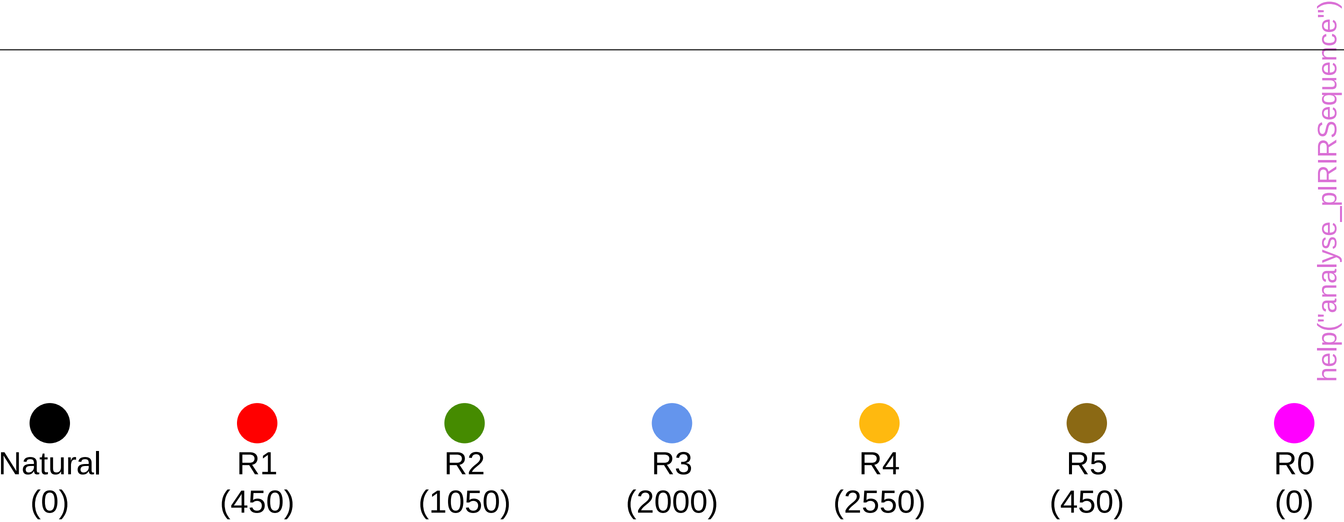

De from MC simulation
DeMC = 1666.57 ± 41.38 | quality = 99.9 %
Frequency
40
27
14
1
1500
1550
1600
1650
1700
1750
1800
Dose [s]
n = 100 , valid fits = 100
help("analyse_pIRIRSequence")

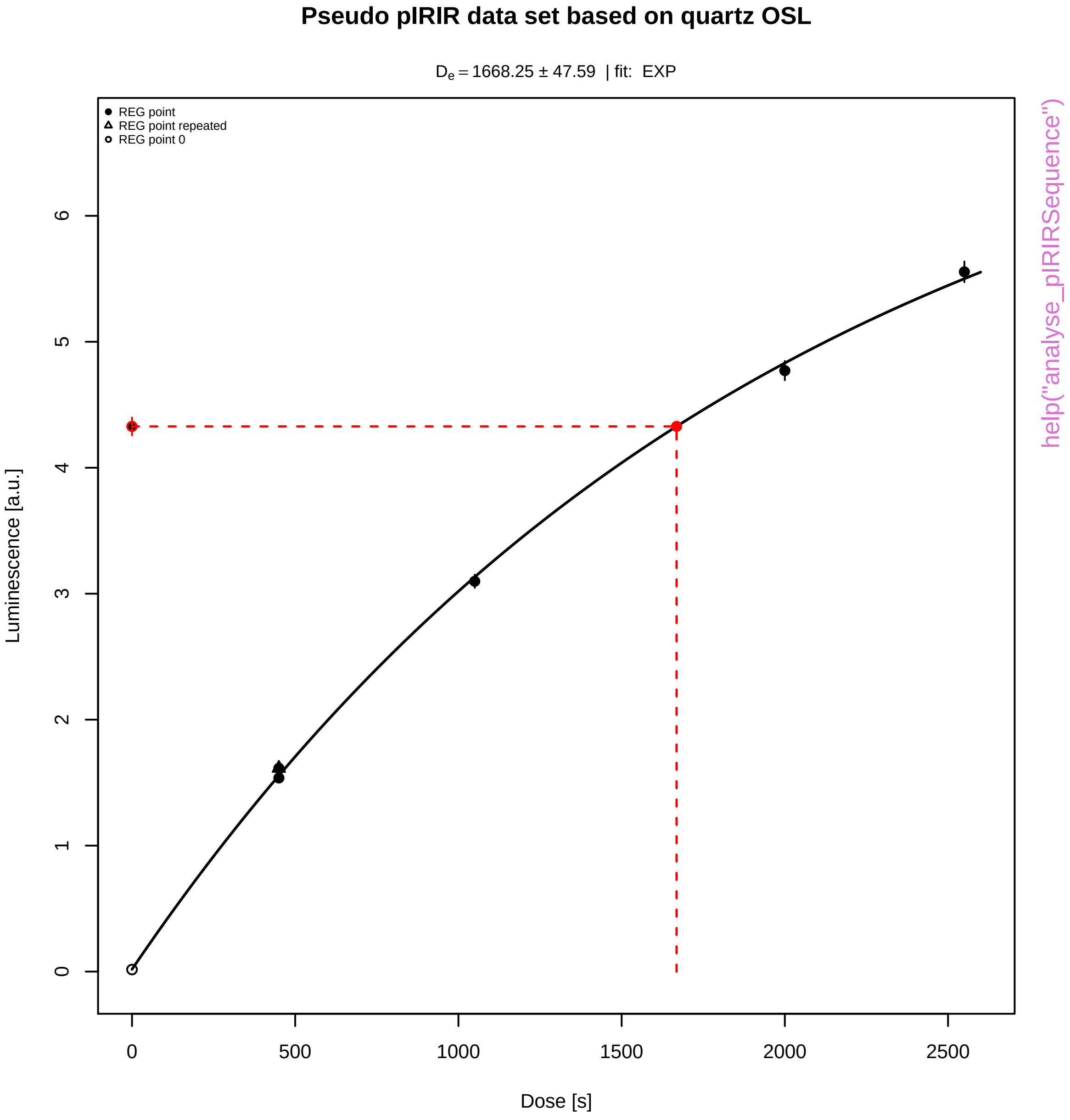

Test dose response
help("analyse_pIRIRSequence")
T_n/T_x
1.00
1.05
1.10
1.15
1.20
1.25
1
2
3
4
5
6
7
SAR cycle

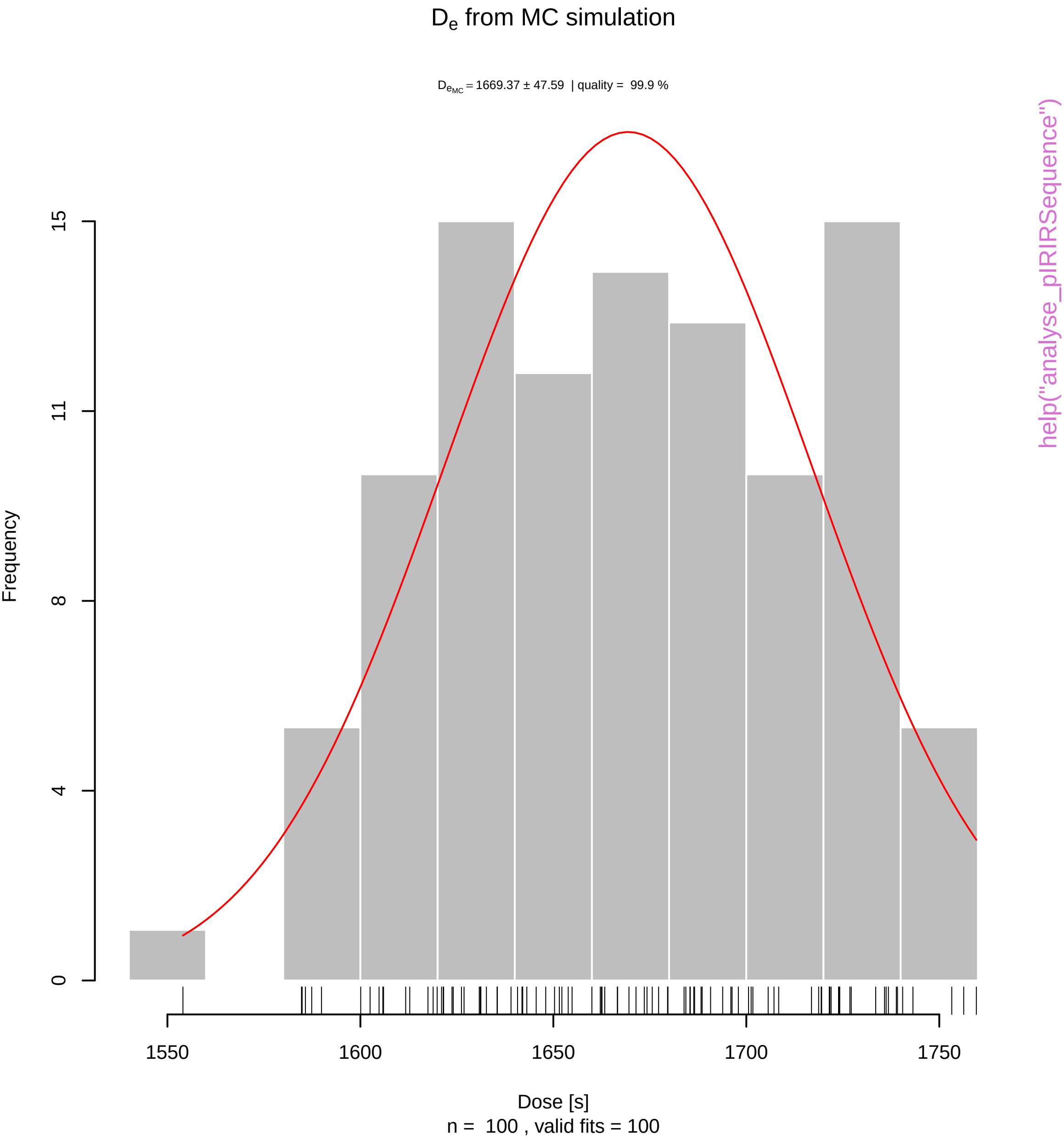

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]
help("analyse_pIRIRSequence")

Pseudo pIRIR data set based on quartz OSL

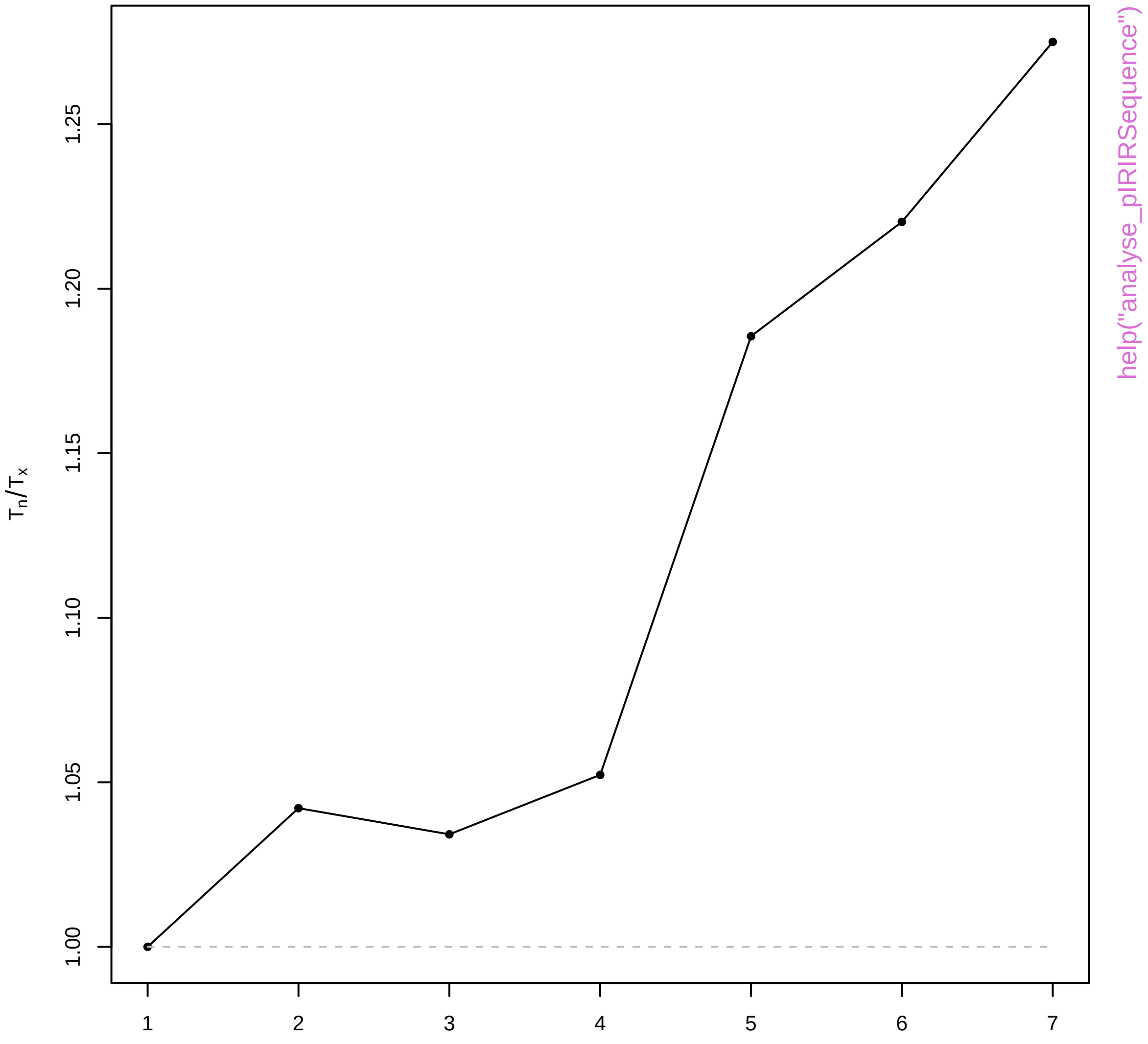


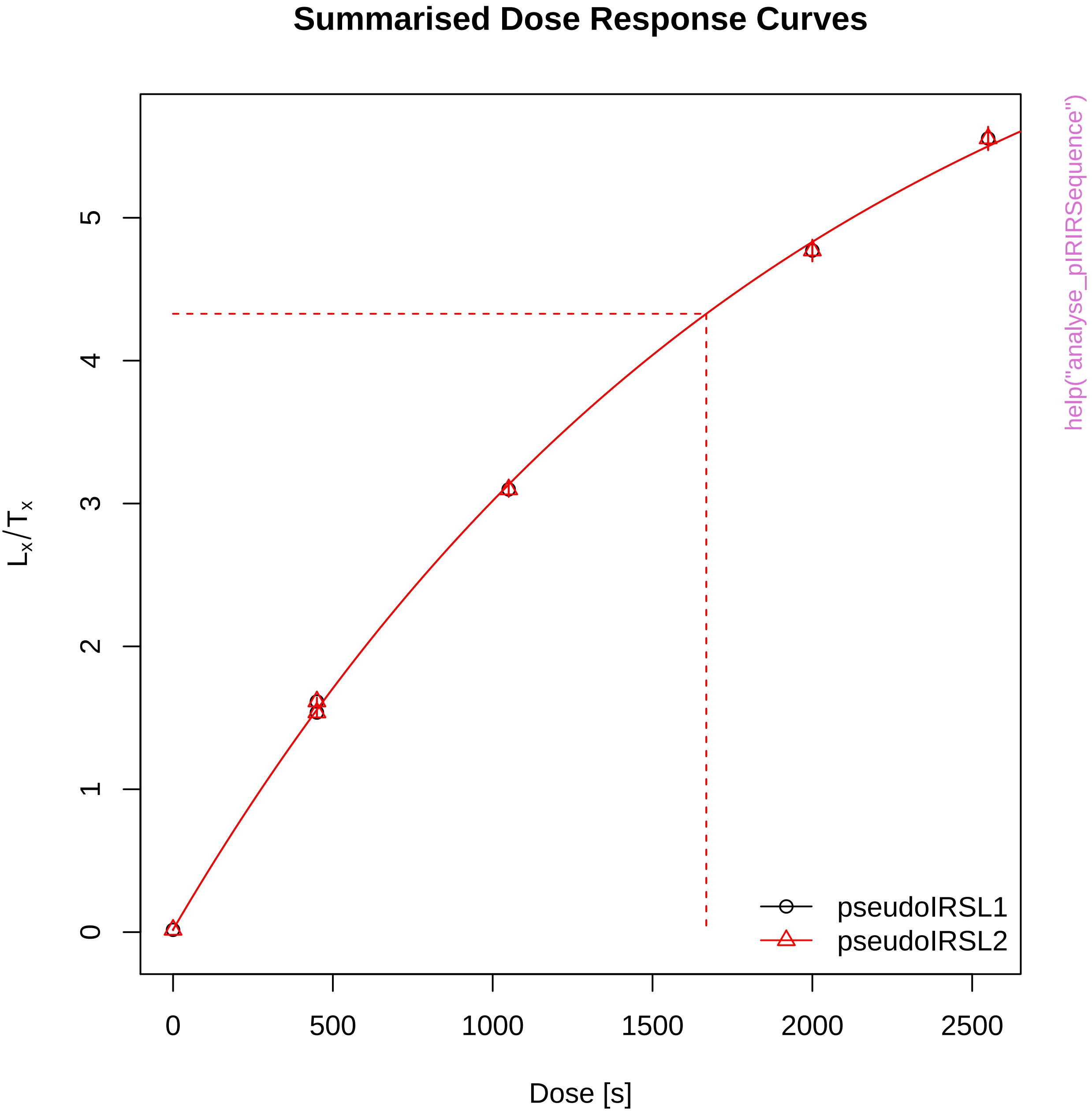

Natural
(0)
R1
(450)
R2
(1050)
R3
(2000)
R4
(2550)
R5
(450)
R0
(0)
help("analyse_pIRIRSequence")

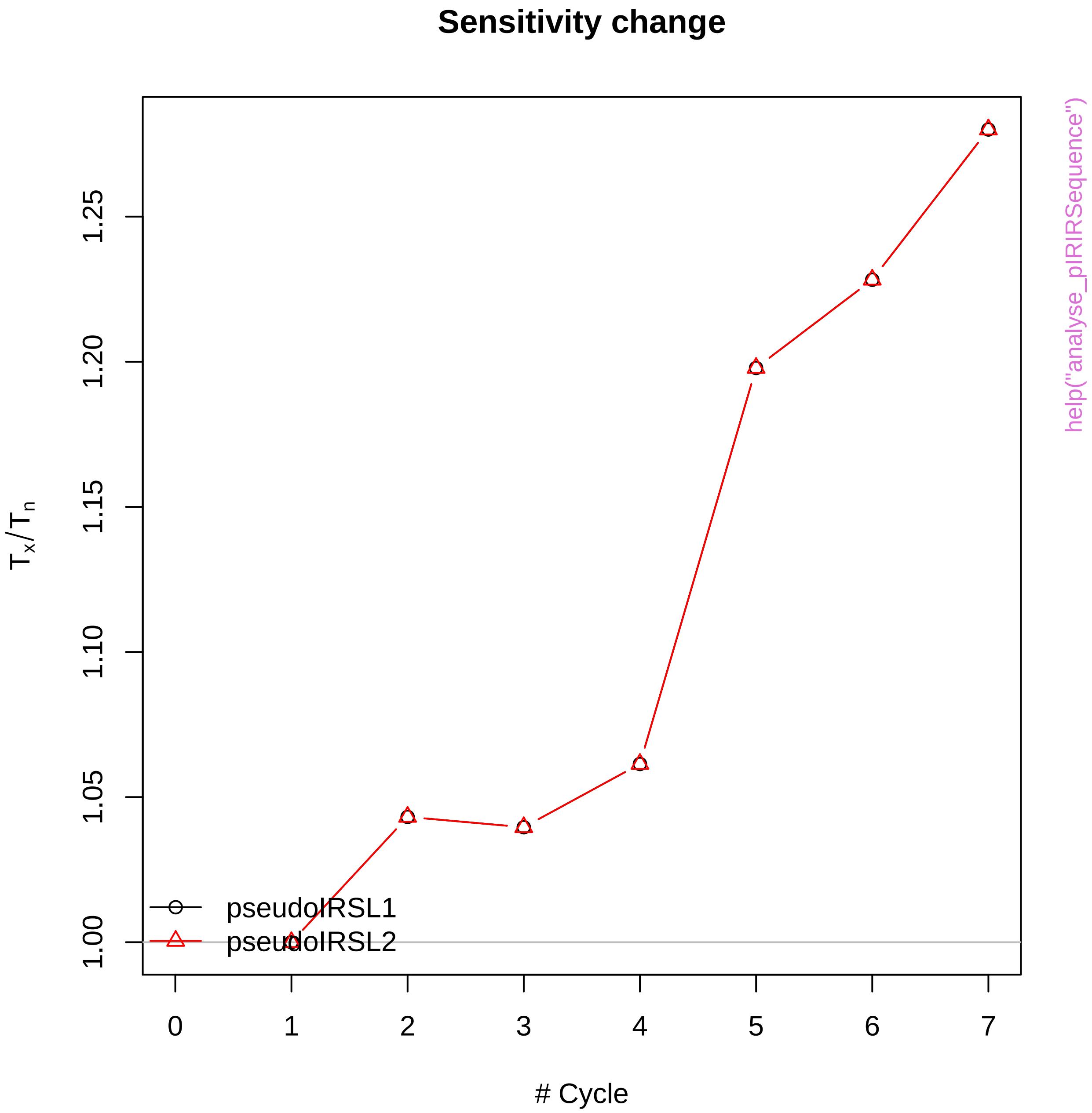

Pseudo pIRIR data set based on quartz OSL
$D_e = 1668.25 \pm 47.59$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
help("analyse_pIRIRSequence")

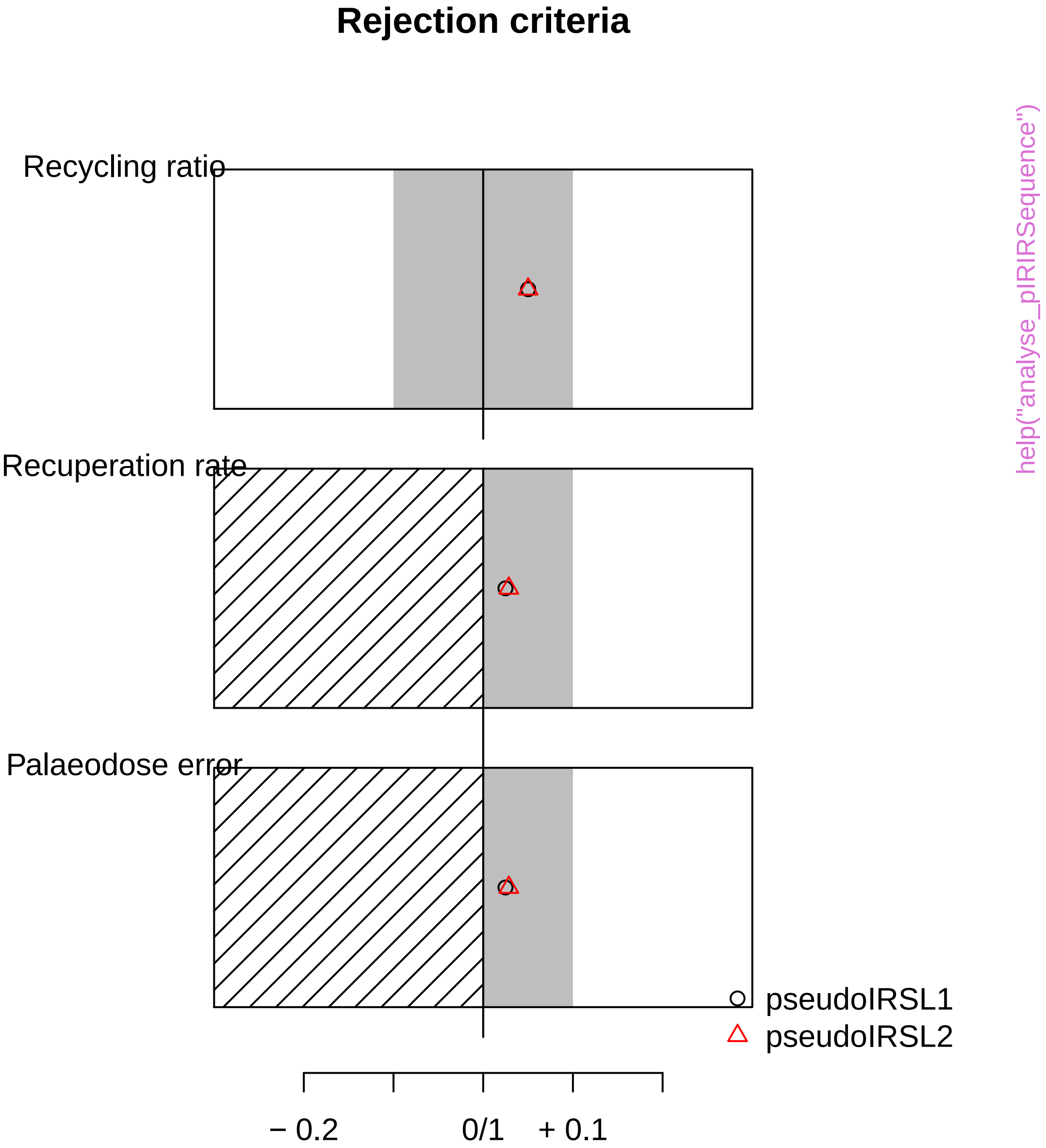

D_e from MC simulation
$D_{e_{MC}}$ = 1669.37 ± 47.59 | quality = 99.9 %
Frequency
0
4
8
11
15
1550
1600
1650
1700
1750
Dose [s]
n = 100 , valid fits = 100
help("analyse_pIRIRSequence")

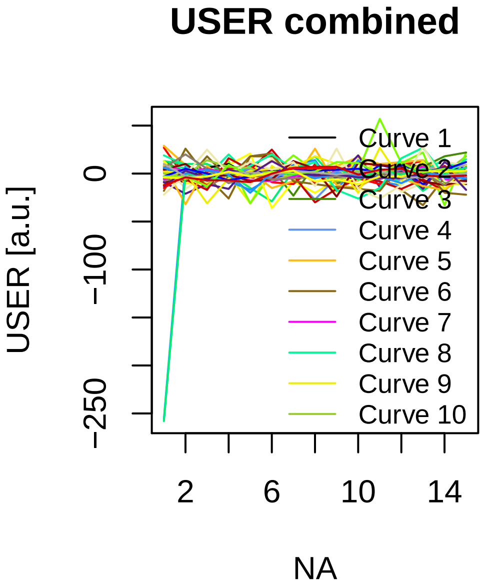
Test dose response

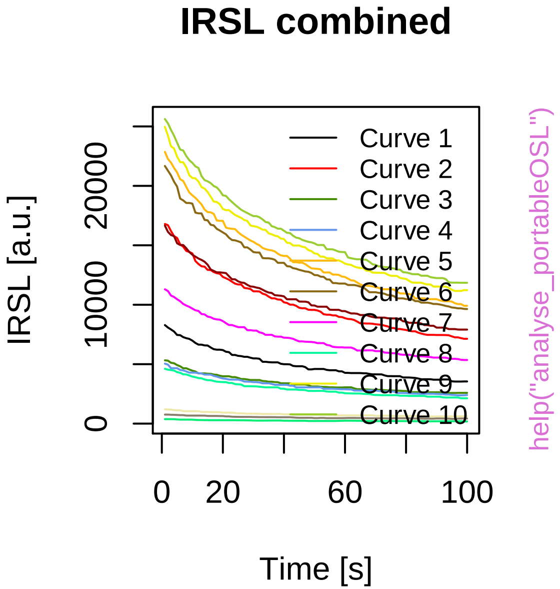


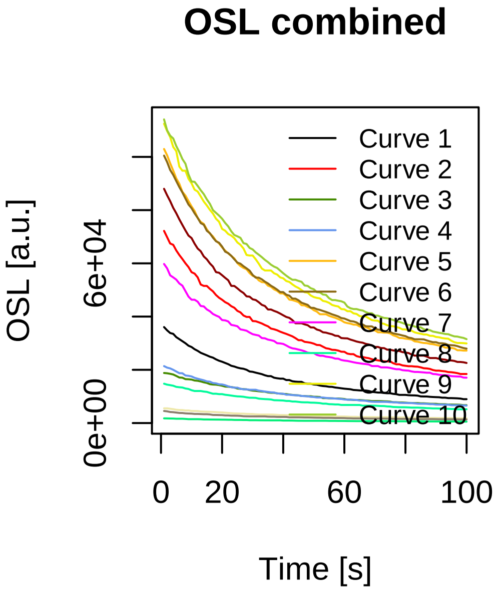

Summarised Dose Response Curves
help("analyse_pIRIRSequence")
L_x/T_x
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose [s]
pseudoIRSL1
pseudoIRSL2

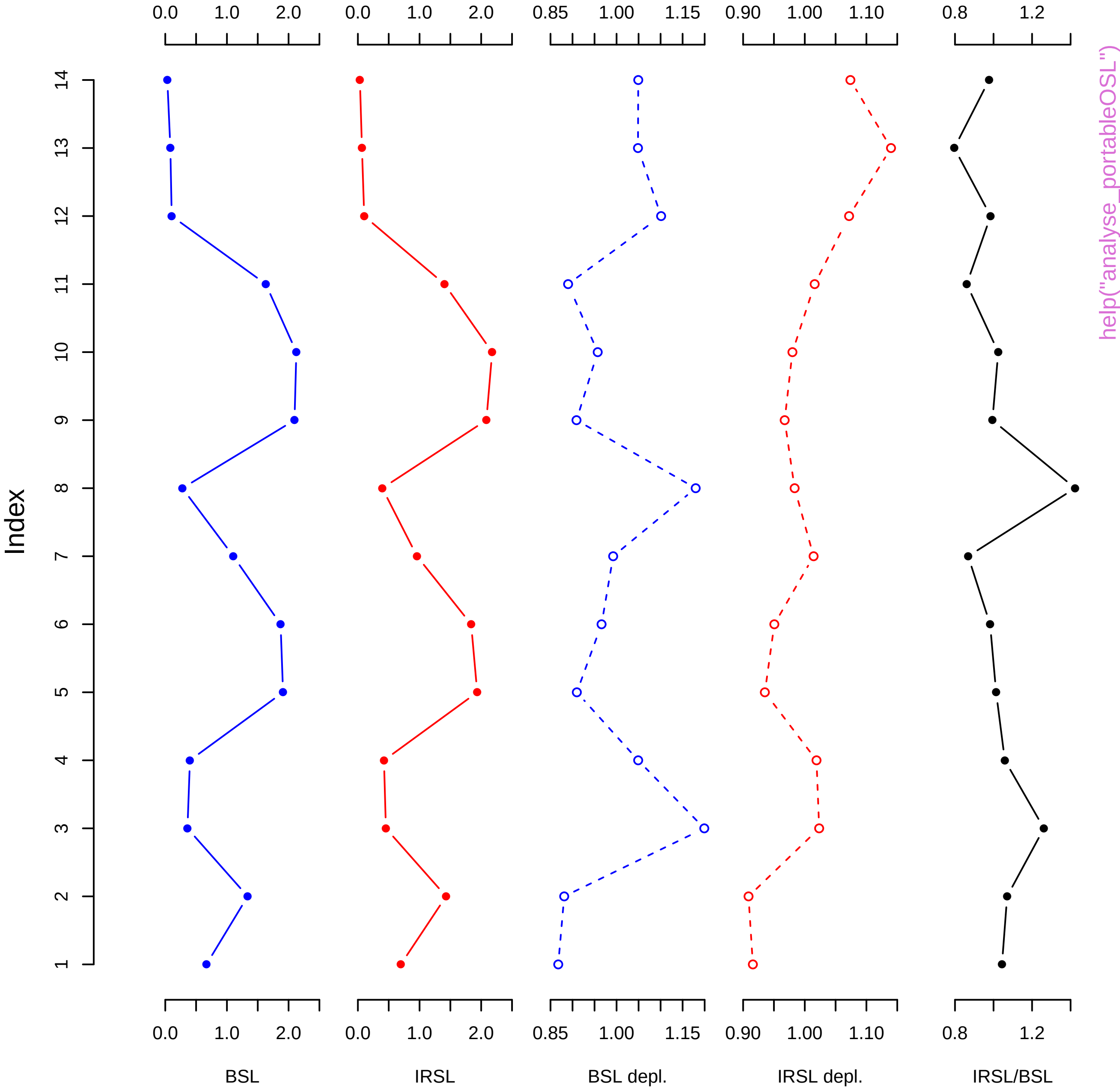

Sensitivity change
T_x/T_n
1.00
1.05
1.10
1.15
1.20
1.25
0
1
2
3
4
5
6
7
# Cycle
pseudoIRSL1
pseudoIRSL2
help("analyse_pIRIRSequence")

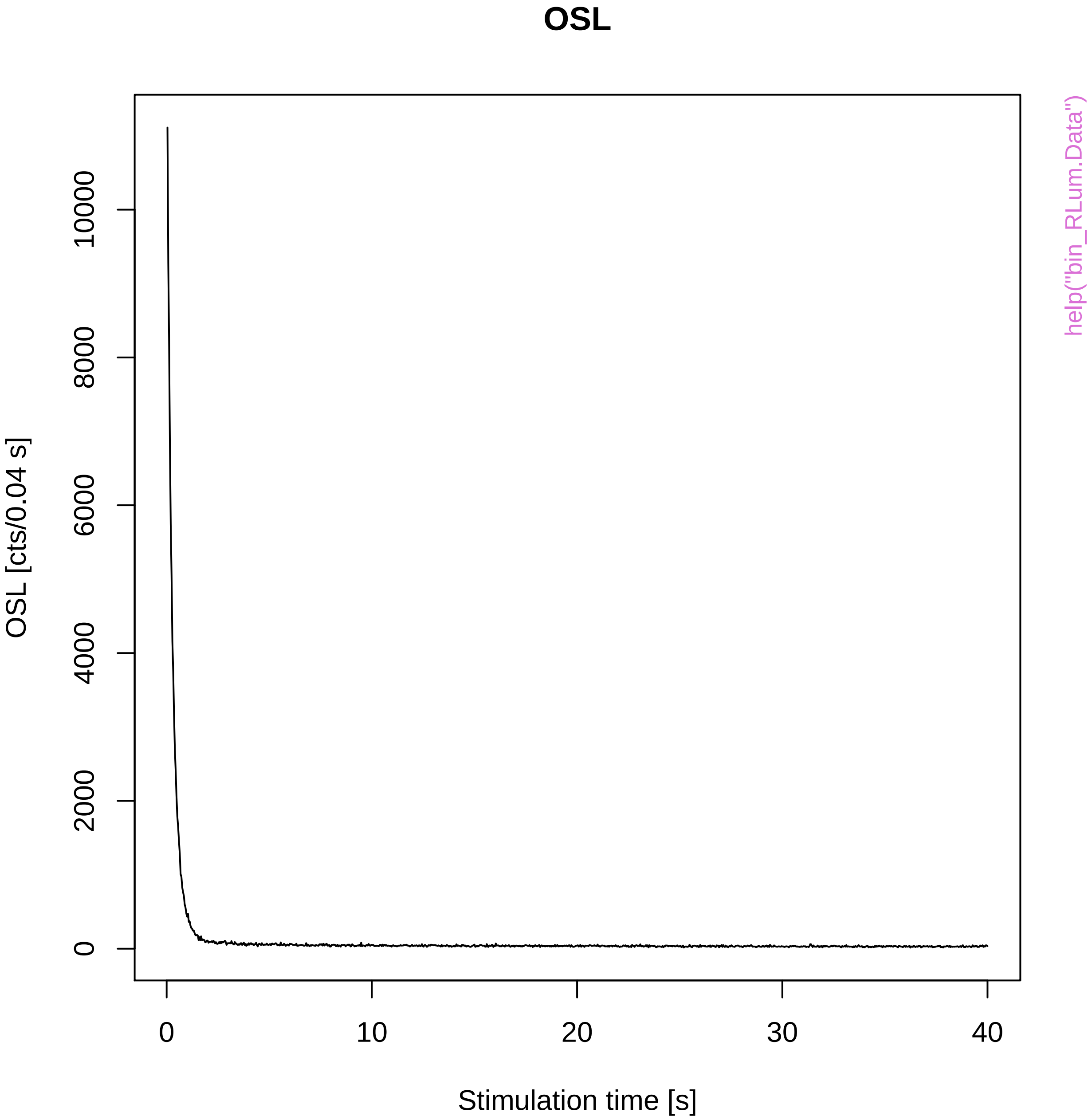

Rejection criteria
Recycling ratio
Recuperation rate
Palaeodose error
pseudoIRSL1
pseudoIRSL2
− 0.2
0/1
+ 0.1
help("analyse_pIRIRSequence")

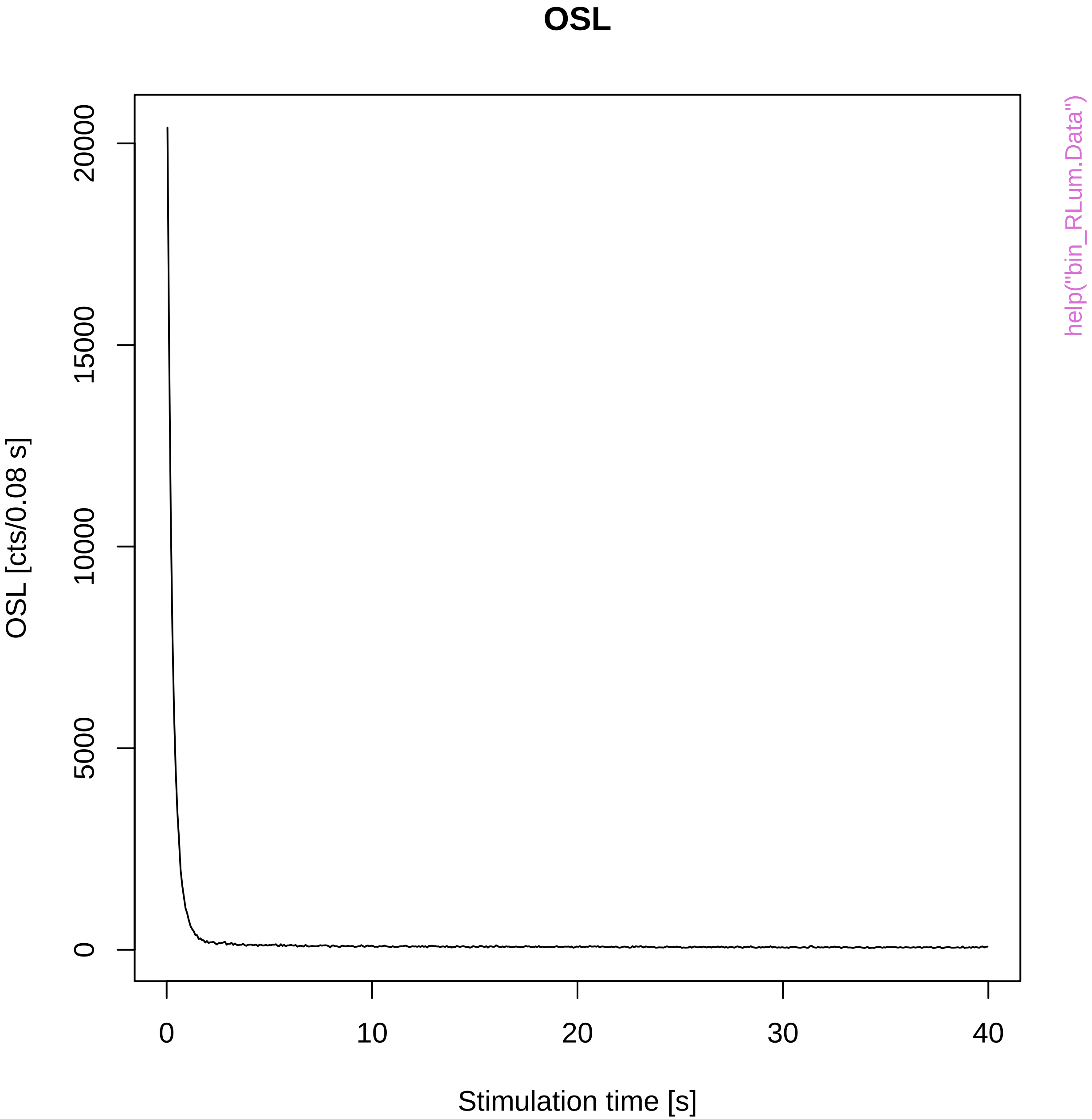

USER combined
USER [a.u.]
0
−100
−250
2
6
10
14
NA
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10

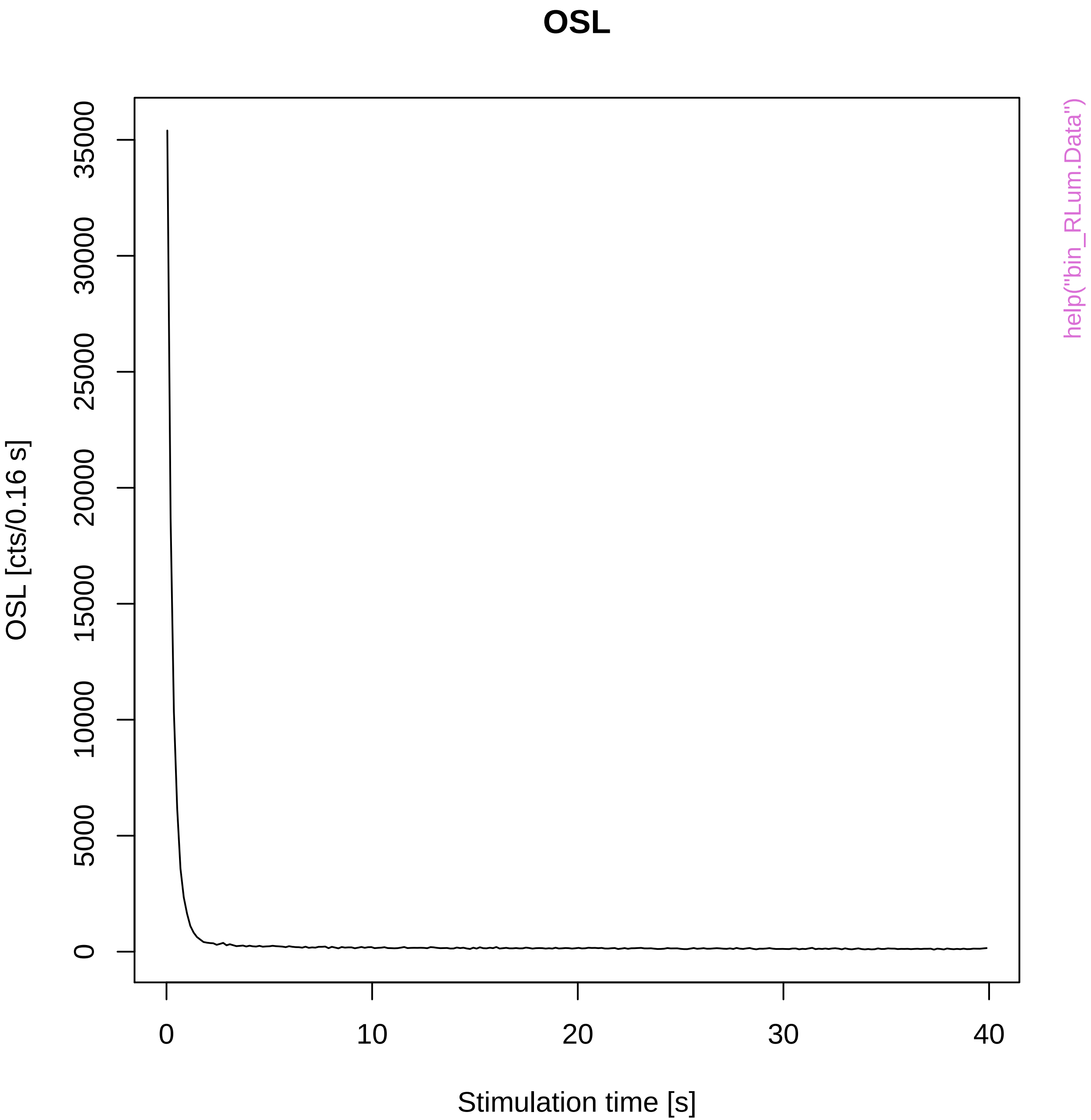

IRSL combined
IRSL [a.u.]
0
10000
20000
0
20
60
100
Time [s]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
help("analyse_portableOSL")

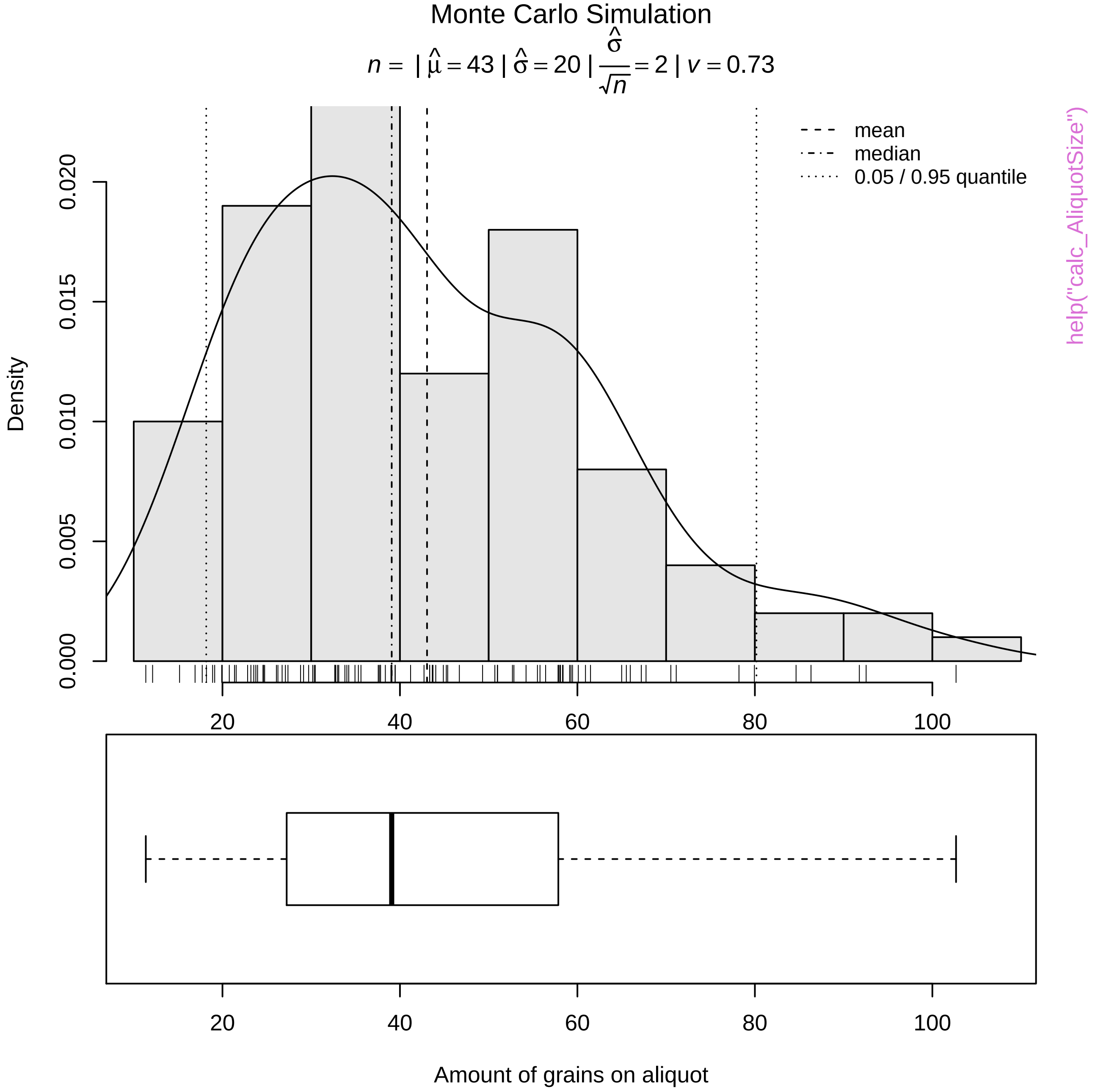

OSL combined
OSL [a.u.]
0e+00
6e+04
0
20
60
100
Time [s]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10

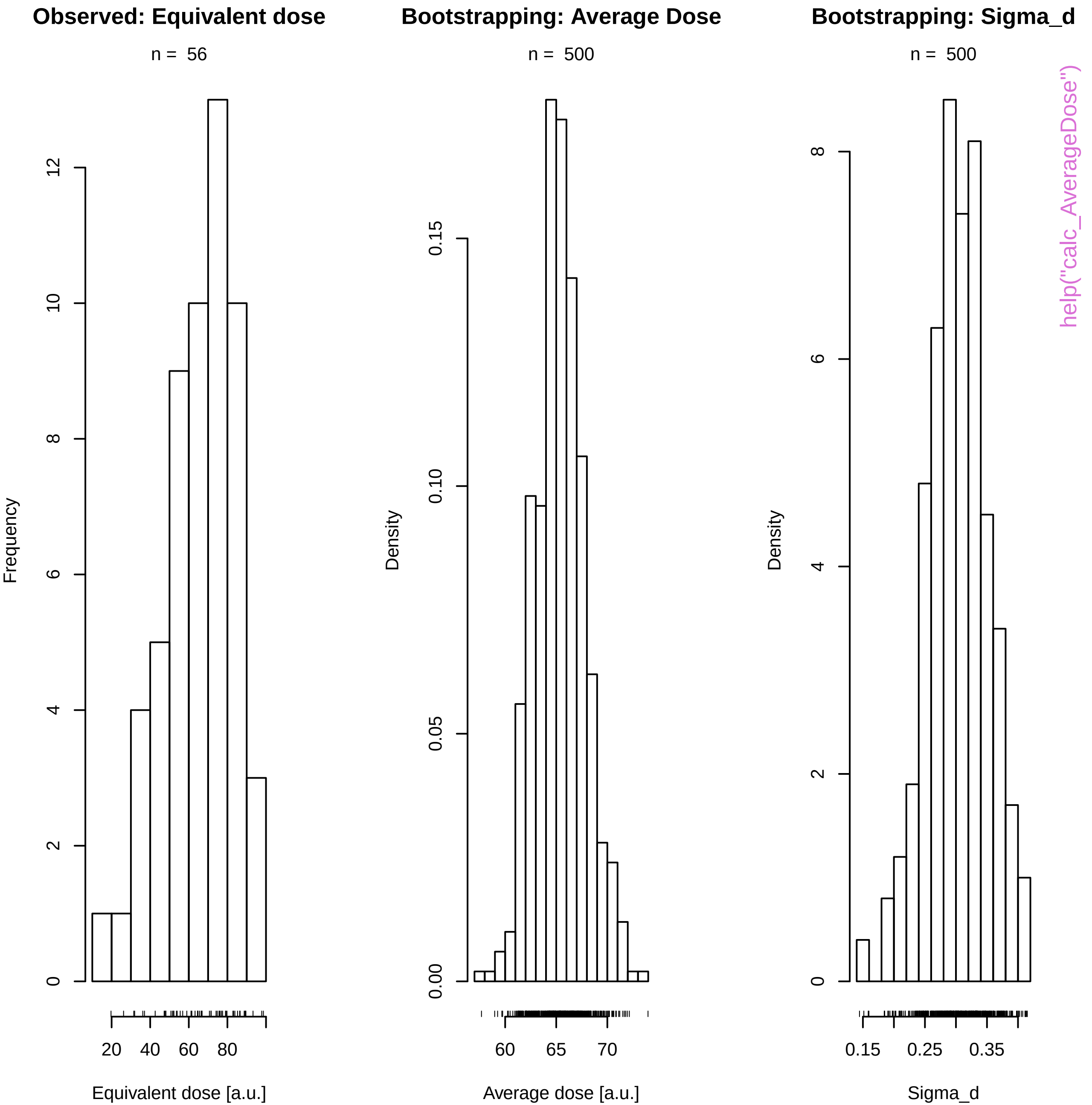

Index
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0.0
1.0
2.0
BSL
0.0
1.0
2.0
IRSL
0.85
1.00
1.15
BSL depl.
0.90
1.00
1.10
IRSL depl.
0.8
1.2
IRSL/BSL
help("analyse_portableOSL")

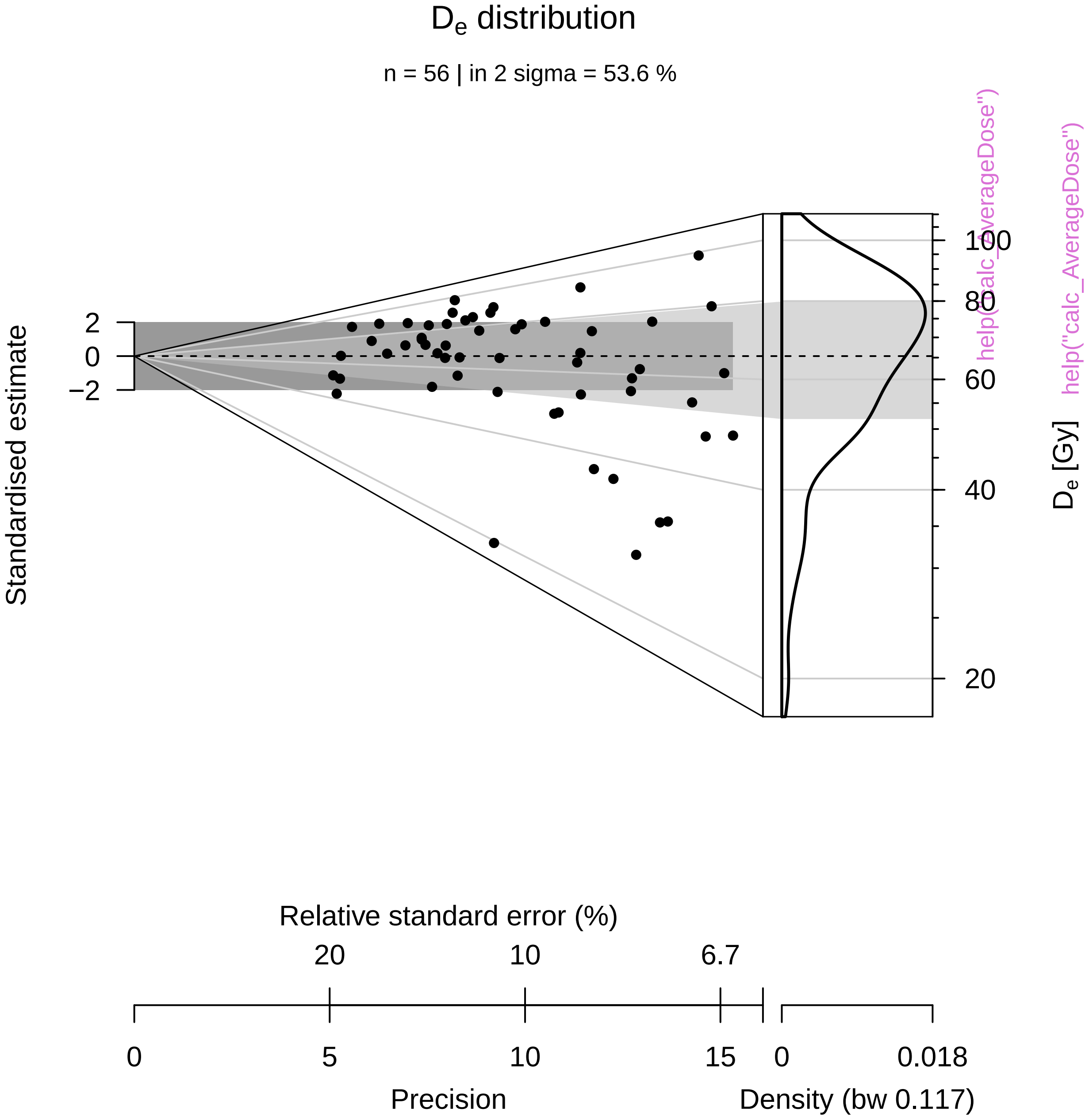

OSL
OSL [cts/0.04 s]
0
2000
4000
6000
8000
10000
Stimulation time [s]
0
10
20
30
40
help("bin_RLum.Data")

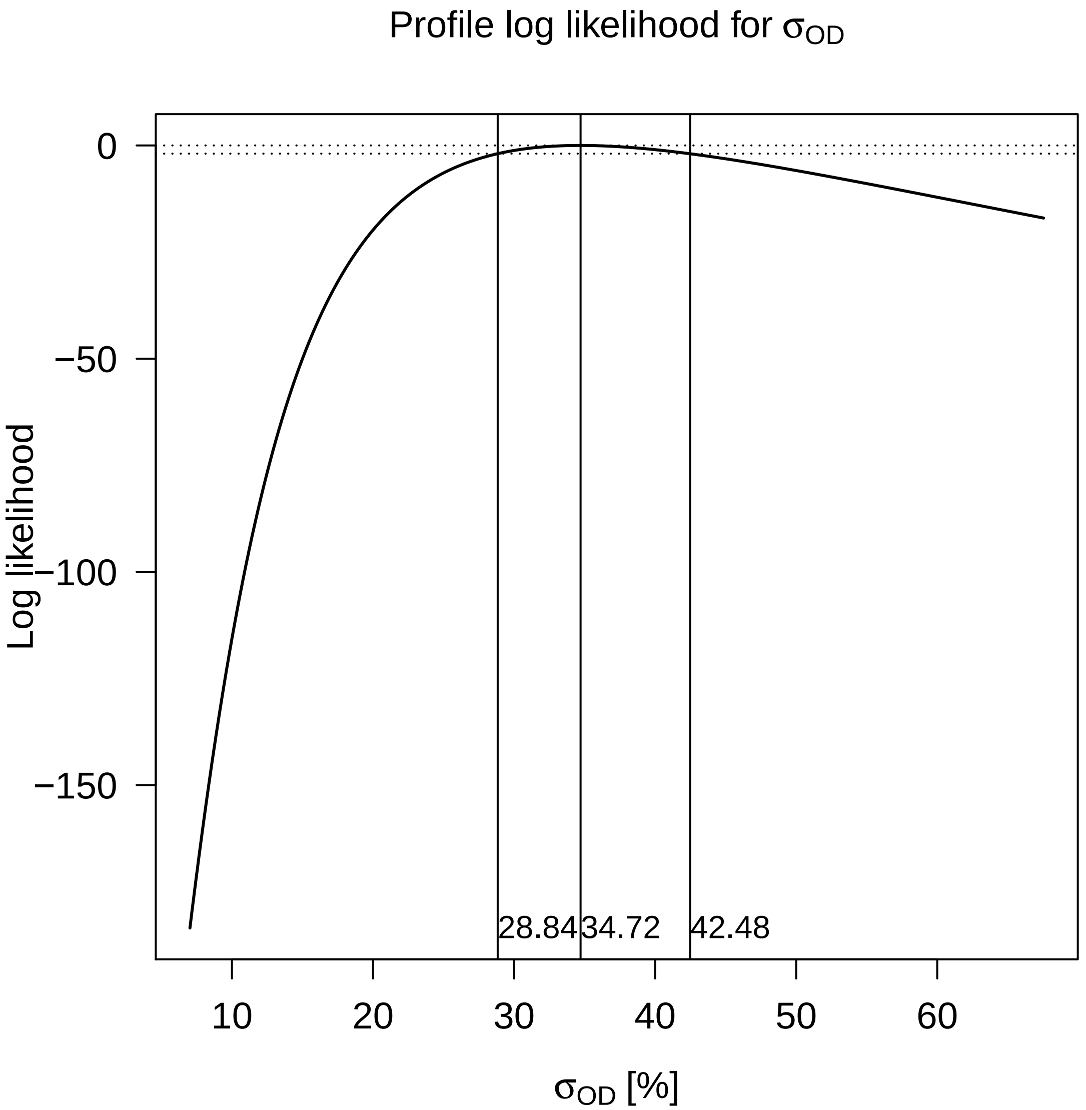

OSL
OSL [cts/0.08 s]
0
5000
10000
15000
20000
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

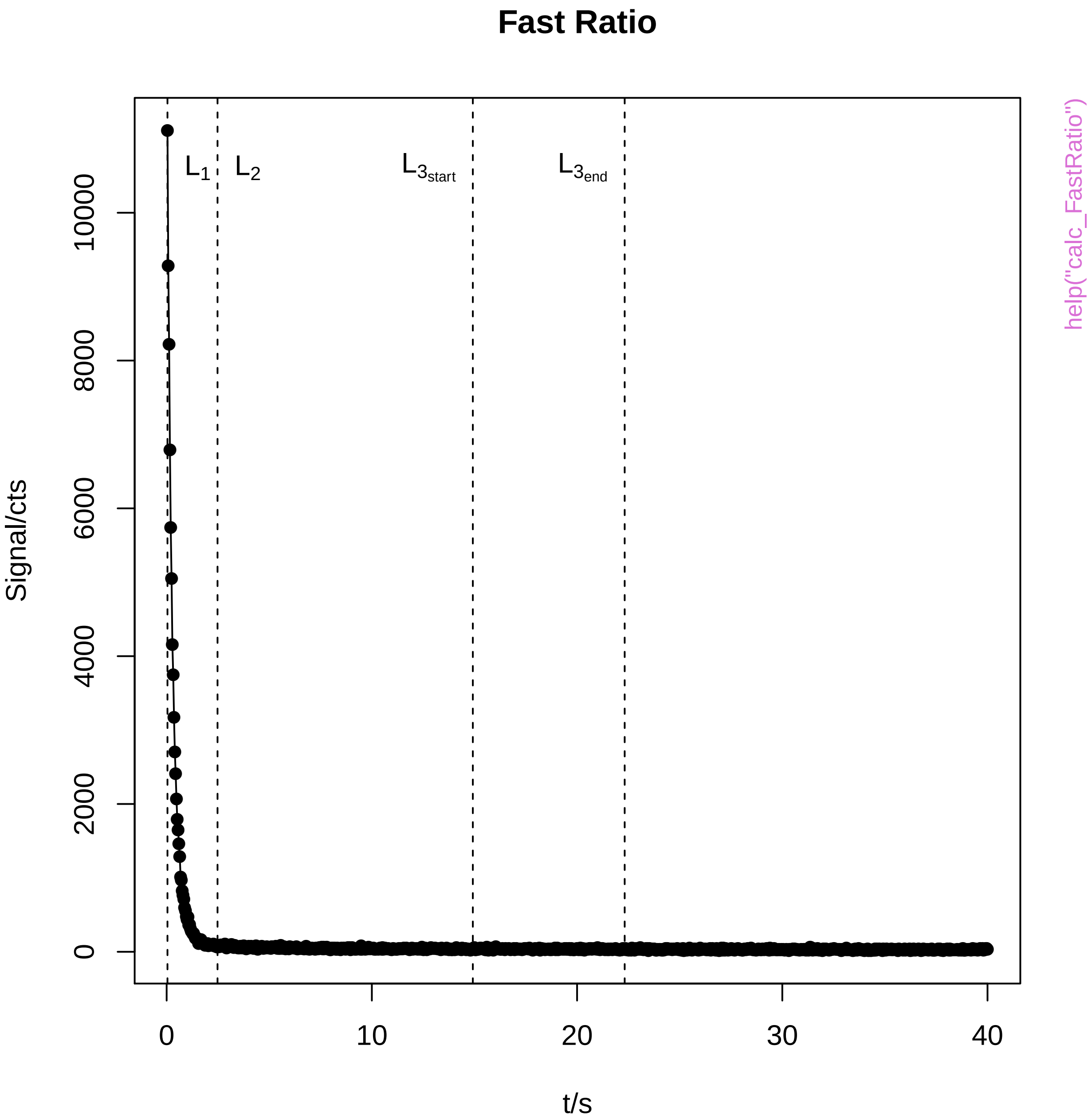

OSL
35000
30000
25000
20000
15000
10000
5000
0
OSL [cts/0.16 s]
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

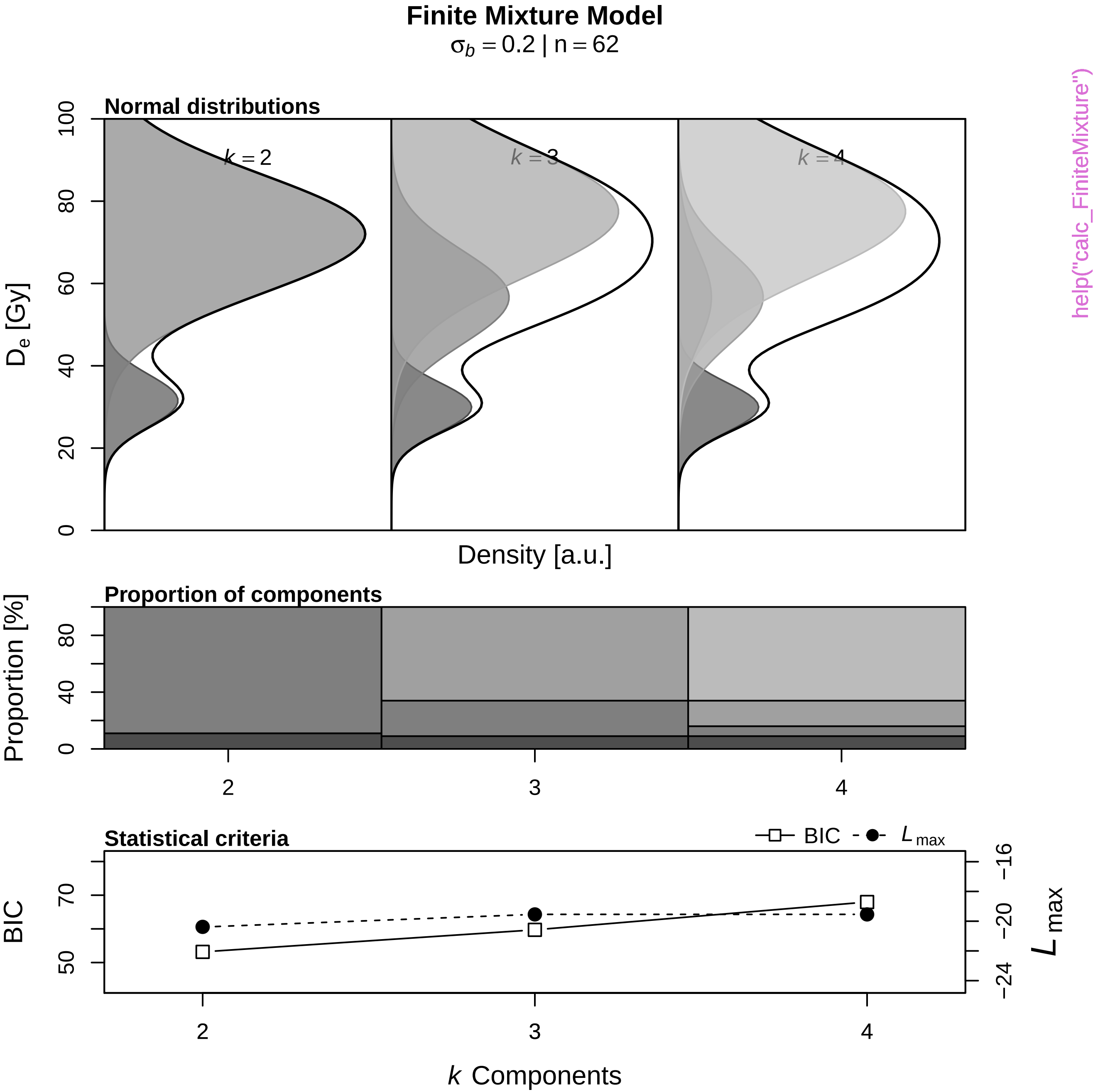

Monte Carlo Simulation
$n = \ | \ \hat{\mu} = 43 \ | \ \hat{\sigma} = 20 \ | \ \frac{\hat{\sigma}}{\sqrt{n}} = 2 \ | \ v = 0.73$
mean
median
0.05 / 0.95 quantile
help("calc_AliquotSize")
Density
0.000
0.005
0.010
0.015
0.020
20
40
60
80
100
20
40
60
80
100
Amount of grains on aliquot

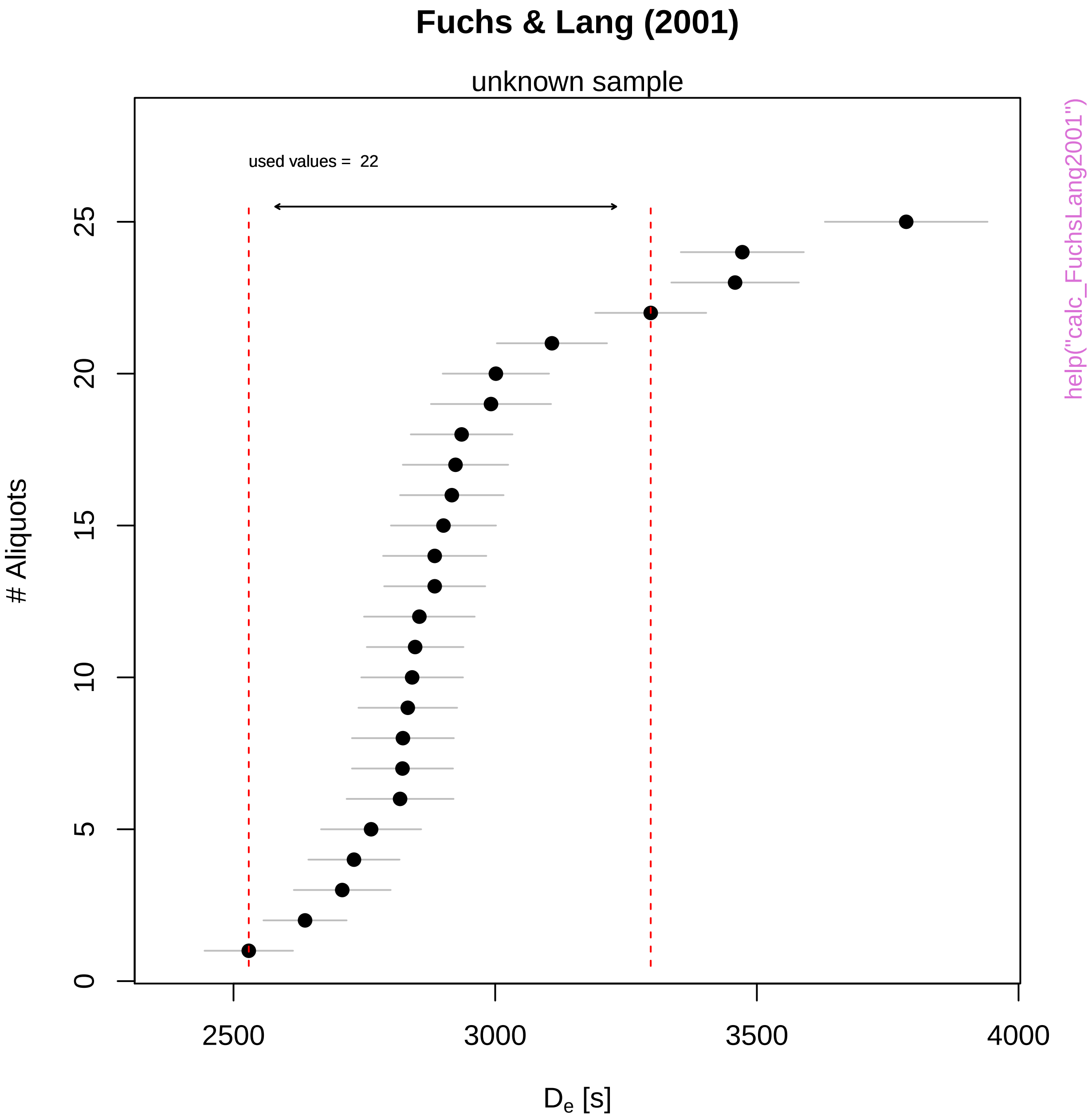

Observed: Equivalent dose
n = 56
Frequency
0
2
4
6
8
10
12
20
40
60
80
Equivalent dose [a.u.]
Bootstrapping: Average Dose
n = 500
Density
0.00
0.05
0.10
0.15
60
65
70
Average dose [a.u.]
Bootstrapping: Sigma_d
n = 500
Density
0
2
4
6
8
0.15
0.25
0.35
Sigma_d
help("calc_AverageDose")

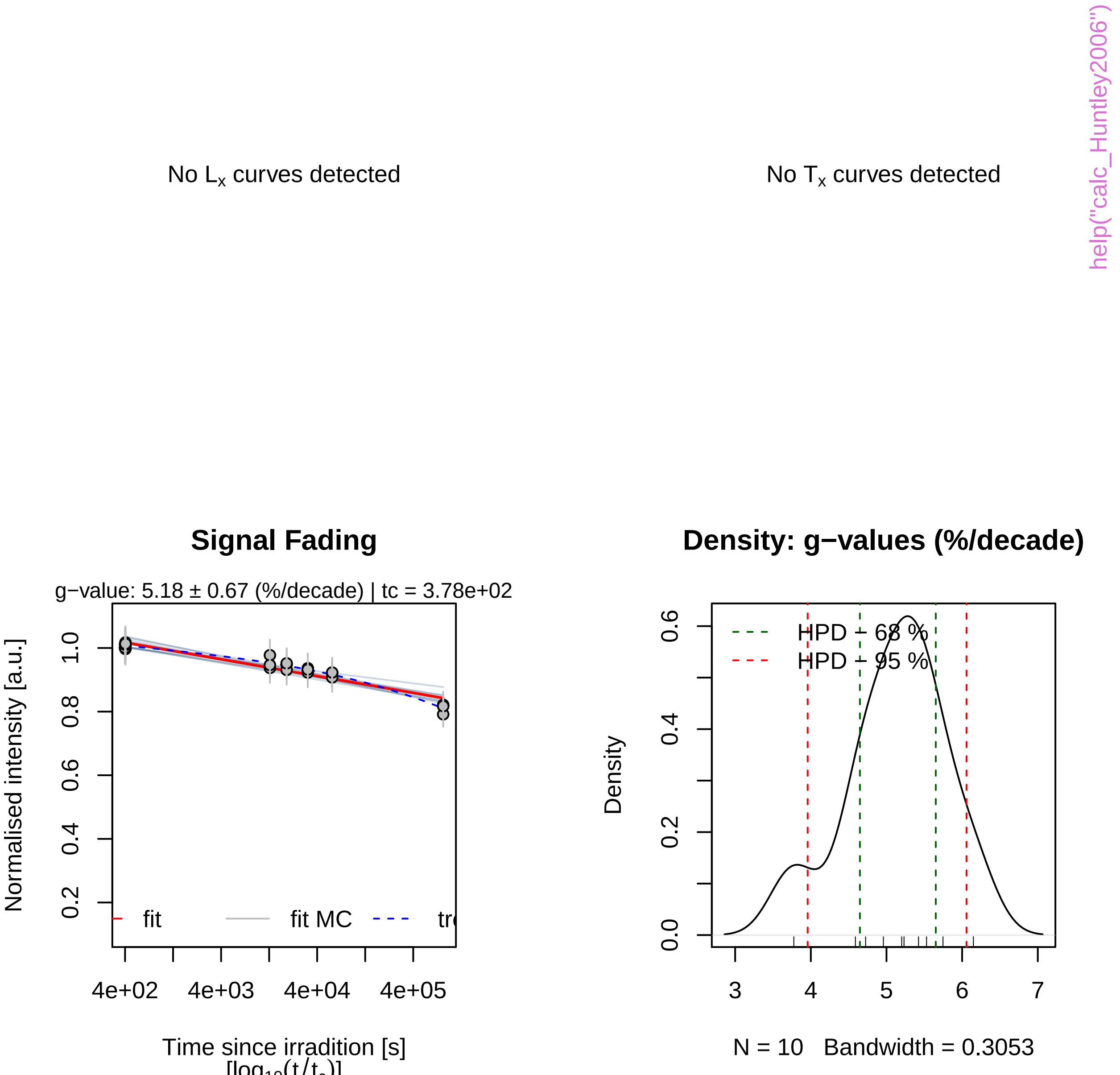

De distribution
n = 56 | in 2 sigma = 53.6 %
Standardised estimate
2
0
−2
help("calc_AverageDose")
help("calc_AverageDose")
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.018
Density (bw 0.117)

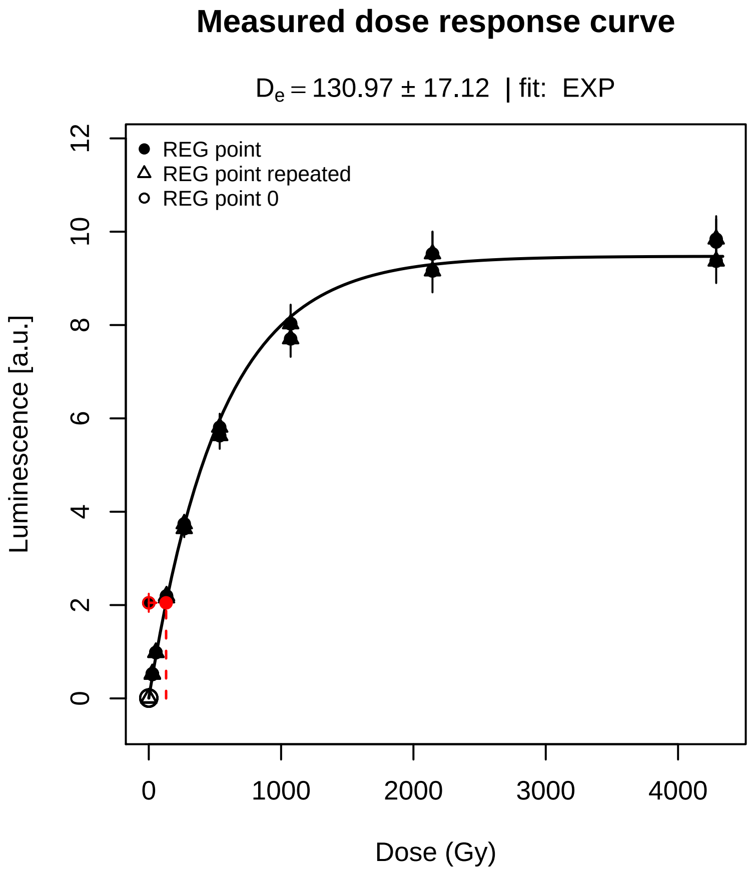

Profile log likelihood for σ$_{OD}$
Log likelihood
0
−50
−100
−150
28.84
34.72
42.48
10
20
30
40
50
60
σ$_{OD}$ [%]


Fast Ratio
Signal/cts
0
2000
4000
6000
8000
10000
t/s
0
10
20
30
40
L_1
L_2
$L_{3_{start}}$
$L_{3_{end}}$
help("calc_FastRatio")

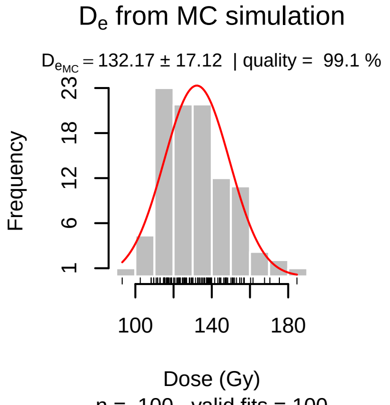

Finite Mixture Model
$\sigma_b = 0.2$ | n = 62
help("calc_FiniteMixture")
Normal distributions
$k = 2$
$k = 3$
$k = 4$
D_e [Gy]
0
20
40
60
80
100
Density [a.u.]
Proportion of components
Proportion [%]
0
40
80
2
3
4
Statistical criteria
BIC
L_{max}
50
70
−24
−20
−16
2
3
4
k Components


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

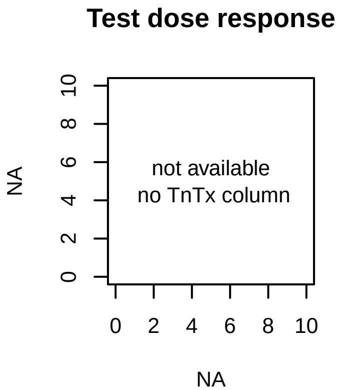

No L_x curves detected
No T_x curves detected
help("calc_Huntley2006")
Signal Fading
g−value: 5.18 ± 0.67 (%/decade) | tc = 3.78e+02
Normalised intensity [a.u.]
1.0
0.8
0.6
0.4
0.2
fit
fit MC
tr
4e+02
4e+03
4e+04
4e+05
Time since irradition [s]
[$\log_{10}(t/t_c)$]
Density: g−values (%/decade)
Density
0.6
0.4
0.2
0.0
HPD − 68 %
HPD − 95 %
3
4
5
6
7
N = 10 Bandwidth = 0.3053



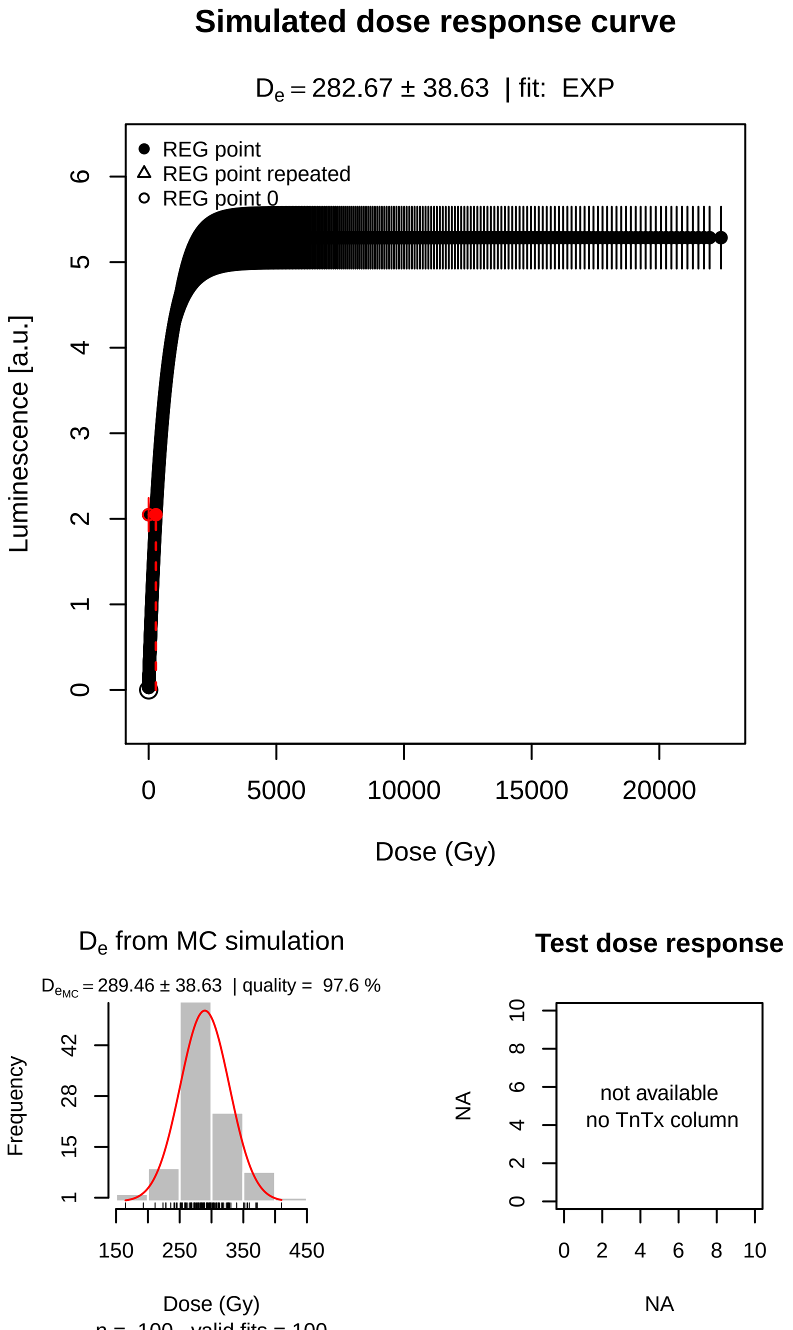
Measured dose response curve

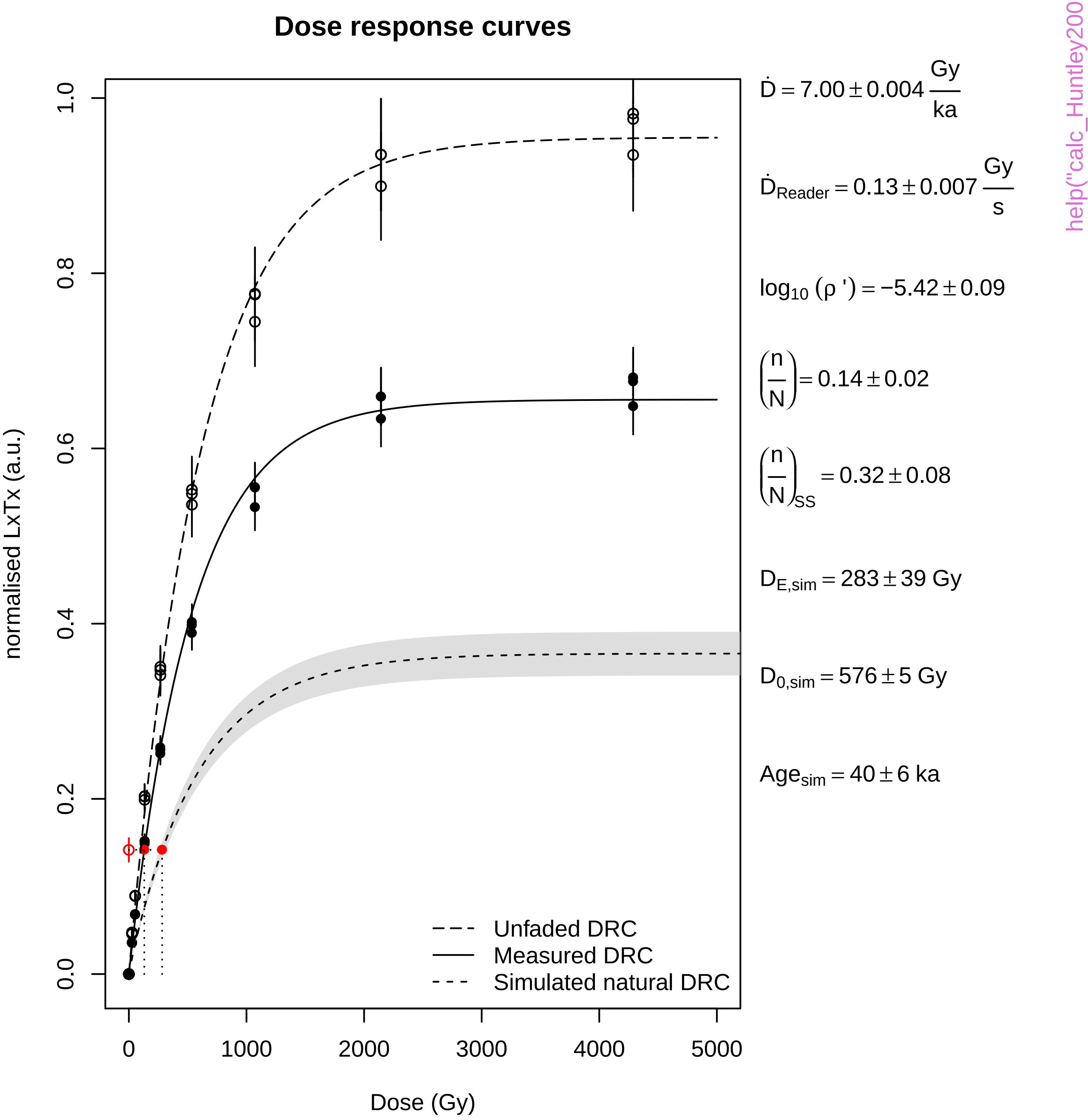


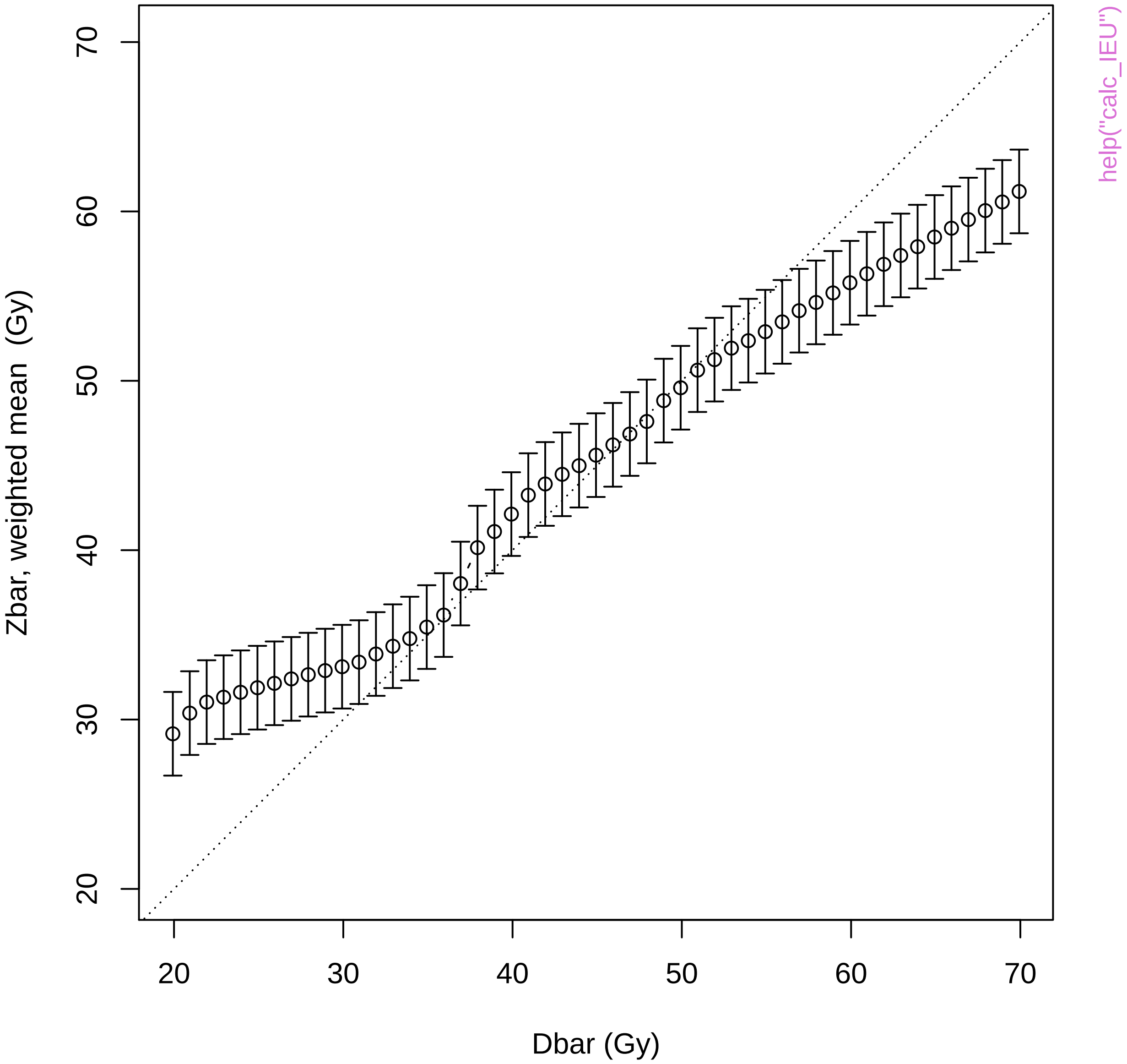
D_e from MC simulation



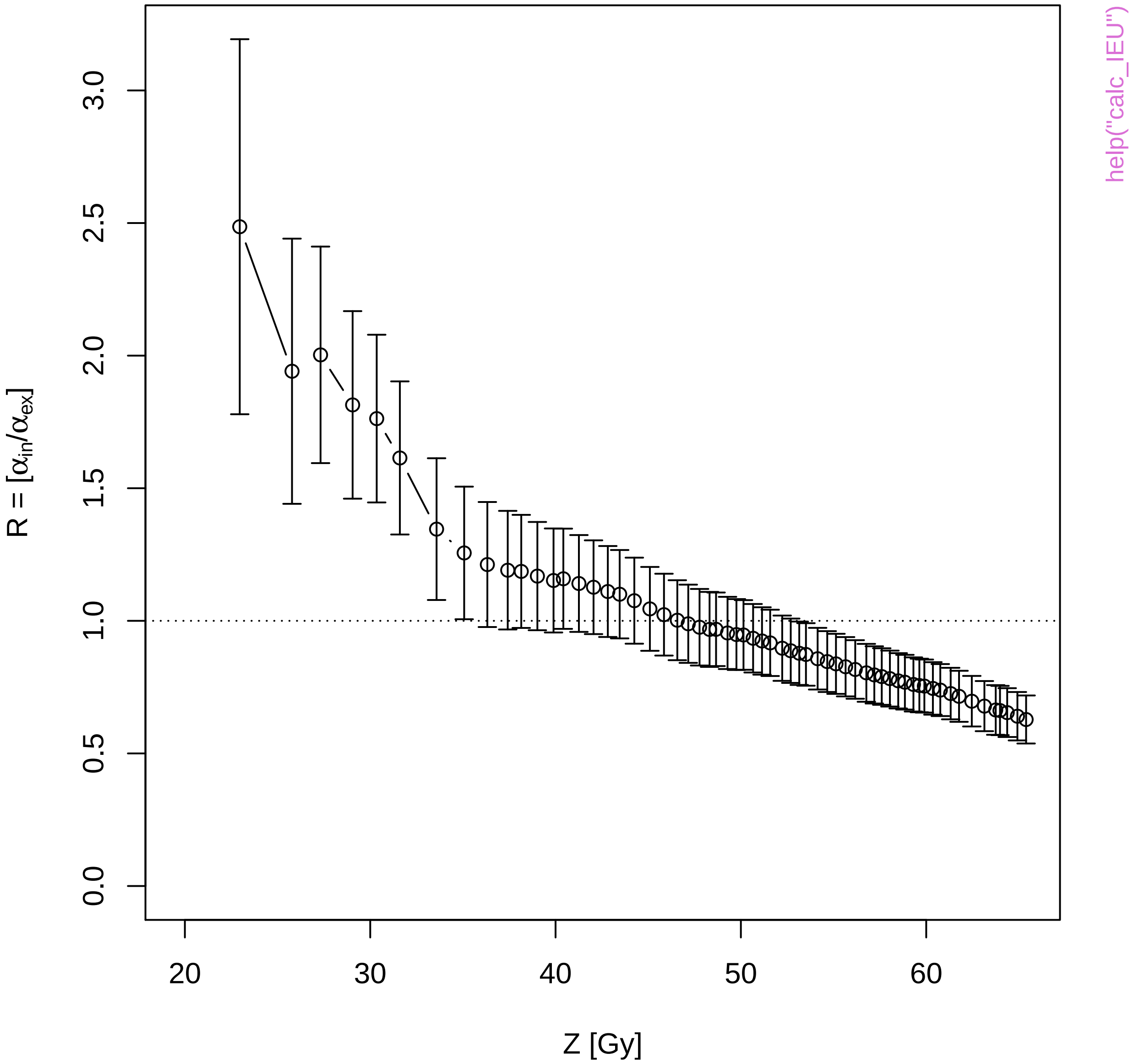
Test dose response


Simulated dose response curve
$D_e = 282.67 \pm 38.63$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
5000
10000
15000
20000
Dose (Gy)
D_e from MC simulation
$D_{e_{MC}} = 289.46 \pm 38.63$ | quality = 97.6 %
Frequency
1
15
28
42
150
250
350
450
Dose (Gy)
n = 100 , valid fits = 100
Test dose response
NA
0
2
4
6
8
10
not available
no TnTx column
0
2
4
6
8
10
NA


Dose response curves
$\dot{D} = 7.00 \pm 0.004 \frac{Gy}{ka}$
$\dot{D}_{Reader} = 0.13 \pm 0.007 \frac{Gy}{s}$
$\log_{10}(\rho') = -5.42 \pm 0.09$
$\left(\frac{n}{N}\right) = 0.14 \pm 0.02$
$\left(\frac{n}{N}\right)_{SS} = 0.32 \pm 0.08$
$D_{E,sim} = 283 \pm 39$ Gy
$D_{0,sim} = 576 \pm 5$ Gy
$Age_{sim} = 40 \pm 6$ ka
help("calc_Huntley2006")
normalised LxTx (a.u.)
0.0
0.2
0.4
0.6
0.8
1.0
Dose (Gy)
0
1000
2000
3000
4000
5000
Unfaded DRC
Measured DRC
Simulated natural DRC



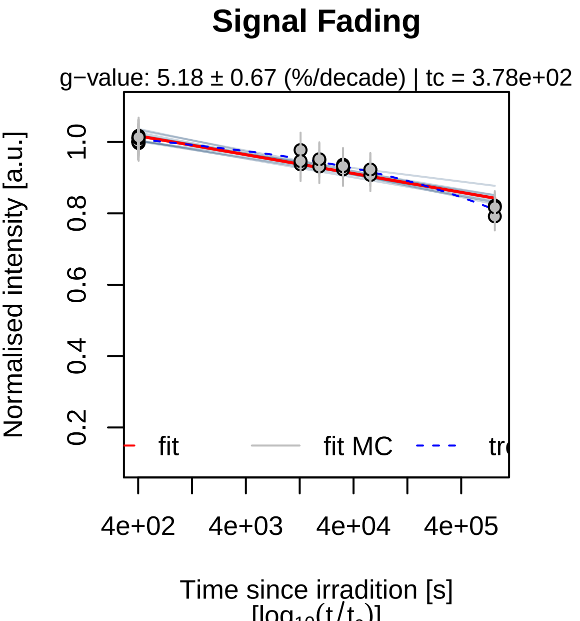
Zbar, weighted mean (Gy)
20
30
40
50
60
70
Dbar (Gy)
20
30
40
50
60
70
help("calc_IEU")

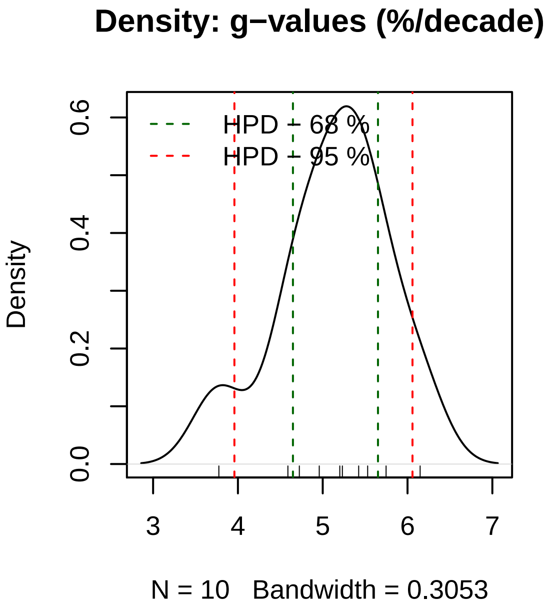

R = $[\alpha_{in}/\alpha_{ex}]$
0.0
0.5
1.0
1.5
2.0
2.5
3.0
20
30
40
50
60
Z [Gy]
help("calc_IEU")

No L_x curves detected

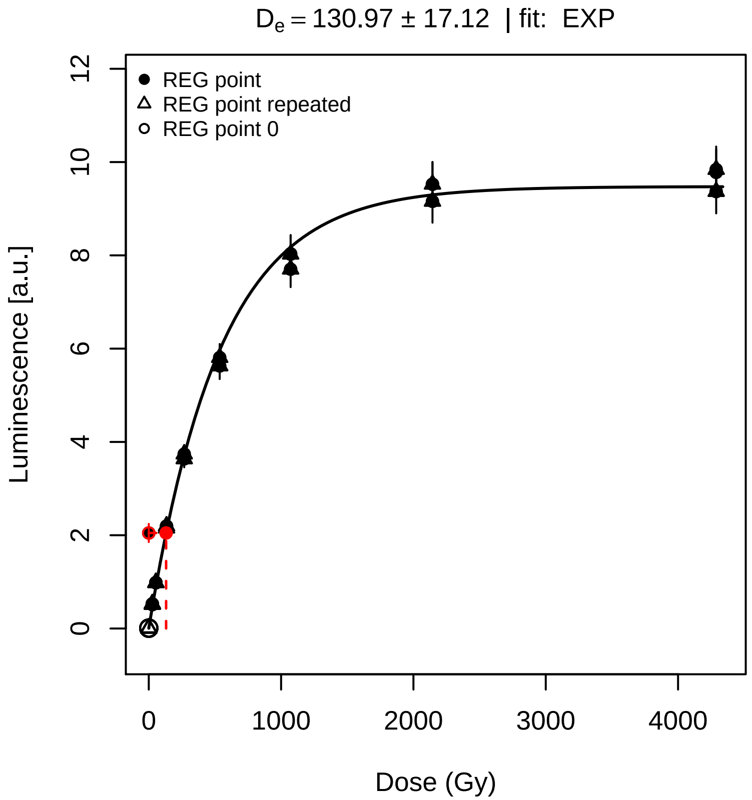
No T_x curves detected

help("calc_Kars2008")

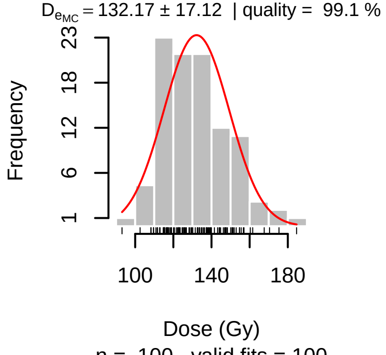




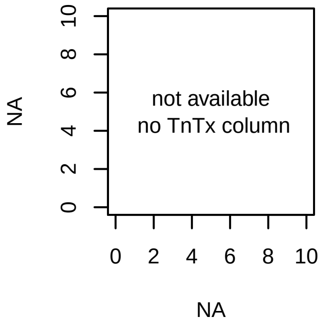
Measured dose response curve

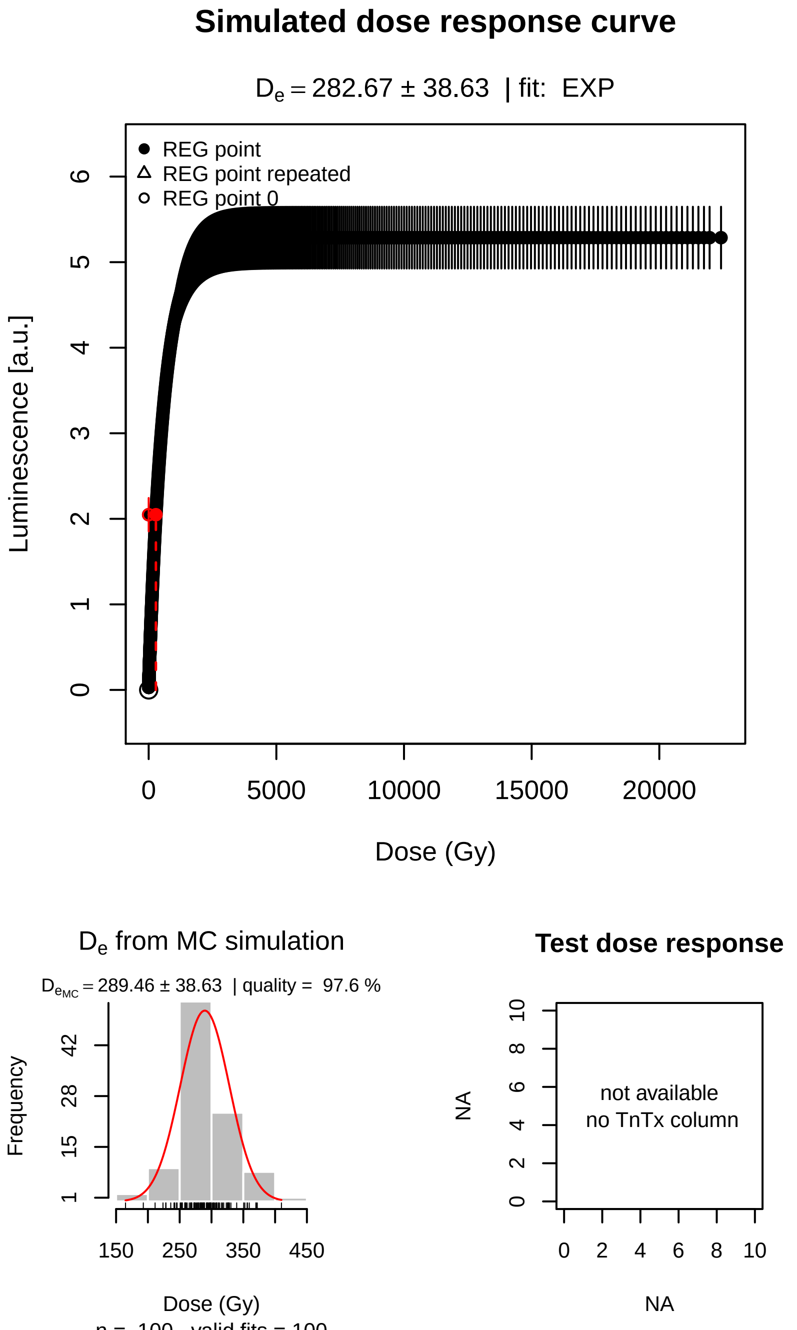


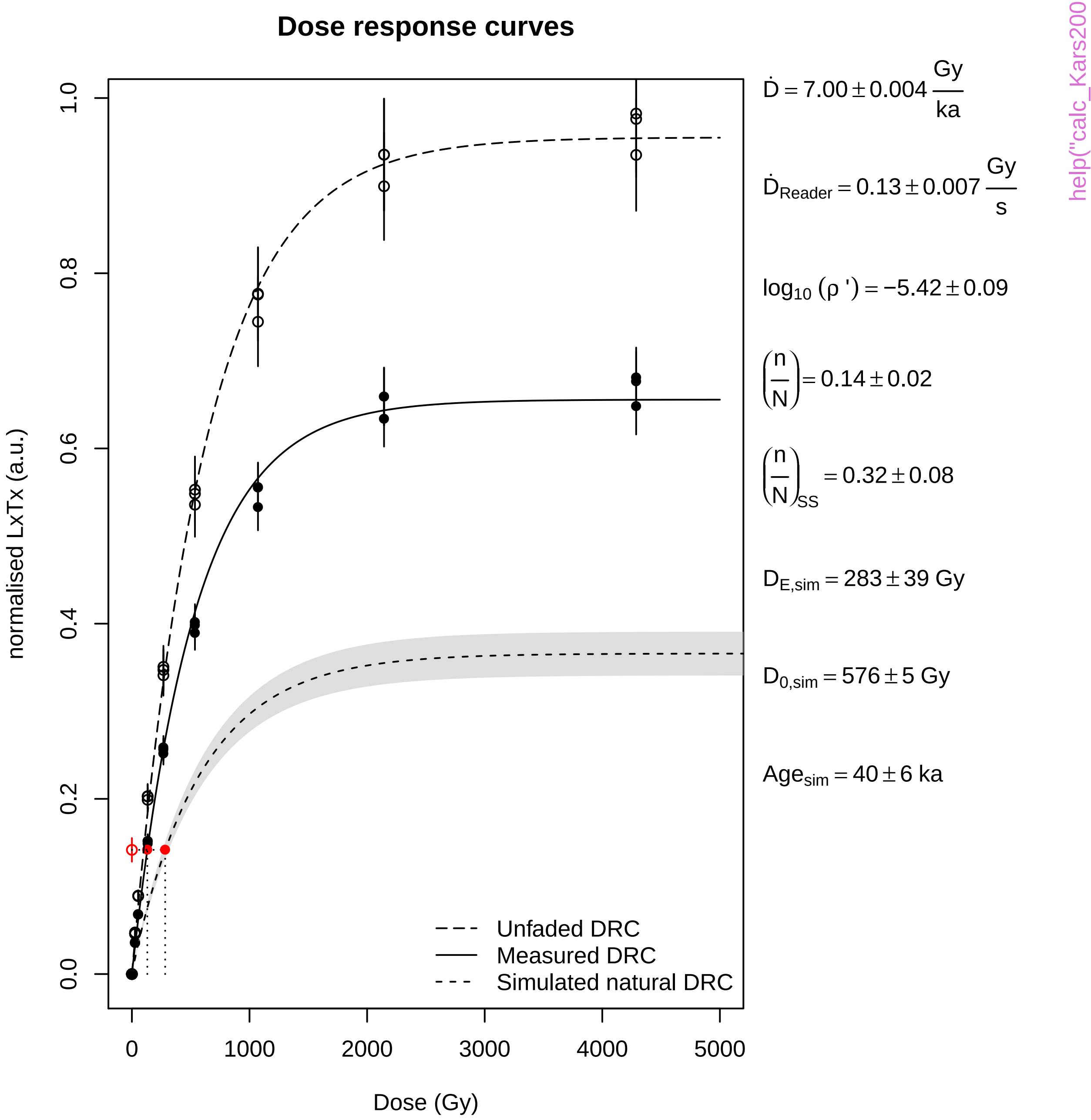
D_e from MC simulation

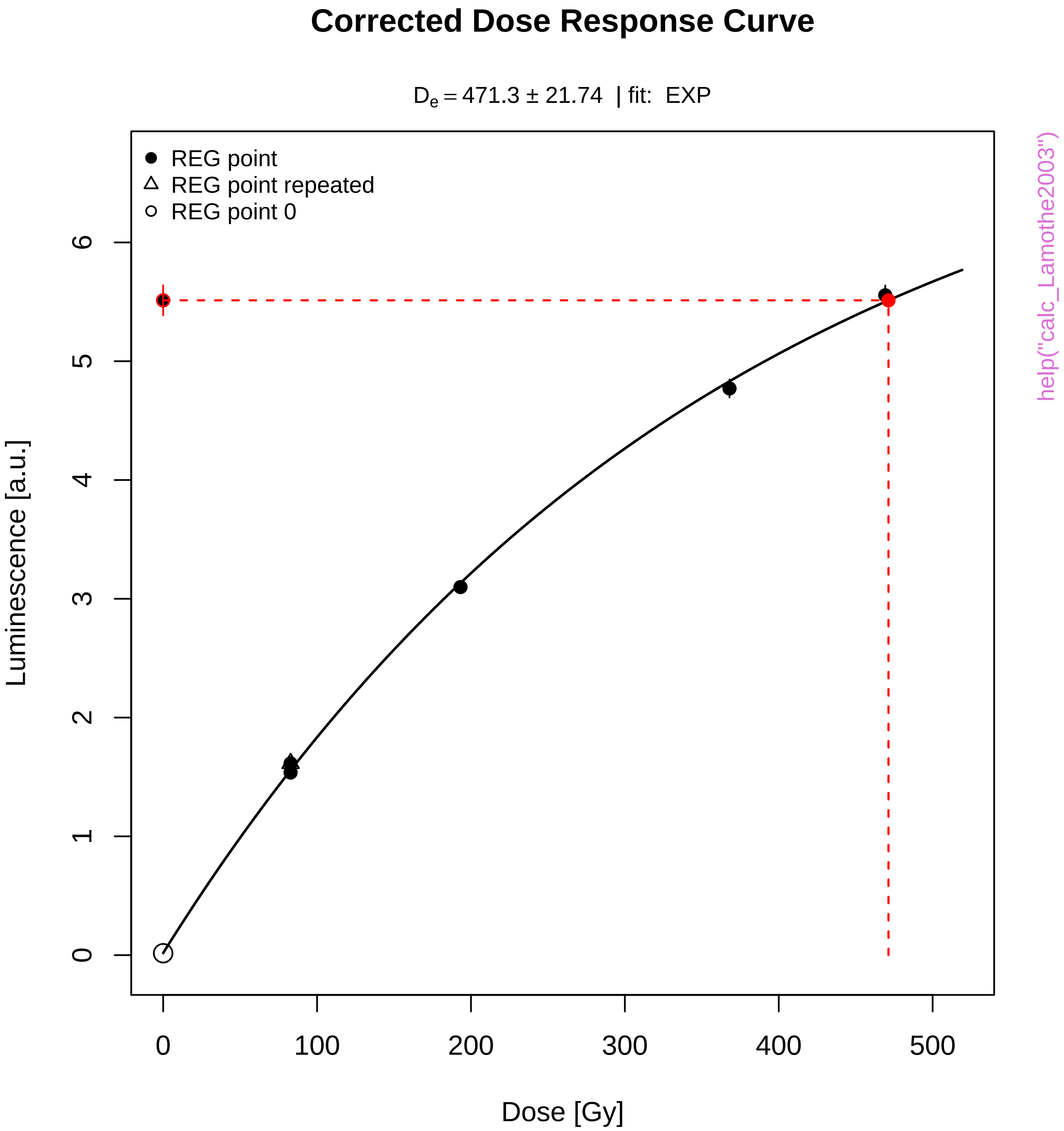


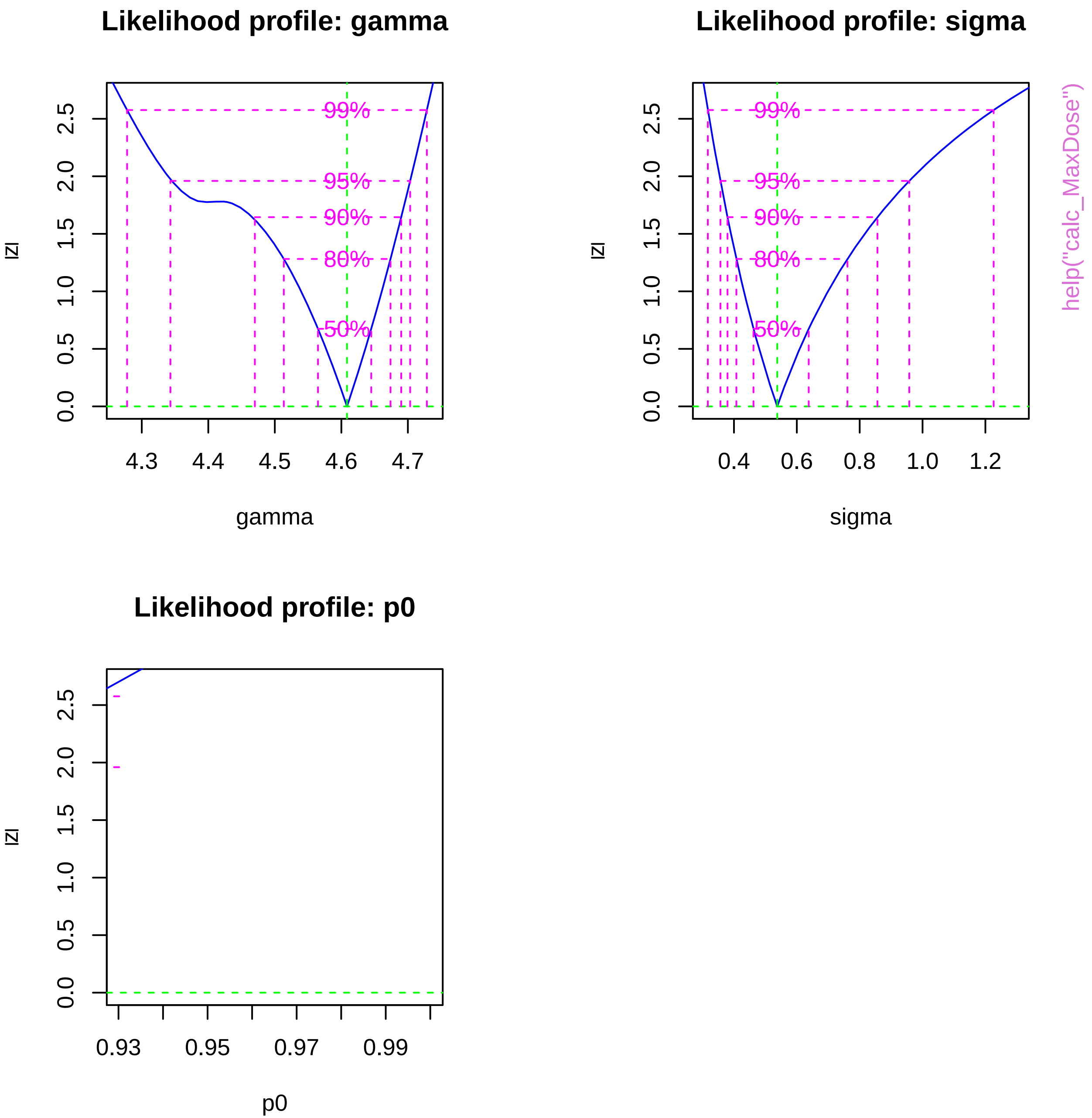
Test dose response

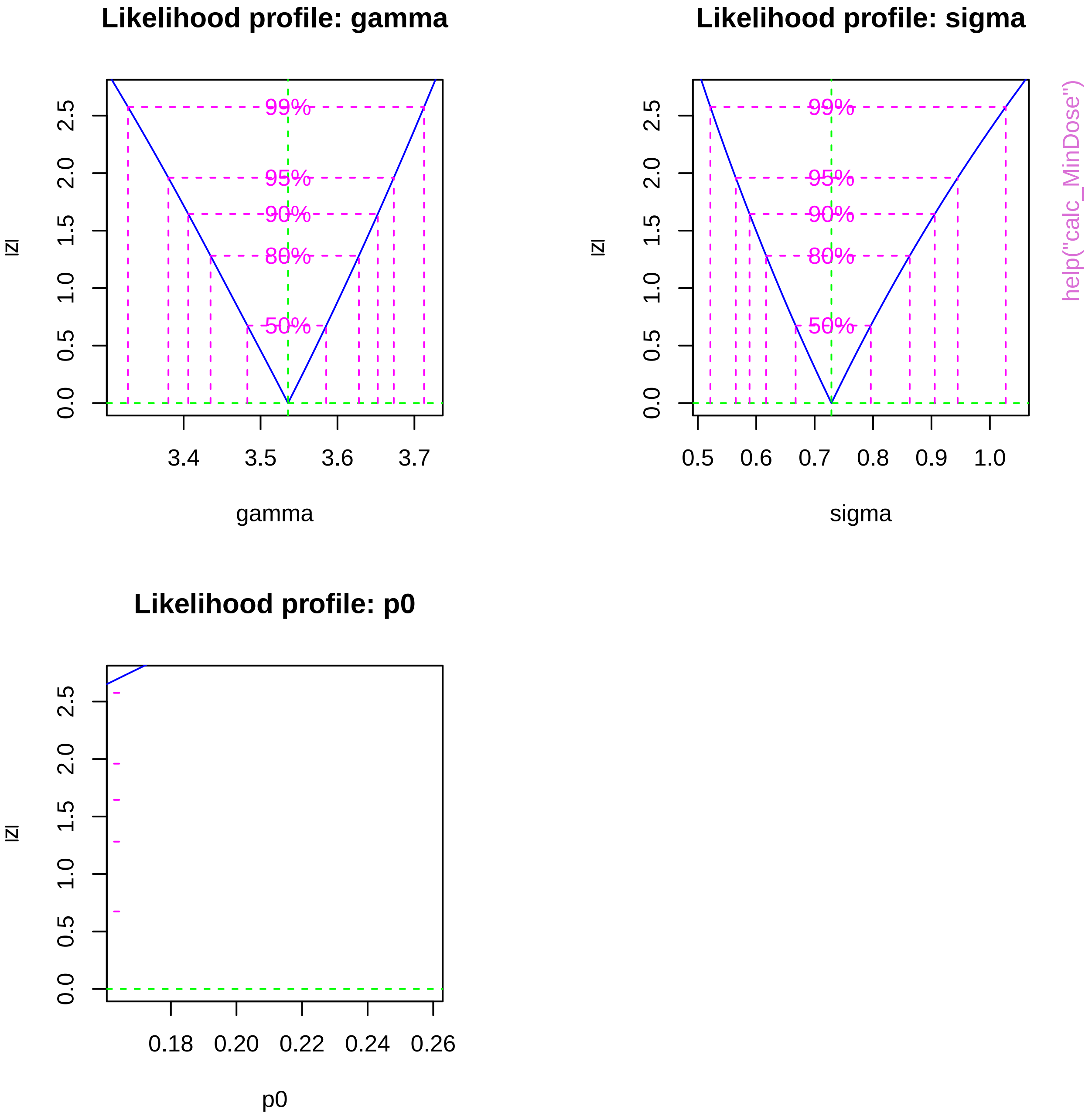



Simulated dose response curve
$D_e = 282.67 \pm 38.63$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
5000
10000
15000
20000
Dose (Gy)
D_e from MC simulation
$D_{e_{MC}} = 289.46 \pm 38.63$ | quality = 97.6 %
Frequency
1
15
28
42
150
250
350
450
Dose (Gy)
n = 100 | valid fits = 100
Test dose response
NA
0
2
4
6
8
10
not available
no TnTx column
0
2
4
6
8
10
NA


Dose response curves
normalised LxTx (a.u.)
0.0
0.2
0.4
0.6
0.8
1.0
Dose (Gy)
0
1000
2000
3000
4000
5000
Unfaded DRC
Measured DRC
Simulated natural DRC
$\dot{D} = 7.00 \pm 0.004 \frac{Gy}{ka}$
$\dot{D}_{Reader} = 0.13 \pm 0.007 \frac{Gy}{s}$
$\log_{10}(\rho') = -5.42 \pm 0.09$
$\left(\frac{n}{N}\right) = 0.14 \pm 0.02$
$\left(\frac{n}{N}\right)_{SS} = 0.32 \pm 0.08$
$D_{E,sim} = 283 \pm 39$ Gy
$D_{0,sim} = 576 \pm 5$ Gy
$Age_{sim} = 40 \pm 6$ ka
help("calc_Kars2008")


Corrected Dose Response Curve
$D_e = 471.3 \pm 21.74$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
help("calc_Lamothe2003")
Luminescence [a.u.]
0
1
2
3
4
5
6
Dose [Gy]
0
100
200
300
400
500

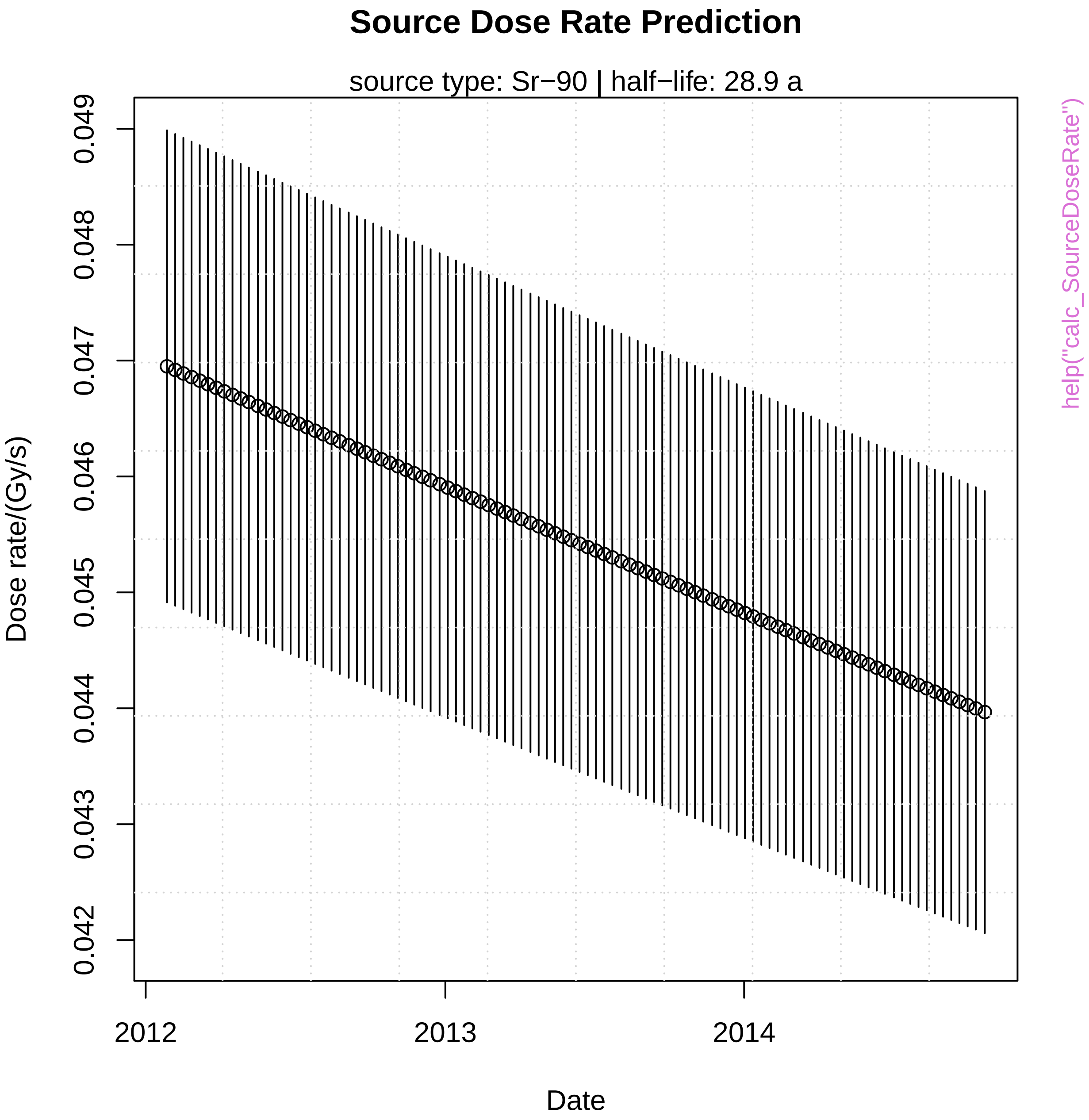

Likelihood profile: gamma
|z|
0.0
0.5
1.0
1.5
2.0
2.5
4.3
4.4
4.5
4.6
4.7
gamma
99%
95%
90%
80%
50%
Likelihood profile: sigma
|z|
0.0
0.5
1.0
1.5
2.0
2.5
0.4
0.6
0.8
1.0
1.2
sigma
99%
95%
90%
80%
50%
help("calc_MaxDose")
Likelihood profile: p0
|z|
0.0
0.5
1.0
1.5
2.0
2.5
0.93
0.95
0.97
0.99
p0

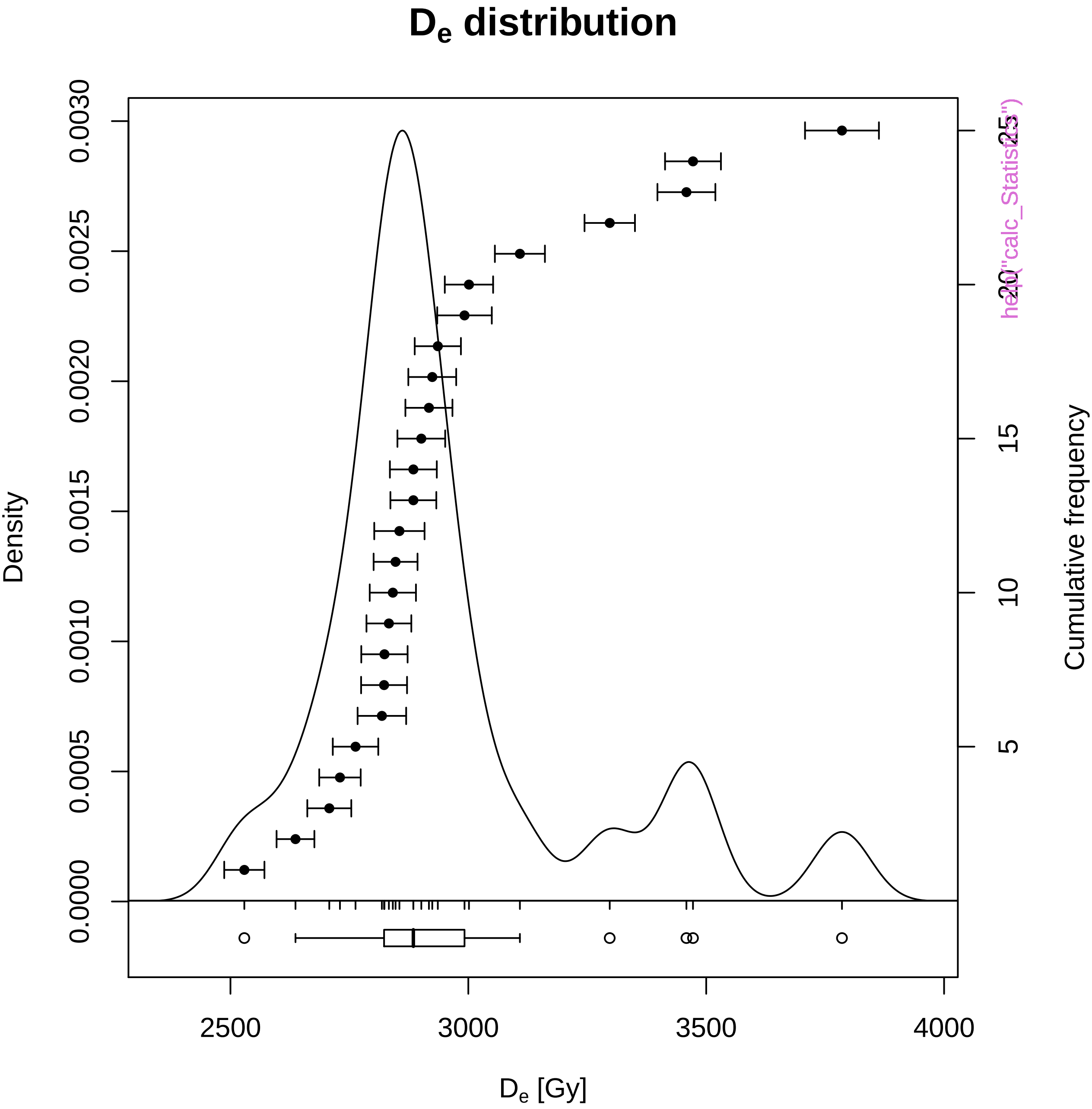


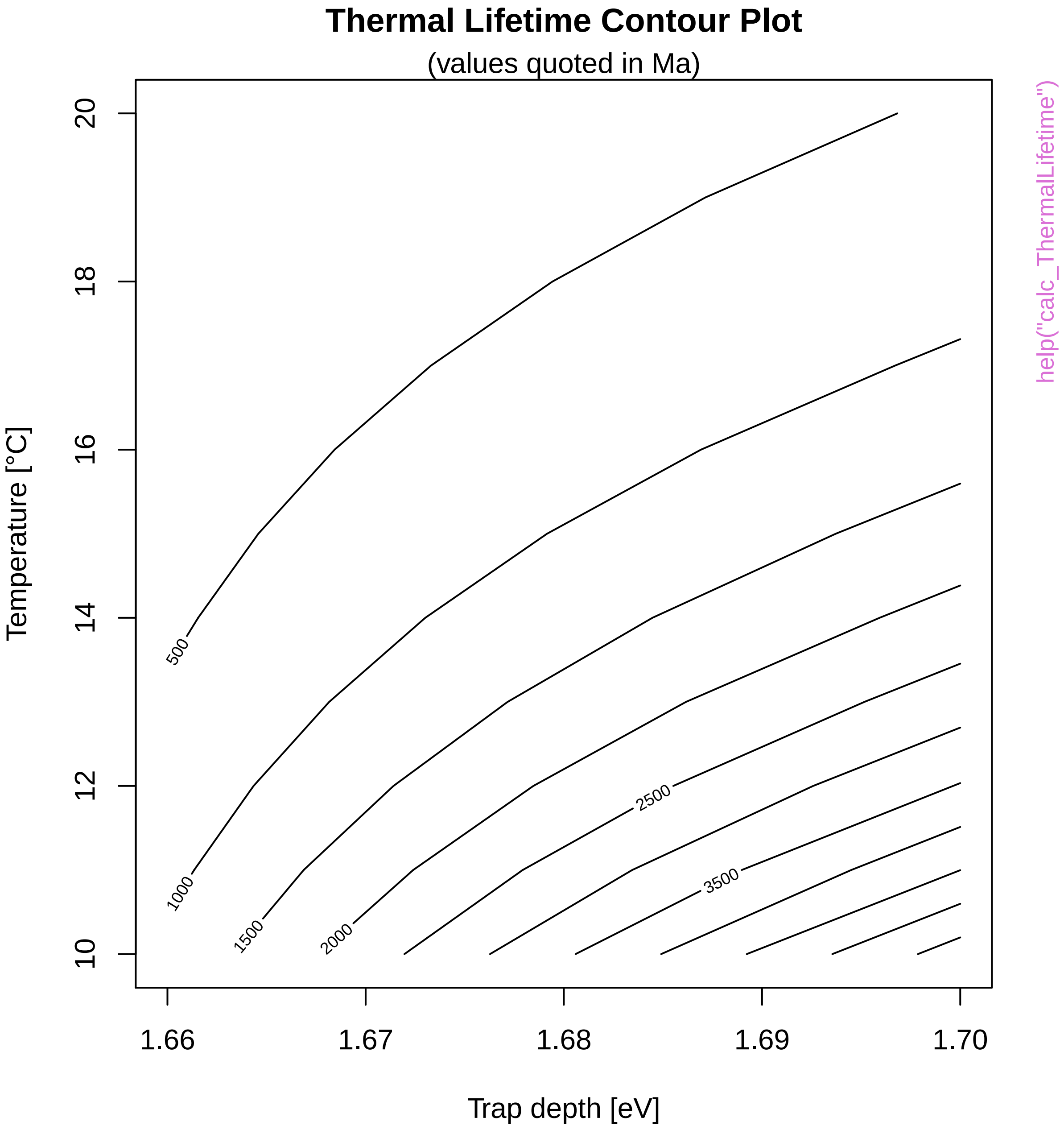
Likelihood profile: gamma

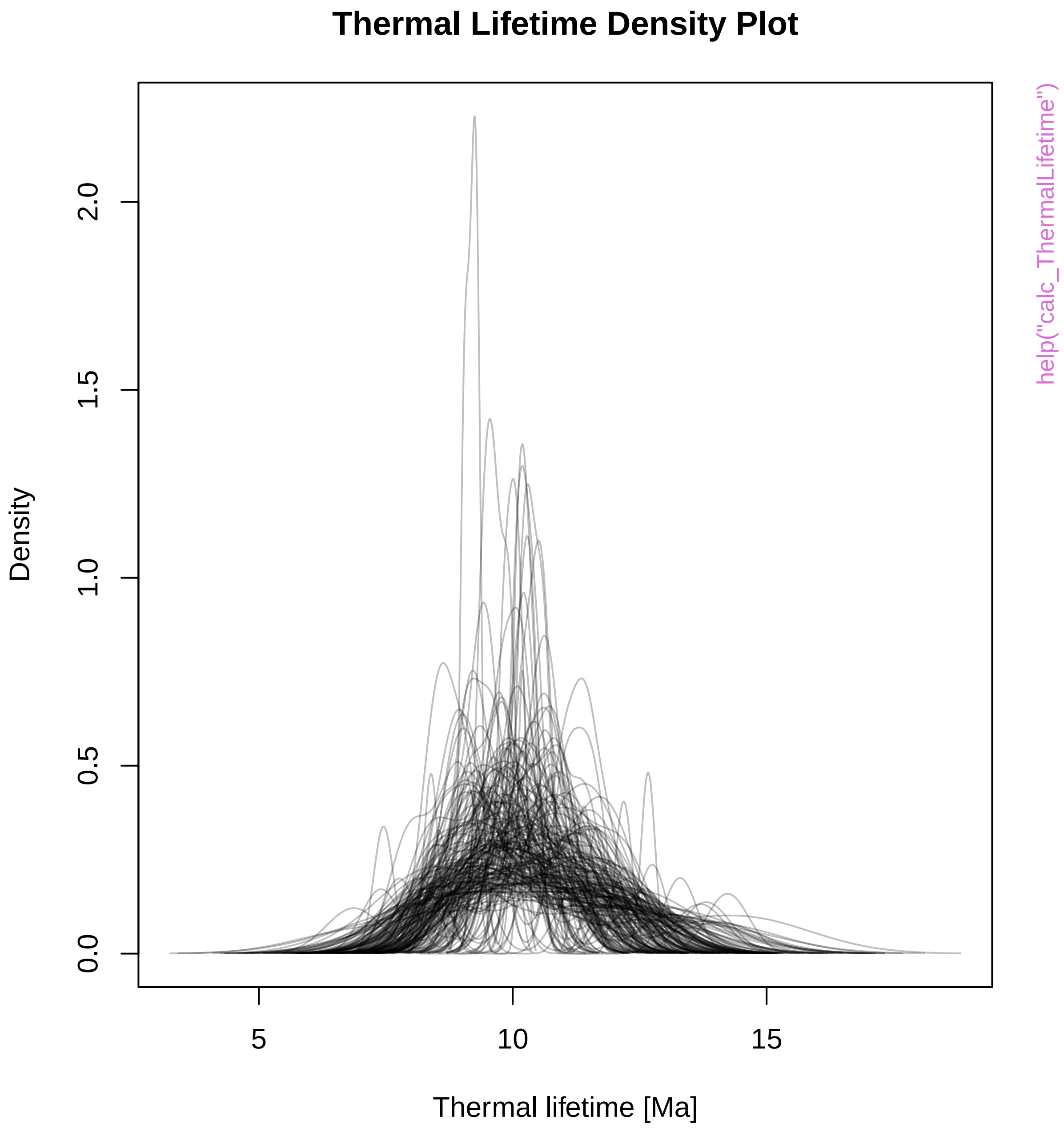
Likelihood profile: sigma

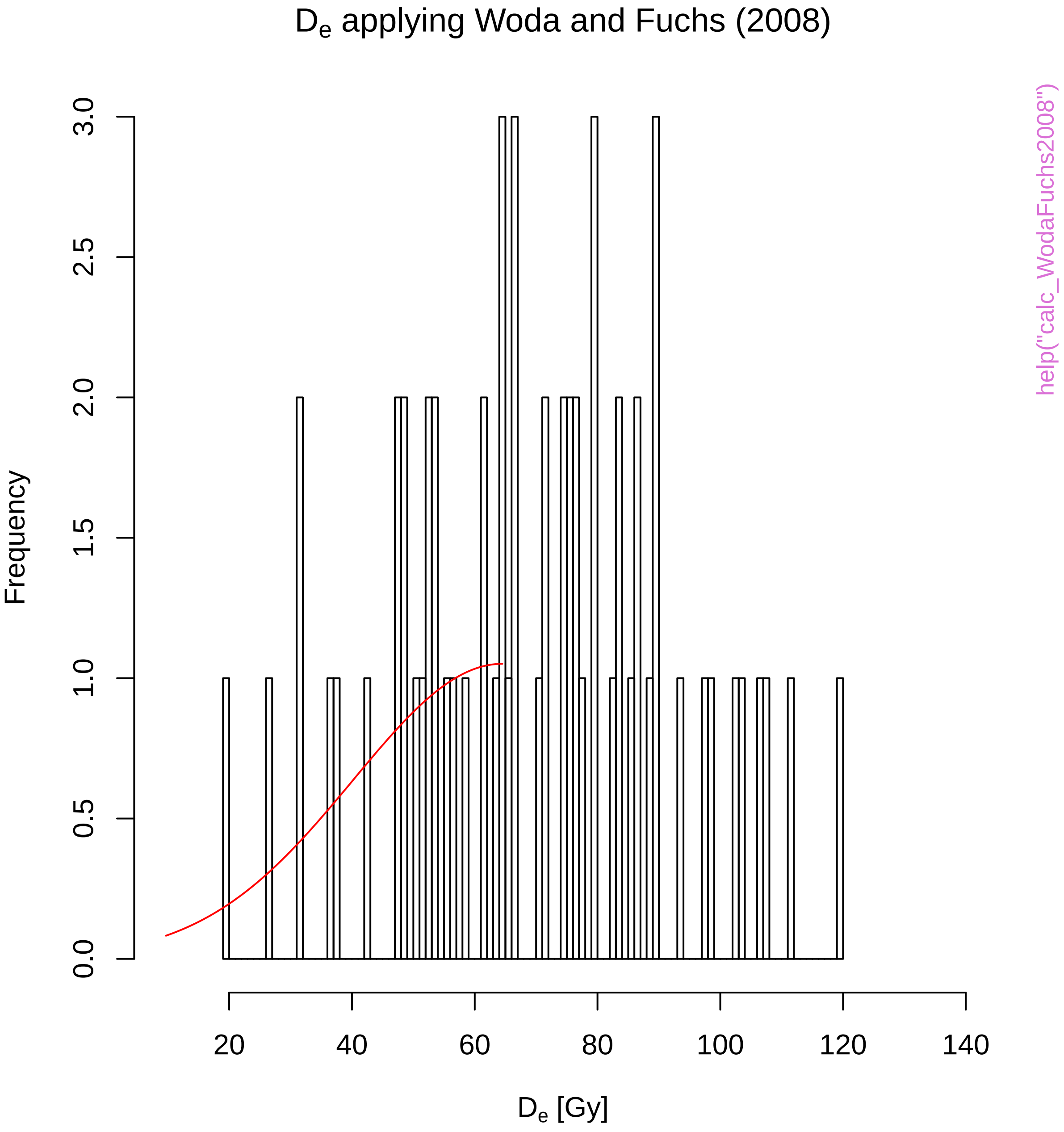
Likelihood profile: p0

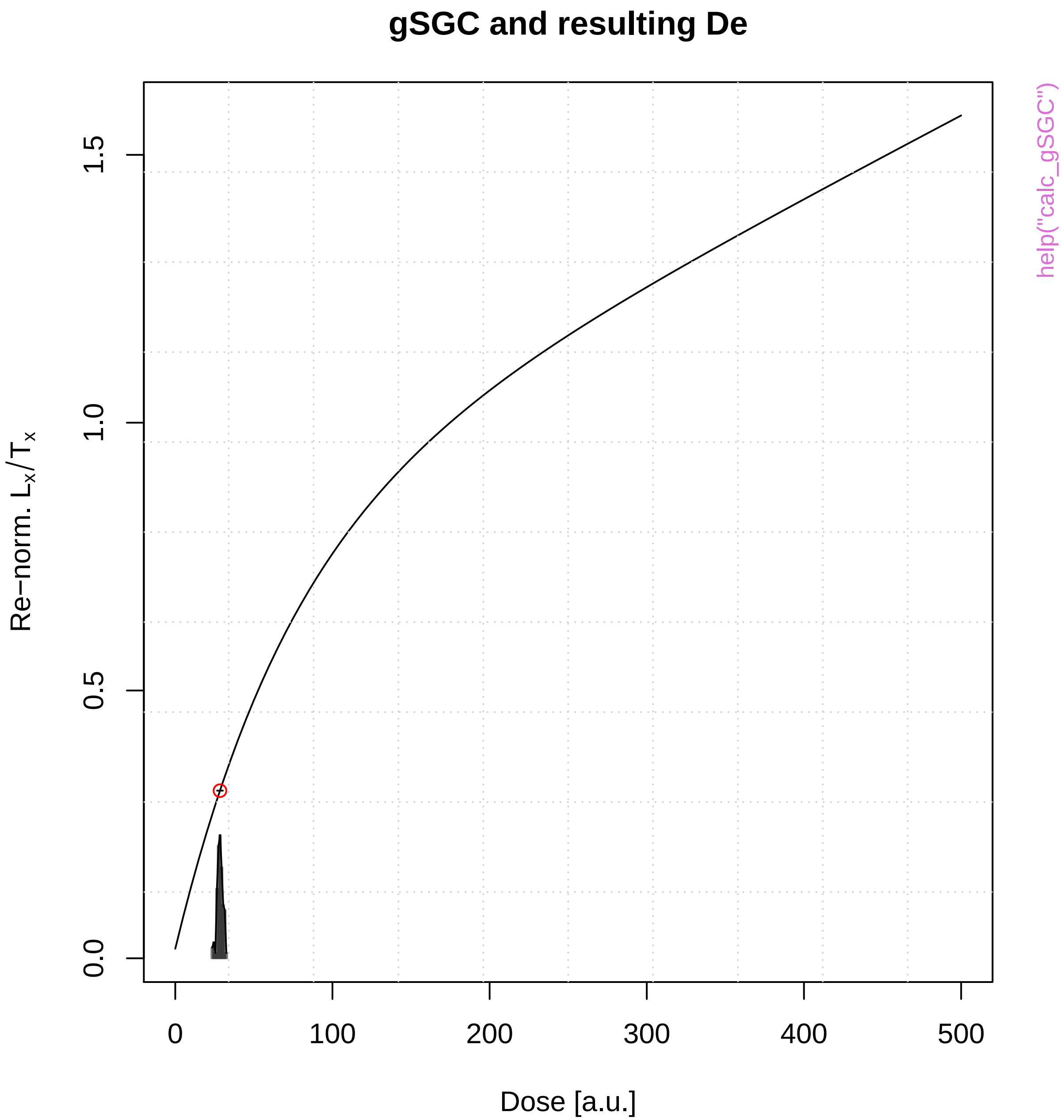

Source Dose Rate Prediction
source type: Sr−90 | half−life: 28.9 a
Dose rate/(Gy/s)
0.049
0.048
0.047
0.046
0.045
0.044
0.043
0.042
2012
2013
2014
Date
help("calc_SourceDoseRate")

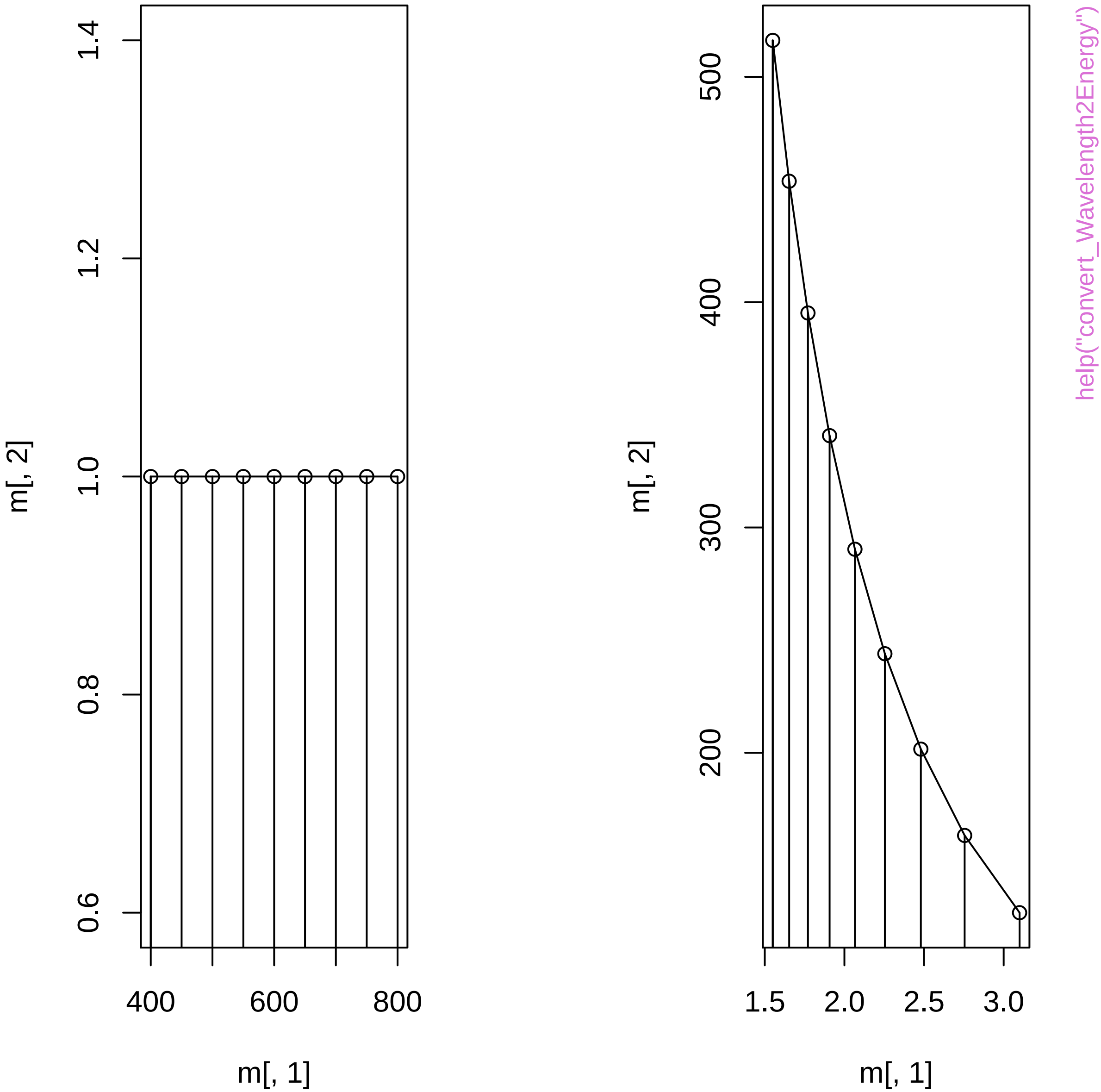
D_e distribution
Density
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
Cumulative frequency
5
10
15
20
25
help("calc_Statistics")
2500
3000
3500
4000
D_e [Gy]

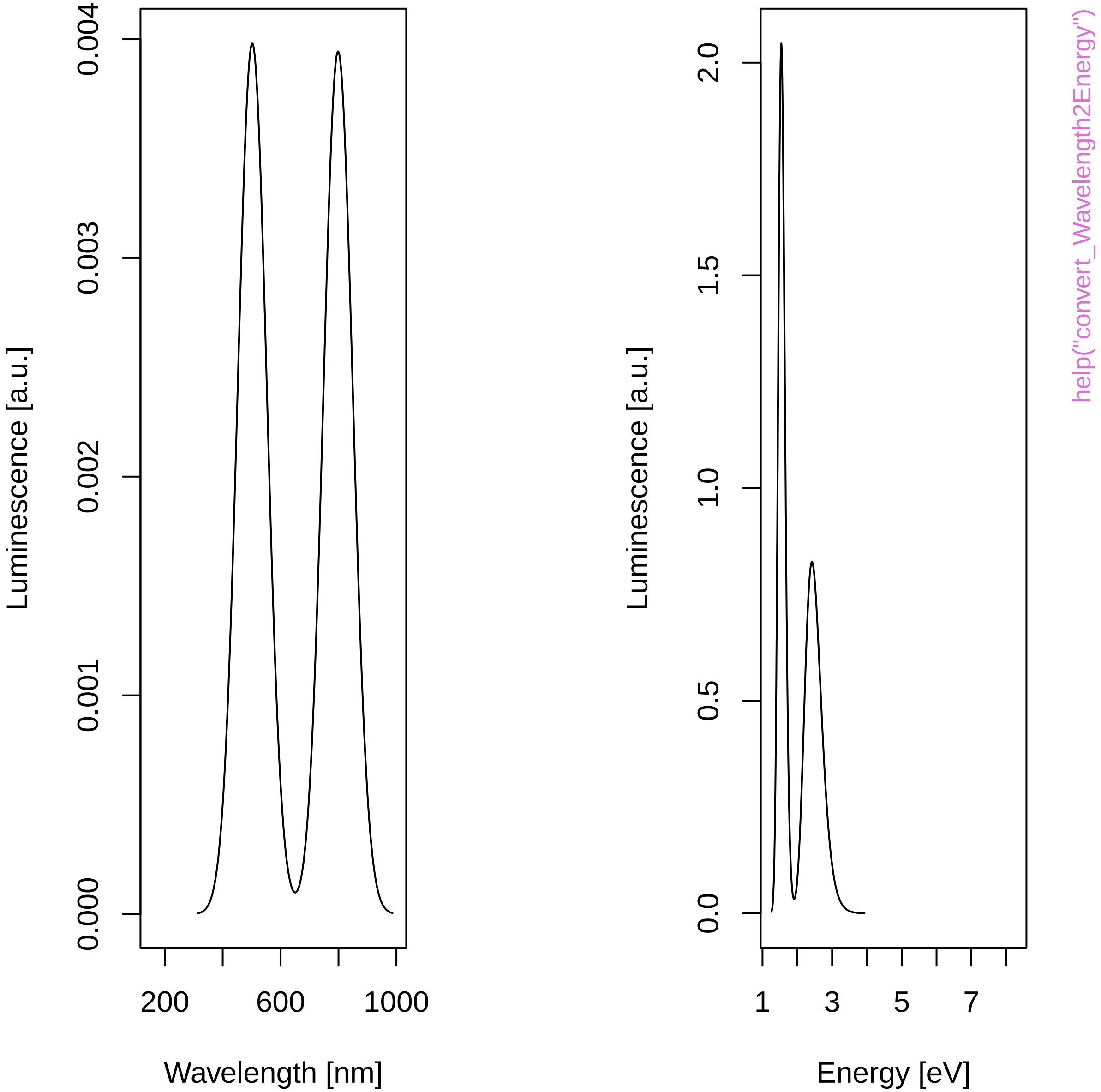

Thermal Lifetime Contour Plot
(values quoted in Ma)
Temperature [°C]
20
18
16
14
12
10
Trap depth [eV]
1.66
1.67
1.68
1.69
1.70
500
1000
1500
2000
2500
3500
help("calc_ThermalLifetime")

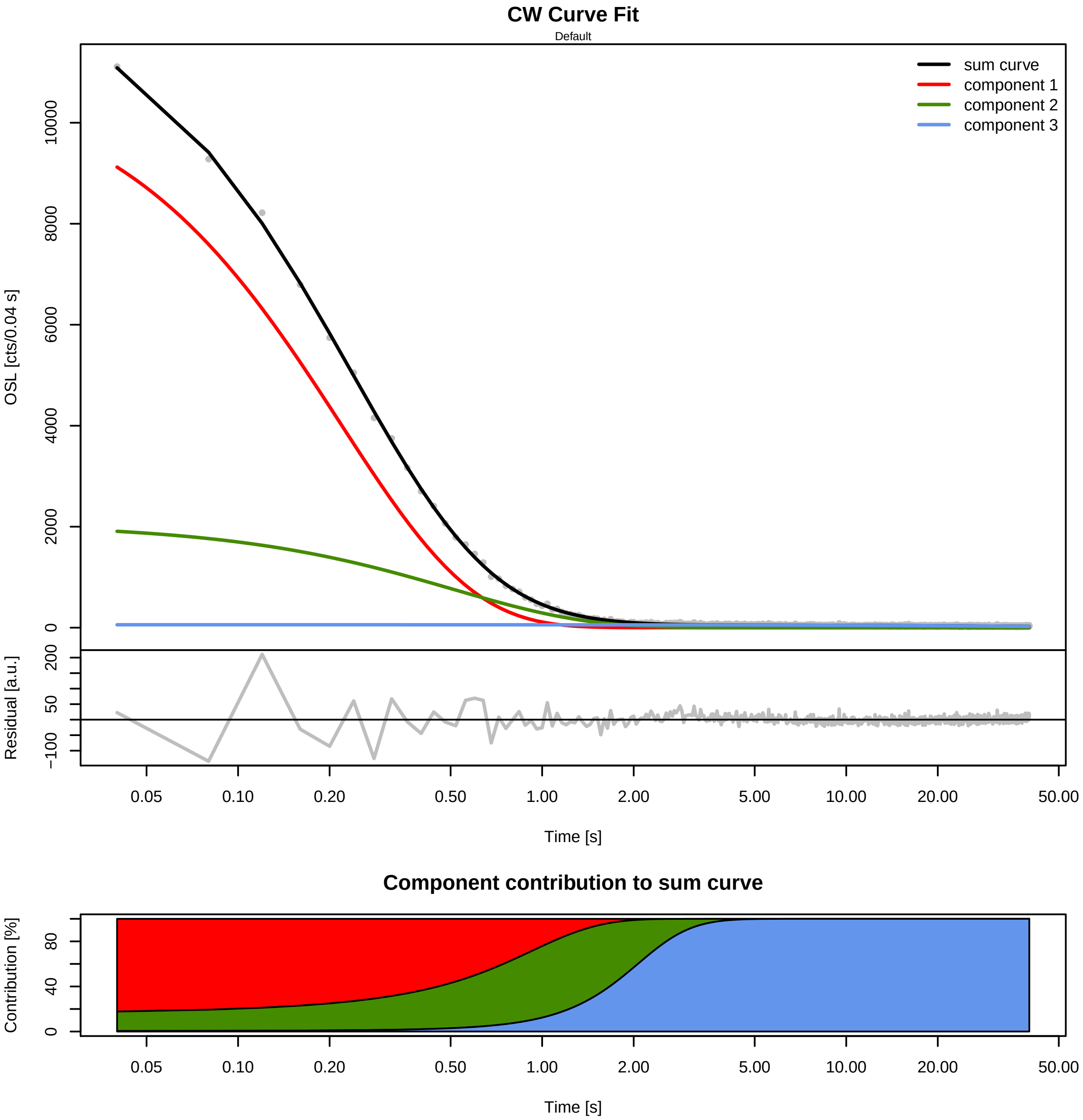

Thermal Lifetime Density Plot
Density
0.0
0.5
1.0
1.5
2.0
5
10
15
Thermal lifetime [Ma]
help("calc_ThermalLifetime")

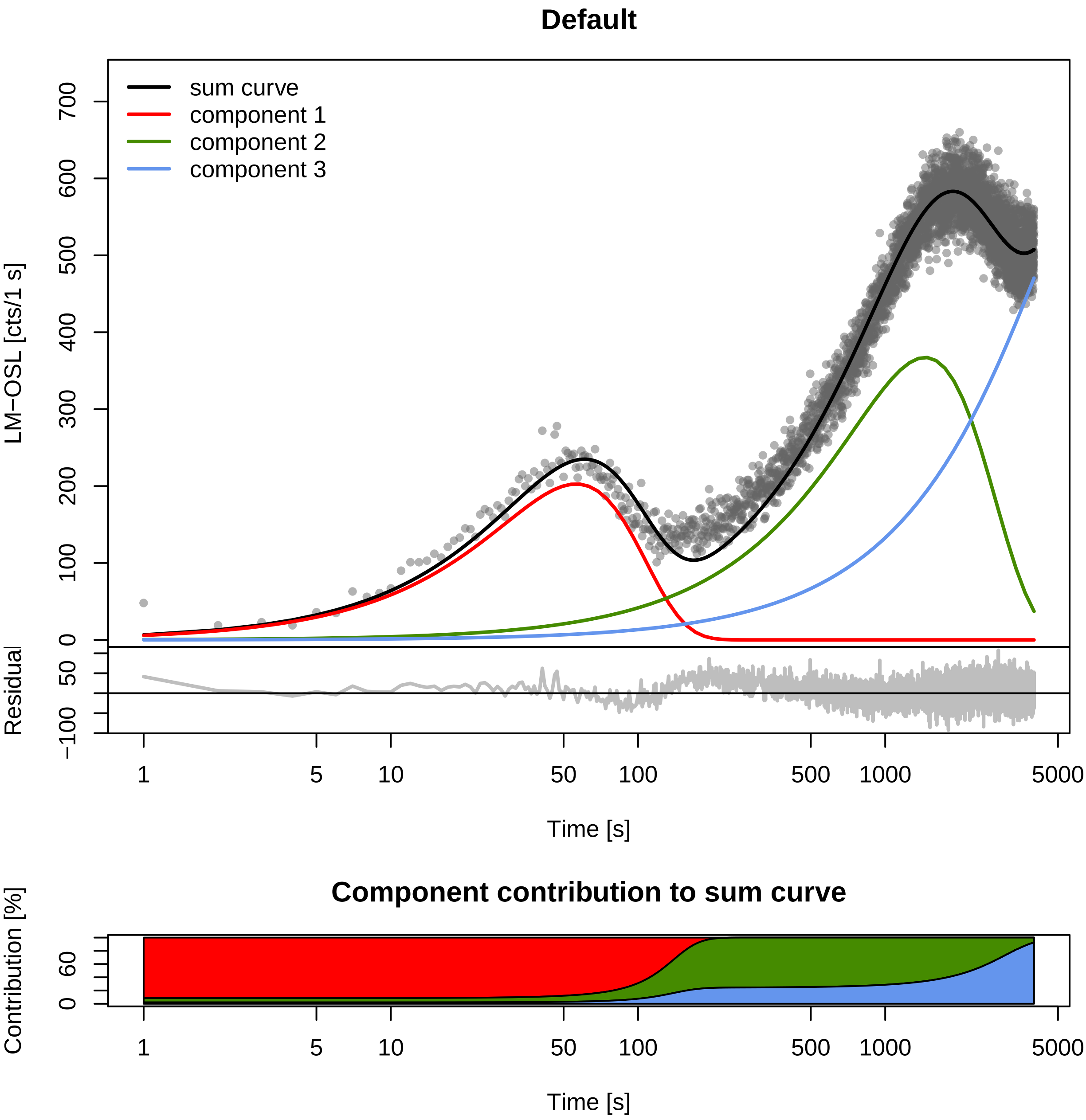

D_e applying Woda and Fuchs (2008)
Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
20
40
60
80
100
120
140
D_e [Gy]
help("calc_WodaFuchs2008")

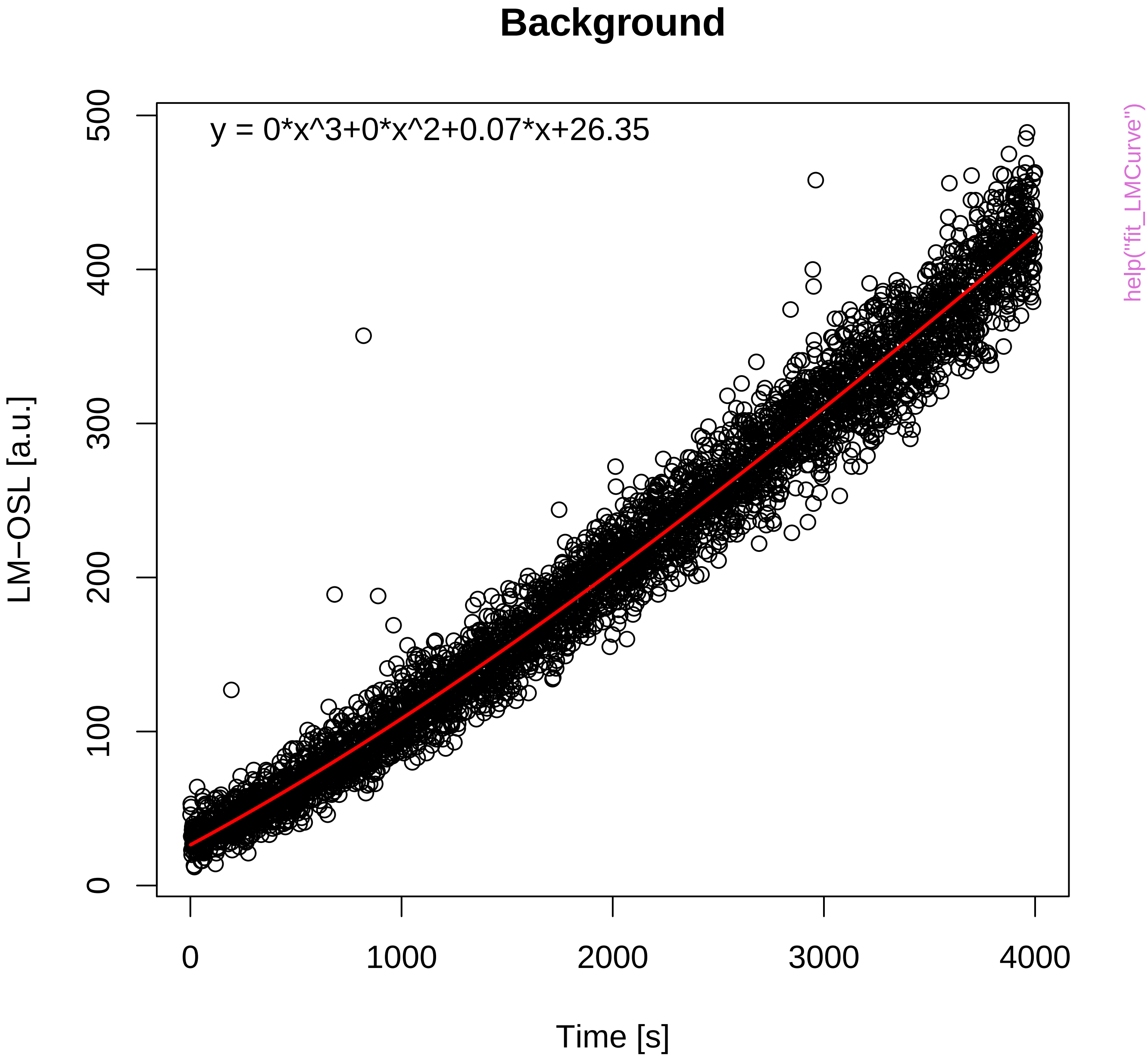

gSGC and resulting De
Re−norm. L_x/T_x
0.0
0.5
1.0
1.5
Dose [a.u.]
0
100
200
300
400
500
help("calc_gSGC")

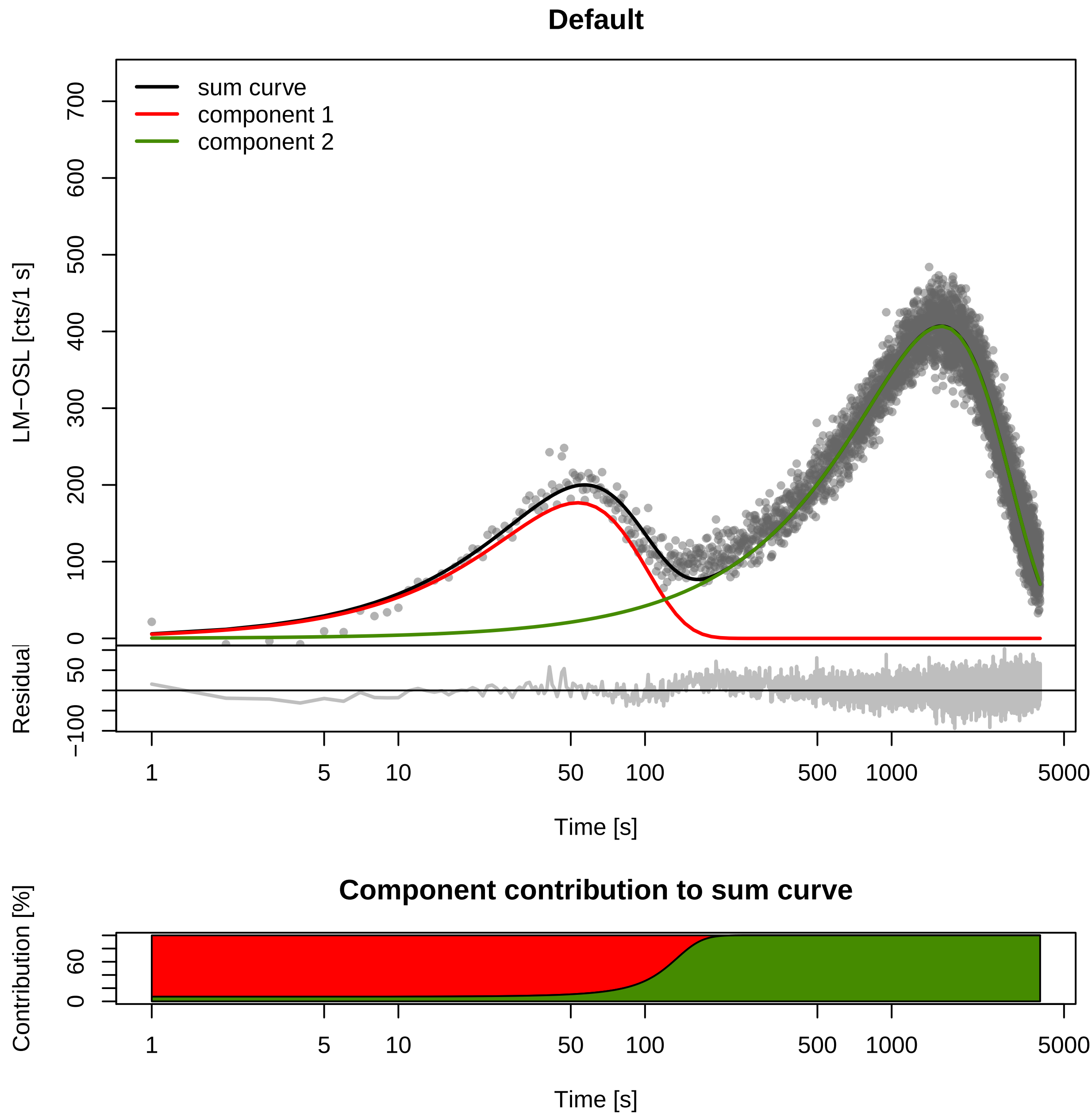

m[, 2]
1.4
1.2
1.0
0.8
0.6
400
600
800
m[, 1]
m[, 2]
500
400
300
200
1.5
2.0
2.5
3.0
m[, 1]
help("convert_Wavelength2Energy")

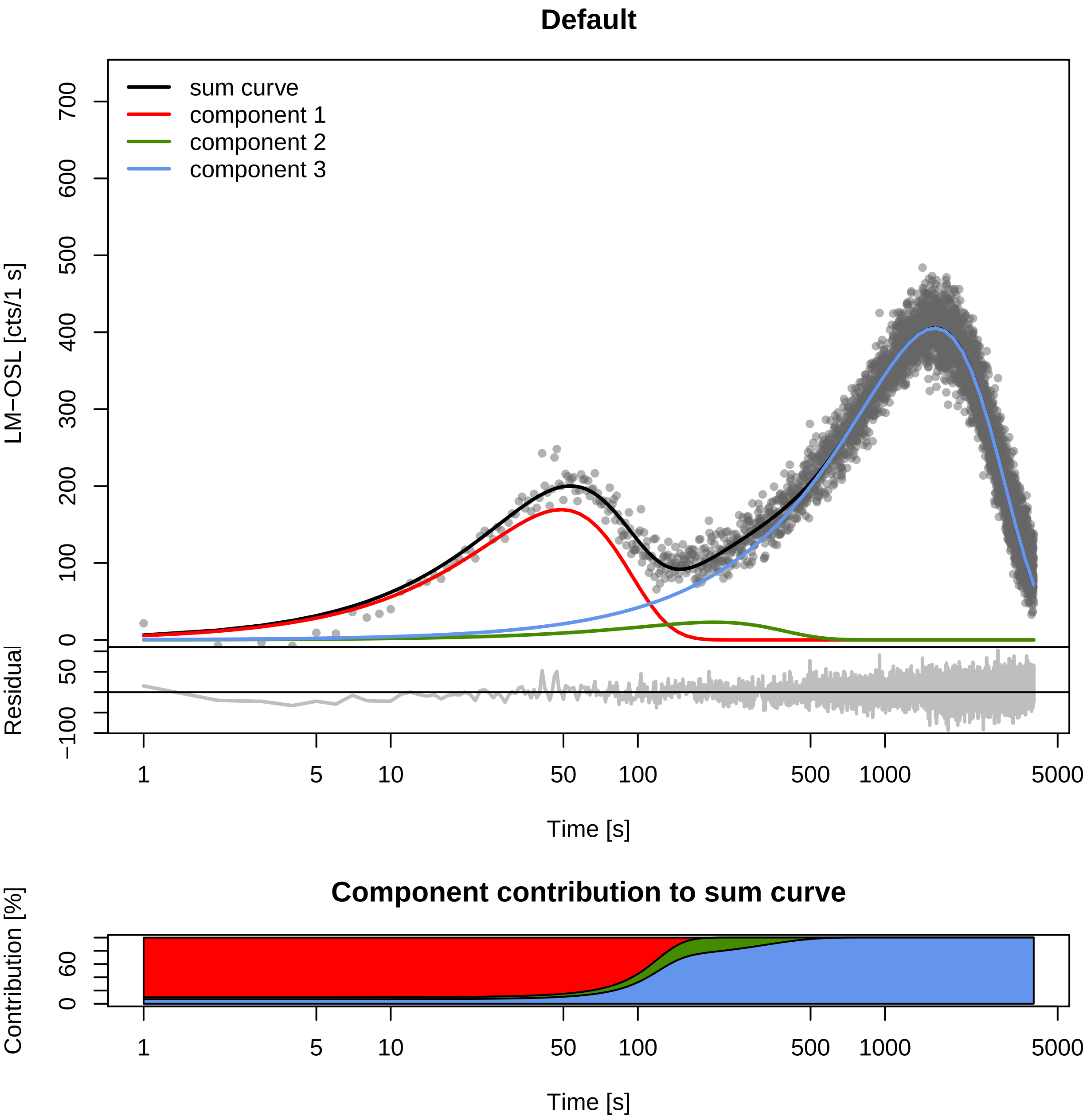

Luminescence [a.u.]
0.000
0.001
0.002
0.003
0.004
200
600
1000
Wavelength [nm]
Luminescence [a.u.]
0.0
0.5
1.0
1.5
2.0
1
3
5
7
Energy [eV]
help("convert_Wavelength2Energy")

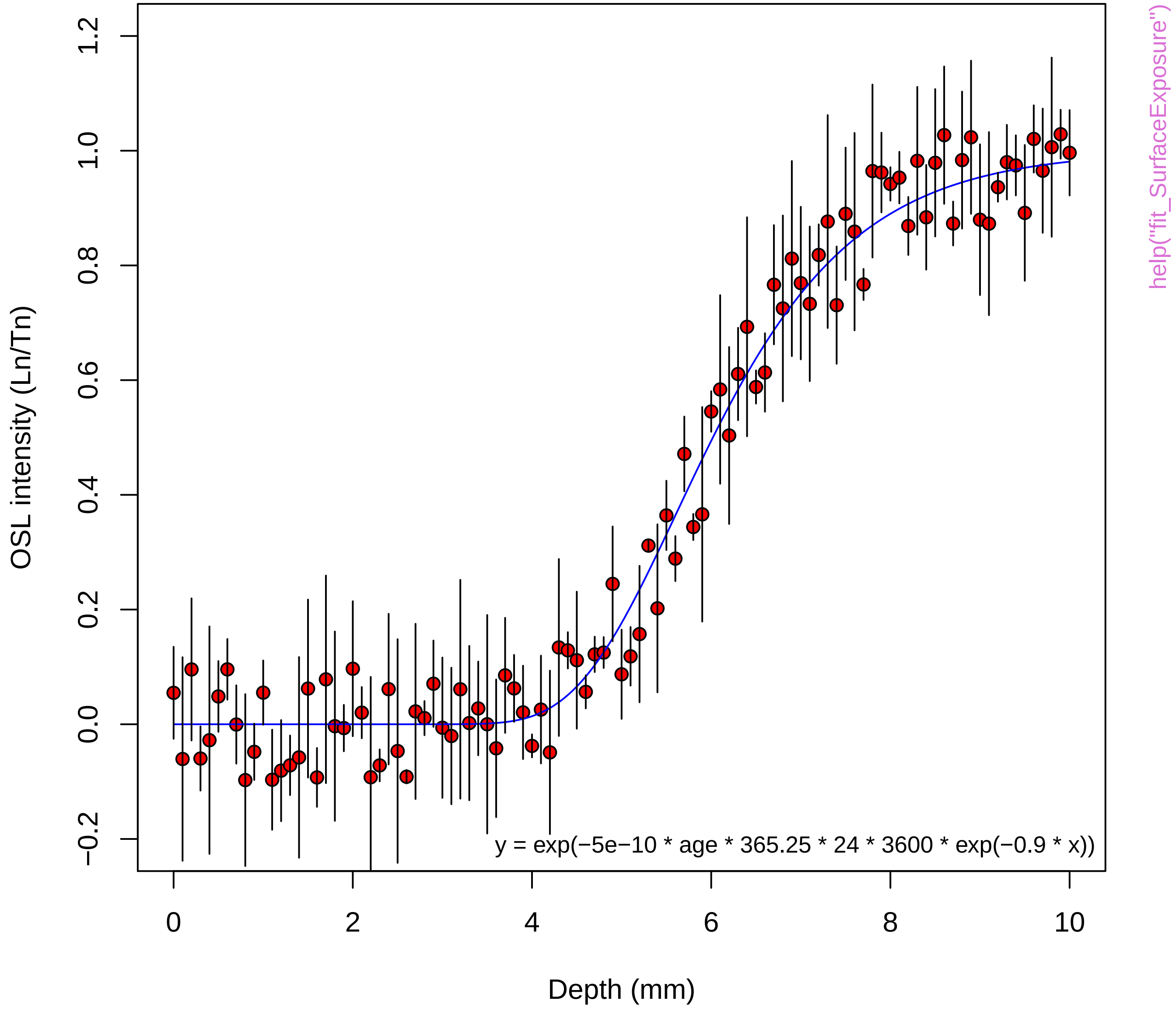

CW Curve Fit
Default
sum curve
component 1
component 2
component 3
OSL [cts/0.04 s]
0
2000
4000
6000
8000
10000
Residual [a.u.]
−100
50
200
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
20.00
50.00
Time [s]
Component contribution to sum curve
Contribution [%]
0
40
80
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
20.00
50.00
Time [s]

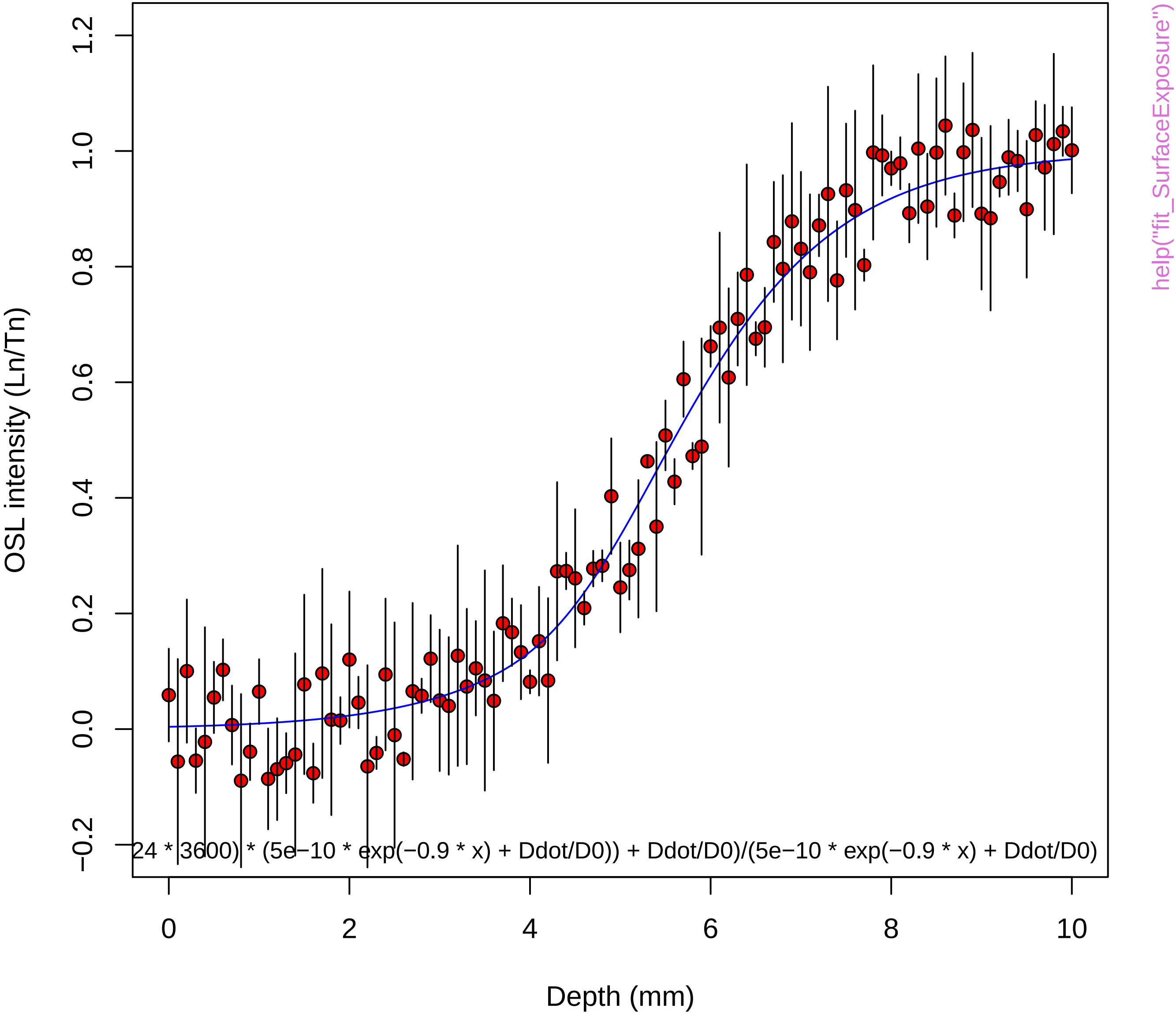

Default
sum curve
component 1
component 2
component 3
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
50
−100
1
5
10
50
100
500
1000
5000
Time [s]
Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

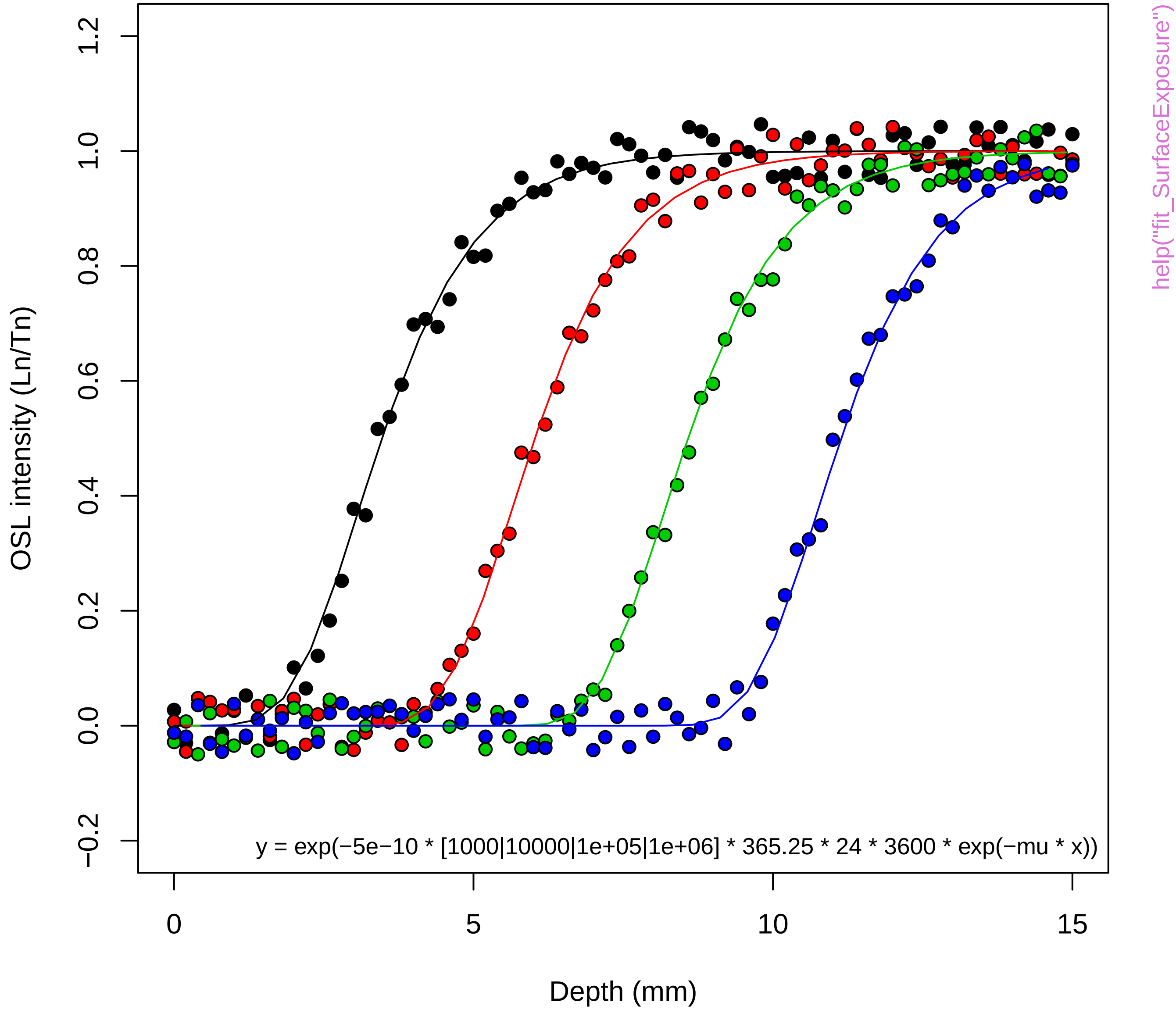

Background
y = 0*x^3+0*x^2+0.07*x+26.35
LM−OSL [a.u.]
0
100
200
300
400
500
0
1000
2000
3000
4000
Time [s]
help("fit_LMCurve")

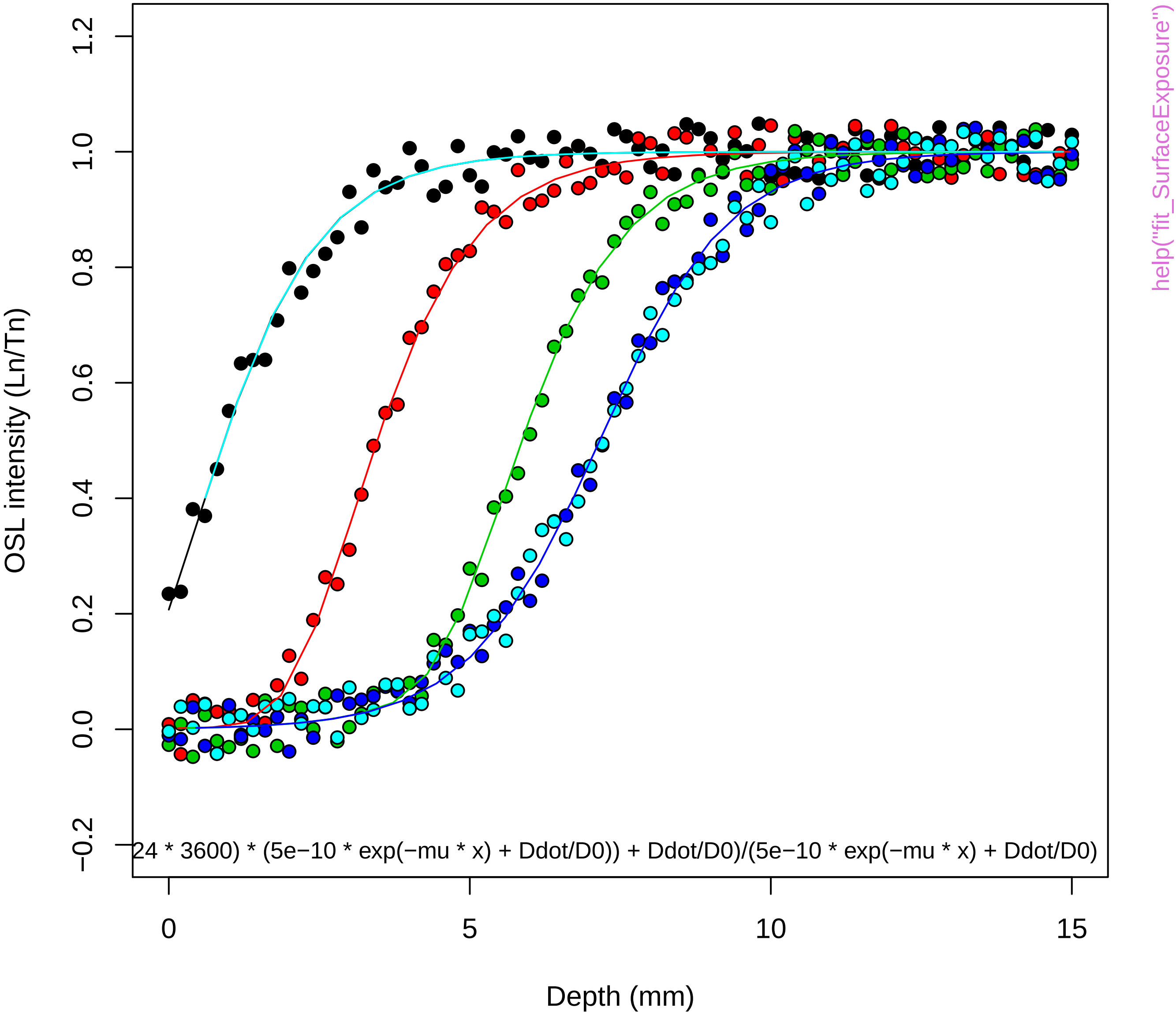

Default
sum curve
component 1
component 2
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
−100
50
Time [s]
1
5
10
50
100
500
1000
5000
Component contribution to sum curve
Contribution [%]
0
60
Time [s]
1
5
10
50
100
500
1000
5000

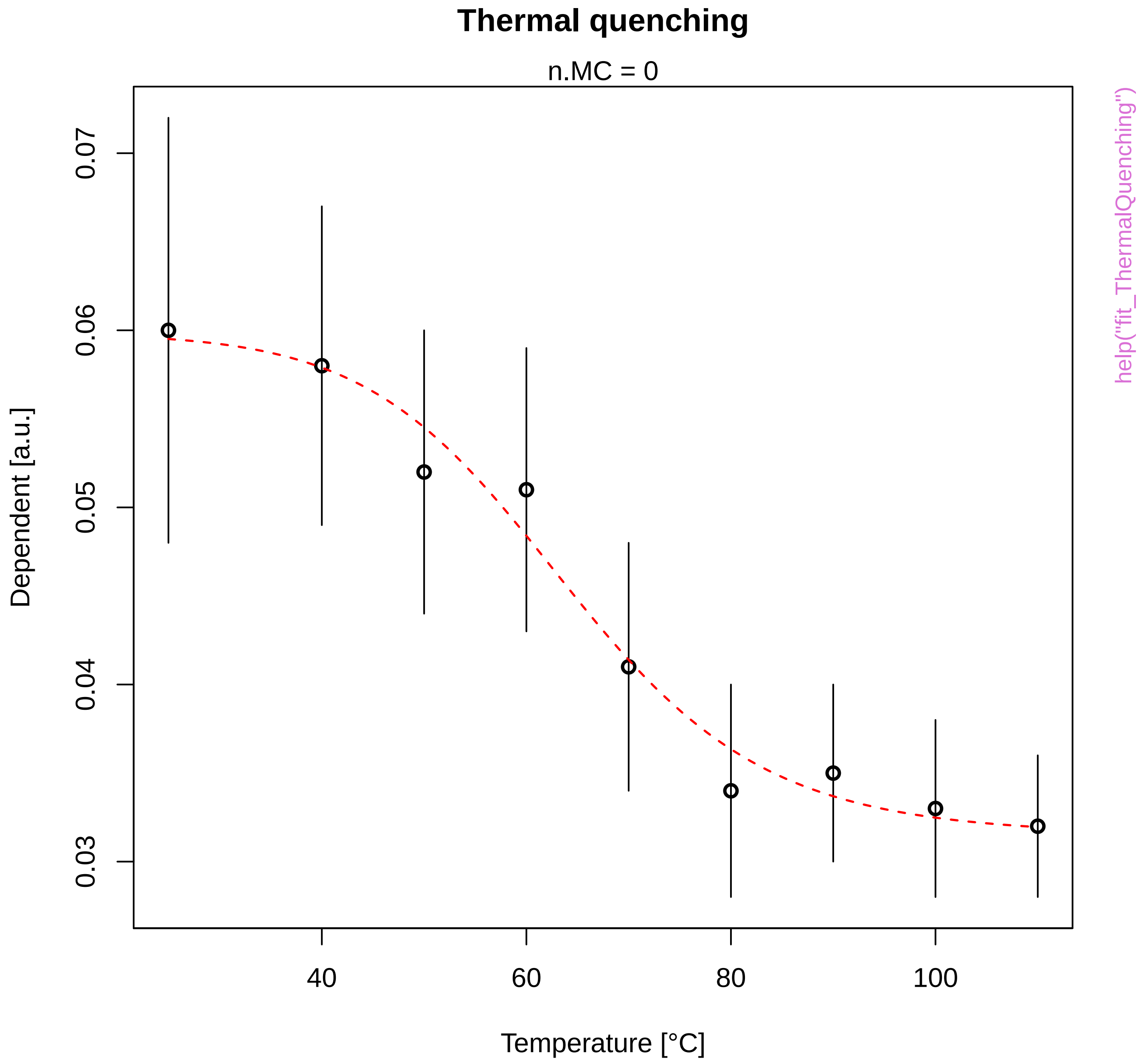

Default
sum curve
component 1
component 2
component 3
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
−100
50
Time [s]
1
5
10
50
100
500
1000
5000
Component contribution to sum curve
Contribution [%]
0
60
Time [s]

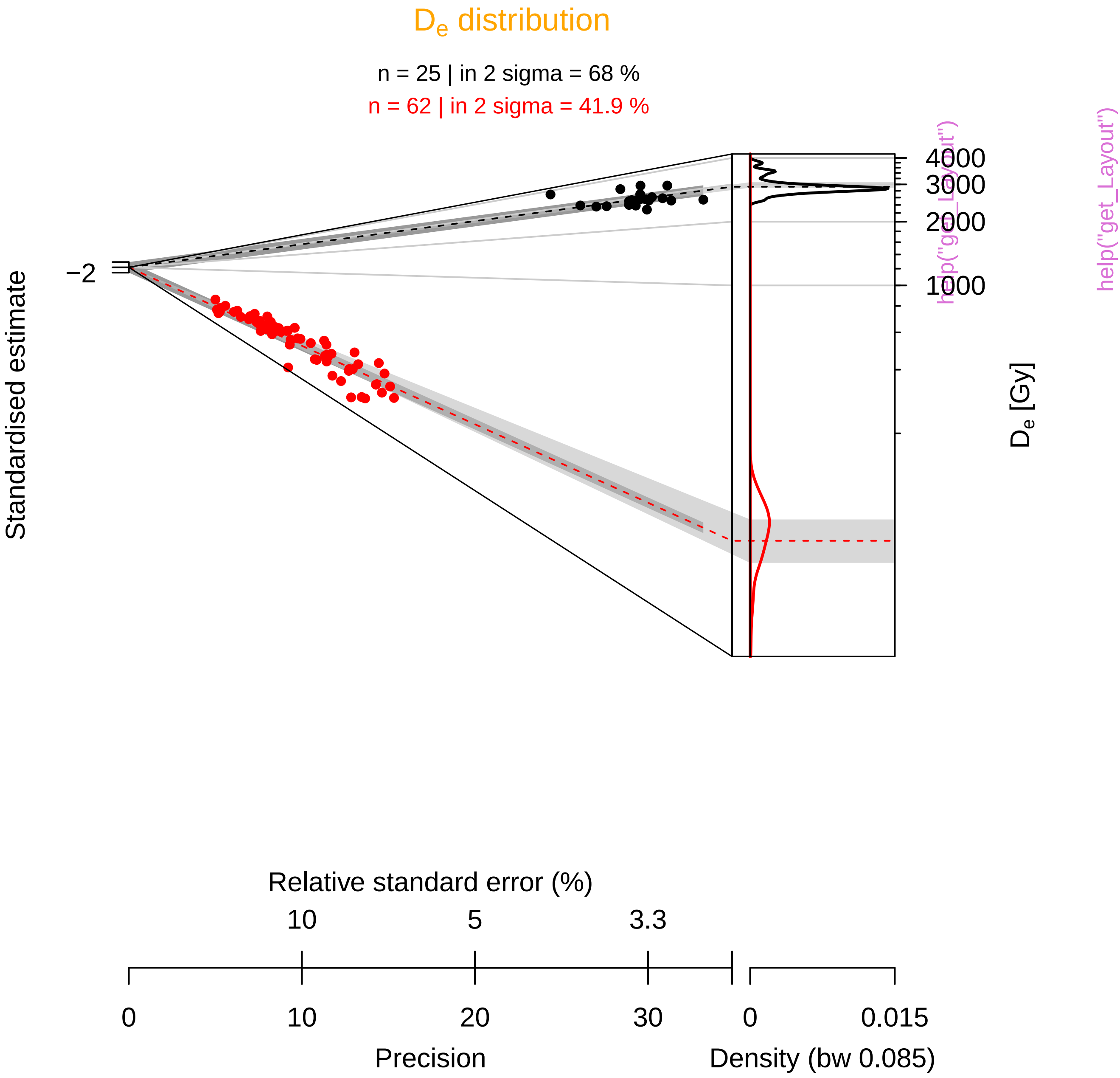

OSL intensity (Ln/Tn)
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
2
4
6
8
10
Depth (mm)
y = exp(−5e−10 * age * 365.25 * 24 * 3600 * exp(−0.9 * x))
help("fit_SurfaceExposure")

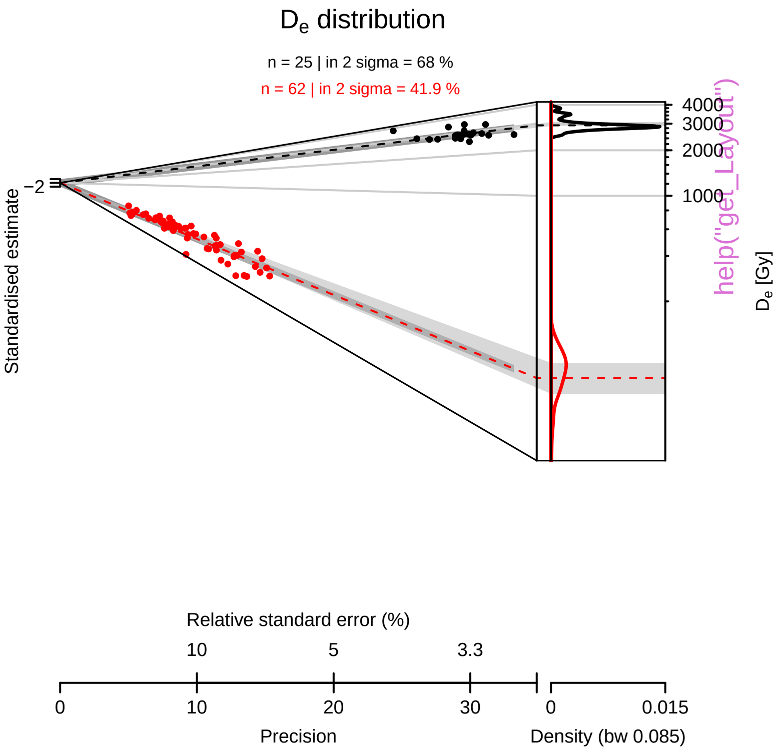

OSL intensity (Ln/Tn)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
24 * 3600) * (5e−10 * exp(−0.9 * x) + Ddot/D0)) + Ddot/D0)/(5e−10 * exp(−0.9 * x) + Ddot/D0)
0
2
4
6
8
10
Depth (mm)
help("fit_SurfaceExposure")


OSL intensity (Ln/Tn)
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
0
5
10
15
Depth (mm)
y = exp(−5e−10 * [1000|10000|1e+05|1e+06] * 365.25 * 24 * 3600 * exp(−mu * x))
help("fit_SurfaceExposure")

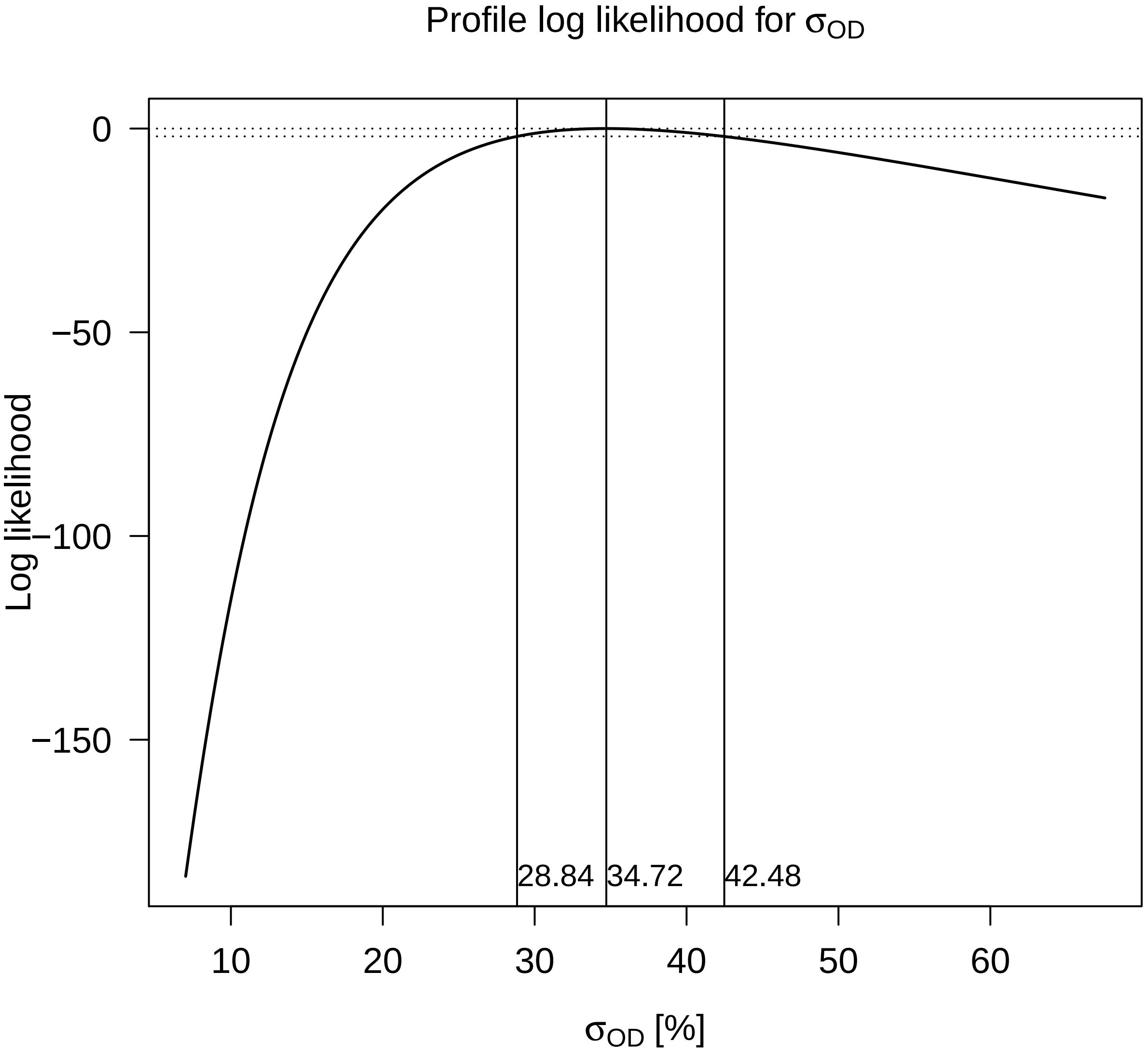

OSL intensity (Ln/Tn)
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
24 * 3600) * (5e−10 * exp(−mu * x) + Ddot/D0)) + Ddot/D0)/(5e−10 * exp(−mu * x) + Ddot/D0)
0
5
10
15
Depth (mm)
help("fit_SurfaceExposure")

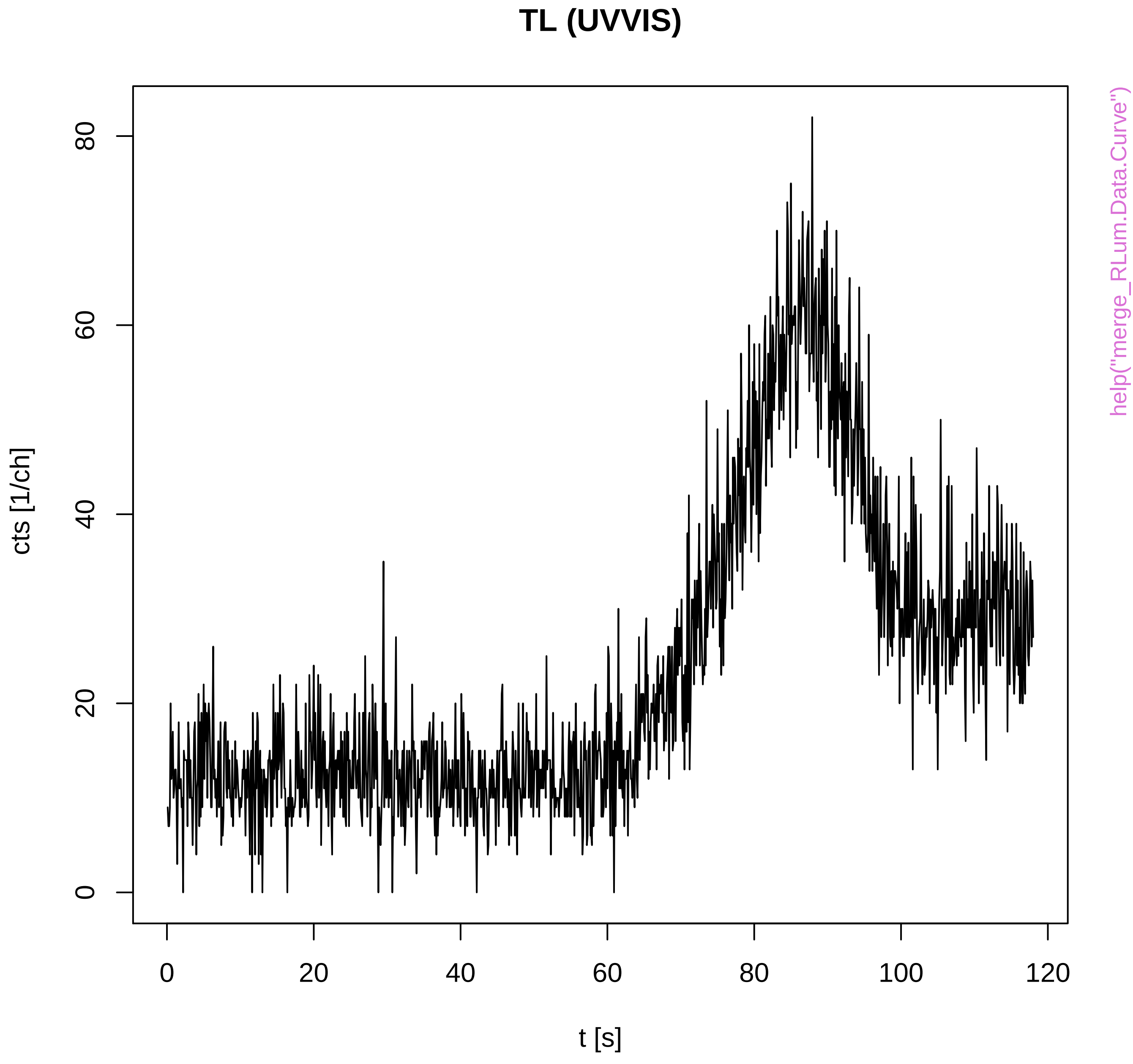

Thermal quenching
n.MC = 0
Dependent [a.u.]
0.03
0.04
0.05
0.06
0.07
40
60
80
100
Temperature [°C]
help("fit_ThermalQuenching")

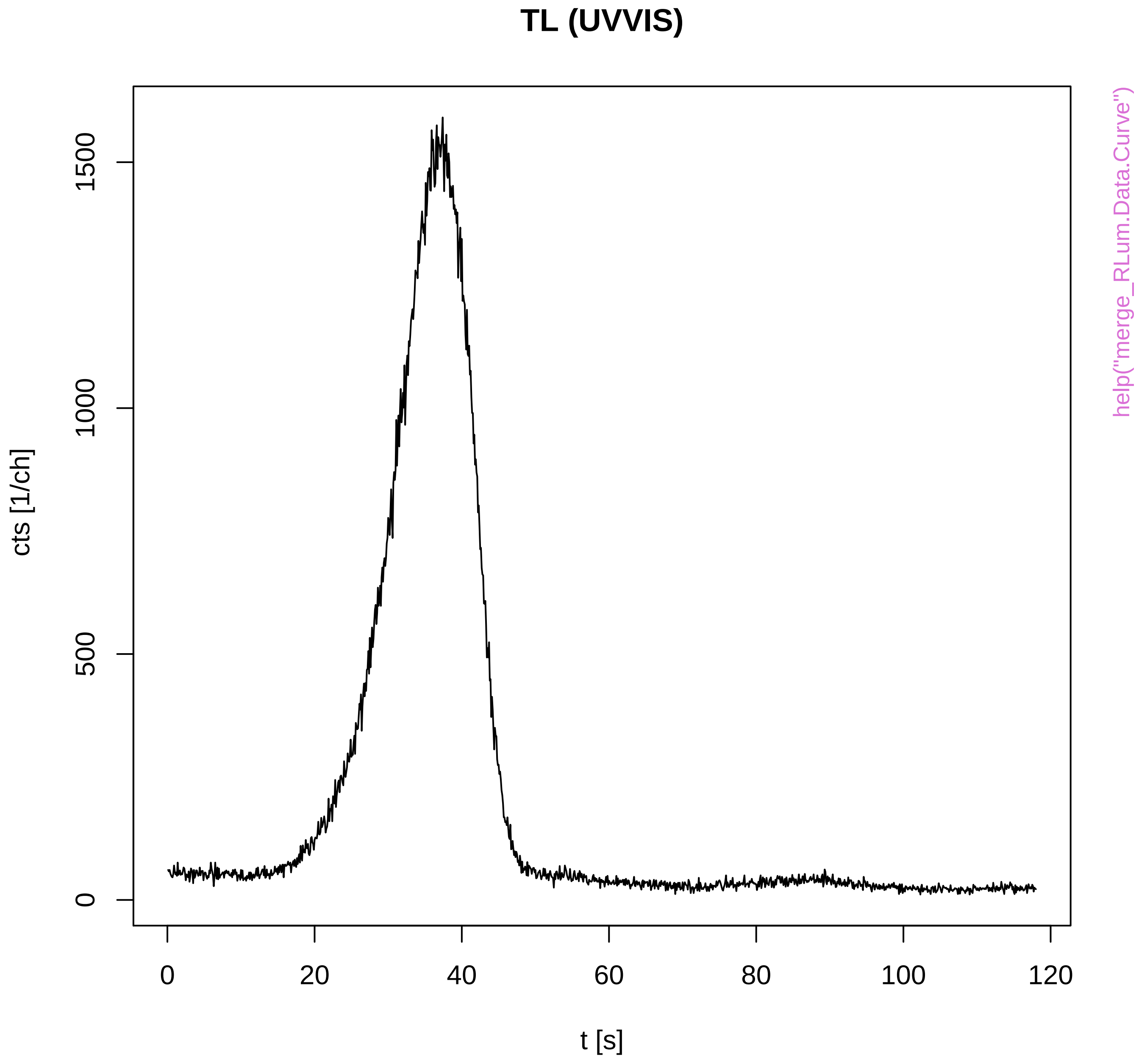

D_e distribution
n = 25 | in 2 sigma = 68 %
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
−2
4000
3000
2000
1000
D_e [Gy]
help("get_Layout")
help("get_Layout")
Relative standard error (%)
10
5
3.3
0
10
20
30
0
0.015
Precision
Density (bw 0.085)

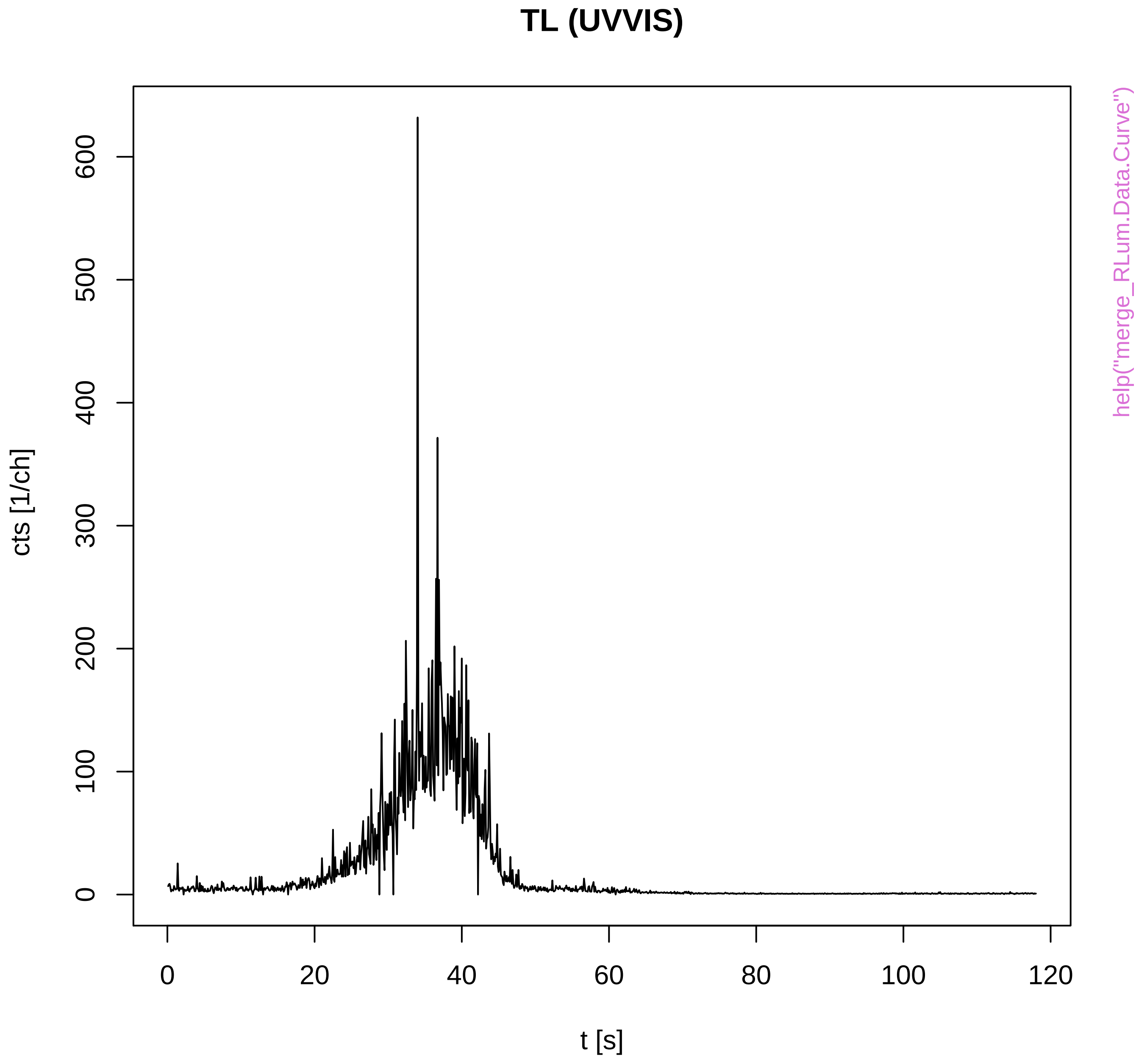


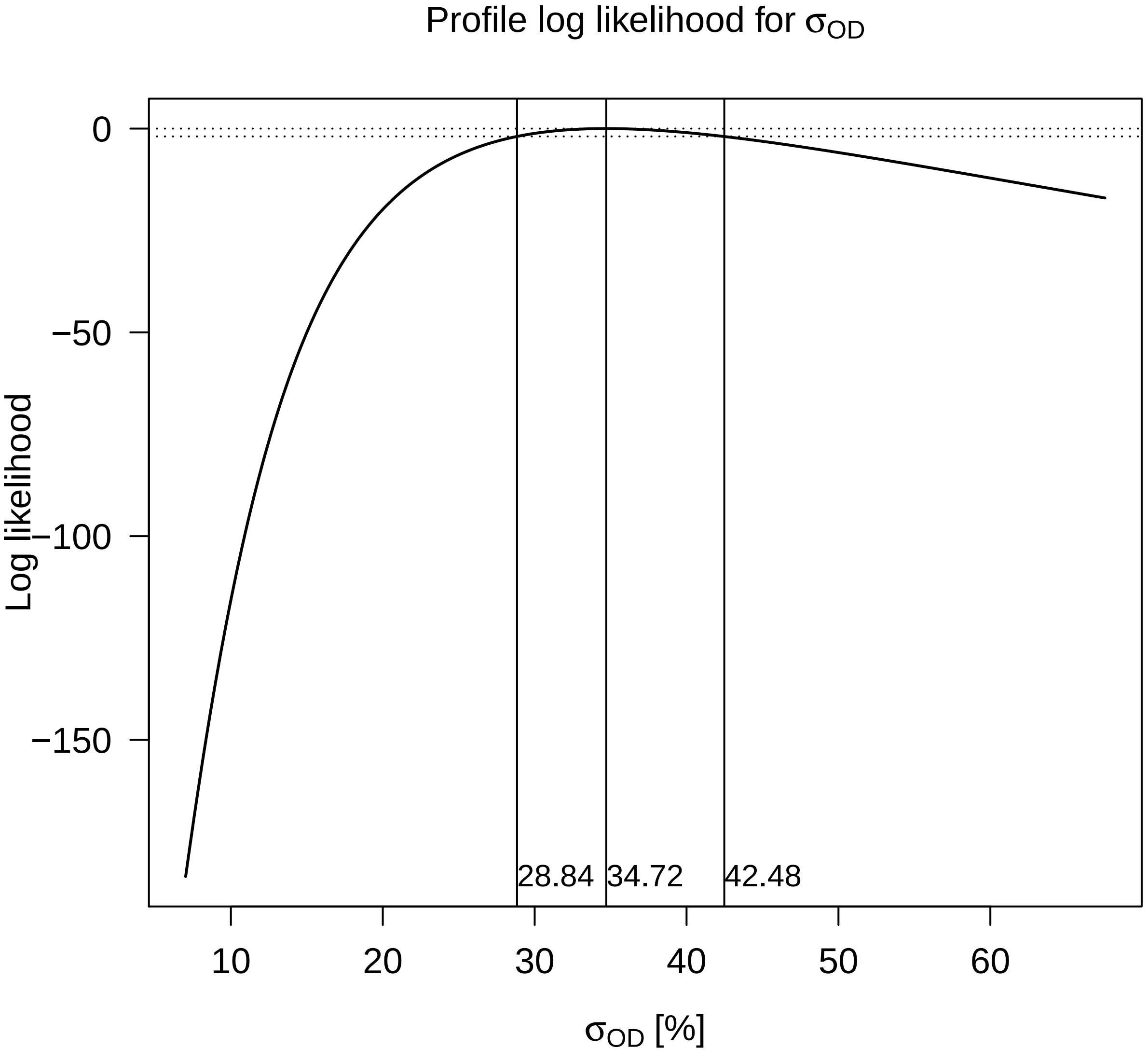
help("get_Layout")


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} [%]

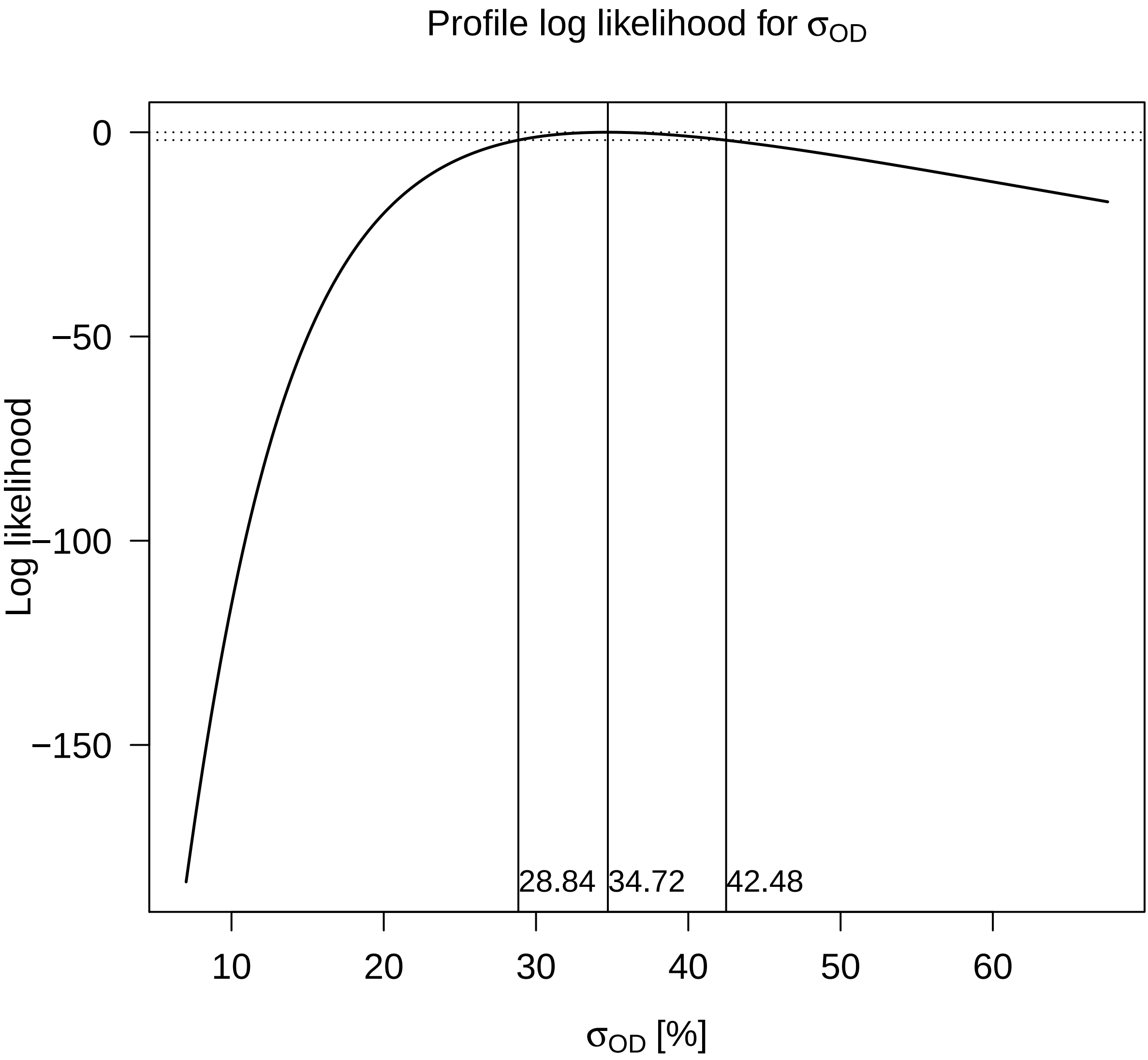

TL (UVVIS)
cts [1/ch]
0
20
40
60
80
t [s]
0
20
40
60
80
100
120
help("merge_RLum.Data.Curve")

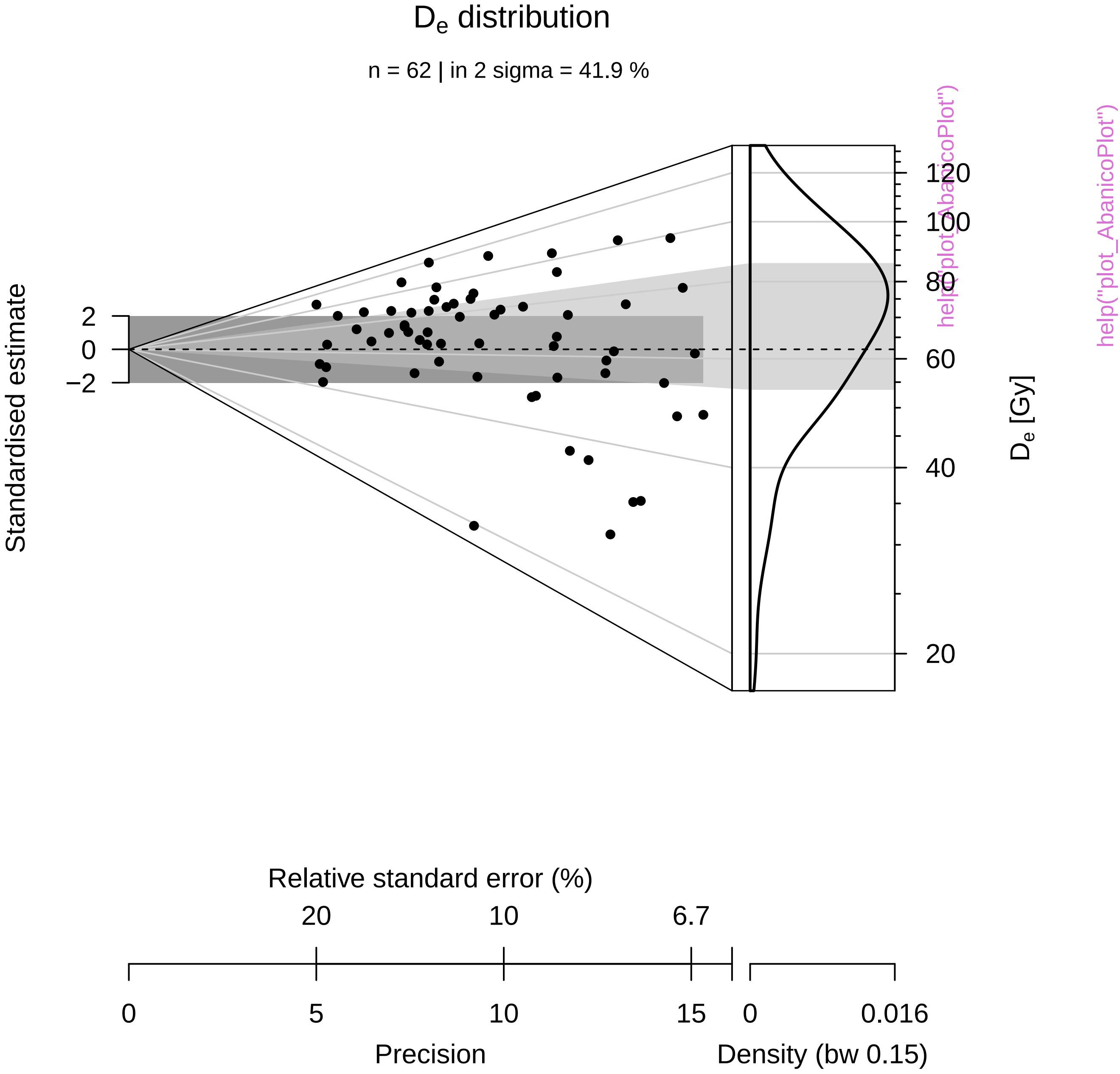

TL (UVVIS)
cts [1/ch]
0
500
1000
1500
0
20
40
60
80
100
120
t [s]
help("merge_RLum.Data.Curve")

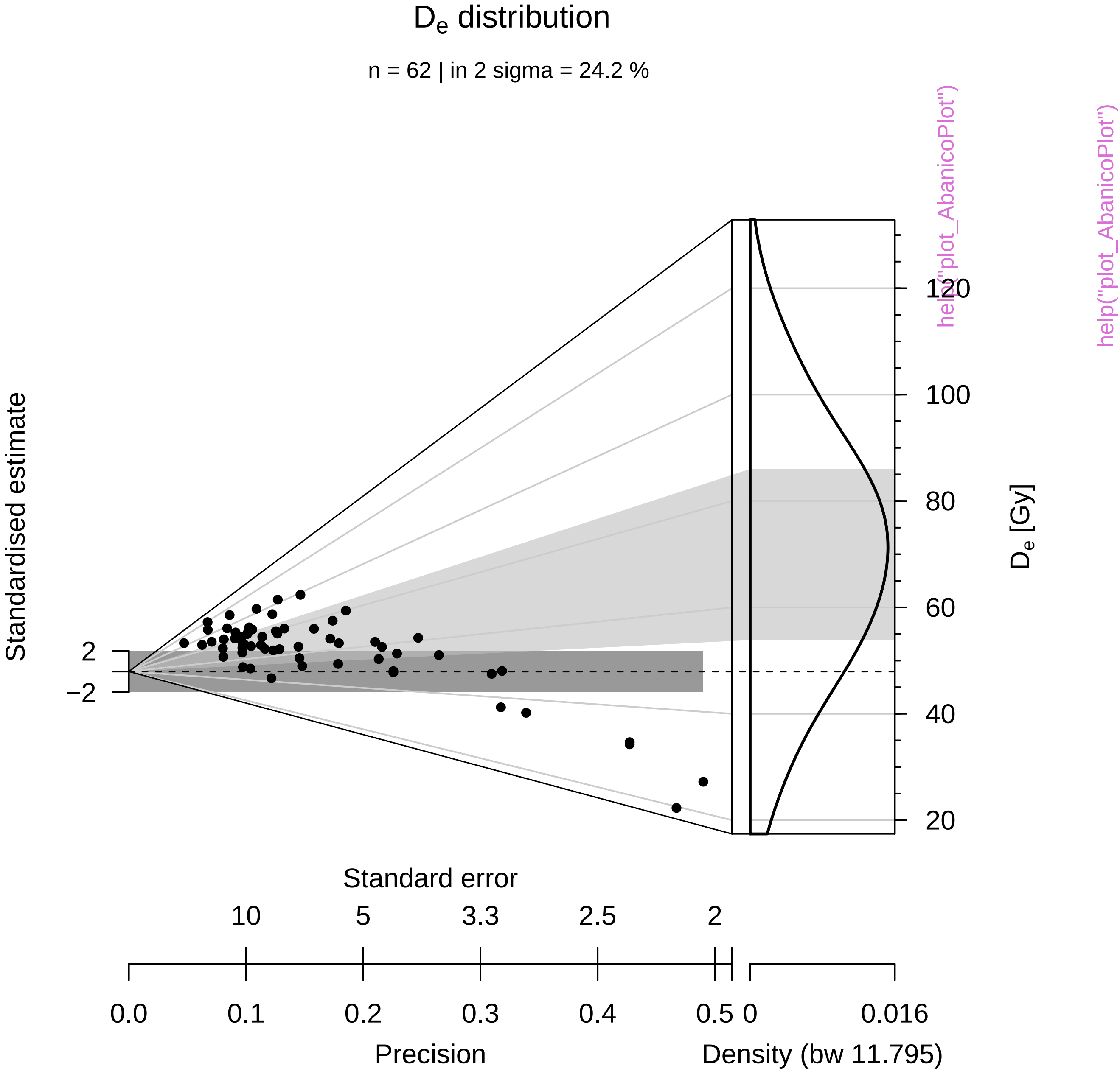

TL (UVVIS)
cts [1/ch]
0
100
200
300
400
500
600
0
20
40
60
80
100
120
t [s]
help("merge_RLum.Data.Curve")

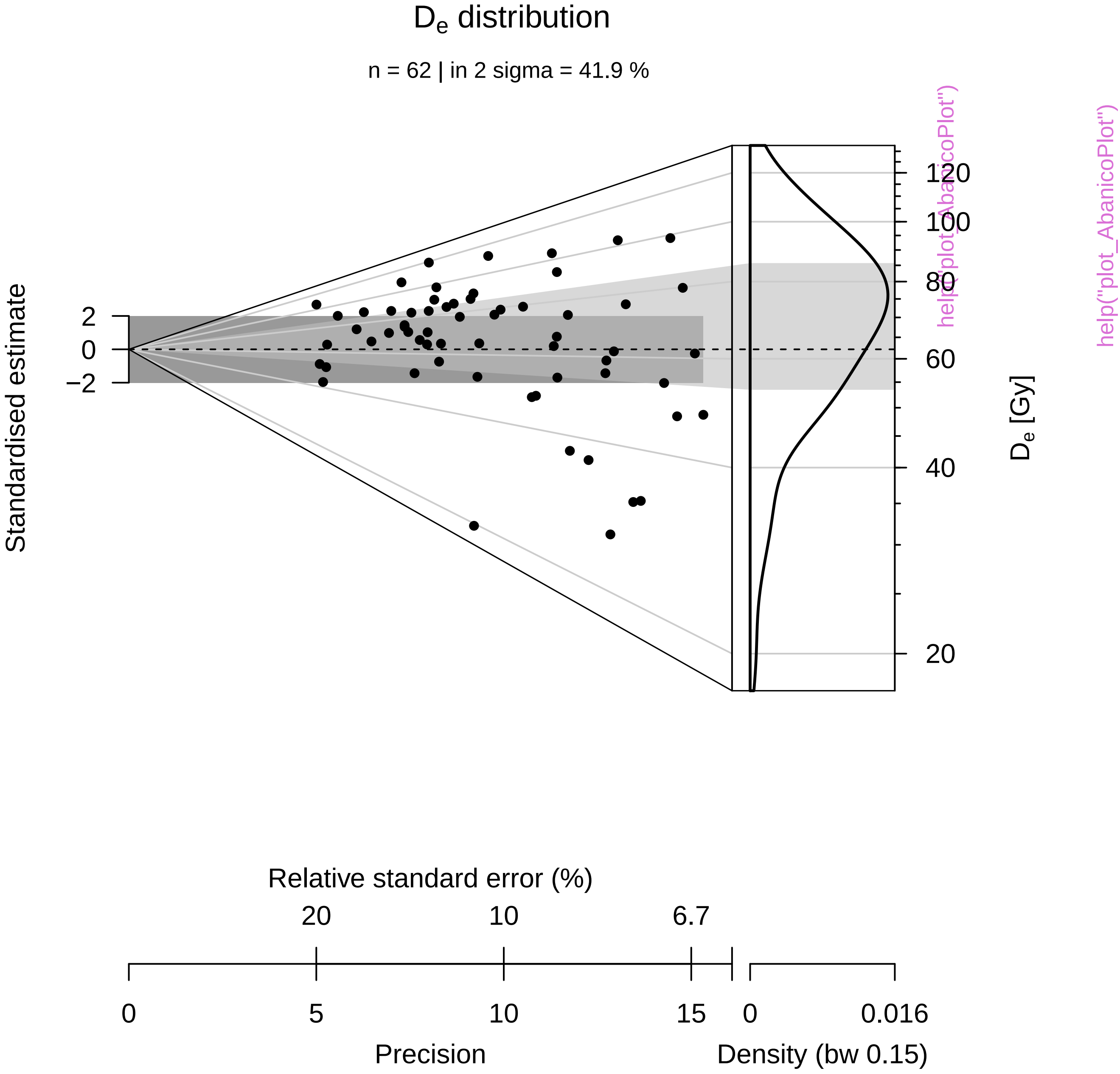


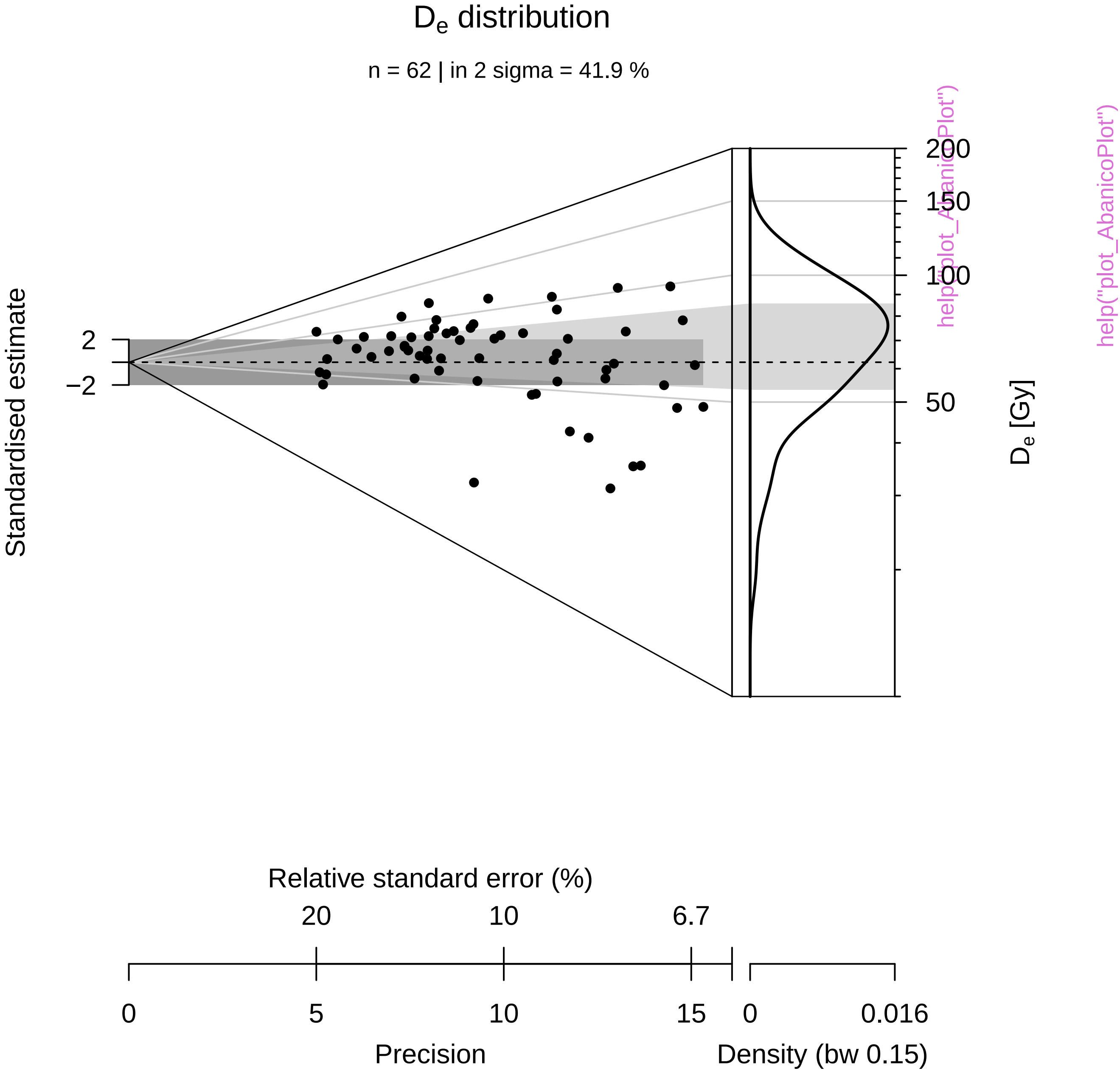
Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]


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} [%]

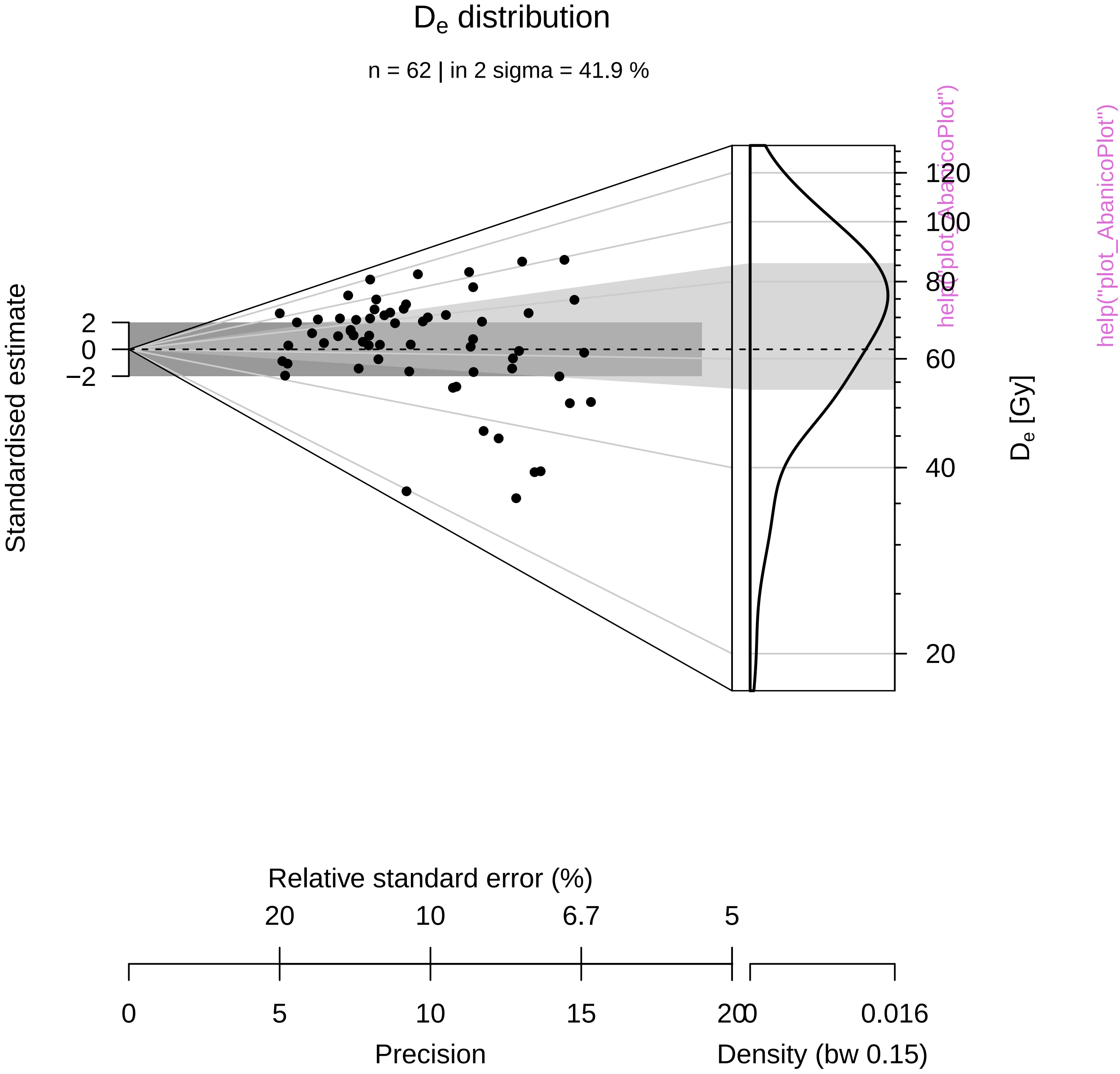

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

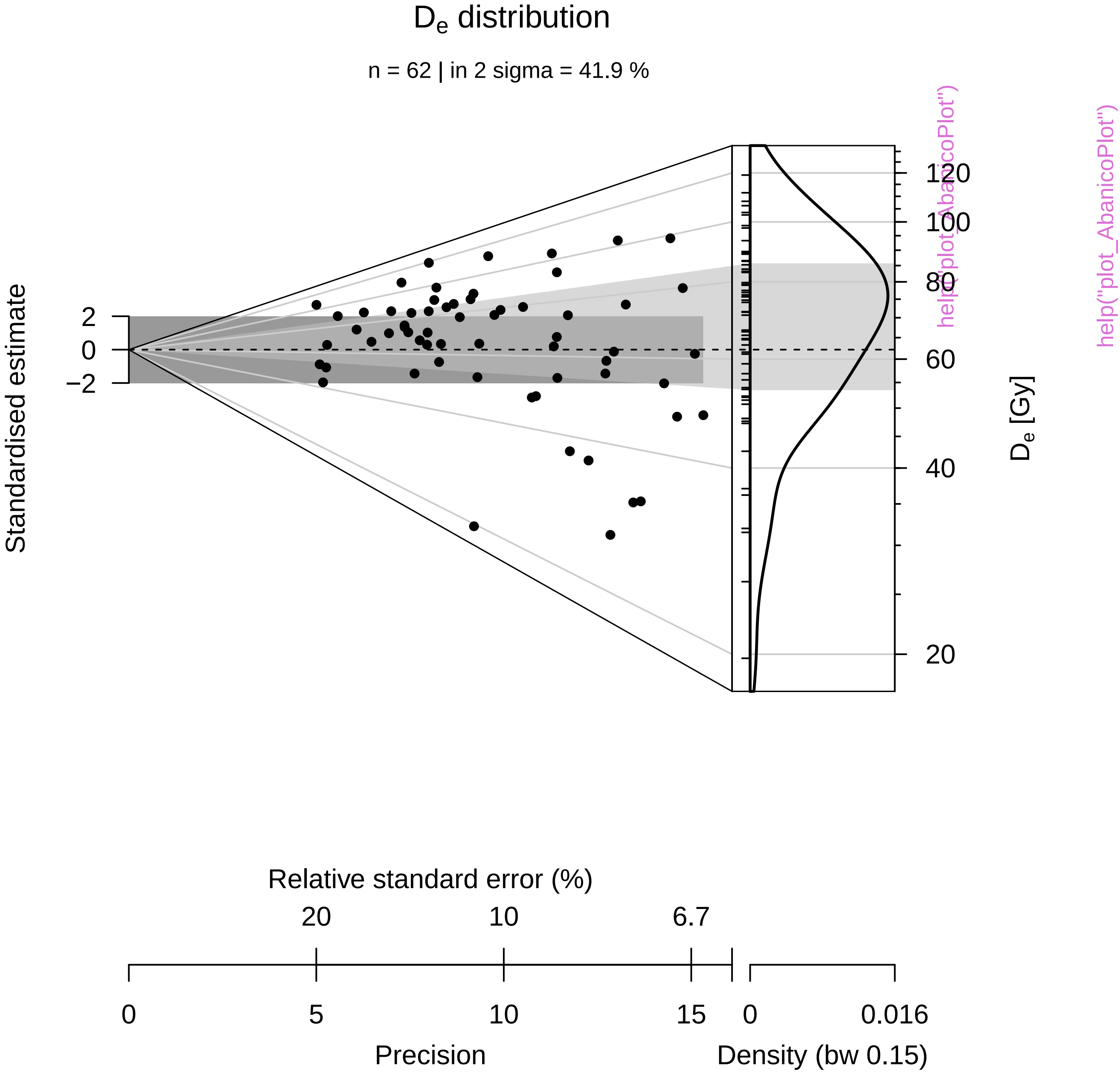

D_e distribution
n = 62 | in 2 sigma = 24.2 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
−2
120
100
80
60
40
20
D_e [Gy]
Standard error
10
5
3.3
2.5
2
0.0
0.1
0.2
0.3
0.4
0.5
0
0.016
Precision
Density (bw 11.795)

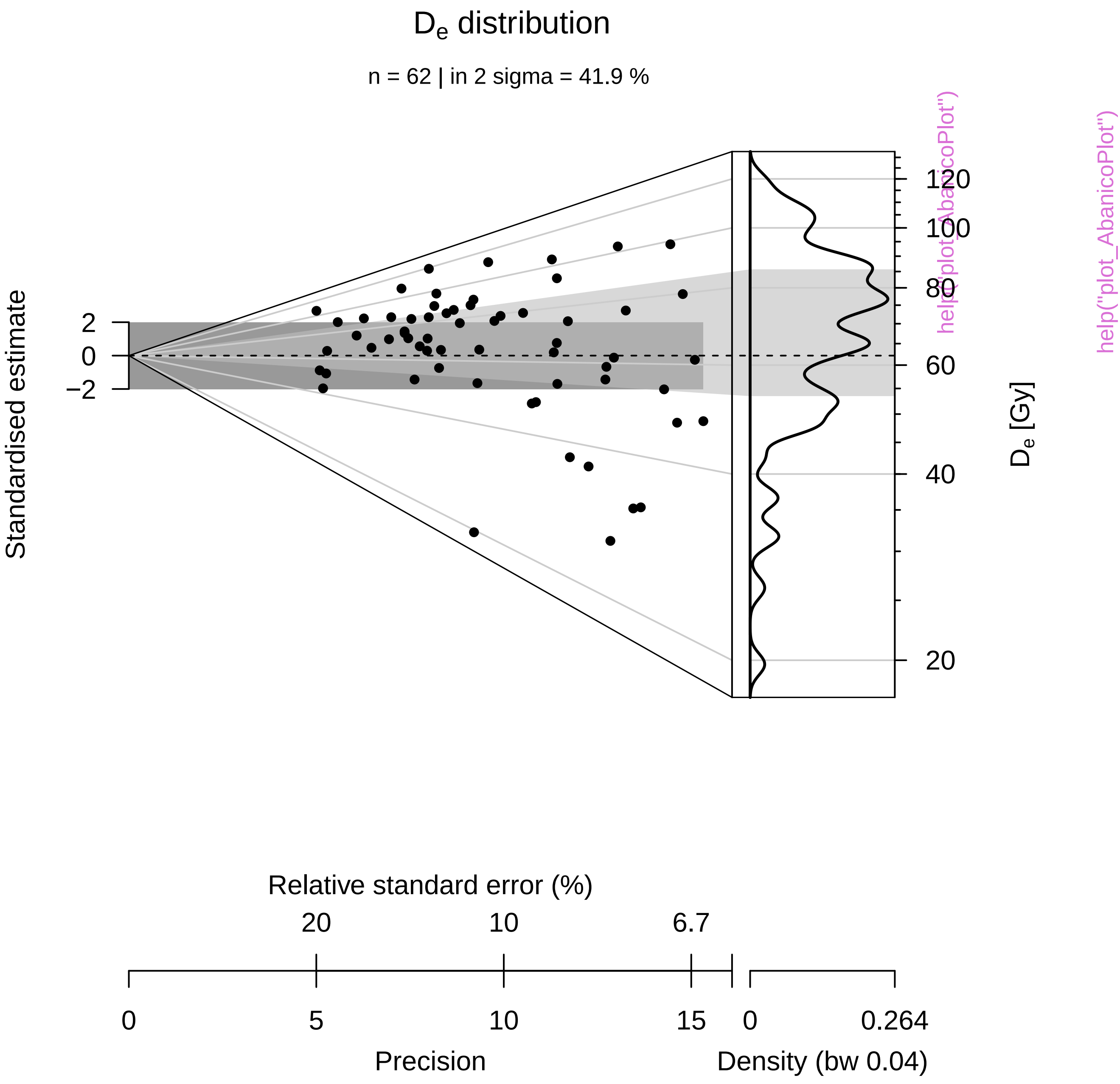

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

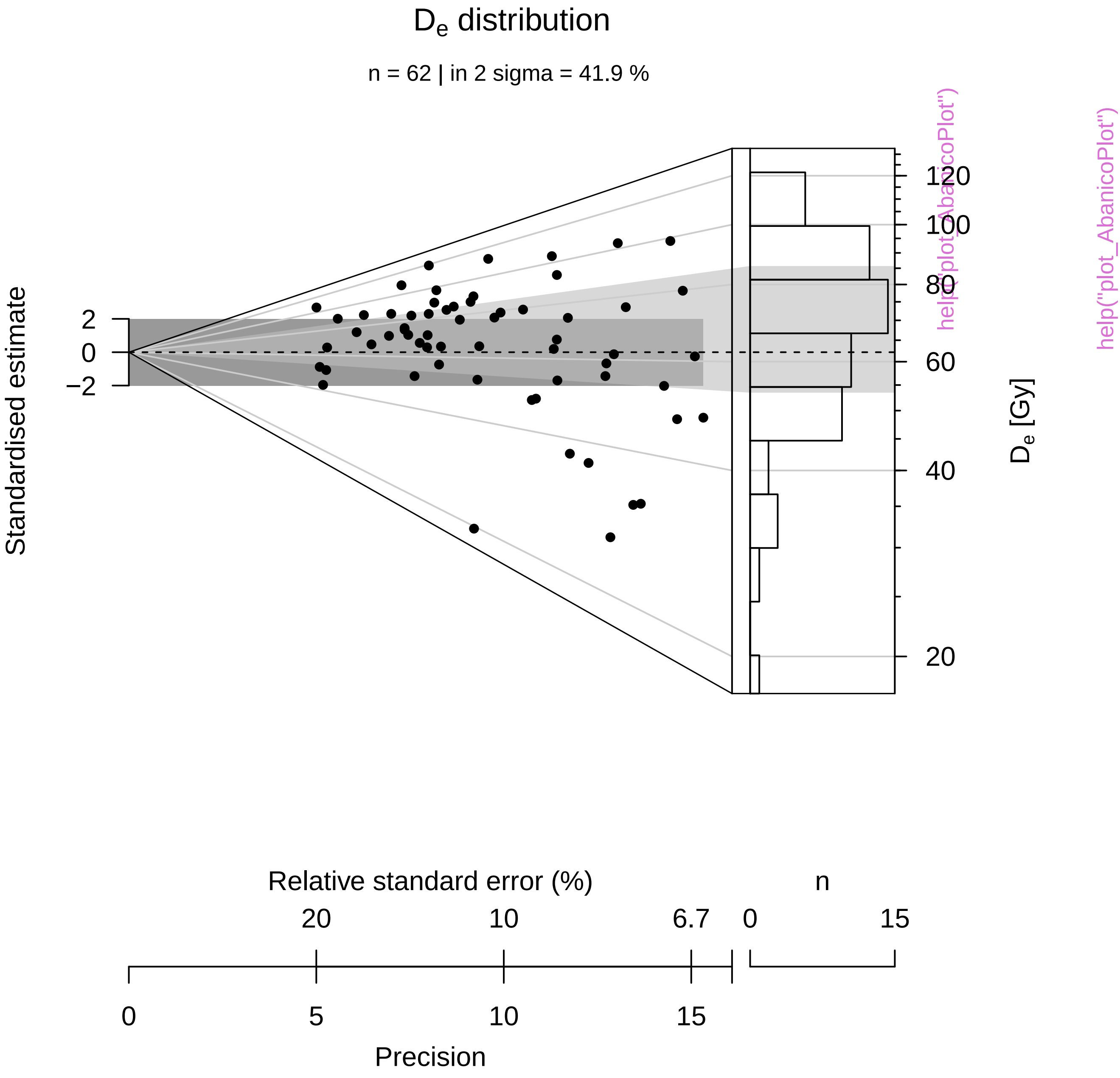


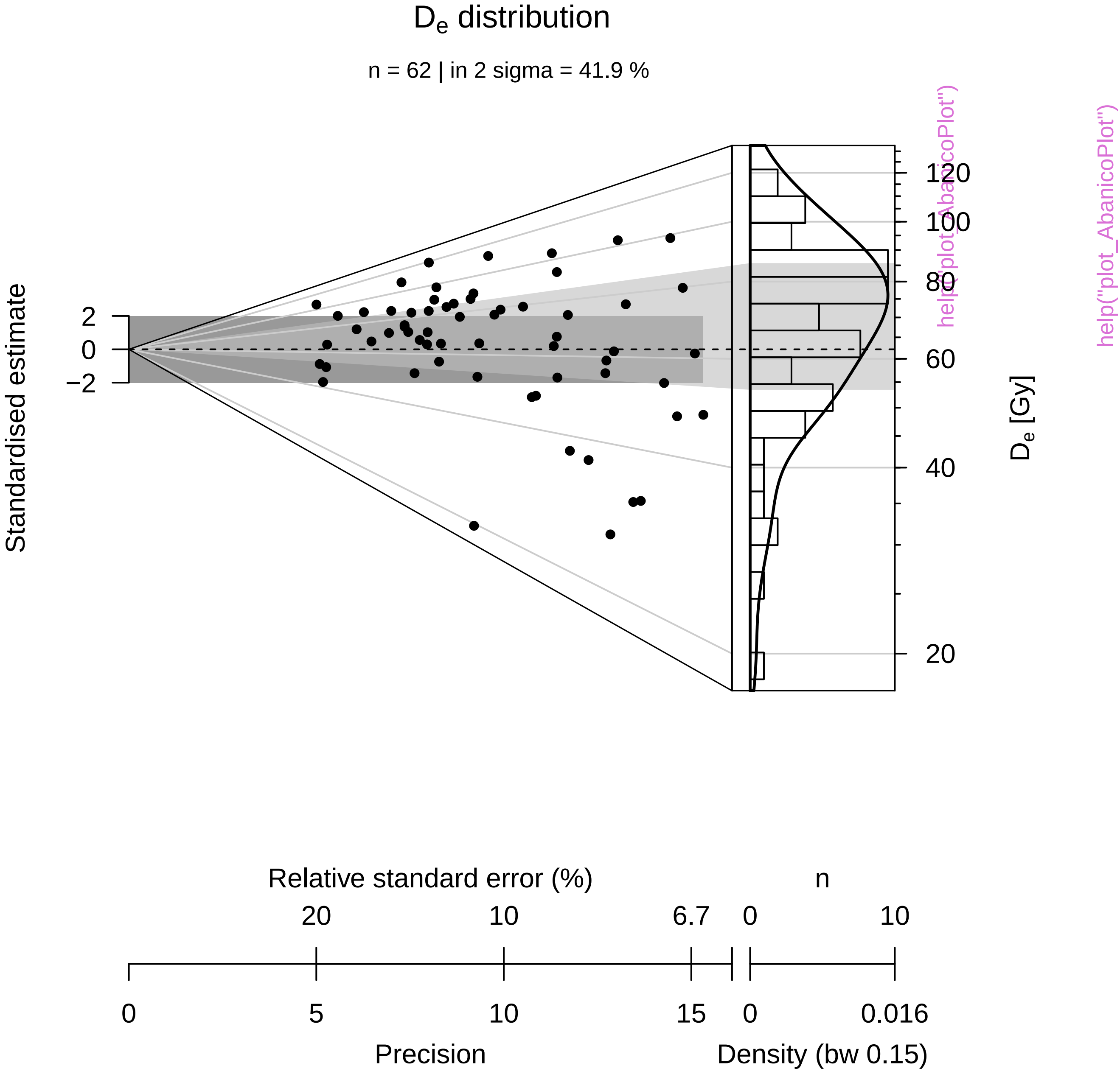
D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
−2
200
150
100
50
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


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)

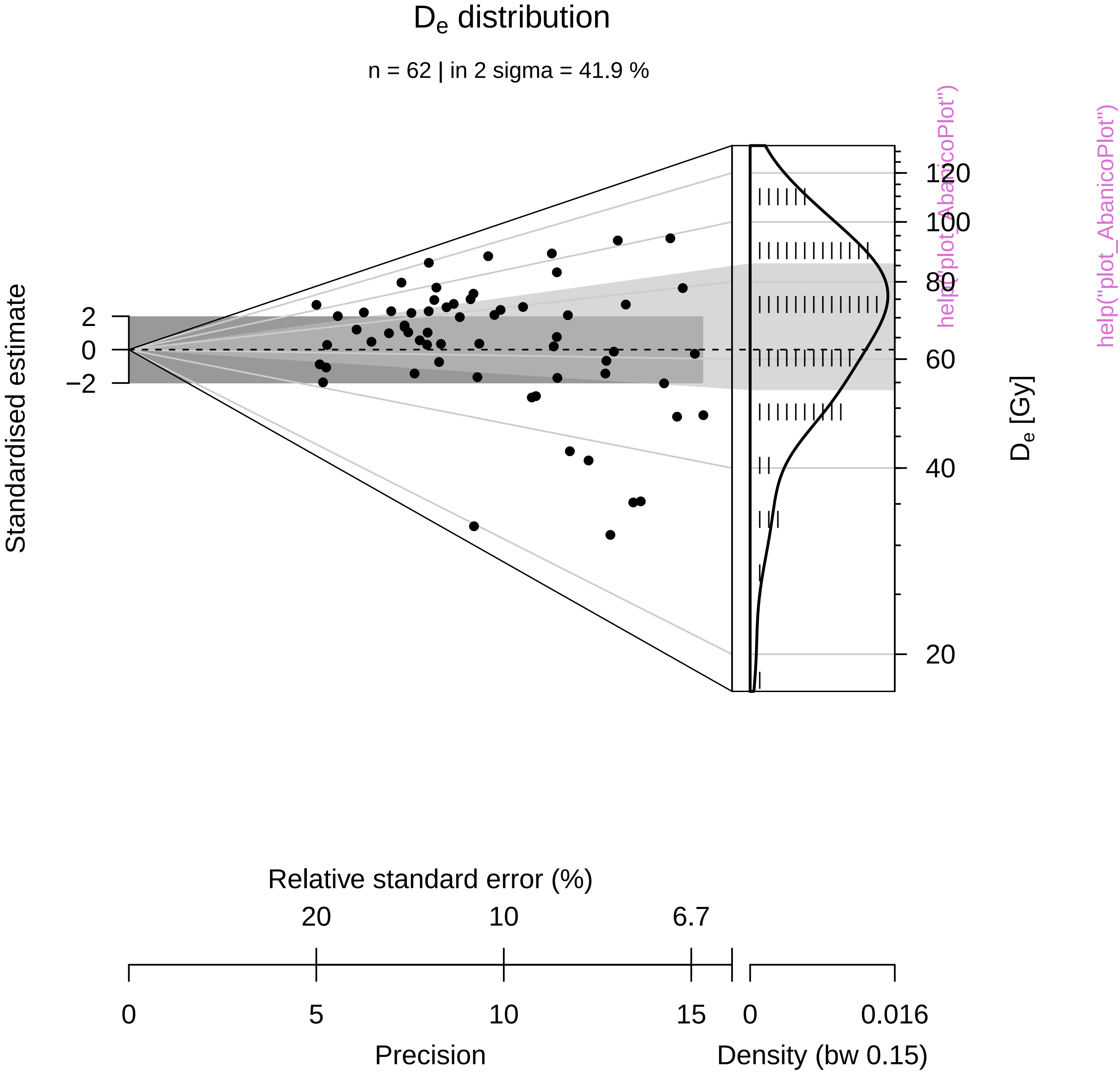

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

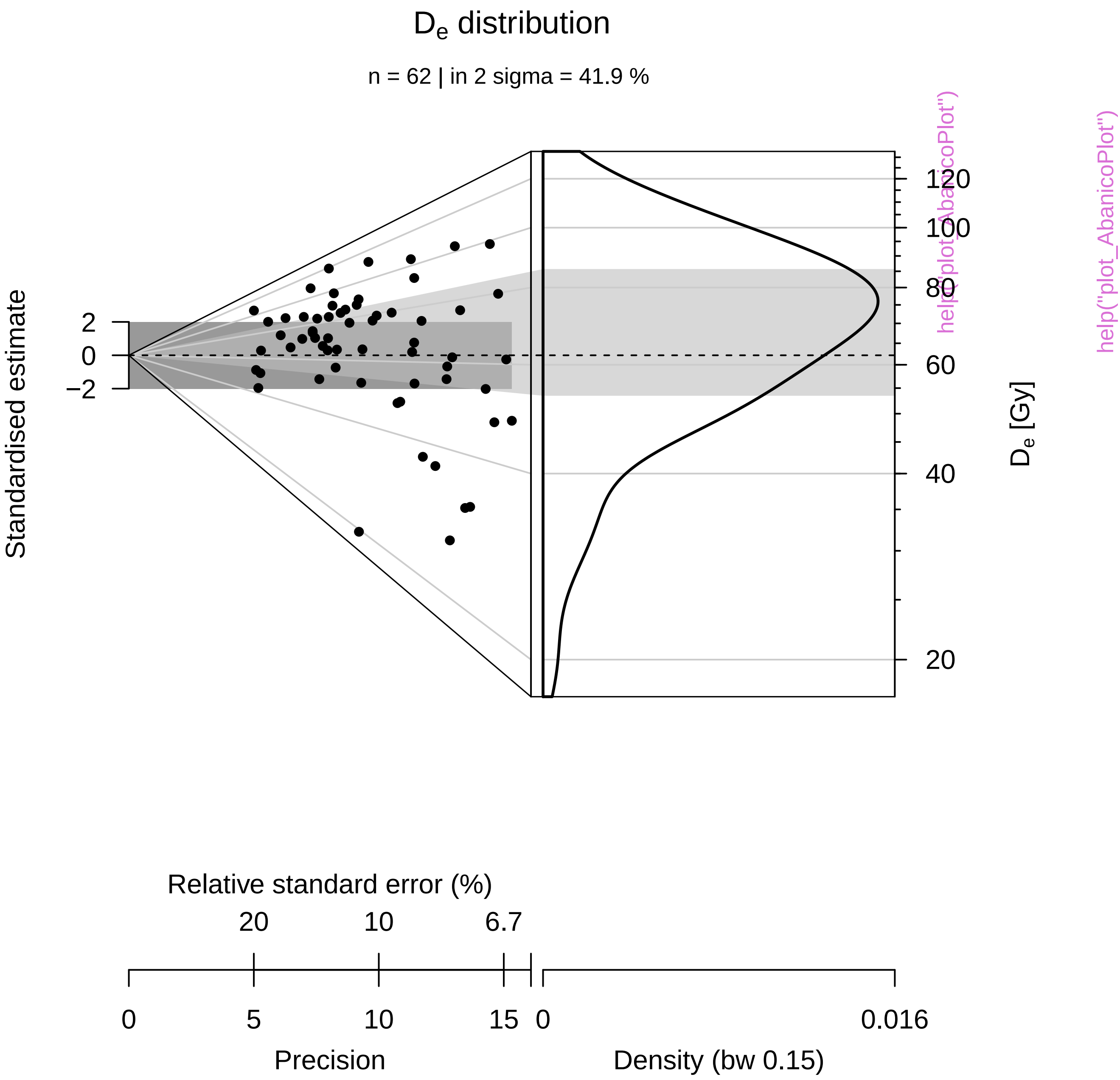

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.264
Density (bw 0.04)


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

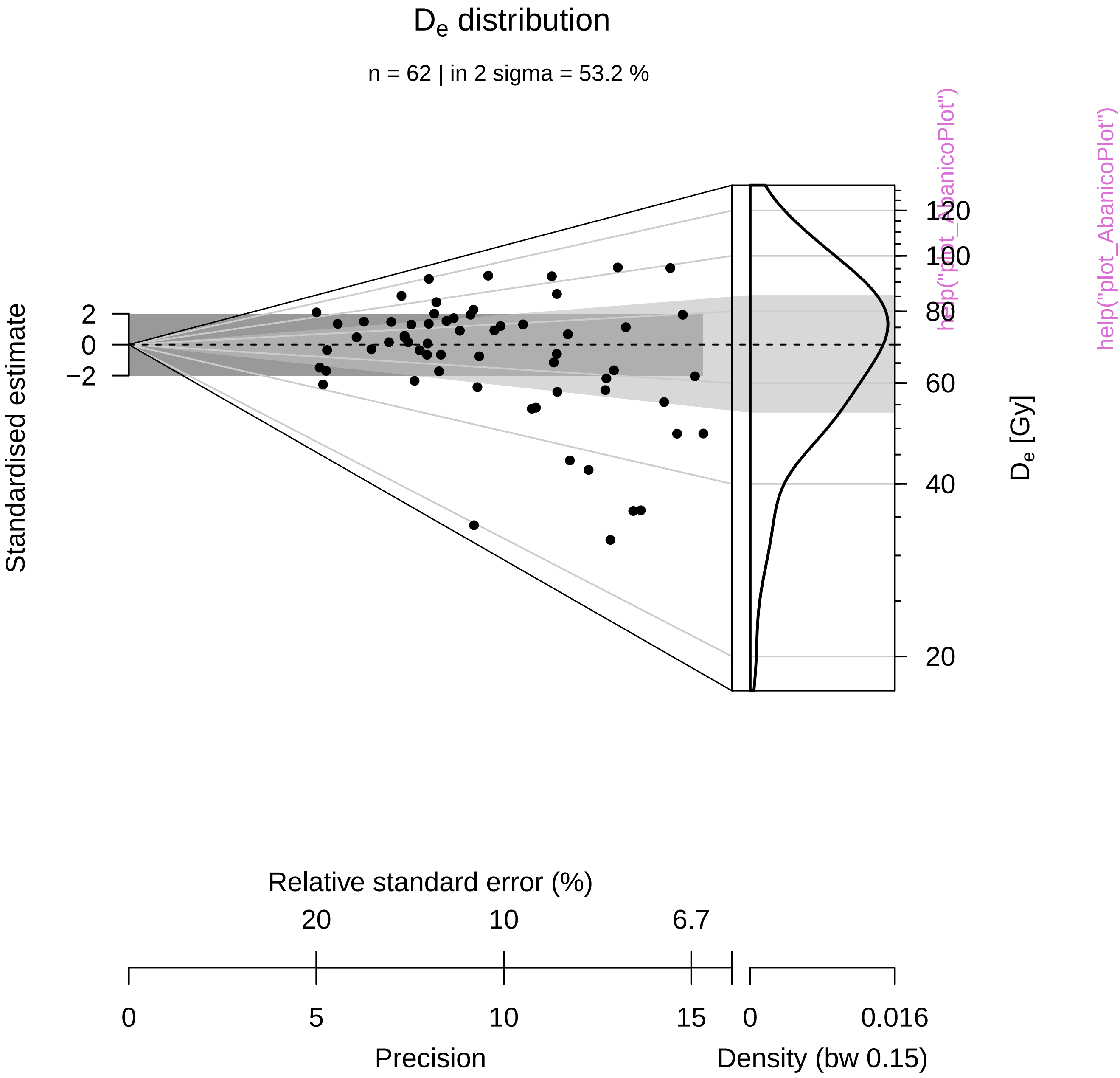


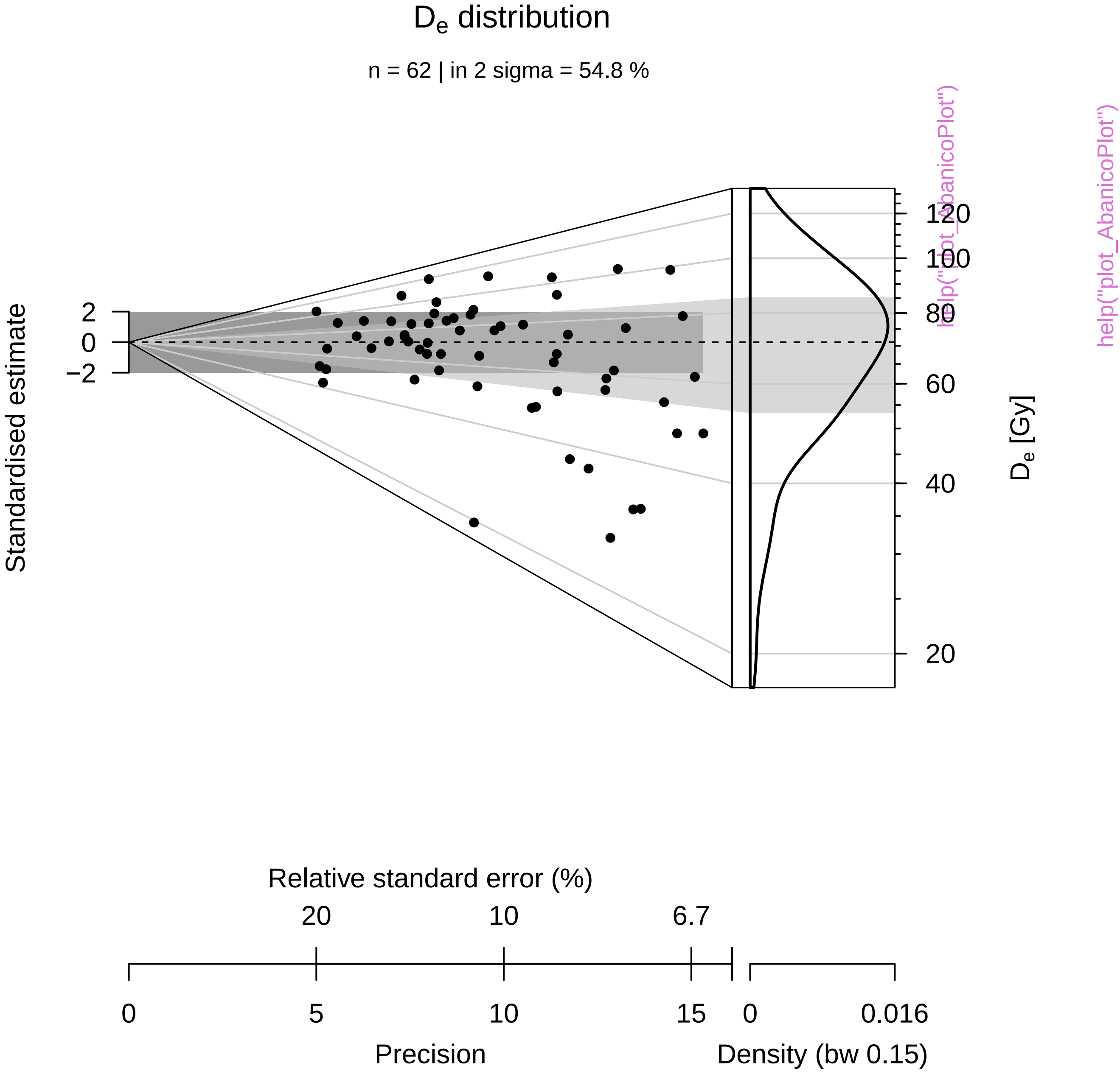
D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
n
0
10
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

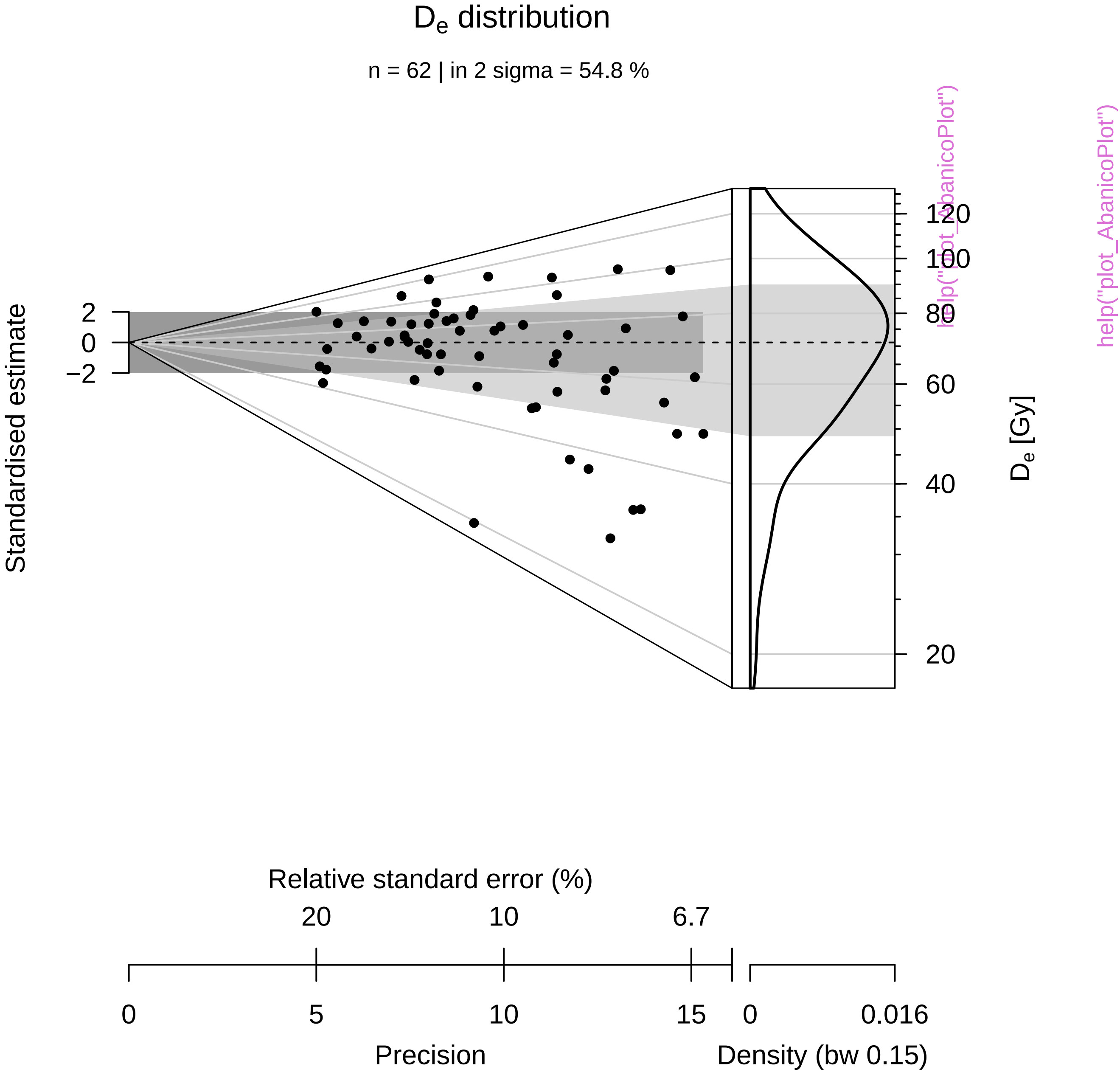

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

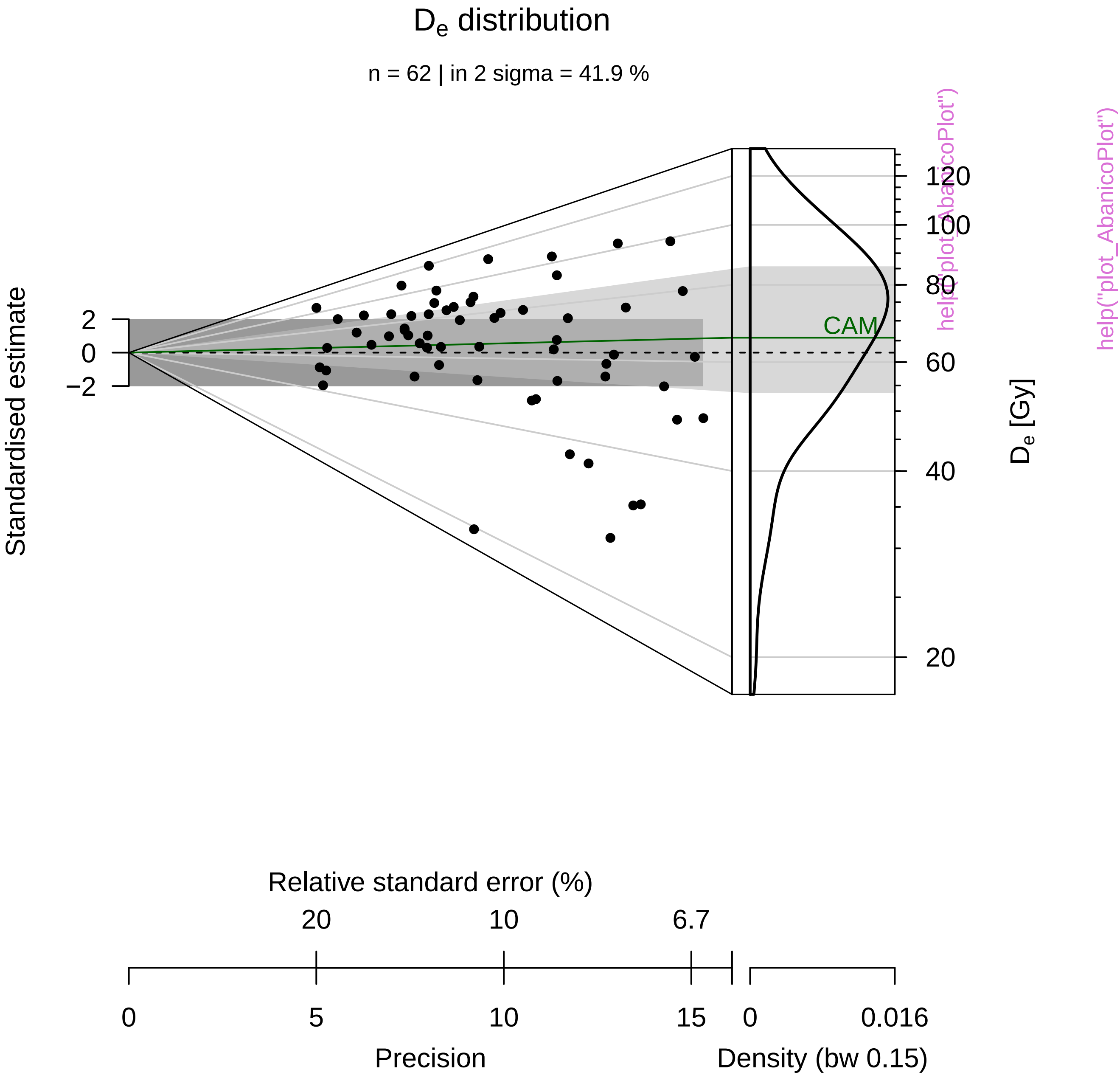


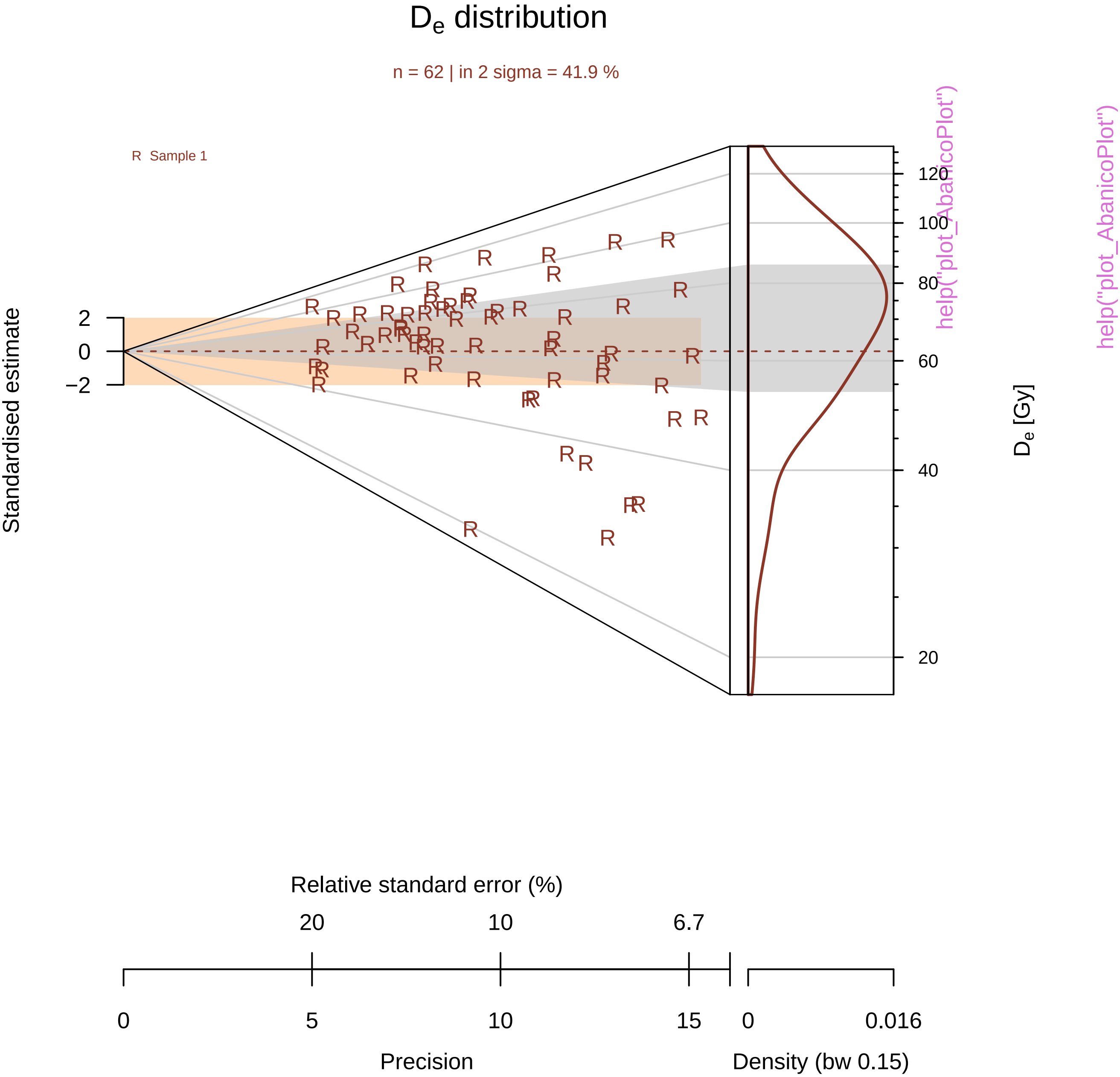
D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

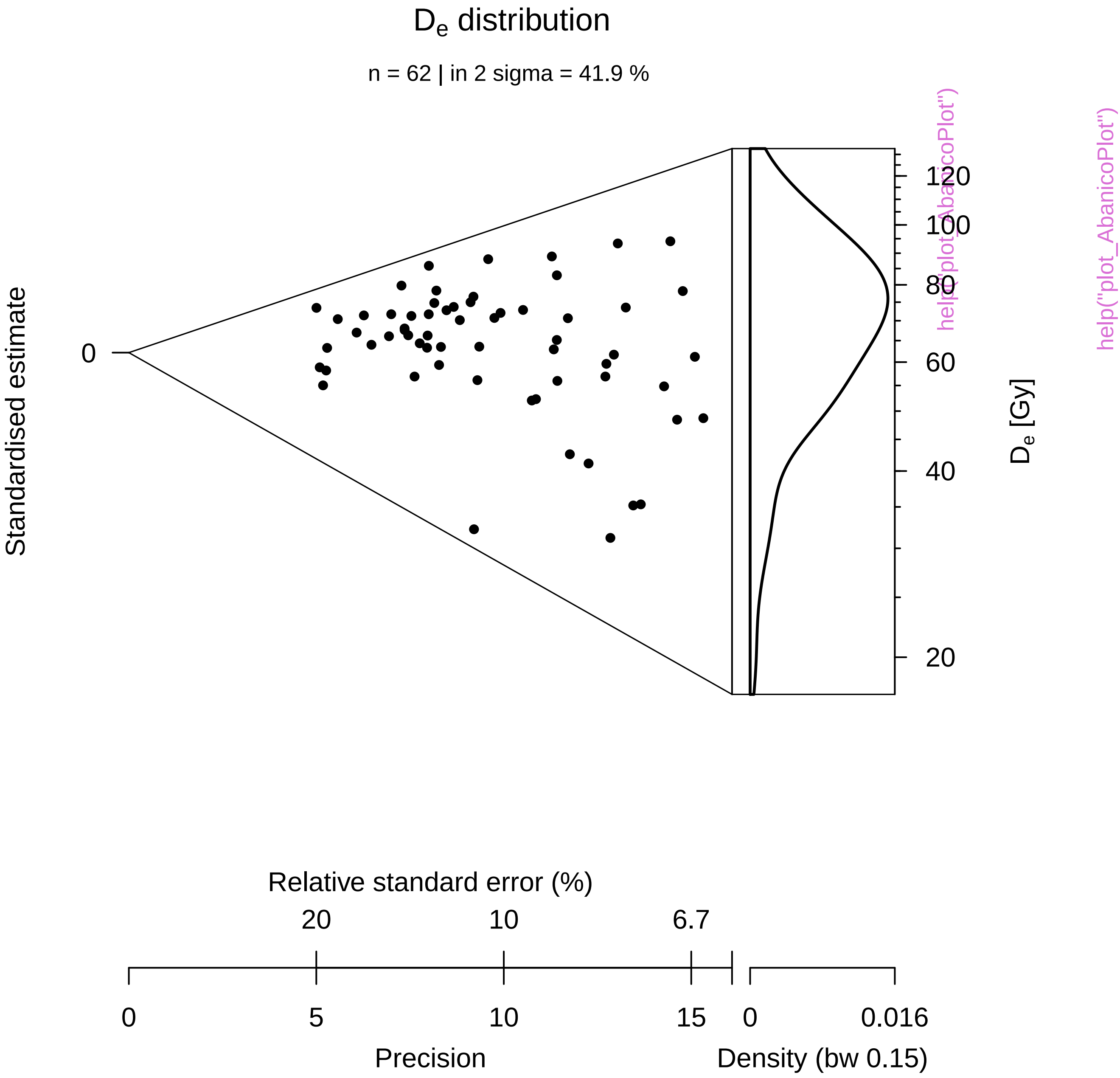

D_e distribution
n = 62 | in 2 sigma = 53.2 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

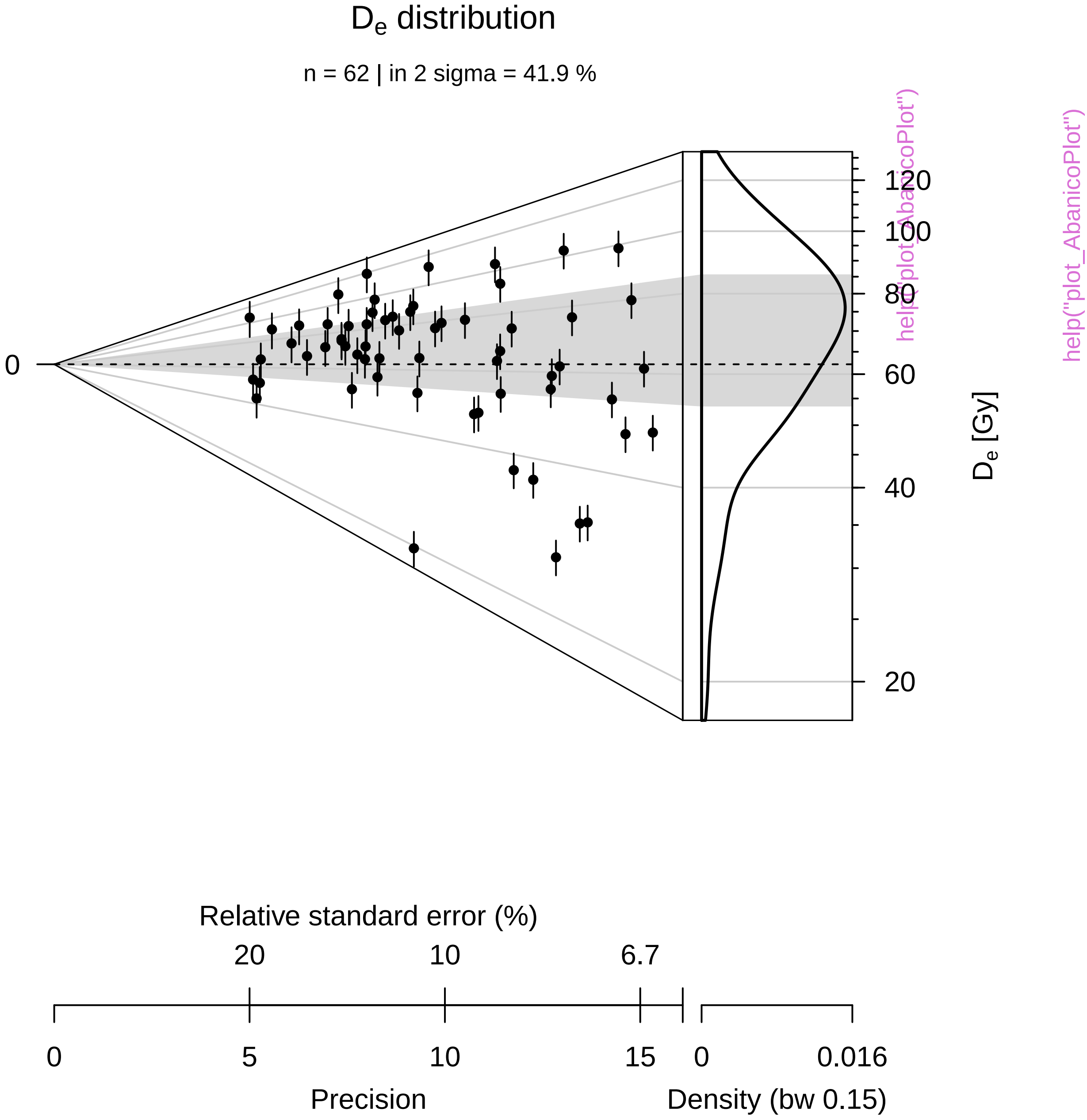

D_e distribution
n = 62 | in 2 sigma = 54.8 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


D_e distribution
n = 62 | in 2 sigma = 54.8 %
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
0
0.016
Density (bw 0.15)

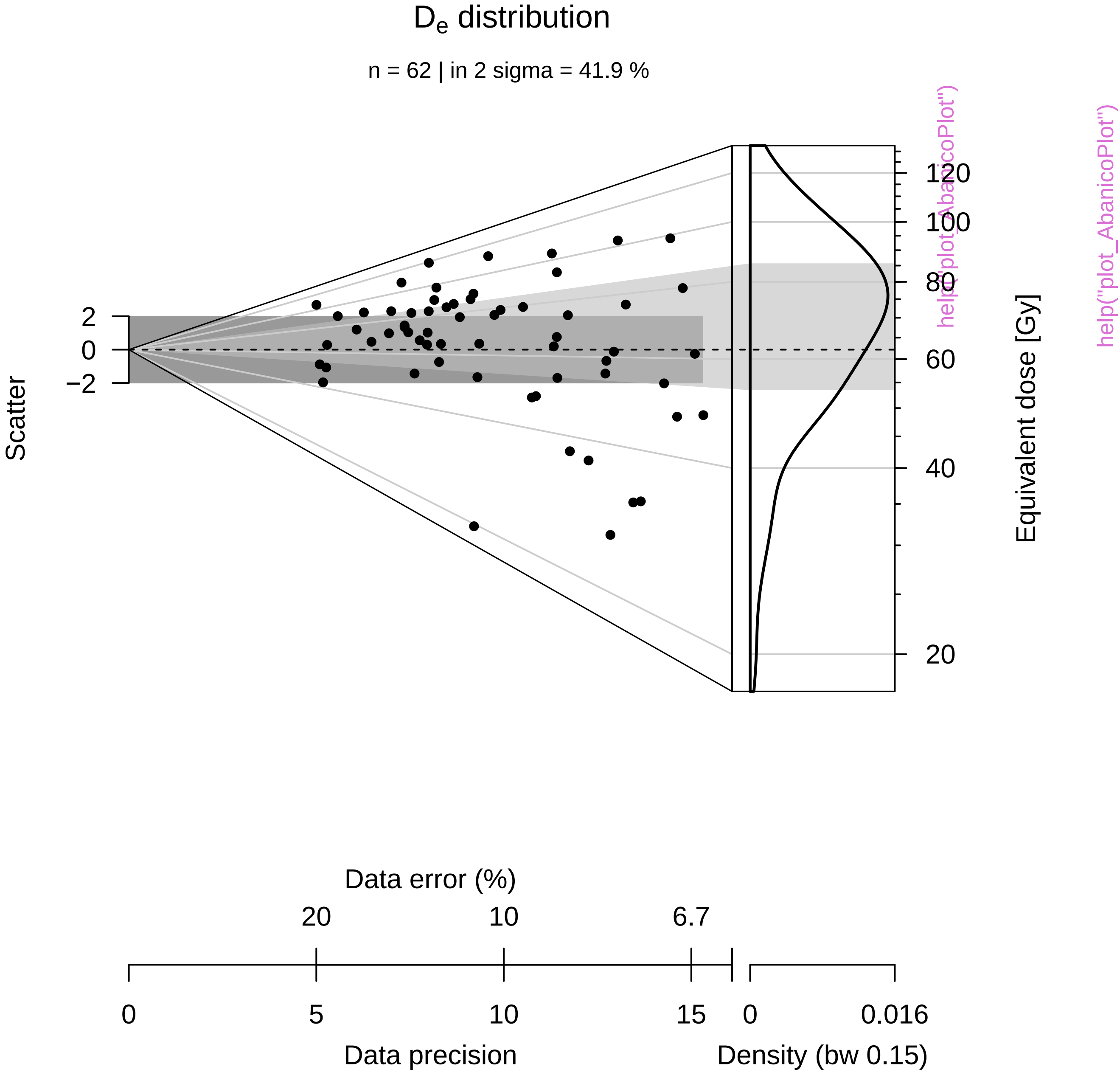

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
CAM
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

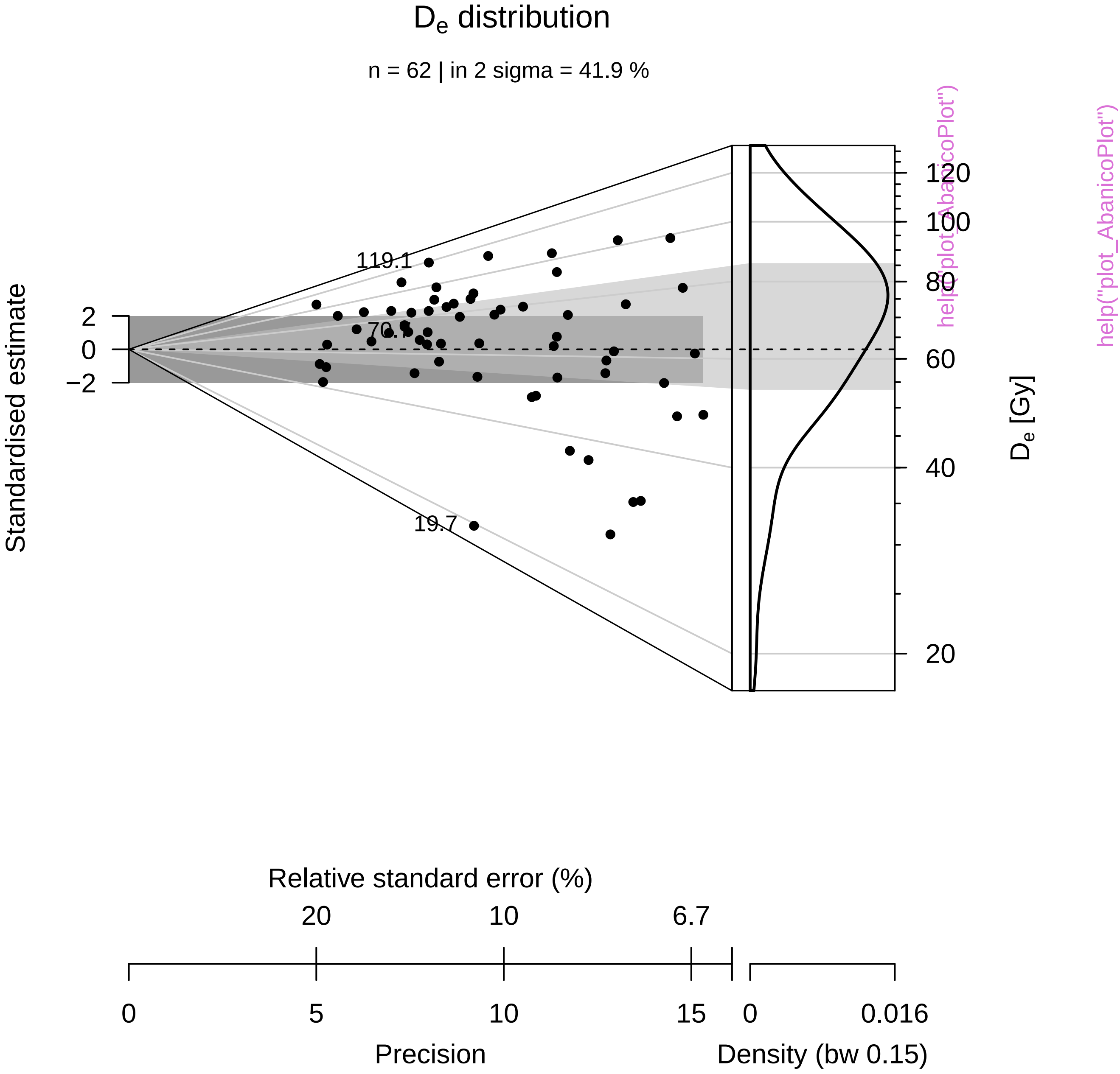

De distribution
n = 62 | in 2 sigma = 41.9 %
R Sample 1
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

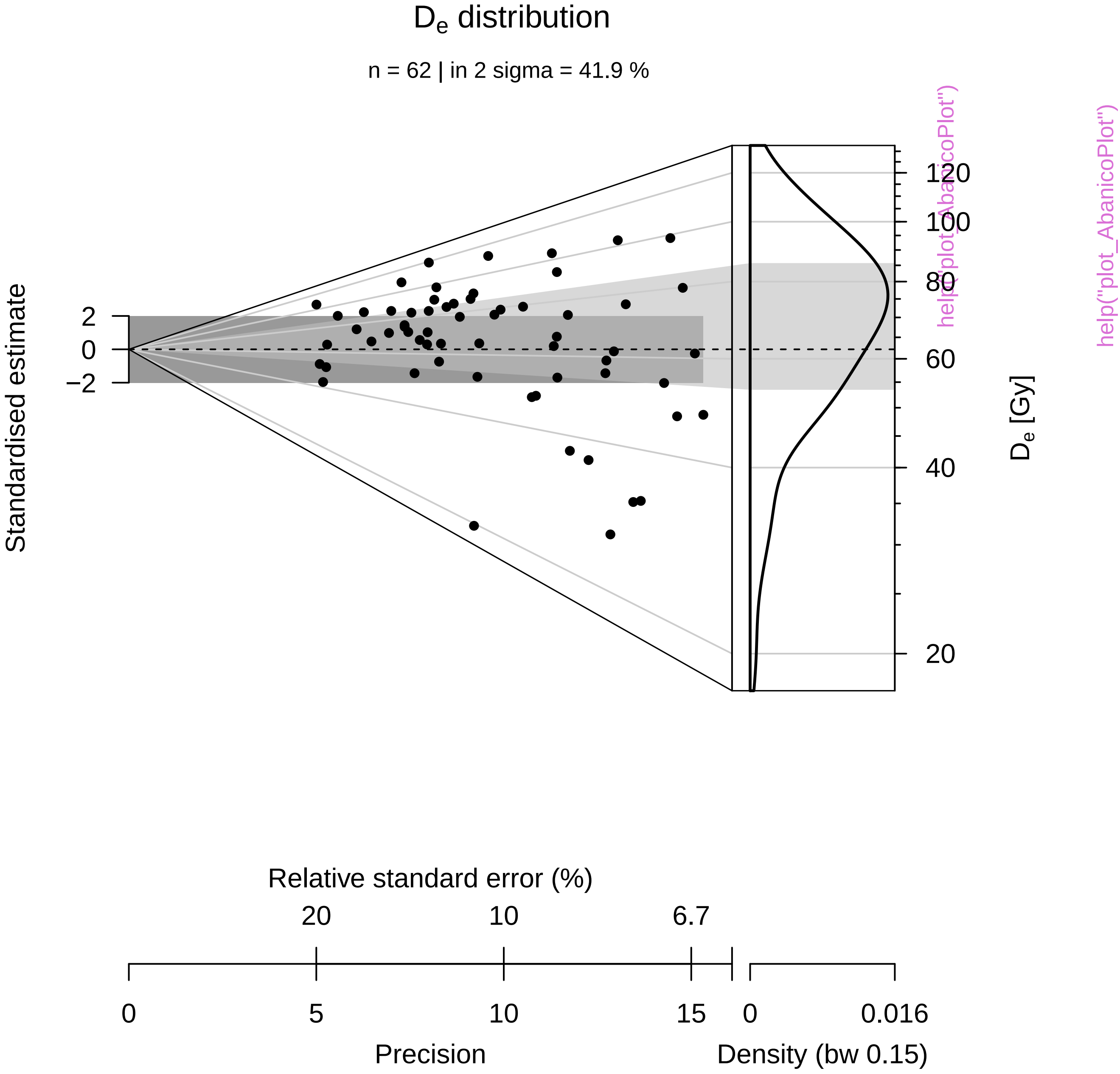

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
0
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)



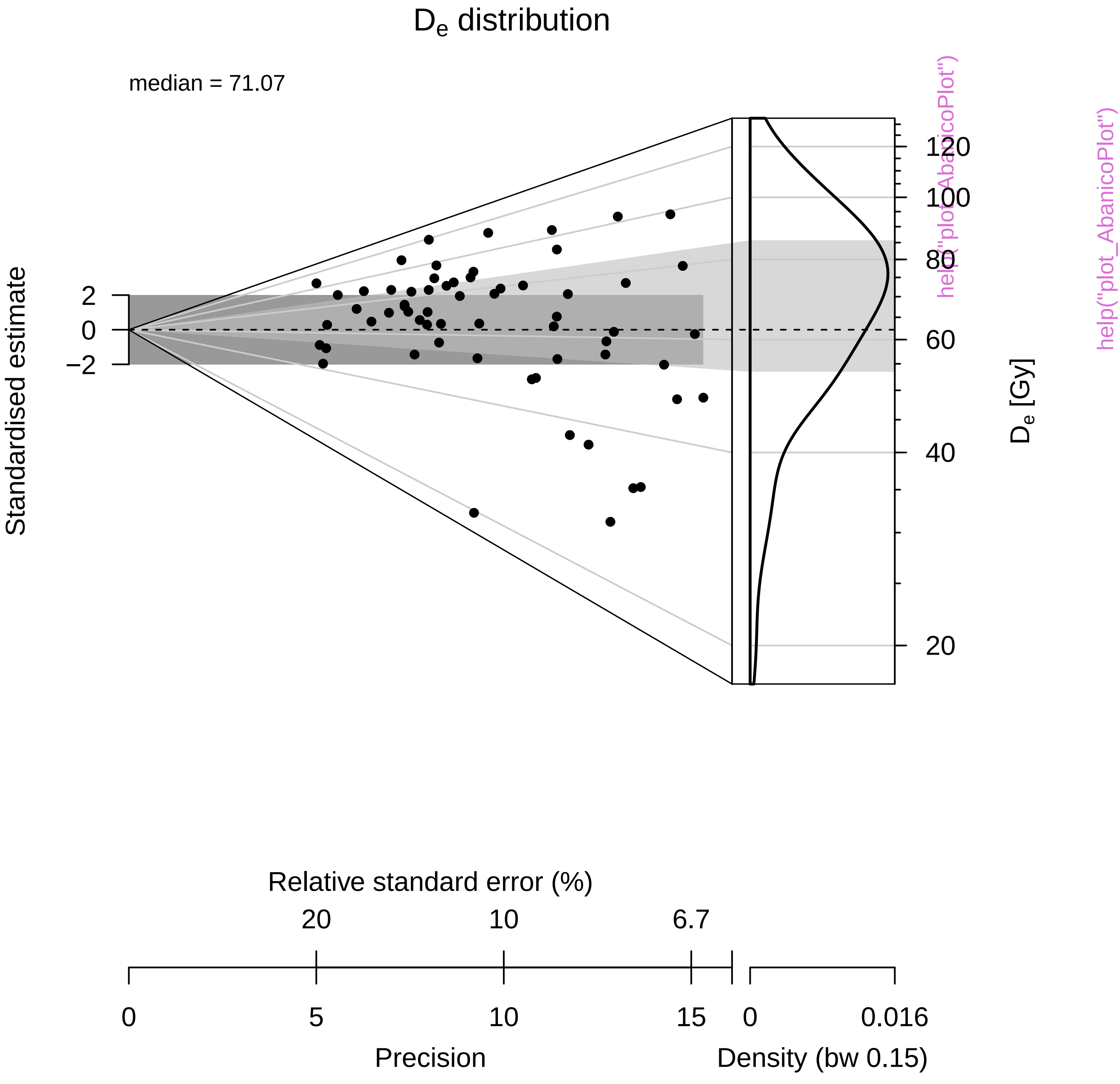
De distribution
n = 62 | in 2 sigma = 41.9 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
0
120
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)


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

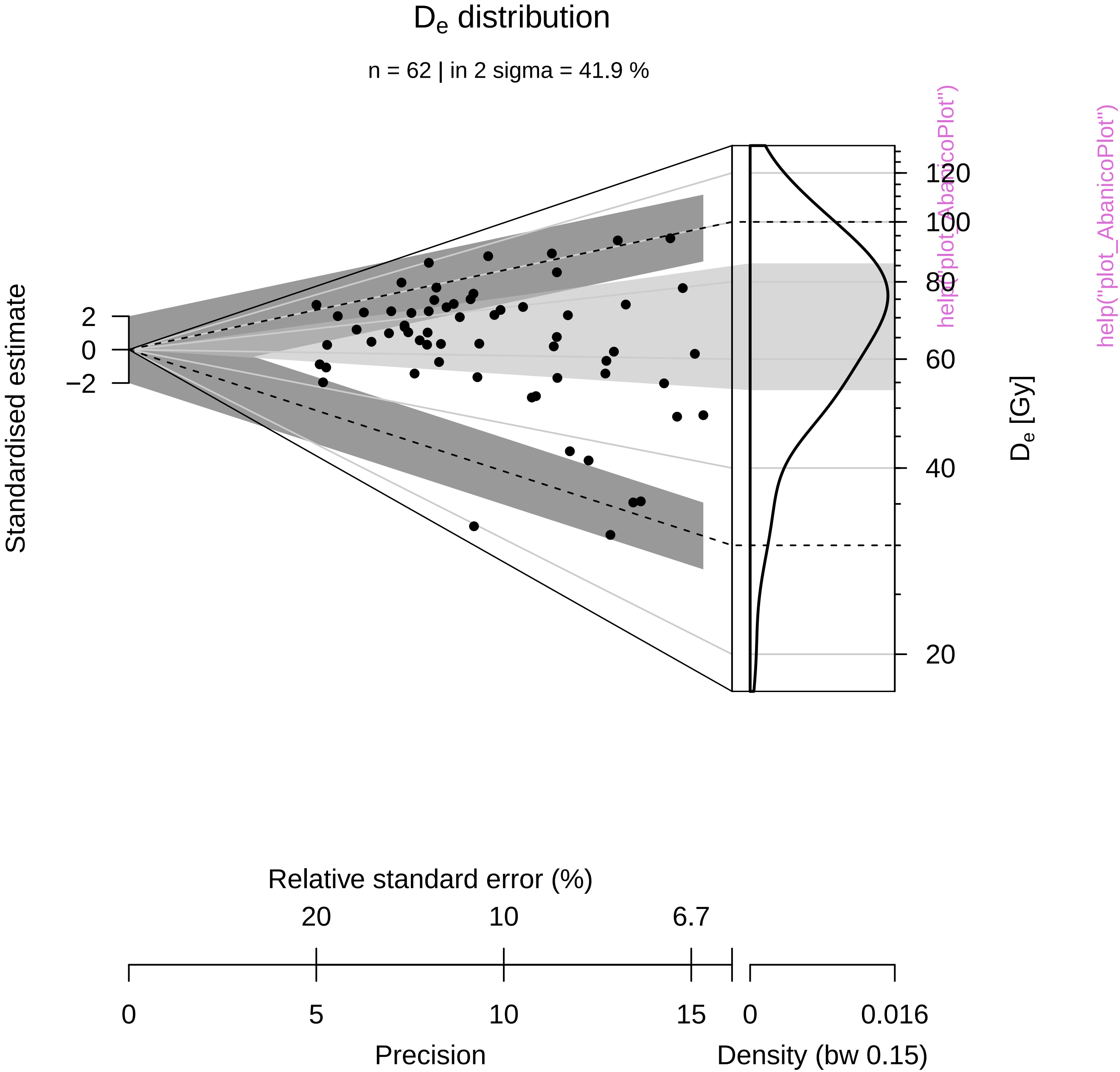

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
119.1
70.7
19.7
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

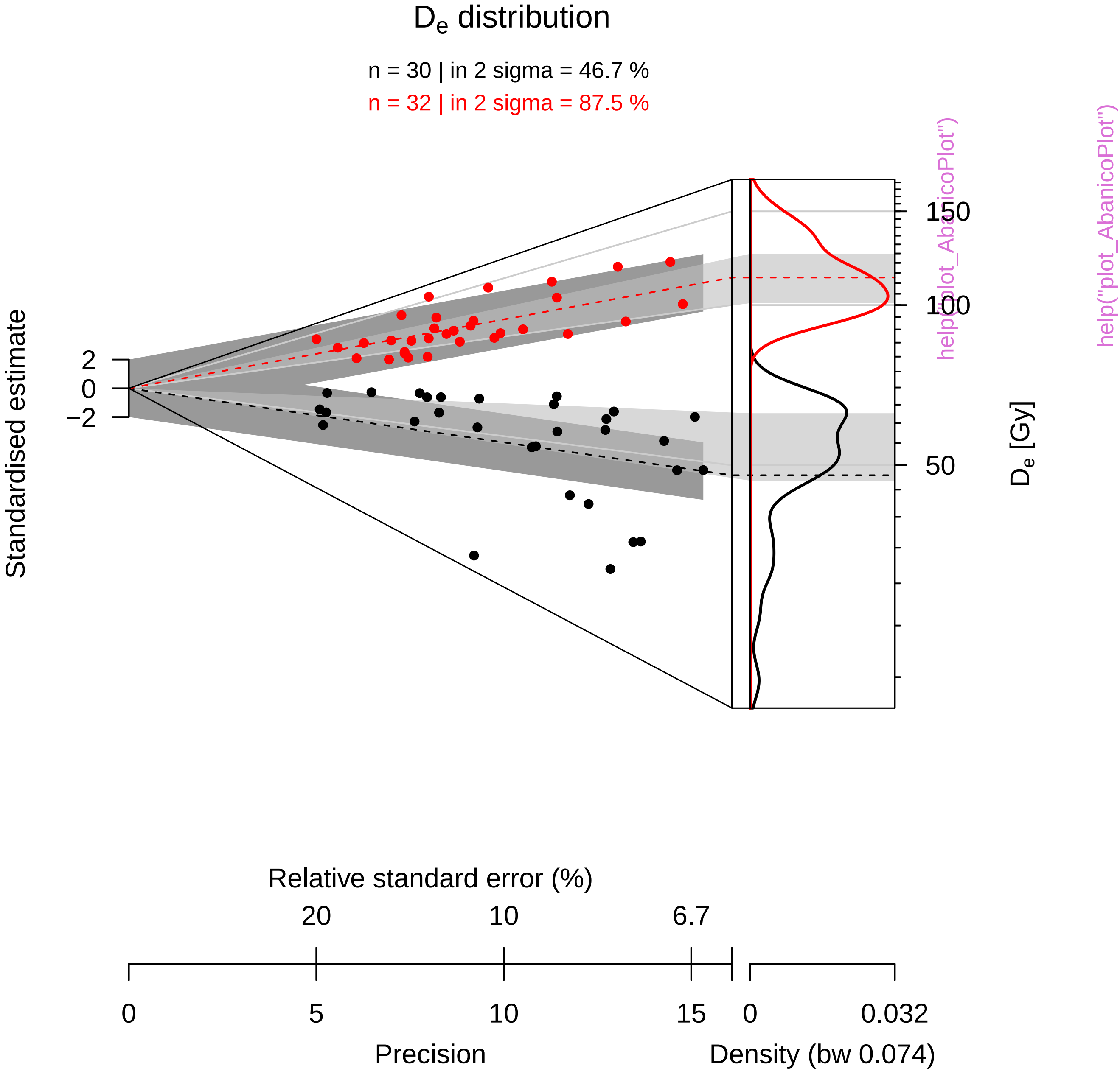


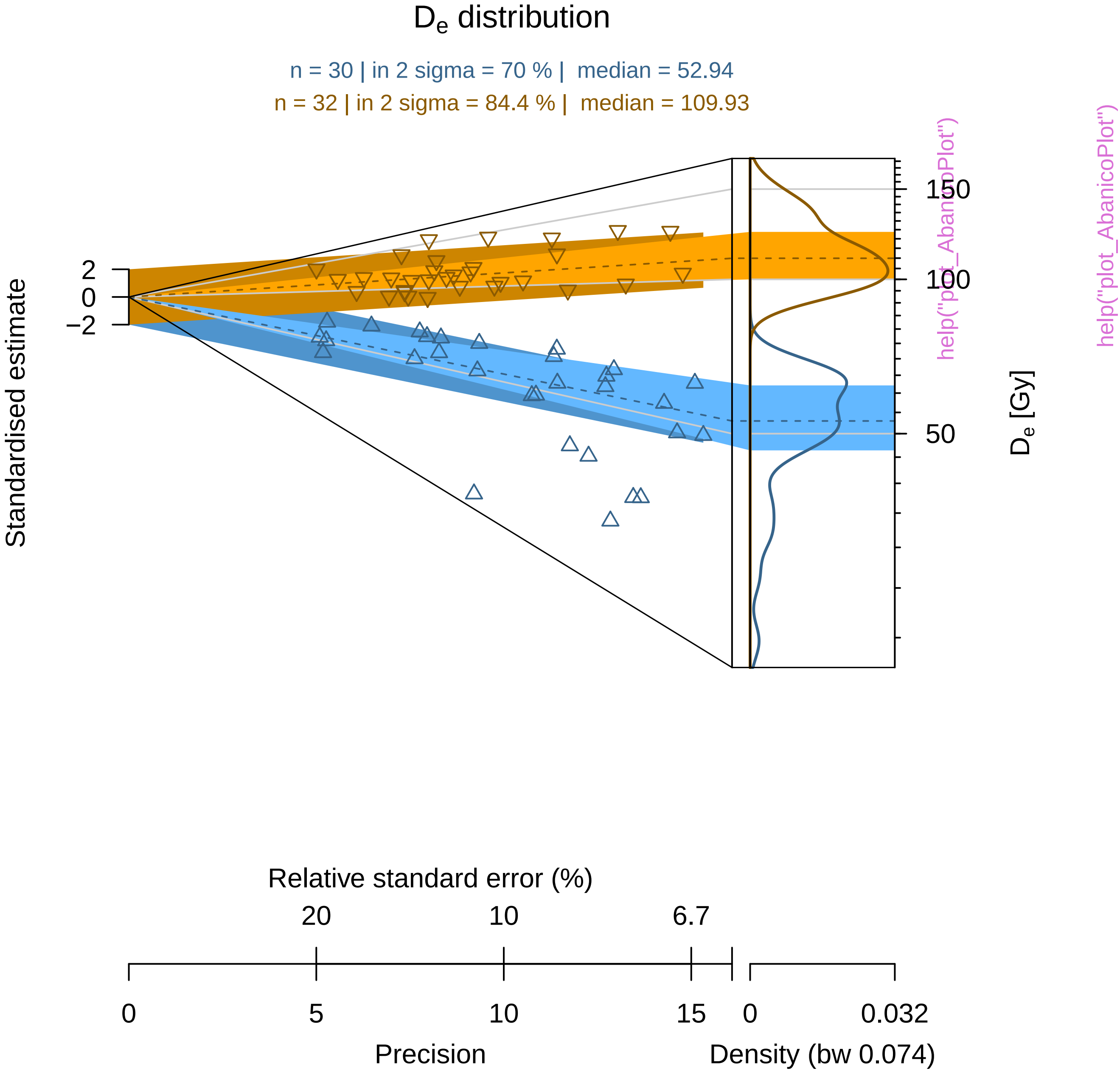
D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)



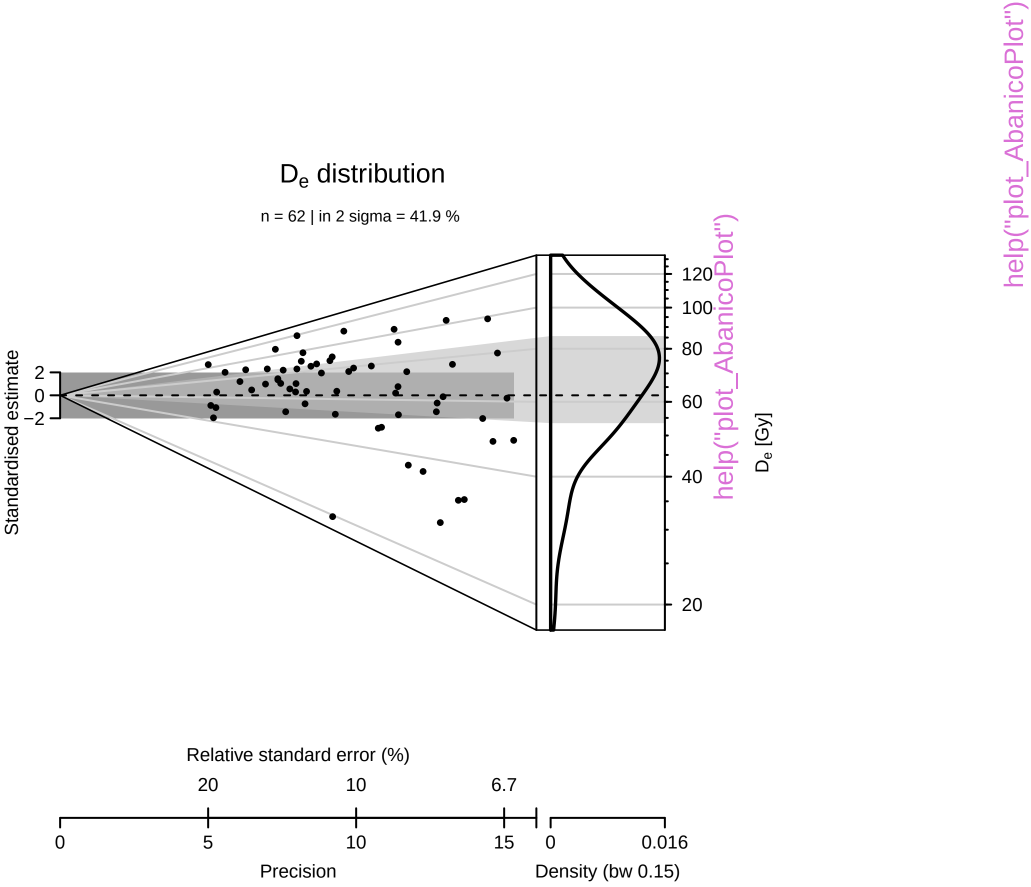
De distribution
median = 71.07
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

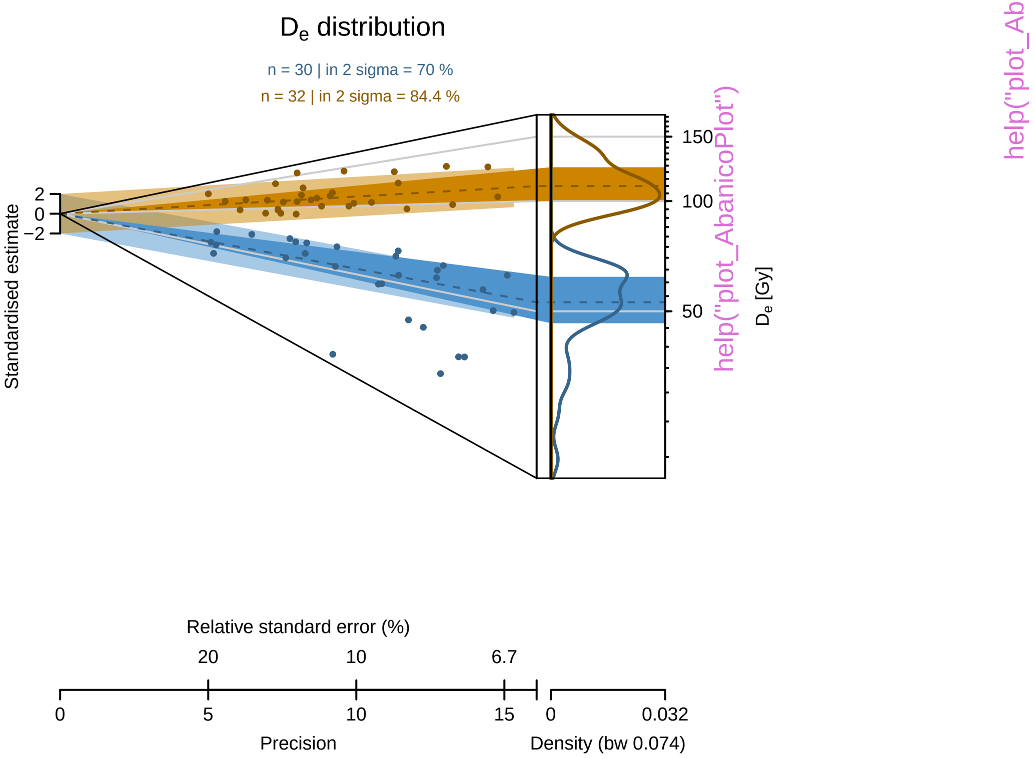

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
–2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

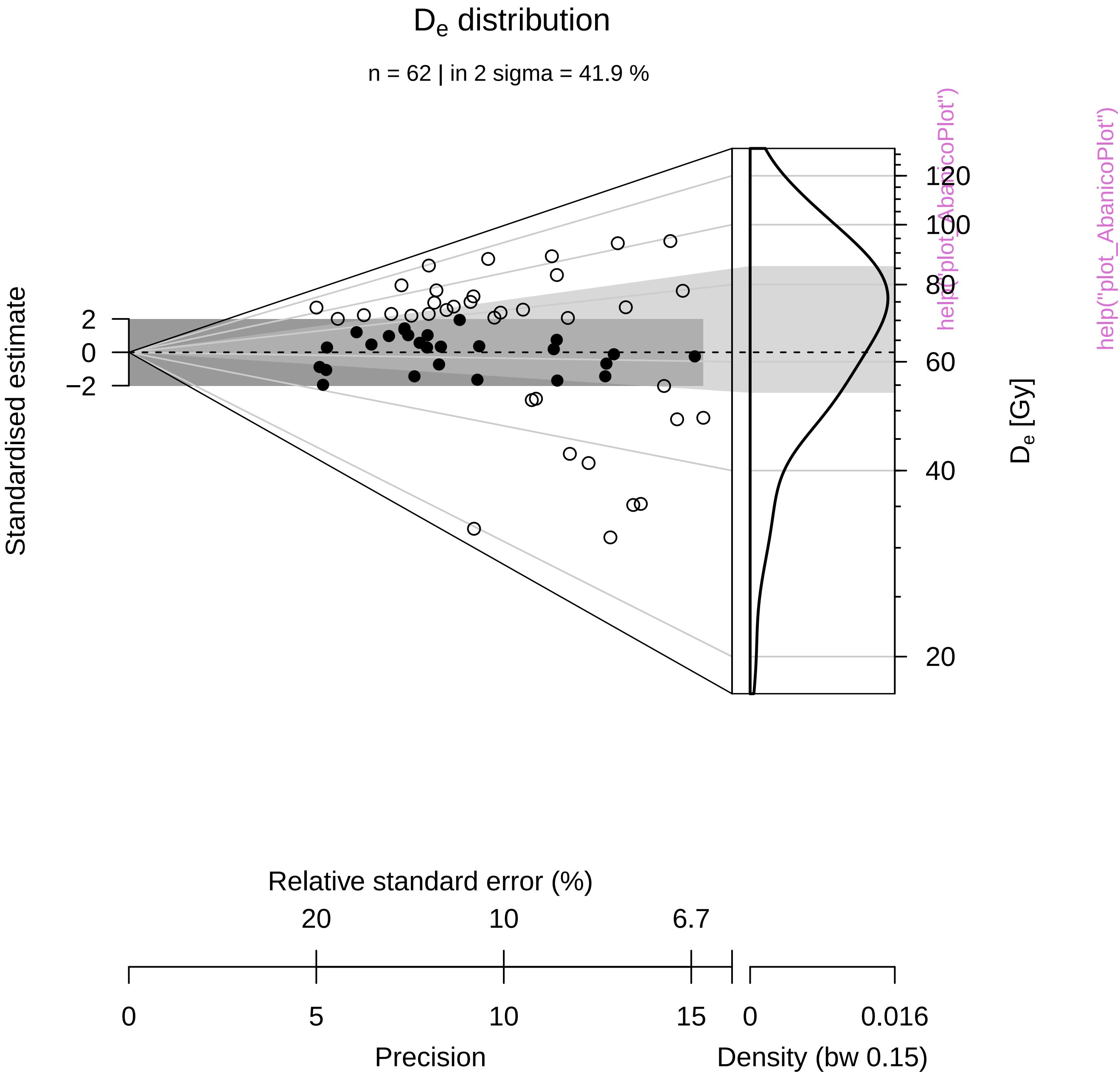

D_e distribution
n = 30 | in 2 sigma = 46.7 %
n = 32 | in 2 sigma = 87.5 %
Standardised estimate
2
0
−2
150
100
50
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.032
Density (bw 0.074)



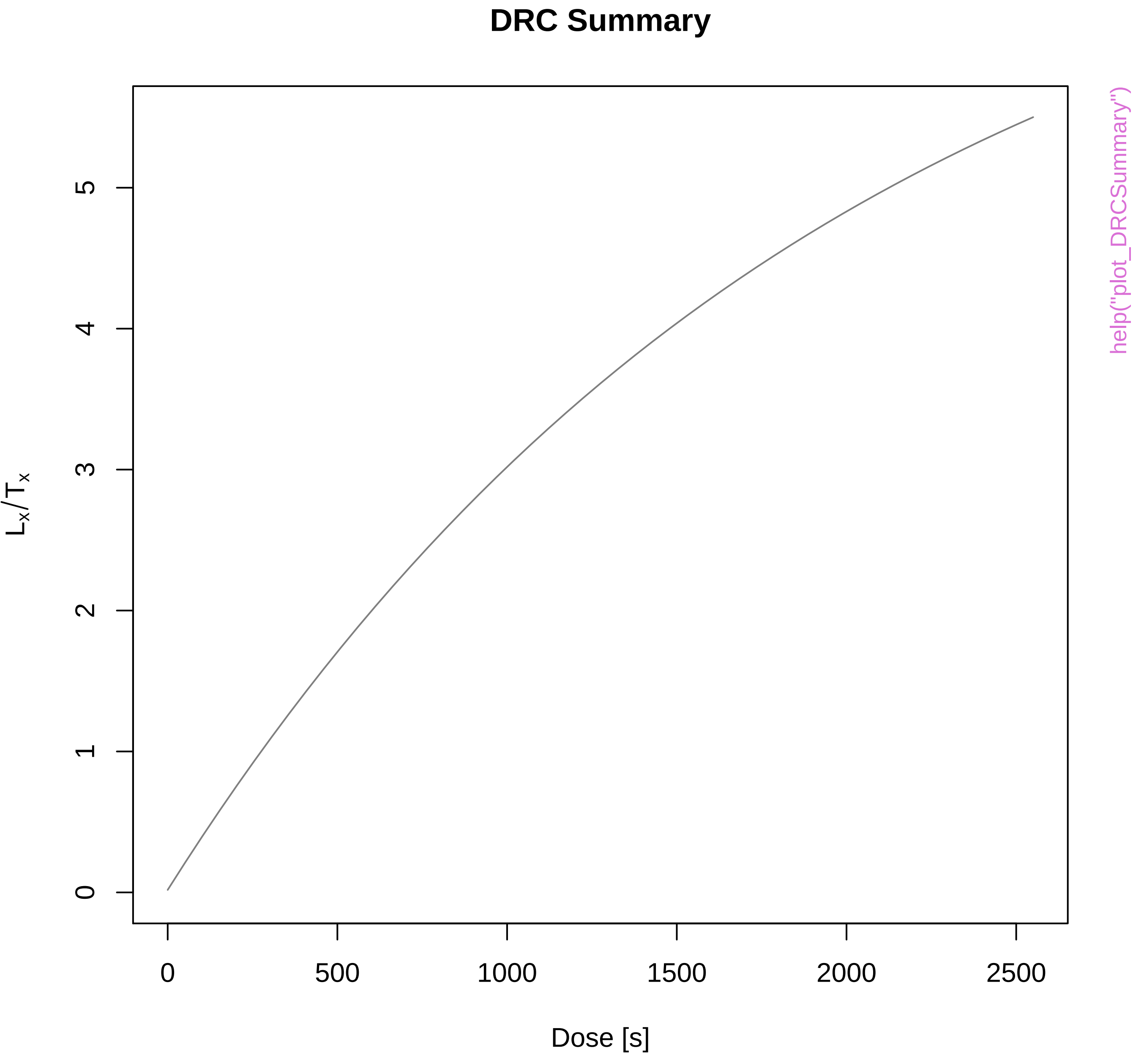
D_e distribution
n = 30 | in 2 sigma = 70 % | median = 52.94
n = 32 | in 2 sigma = 84.4 % | median = 109.93
Standardised estimate
2
0
−2
150
100
50
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.032
Density (bw 0.074)

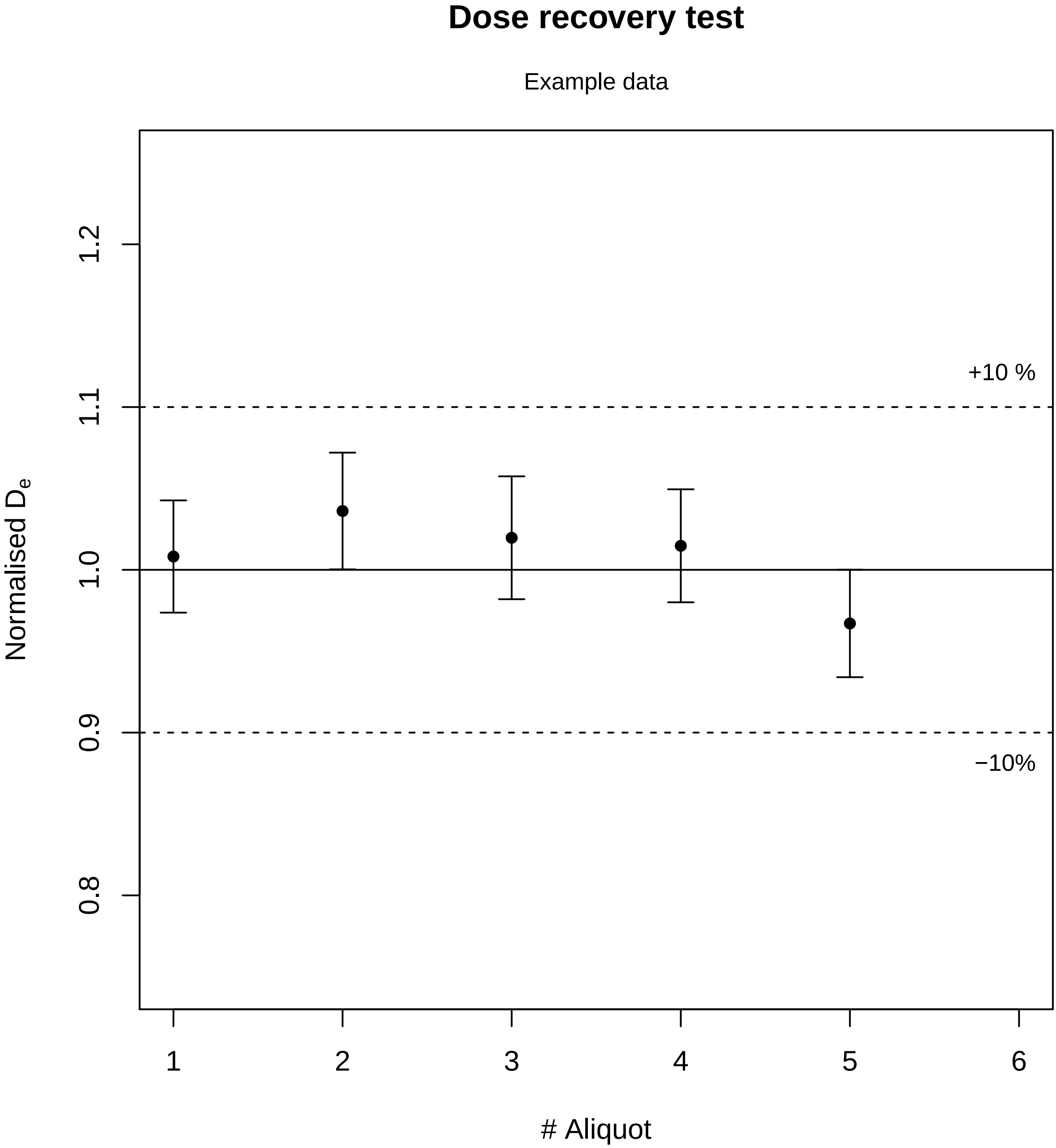

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

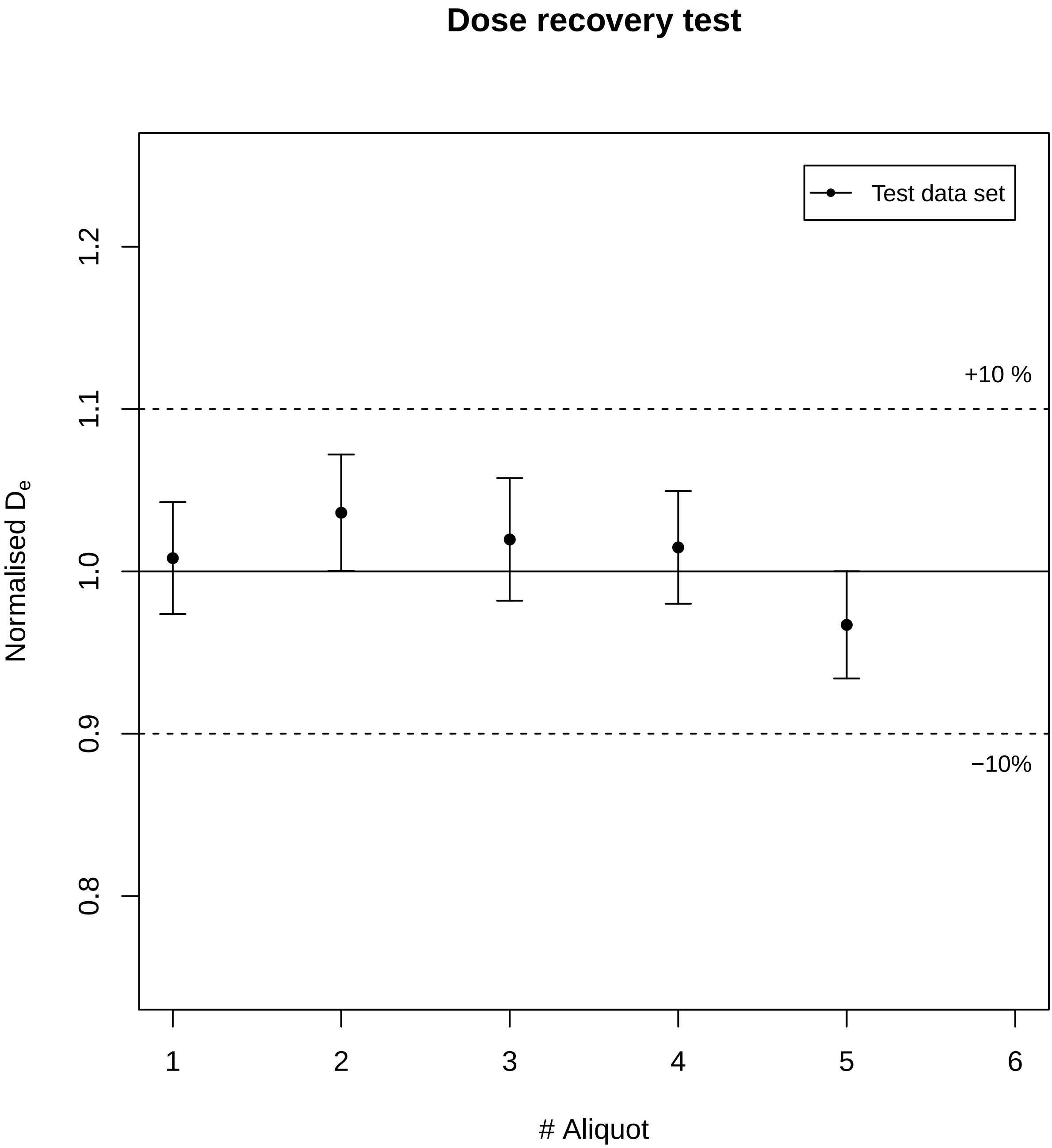

D_e distribution
n = 30 | in 2 sigma = 70 %
n = 32 | in 2 sigma = 84.4 %
Standardised estimate
2
0
−2
150
100
50
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.032
Precision
Density (bw 0.074)

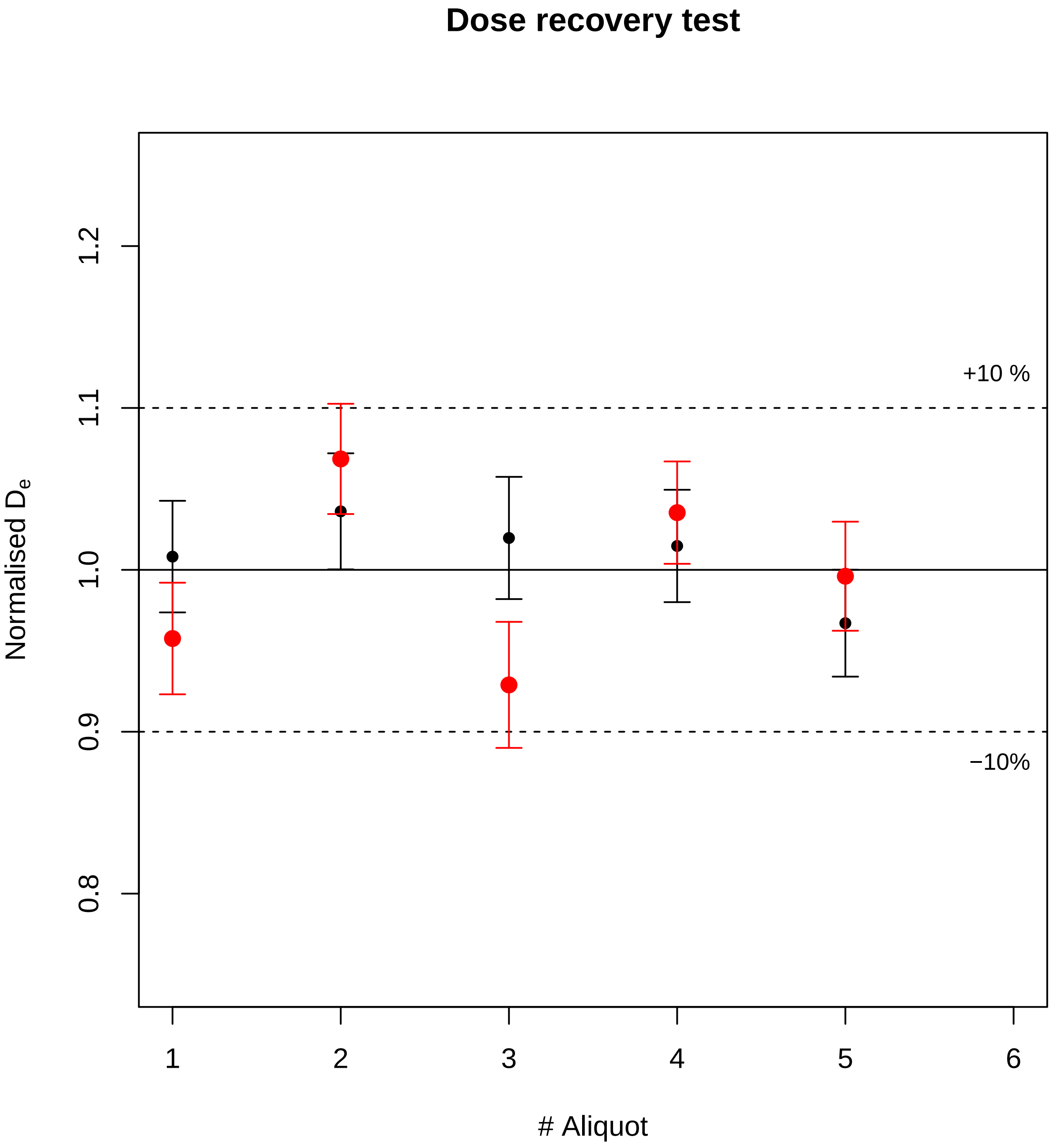


D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

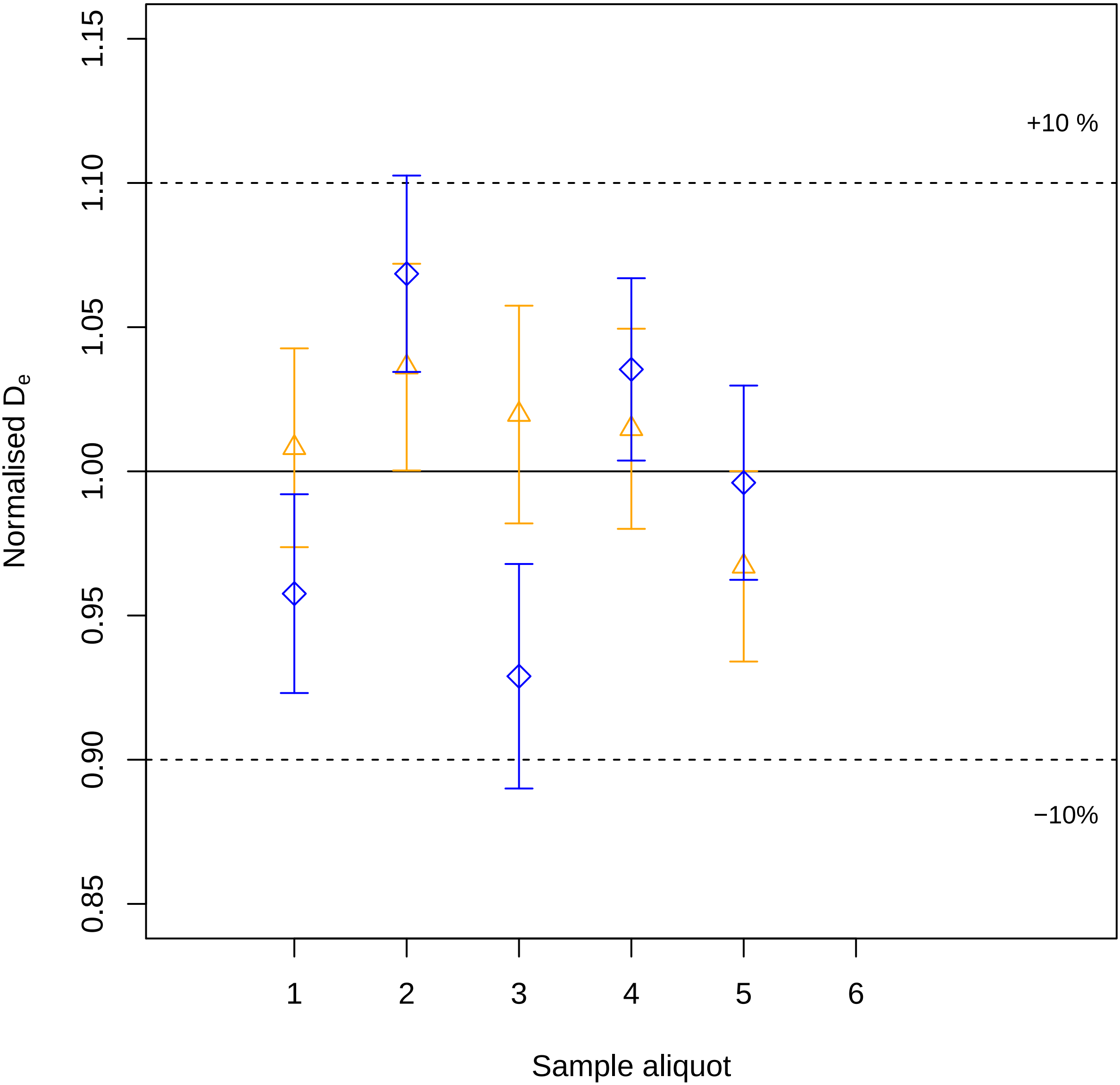

DRC Summary
L_x/T_x
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose [s]
help("plot_DRCSummary")

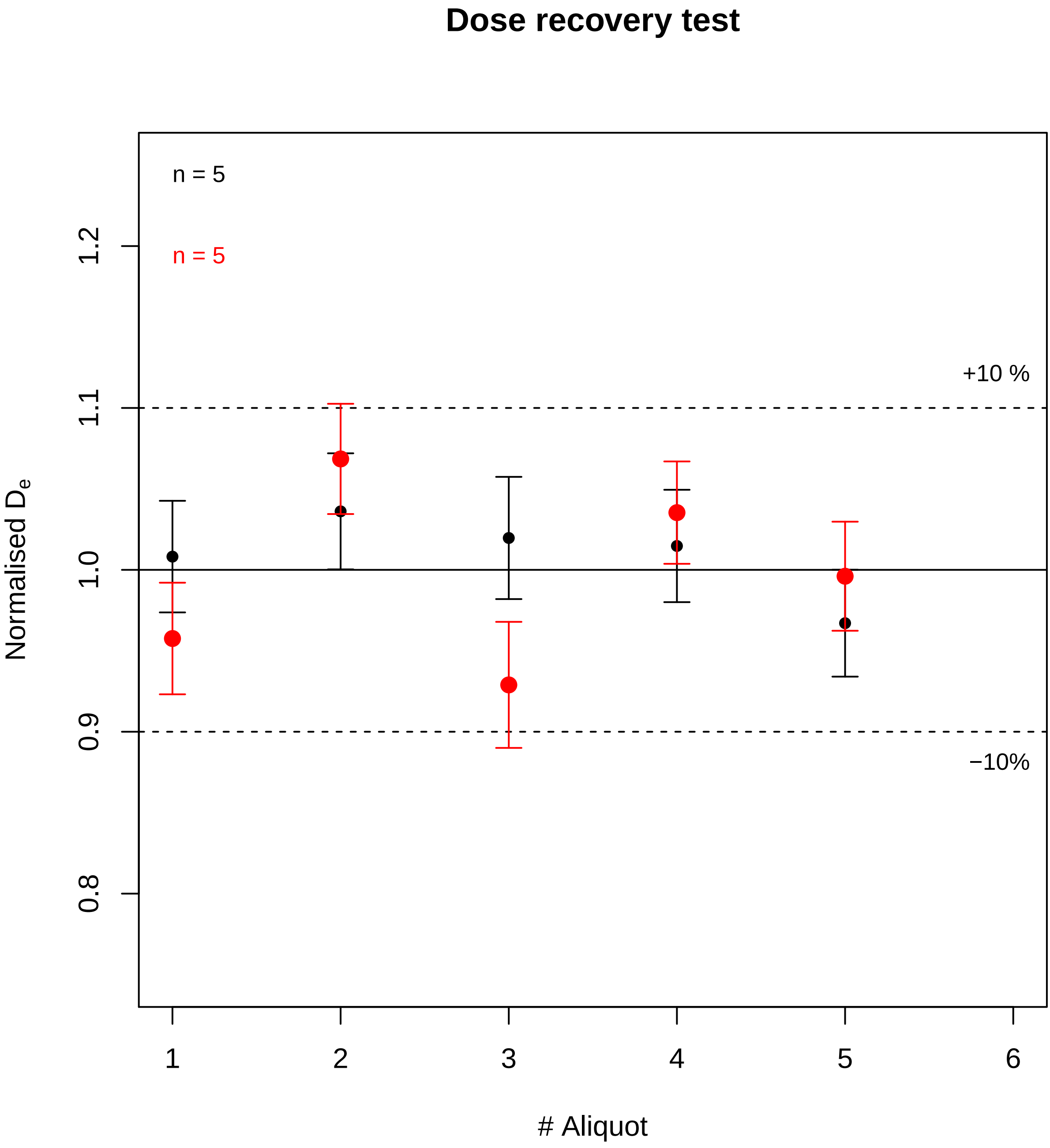

Dose recovery test
Example data
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
1
2
3
4
5
6
# Aliquot

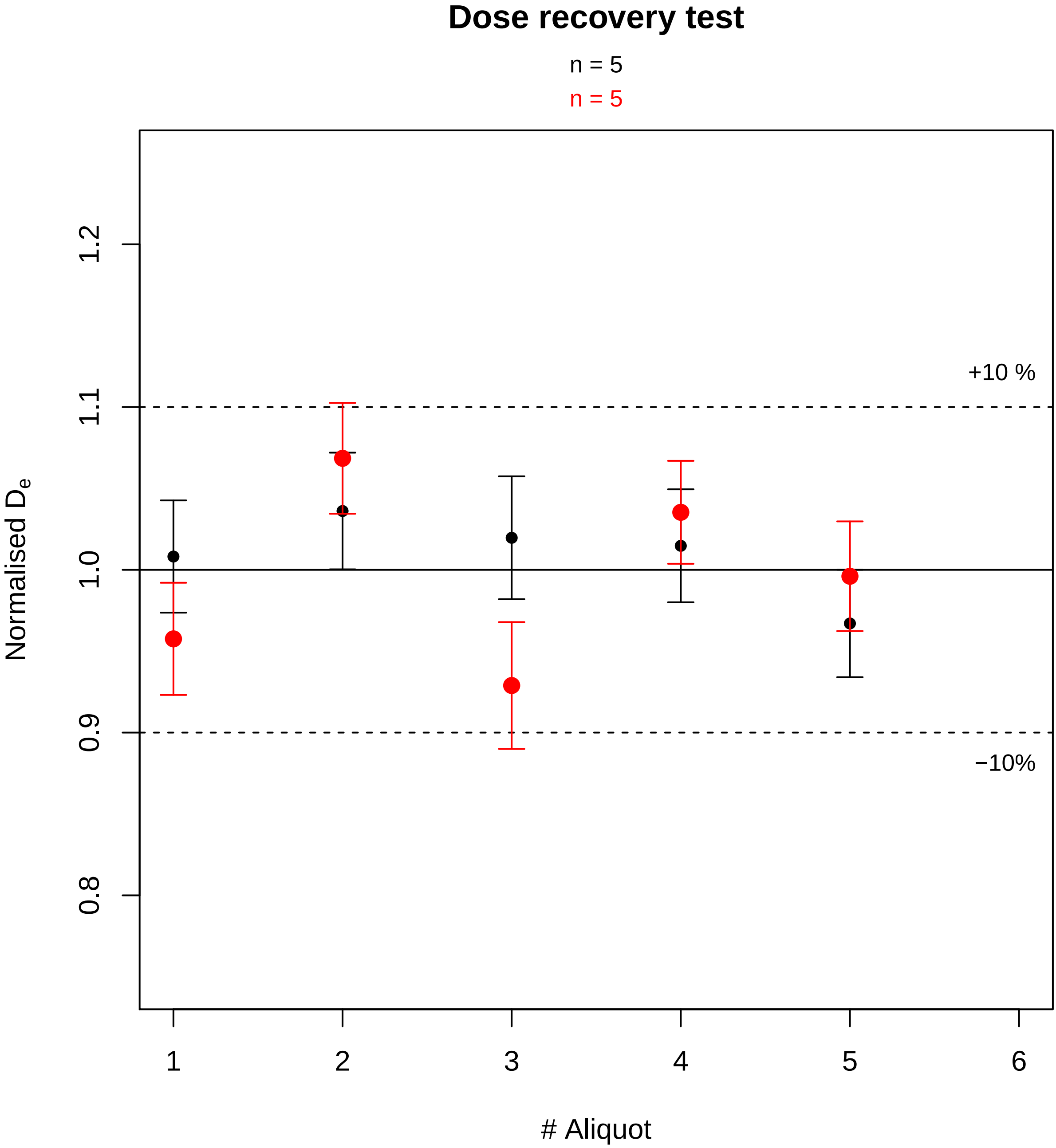

Dose recovery test
Test data set
+10 %
−10%
1.2
1.1
1.0
0.9
0.8
Normalised D_e
1
2
3
4
5
6
# Aliquot

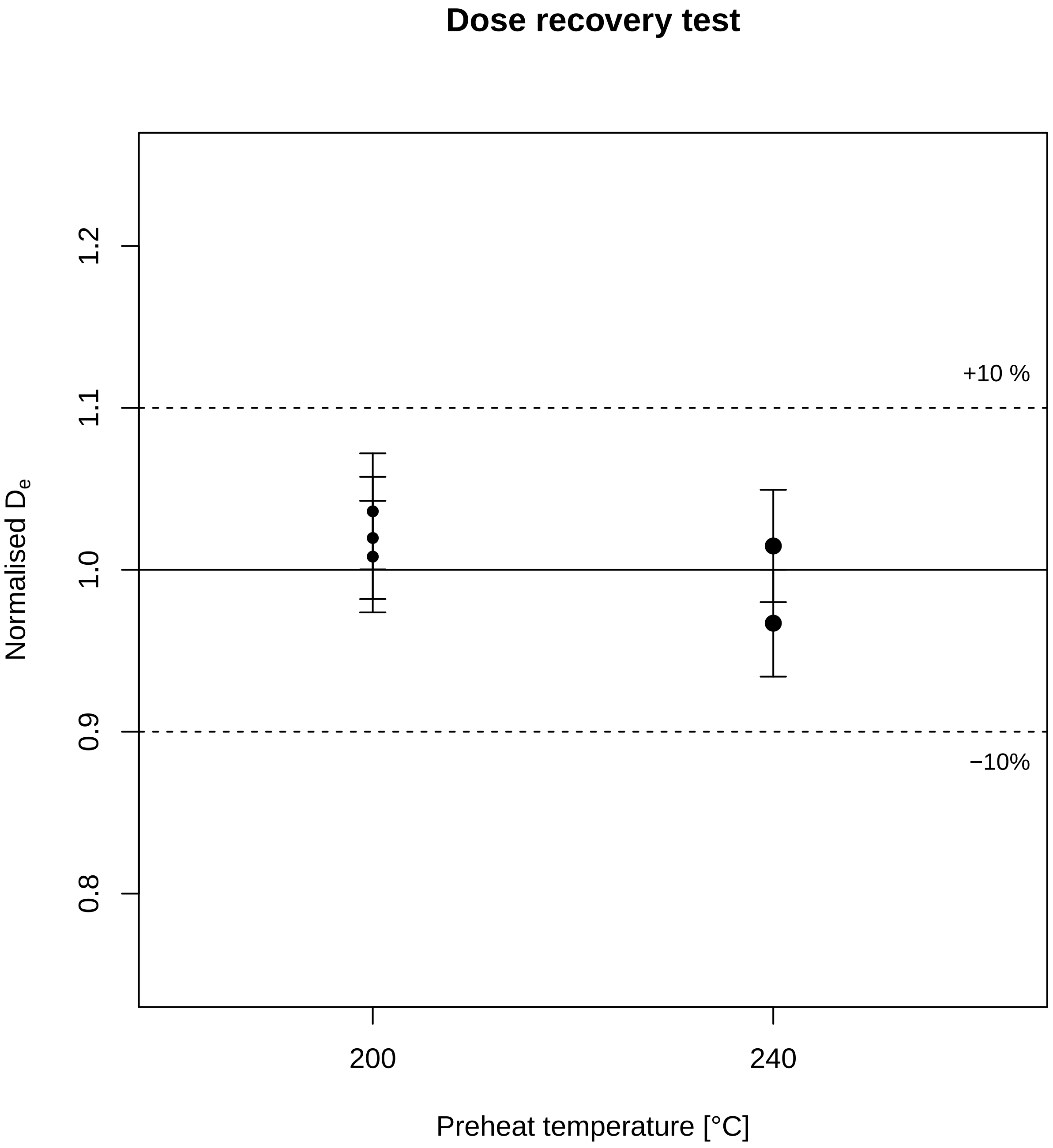

Dose recovery test
Normalised D_e
0.8
0.9
1.0
1.1
1.2
+10 %
−10%
1
2
3
4
5
6
# Aliquot

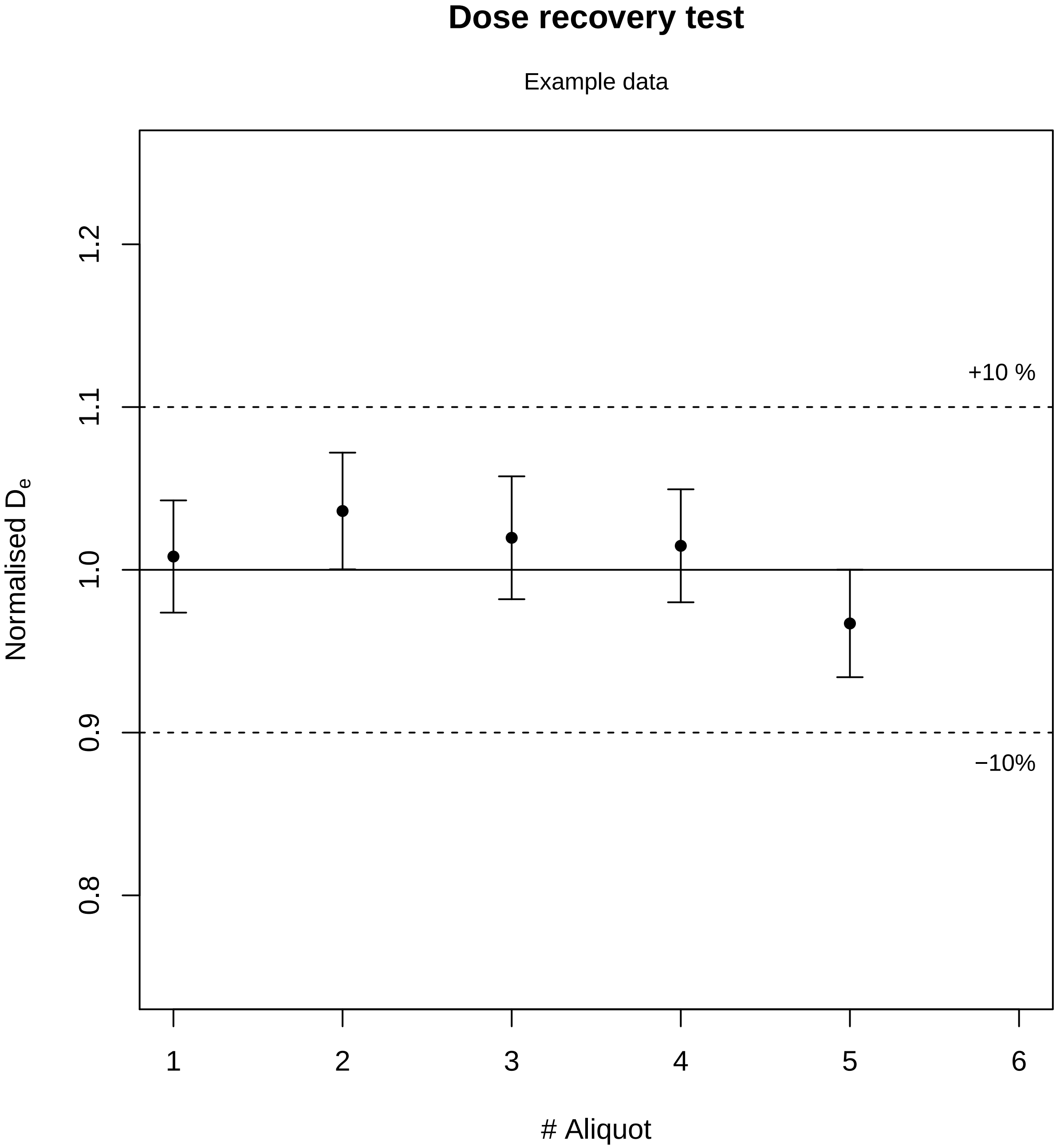
Dose recovery test

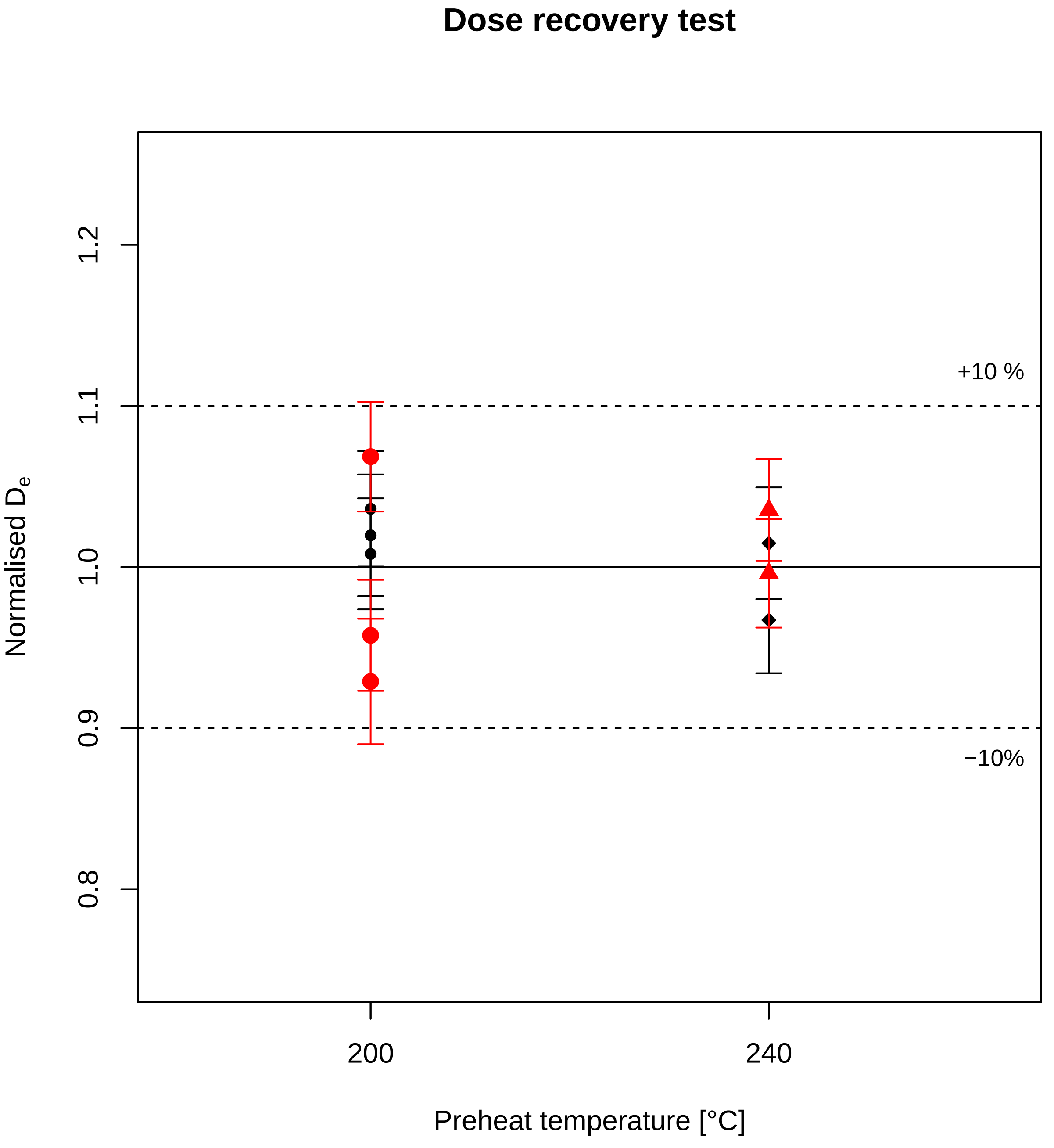


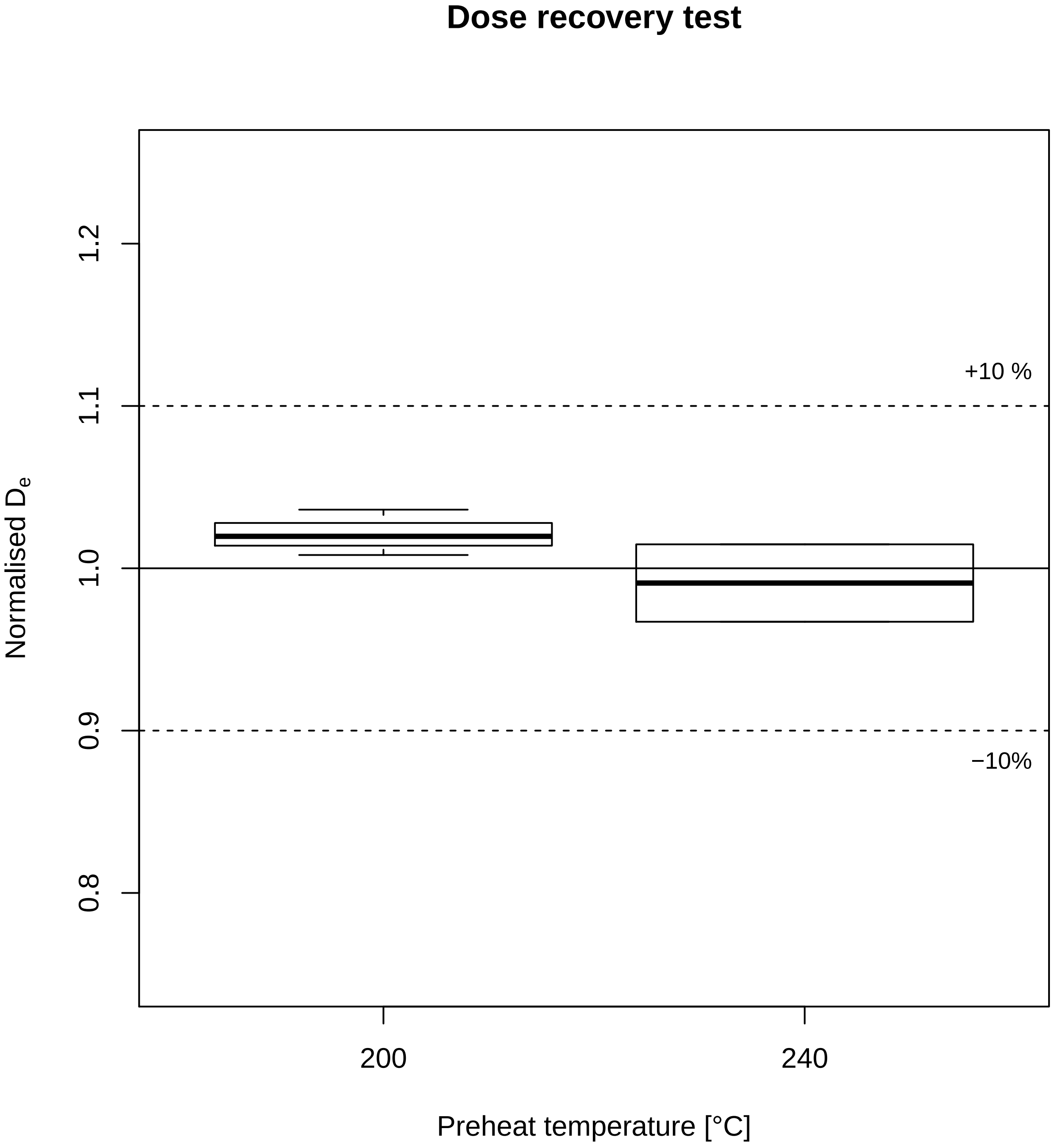

Dose recovery test
n = 5
n = 5
+10 %
−10%
Normalised D_e
1.2
1.1
1.0
0.9
0.8
1
2
3
4
5
6
# Aliquot

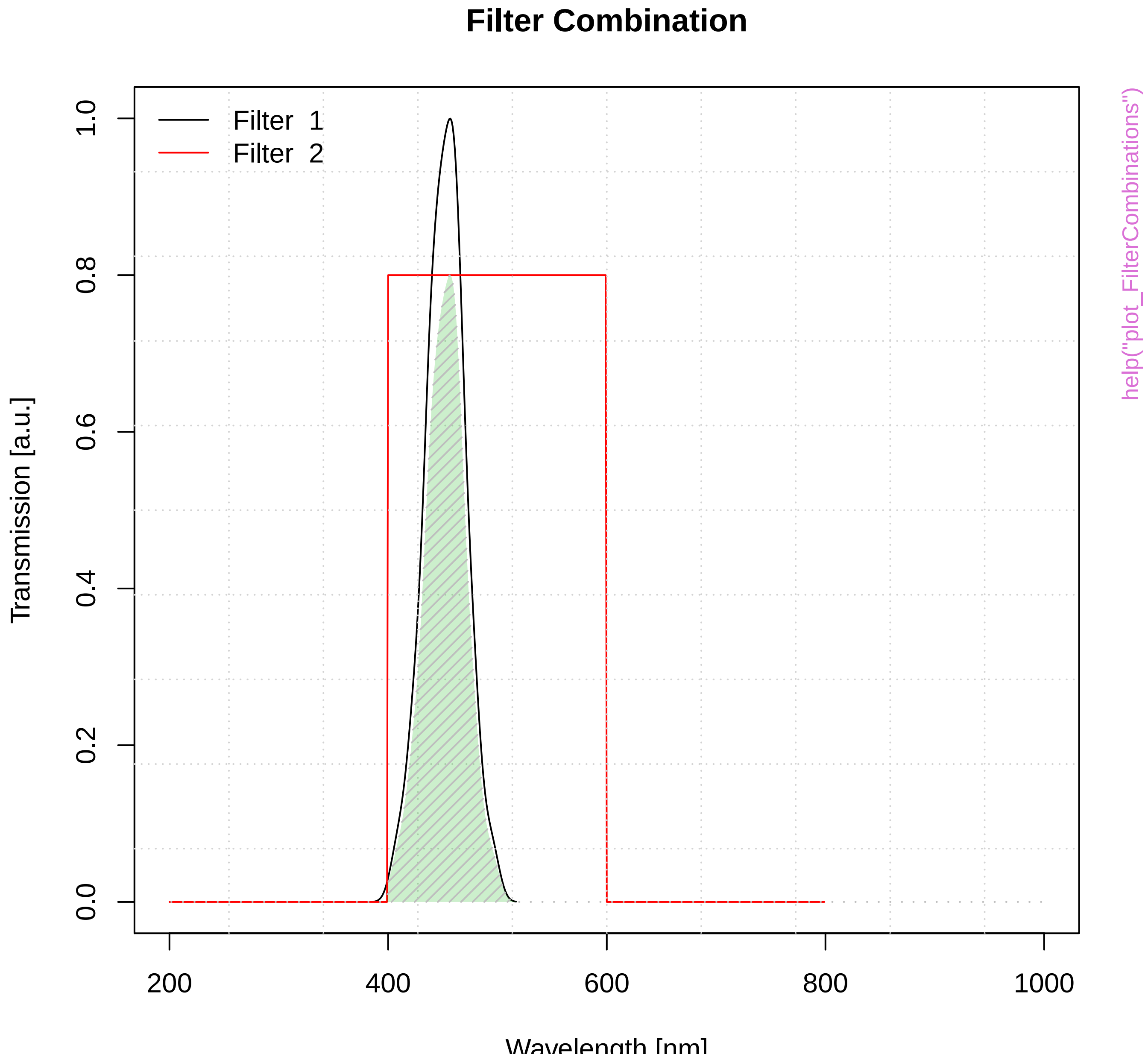

Dose recovery test
n = 5
n = 5
+10 %
−10%
Normalised D_e
0.8
0.9
1.0
1.1
1.2
1
2
3
4
5
6
# Aliquot

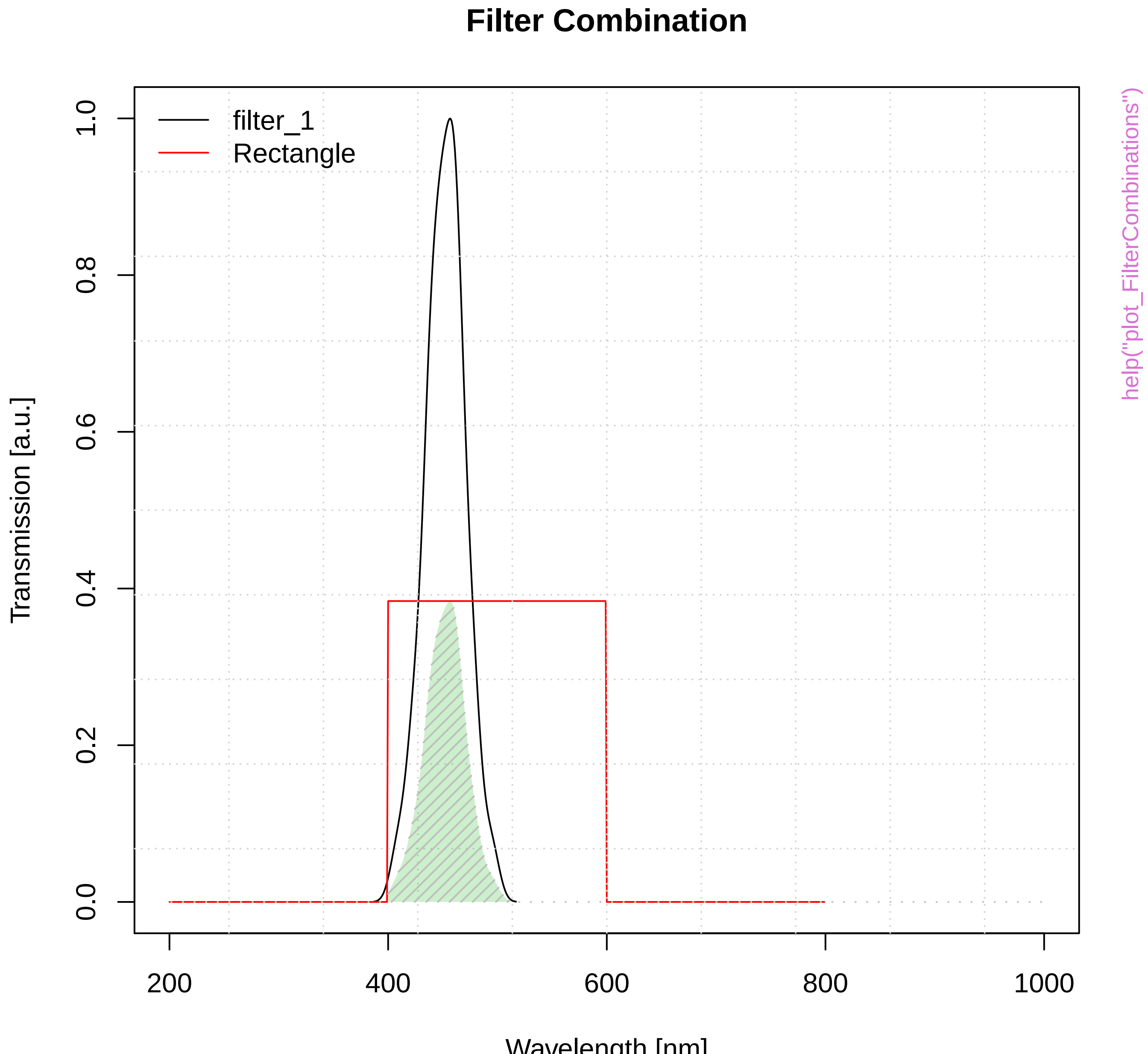

Dose recovery test
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
200
240
Preheat temperature [°C]

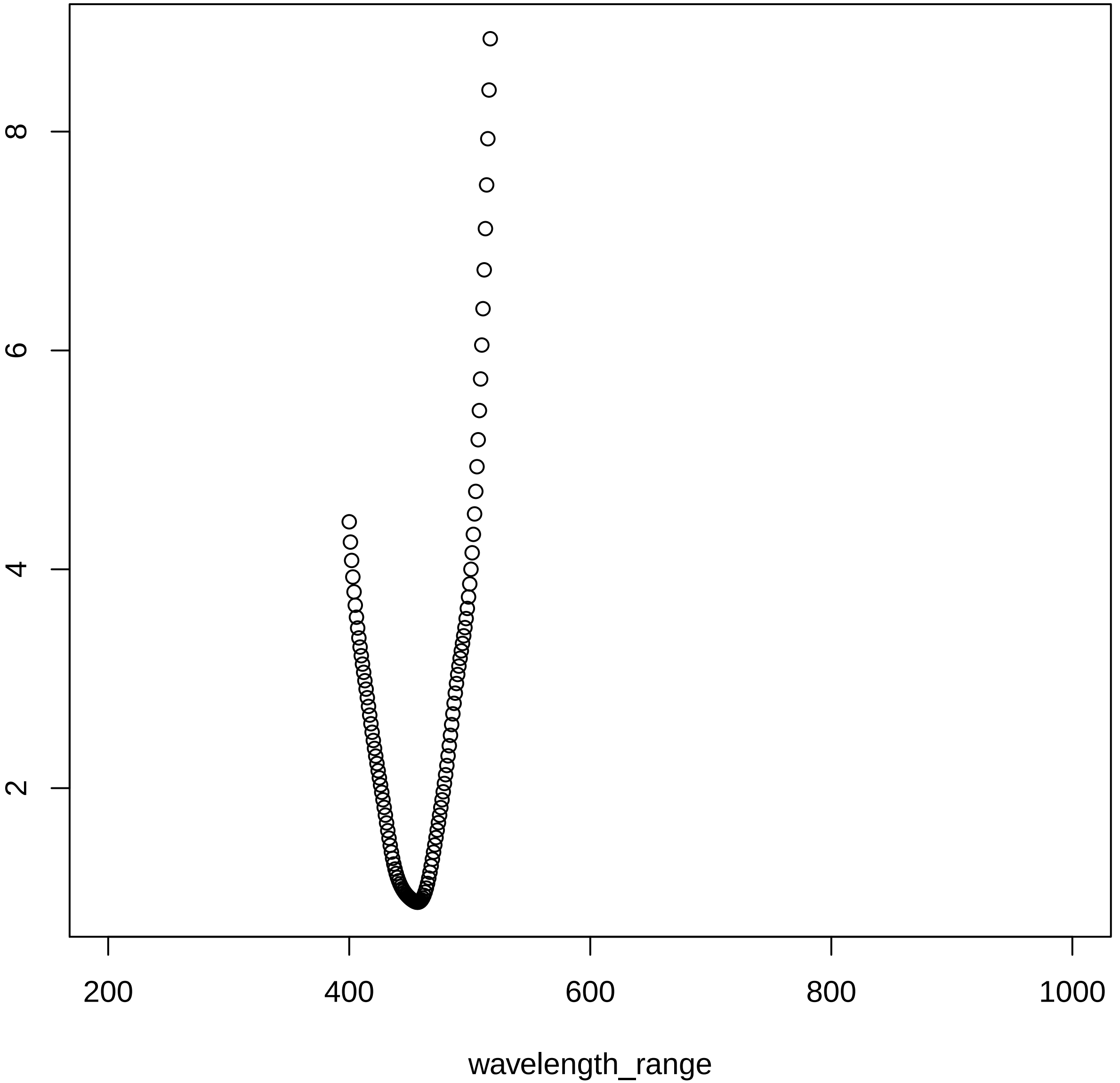

Dose recovery test
Example data
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
1
2
3
4
5
6
# Aliquot


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

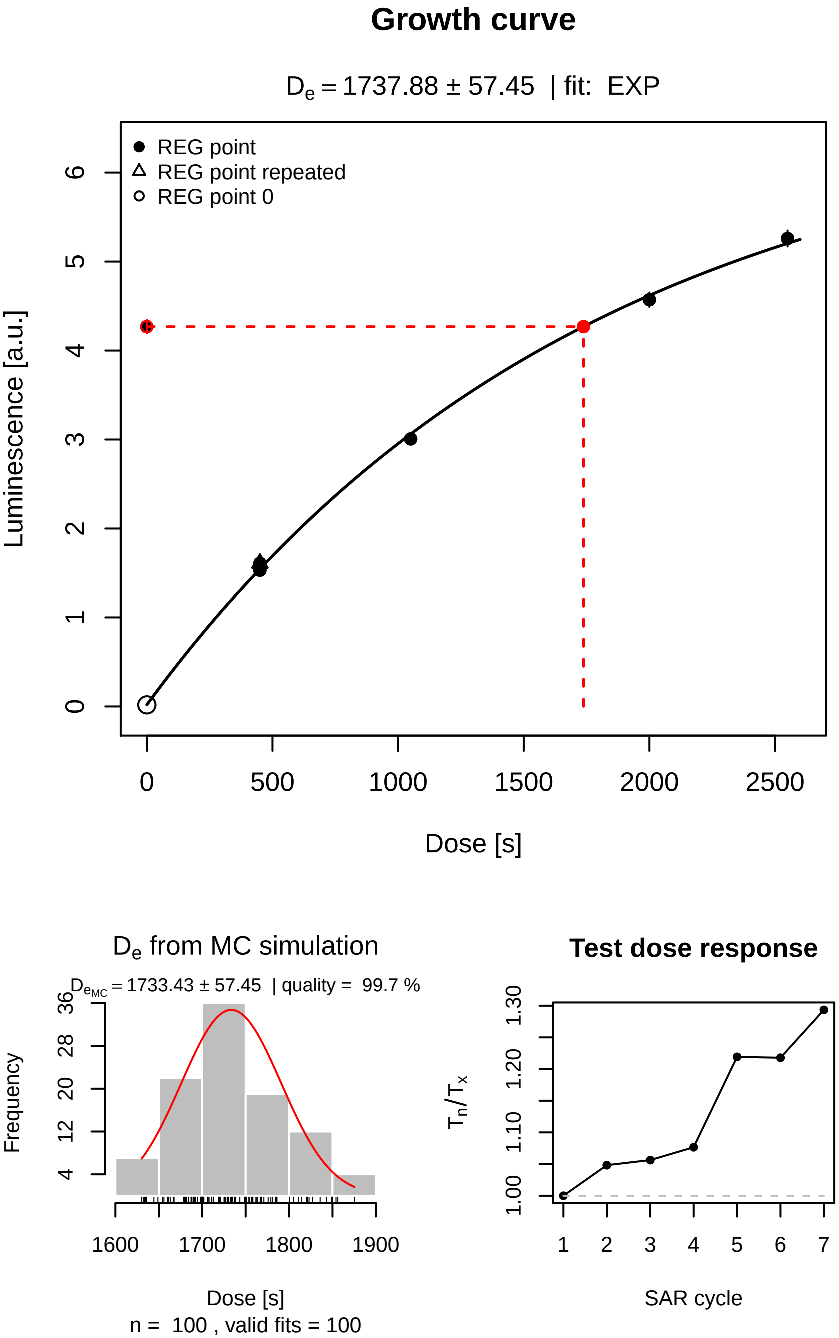

Dose recovery test
Normalised D_e
1.2
1.1
1.0
0.9
0.8
+10 %
−10%
200
240
Preheat temperature [°C]

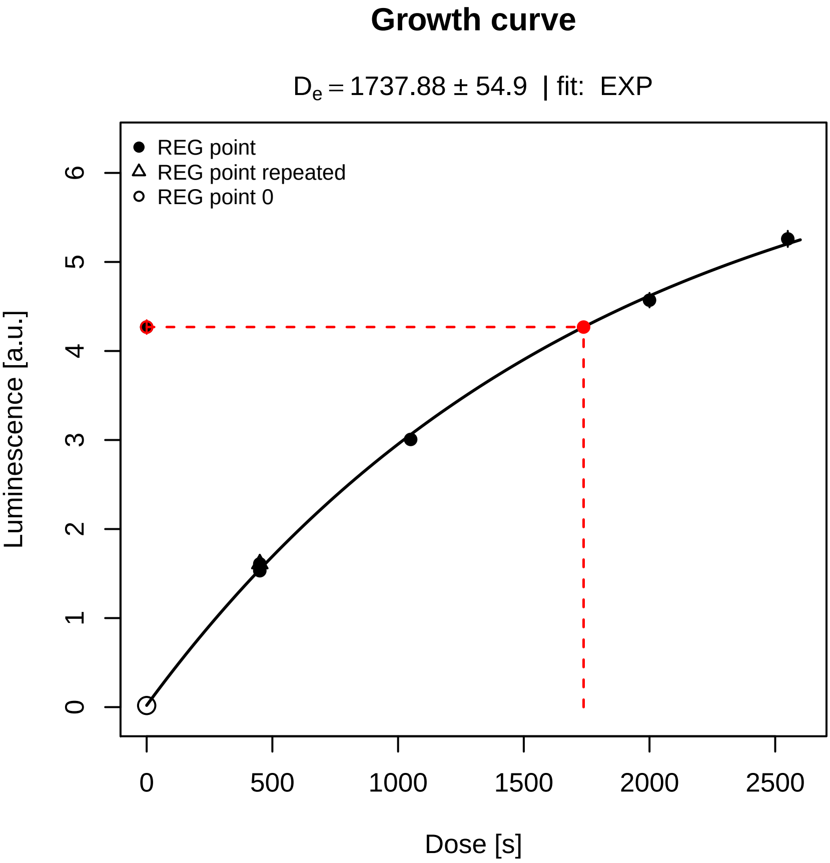

Filter Combination
Filter 1
Filter 2
Transmission [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
200
400
600
800
1000
Wavelength [nm]
help("plot_FilterCombinations")


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")



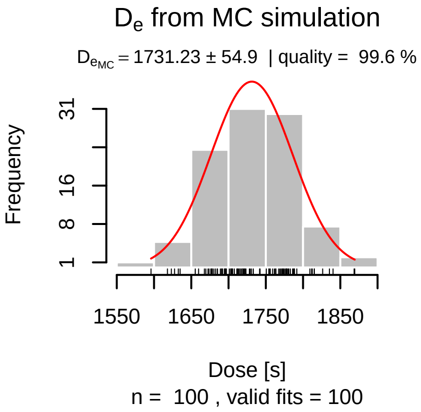
help("plot_FilterCombinations")


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



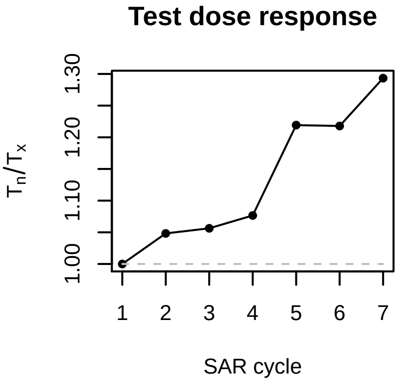
Growth curve

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

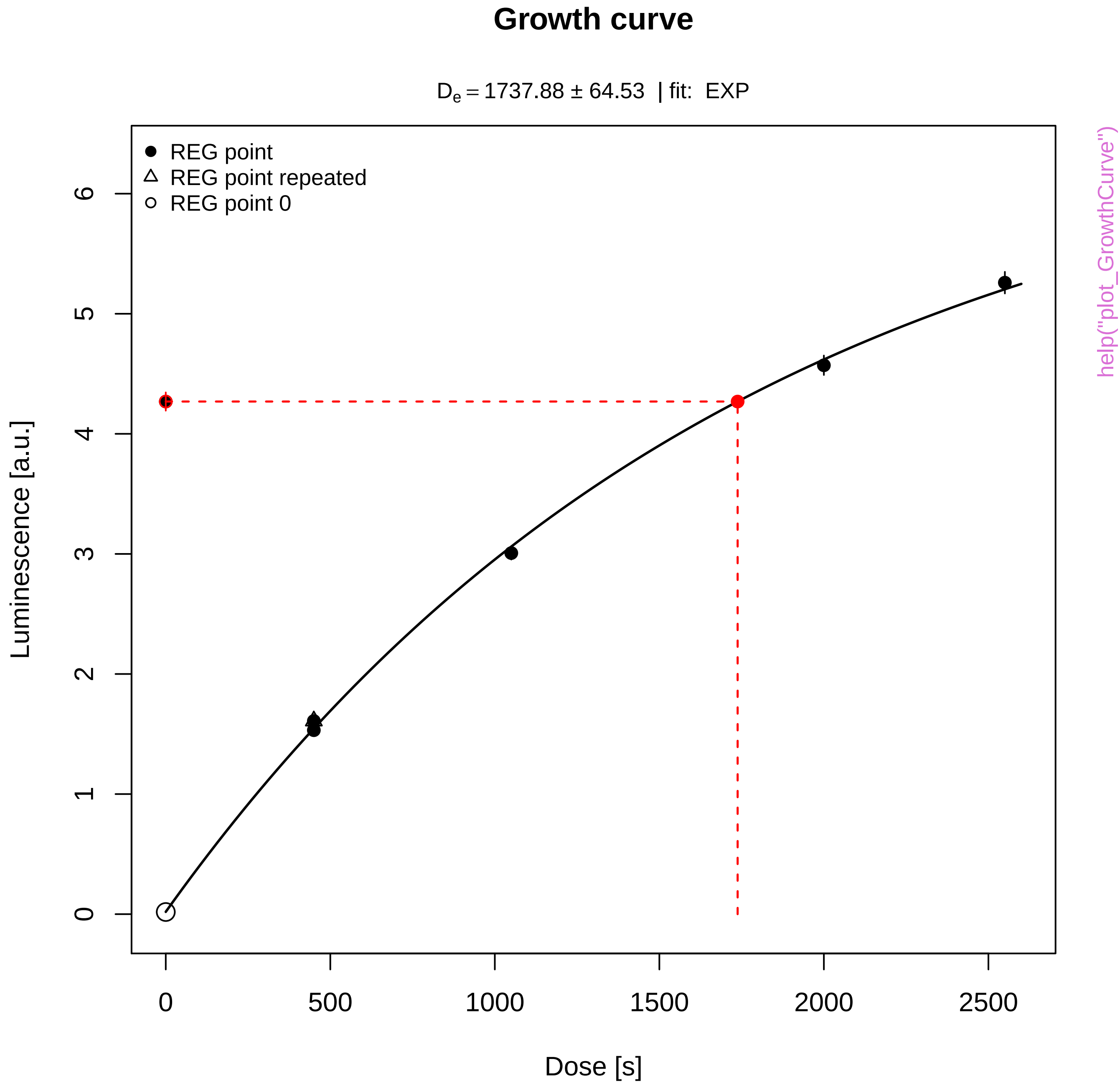


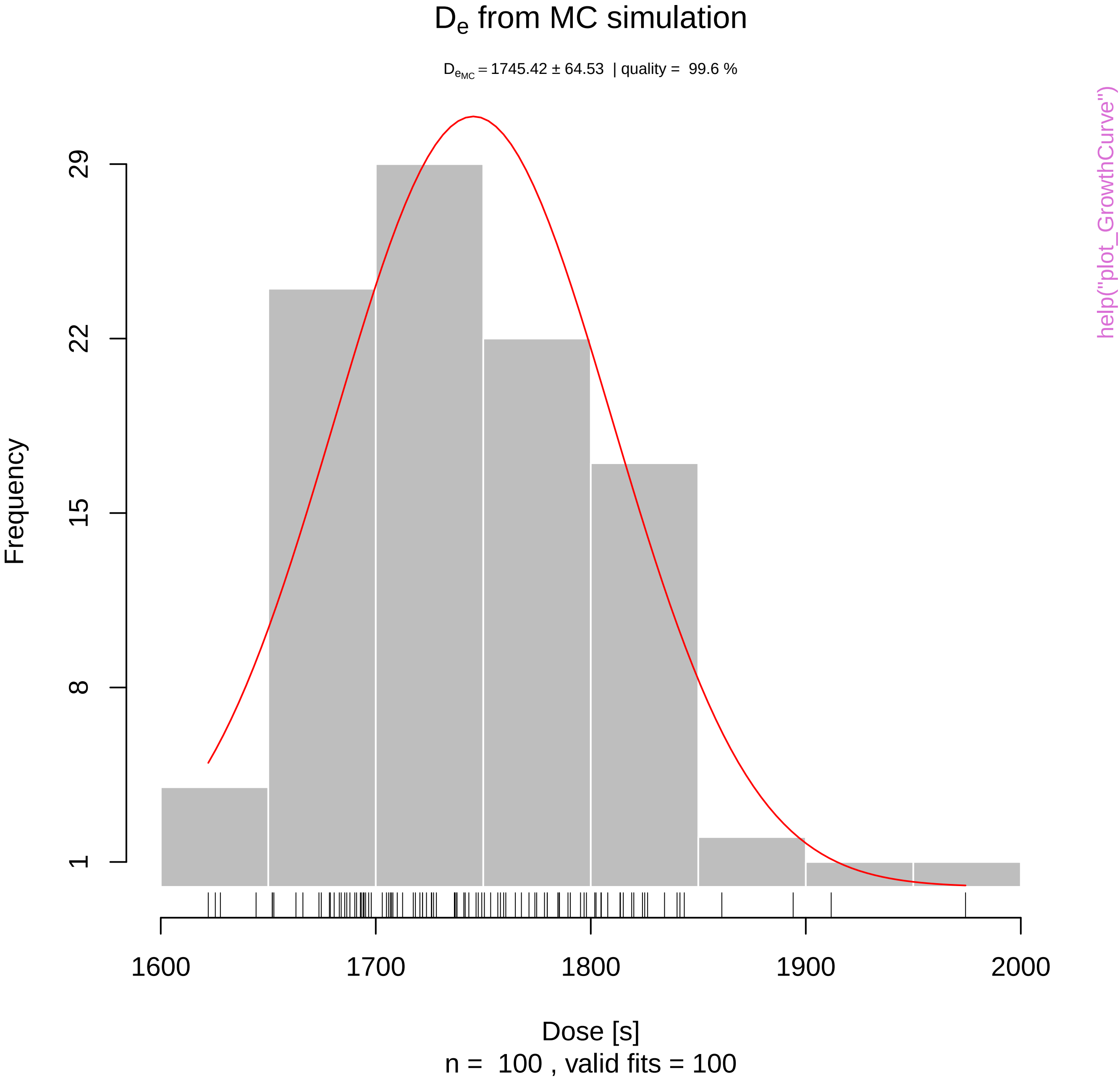
D_e from MC simulation

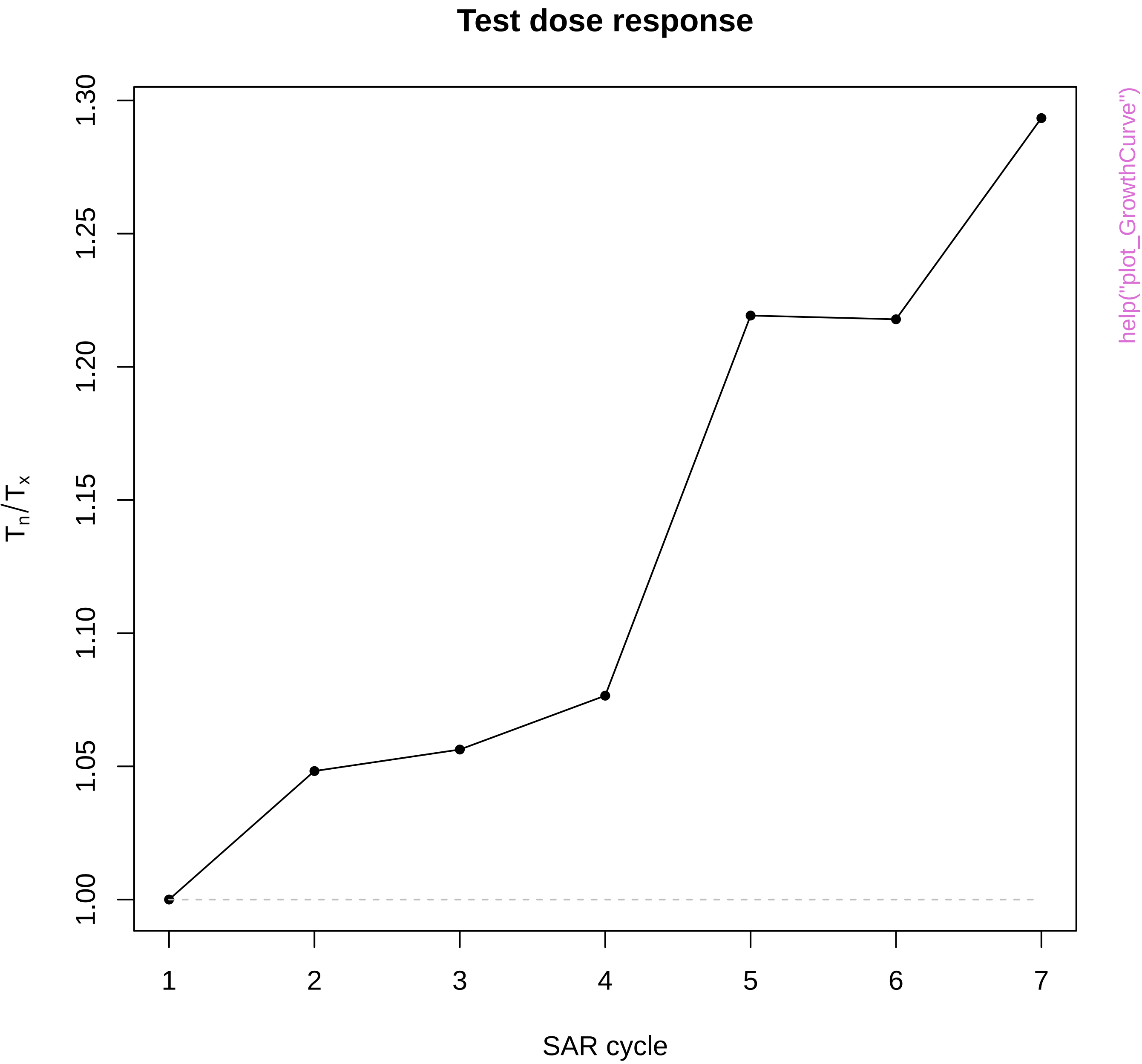
$D_{e_{MC}} = 1731.23 \pm 54.9$ | quality = 99.6 %

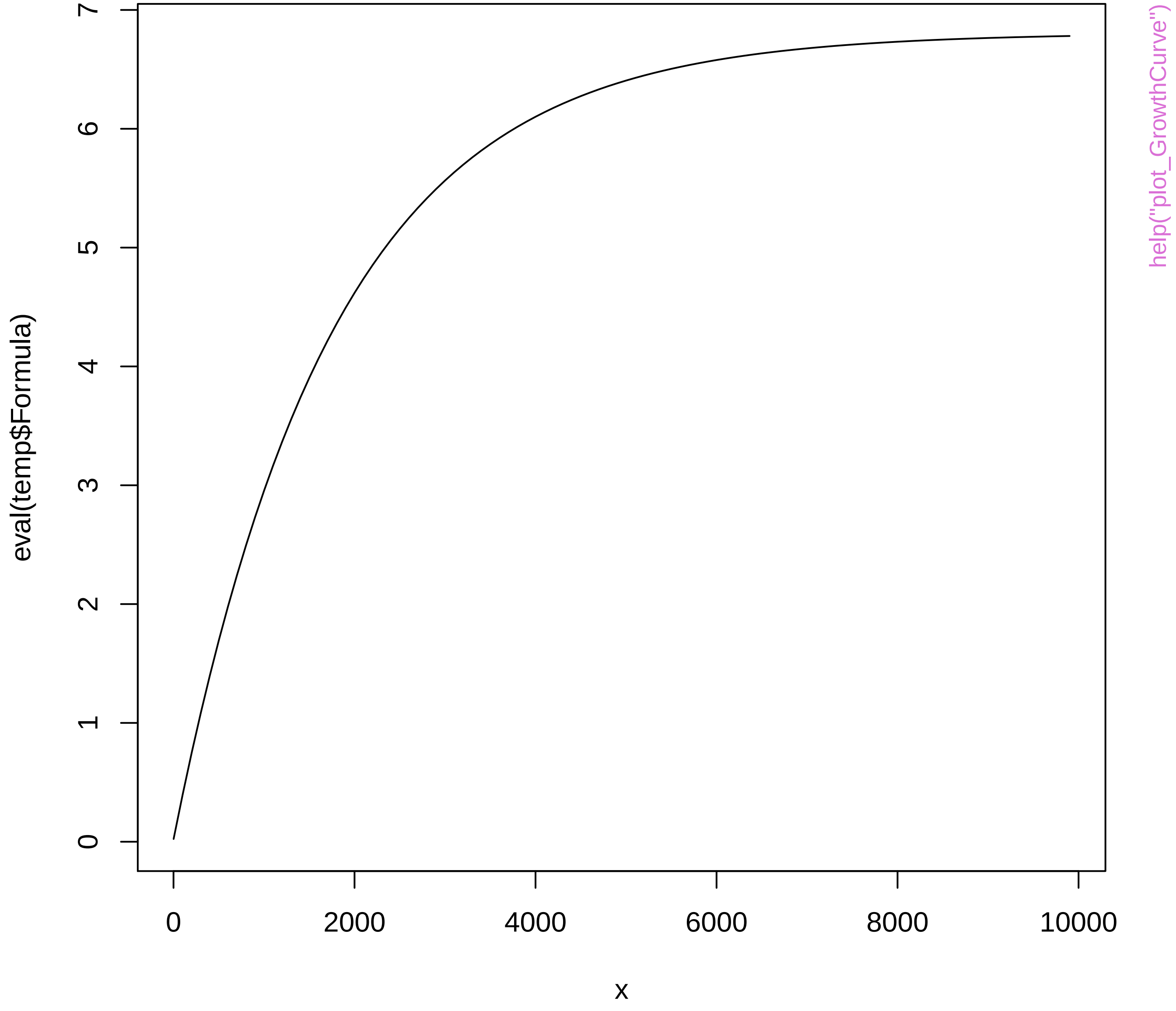


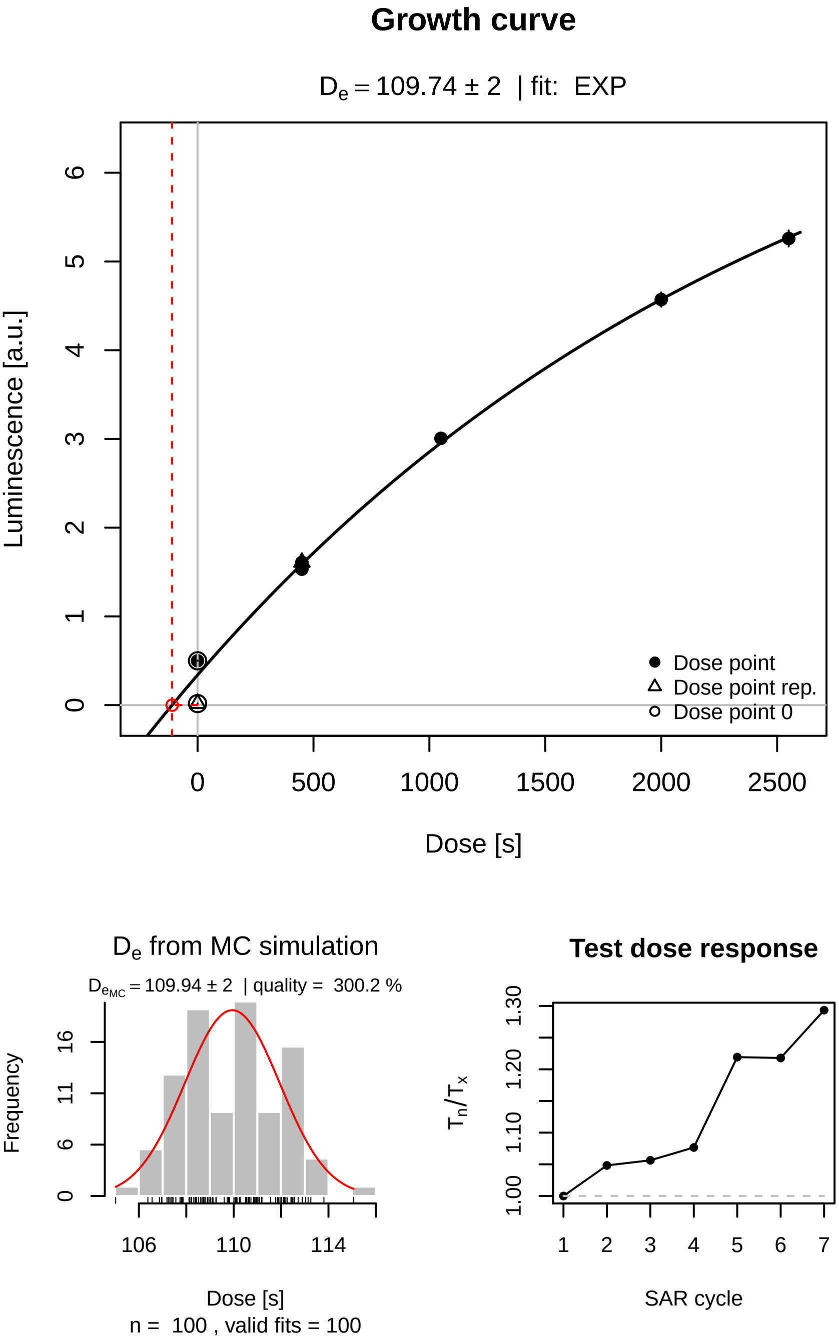
Test dose response

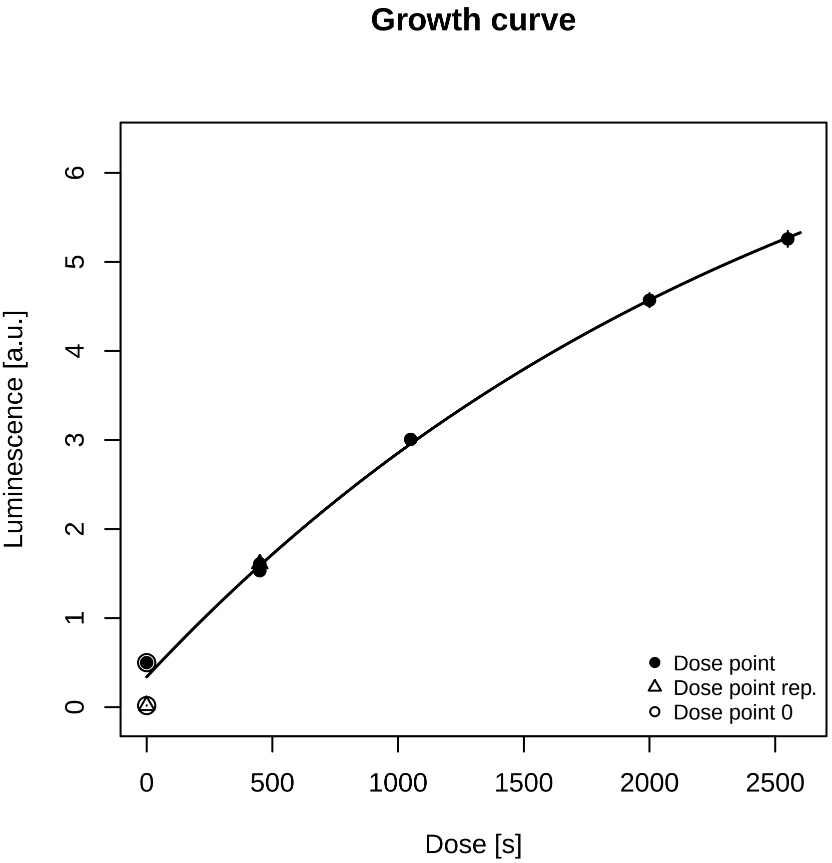

Growth curve
$D_e = 1737.88 \pm 64.53$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
help("plot_GrowthCurve")

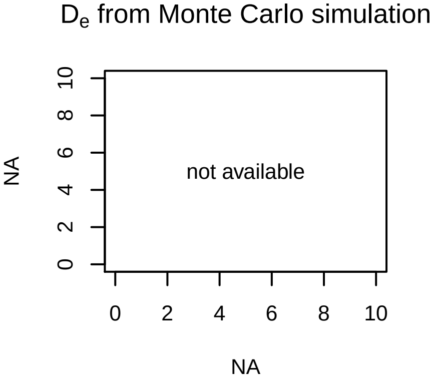

D_e from MC simulation
$D_{e_{MC}} = 1745.42 \pm 64.53$ | quality = 99.6 %
Frequency
1
8
15
22
29
1600
1700
1800
1900
2000
Dose [s]
n = 100 , valid fits = 100
help("plot_GrowthCurve")

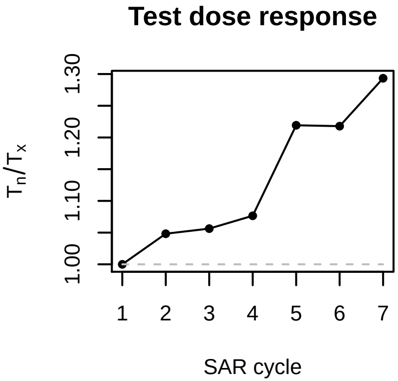

Test dose response
1.30
1.25
1.20
1.15
1.10
1.05
1.00
T_n/T_x
1
2
3
4
5
6
7
SAR cycle
help("plot_GrowthCurve")

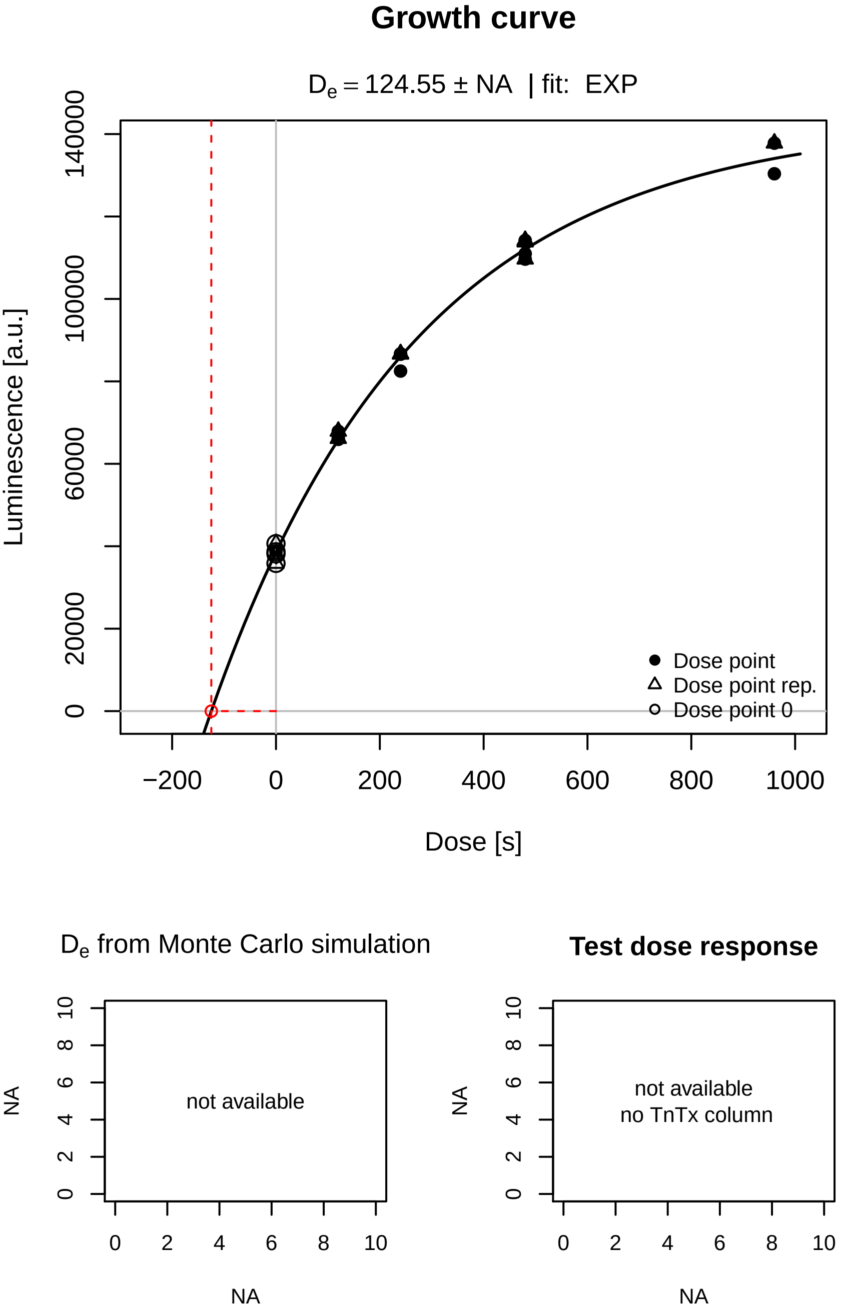

7
6
5
4
3
2
1
0
eval(temp$Formula)
0
2000
4000
6000
8000
10000
x
help("plot_GrowthCurve")

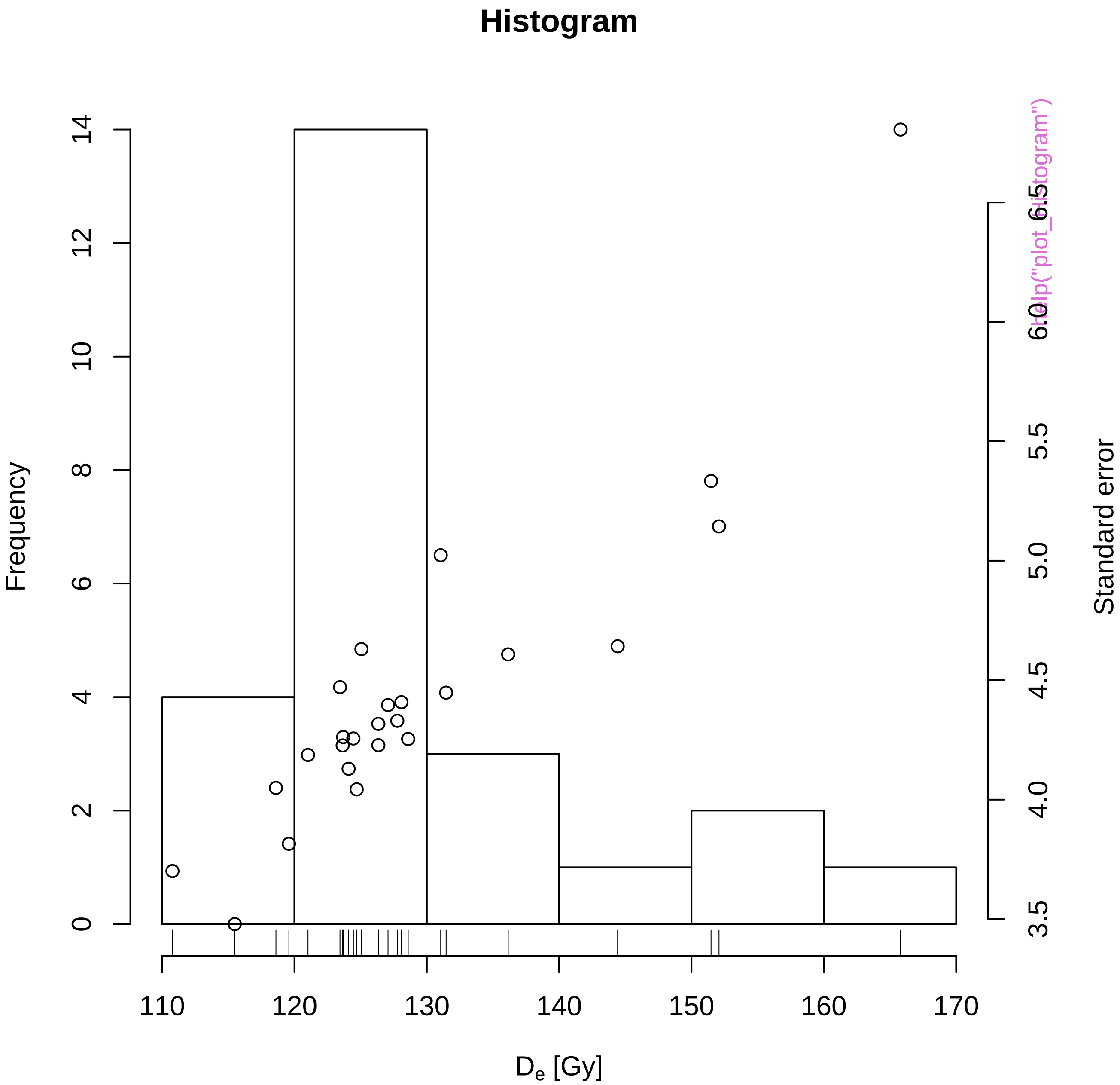

Growth curve
$D_e = 109.74 \pm 2$ | fit: EXP
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
● Dose point
△ Dose point rep.
○ Dose point 0
D_e from MC simulation
$D_{e_{MC}} = 109.94 \pm 2$ | quality = 300.2 %
Frequency
0
6
11
16
106
110
114
Dose [s]
n = 100 , valid fits = 100
Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

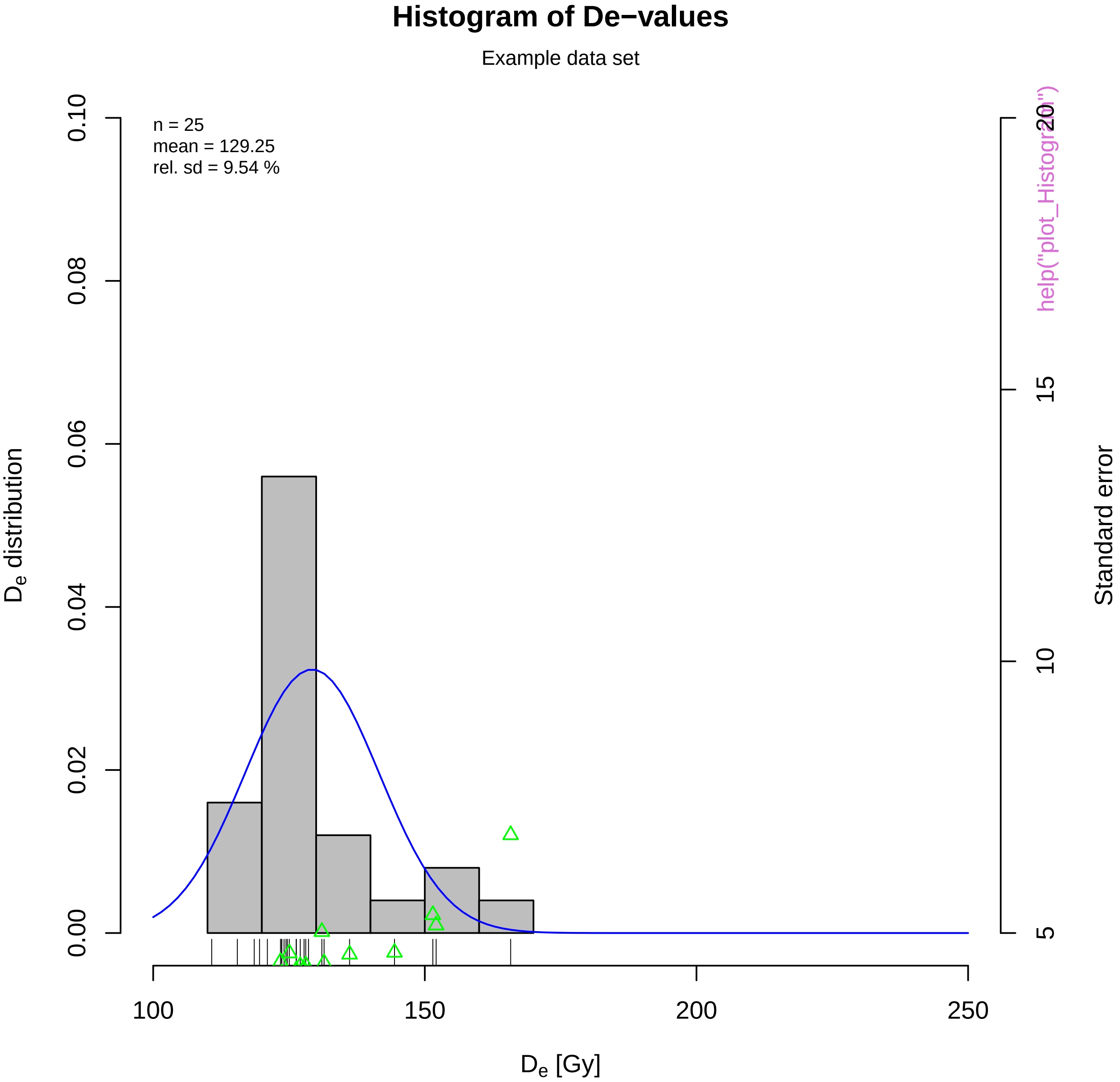

Growth curve
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
● Dose point
△ Dose point rep.
○ Dose point 0

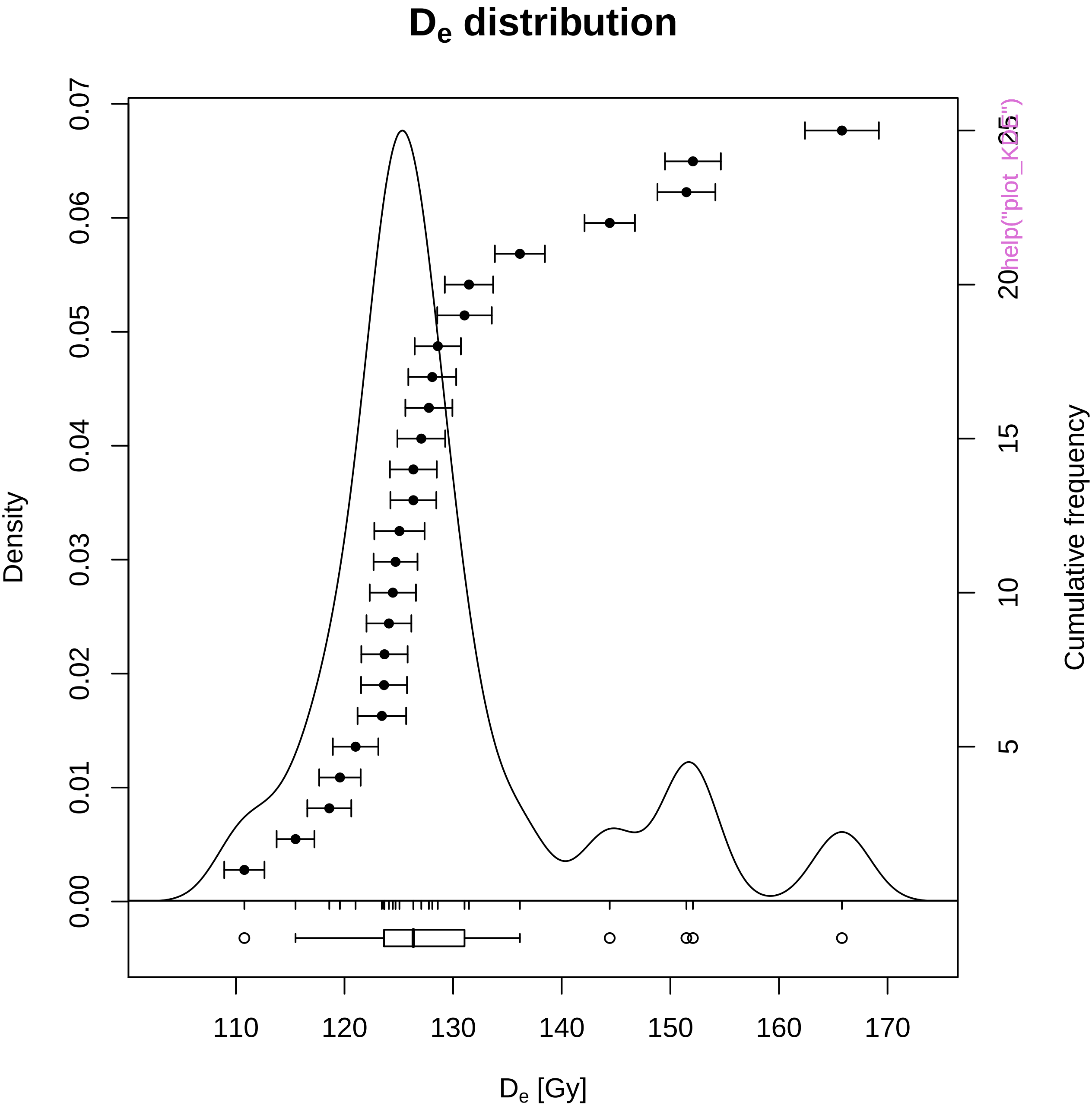

D_e from Monte Carlo simulation
NA
0
2
4
6
8
10
not available
0
2
4
6
8
10
NA

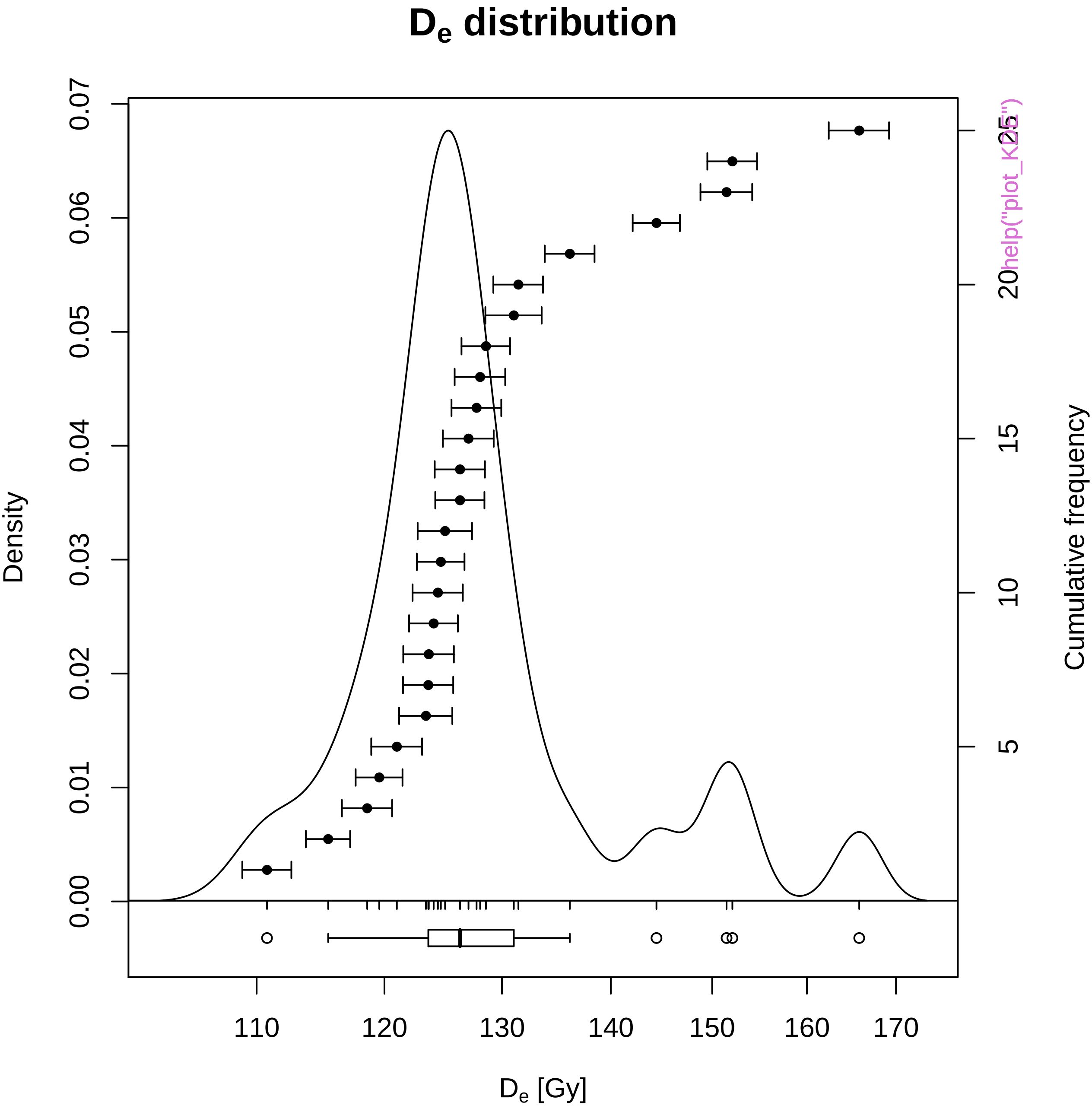

Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

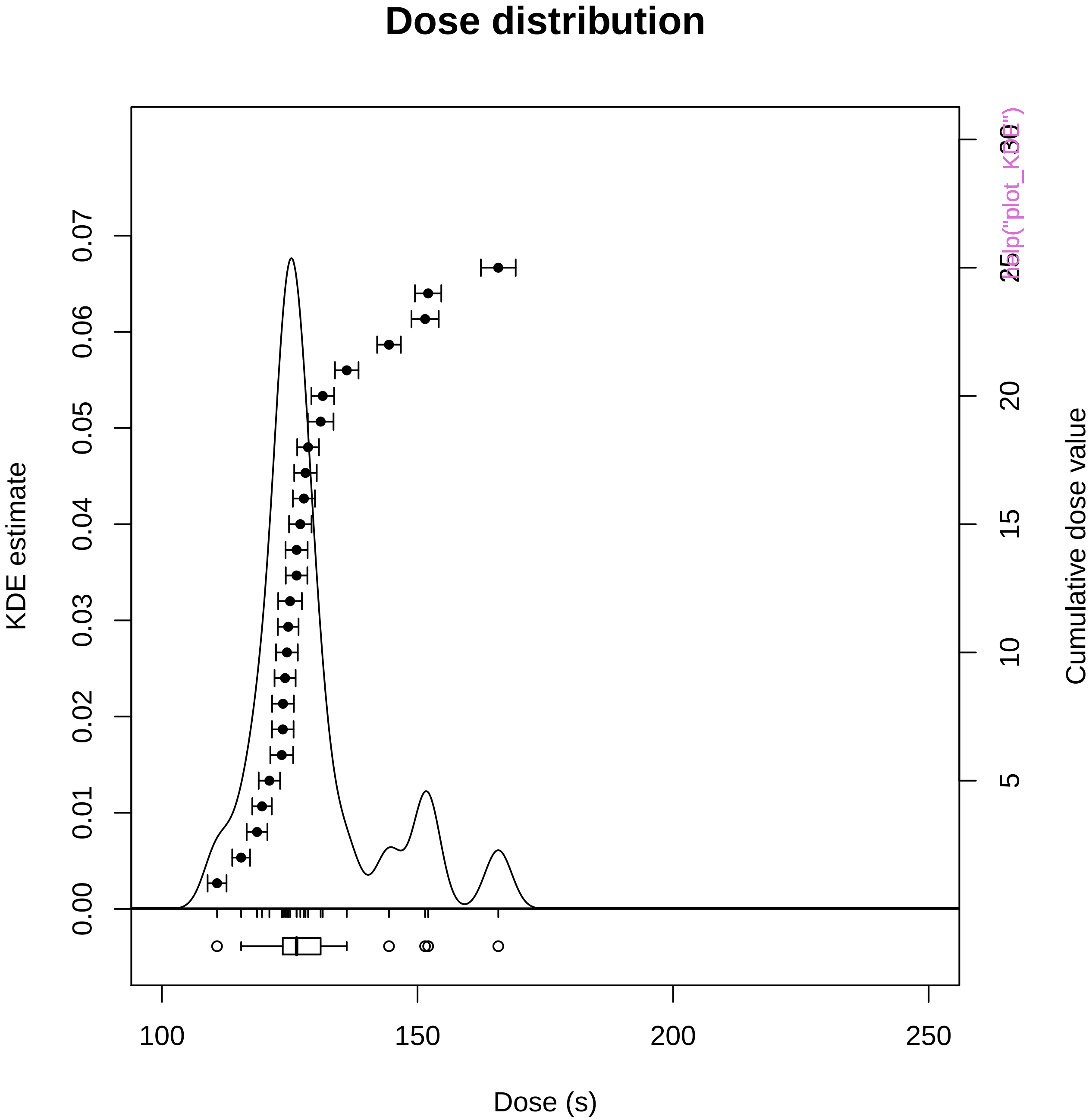

Growth curve
$D_e = 124.55 \pm NA$ | fit: EXP
Luminescence [a.u.]
140000
100000
60000
20000
0
Dose point
Dose point rep.
Dose point 0
−200
0
200
400
600
800
1000
Dose [s]
D_e from Monte Carlo simulation
not available
NA
0
2
4
6
8
10
NA
Test dose response
not available
no TnTx column
NA
0
2
4
6
8
10
NA

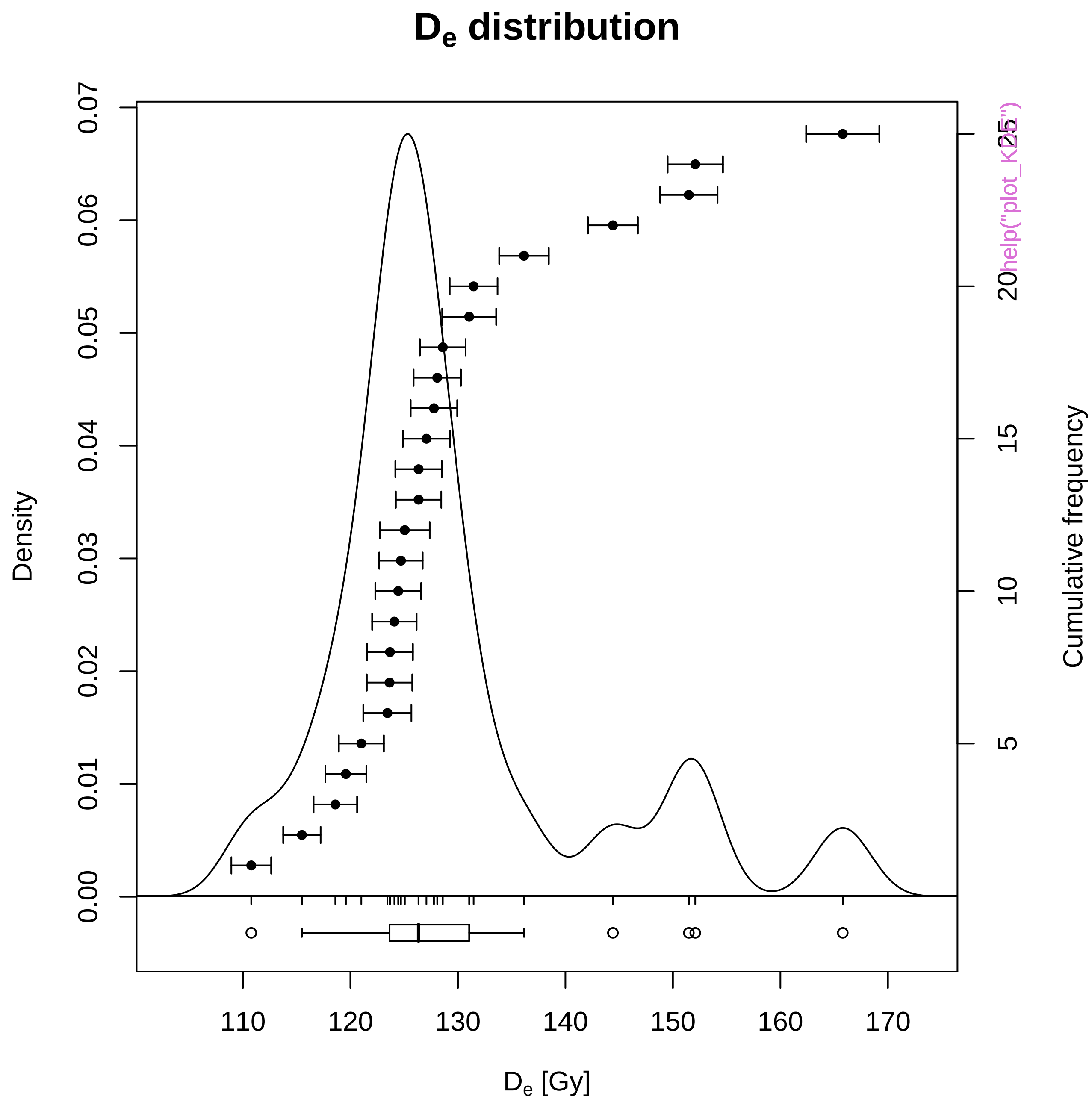

Histogram
Frequency
0
2
4
6
8
10
12
14
Standard error
3.5
4.0
4.5
5.0
5.5
6.0
6.5
help("plot_Histogram")
110
120
130
140
150
160
170
D_e [Gy]


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


D_e distribution
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
0.01
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]

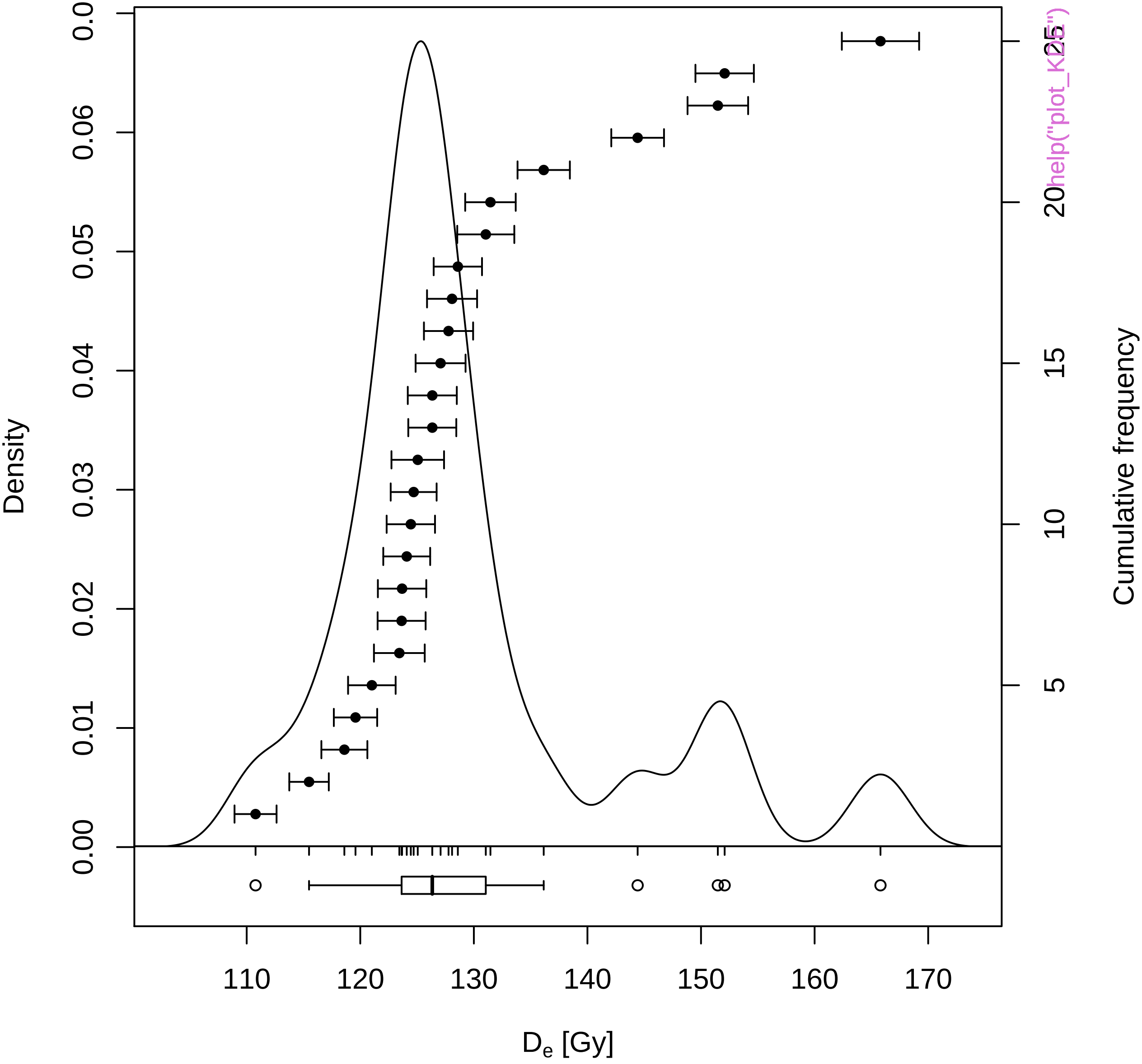

Dose distribution
KDE estimate
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative dose value
5
10
15
20
25
30
help("plot_KDE")
100
150
200
250
Dose (s)

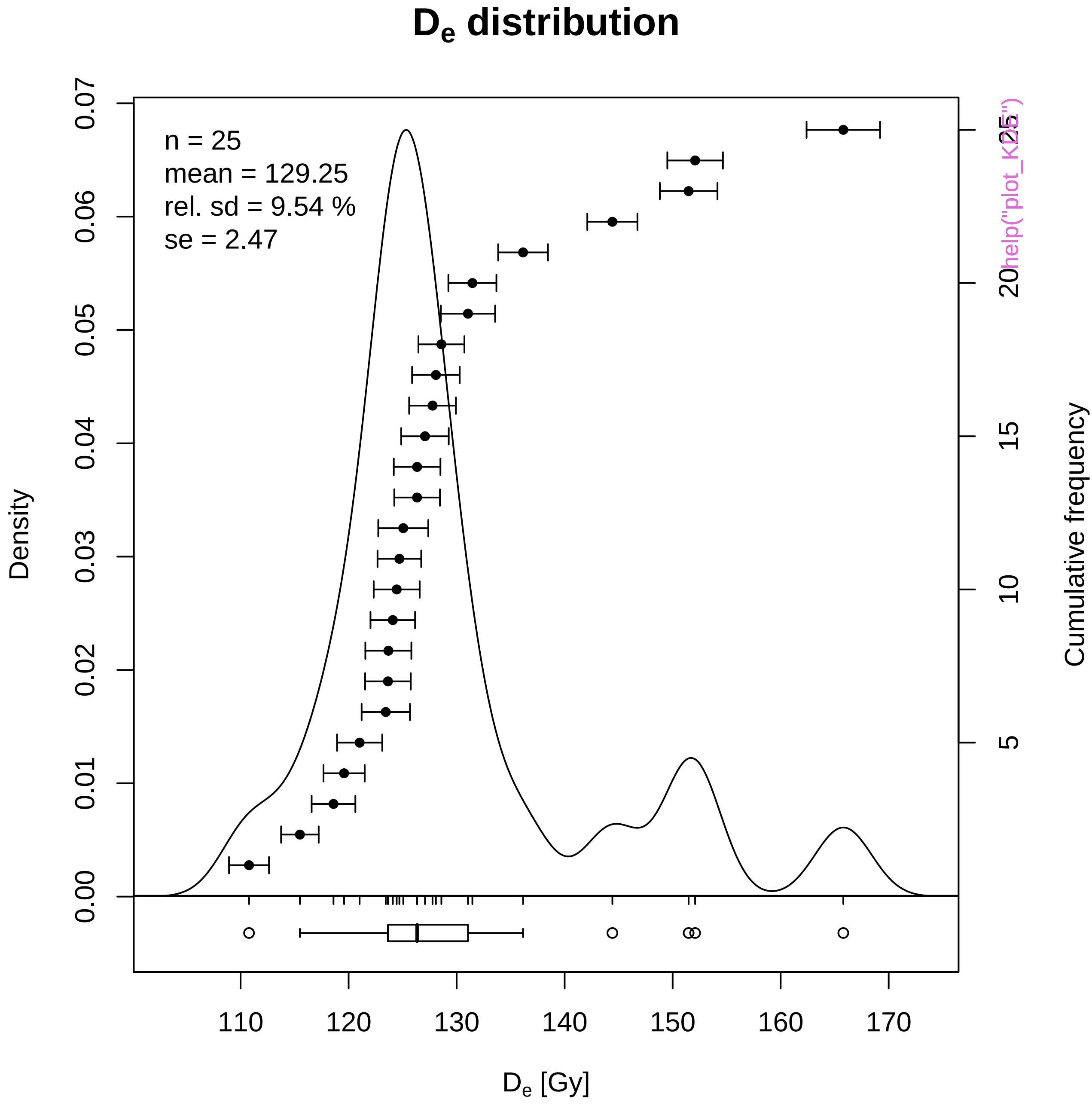


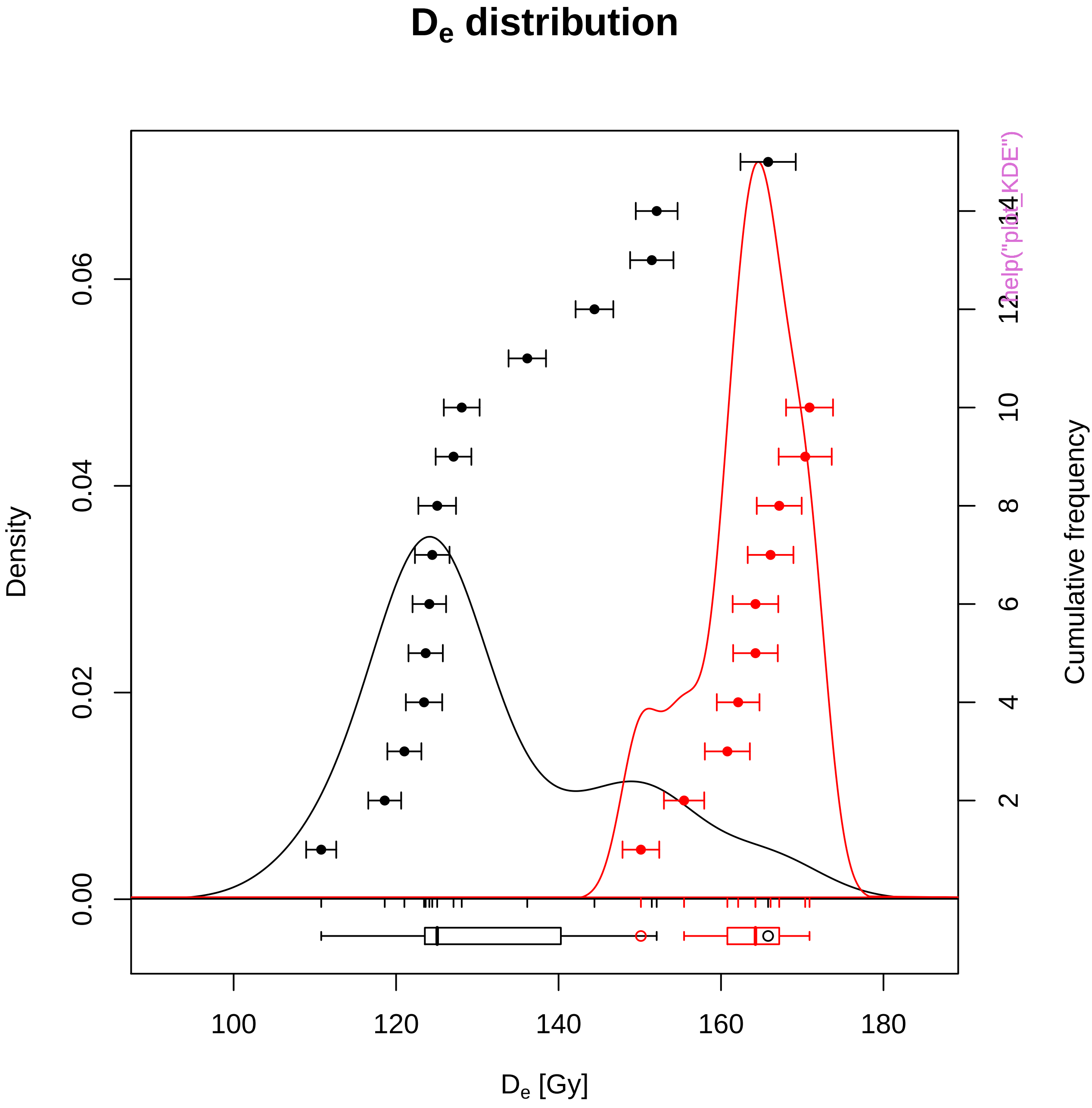
D_e distribution
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D_e [Gy]

D_e distribution

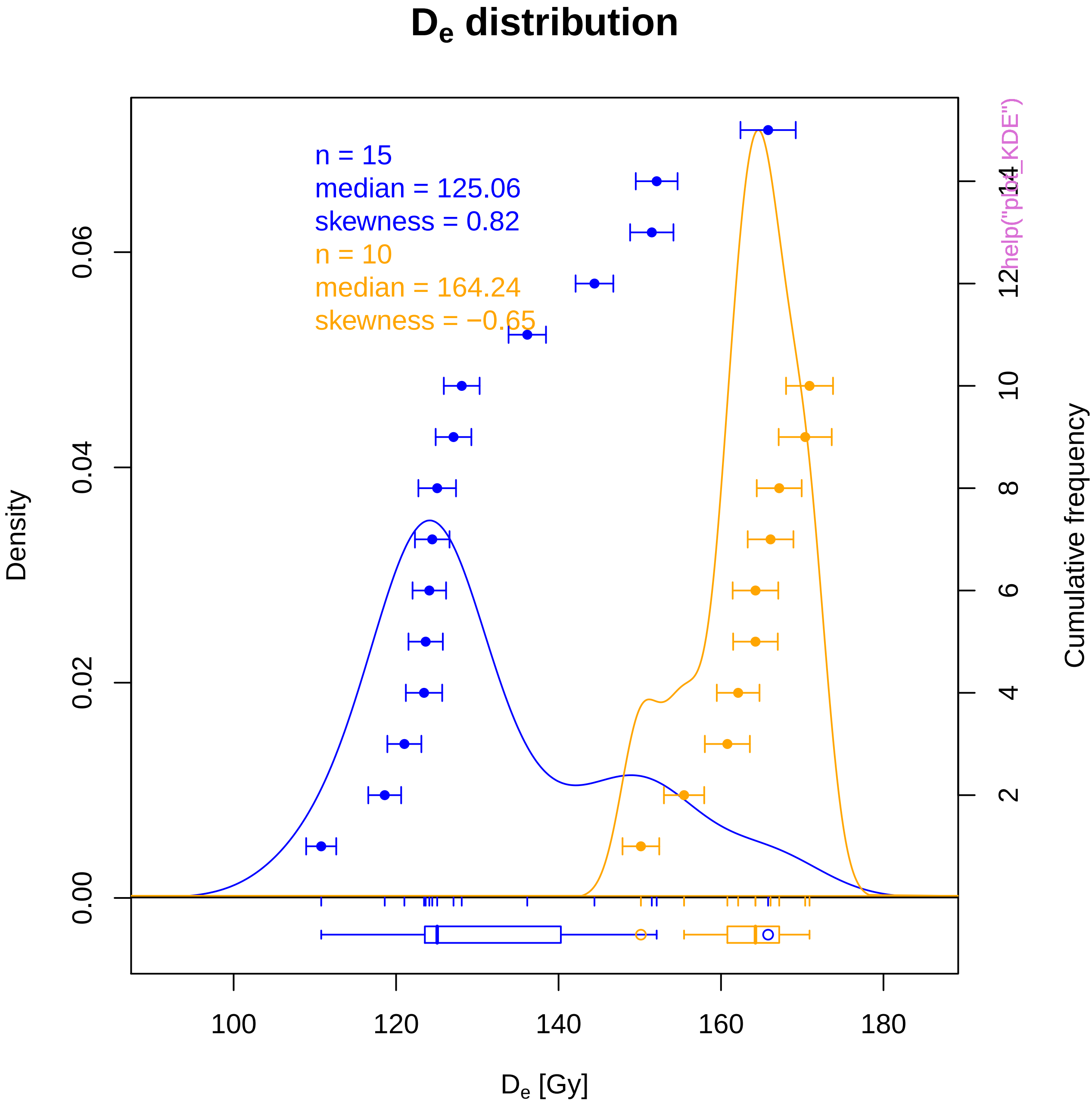
n = 25 | median = 126.34 | skewness = 1.34 | in 2 sigma = 96 %



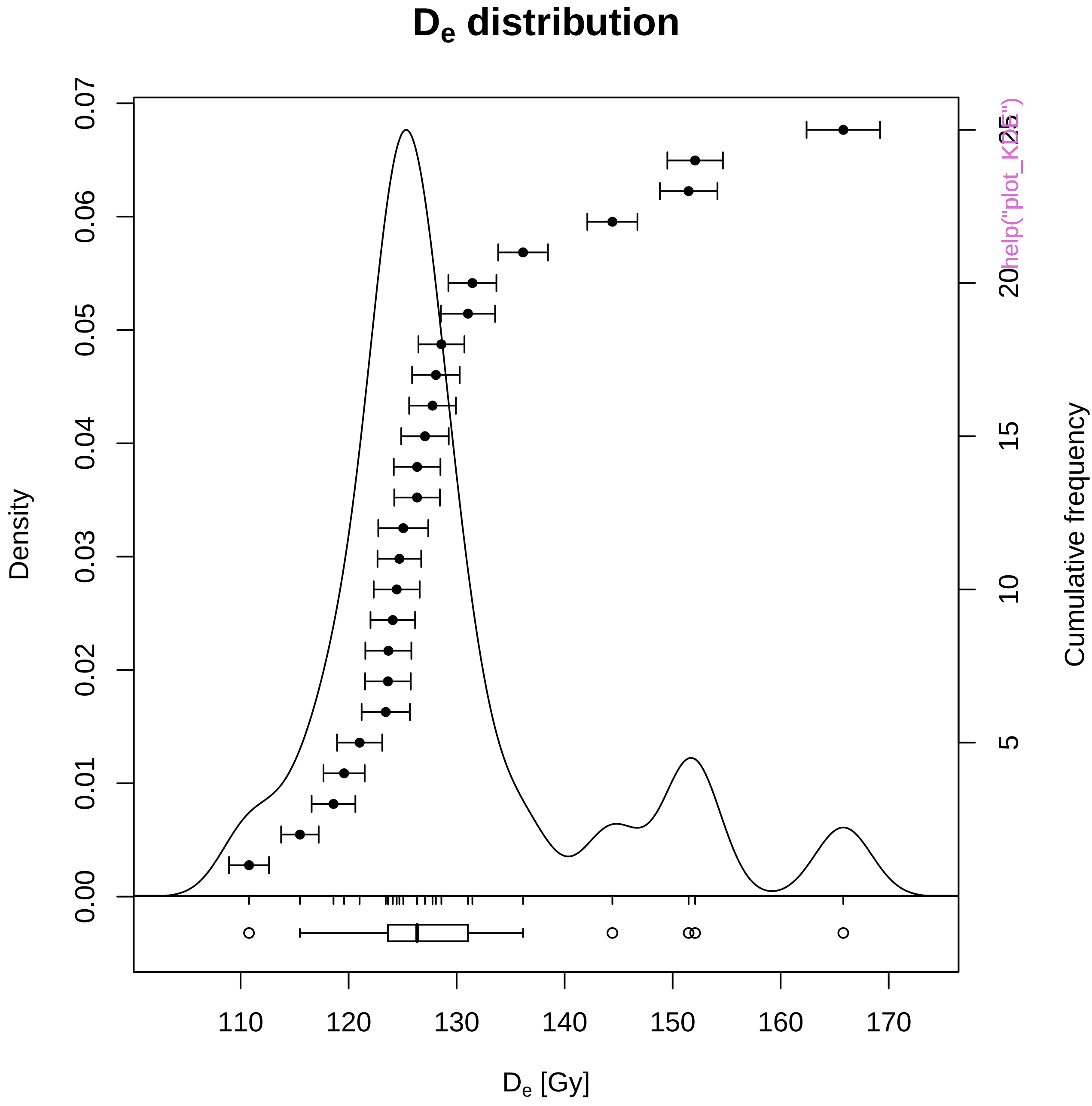

D_e distribution
n = 25
mean = 129.25
rel. sd = 9.54 %
se = 2.47
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D_e [Gy]

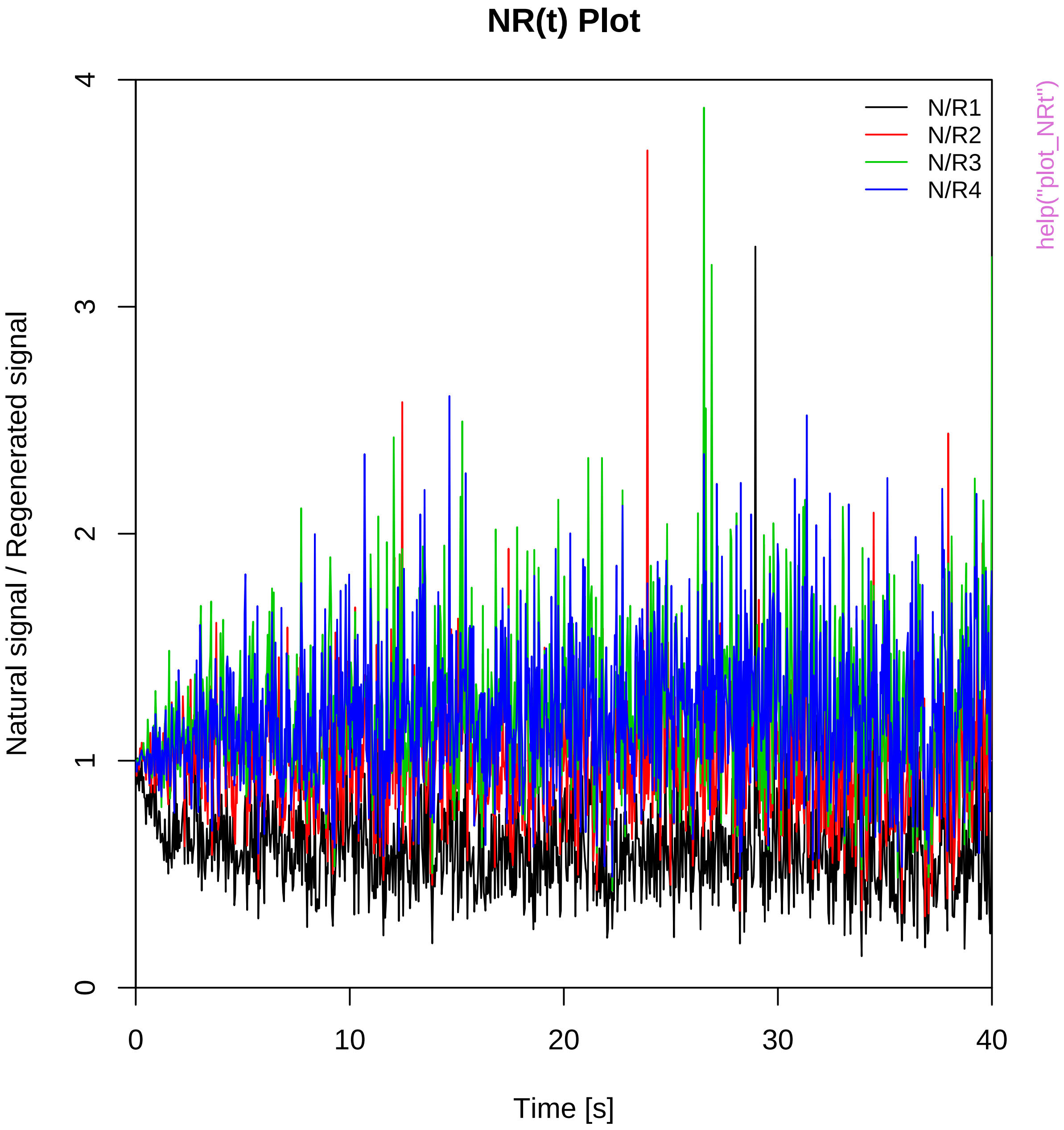


D_e distribution
Density
0.00
0.02
0.04
0.06
Cumulative frequency
2
4
6
8
10
12
14
help("plot_KDE")
100
120
140
160
180
D_e [Gy]

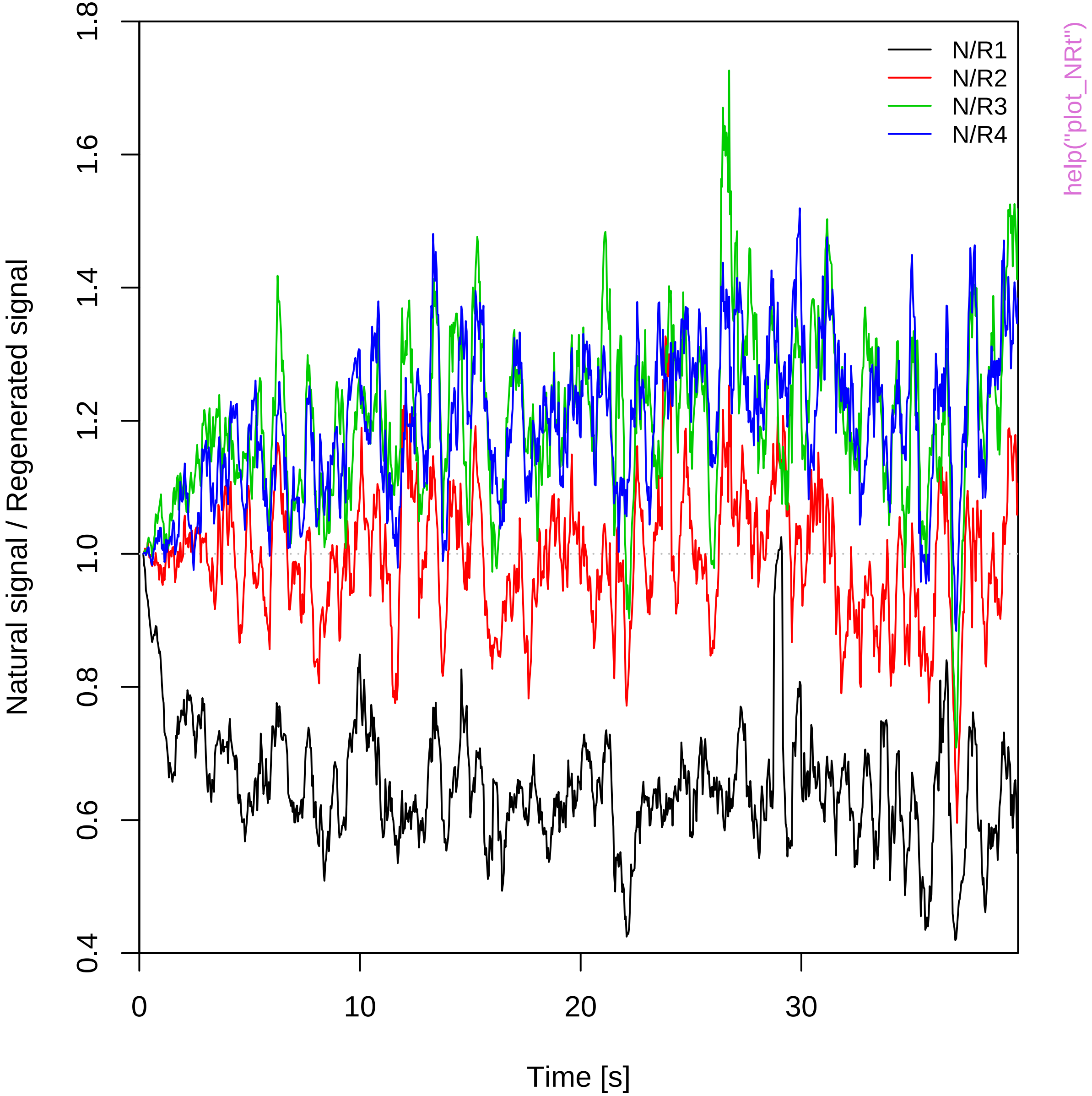


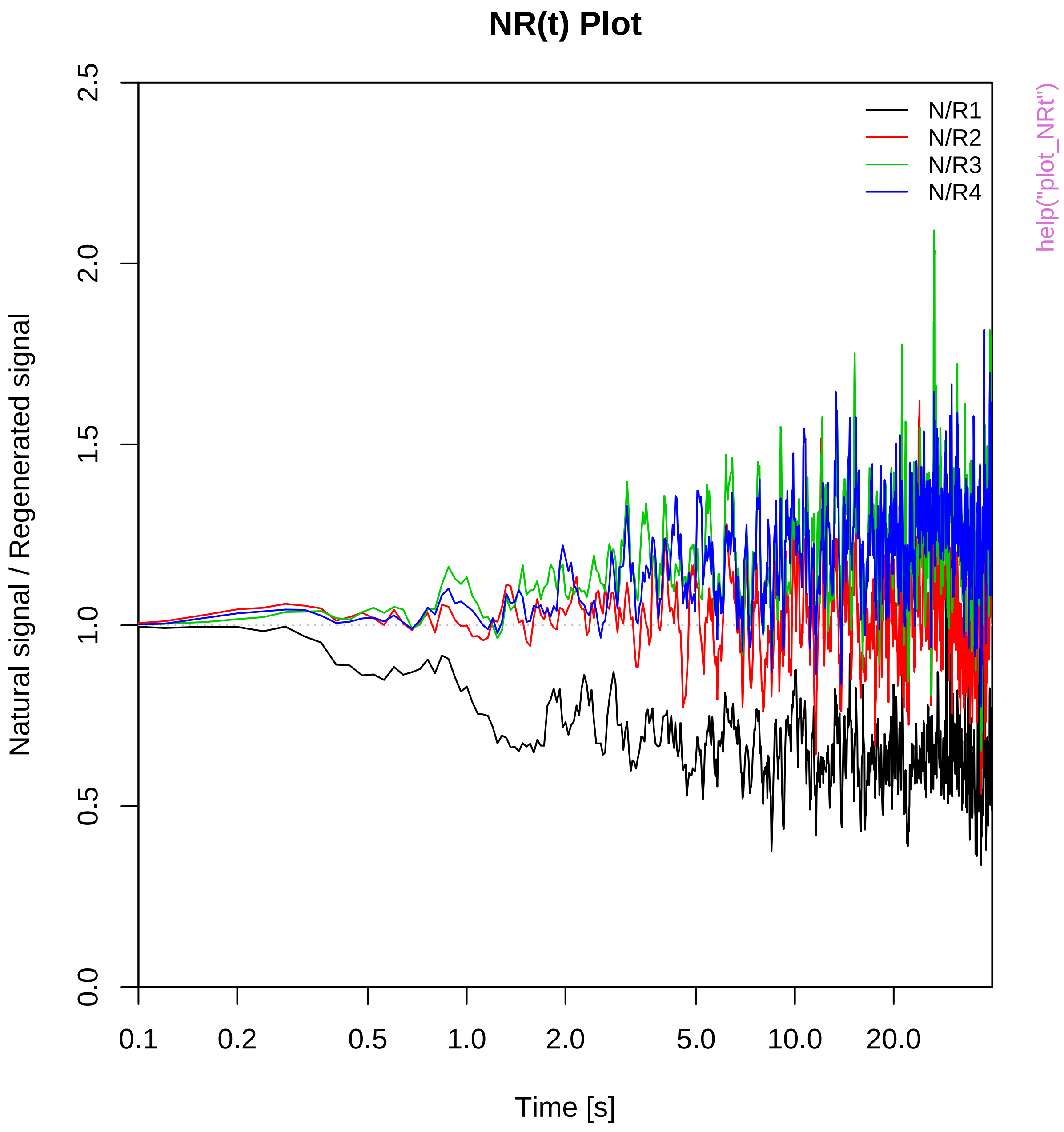
D$_e$ distribution
n = 15
median = 125.06
skewness = 0.82
n = 10
median = 164.24
skewness = −0.65
help("plot_KDE")
Density
0.00
0.02
0.04
0.06
Cumulative frequency
2
4
6
8
10
12
14
100
120
140
160
180
D$_e$ [Gy]

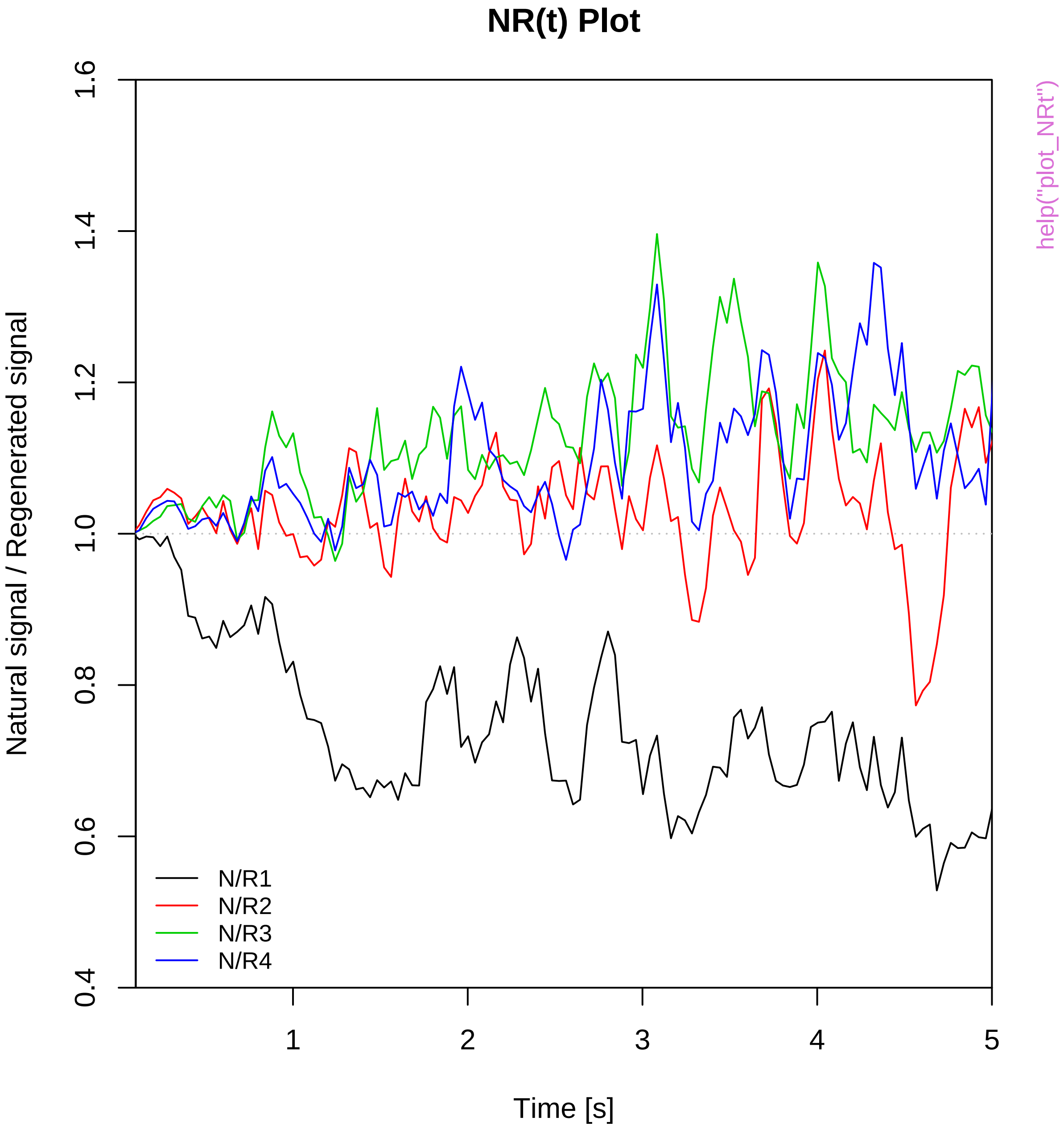

De distribution
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
De [Gy]

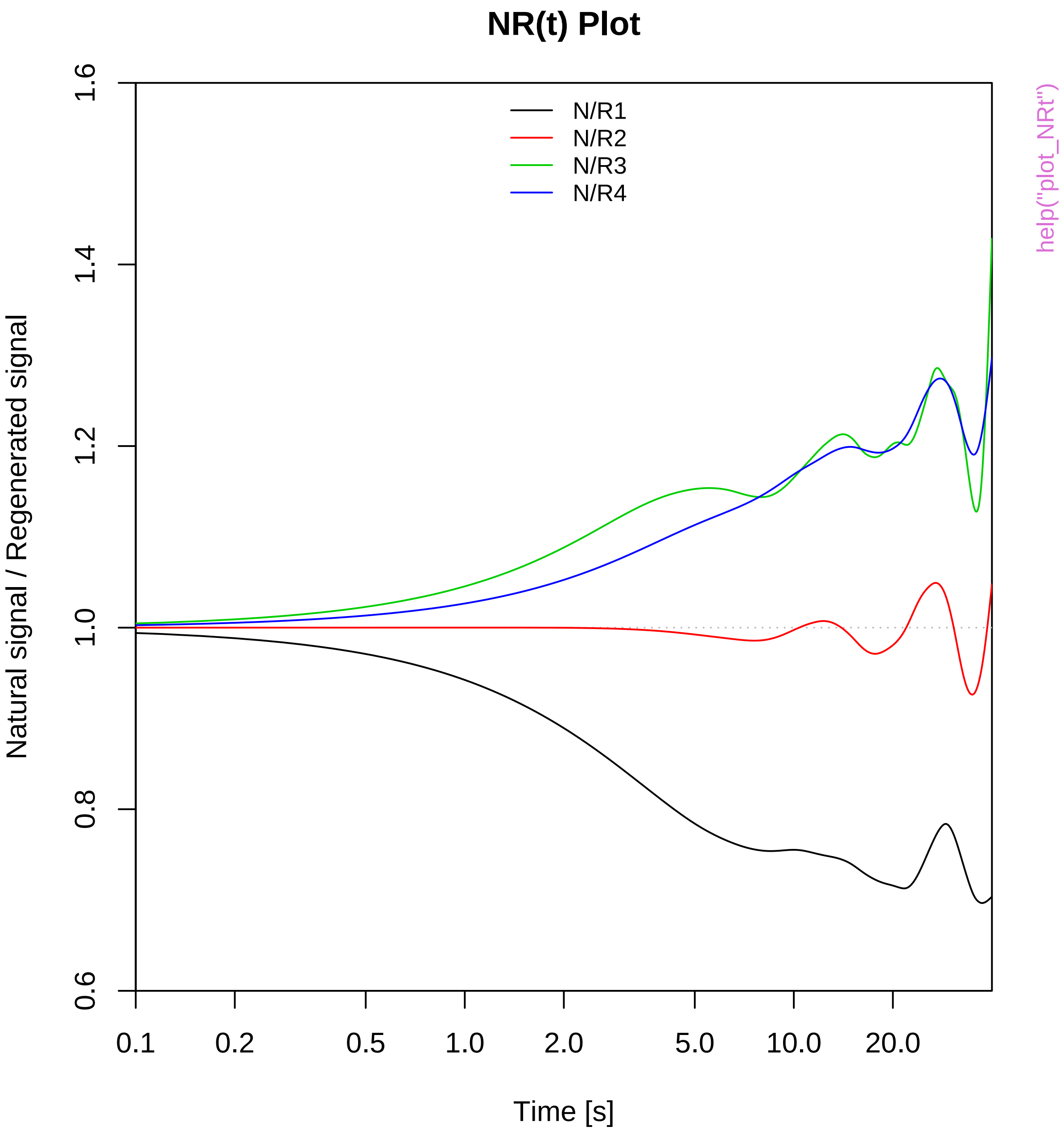

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0
1
2
3
4
Time [s]
0
10
20
30
40

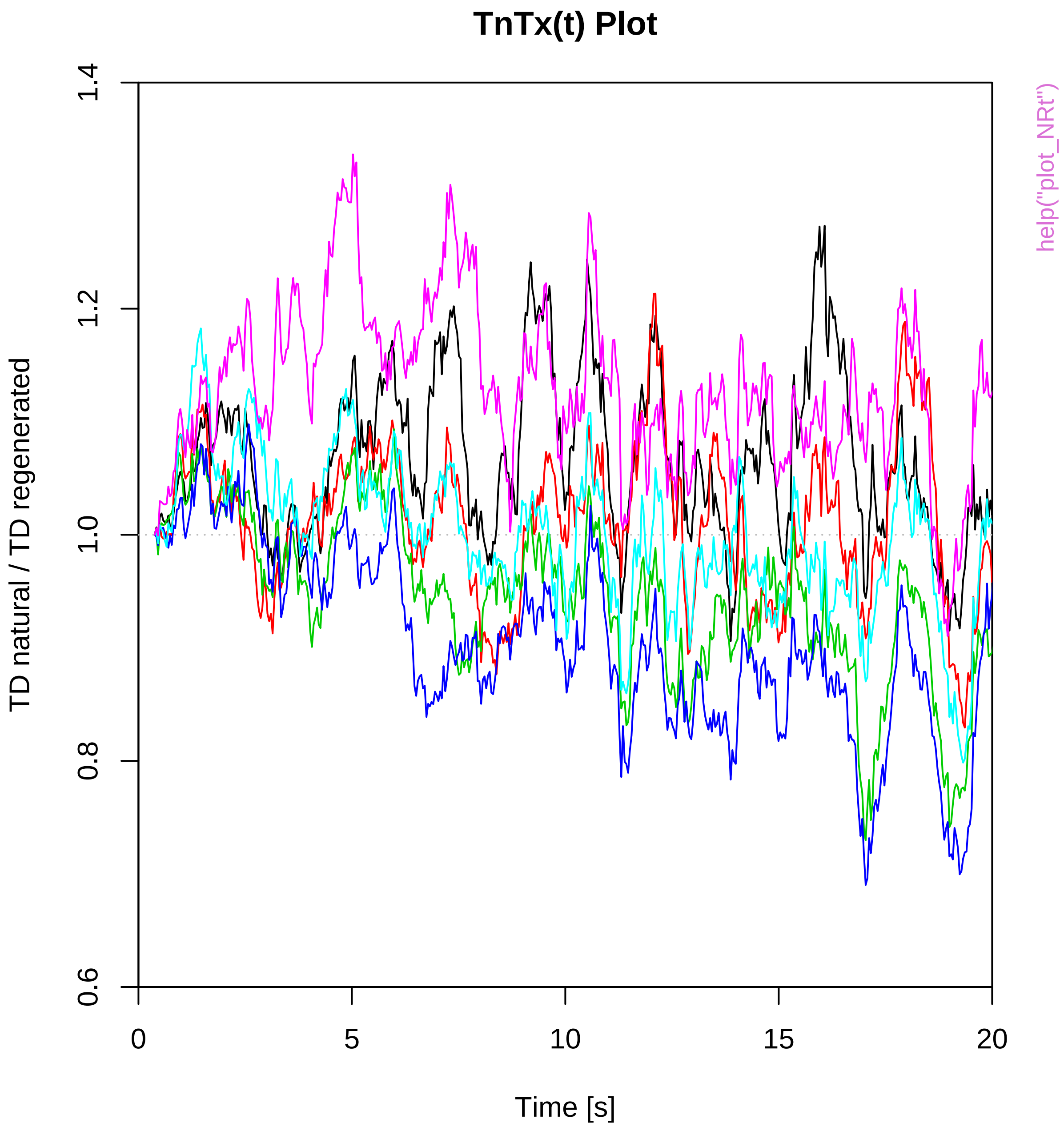
NR(t) Plot

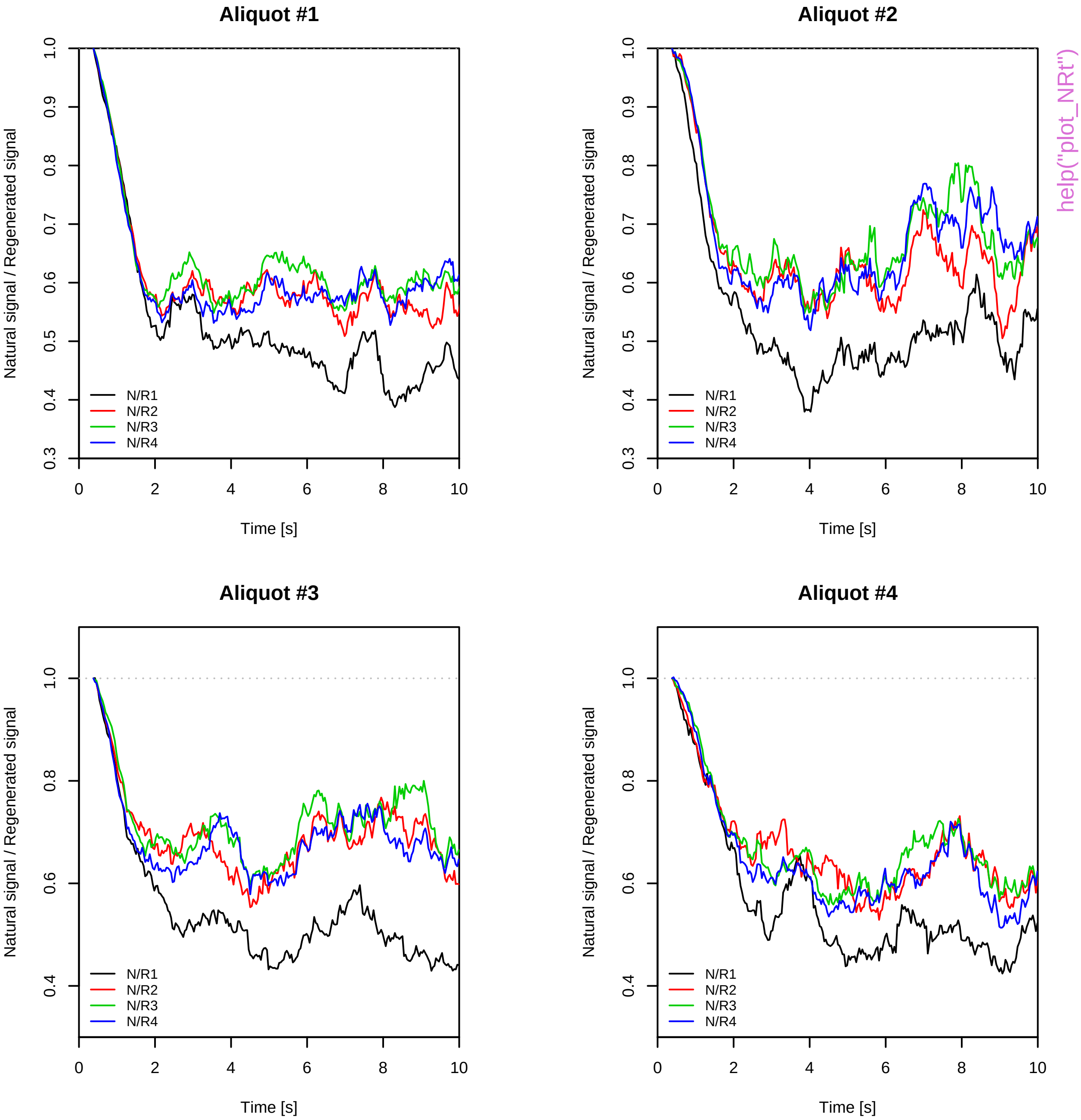

Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0
10
20
30
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

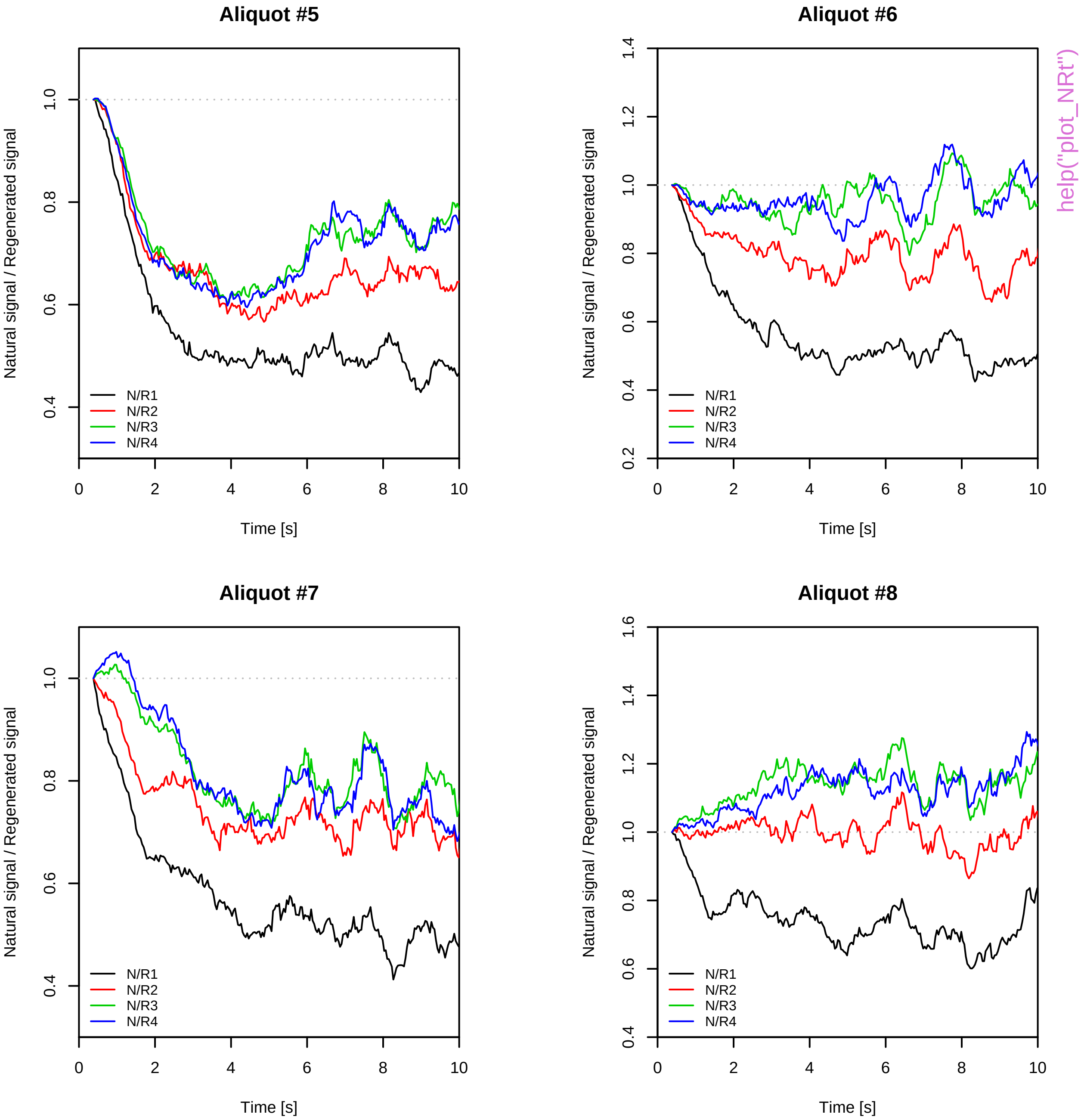

NR(t) Plot
Natural signal / Regenerated signal
Time [s]
0.0
0.5
1.0
1.5
2.0
2.5
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

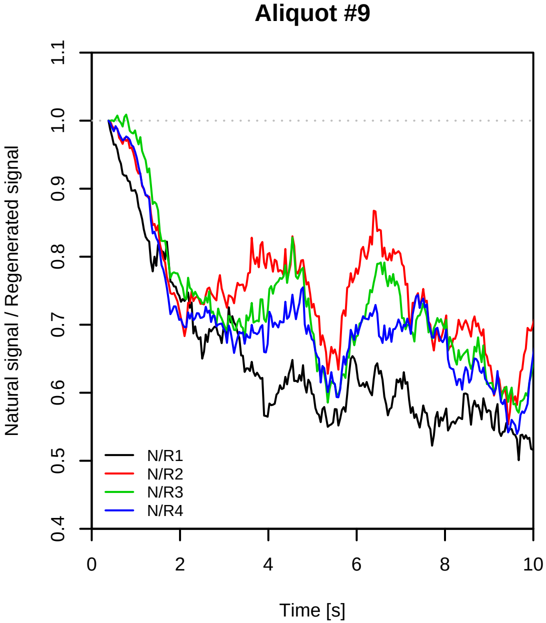

NR(t) Plot
Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1
2
3
4
5
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")


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]

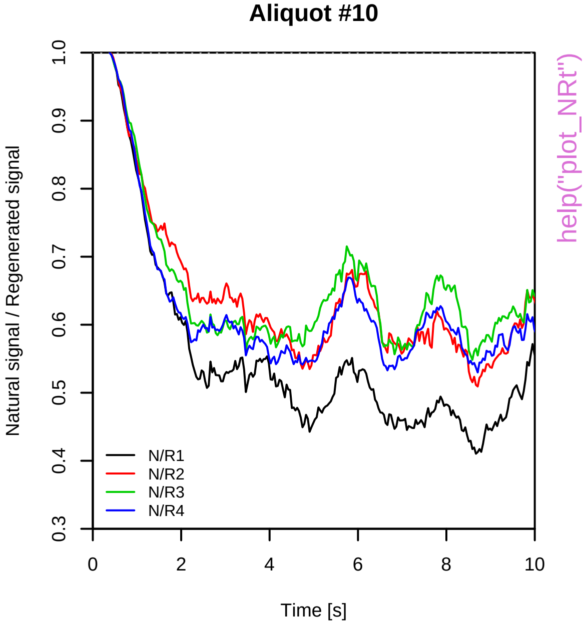

TnTx(t) Plot
TD natural / TD regenerated
0.6
0.8
1.0
1.2
1.4
0
5
10
15
20
Time [s]
help("plot_NRt")


Aliquot #1
Aliquot #2
Aliquot #3
Aliquot #4
Natural signal / Regenerated signal
Time [s]
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

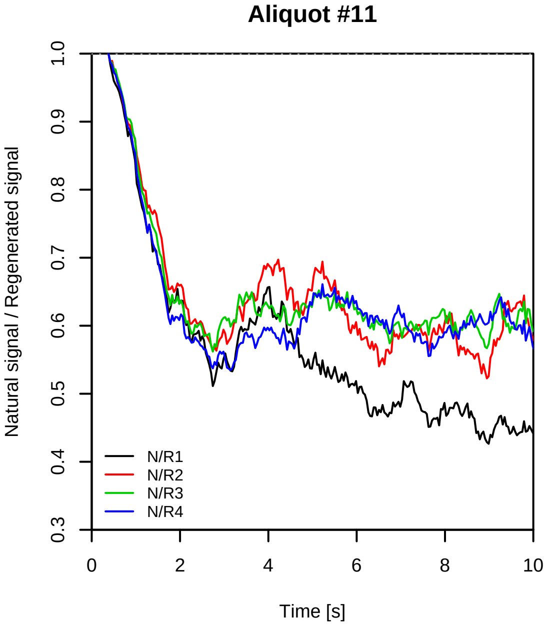

Aliquot #5
Aliquot #6
Aliquot #7
Aliquot #8
Natural signal / Regenerated signal
Time [s]
0
2
4
6
8
10
0.4
0.6
0.8
1.0
0.2
1.2
1.4
1.6
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")



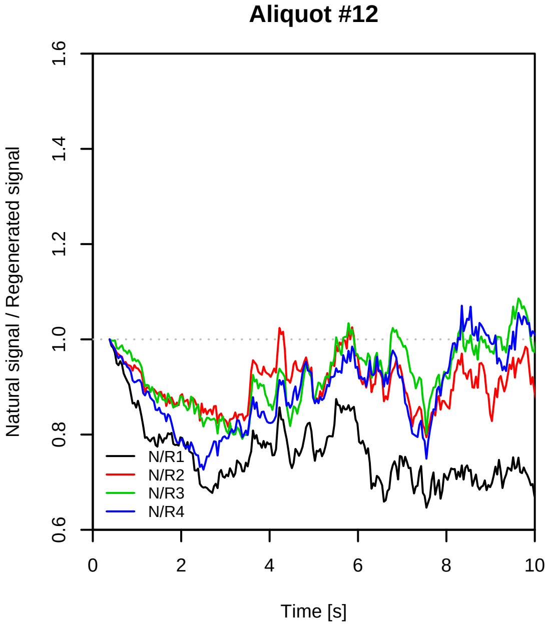
Aliquot #9



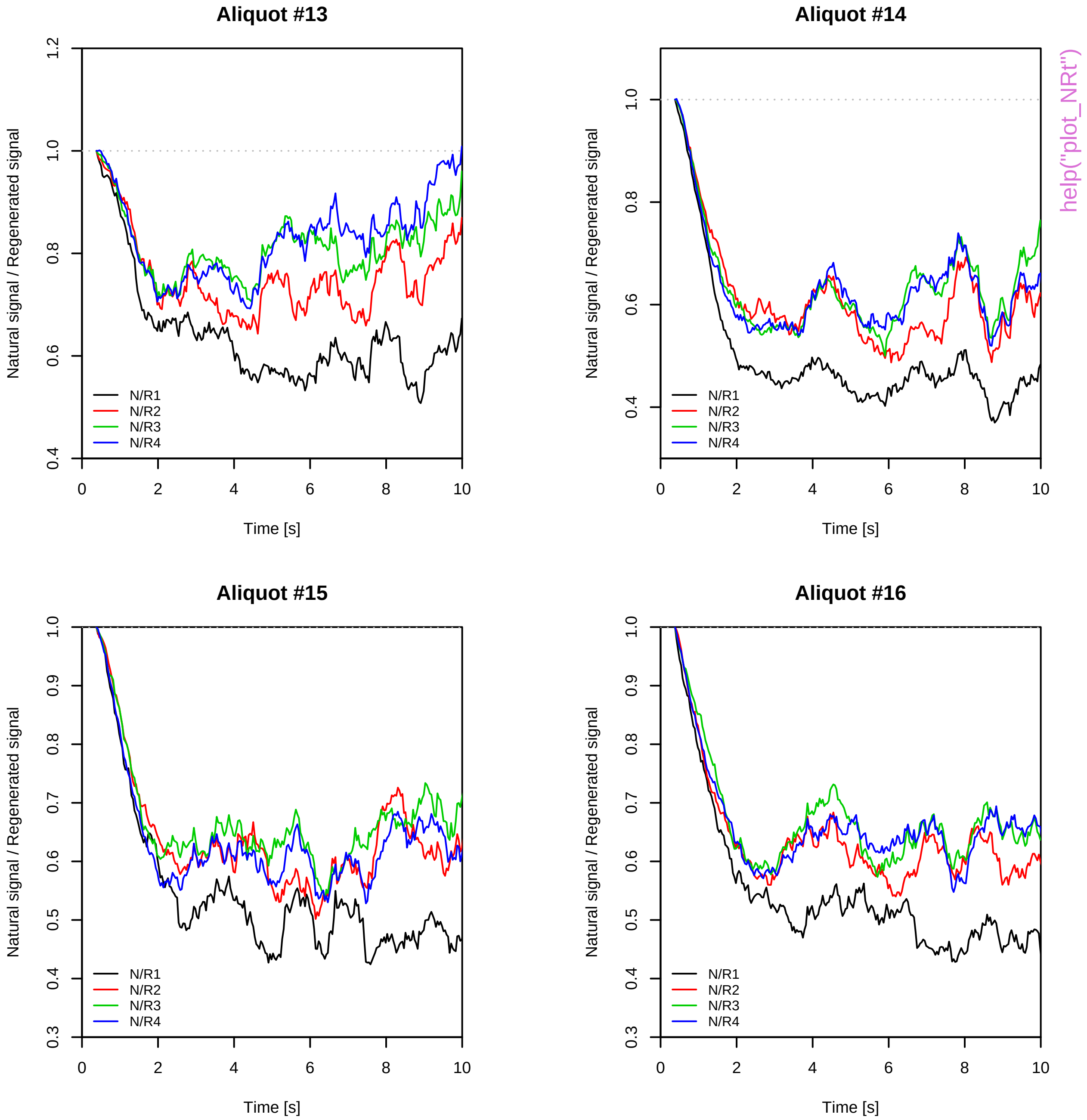
Aliquot #10

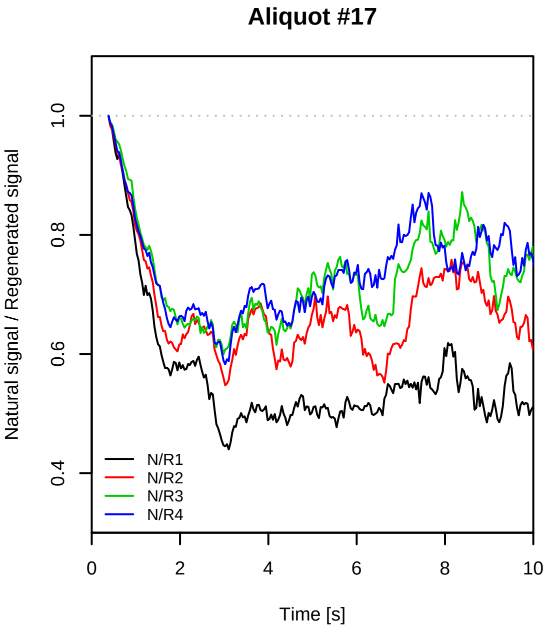


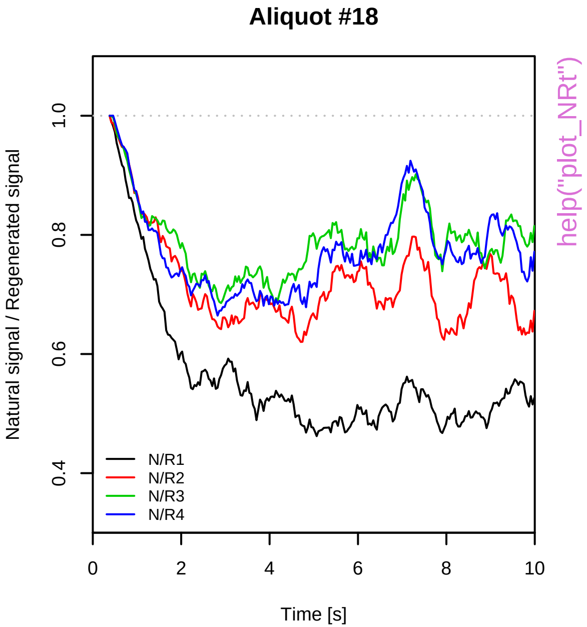
Aliquot #11

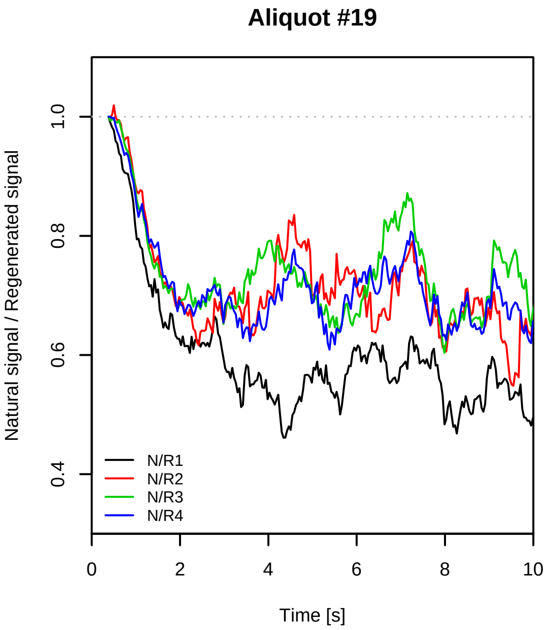


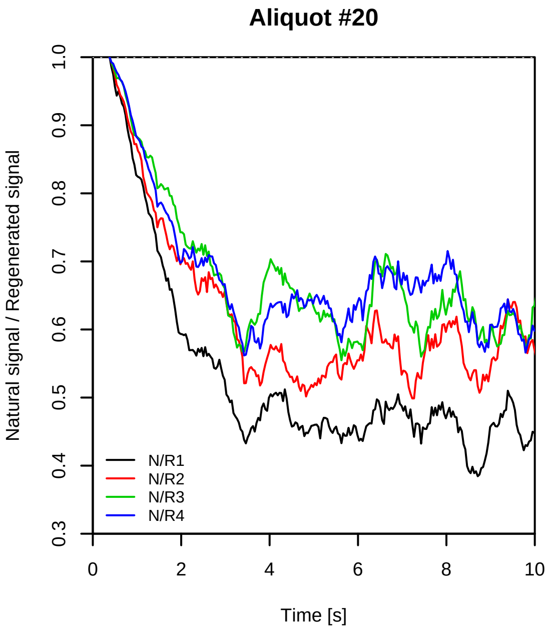
Aliquot #12

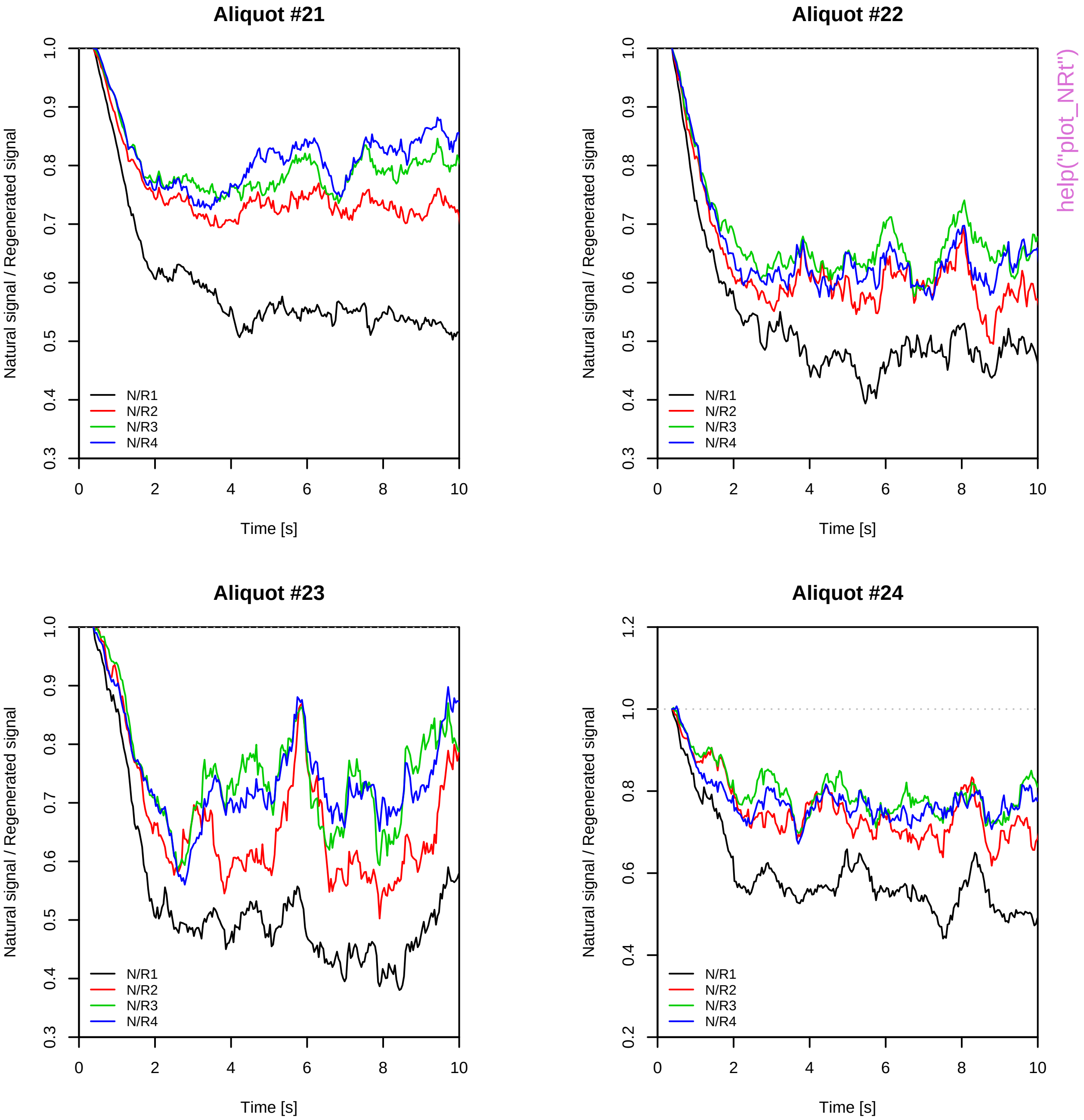

Aliquot #13
Aliquot #14
Aliquot #15
Aliquot #16
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
0.4
0.6
0.8
1.0
1.2
0.3
0.5
0.7
0.9
0
2
4
6
8
10

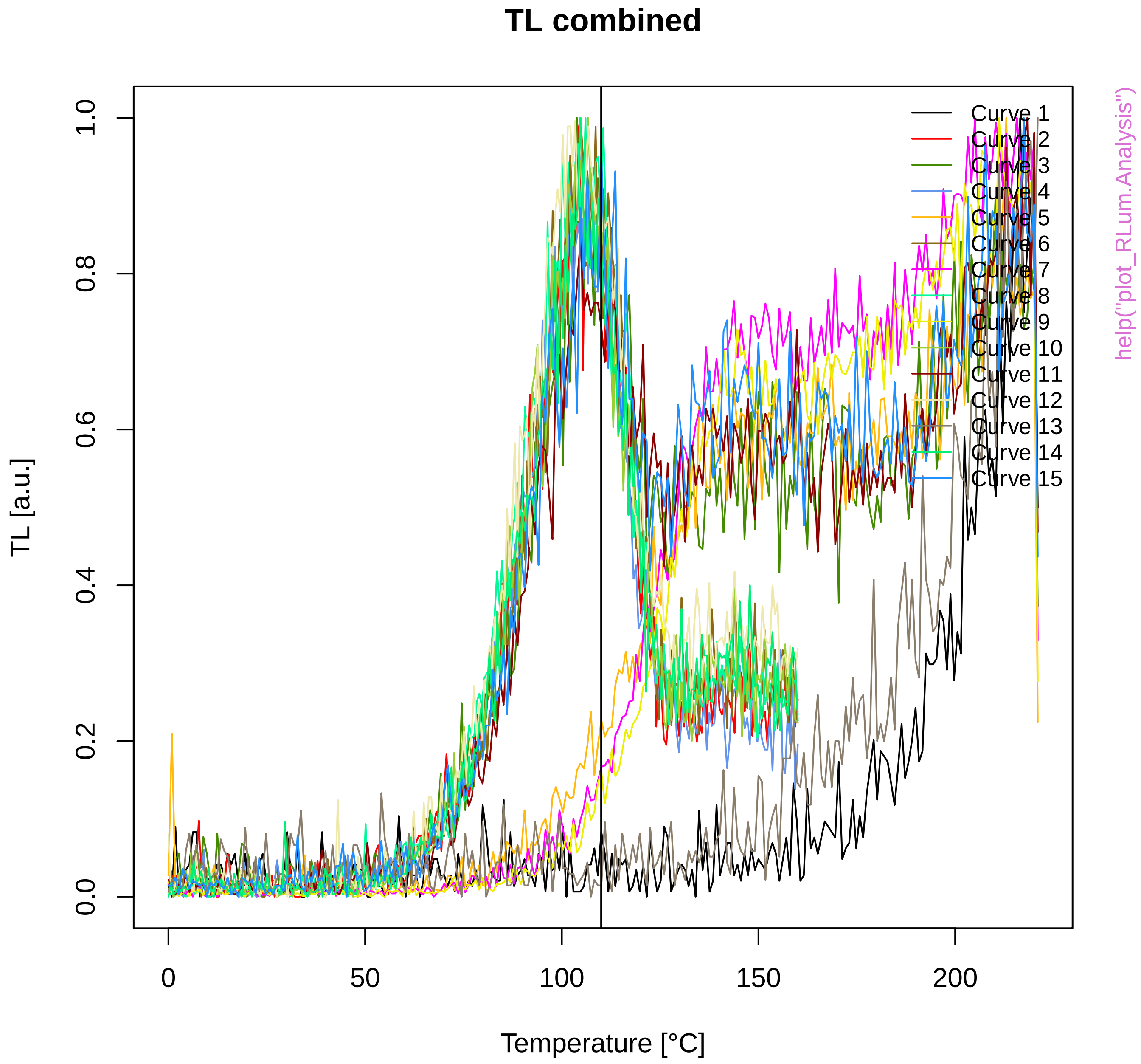

Aliquot #17
Natural signal / Regenerated signal
1.0
0.8
0.6
0.4
0
2
4
6
8
10
Time [s]
N/R1
N/R2
N/R3
N/R4

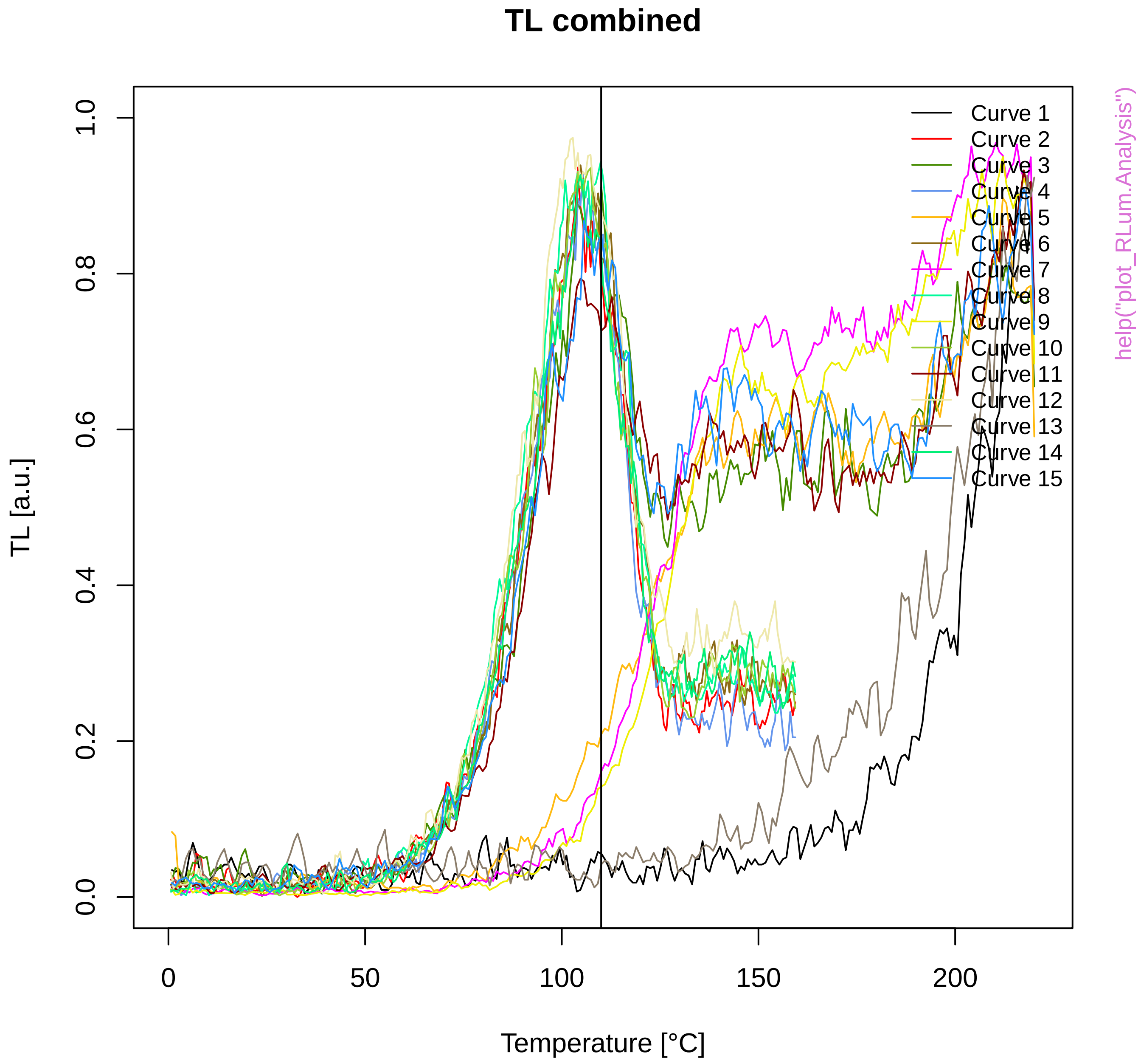

Aliquot #18
Natural signal / Regenerated signal
1.0
0.8
0.6
0.4
0
2
4
6
8
10
Time [s]
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

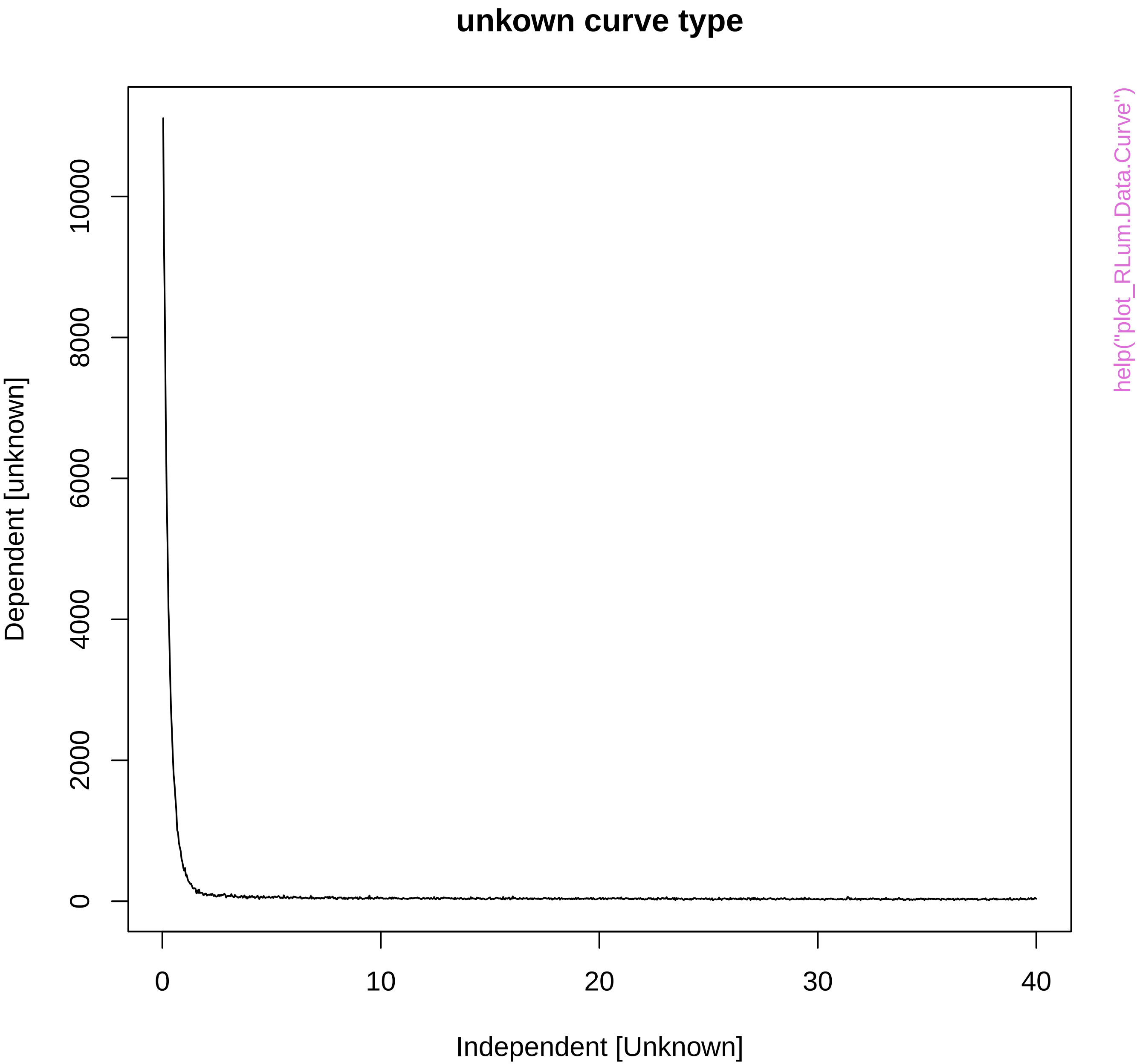

Aliquot #19
Natural signal / Regenerated signal
1.0
0.8
0.6
0.4
0
2
4
6
8
10
Time [s]
N/R1
N/R2
N/R3
N/R4

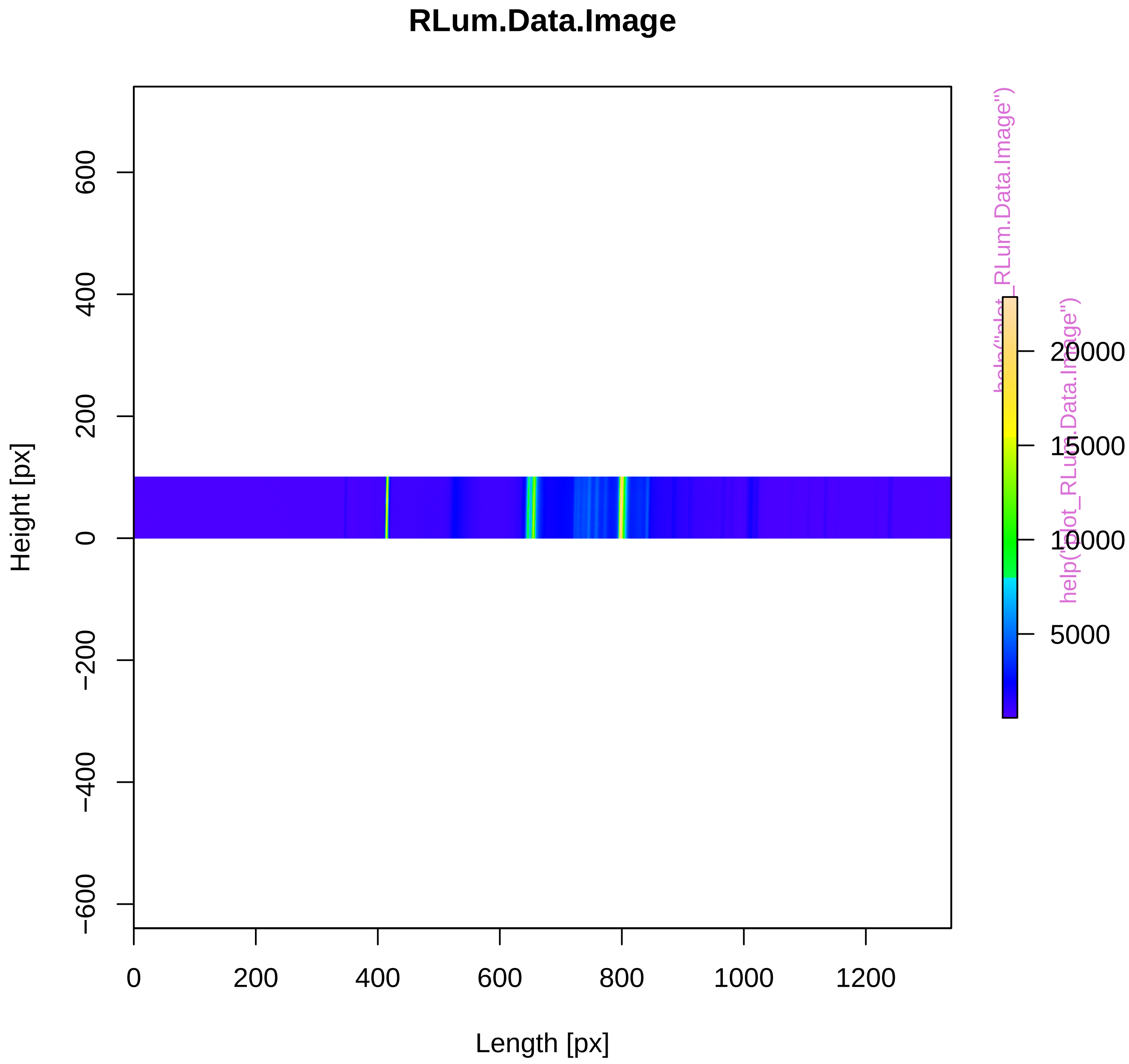

Aliquot #20
Natural signal / Regenerated signal
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0
2
4
6
8
10
Time [s]
N/R1
N/R2
N/R3
N/R4

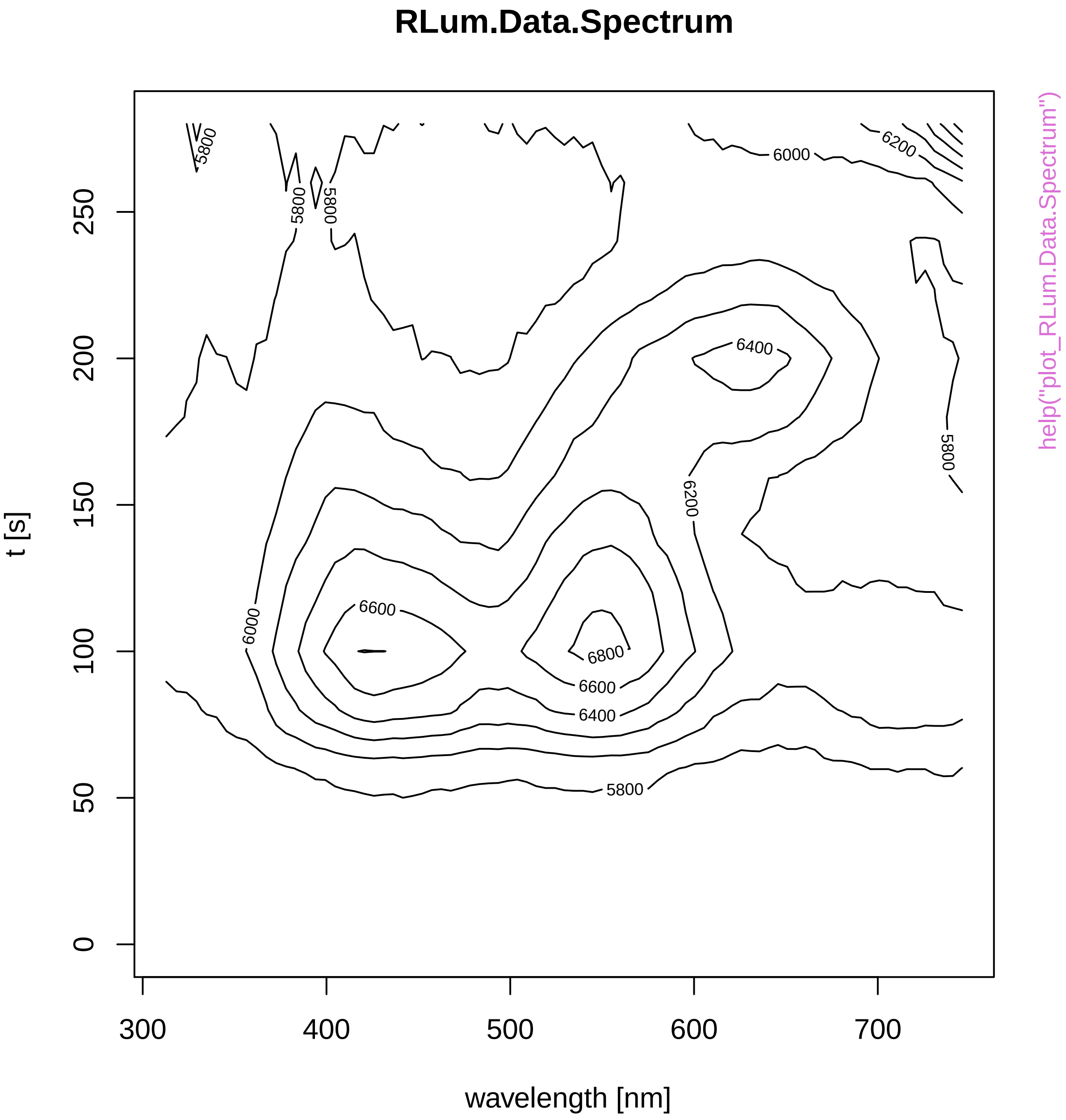

Aliquot #21
Aliquot #22
Aliquot #23
Aliquot #24
Natural signal / Regenerated signal
Time [s]
0
2
4
6
8
10
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0.2
1.2
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

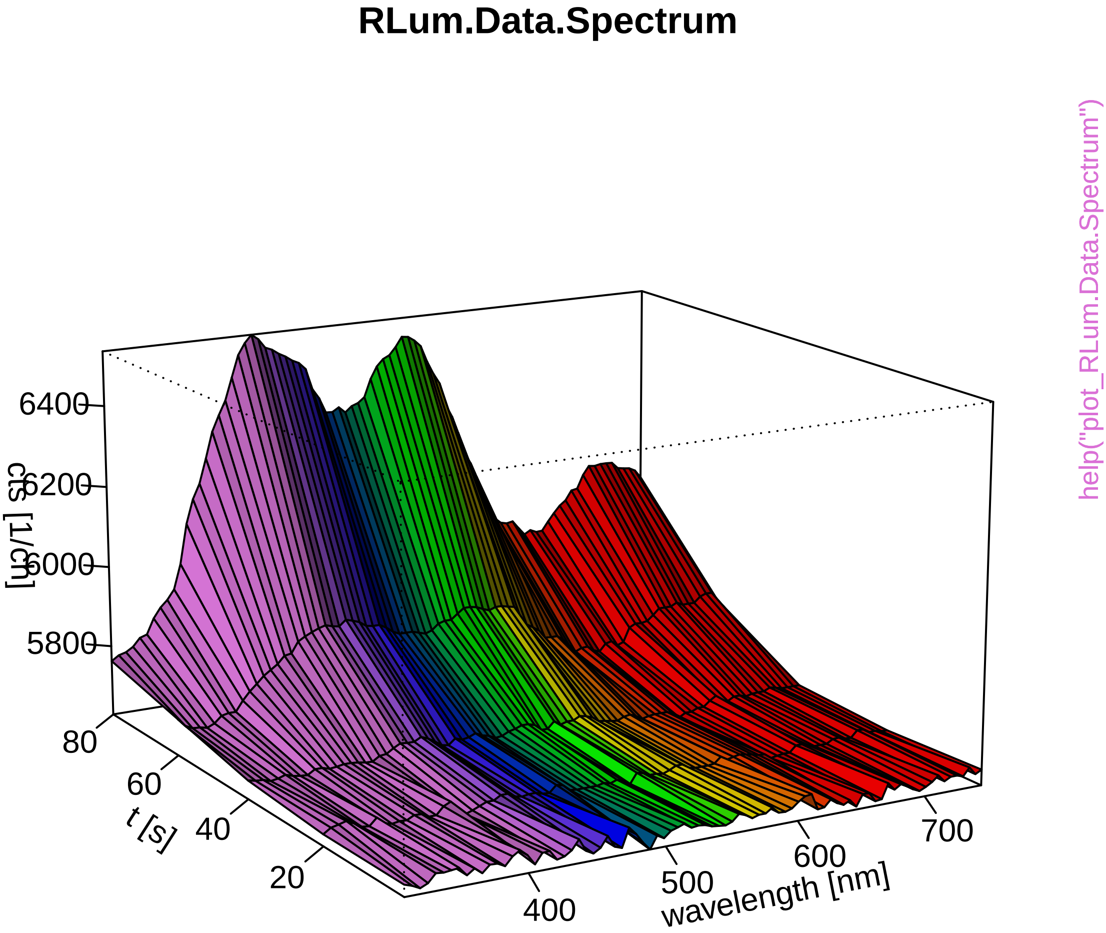

TL combined
TL [a.u.]
Temperature [°C]
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
Curve 11
Curve 12
Curve 13
Curve 14
Curve 15
help("plot_RLum.Analysis")

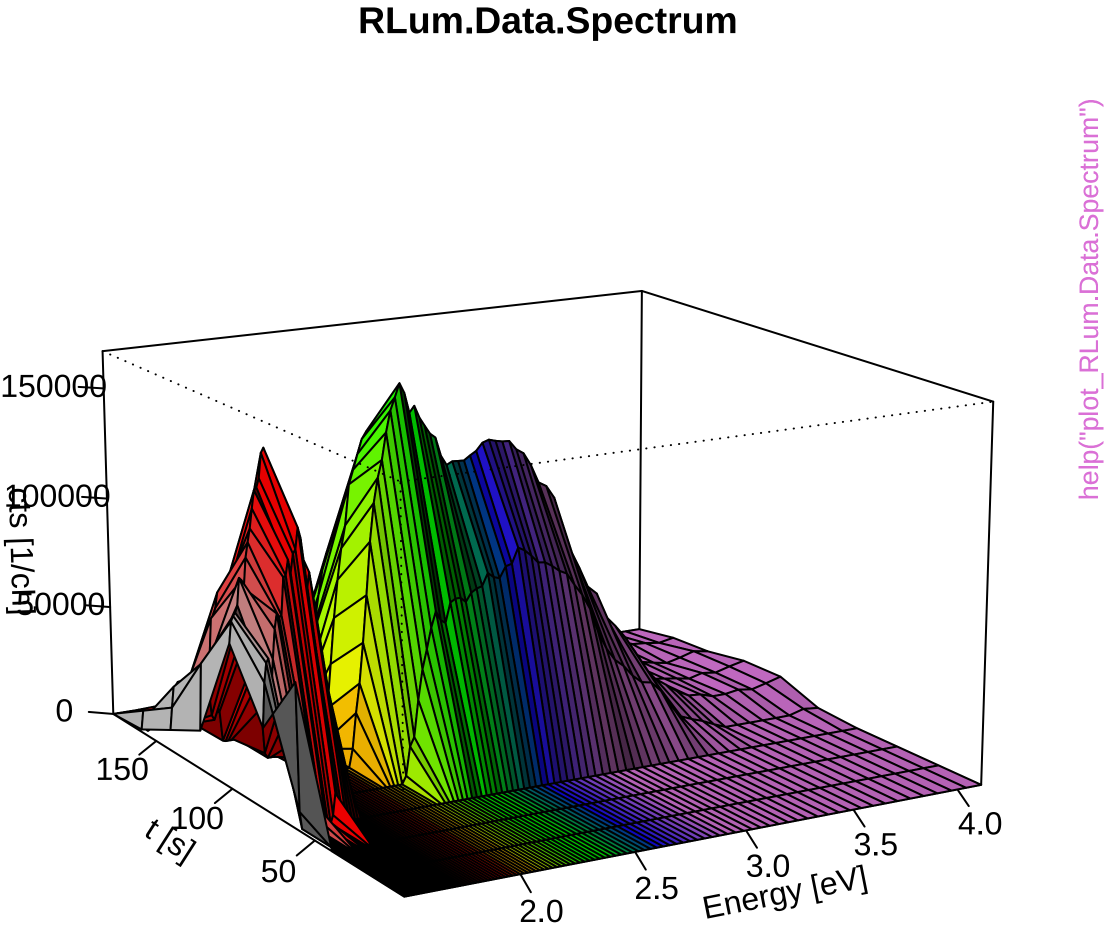

TL combined
TL [a.u.]
Temperature [°C]
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
Curve 11
Curve 12
Curve 13
Curve 14
Curve 15
help("plot_RLum.Analysis")

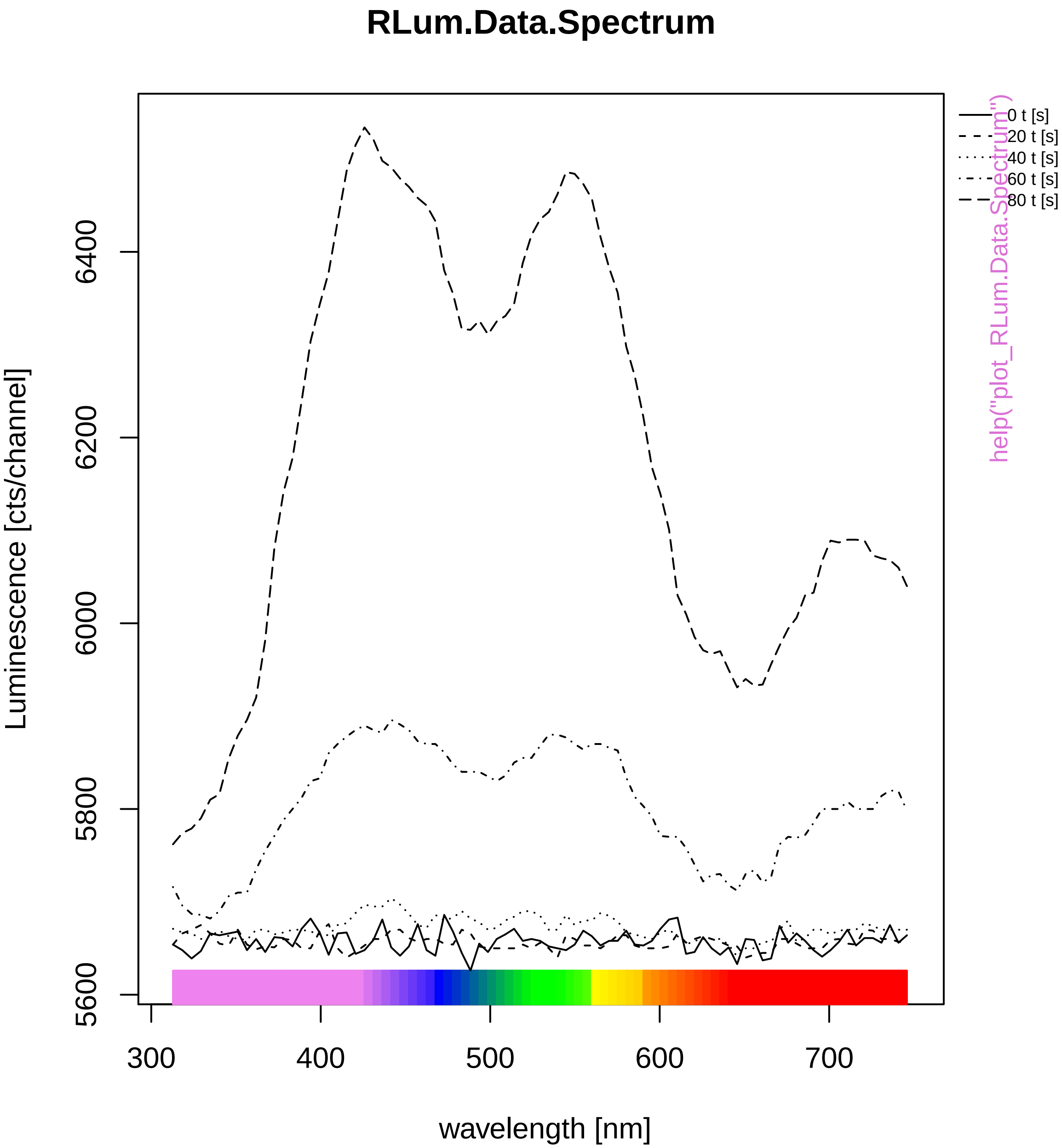

unkown curve type
Dependent [unknown]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Independent [Unknown]
help("plot_RLum.Data.Curve")

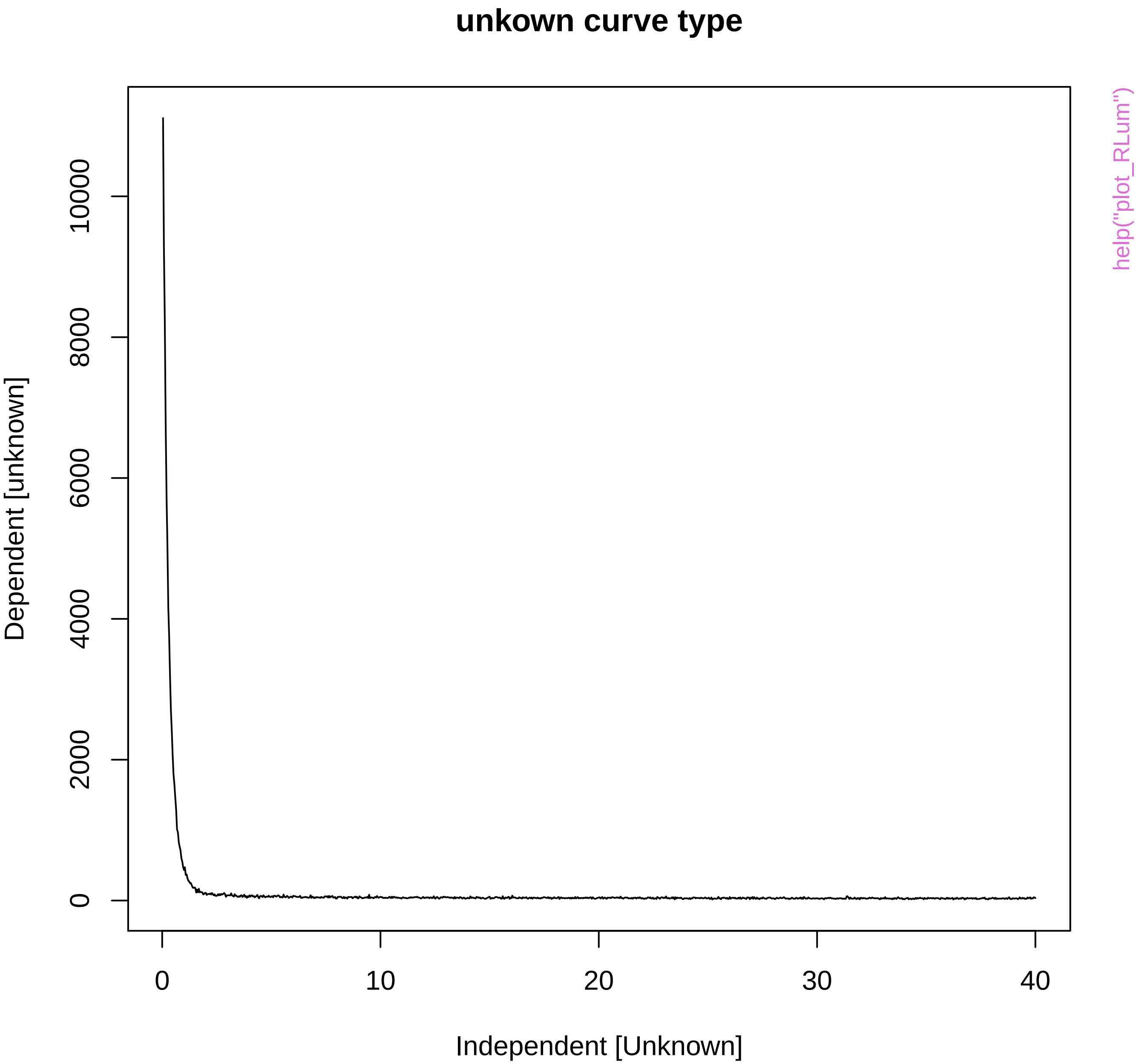

RLum.Data.Image
Height [px]
600
400
200
0
−200
−400
−600
Length [px]
0
200
400
600
800
1000
1200
20000
15000
10000
5000
help("plot_RLum.Data.Image")
help("plot_RLum.Data.Image")

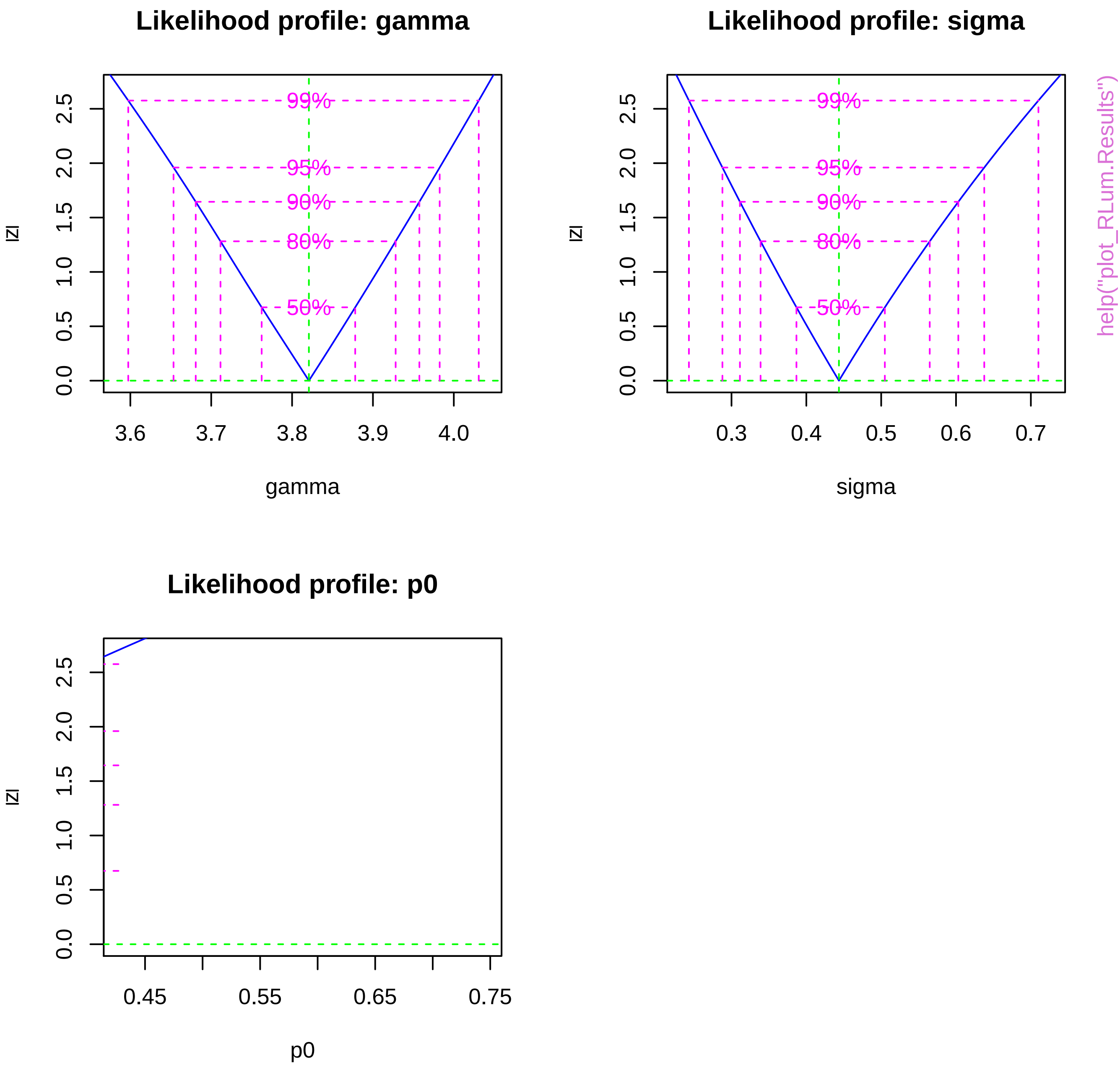

RLum.Data.Spectrum
t [s]
0
50
100
150
200
250
300
400
500
600
700
wavelength [nm]
5800
6000
6200
6400
6600
6800
help("plot_RLum.Data.Spectrum")

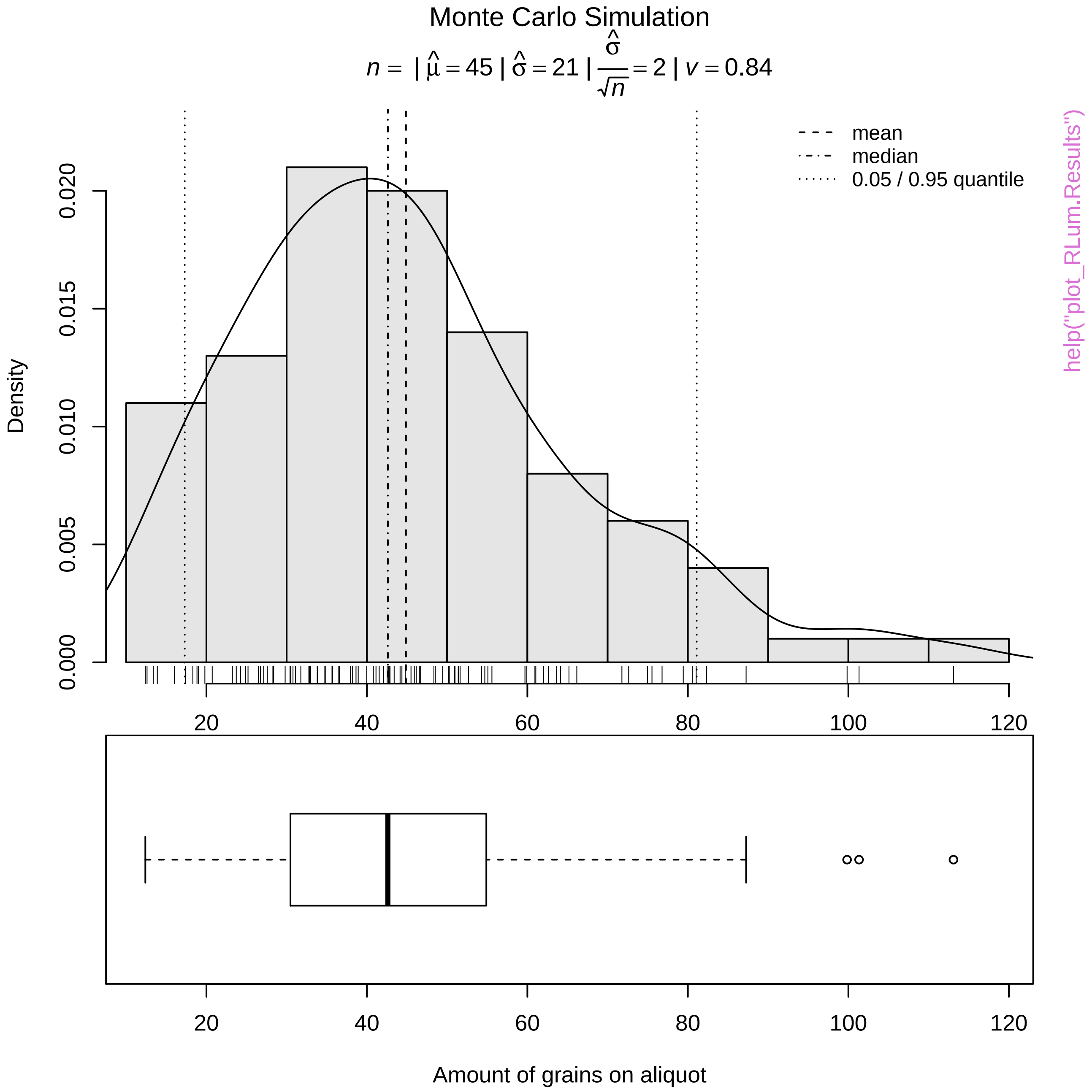

RLum.Data.Spectrum
help("plot_RLum.Data.Spectrum")
cts [1/ch]
6400
6200
6000
5800
80
60
40
20
t [s]
400
500
600
700
wavelength [nm]

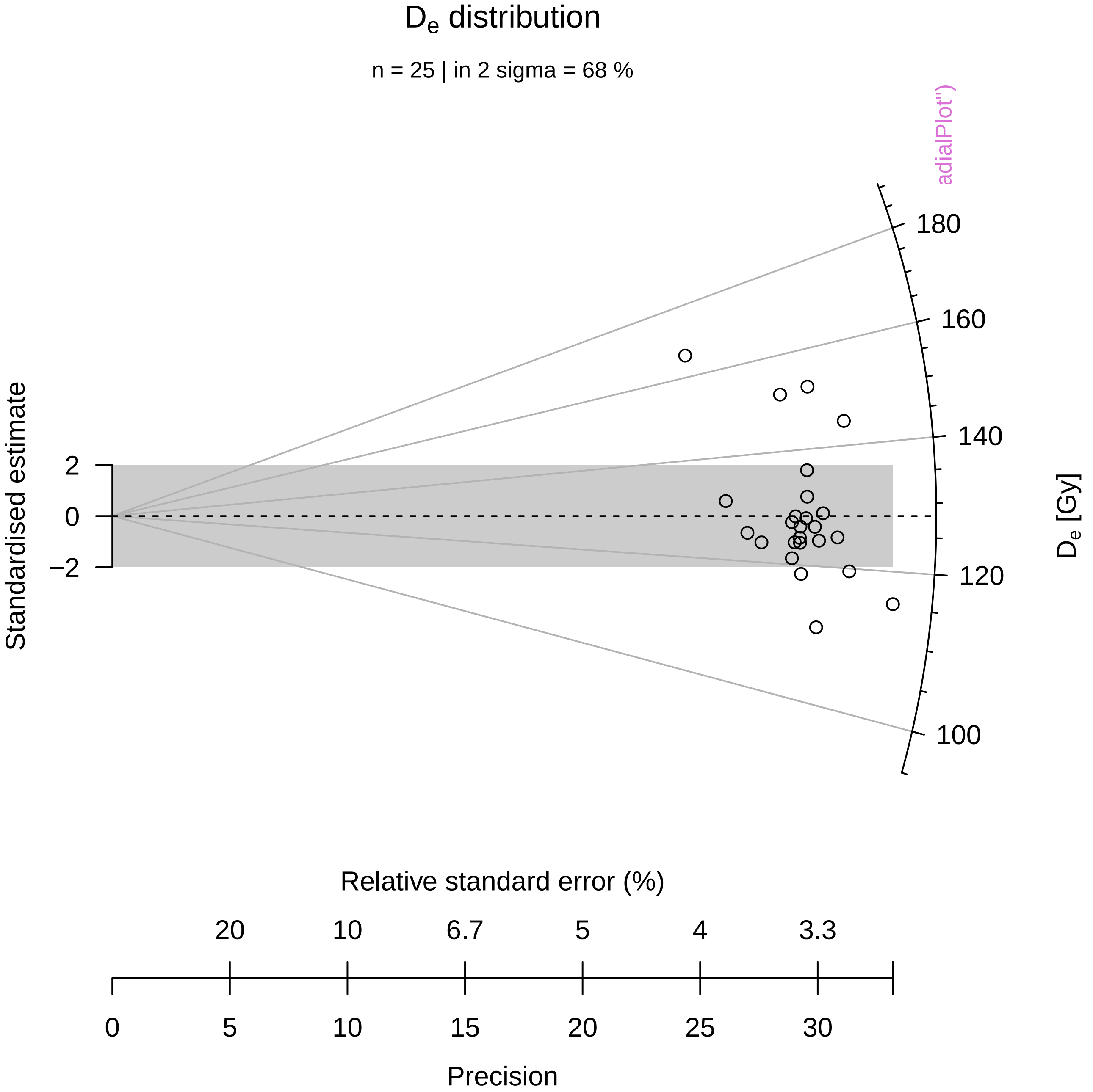

RLum.Data.Spectrum
help("plot_RLum.Data.Spectrum")
cts [1/ch]
150000
100000
50000
0
t [s]
150
100
50
Energy [eV]
2.0
2.5
3.0
3.5
4.0

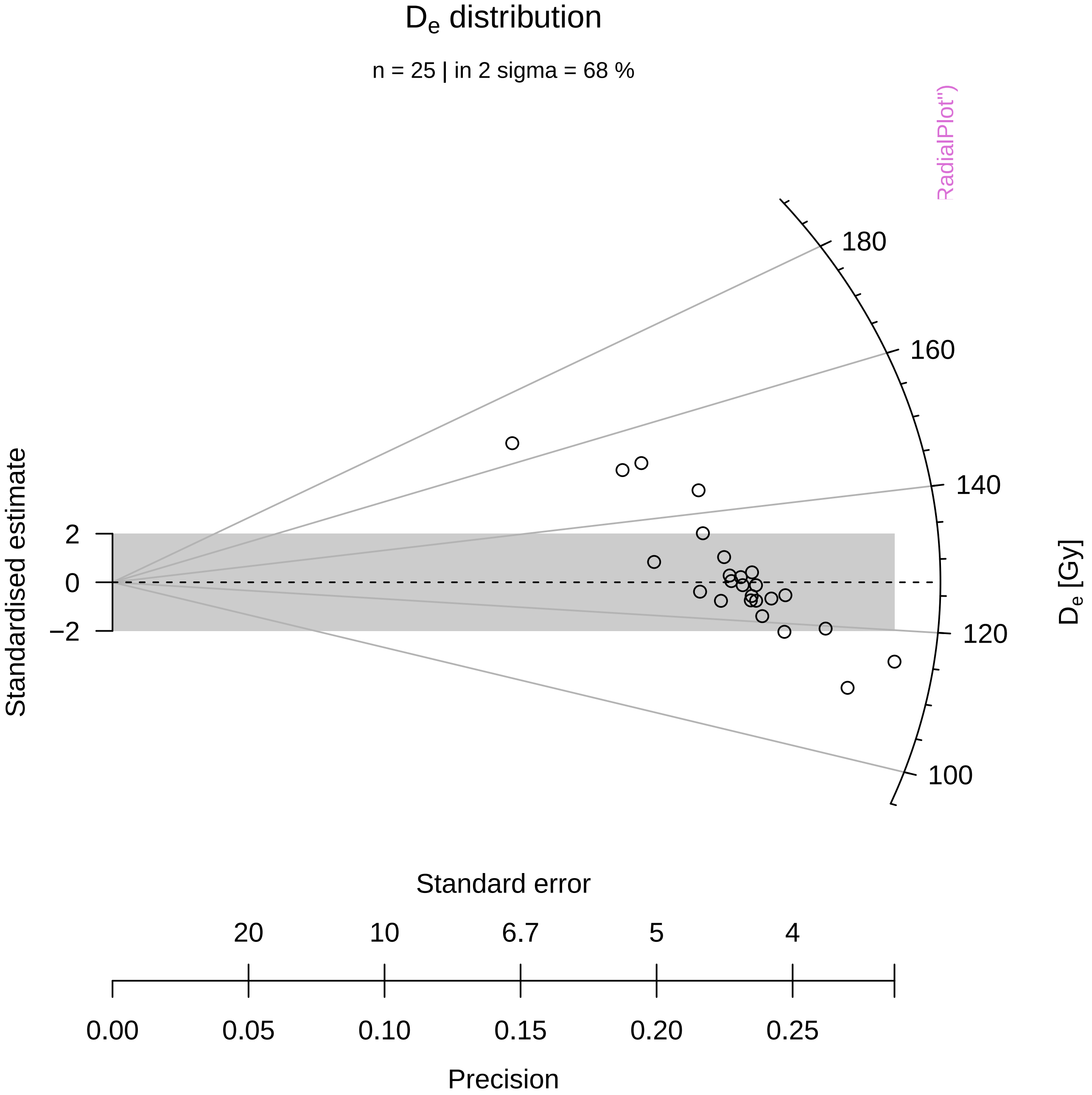

RLum.Data.Spectrum
Luminescence [cts/channel]
wavelength [nm]
5600
5800
6000
6200
6400
300
400
500
600
700
0 t [s]
20 t [s]
40 t [s]
60 t [s]
80 t [s]
help("plot_RLum.Data.Spectrum")

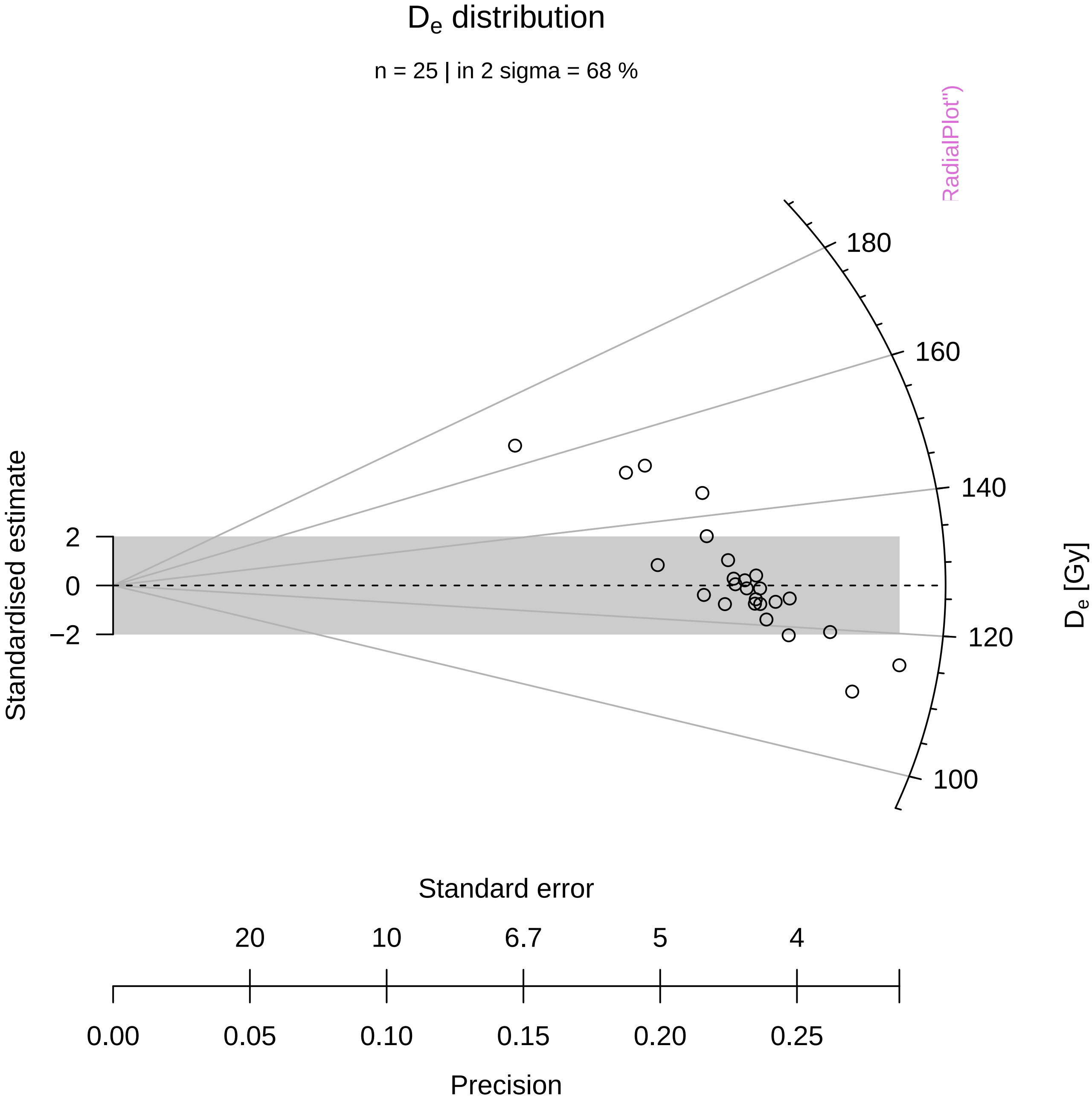

unkown curve type
Dependent [unknown]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Independent [Unknown]
help("plot_RLum")

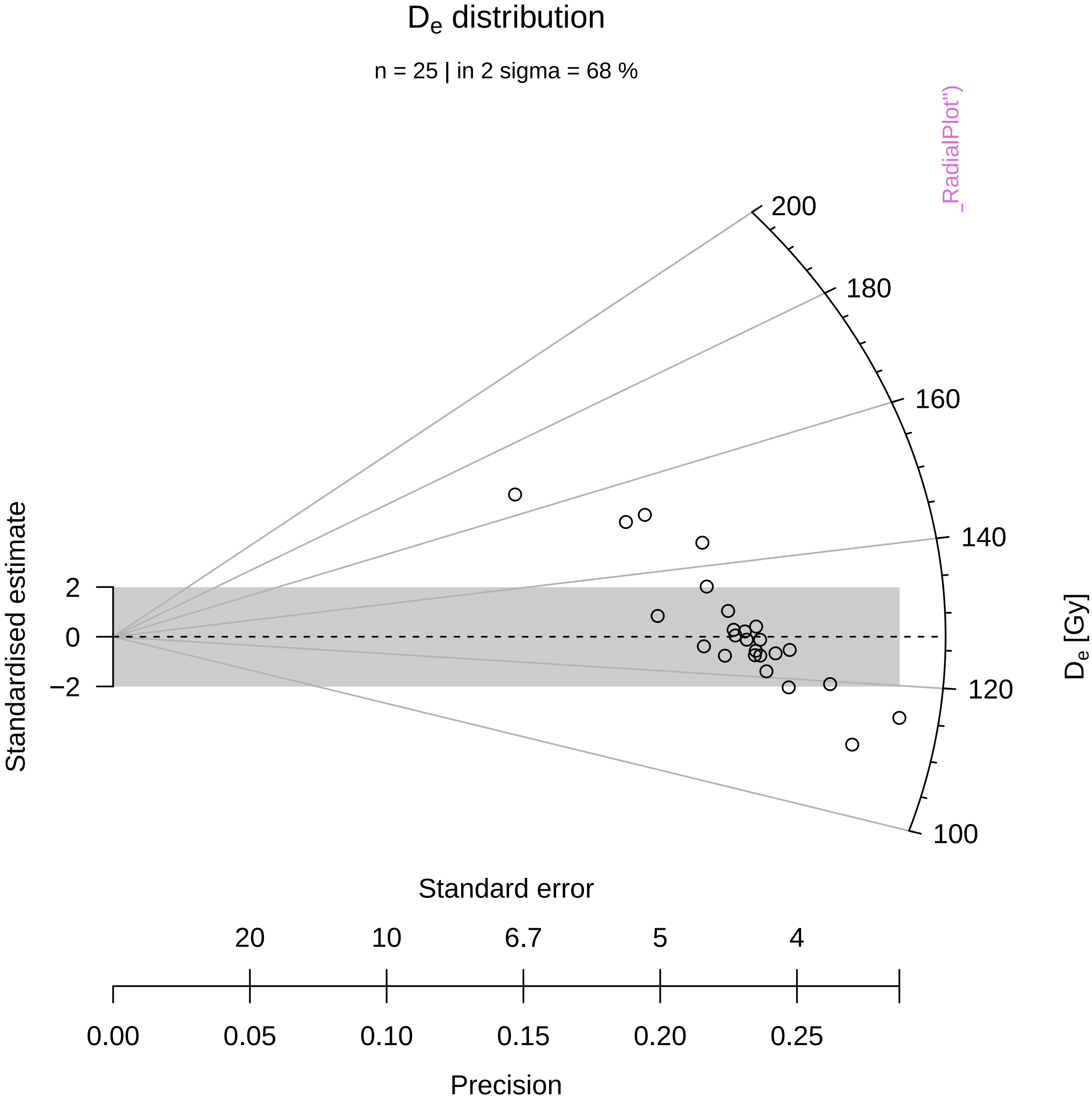

Likelihood profile: gamma
Likelihood profile: sigma
Likelihood profile: p0
|z|
0.0
0.5
1.0
1.5
2.0
2.5
99%
95%
90%
80%
50%
3.6
3.7
3.8
3.9
4.0
gamma
0.3
0.4
0.5
0.6
0.7
sigma
0.45
0.55
0.65
0.75
p0
help("plot_RLum.Results")

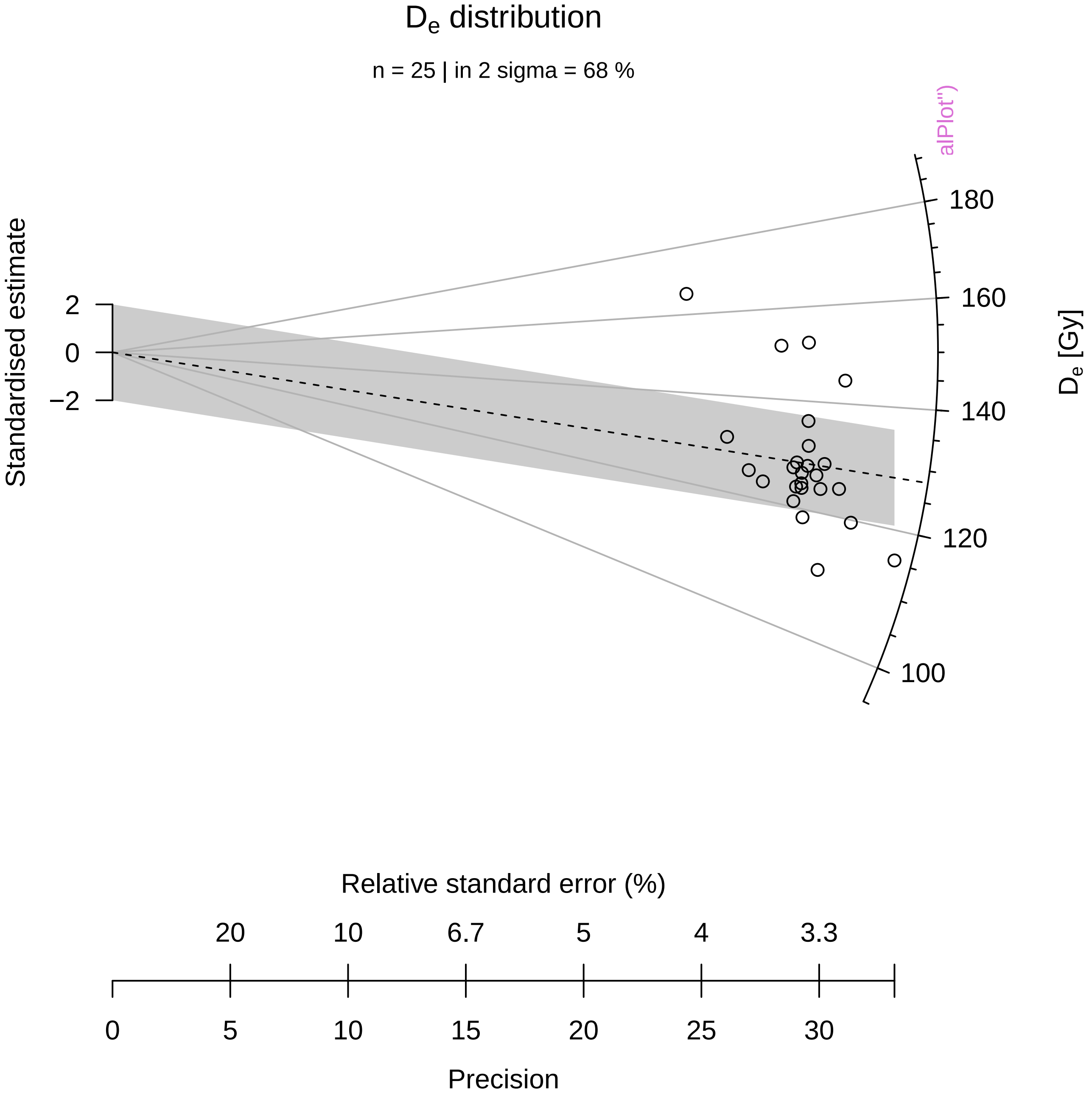

Monte Carlo Simulation
$n = \; | \; \hat{\mu} = 45 \; | \; \hat{\sigma} = 21 \; | \; \frac{\hat{\sigma}}{\sqrt{n}} = 2 \; | \; v = 0.84$
mean
median
0.05 / 0.95 quantile
help("plot_RLum.Results")
Density
0.000
0.005
0.010
0.015
0.020
20
40
60
80
100
120
20
40
60
80
100
120
Amount of grains on aliquot

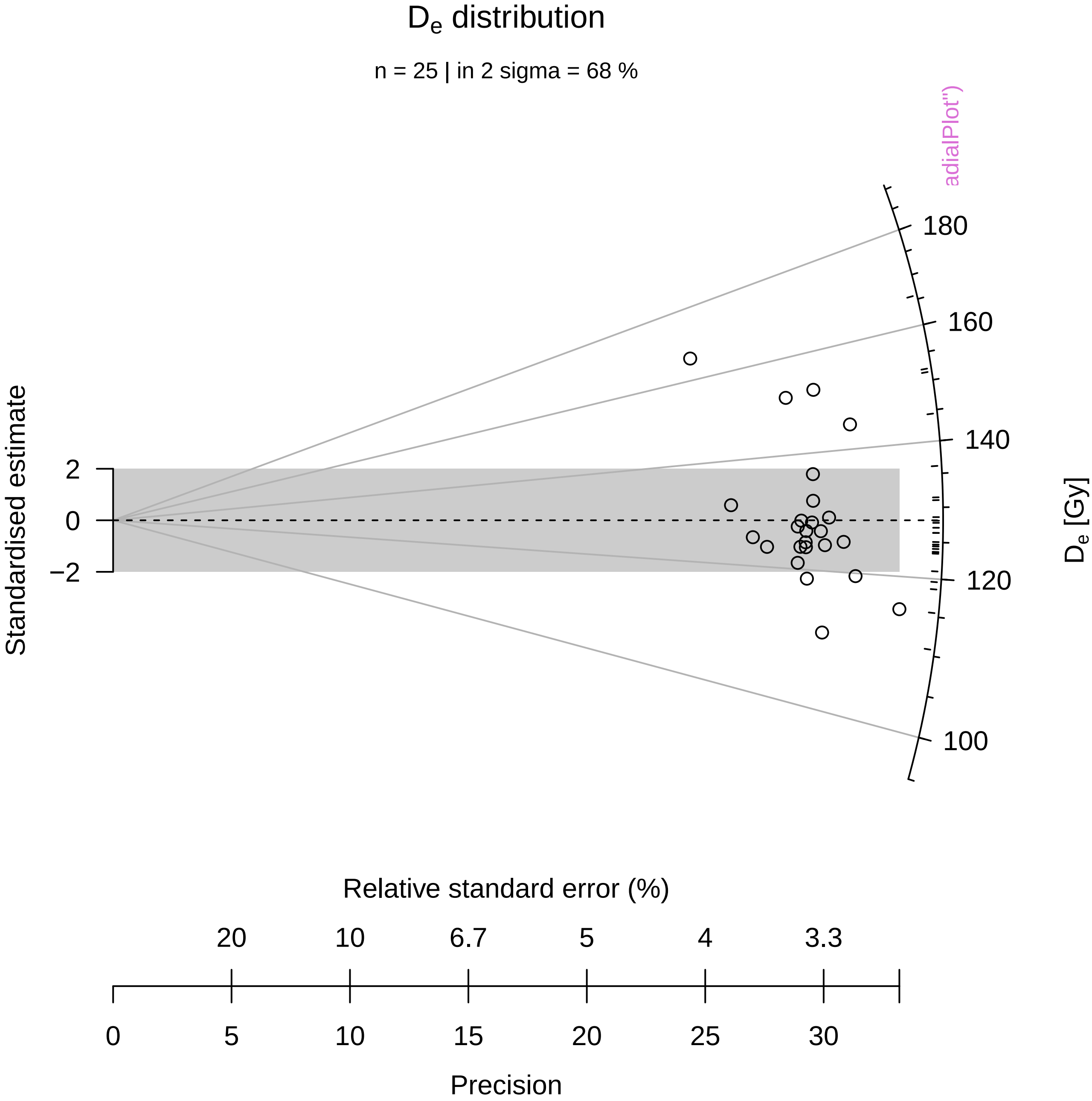

D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision


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

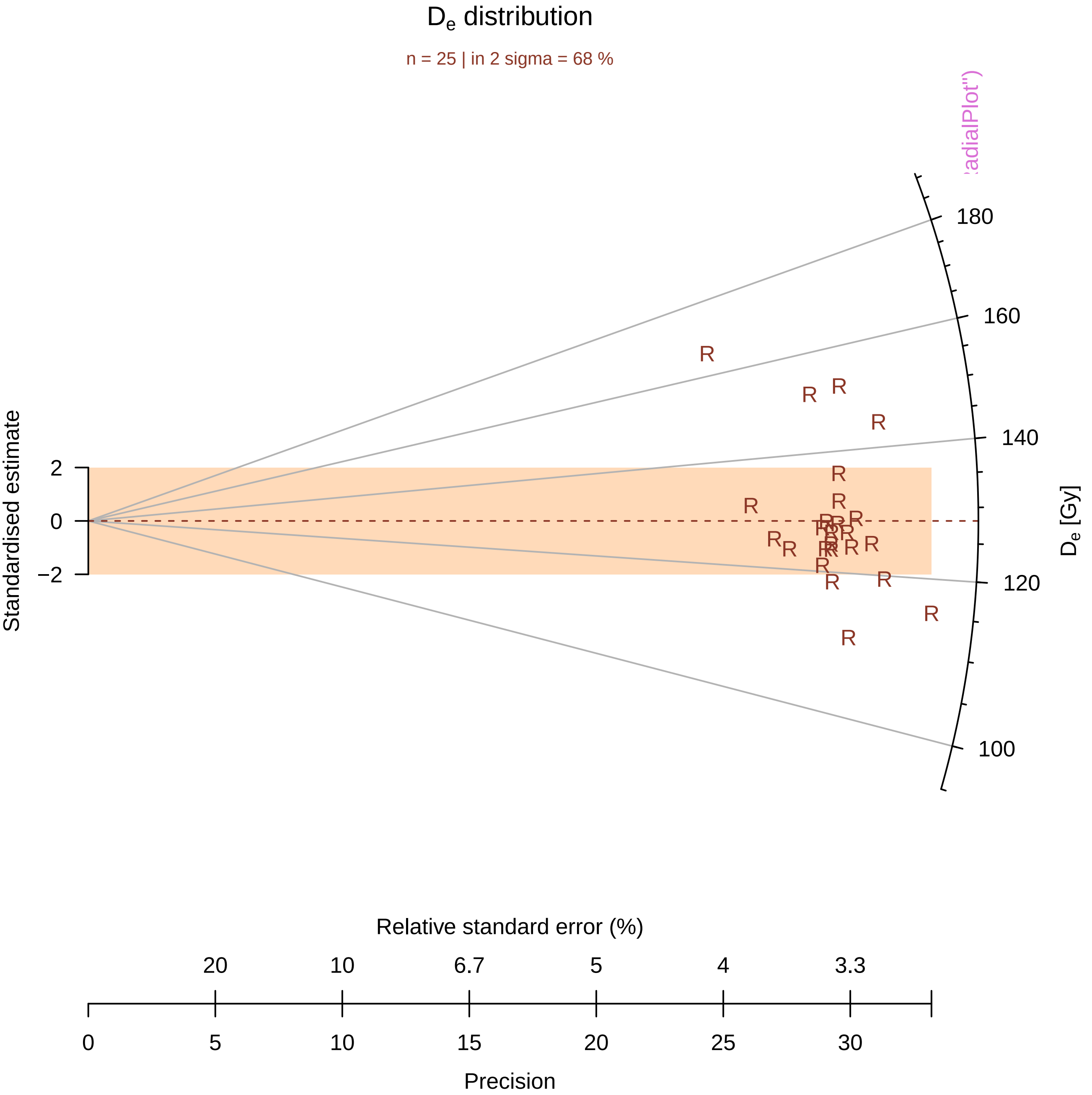

De distribution
n = 25 | in 2 sigma = 68 %
RadialPlot")
180
160
140
120
100
De [Gy]
Standardised estimate
2
0
−2
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision


D_e distribution
n = 25 | in 2 sigma = 68 %
_RadialPlot")
200
180
160
140
120
100
D_e [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

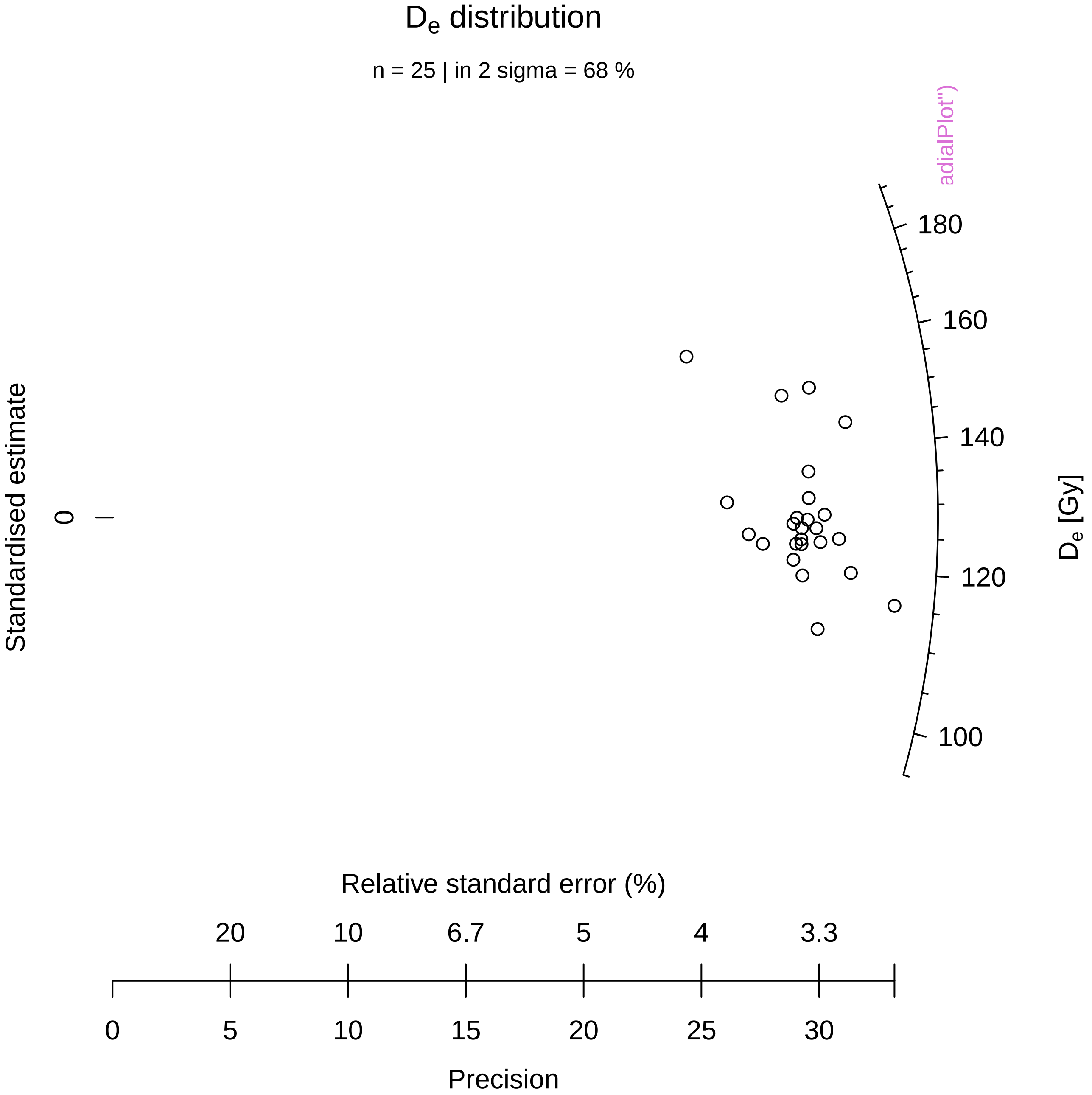

D_e distribution
n = 25 | in 2 sigma = 68 %
alPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision



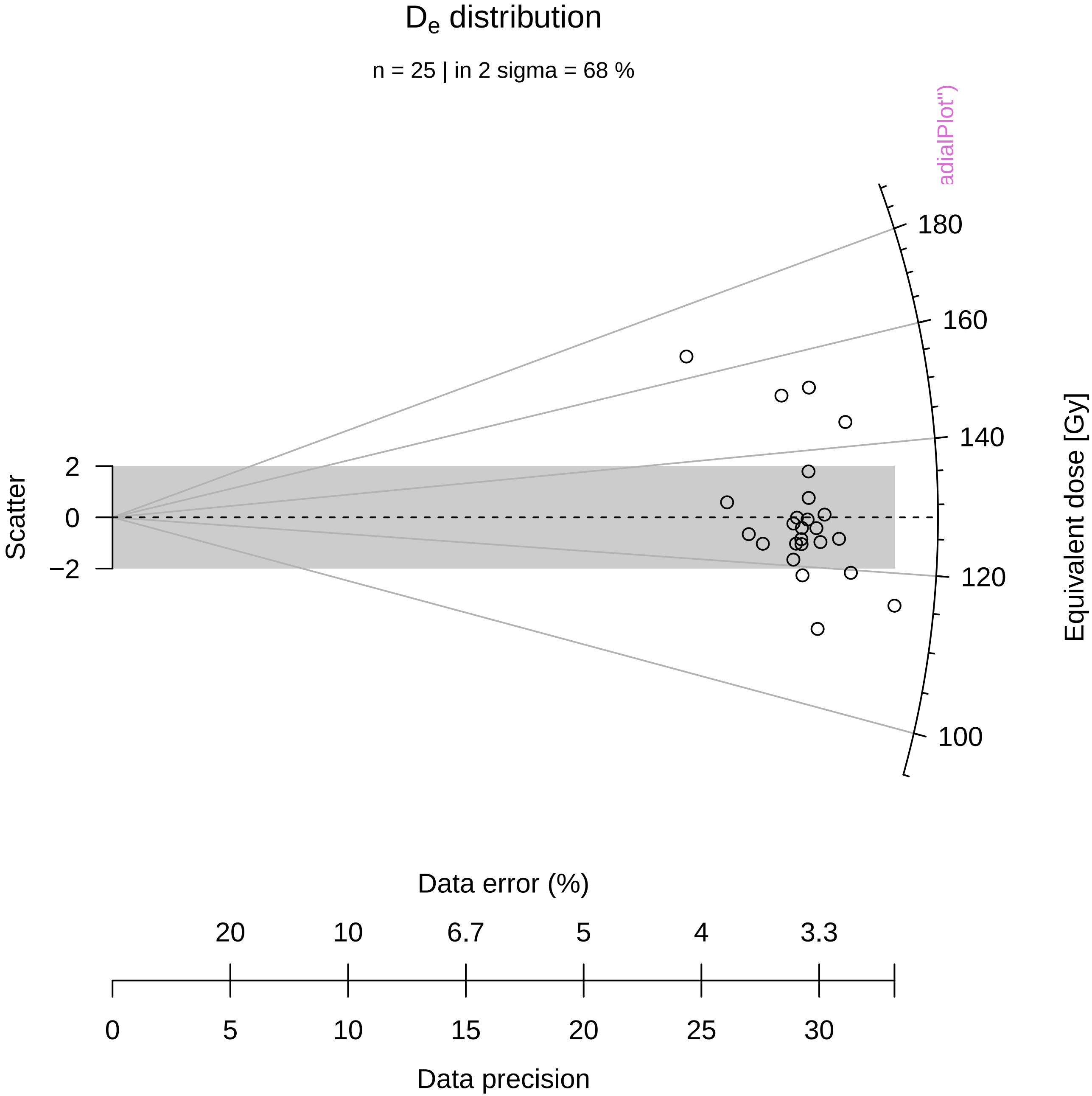
D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

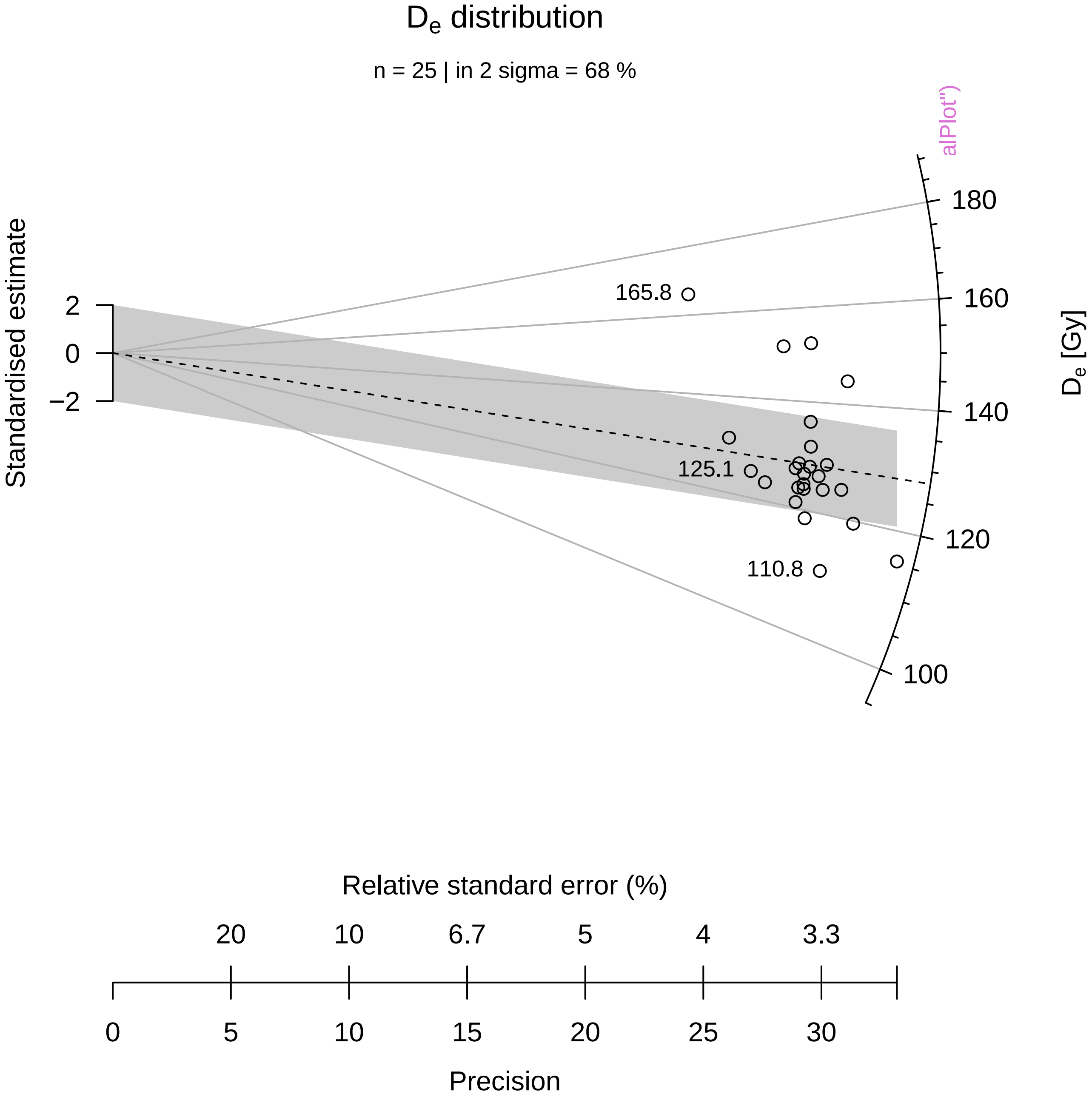


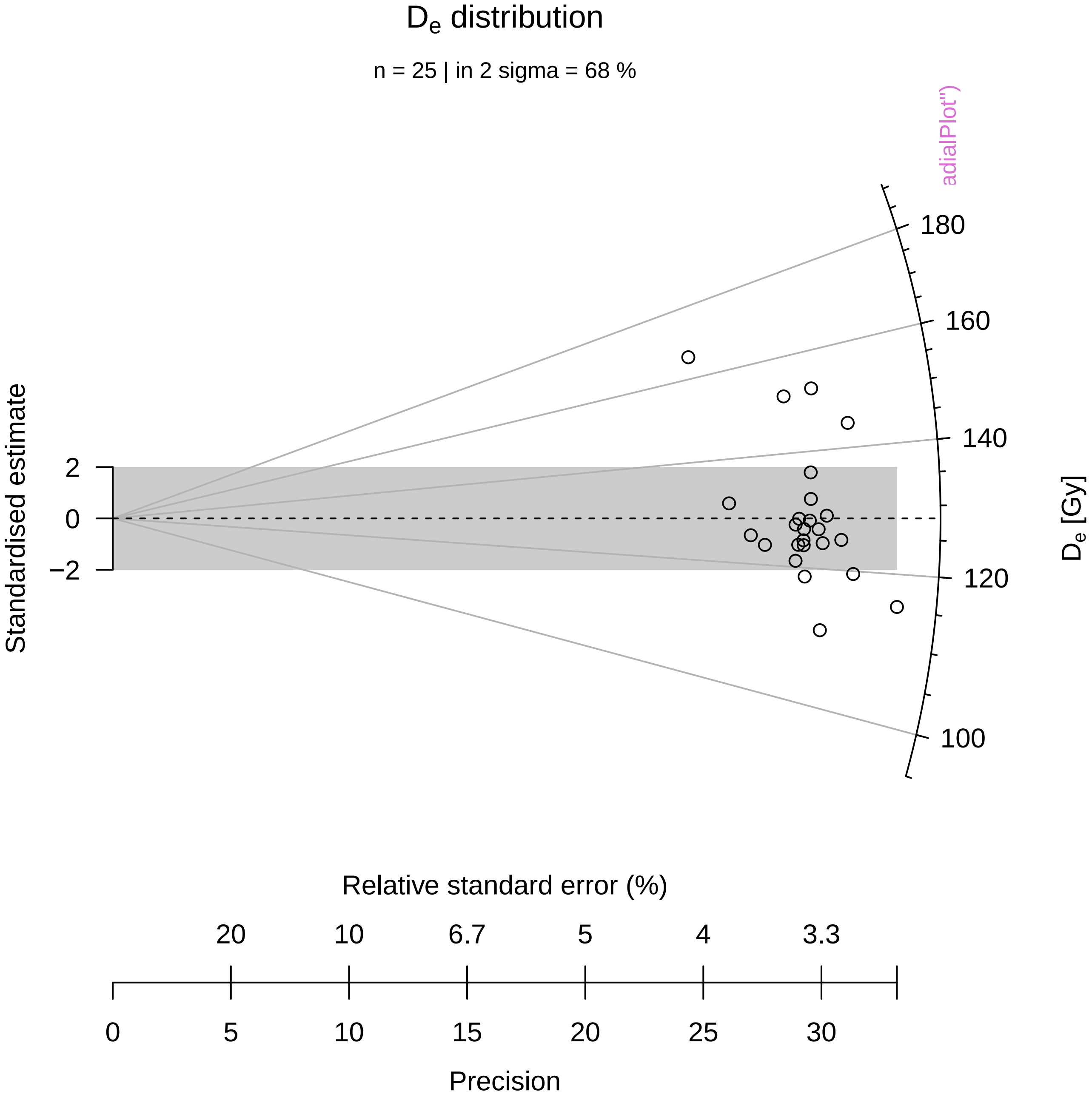
D$_e$ distribution
n = 25 | in 2 sigma = 68 %
radialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D$_e$ [Gy]
R
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

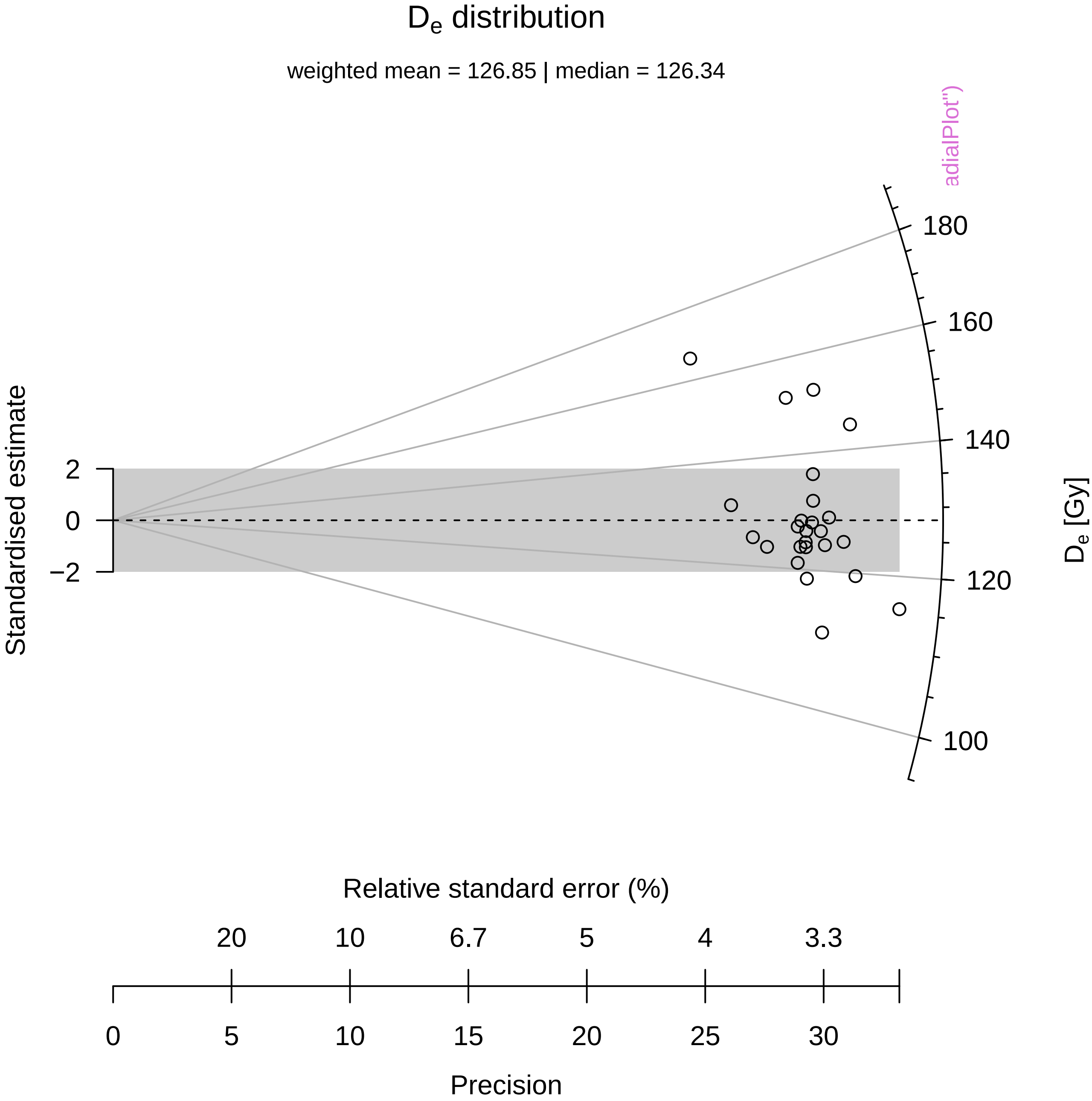


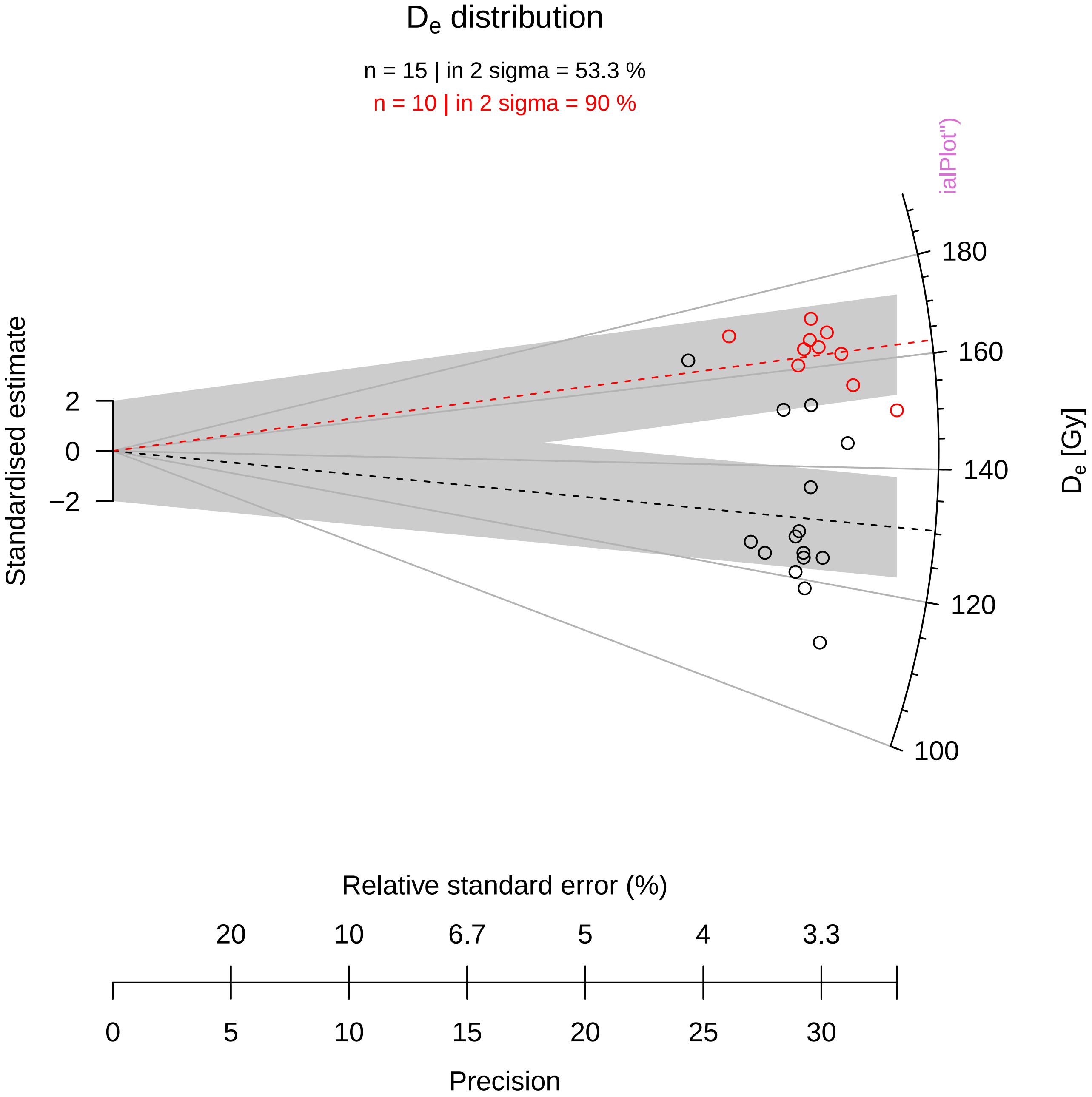
D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
0
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

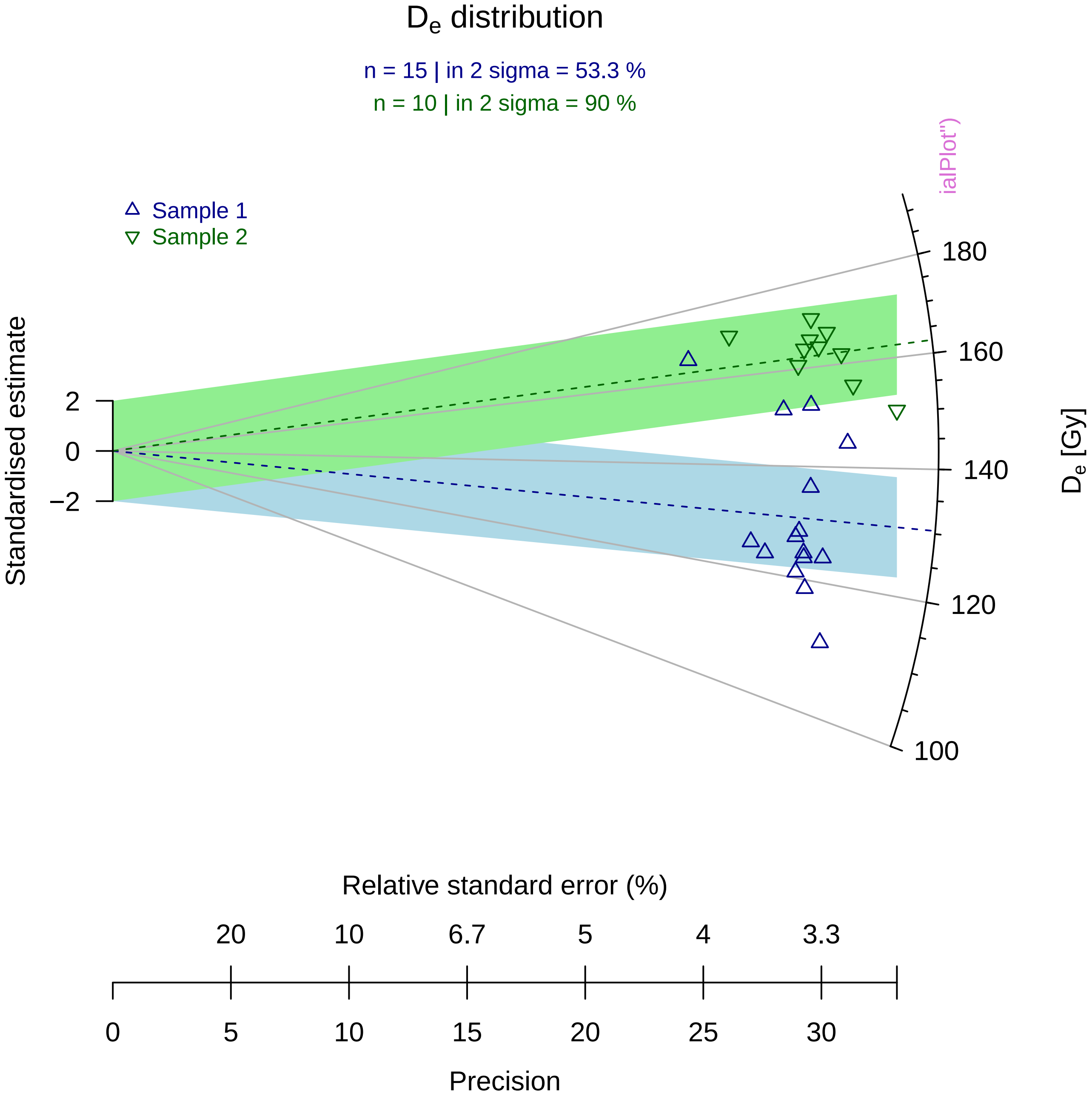

D$_e$ distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Scatter
2
0
−2
Equivalent dose [Gy]
180
160
140
120
100
Data error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Data precision

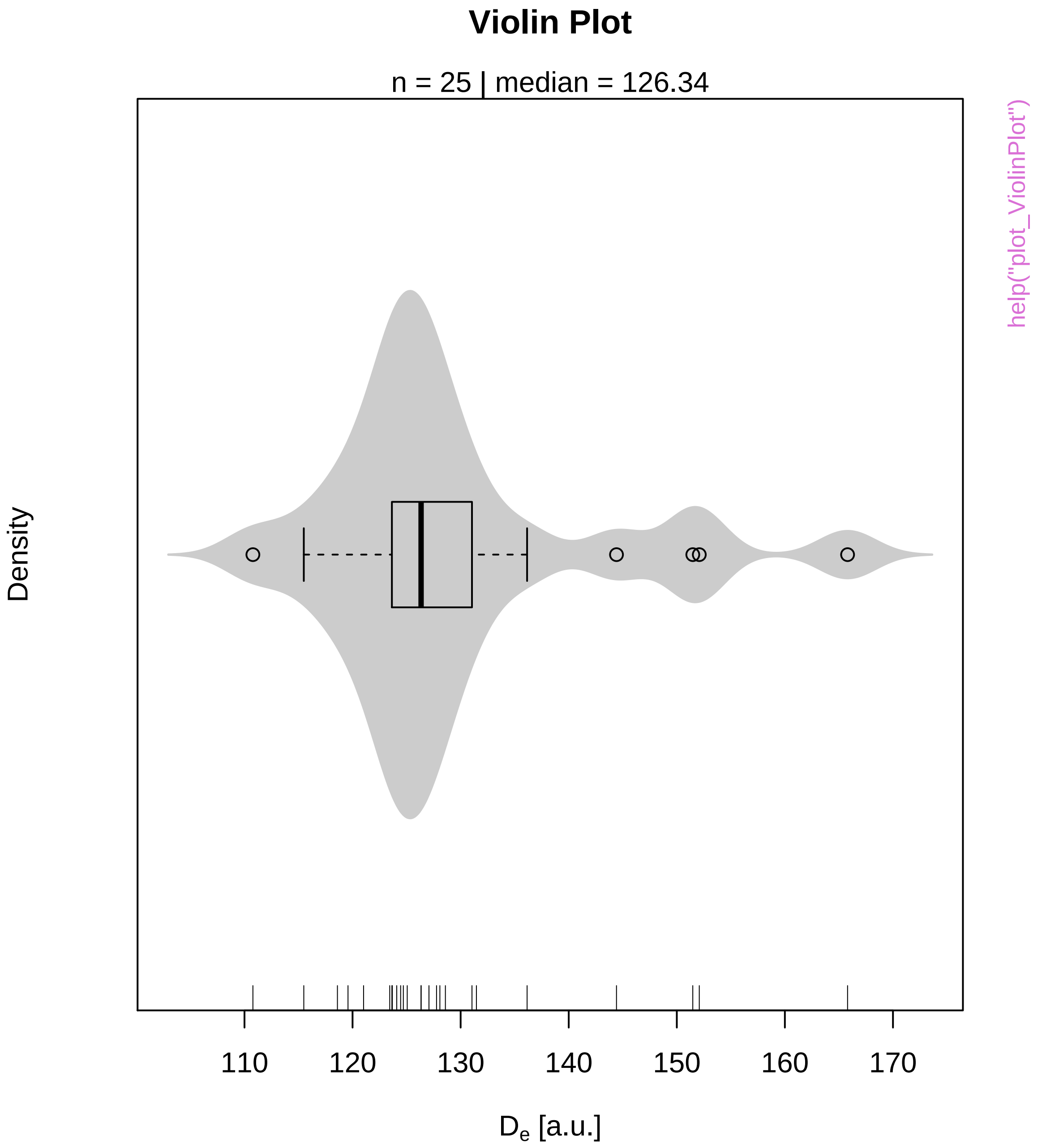

De distribution
n = 25 | in 2 sigma = 68 %
alPlot")
Standardised estimate
2
0
−2
165.8
125.1
110.8
180
160
140
120
100
De [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

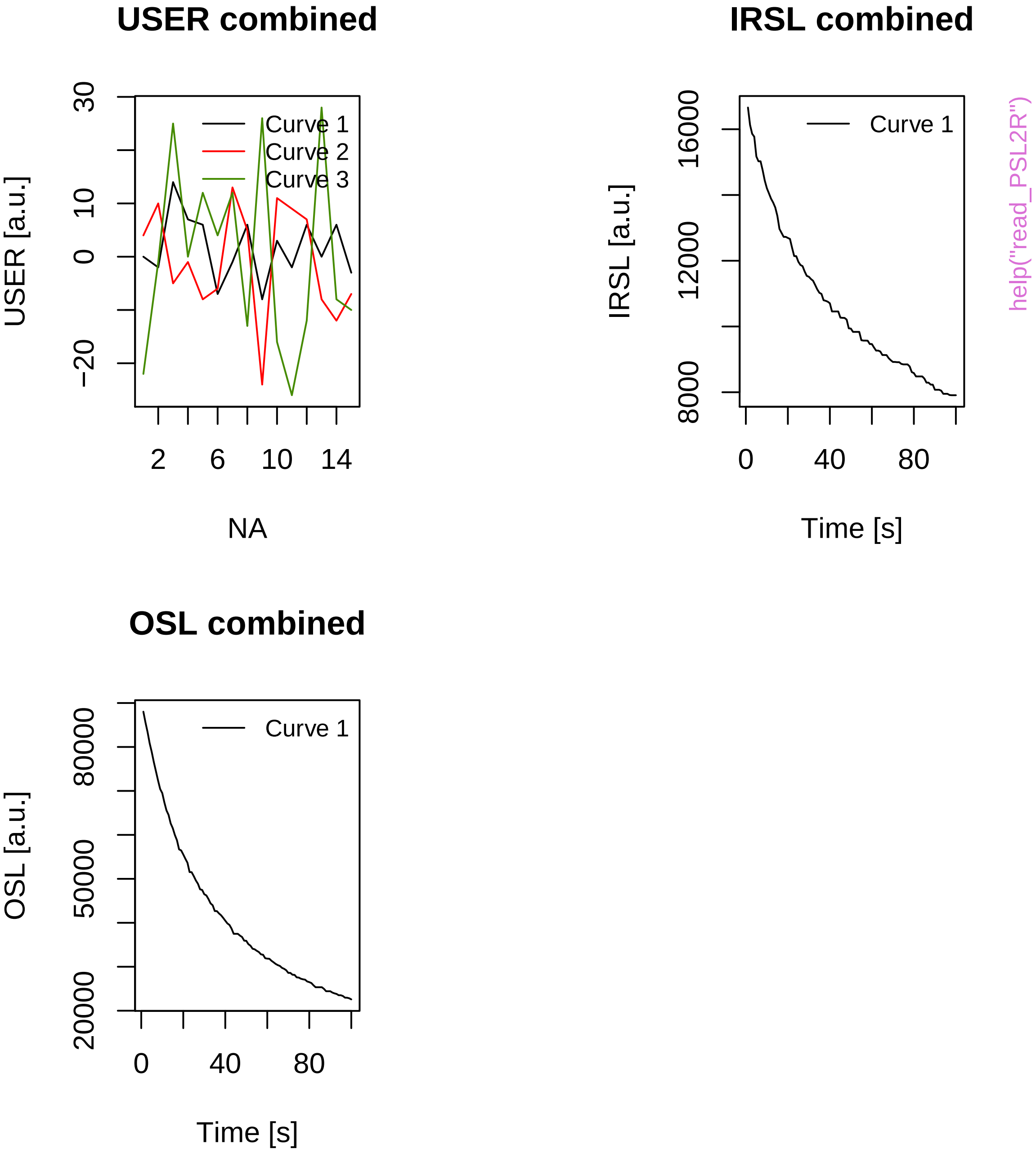

D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

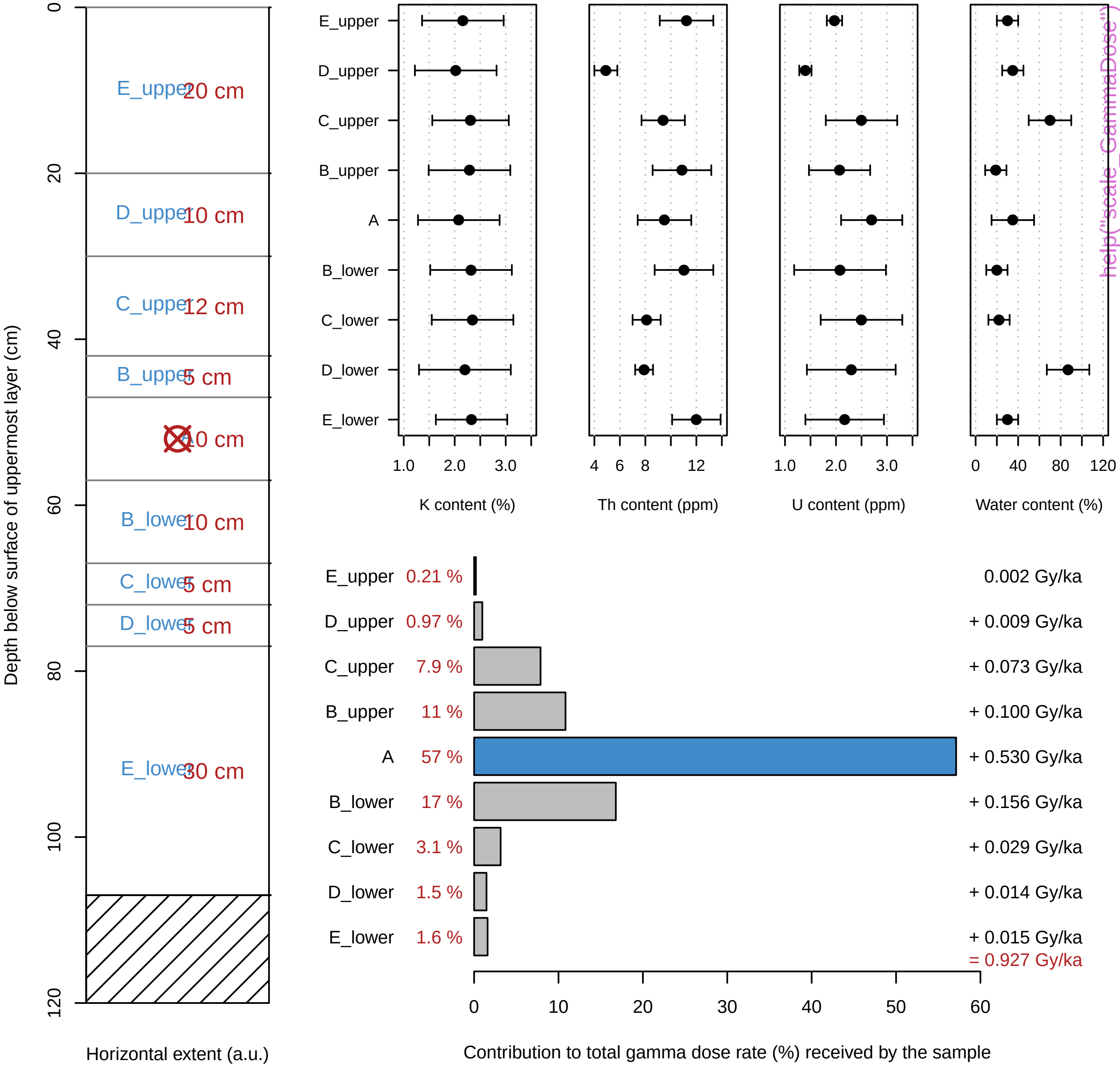

D_e distribution
weighted mean = 126.85 | median = 126.34
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

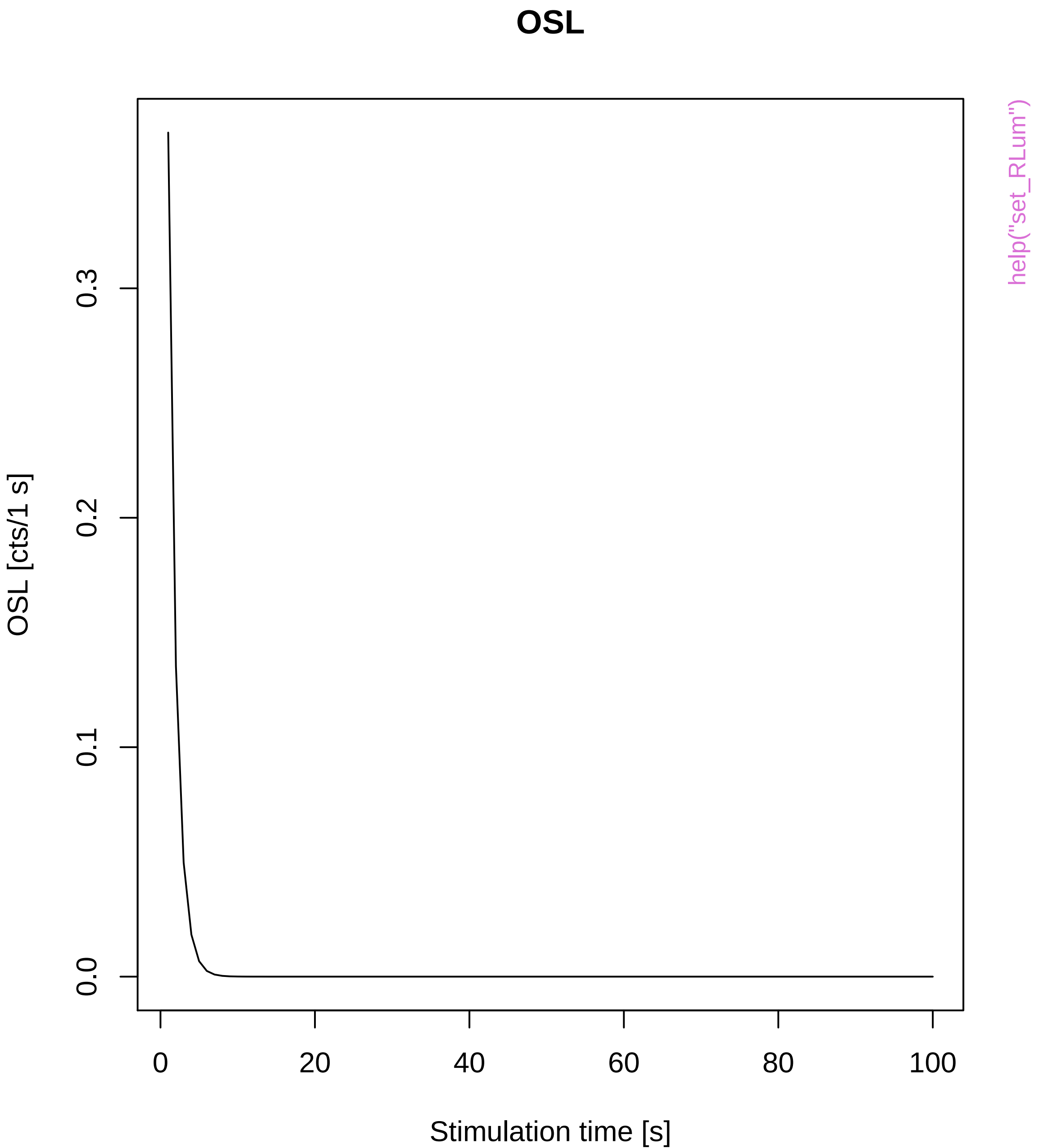

D_e distribution
n = 15 | in 2 sigma = 53.3 %
n = 10 | in 2 sigma = 90 %
ialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

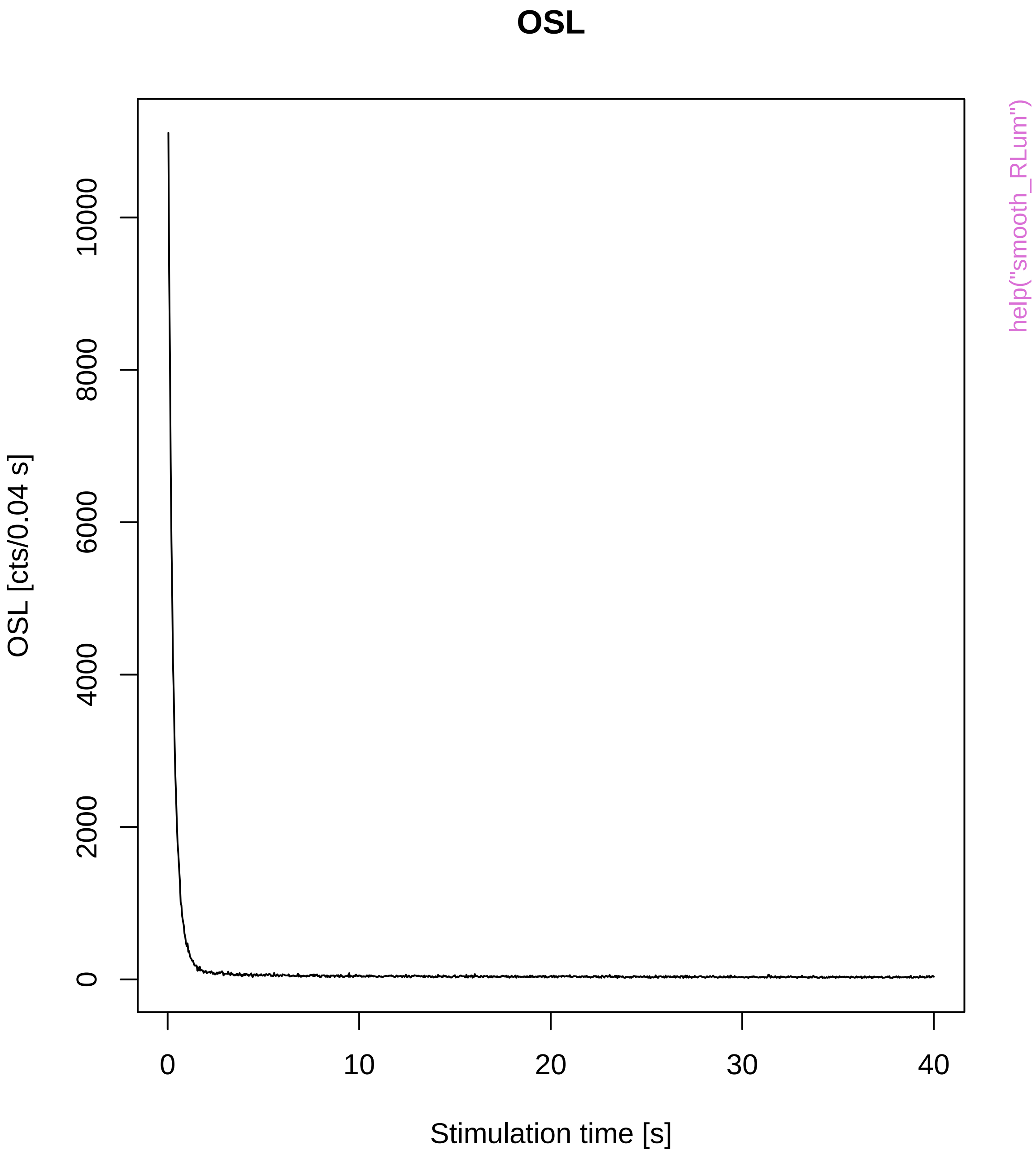

D_e distribution
n = 15 | in 2 sigma = 53.3 %
n = 10 | in 2 sigma = 90 %
ialPlot")
Sample 1
Sample 2
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

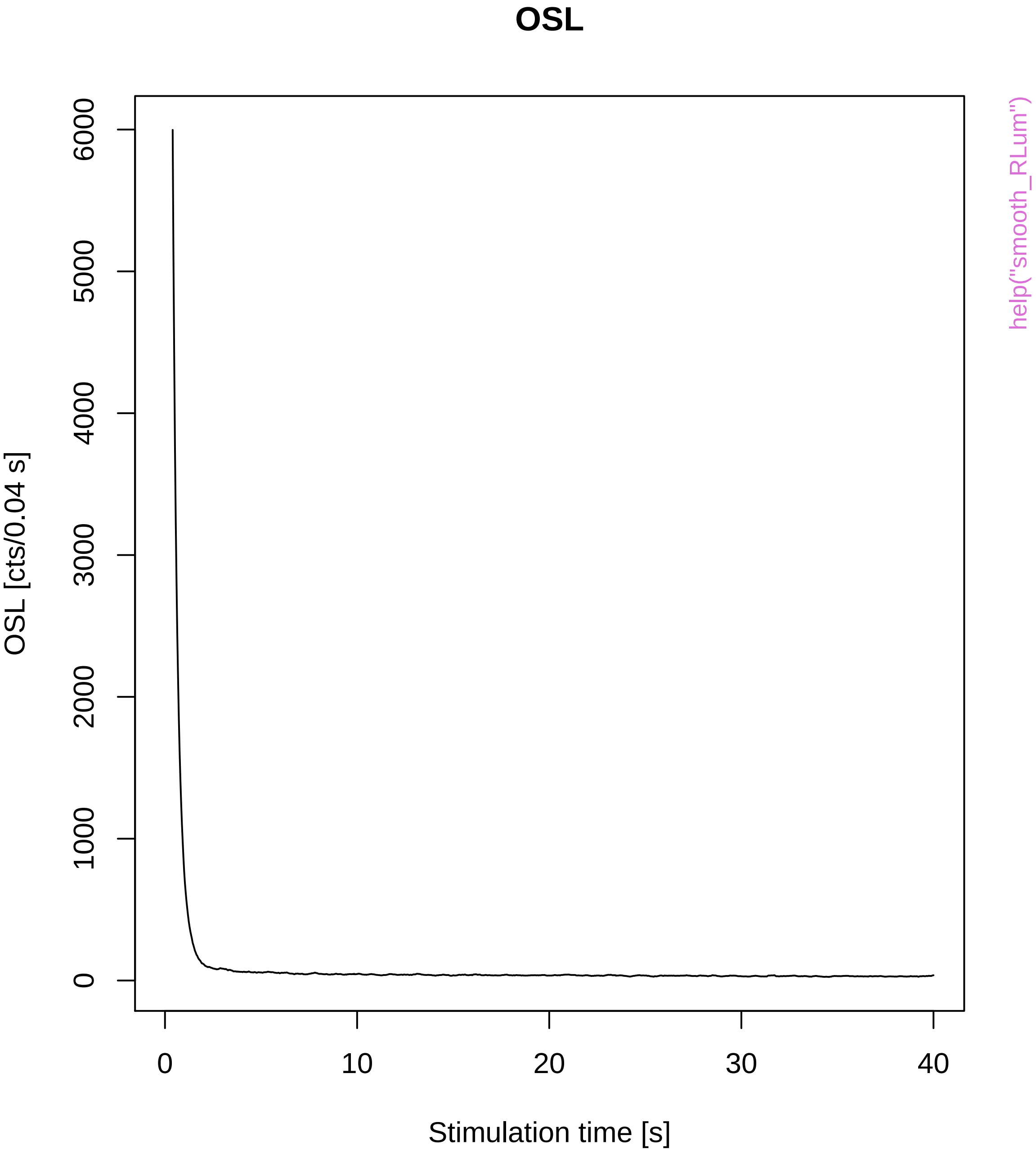

Violin Plot
n = 25 | median = 126.34
help("plot_ViolinPlot")
Density
110
120
130
140
150
160
170
D_e [a.u.]

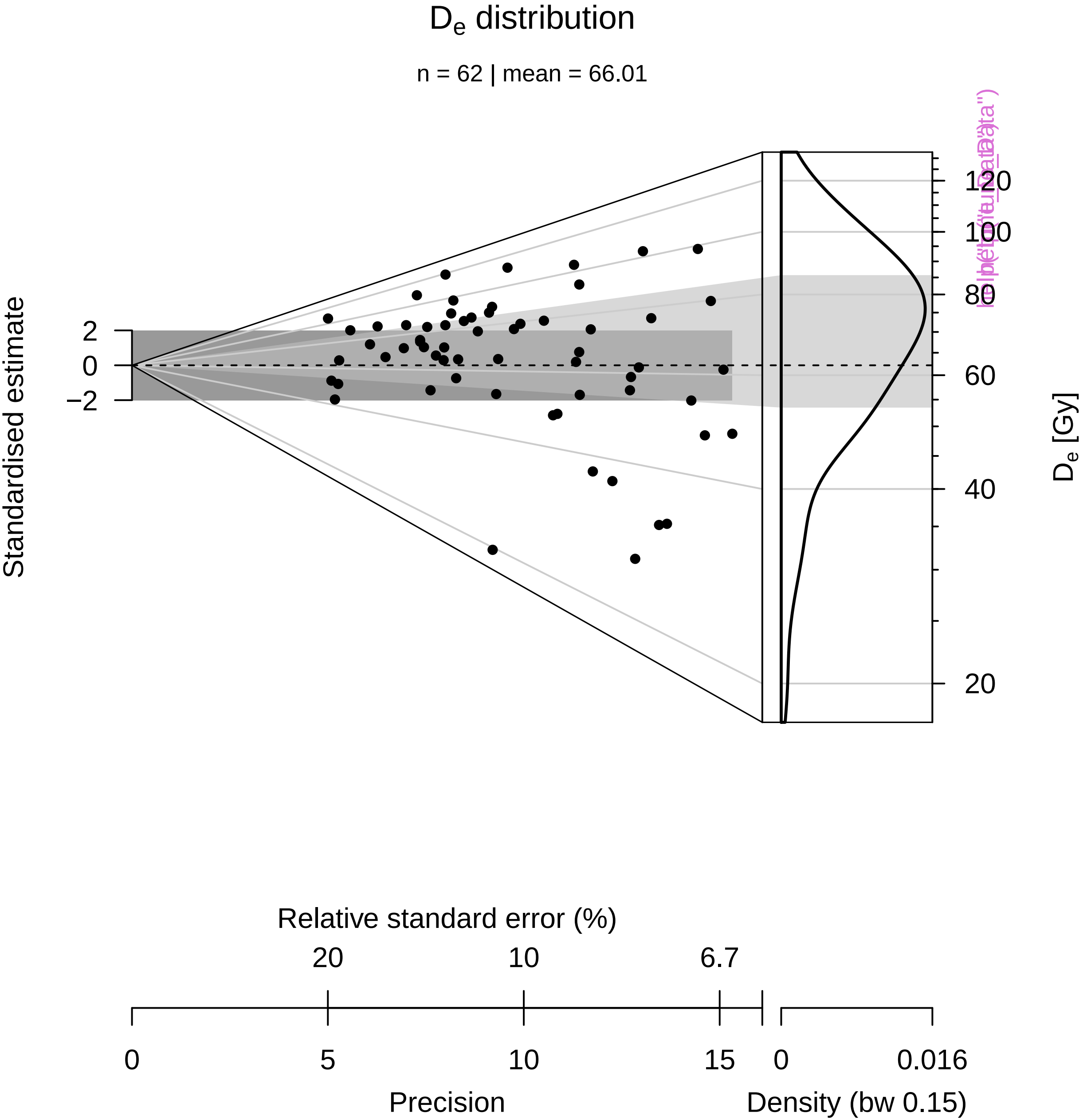

USER combined
USER [a.u.]
30
10
0
−20
2
6
10
14
NA
Curve 1
Curve 2
Curve 3
IRSL combined
IRSL [a.u.]
16000
12000
8000
0
40
80
Time [s]
Curve 1
help("read_PSL2R")
OSL combined
OSL [a.u.]
80000
50000
20000
0
40
80
Time [s]
Curve 1

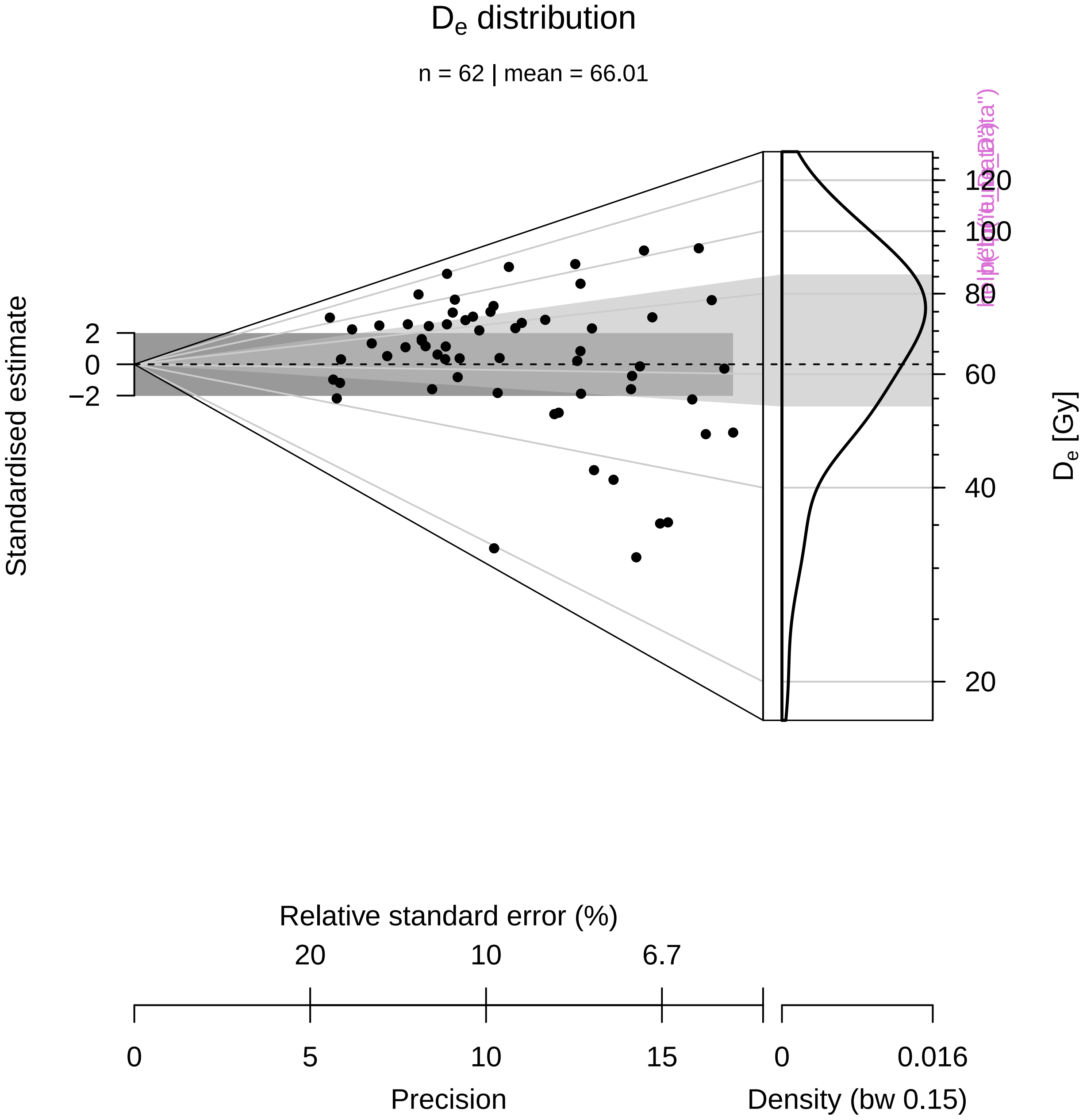

Depth below surface of uppermost layer (cm)
0
20
40
60
80
100
120
E_upper 20 cm
D_upper 10 cm
C_upper 12 cm
B_upper 5 cm
A 10 cm
B_lower 10 cm
C_lower 5 cm
D_lower 5 cm
E_lower 30 cm
Horizontal extent (a.u.)
E_upper
D_upper
C_upper
B_upper
A
B_lower
C_lower
D_lower
E_lower
1.0
2.0
3.0
K content (%)
4
6
8
12
Th content (ppm)
1.0
2.0
3.0
U content (ppm)
0
40
80
120
Water content (%)
help("scale_GammaDose")
E_upper 0.21 % 0.002 Gy/ka
D_upper 0.97 % + 0.009 Gy/ka
C_upper 7.9 % + 0.073 Gy/ka
B_upper 11 % + 0.100 Gy/ka
A 57 % + 0.530 Gy/ka
B_lower 17 % + 0.156 Gy/ka
C_lower 3.1 % + 0.029 Gy/ka
D_lower 1.5 % + 0.014 Gy/ka
E_lower 1.6 % + 0.015 Gy/ka
= 0.927 Gy/ka
0
10
20
30
40
50
60
Contribution to total gamma dose rate (%) received by the sample


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")


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


OSL
help("smooth_RLum")
OSL [cts/0.04 s]
0
1000
2000
3000
4000
5000
6000
0
10
20
30
40
Stimulation time [s]


D$_e$ distribution
n = 62 | mean = 66.01
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


D_e distribution
n = 62 | mean = 66.01
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)