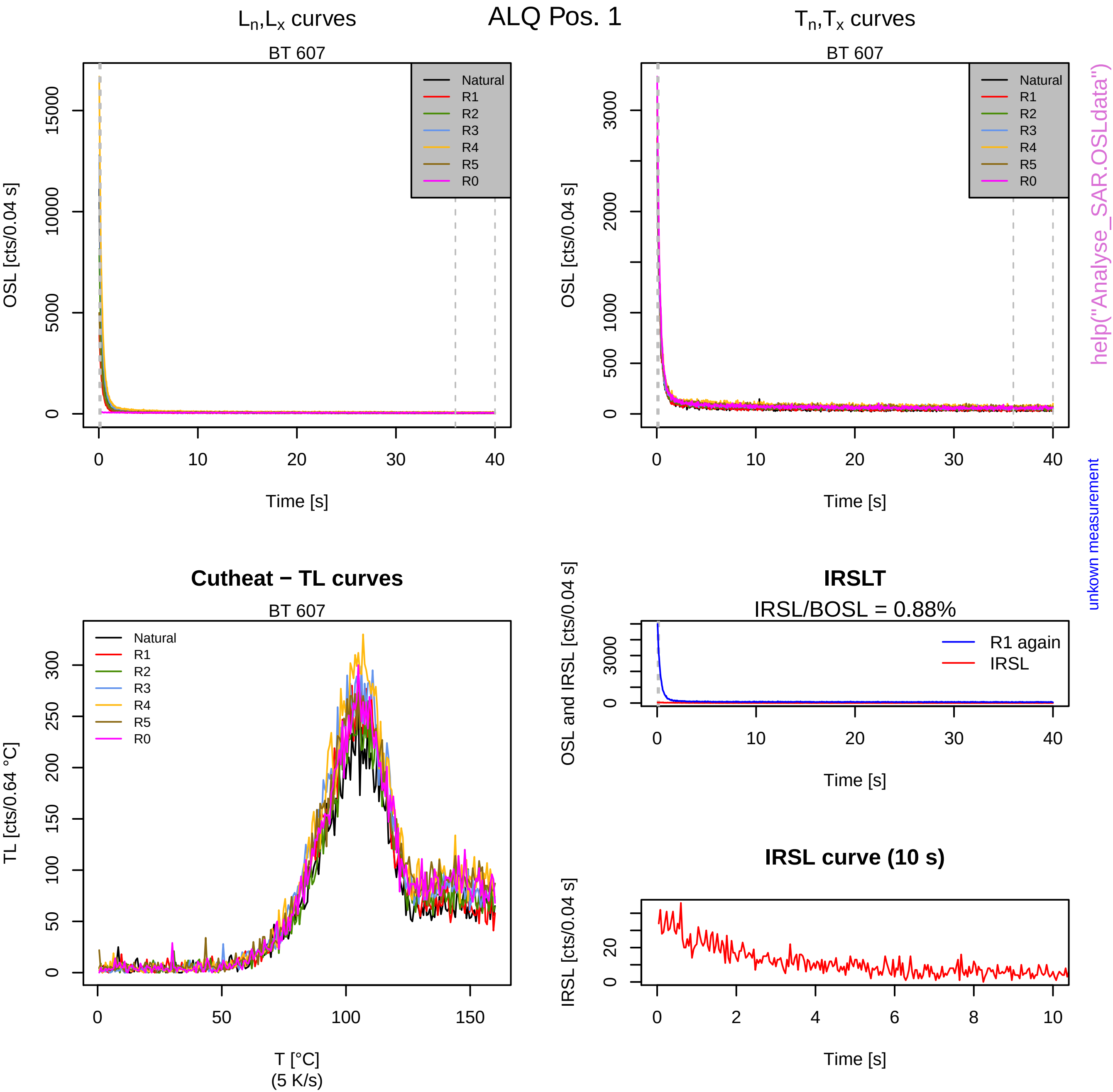
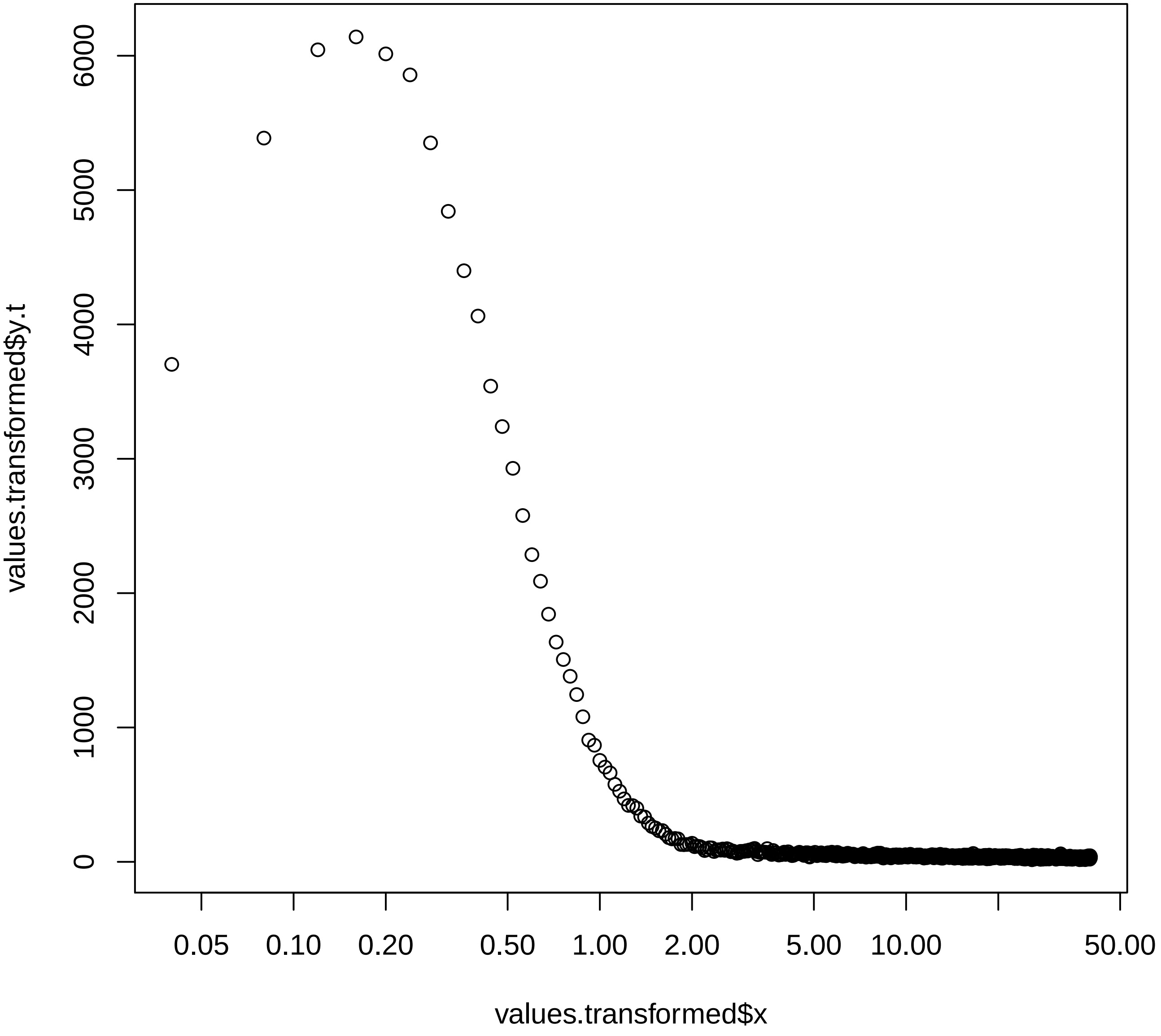
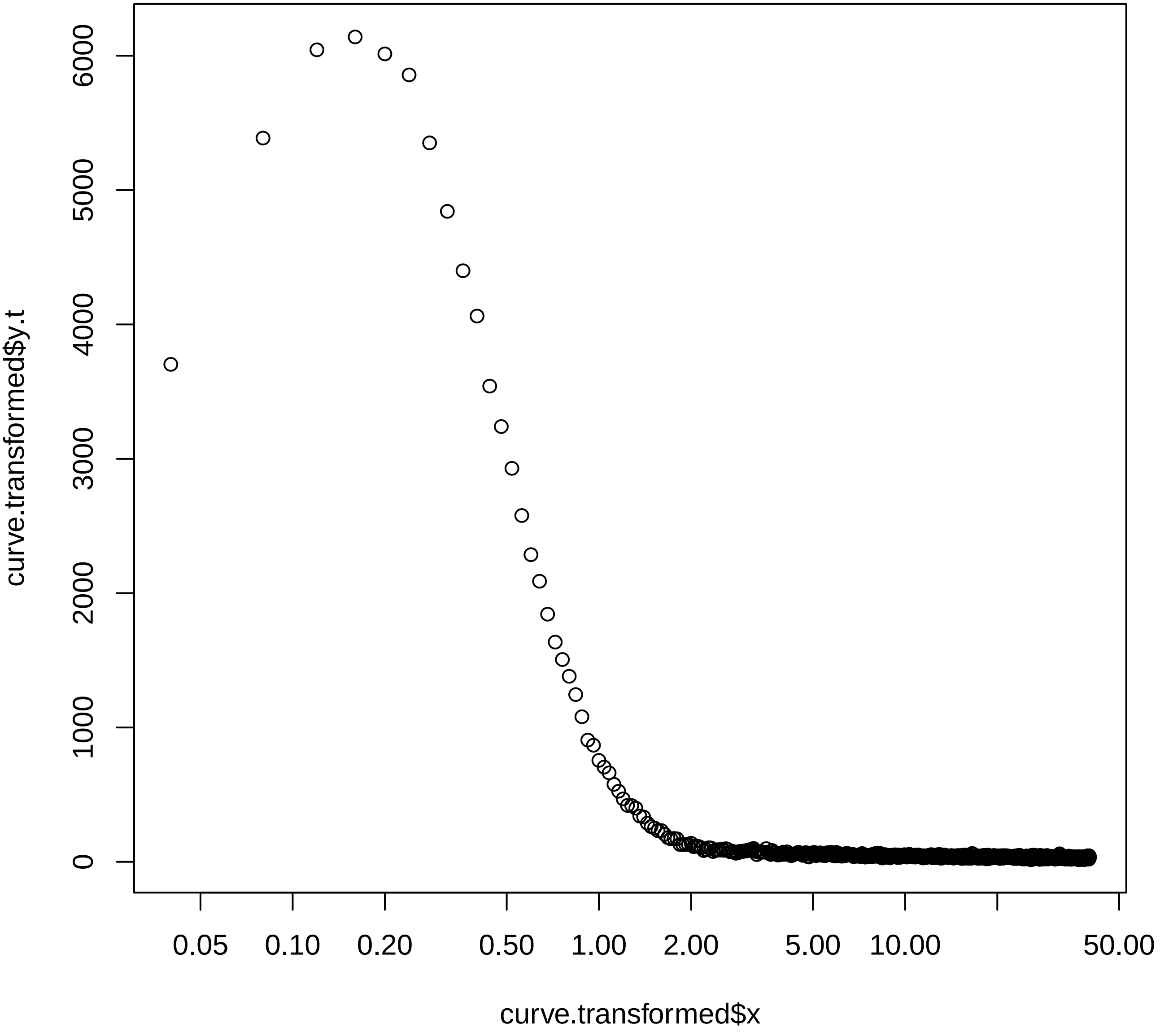

ALQ Pos. 1
L_n,L_x curves
BT 607
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]
Natural
R1
R2
R3
R4
R5
R0
T_n,T_x curves
BT 607
OSL [cts/0.04 s]
0
500
1000
2000
3000
0
10
20
30
40
Time [s]
Natural
R1
R2
R3
R4
R5
R0
help("Analyse_SAR.OSLdata")
unkown measurement
Cutheat − TL curves
BT 607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



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
help("CW2pHMi")

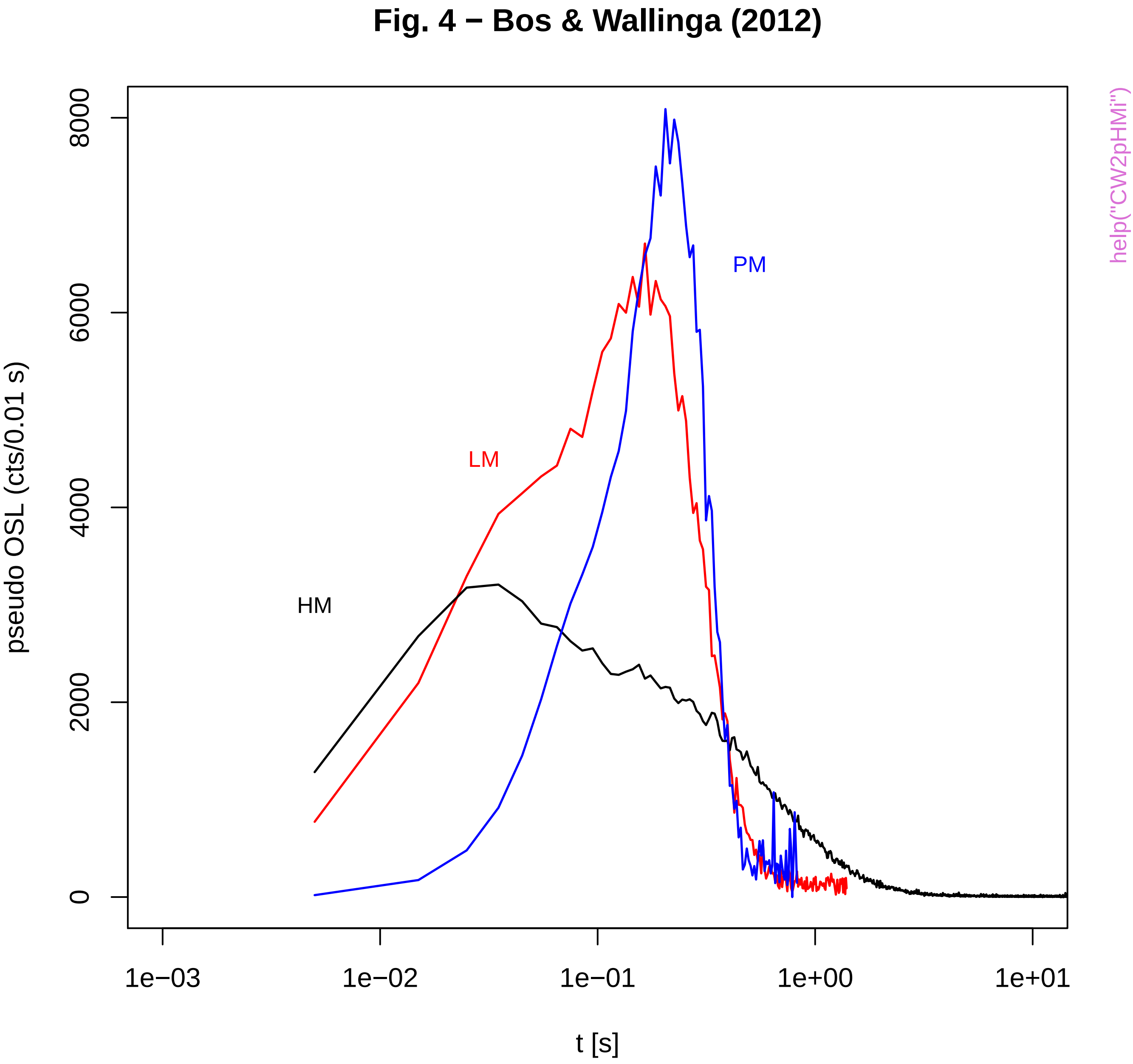
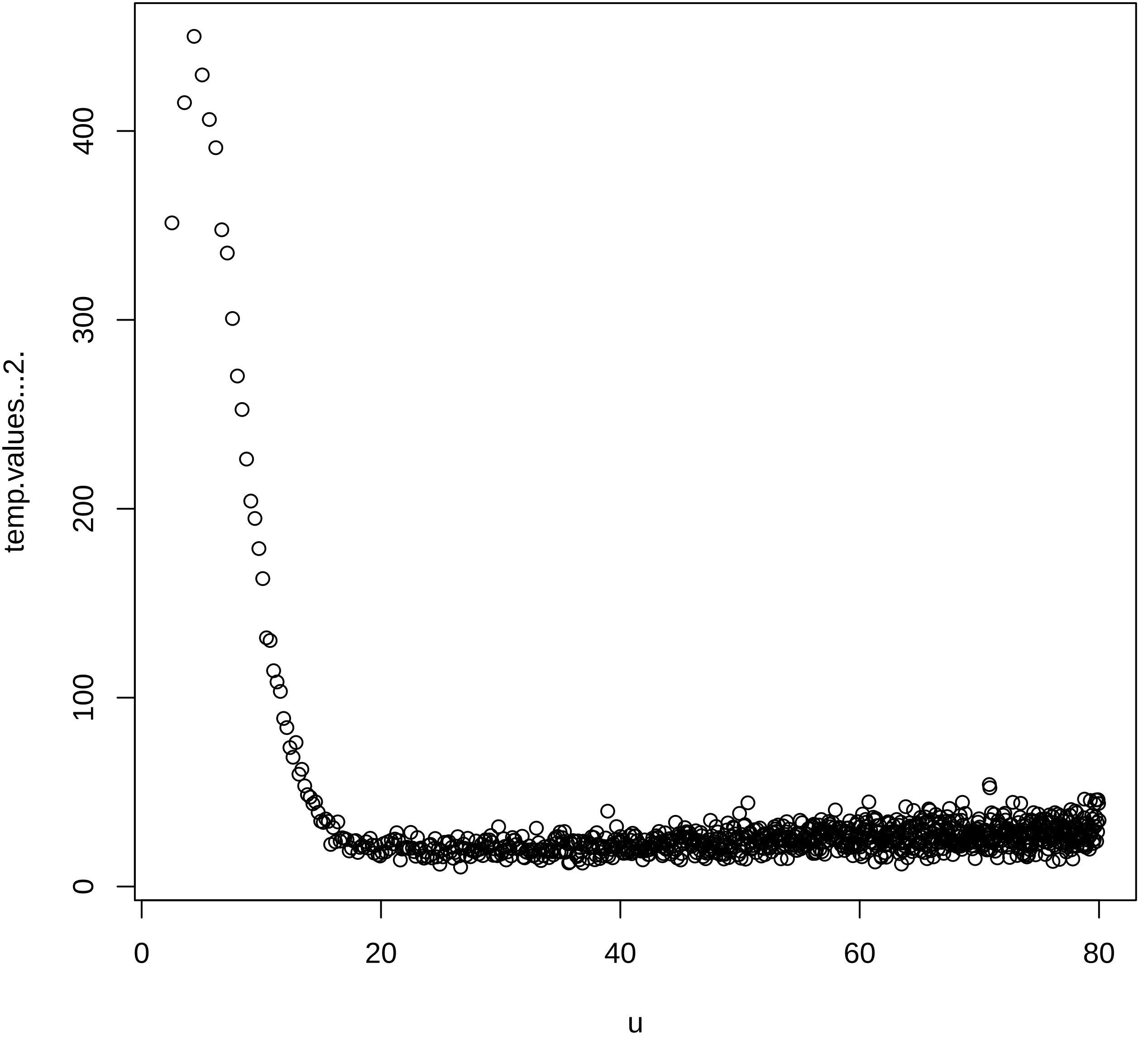
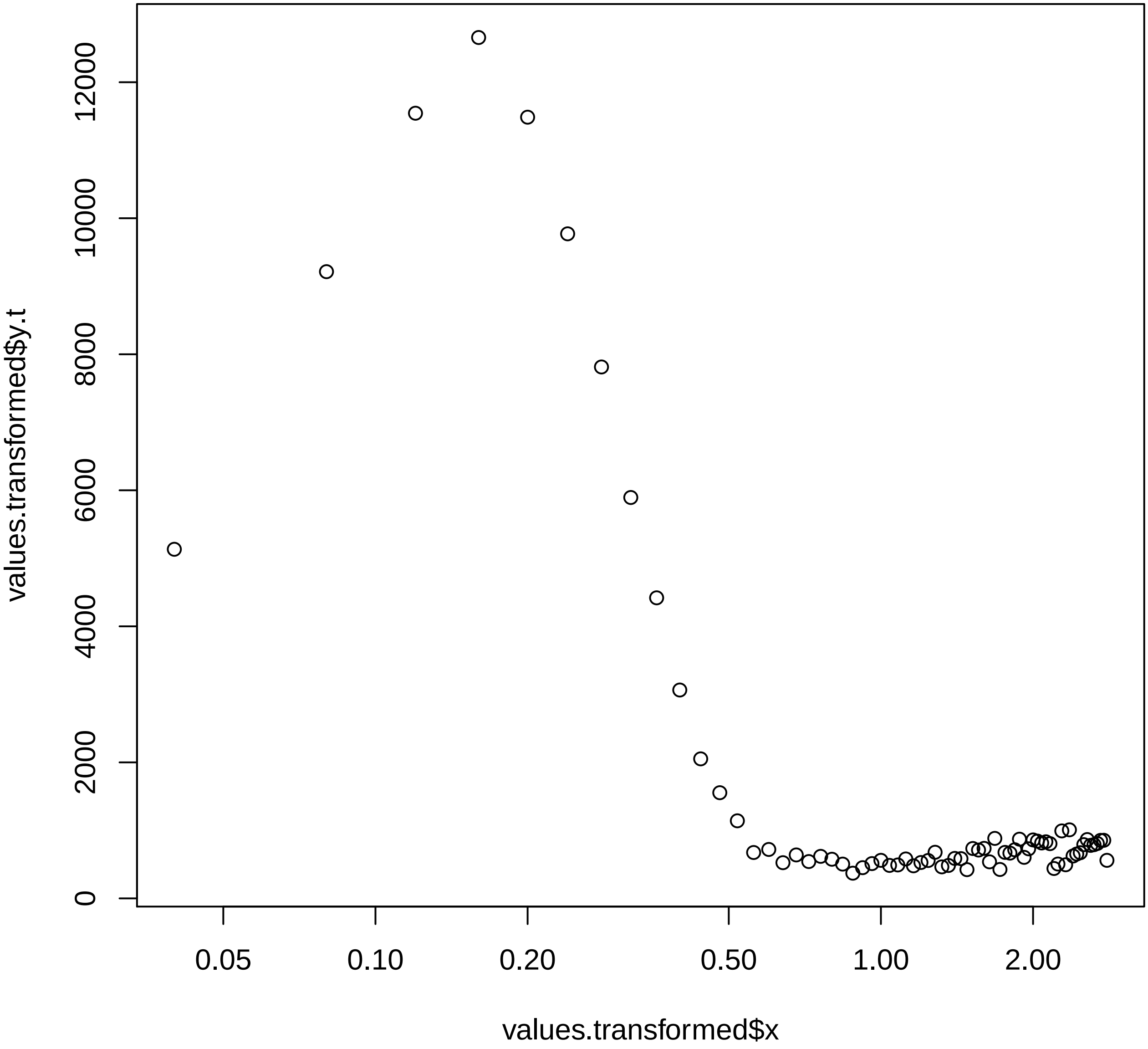


Fig. 4 − Bos & Wallinga (2012)
pseudo OSL (cts/0.01 s)
0
2000
4000
6000
8000
HM
LM
PM
1e−03
1e−02
1e−01
1e+00
1e+01
t [s]
help("CW2pHMi")


temp.values...2.
0
100
200
300
400
0
20
40
60
80
u

help("CW2pLM")



help("CW2pLMi")

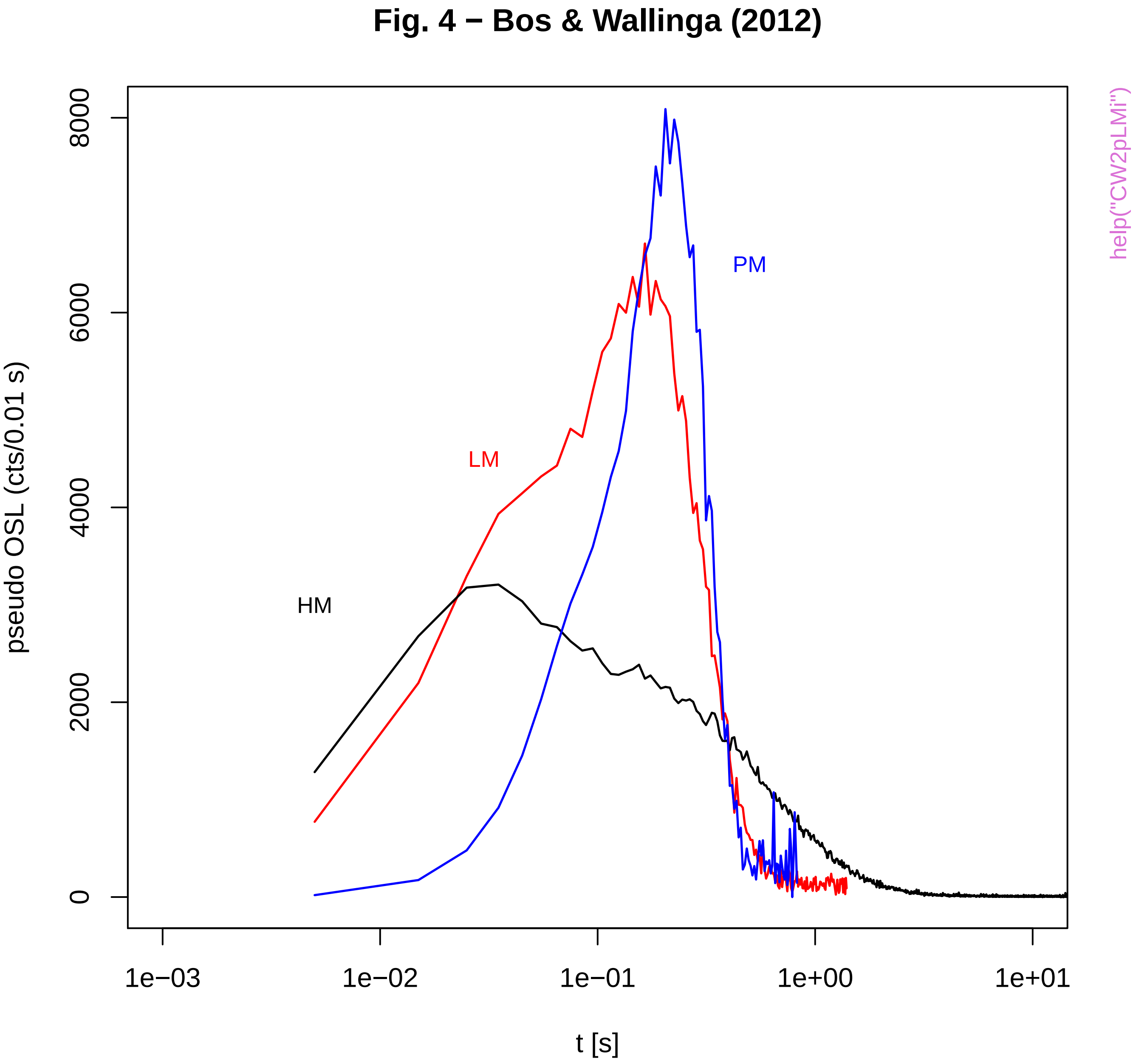


Fig. 4 − Bos & Wallinga (2012)
pseudo OSL (cts/0.01 s)
0
2000
4000
6000
8000
t [s]
1e−03
1e−02
1e−01
1e+00
1e+01
HM
LM
PM
help("CW2pLMi")

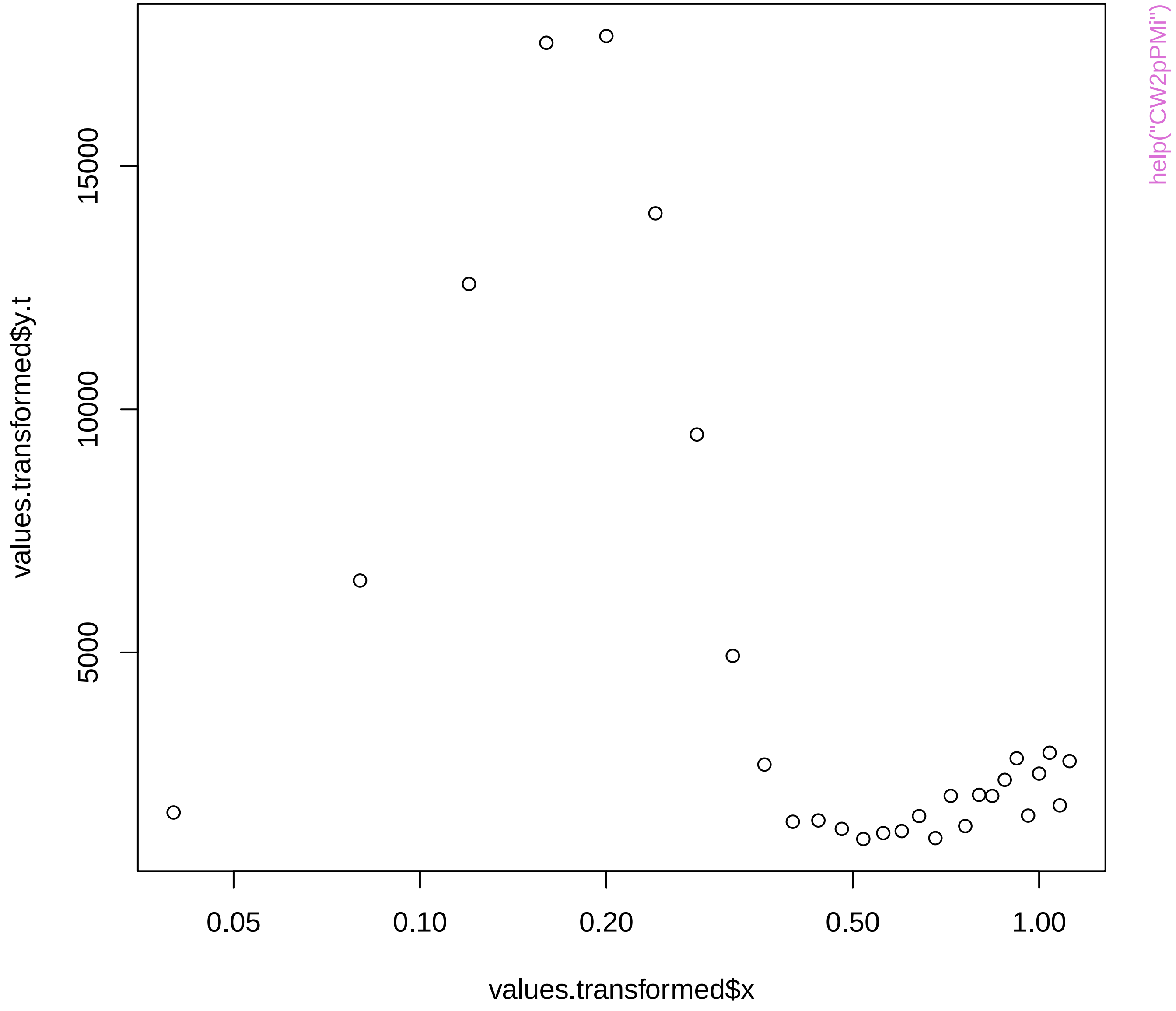
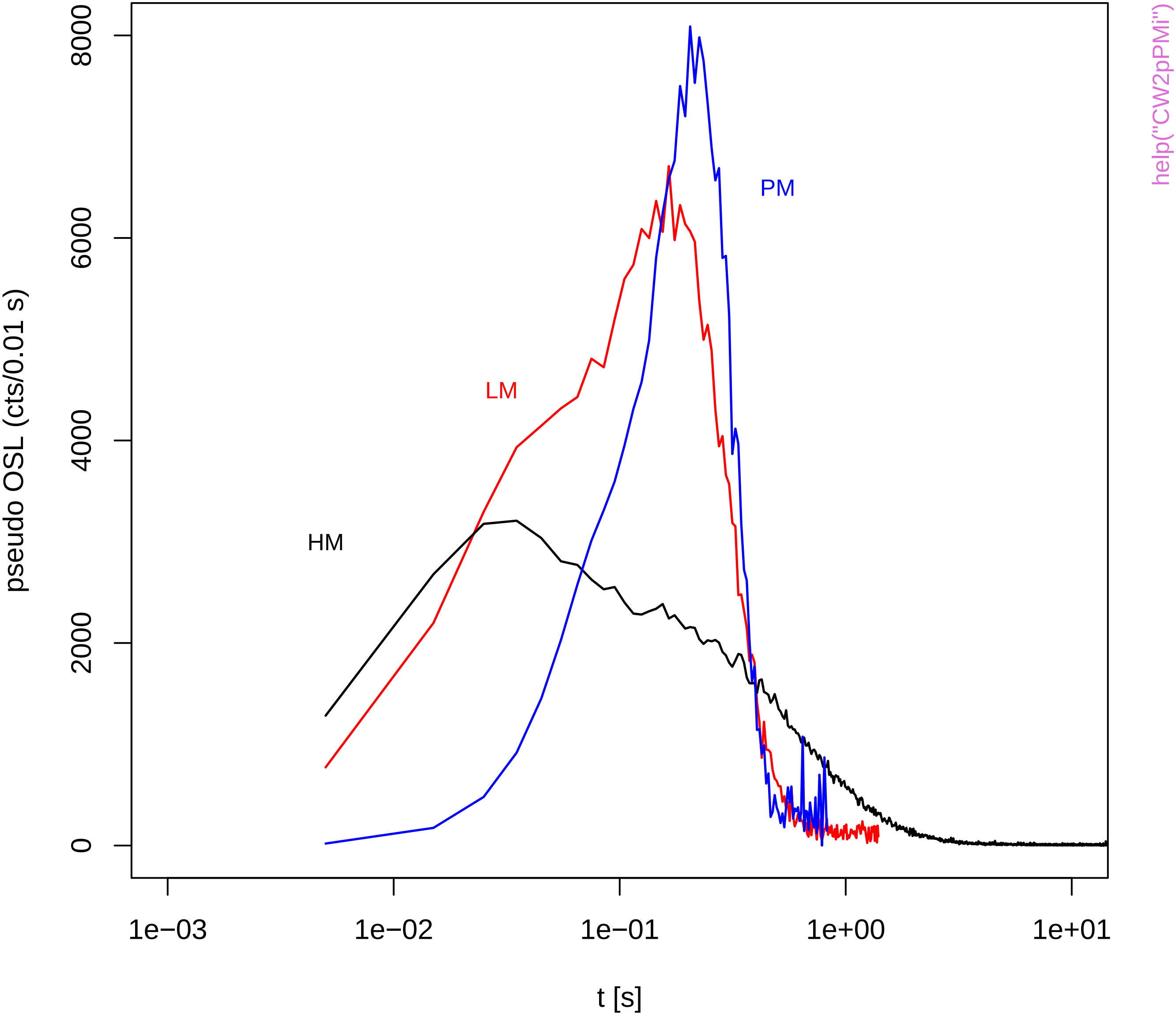
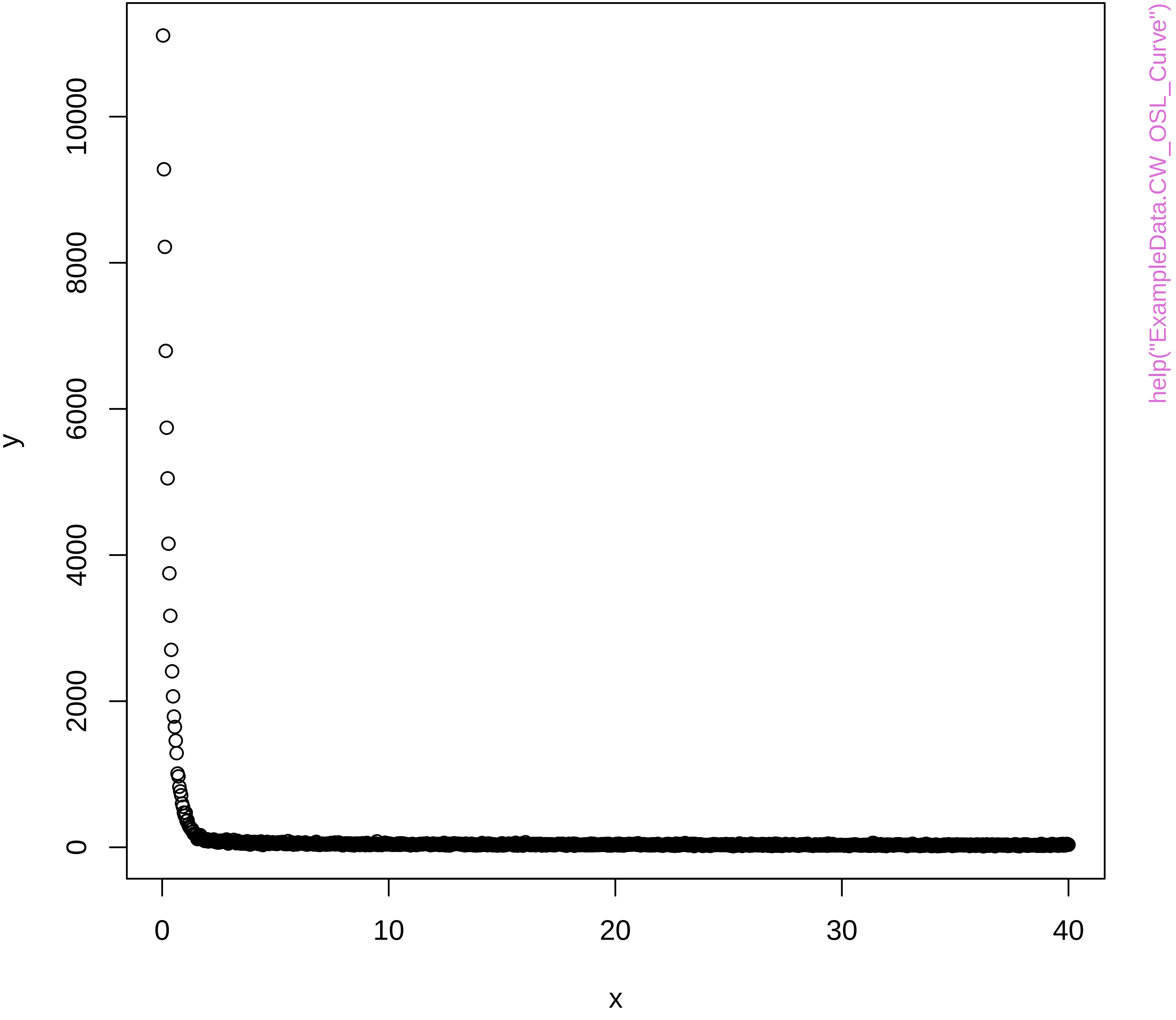
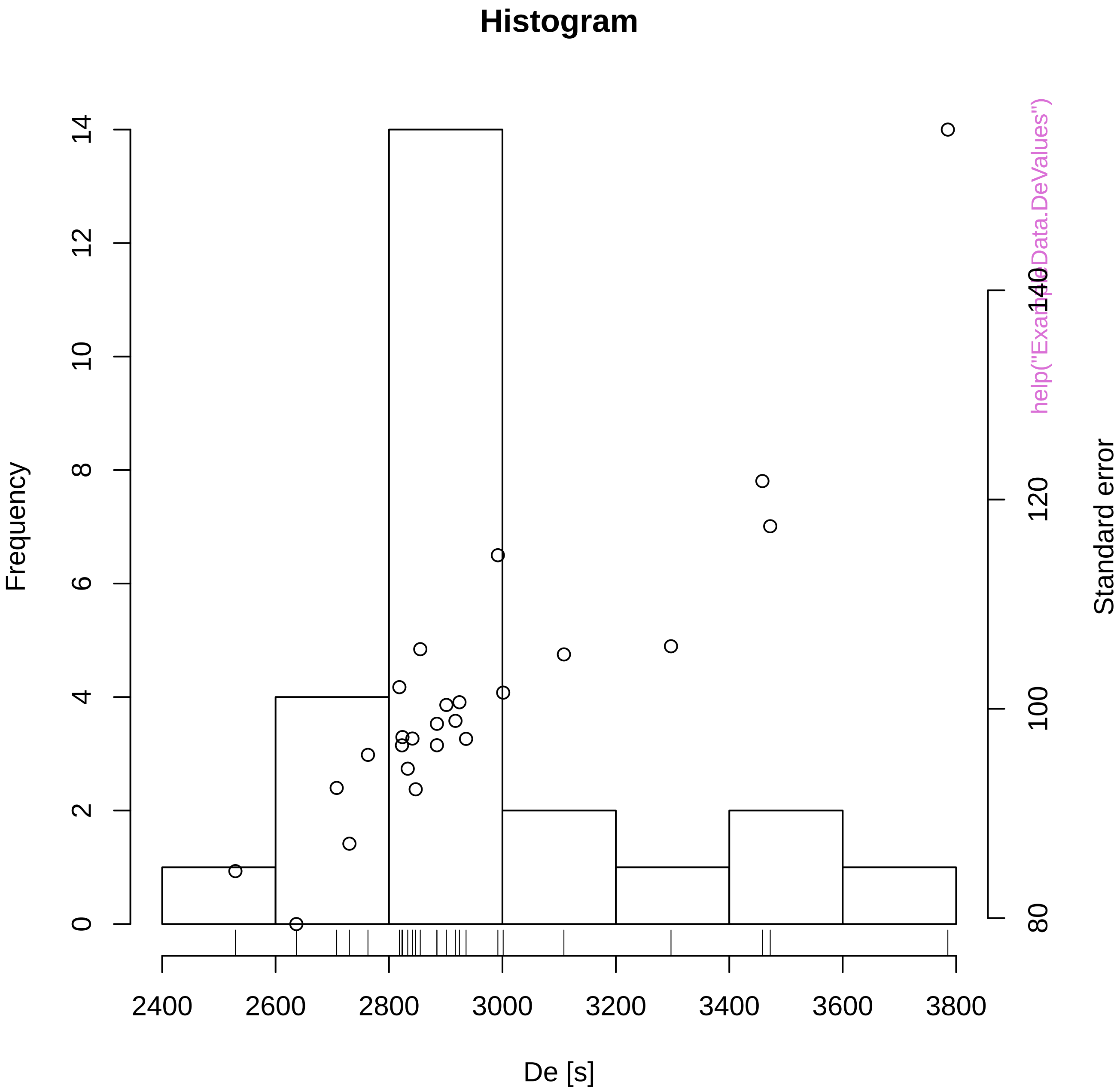

15000
10000
5000
values.transformed$y.t
0.05
0.10
0.20
0.50
1.00
values.transformed$x
help("CW2pPMi")

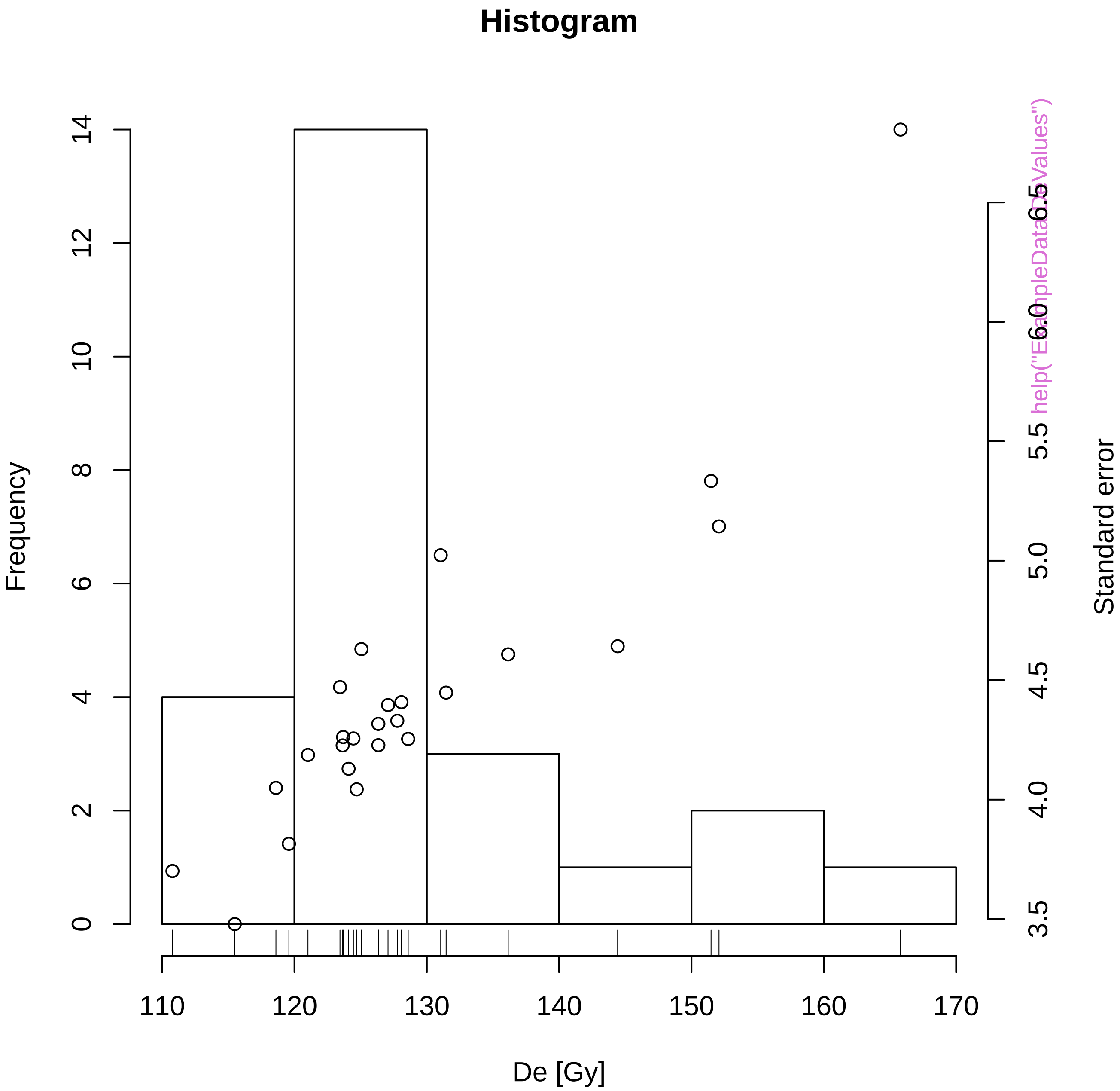
Fig. 4 − Bos & Wallinga (2012)





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

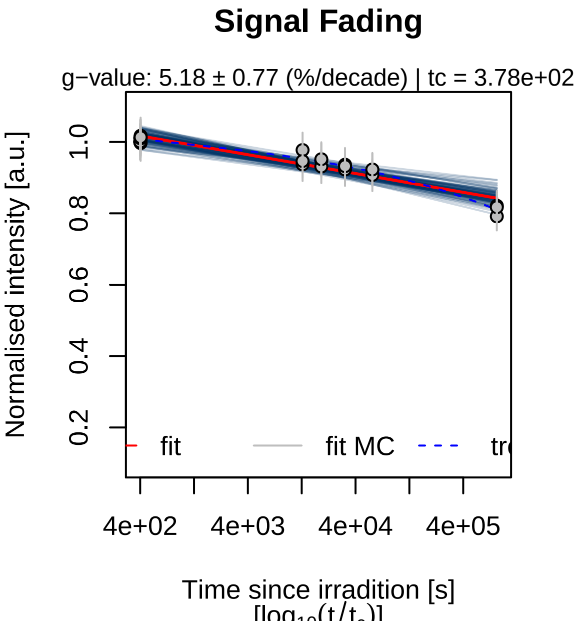

Histogram
Frequency
0
2
4
6
8
10
12
14
De [s]
2400
2600
2800
3000
3200
3400
3600
3800
Standard error
80
100
120
140
help("ExampleData.DeValues")

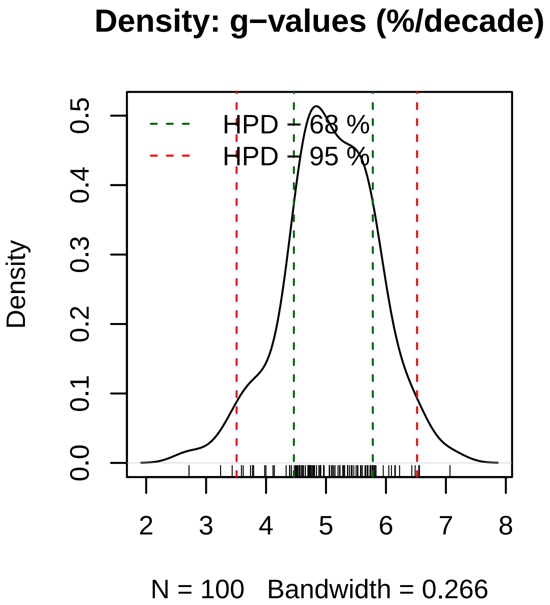

Histogram
Frequency
0
2
4
6
8
10
12
14
De [Gy]
110
120
130
140
150
160
170
Standard error
3.5
4.0
4.5
5.0
5.5
6.0
6.5
help("ExampleData.DeValues")

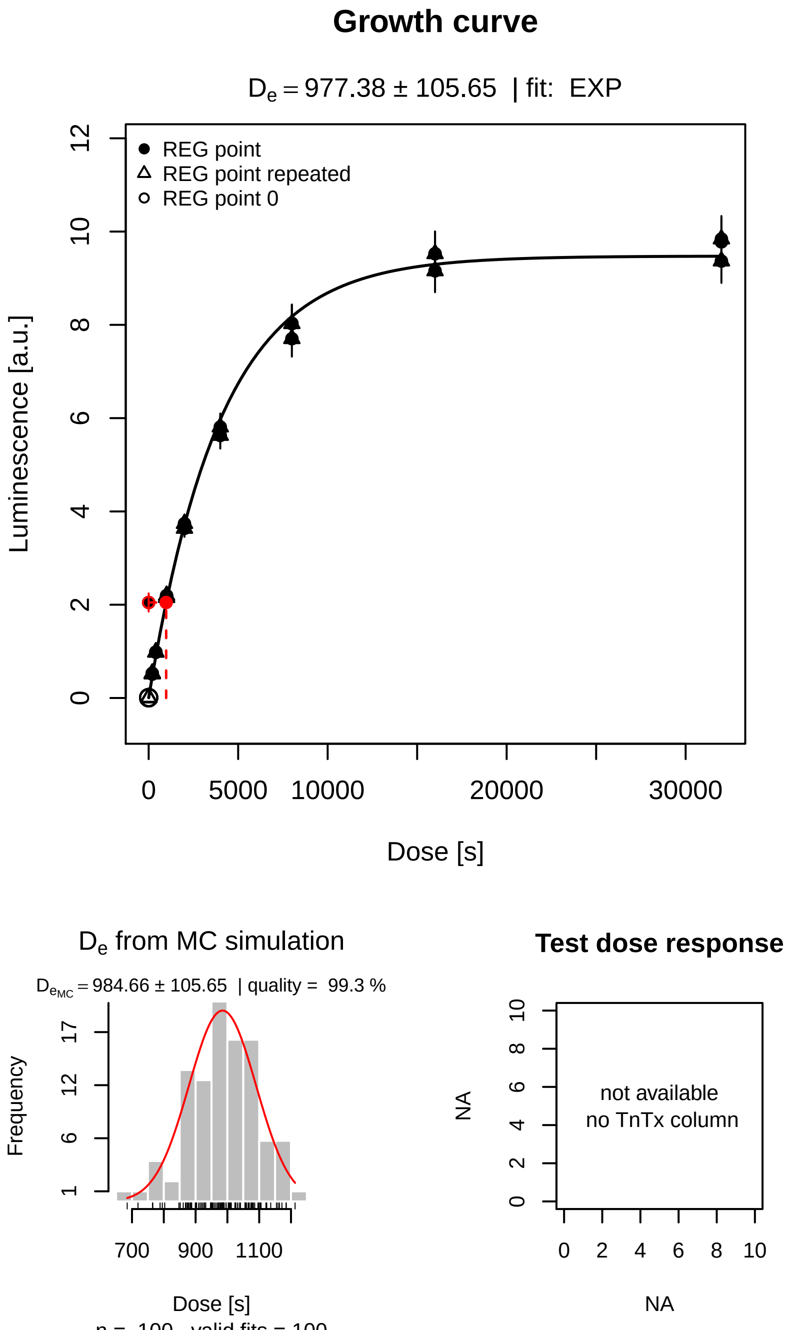
No L_x curves detected

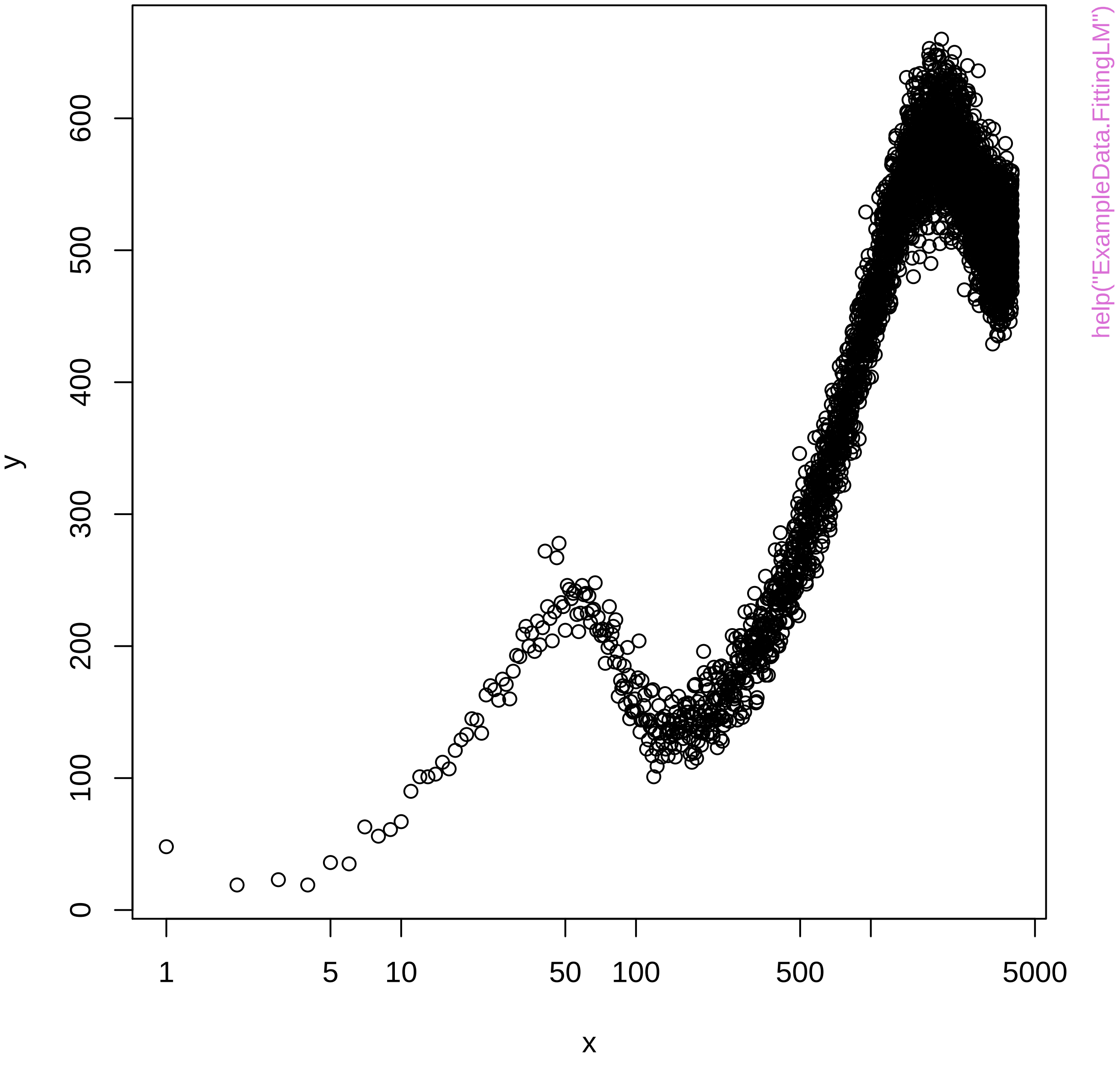
No T_x curves detected

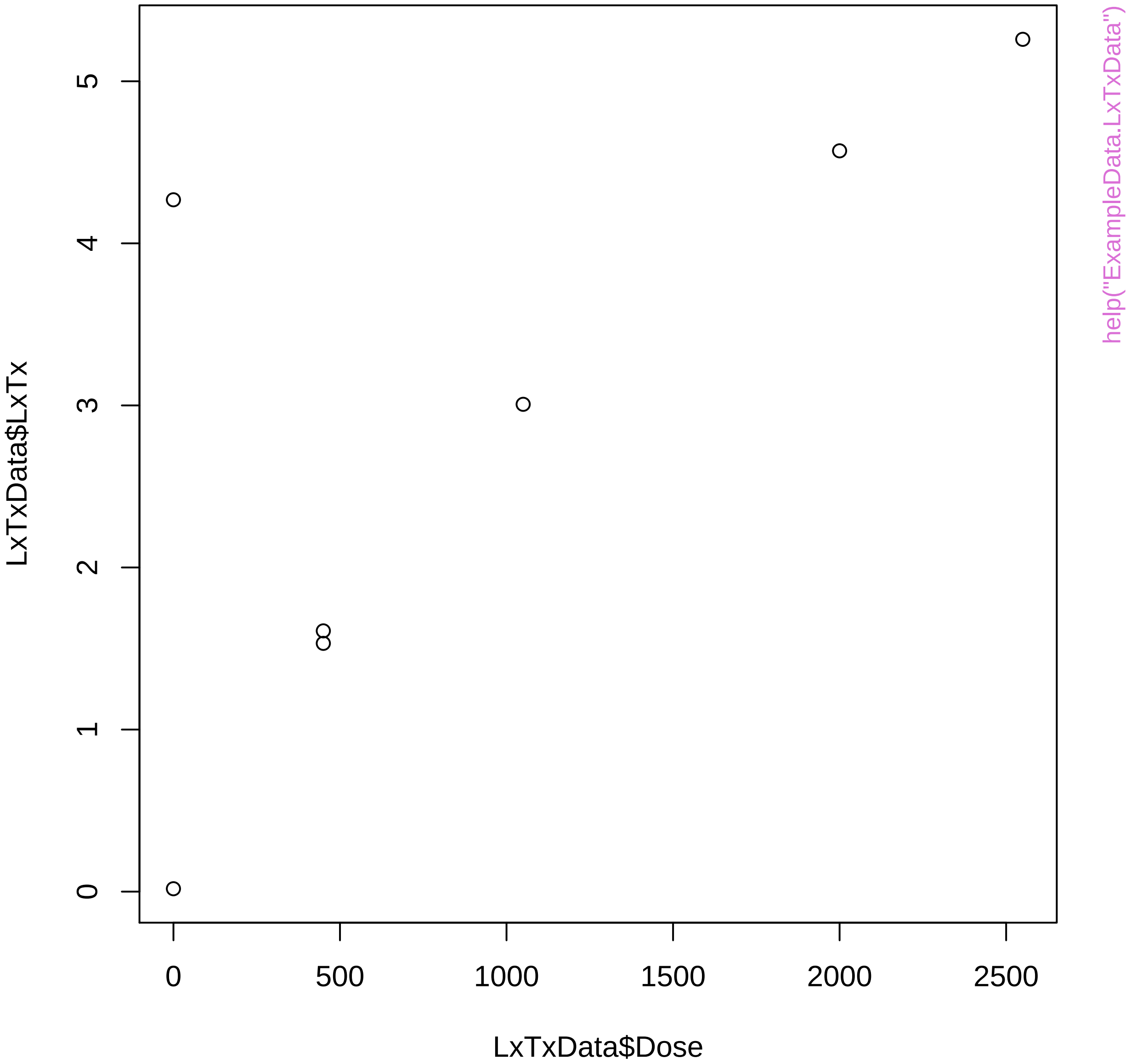
help("ExampleData.Fading")

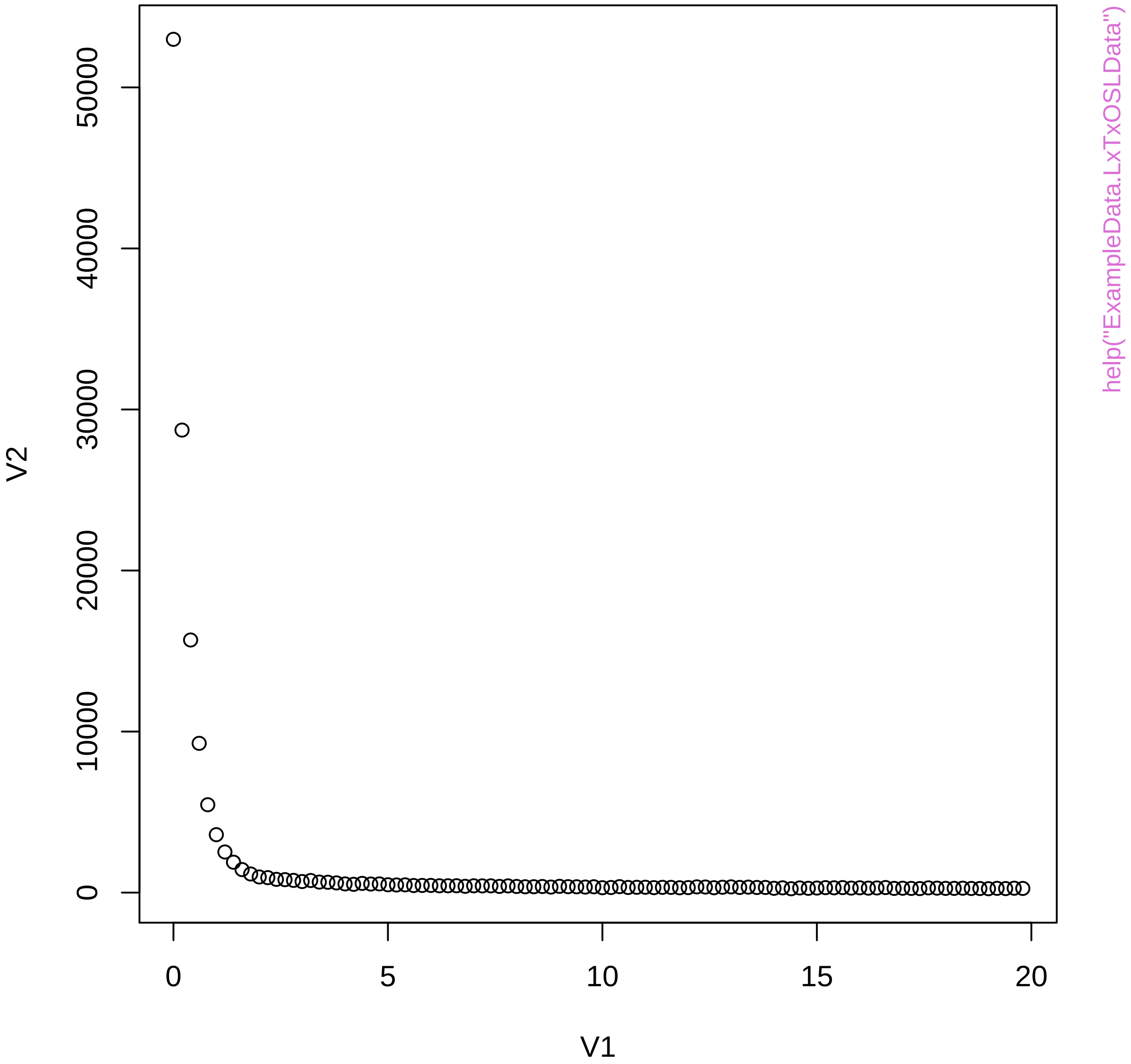


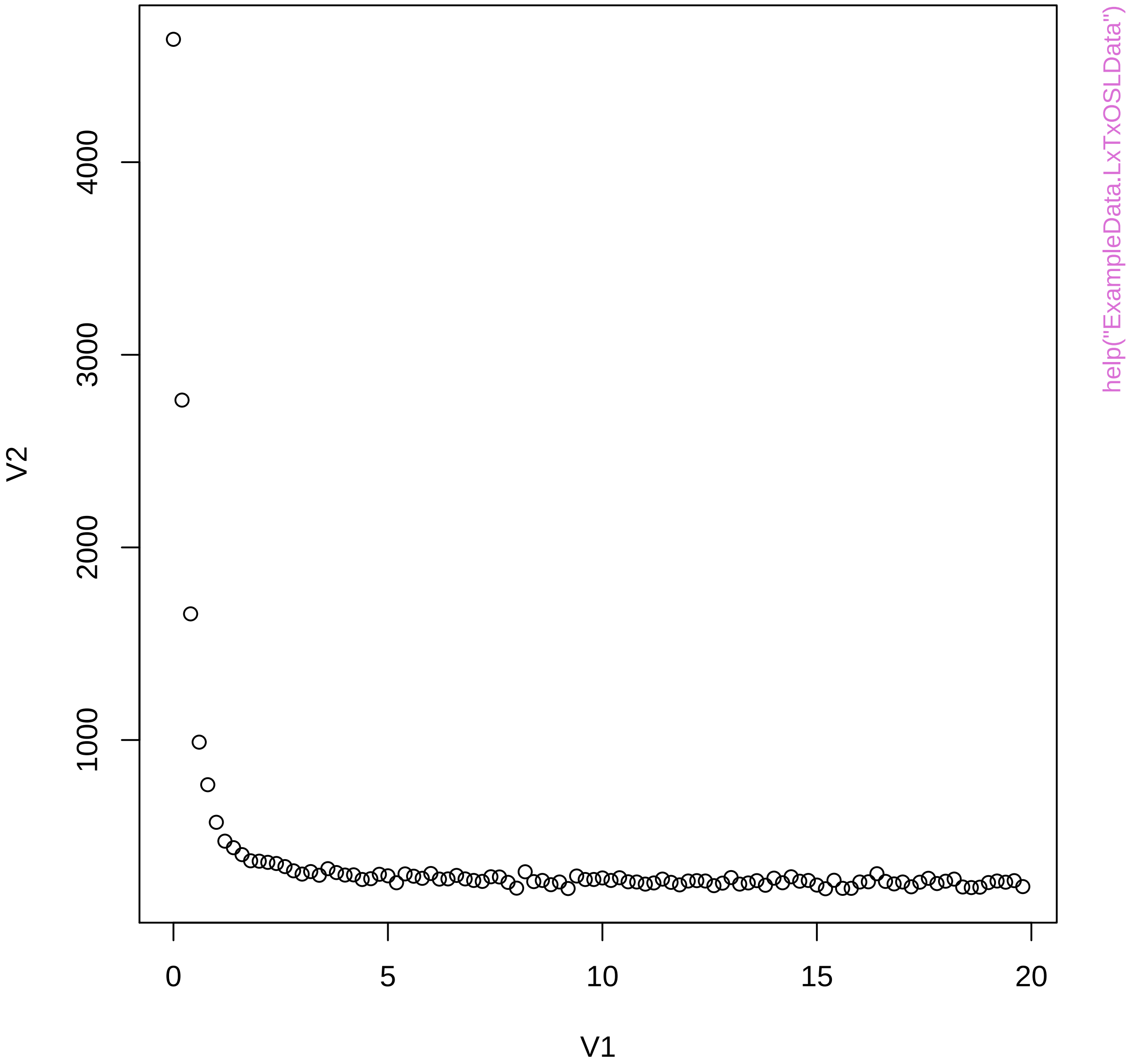


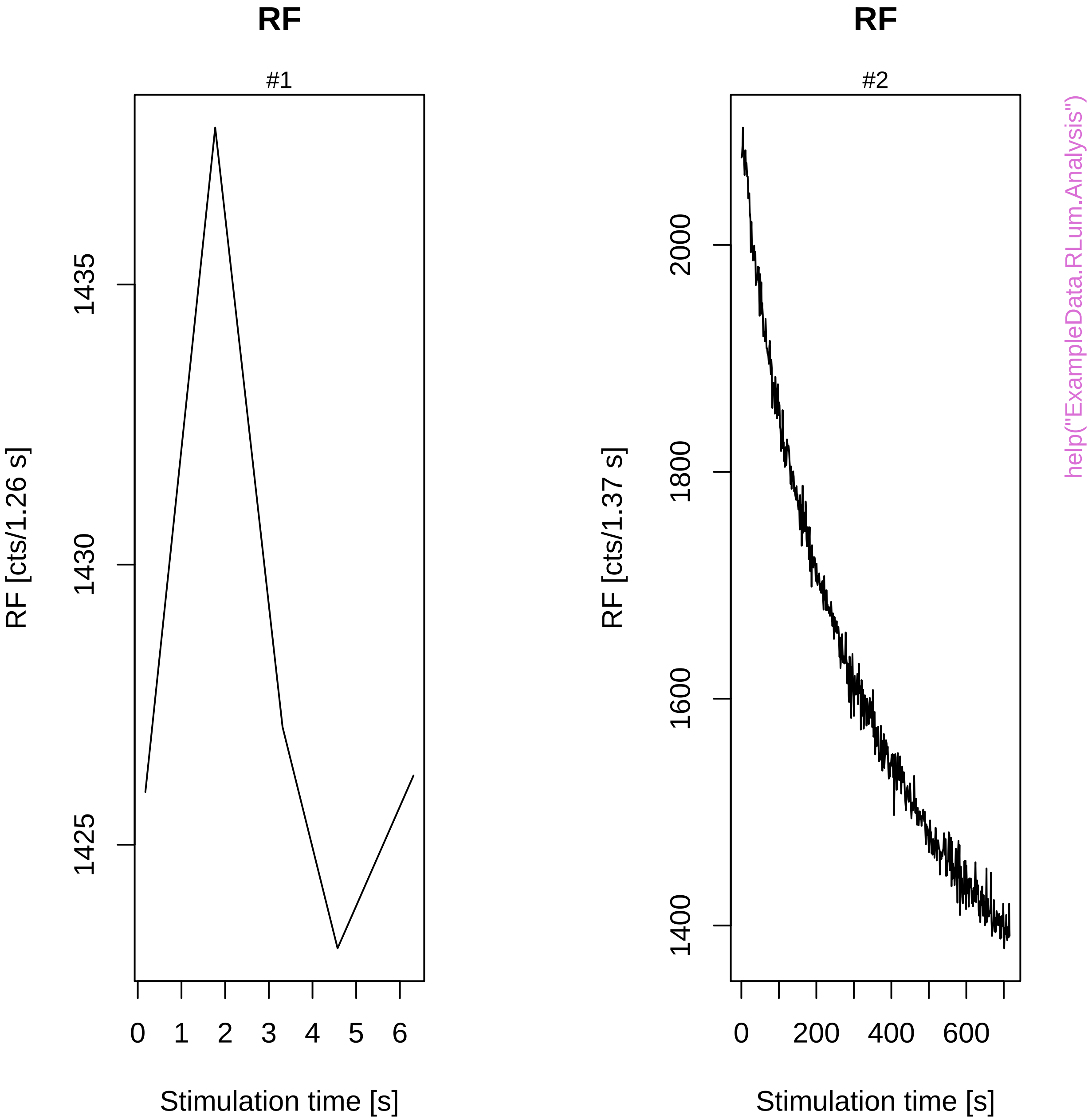

Growth curve
$D_e = 977.38 \pm 105.65$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
2
4
6
8
10
12
0
5000
10000
20000
30000
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 984.66 \pm 105.65$ | quality = 99.3 %
Frequency
1
6
12
17
700
900
1100
Dose [s]
n = 100 , valid fits = 100
Test dose response
not available
no TnTx column
NA
0
2
4
6
8
10
0
2
4
6
8
10
NA

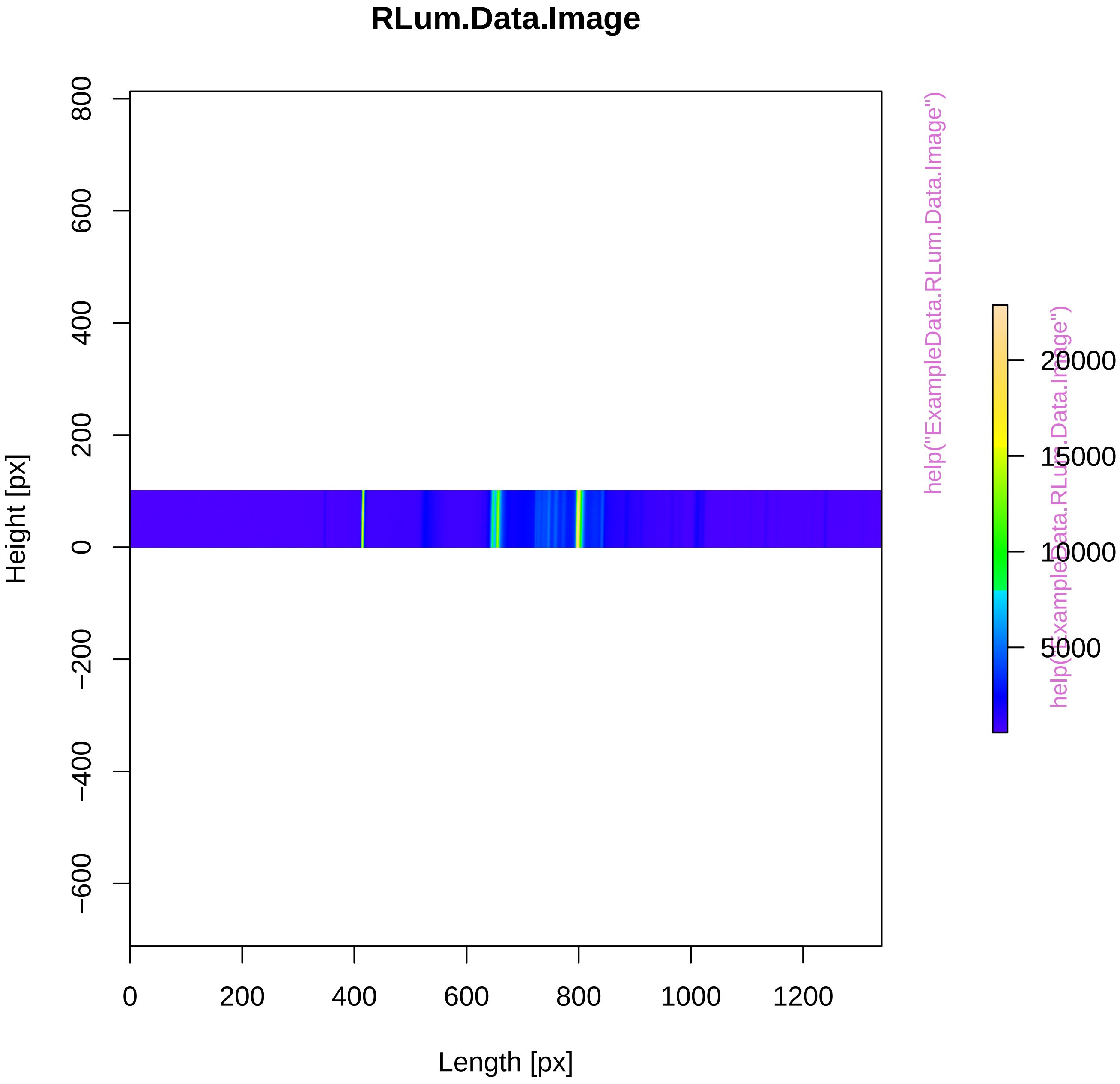

600
500
400
300
200
100
0
y
1
5
10
50
100
500
5000
x
help("ExampleData.FittingLM")

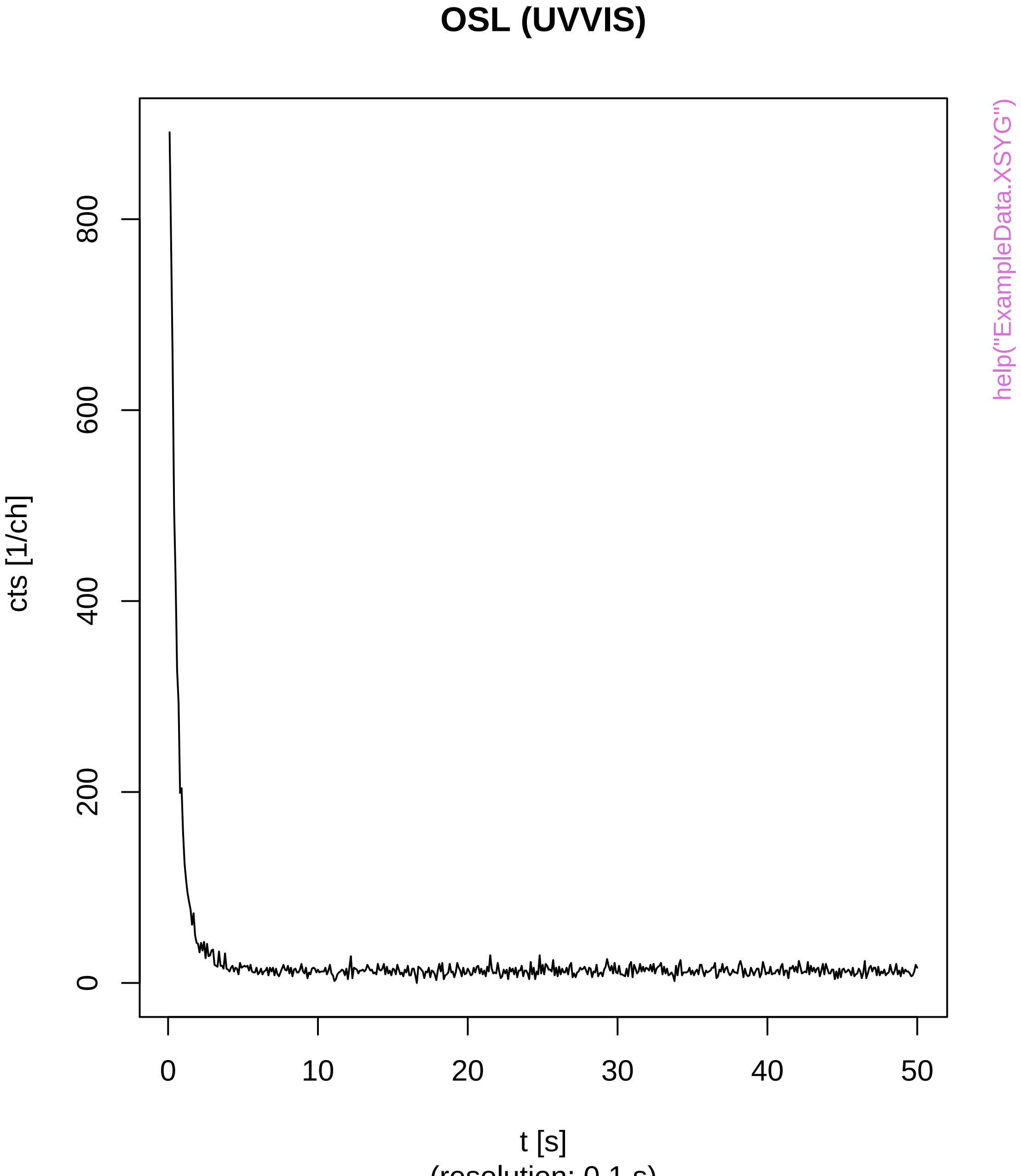

LxTxData$LxTx
0
1
2
3
4
5
0
500
1000
1500
2000
2500
LxTxData$Dose
help("ExampleData.LxTxData")

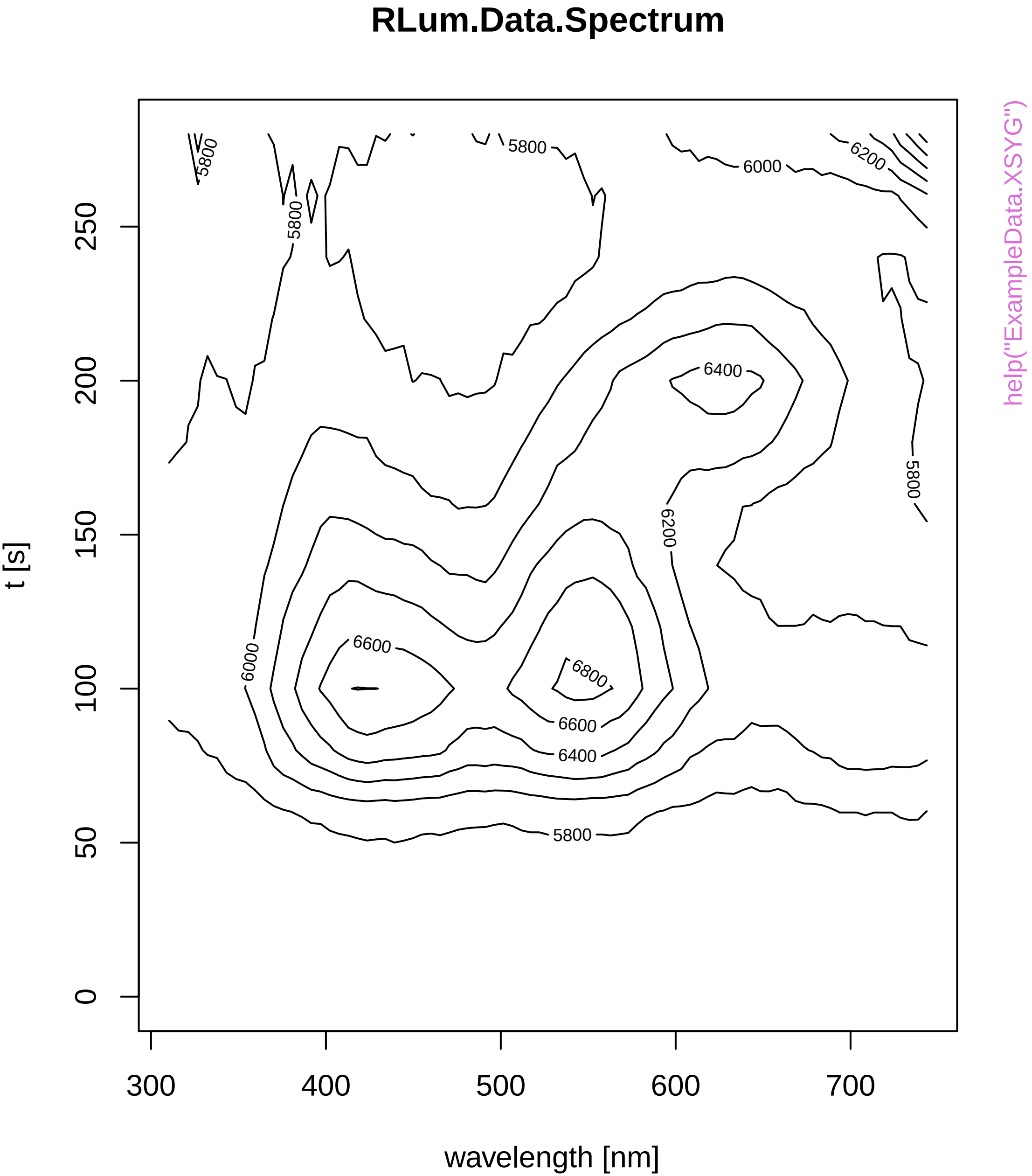

V2
0
10000
20000
30000
40000
50000
V1
0
5
10
15
20
help("ExampleData.LxTxOSLData")

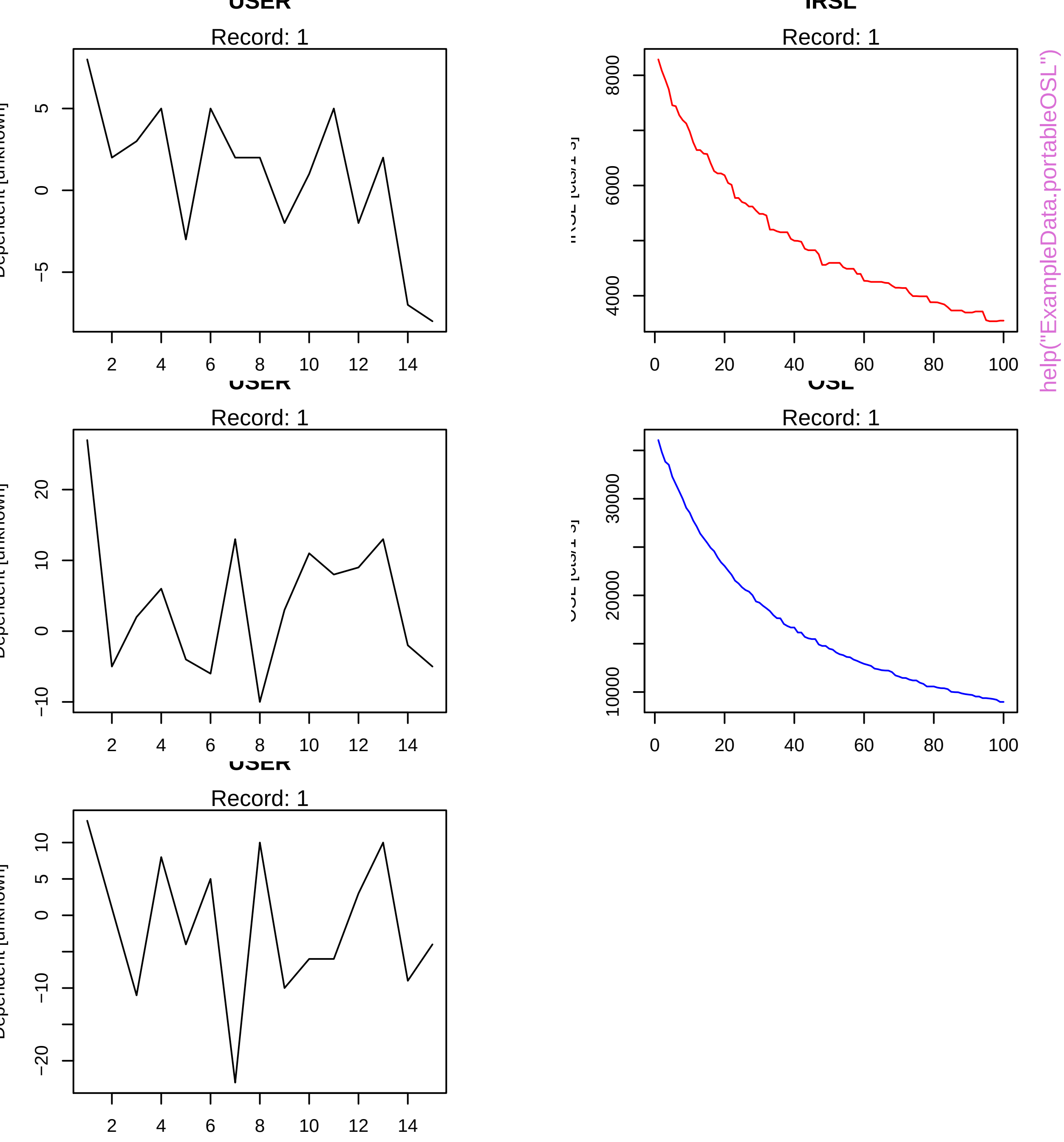

help("ExampleData.LxTxOSLData")
V2
4000
3000
2000
1000
0
5
10
15
20
V1

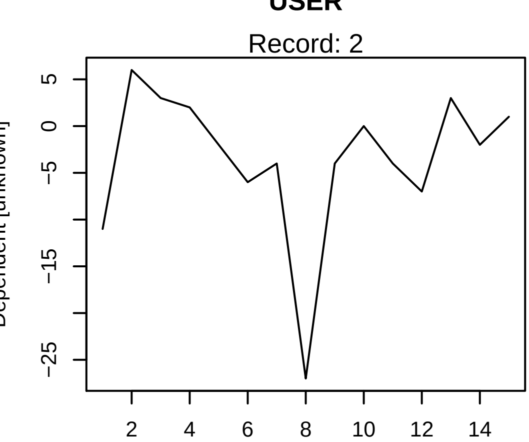

RF
#1
RF [cts/1.26 s]
1425
1430
1435
0
1
2
3
4
5
6
Stimulation time [s]
RF
#2
RF [cts/1.37 s]
1400
1600
1800
2000
0
200
400
600
Stimulation time [s]
help("ExampleData.RLum.Analysis")

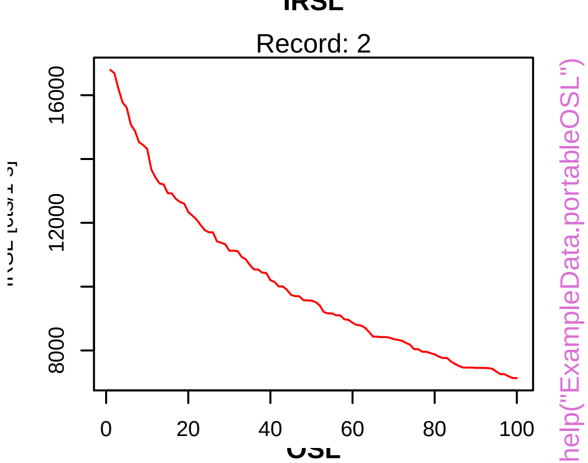

RLum.Data.Image
Height [px]
800
600
400
200
0
−200
−400
−600
0
200
400
600
800
1000
1200
Length [px]
help("ExampleData.RLum.Data.Image")
help("ExampleData.RLum.Data.Image")
20000
15000
10000
5000

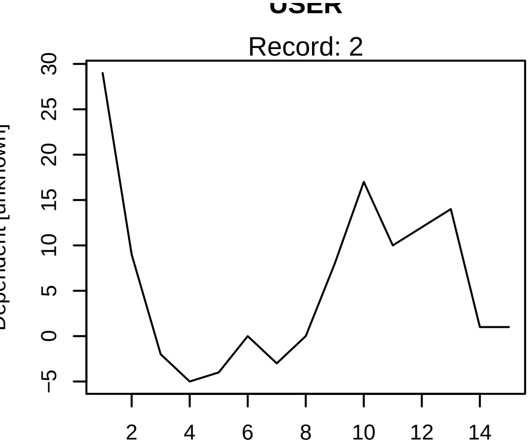

OSL (UVVIS)
cts [1/ch]
0
200
400
600
800
0
10
20
30
40
50
t [s]
(resolution: 0.1 s)
help("ExampleData.XSYG")

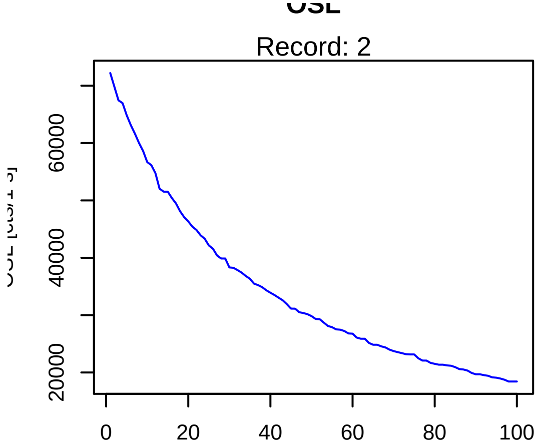

RLum.Data.Spectrum
t [s]
0
50
100
150
200
250
300
400
500
600
700
wavelength [nm]
5800
6000
6200
6400
6600
6800
help("ExampleData.XSYG")

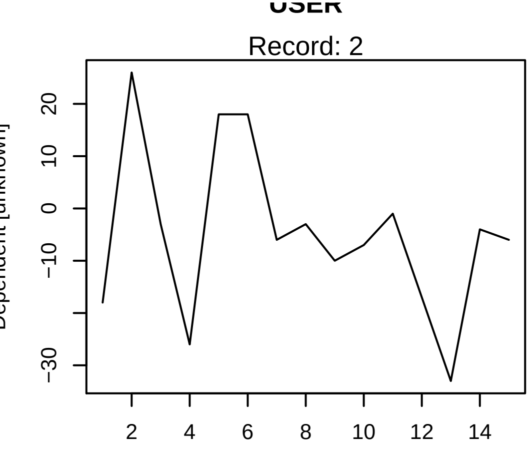

USER
Record: 1
IRSL
Record: 1
USER
Record: 1
OSL
Record: 1
USER
Record: 1
Dependent [unknown]
5
0
−5
20
10
0
−10
10
5
0
−10
−20
2
4
6
8
10
12
14
8000
6000
4000
30000
20000
10000
0
20
40
60
80
100
help("ExampleData.portableOSL")

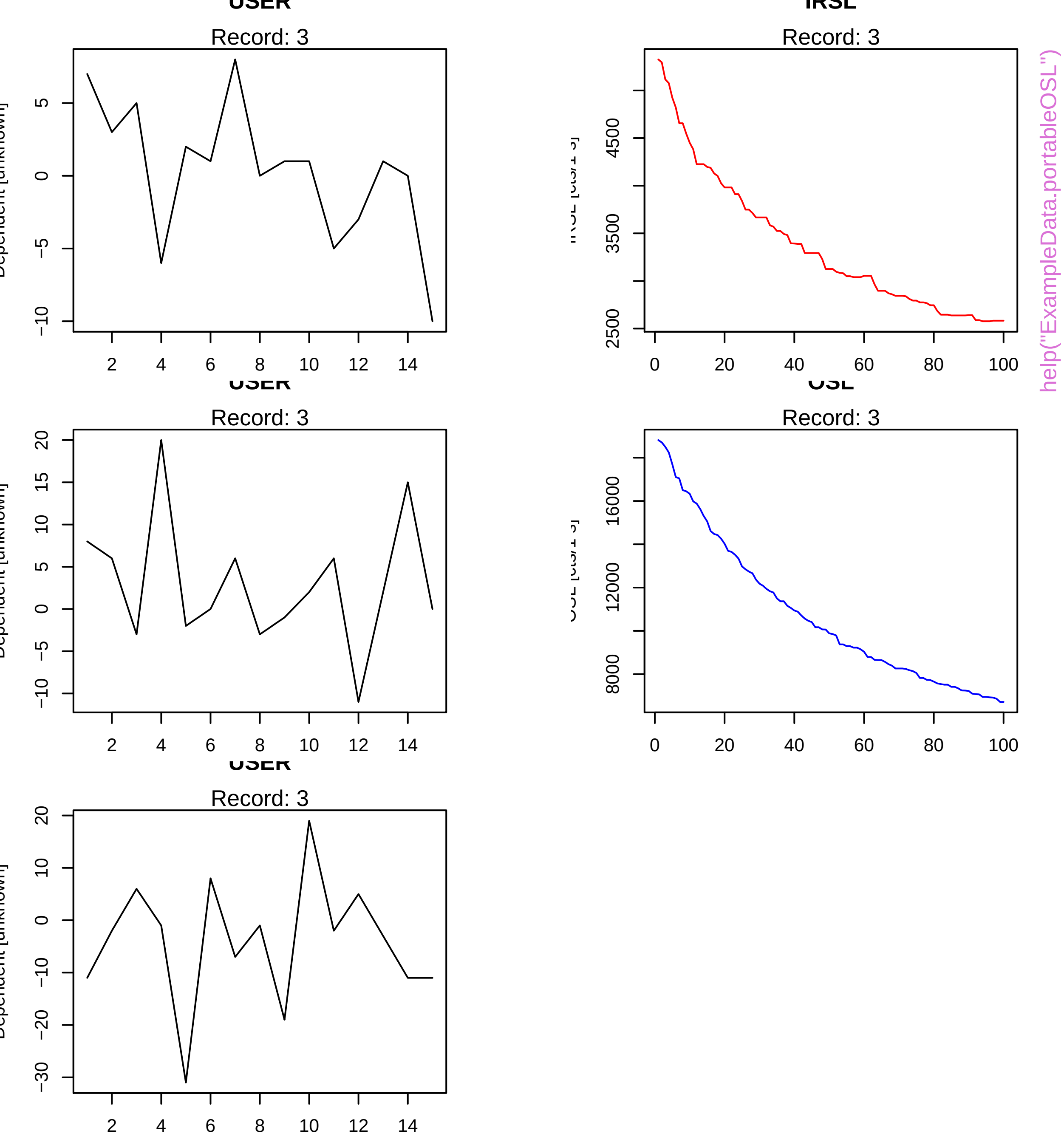

USER
Record: 2
Dependent [unknown]
5
0
−5
−15
−25
2
4
6
8
10
12
14

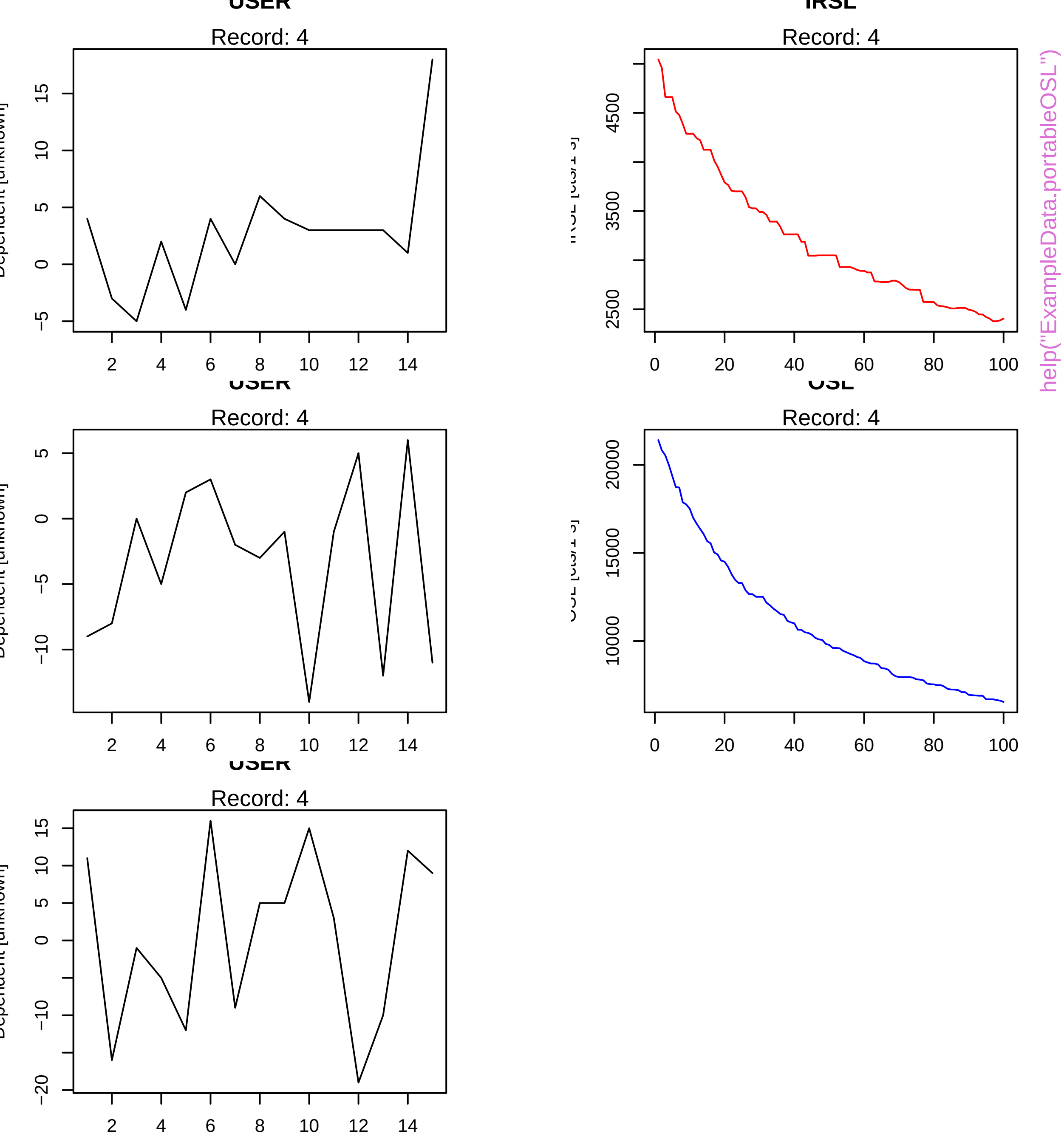

IRSL
Record: 2
16000
12000
8000
0
20
40
60
80
100
help("ExampleData.portableOSL")

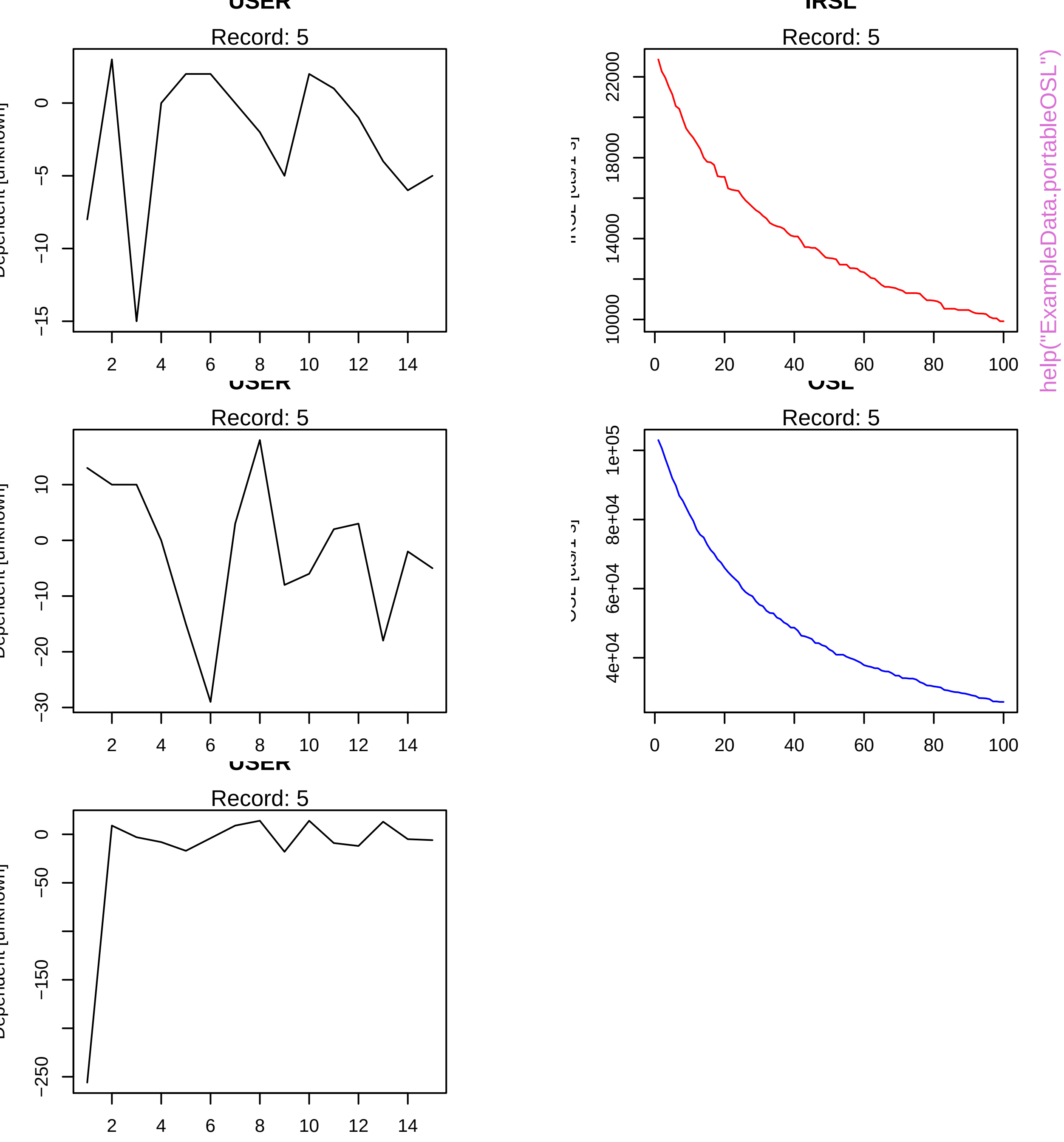

USER
Record: 2
Dependent [unknown]
30
25
20
15
10
5
0
−5
2
4
6
8
10
12
14

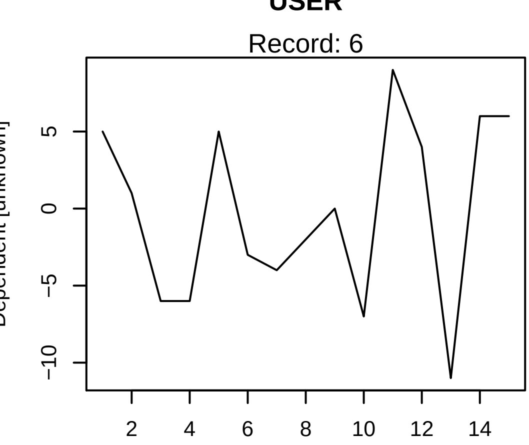

OSL
Record: 2
60000
40000
20000
0
20
40
60
80
100

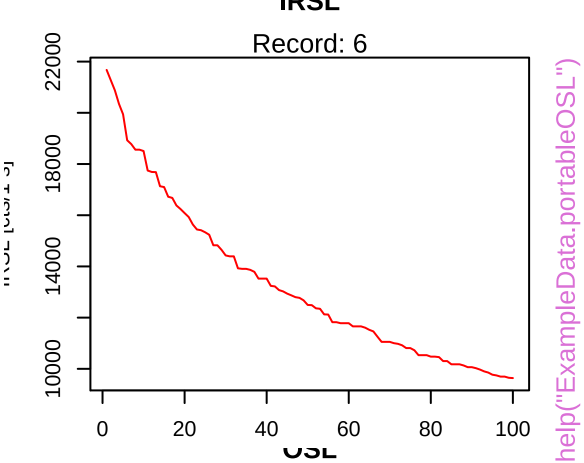

USER
Record: 2
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14

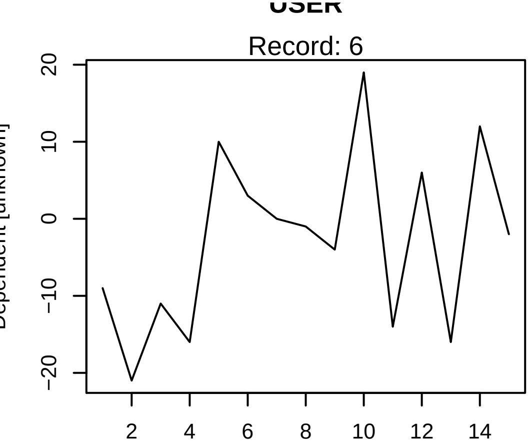

USER
Record: 3
Dependent [unknown]
IRSL
Record: 3
2500
3500
4500
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 3
Dependent [unknown]
OSL
Record: 3
8000
12000
16000
0
20
40
60
80
100
USER
Record: 3
Dependent [unknown]
2
4
6
8
10
12
14

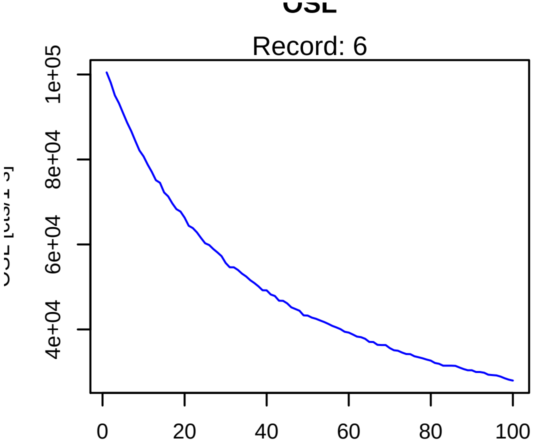

USER
Record: 4
Dependent [unknown]
IRSL
Record: 4
USER
Record: 4
OSL
Record: 4
USER
Record: 4
help("ExampleData.portableOSL")

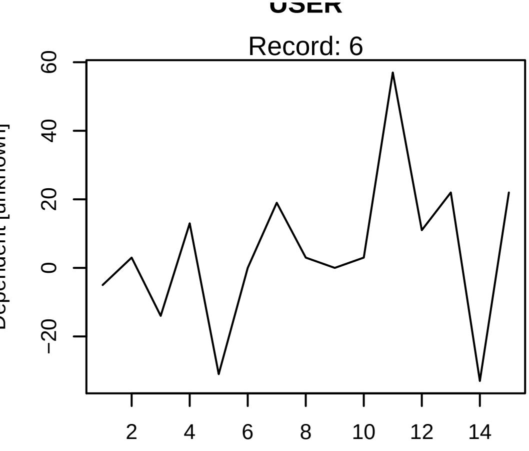

USER
Record: 5
0
−5
−10
−15
2
4
6
8
10
12
14
Dependent [unknown]
IRSL
Record: 5
22000
18000
14000
10000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 5
10
0
−10
−20
−30
OSL
Record: 5
1e+05
8e+04
6e+04
4e+04
USER
Record: 5
0
−50
−150
−250

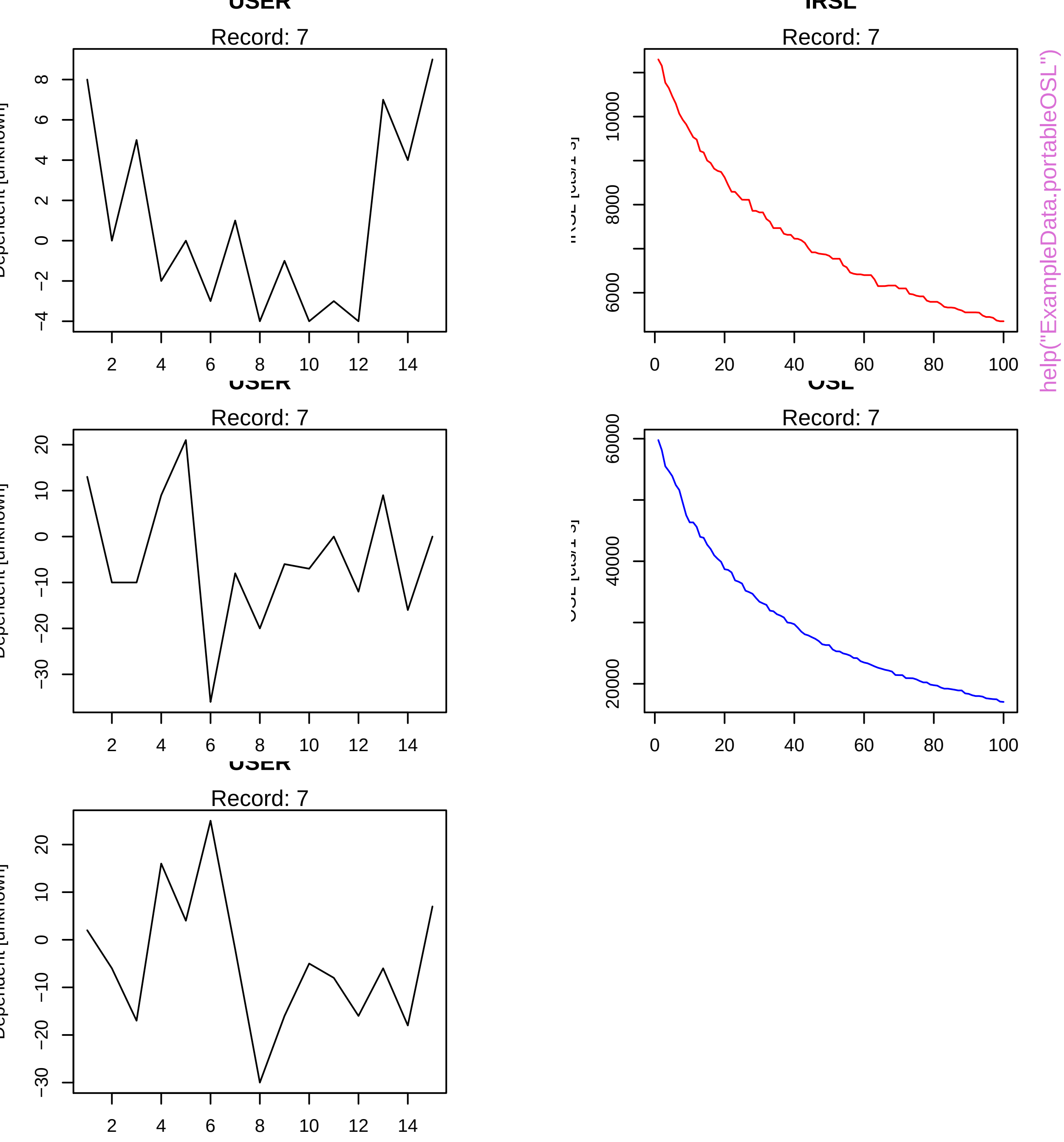

USER
Record: 6
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14

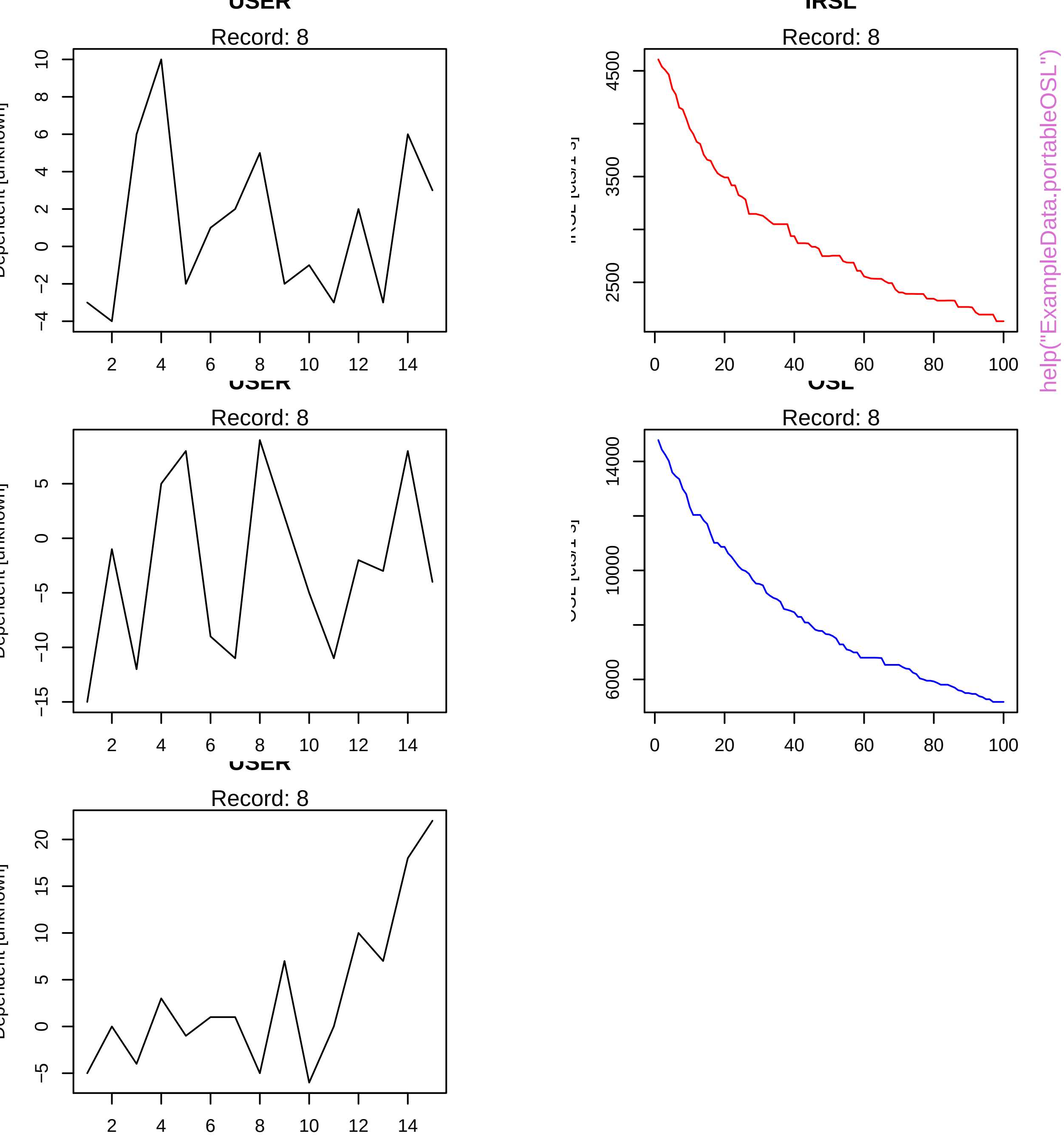

IRSL
Record: 6
22000
18000
14000
10000
0
20
40
60
80
100
help("ExampleData.portableOSL")

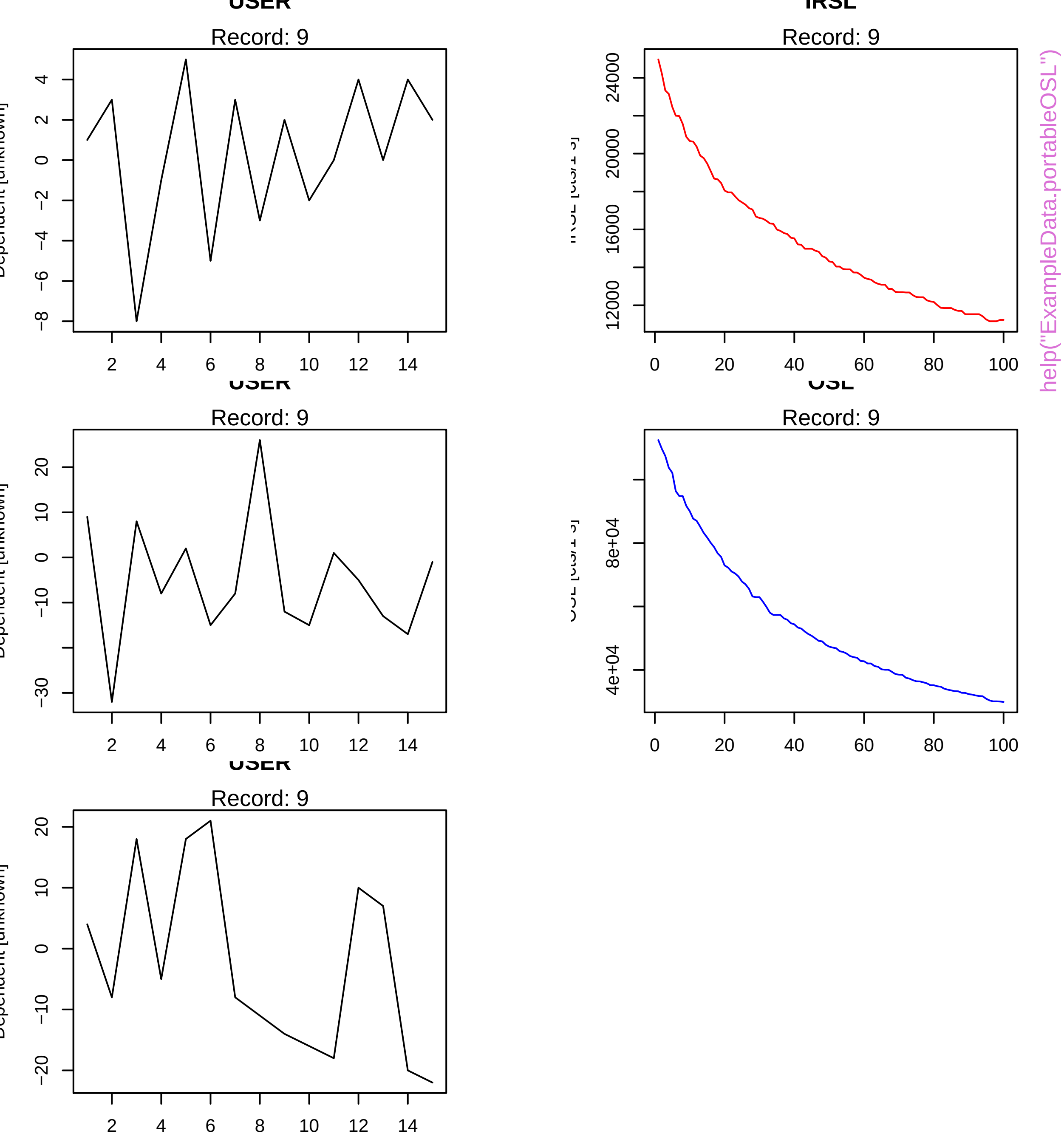

USER
Record: 6
Dependent [unknown]
20
10
0
−10
−20
2
4
6
8
10
12
14

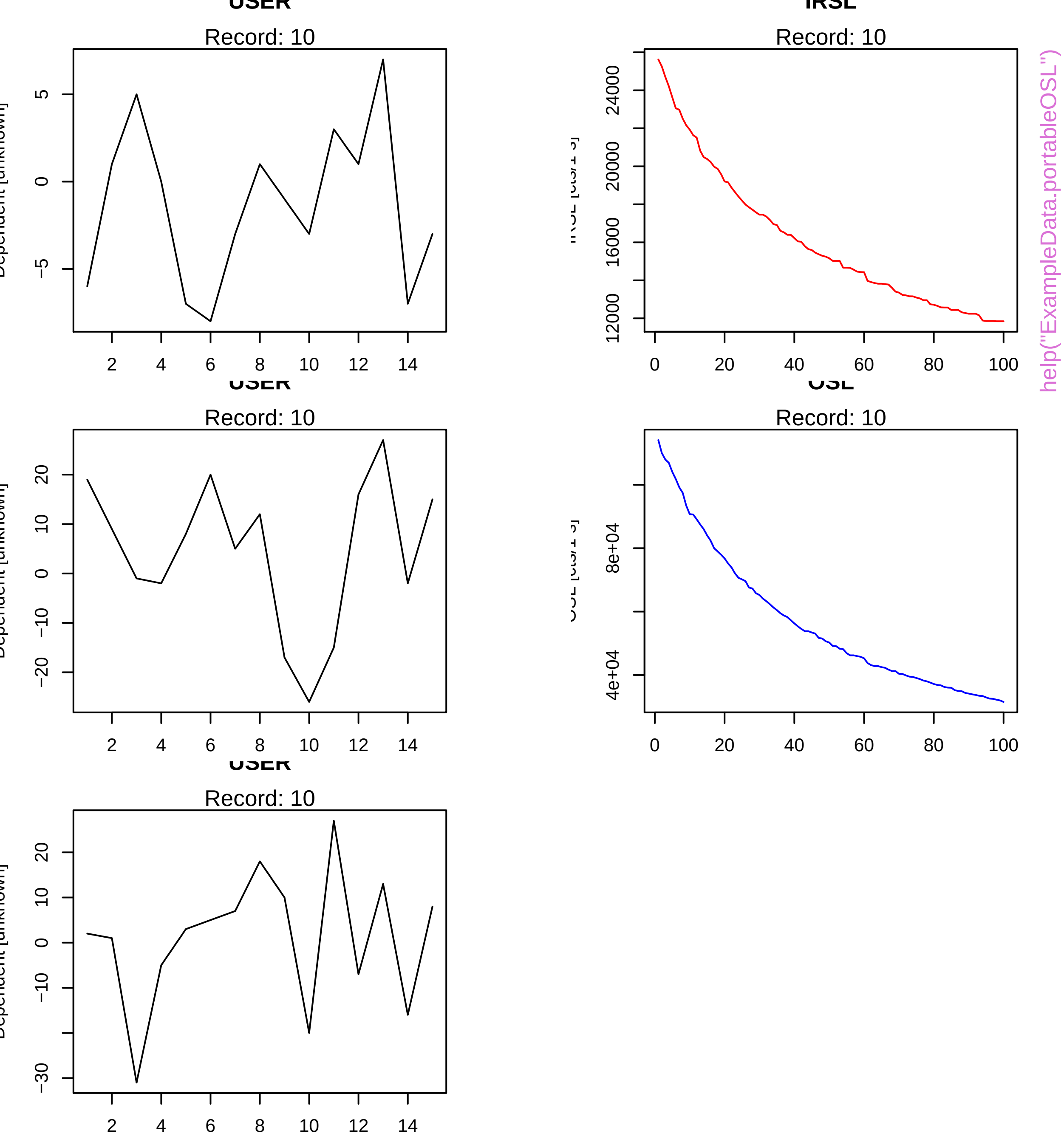

OSL
Record: 6
1e+05
8e+04
6e+04
4e+04
0
20
40
60
80
100

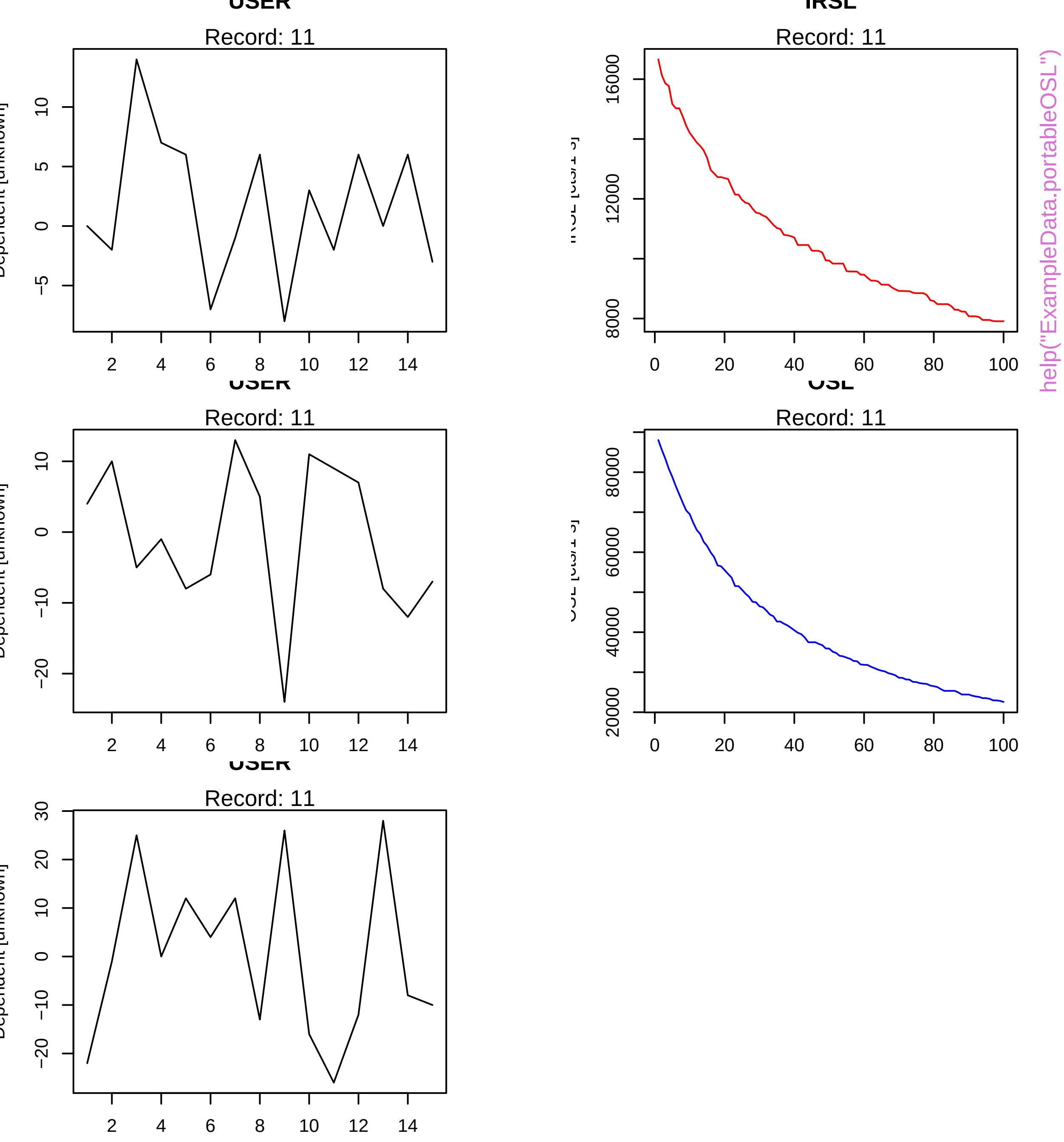

USER
Record: 6
Dependent [unknown]
60
40
20
0
−20
2
4
6
8
10
12
14

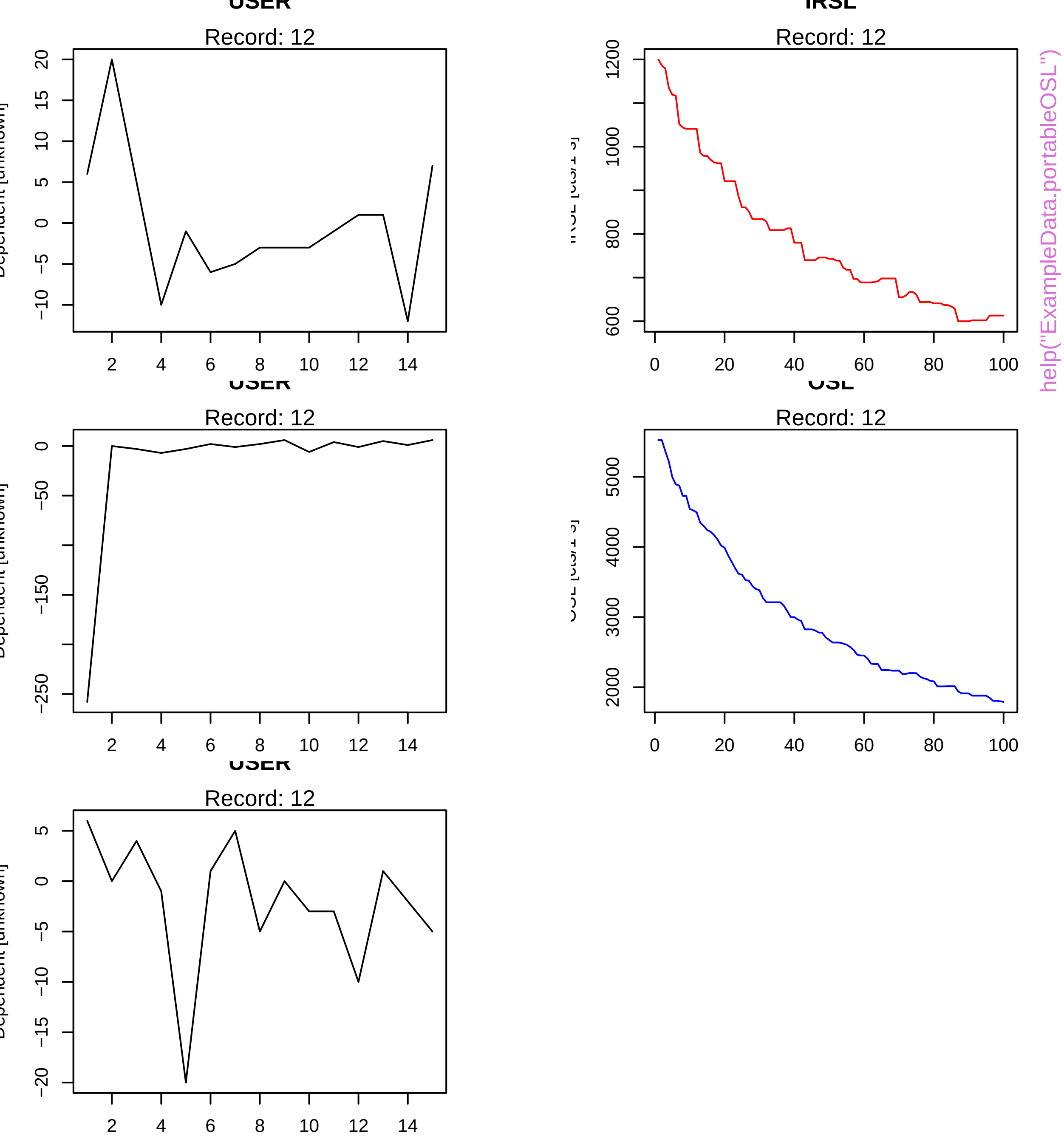

USER
Record: 7
Dependent [unknown]
−4 −2 0 2 4 6 8
2 4 6 8 10 12 14
IRSL
Record: 7
IRSL [cts/1 s]
6000 8000 10000
0 20 40 60 80 100
help("ExampleData.portableOSL")
USER
Record: 7
Dependent [unknown]
−30 −20 −10 0 10 20
2 4 6 8 10 12 14
OSL
Record: 7
OSL [cts/1 s]
20000 40000 60000
0 20 40 60 80 100
USER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

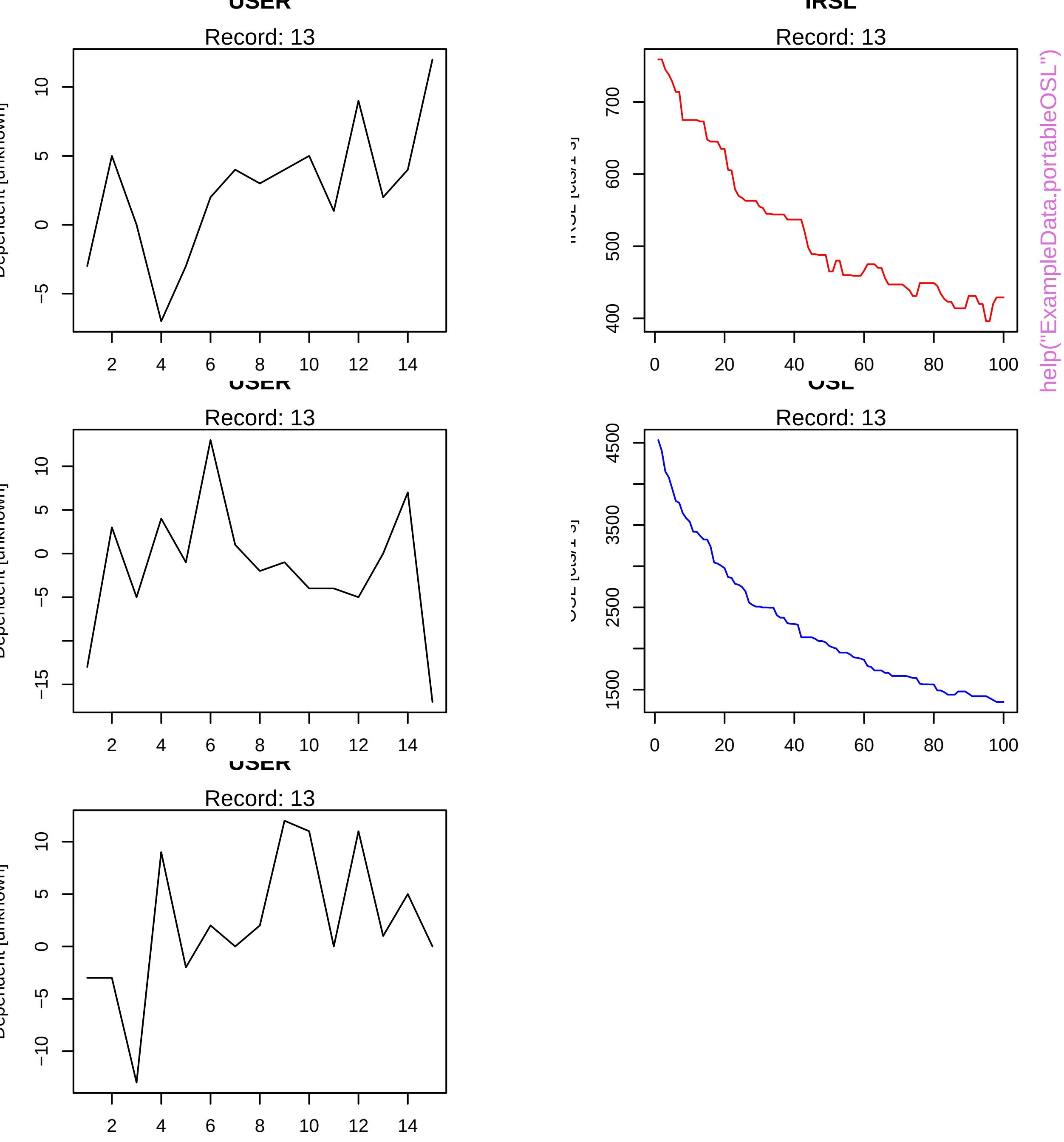

USER
Record: 8
IRSL
Record: 8
USER
Record: 8
OSL
Record: 8
USER
Record: 8
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
4500
3500
2500
0
20
40
60
80
100
help("ExampleData.portableOSL")
5
0
−5
−10
−15
14000
10000
6000
20
15
10
5
0
−5

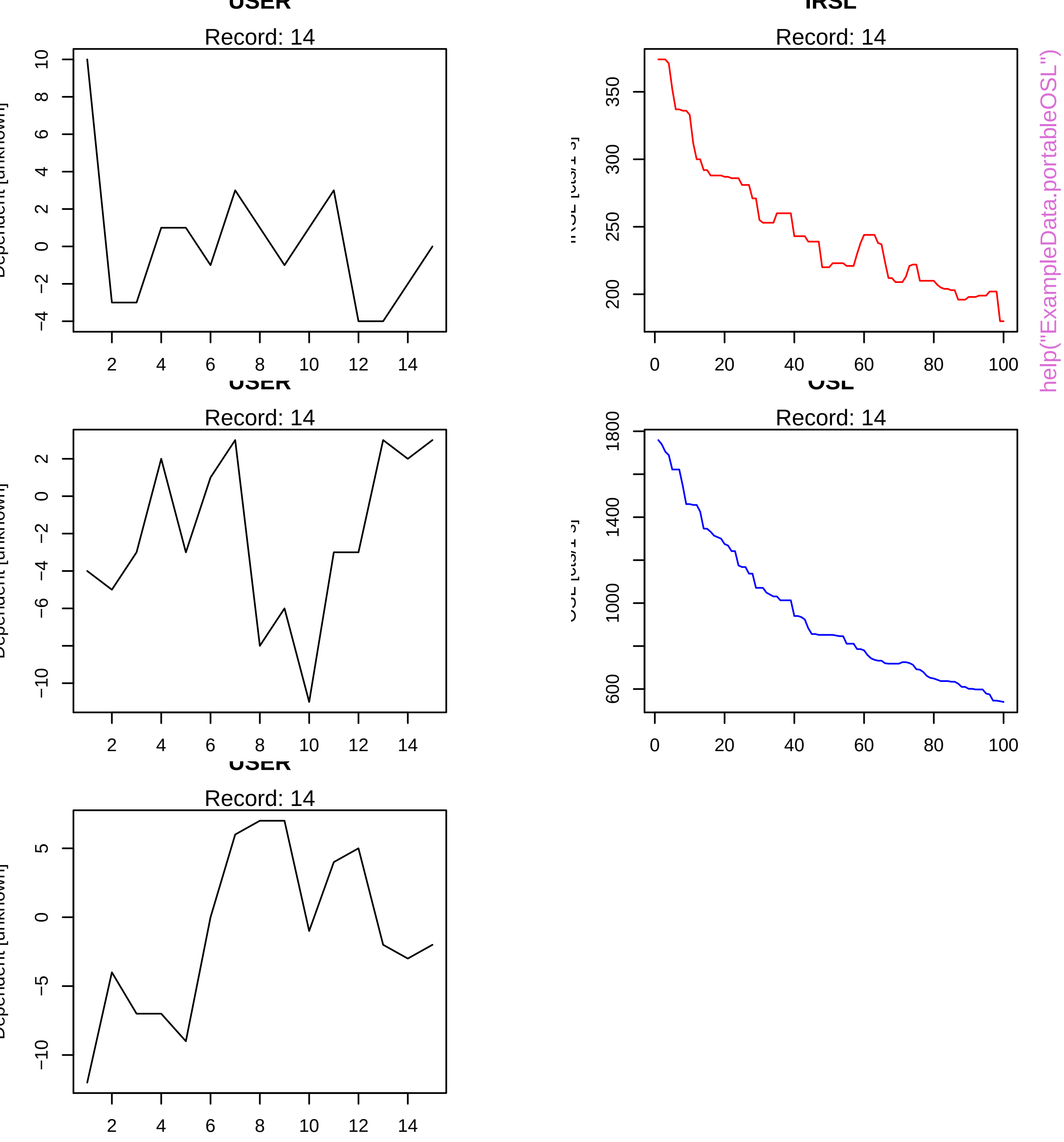

USER
Record: 9
Dependent [unknown]
4
2
0
−2
−4
−6
−8
2
4
6
8
10
12
14
IRSL
Record: 9
IRSL [cts/1 s]
24000
20000
16000
12000
0
20
40
60
80
100
USER
Record: 9
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14
OSL
Record: 9
OSL [cts/1 s]
8e+04
4e+04
0
20
40
60
80
100
USER
Record: 9
Dependent [unknown]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

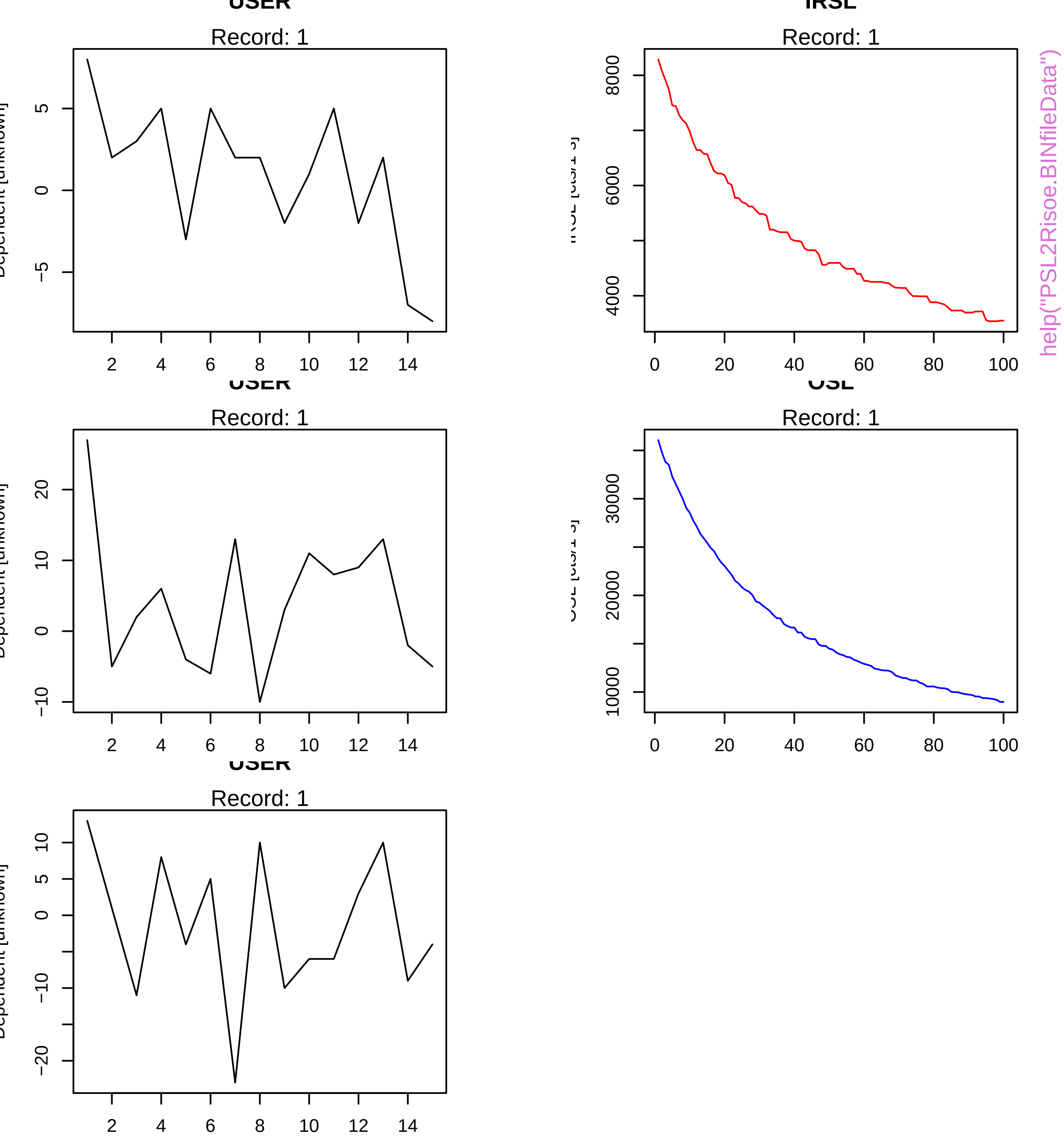

USER
Record: 10
5
0
−5
2
4
6
8
10
12
14
IRSL
Record: 10
24000
20000
16000
12000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 10
20
10
0
−10
−20
OSL
Record: 10
8e+04
4e+04
USER
Record: 10
20
10
0
−10
−30
Dependent [unknown]

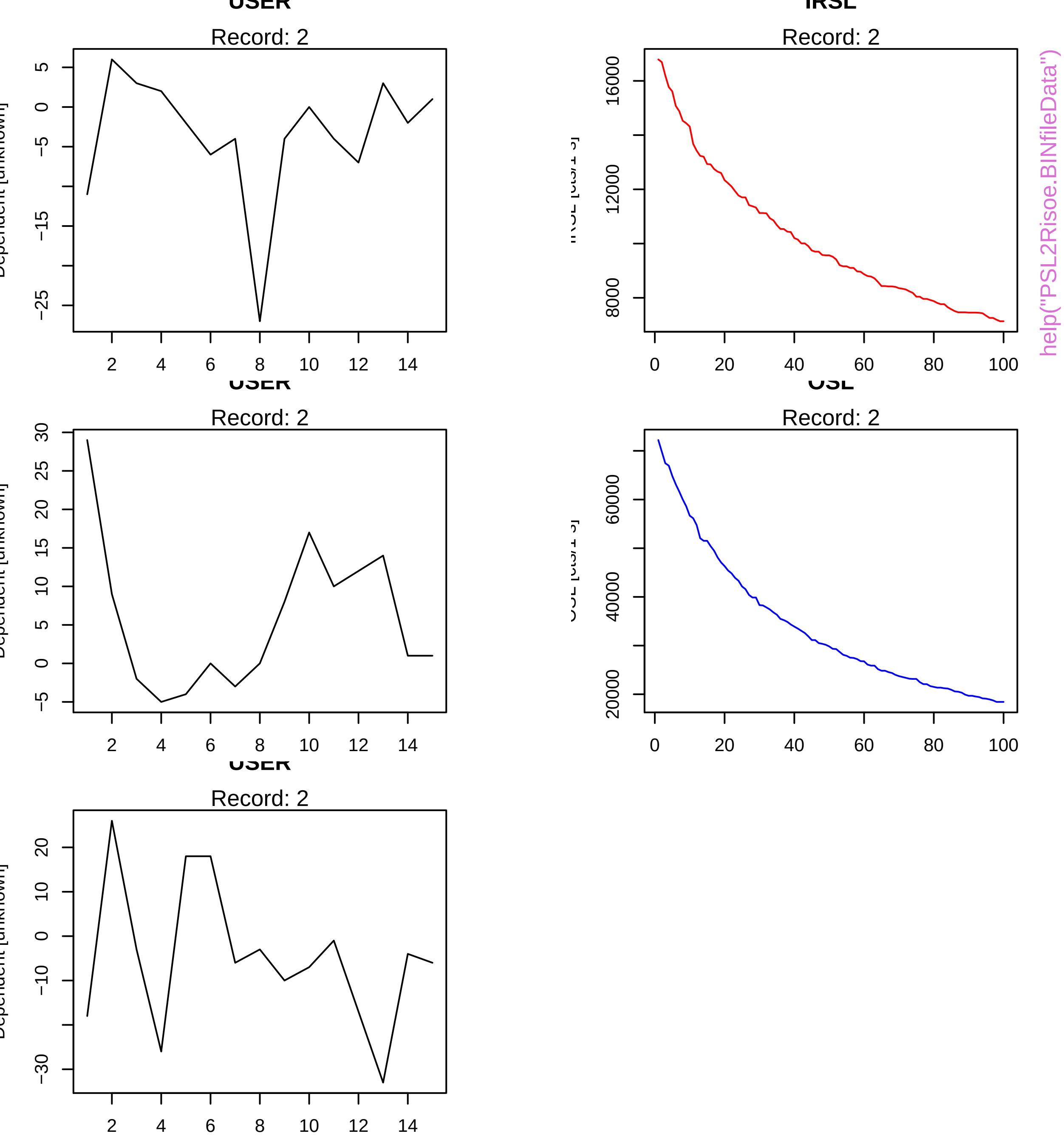

USER
Record: 11
Dependent [unknown]
−5
0
5
10
2
4
6
8
10
12
14
IRSL
Record: 11
8000
12000
16000
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 11
Dependent [unknown]
−20
−10
0
10
2
4
6
8
10
12
14
OSL
Record: 11
20000
40000
60000
80000
0
20
40
60
80
100
USER
Record: 11
Dependent [unknown]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

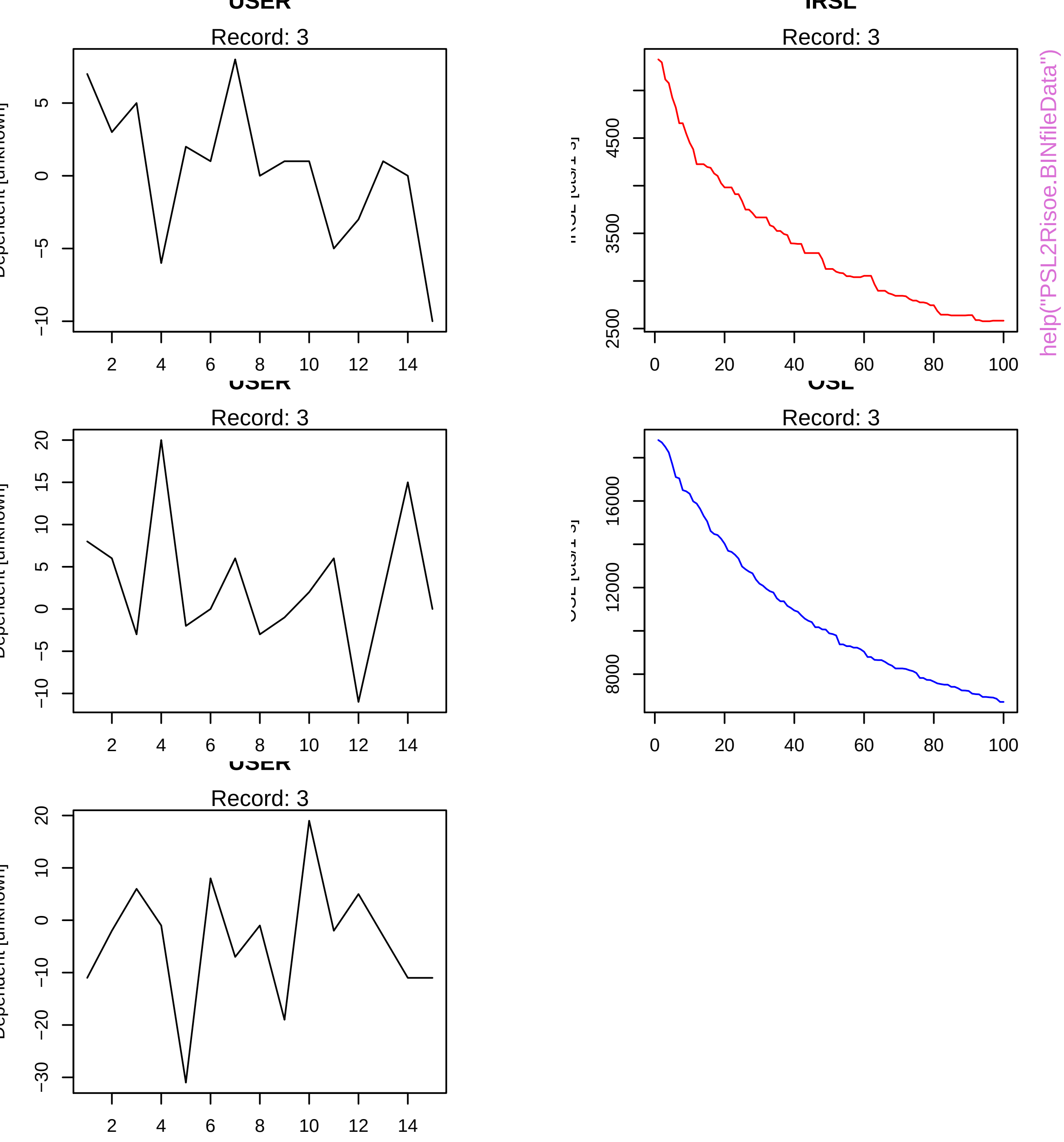

USER
Record: 12
20
15
10
5
0
−5
−10
2
4
6
8
10
12
14
Dependent [unknown]
IRSL
Record: 12
1200
1000
800
600
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 12
0
−50
−150
−250
2
4
6
8
10
12
14
Dependent [unknown]
OSL
Record: 12
5000
4000
3000
2000
0
20
40
60
80
100
USER
Record: 12
5
0
−5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

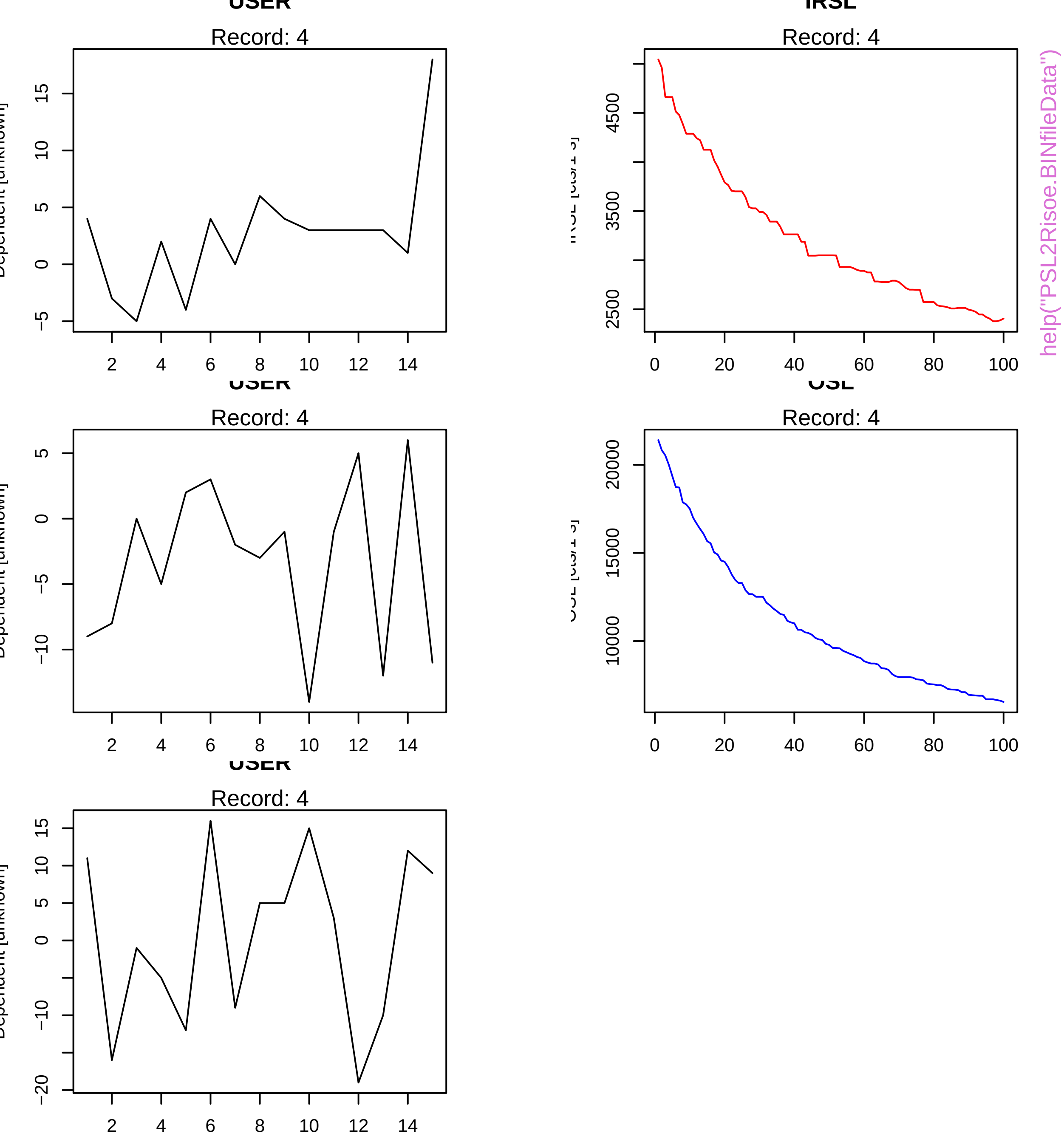

USER
Record: 13
Dependent [unknown]
10
5
0
−5
2
4
6
8
10
12
14
IRSL
Record: 13
IRSL [cts/1 s]
700
600
500
400
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 13
Dependent [unknown]
10
5
0
−5
−15
2
4
6
8
10
12
14
OSL
Record: 13
OSL [cts/1 s]
4500
3500
2500
1500
0
20
40
60
80
100
USER
Record: 13
Dependent [unknown]
10
5
0
−5
−10
2
4
6
8
10
12
14

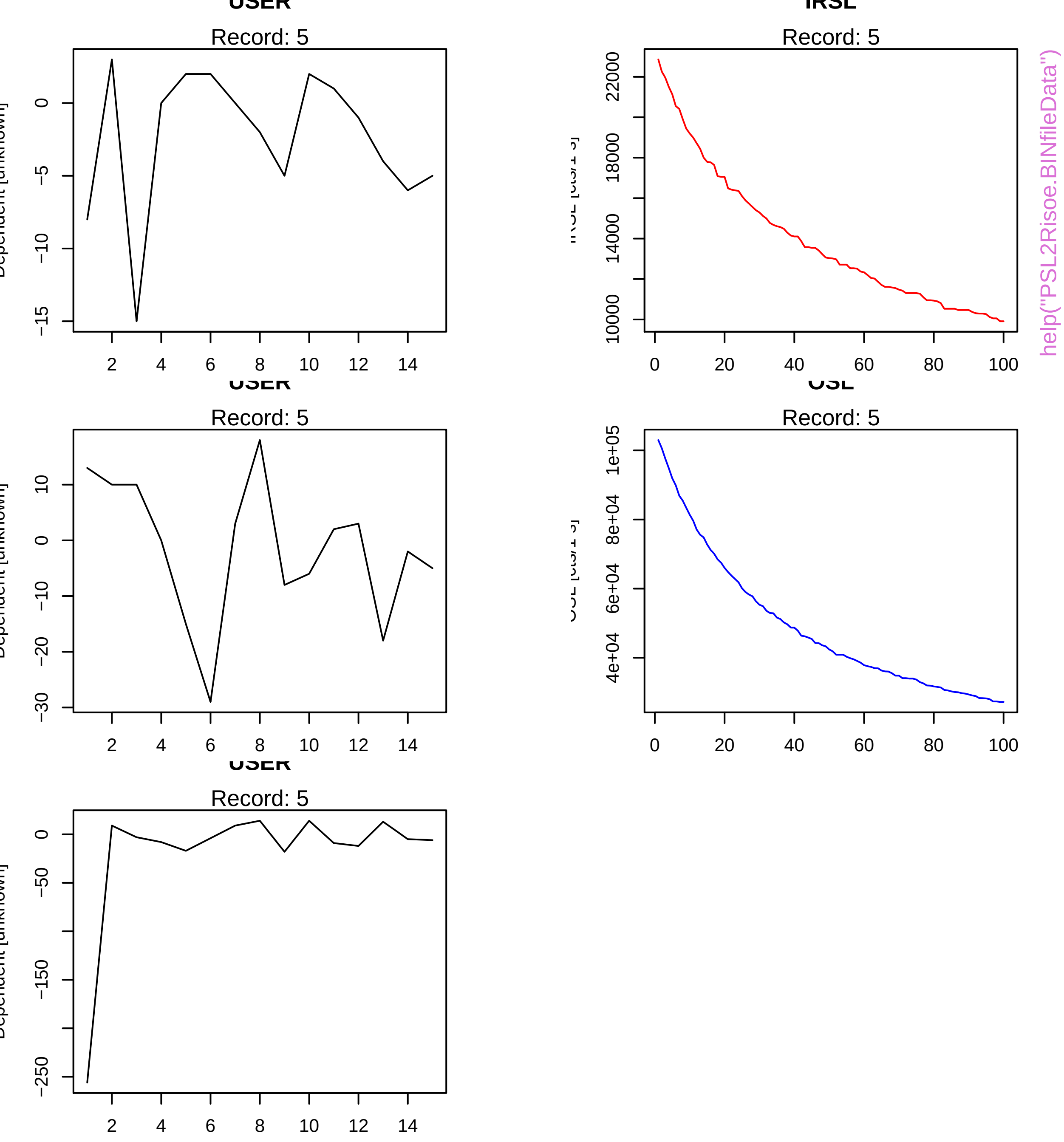

USER
Record: 14
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 14
350
300
250
200
0
20
40
60
80
100
help("ExampleData.portableOSL")
USER
Record: 14
Dependent [unknown]
2
0
−2
−4
−6
−10
2
4
6
8
10
12
14
OSL
Record: 14
1800
1400
1000
600
0
20
40
60
80
100
USER
Record: 14
Dependent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

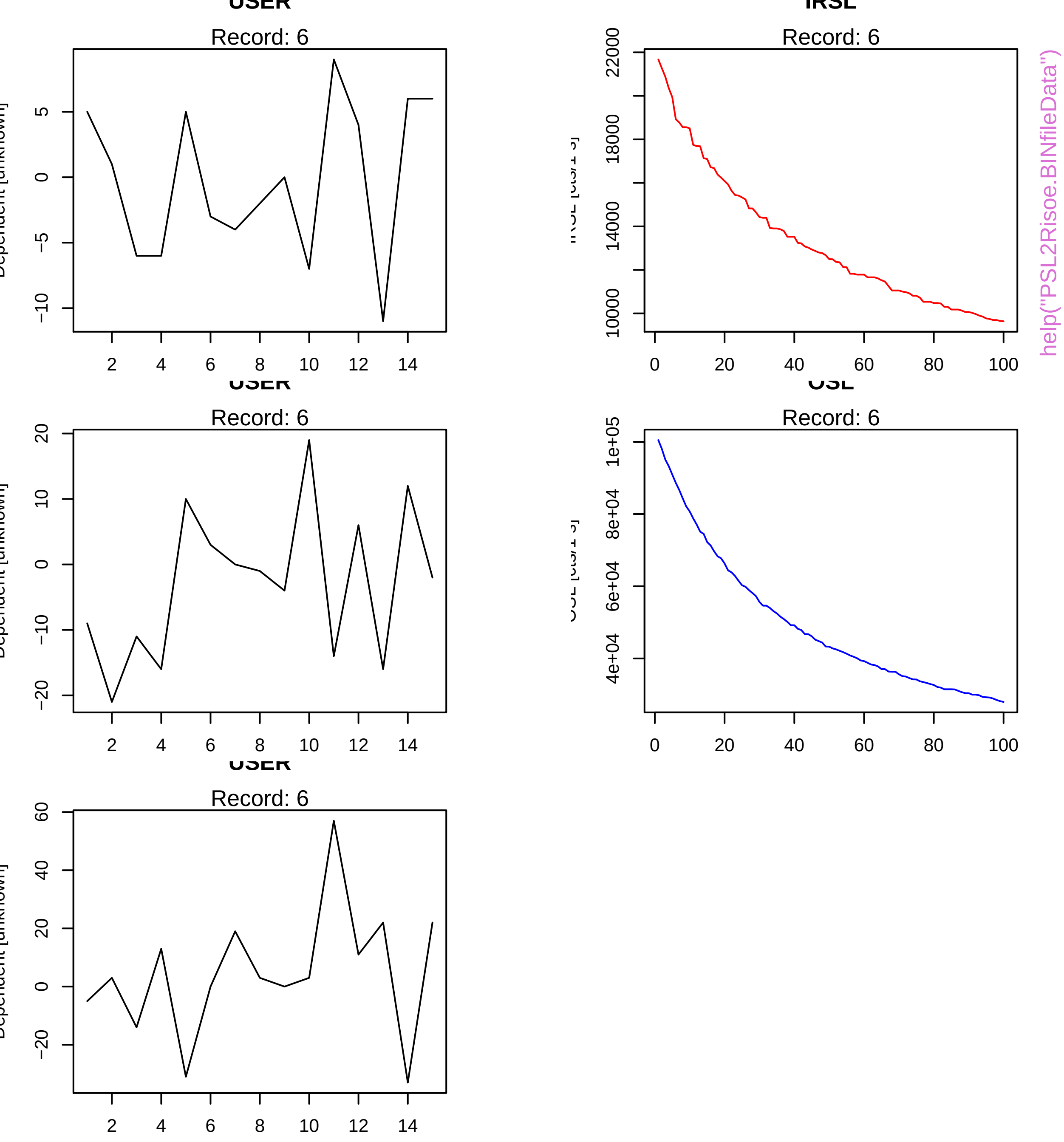

USER
Record: 1
Dependent [unknown]
5
0
−5
2
4
6
8
10
12
14
IRSL
Record: 1
8000
6000
4000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 1
Dependent [unknown]
20
10
0
−10
2
4
6
8
10
12
14
OSL
Record: 1
30000
20000
10000
0
20
40
60
80
100
USER
Record: 1
Dependent [unknown]
10
5
0
−10
−20
2
4
6
8
10
12
14

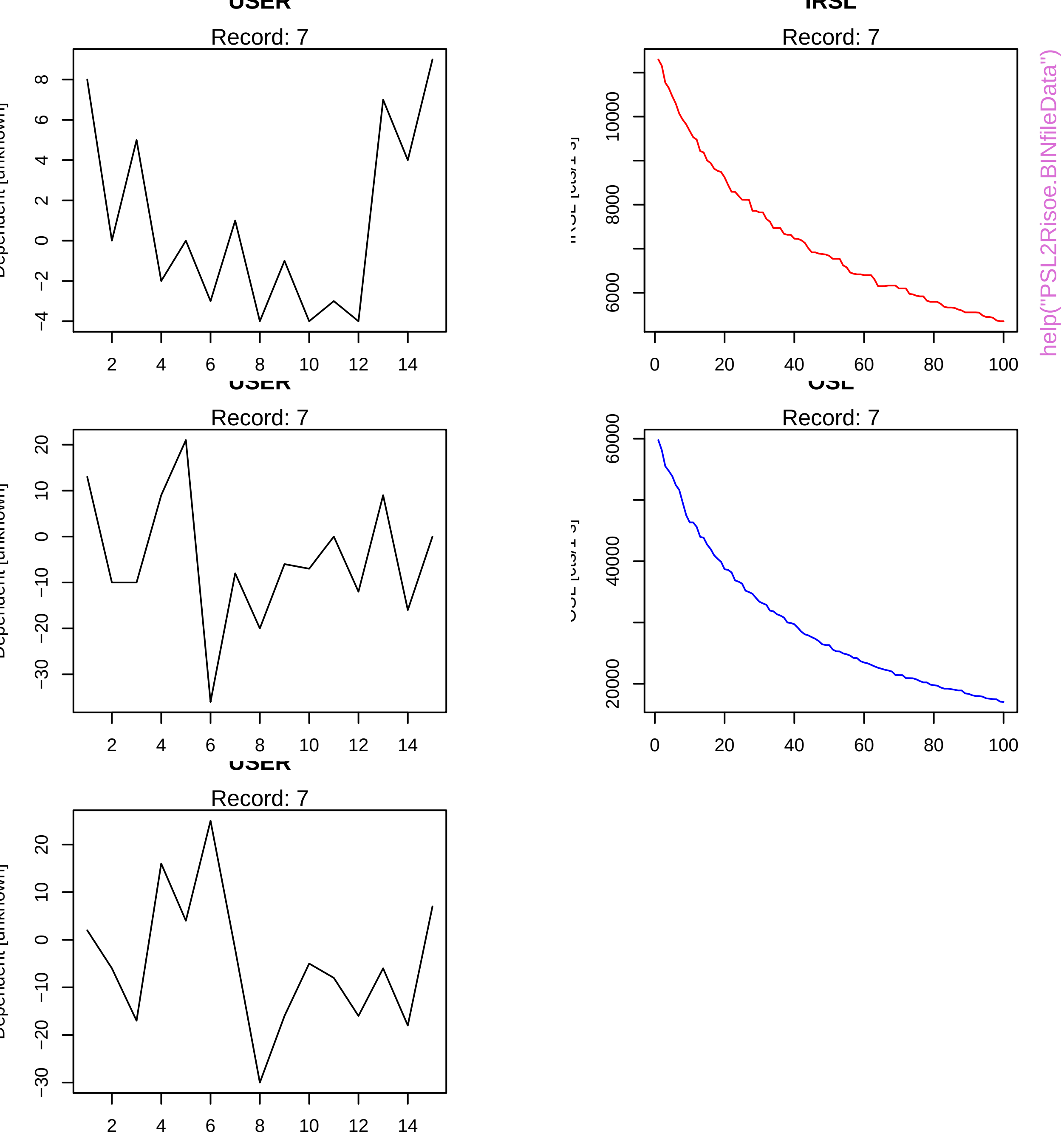

USER
Record: 2
Dependent [unknown]
5
0
−5
−15
−25
2
4
6
8
10
12
14
IRSL
Record: 2
IRSL [cts/1 s]
16000
12000
8000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 2
Dependent [unknown]
30
25
20
15
10
5
0
−5
2
4
6
8
10
12
14
OSL
Record: 2
OSL [cts/1 s]
60000
40000
20000
0
20
40
60
80
100
USER
Record: 2
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14

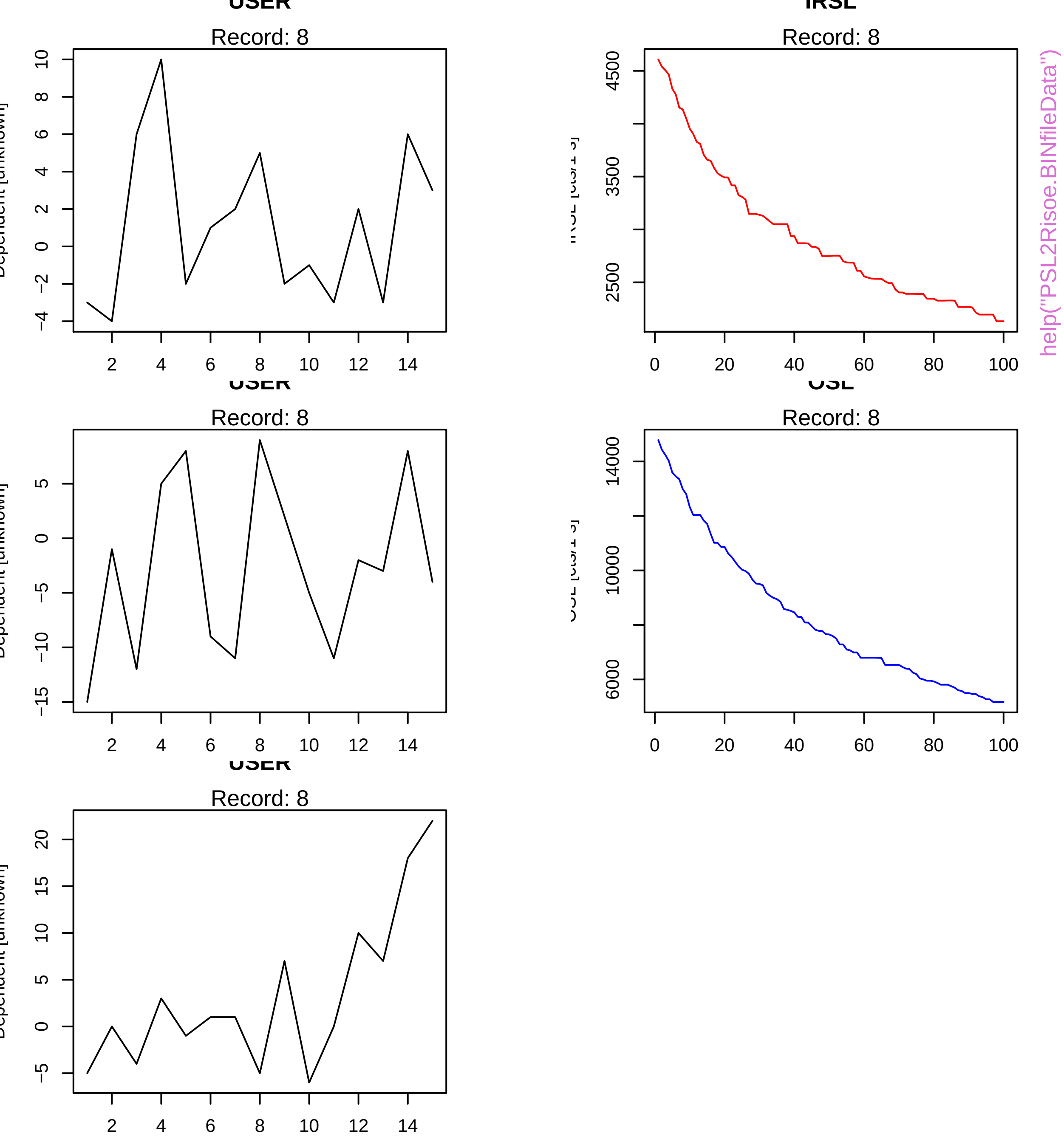

USER
Record: 3
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14
IRSL
Record: 3
4500
3500
2500
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 3
Dependent [unknown]
20
15
10
5
0
−5
−10
2
4
6
8
10
12
14
OSL
Record: 3
16000
12000
8000
0
20
40
60
80
100
USER
Record: 3
Dependent [unknown]
20
10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

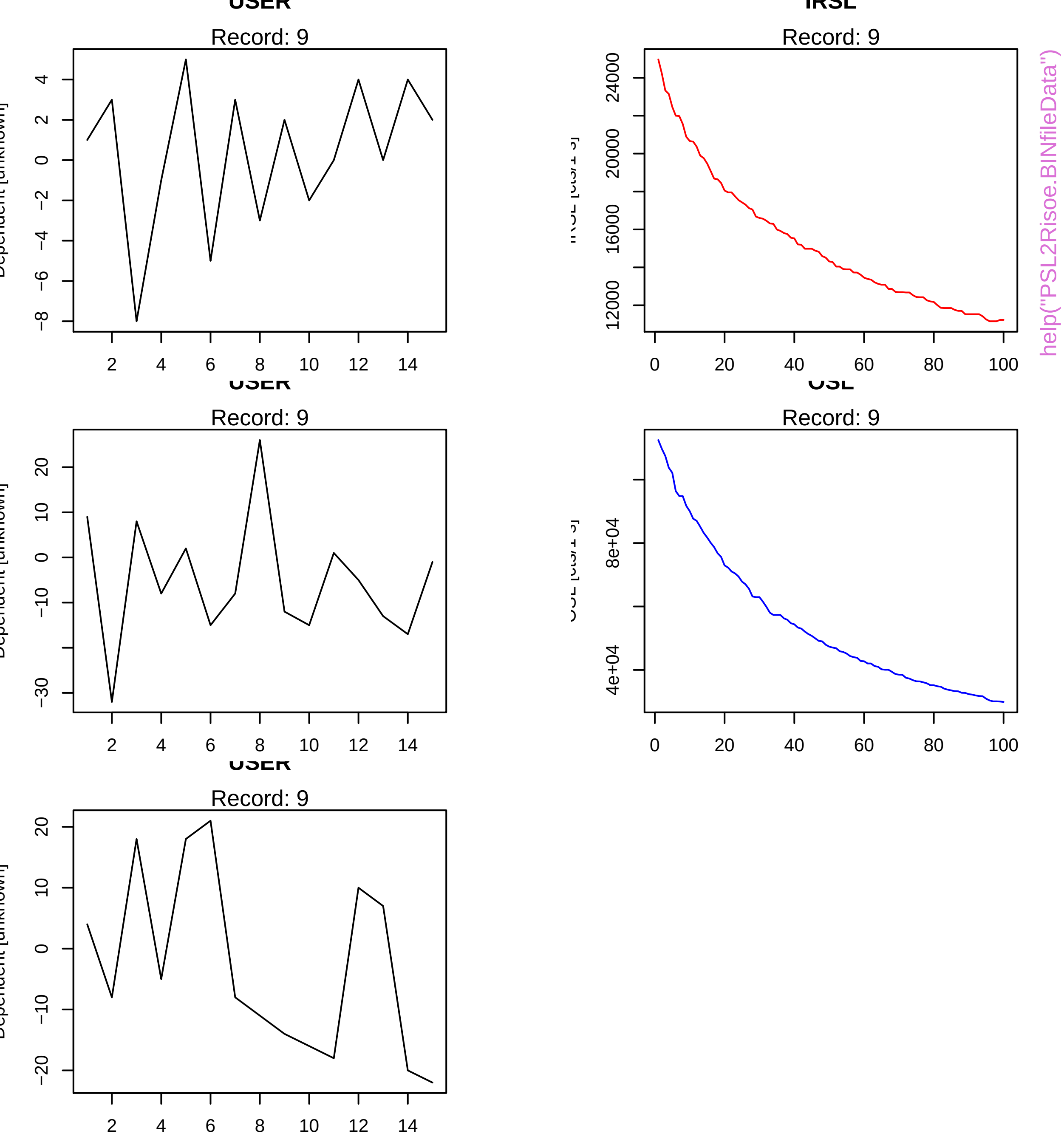

USER
Record: 4
Dependent [unknown]
−5
0
5
10
15
2
4
6
8
10
12
14
IRSL
Record: 4
2500
3500
4500
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 4
Dependent [unknown]
−10
−5
0
5
2
4
6
8
10
12
14
OSL
Record: 4
10000
15000
20000
0
20
40
60
80
100
USER
Record: 4
Dependent [unknown]
−20
−10
0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

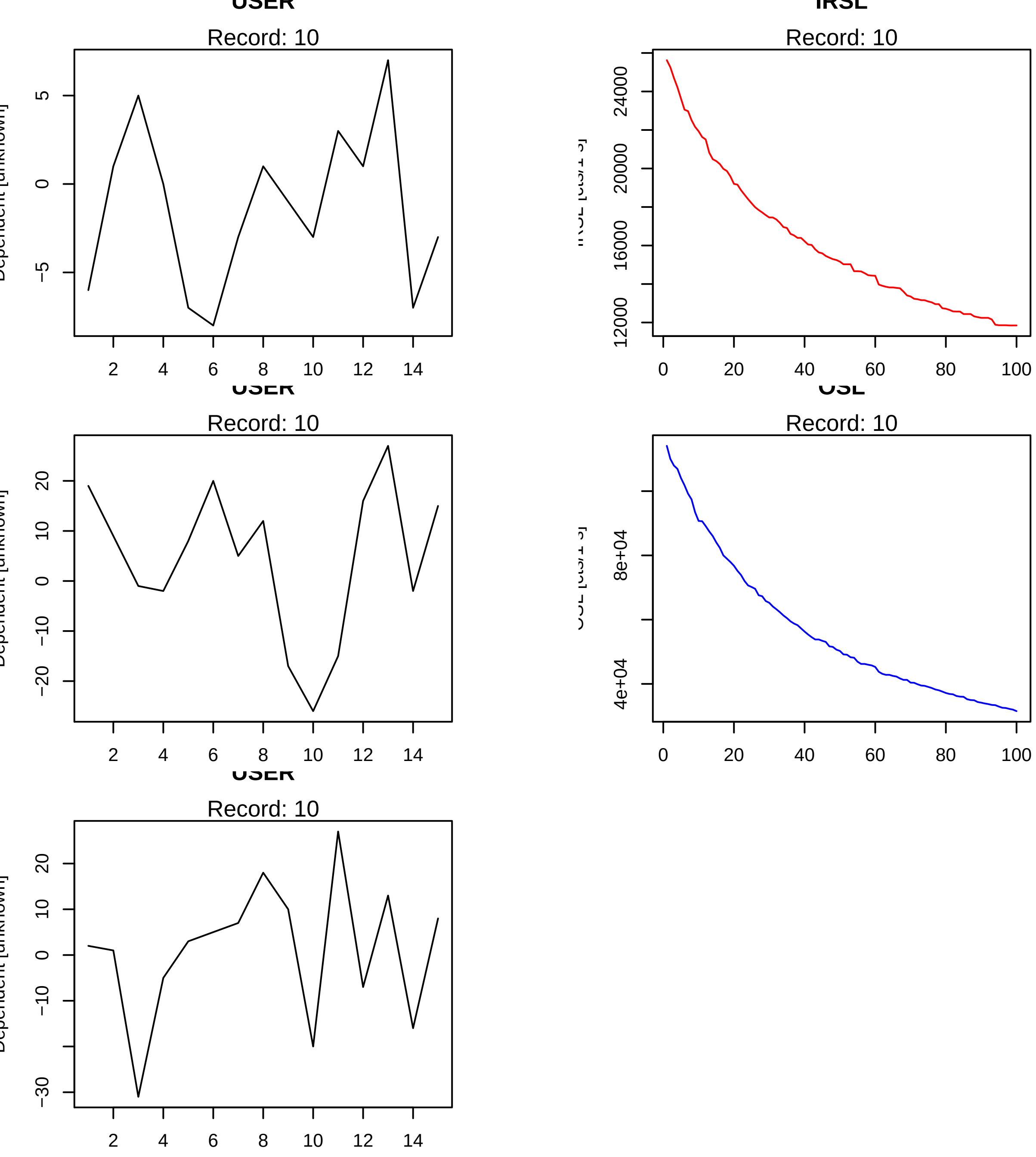

USER
Record: 5
Dependent [unknown]
0
−5
−10
−15
2
4
6
8
10
12
14
IRSL
Record: 5
22000
18000
14000
10000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 5
Dependent [unknown]
10
0
−10
−20
−30
2
4
6
8
10
12
14
OSL
Record: 5
1e+05
8e+04
6e+04
4e+04
0
20
40
60
80
100
USER
Record: 5
Dependent [unknown]
0
−50
−150
−250
2
4
6
8
10
12
14

USER
Record: 6
Dependent [unknown]
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

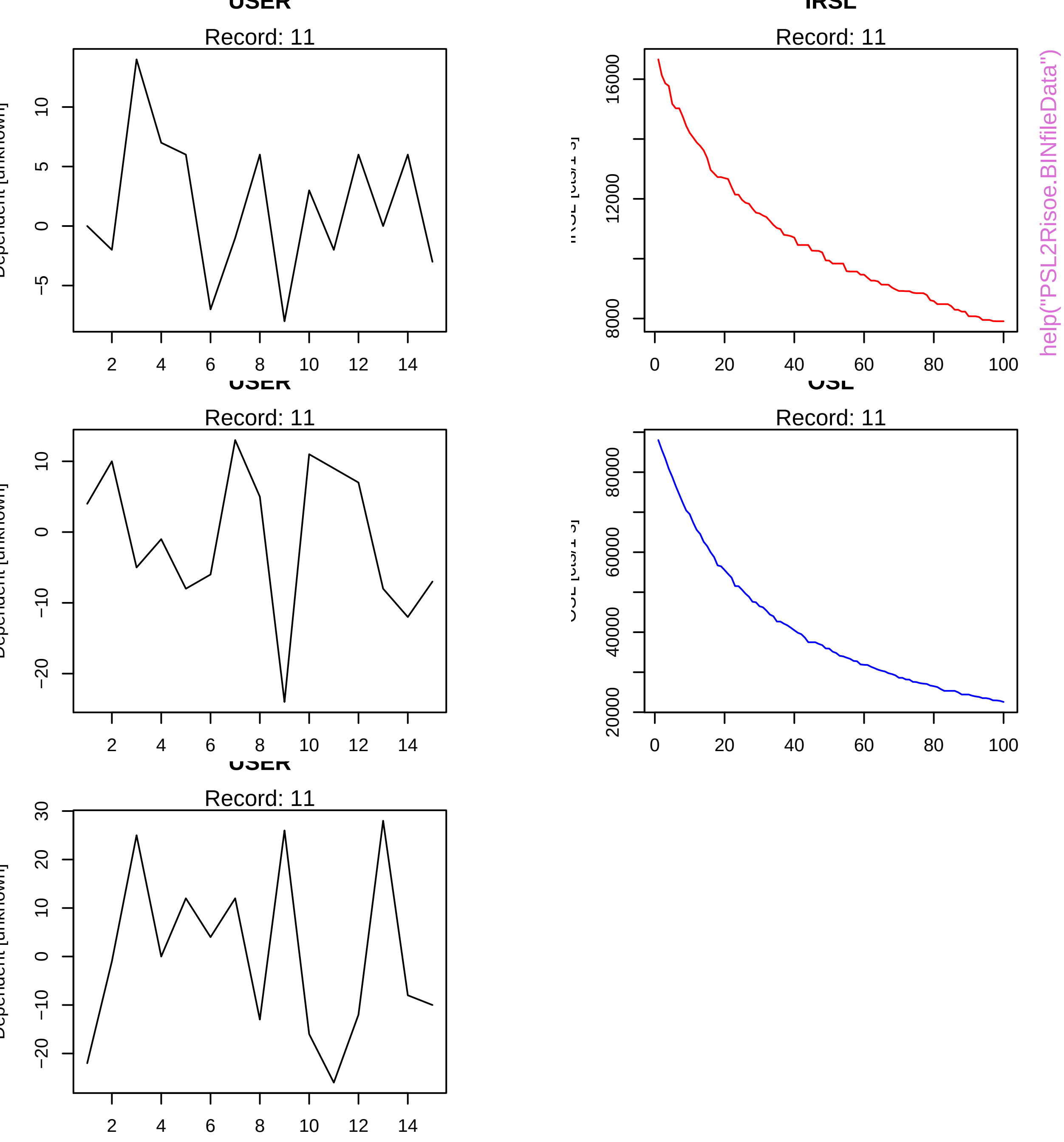

USER
Record: 7
Dependent [unknown]
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 7
10000
8000
6000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 7
Dependent [unknown]
20
10
0
−10
−20
−30
OSL
Record: 7
60000
40000
20000
USER
Record: 7
Dependent [unknown]

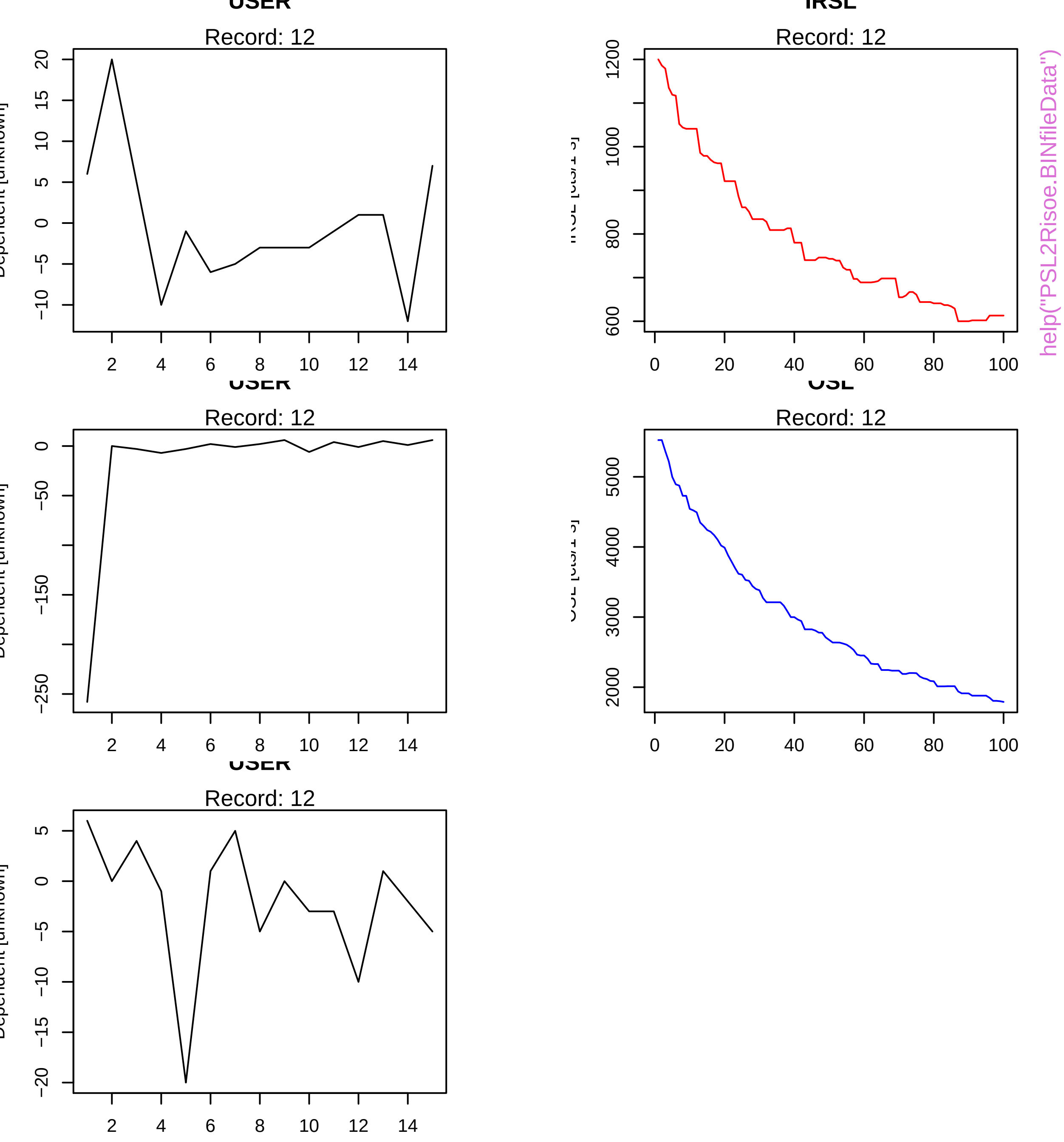

USER
Record: 8
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 8
IRSL [cts/1 s]
4500
3500
2500
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 8
Dependent [unknown]
5
0
−5
−10
−15
2
4
6
8
10
12
14
OSL
Record: 8
OSL [cts/1 s]
14000
10000
6000
0
20
40
60
80
100
USER
Record: 8
Dependent [unknown]
20
15
10
5
0
−5
2
4
6
8
10
12
14

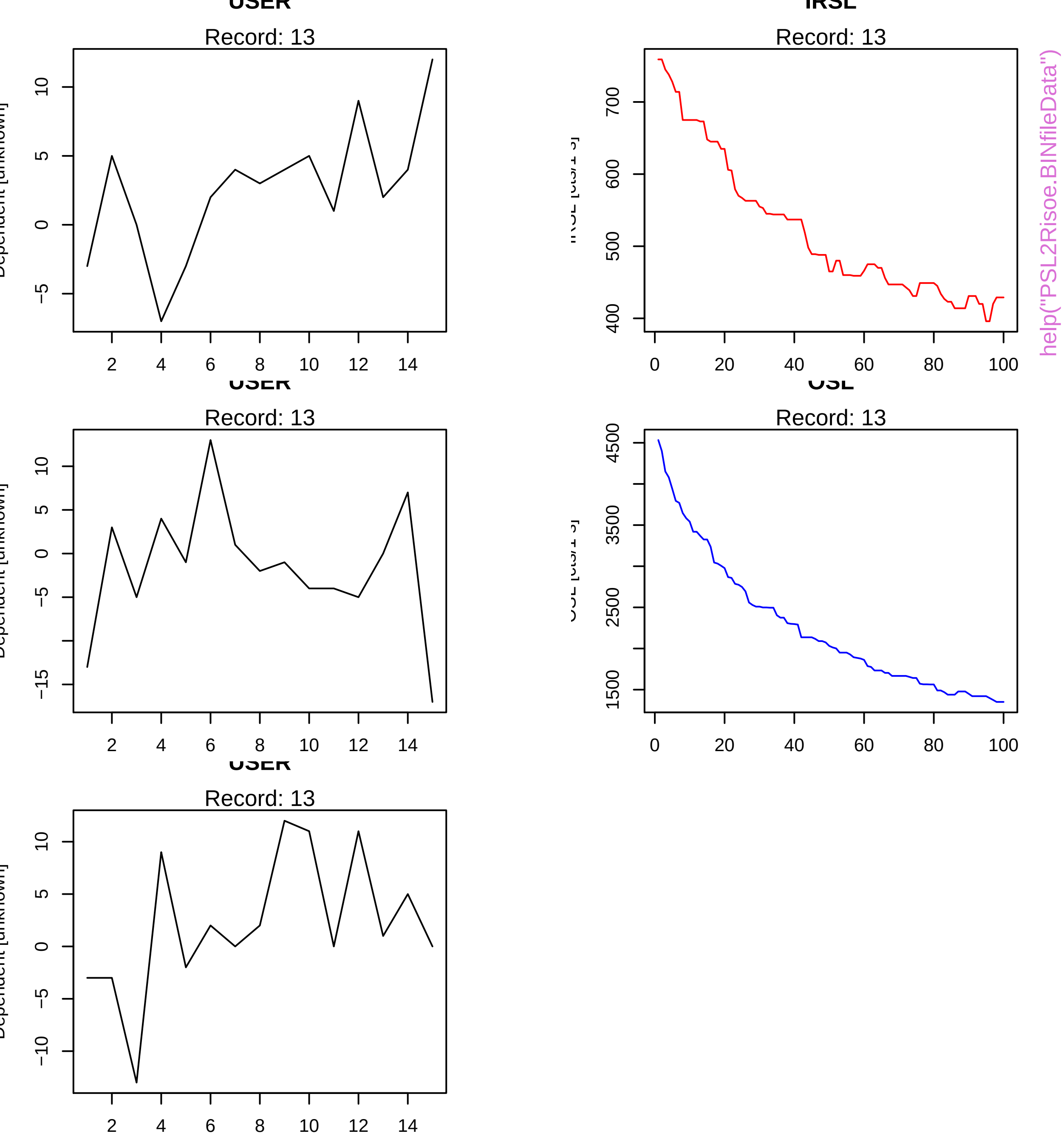

USER
Record: 9
Dependent [unknown]
4
2
0
−2
−4
−6
−8
2
4
6
8
10
12
14
IRSL
Record: 9
IRSL [cts/1 s]
24000
20000
16000
12000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 9
Dependent [unknown]
20
10
0
−10
−30
2
4
6
8
10
12
14
OSL
Record: 9
OSL [cts/1 s]
8e+04
4e+04
0
20
40
60
80
100
USER
Record: 9
Dependent [unknown]
20
10
0
−10
−20
2
4
6
8
10
12
14



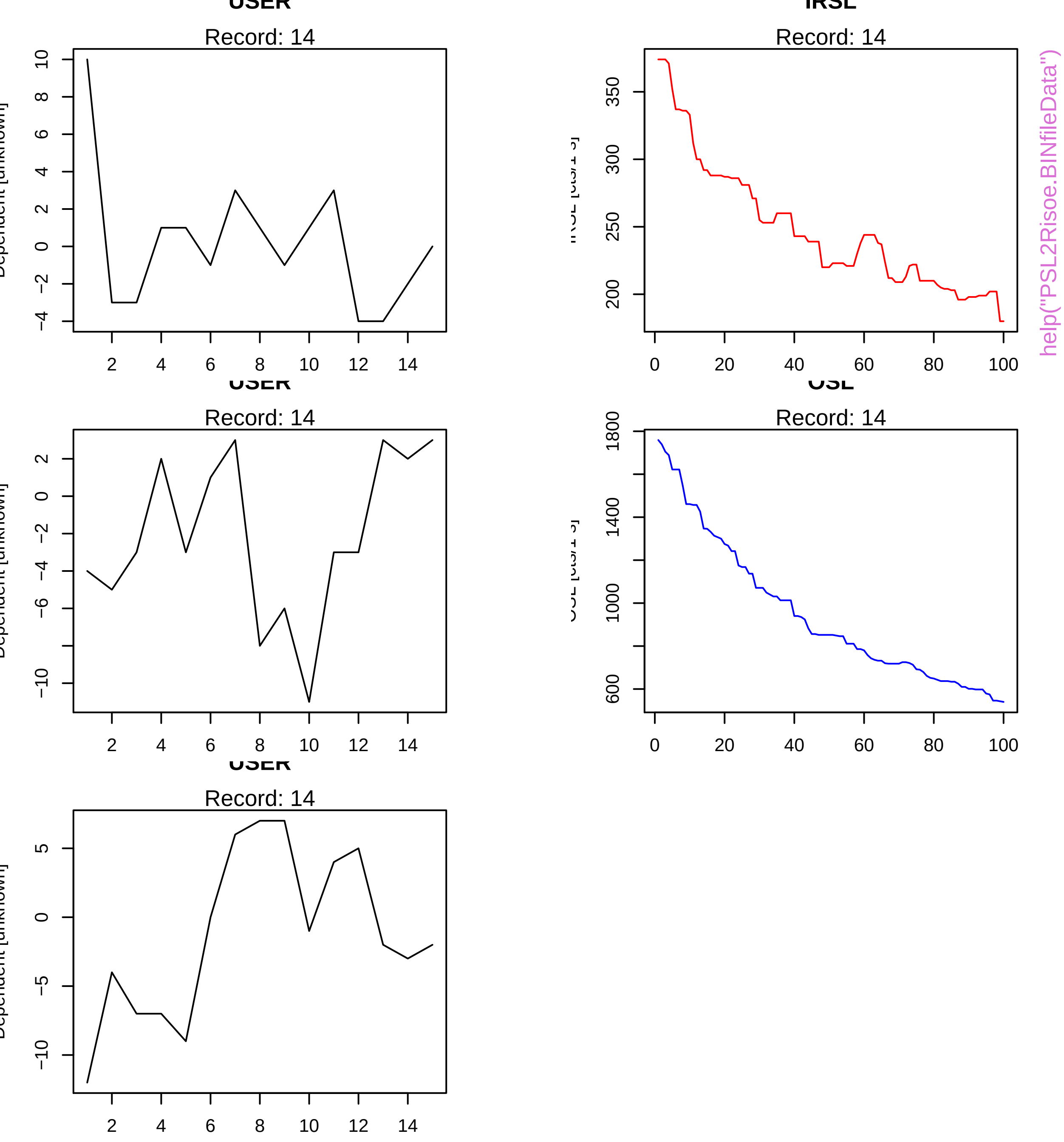
help("PSL2Risoe.BINfileData")

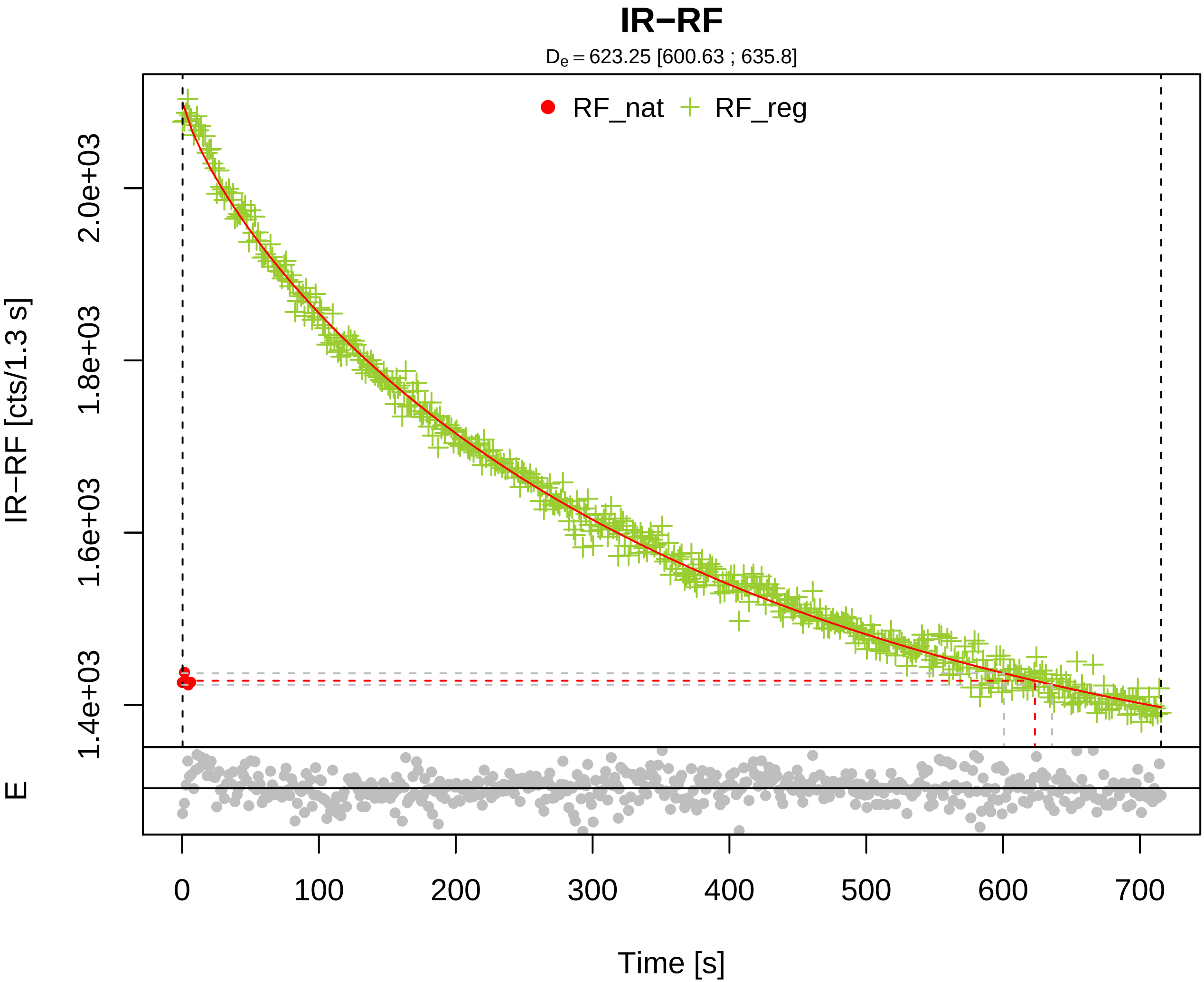

USER
Record: 11
Dependent [unknown]
−5
0
5
10
2
4
6
8
10
12
14
IRSL
Record: 11
8000
12000
16000
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 11
Dependent [unknown]
−20
−10
0
10
2
4
6
8
10
12
14
OSL
Record: 11
20000
40000
60000
80000
0
20
40
60
80
100
USER
Record: 11
Dependent [unknown]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

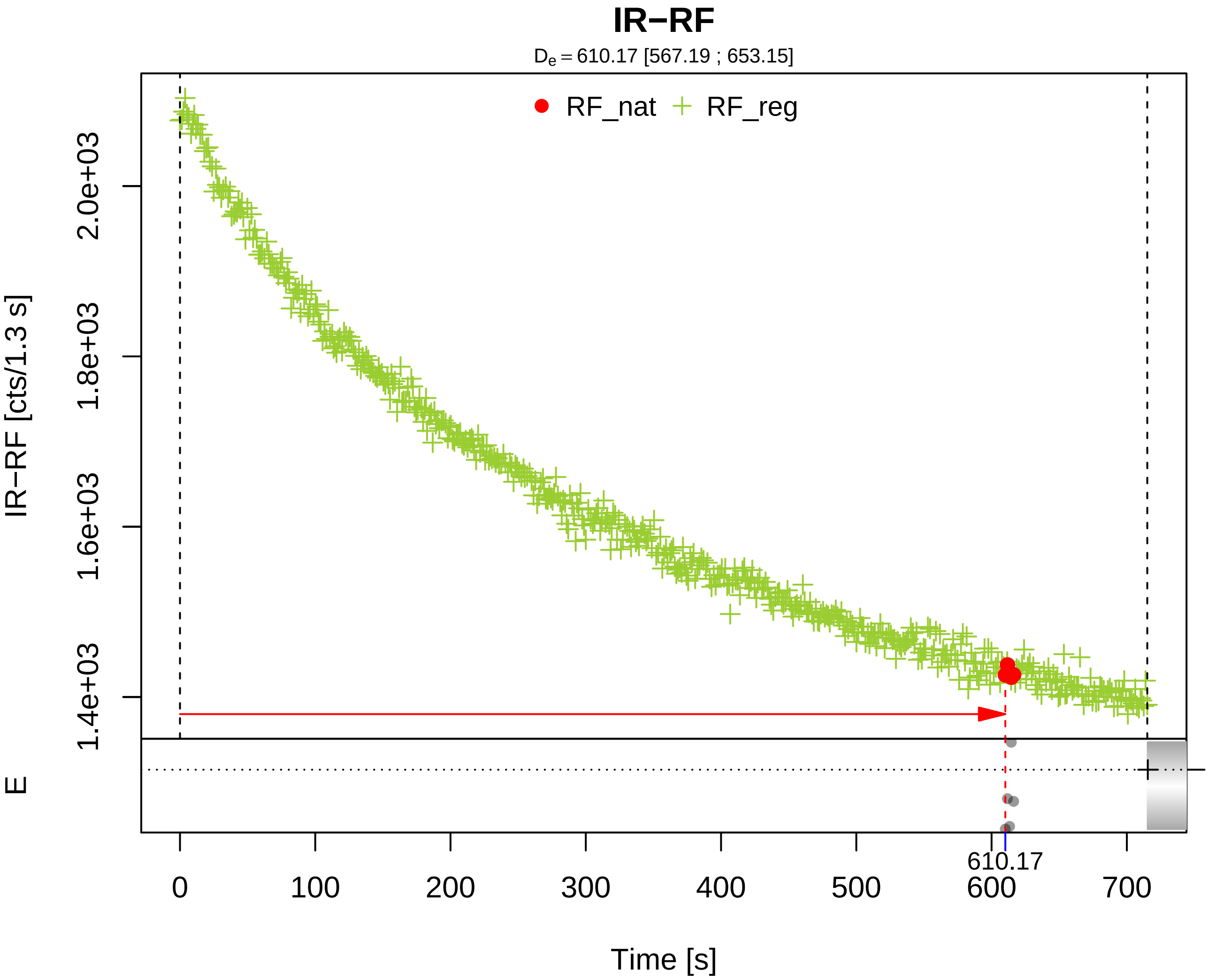

USER
Record: 12
Dependent [unknown]
20
15
10
5
0
−5
−10
2
4
6
8
10
12
14
IRSL
Record: 12
1200
1000
800
600
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 12
Dependent [unknown]
0
−50
−150
−250
2
4
6
8
10
12
14
OSL
Record: 12
5000
4000
3000
2000
0
20
40
60
80
100
USER
Record: 12
Dependent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

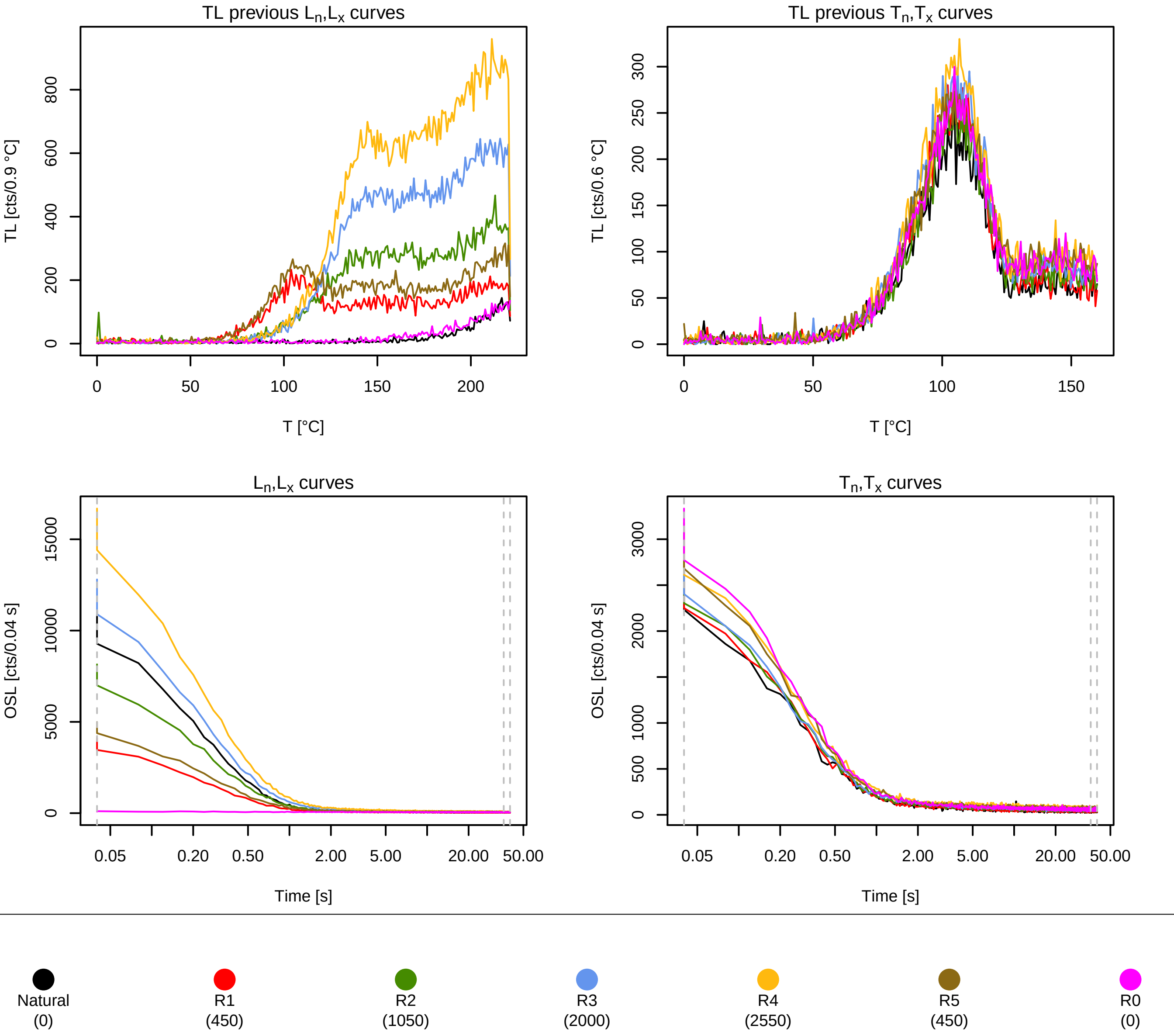


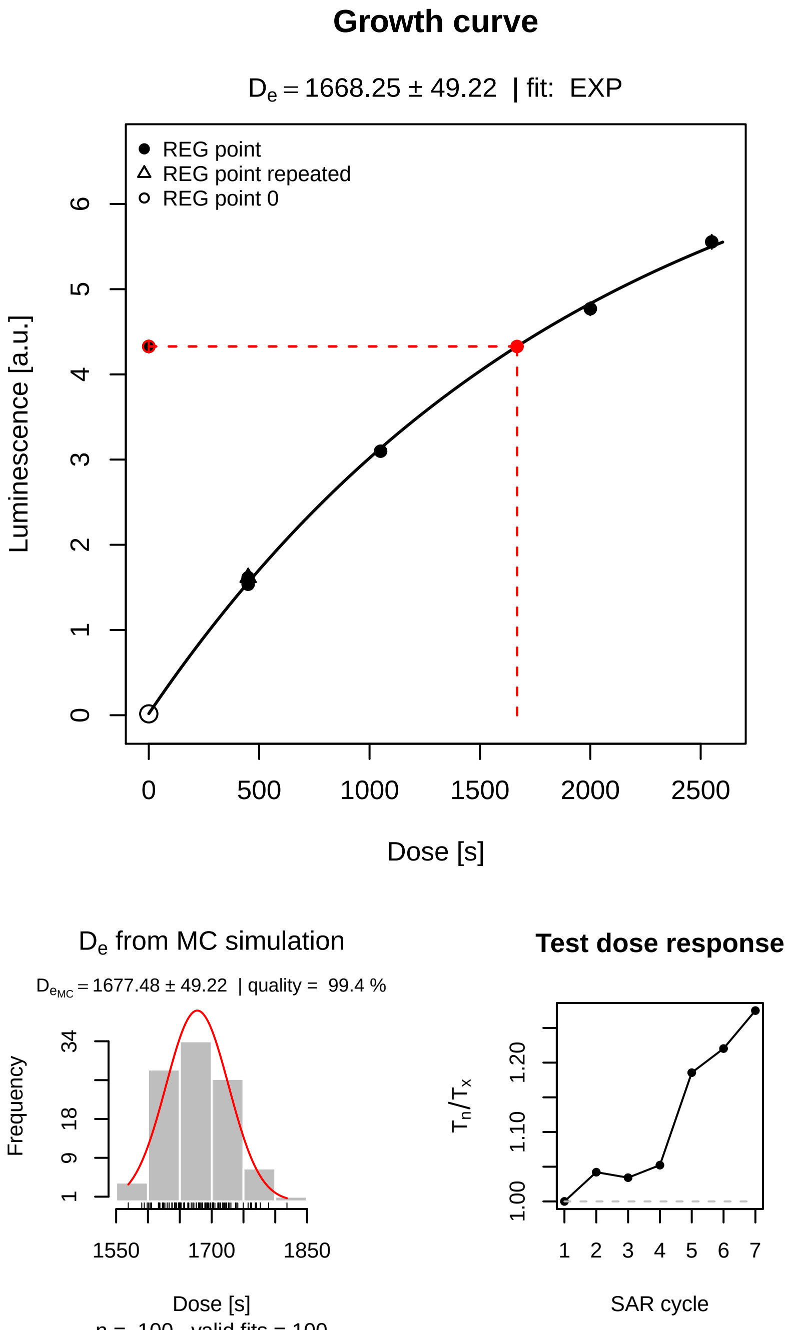
help("PSL2Risoe.BINfileData")

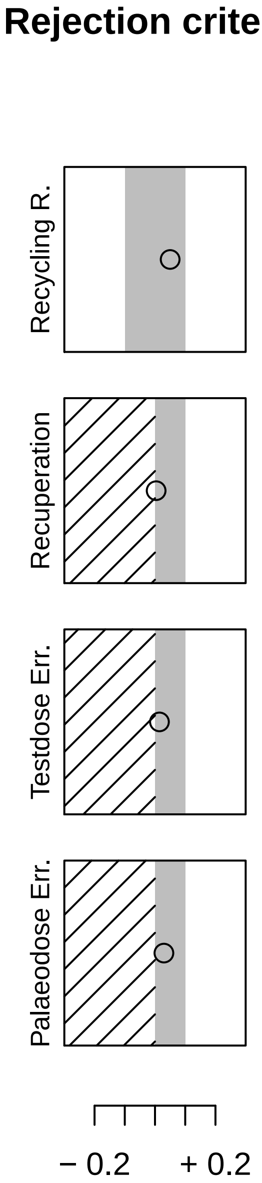

USER
Record: 14
Dependent [unknown]
10
8
6
4
2
0
−2
−4
2
4
6
8
10
12
14
IRSL
Record: 14
IRSL [cts/1 s]
350
300
250
200
0
20
40
60
80
100
help("PSL2Risoe.BINfileData")
USER
Record: 14
Dependent [unknown]
2
0
−2
−4
−6
−10
2
4
6
8
10
12
14
OSL
Record: 14
OSL [cts/1 s]
1800
1400
1000
600
0
20
40
60
80
100
USER
Record: 14
Dependent [unknown]
5
0
−5
−10
2
4
6
8
10
12
14

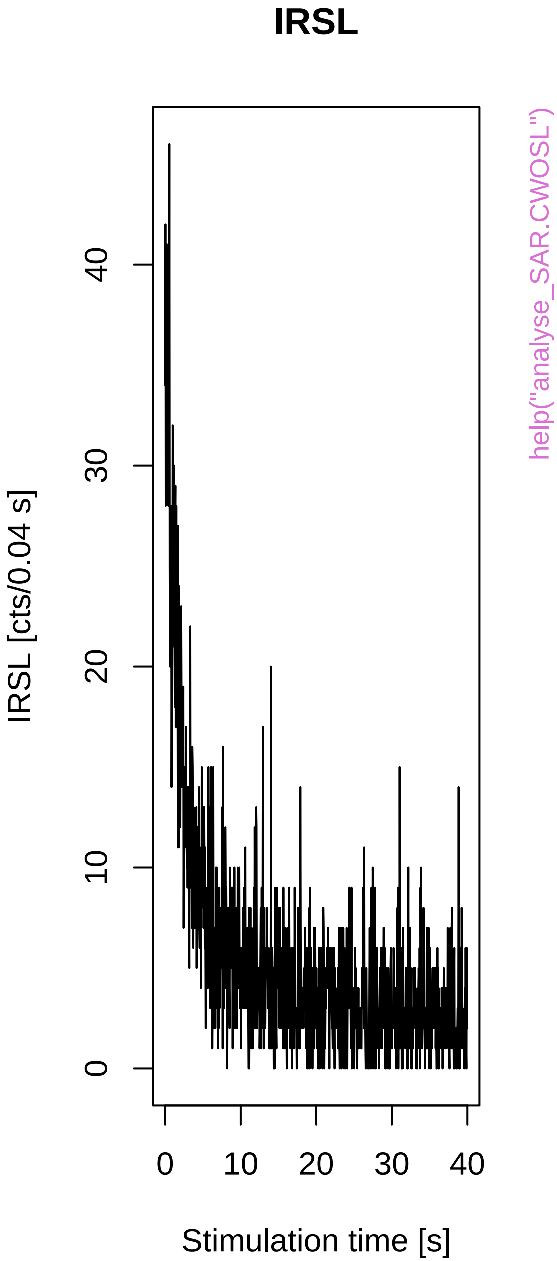

IR−RF
$D_e = 623.25$ [600.63 ; 635.8]
● RF_nat
+ RF_reg
IR−RF [cts/1.3 s]
2.0e+03
1.8e+03
1.6e+03
1.4e+03
E
0
100
200
300
400
500
600
700
Time [s]

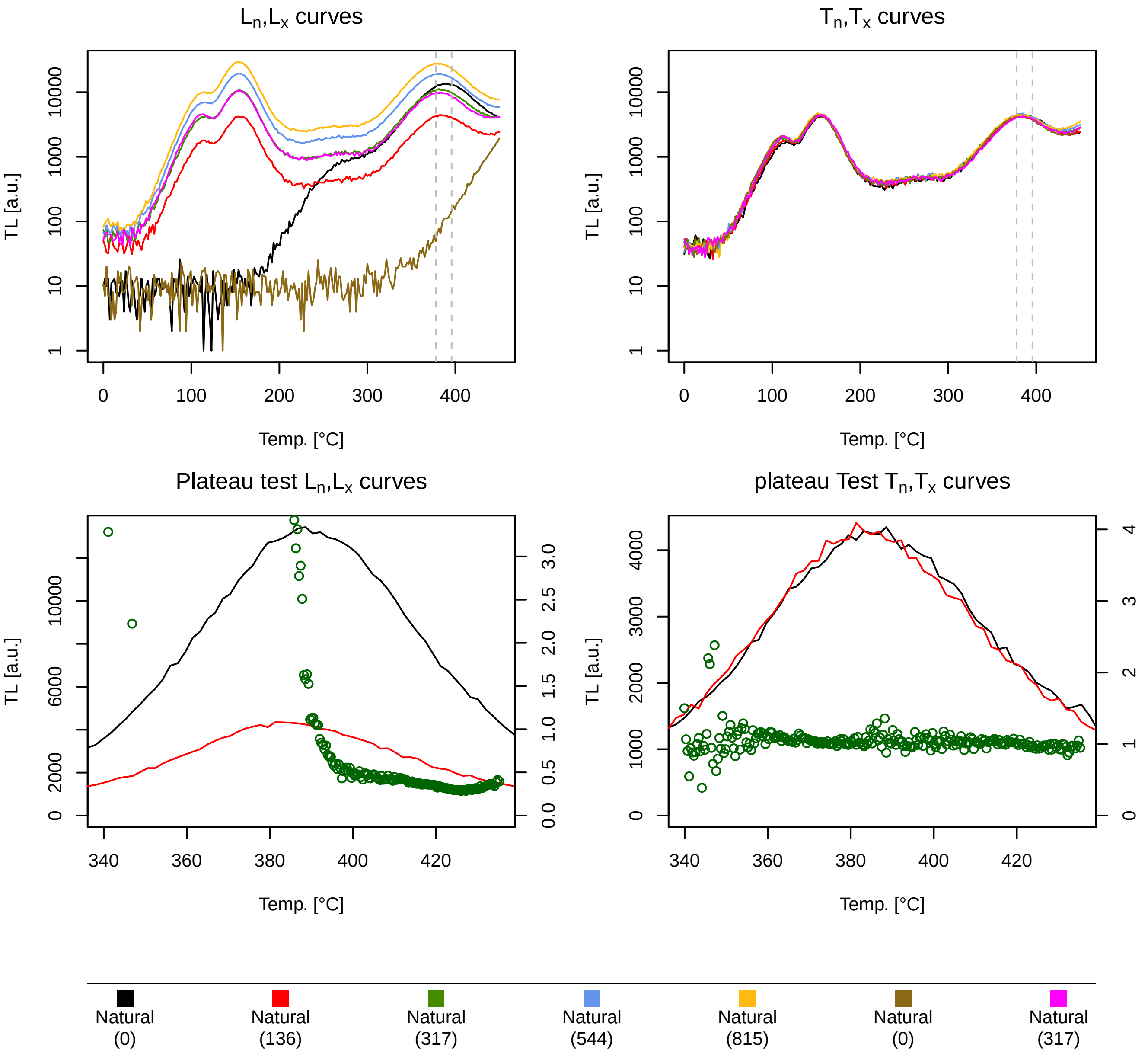

IR−RF
D_e = 610.17 [567.19 ; 653.15]
● RF_nat
+ RF_reg
IR−RF [cts/1.3 s]
2.0e+03
1.8e+03
1.6e+03
1.4e+03
E
610.17
0
100
200
300
400
500
600
700
Time [s]


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)

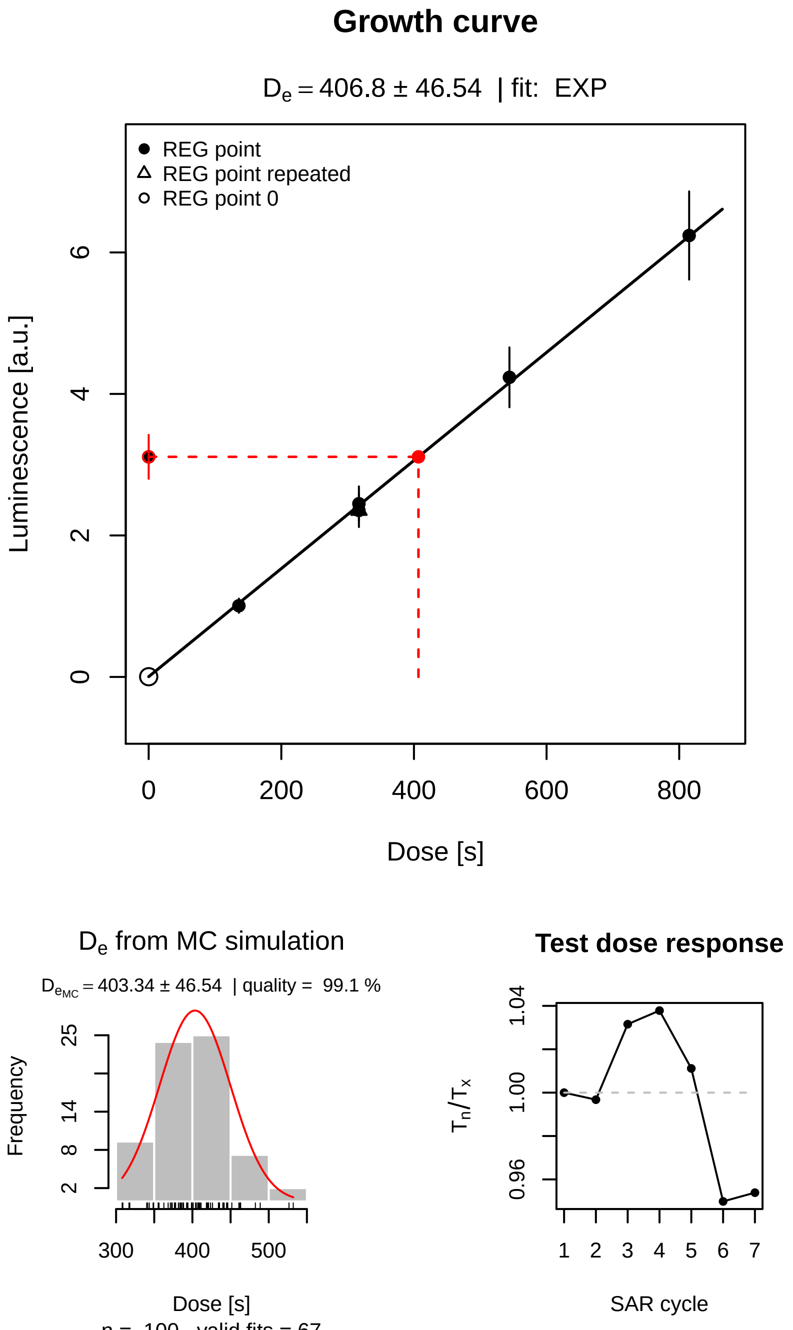

Growth curve
$D_e = 1668.25 \pm 49.22$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 1677.48 \pm 49.22$ | quality = 99.4 %
Frequency
1
9
18
34
1550
1700
1850
Dose [s]
n = 100 | valid fits = 100
Test dose response
T_n/T_x
1.00
1.10
1.20
1
2
3
4
5
6
7
SAR cycle


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


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



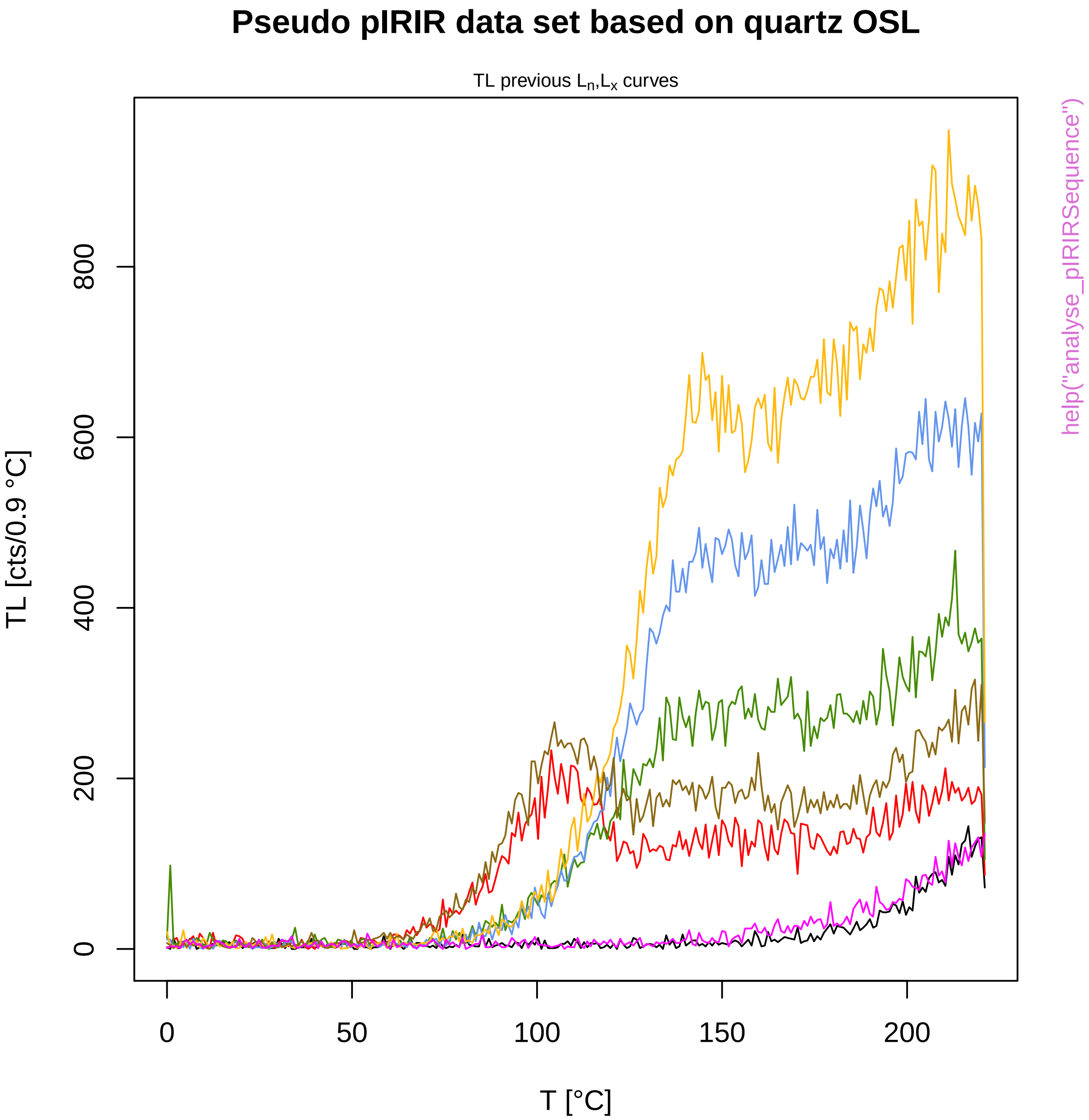
L_n,L_x curves
T_n,T_x curves
Plateau test L_n,L_x curves
plateau Test T_n,T_x curves
TL [a.u.]
Temp. [°C]
1
10
100
1000
10000
0
100
200
300
400
0
2000
6000
10000
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1000
3000
4000
1
2
3
4
340
360
380
400
420
Natural (0)
Natural (136)
Natural (317)
Natural (544)
Natural (815)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

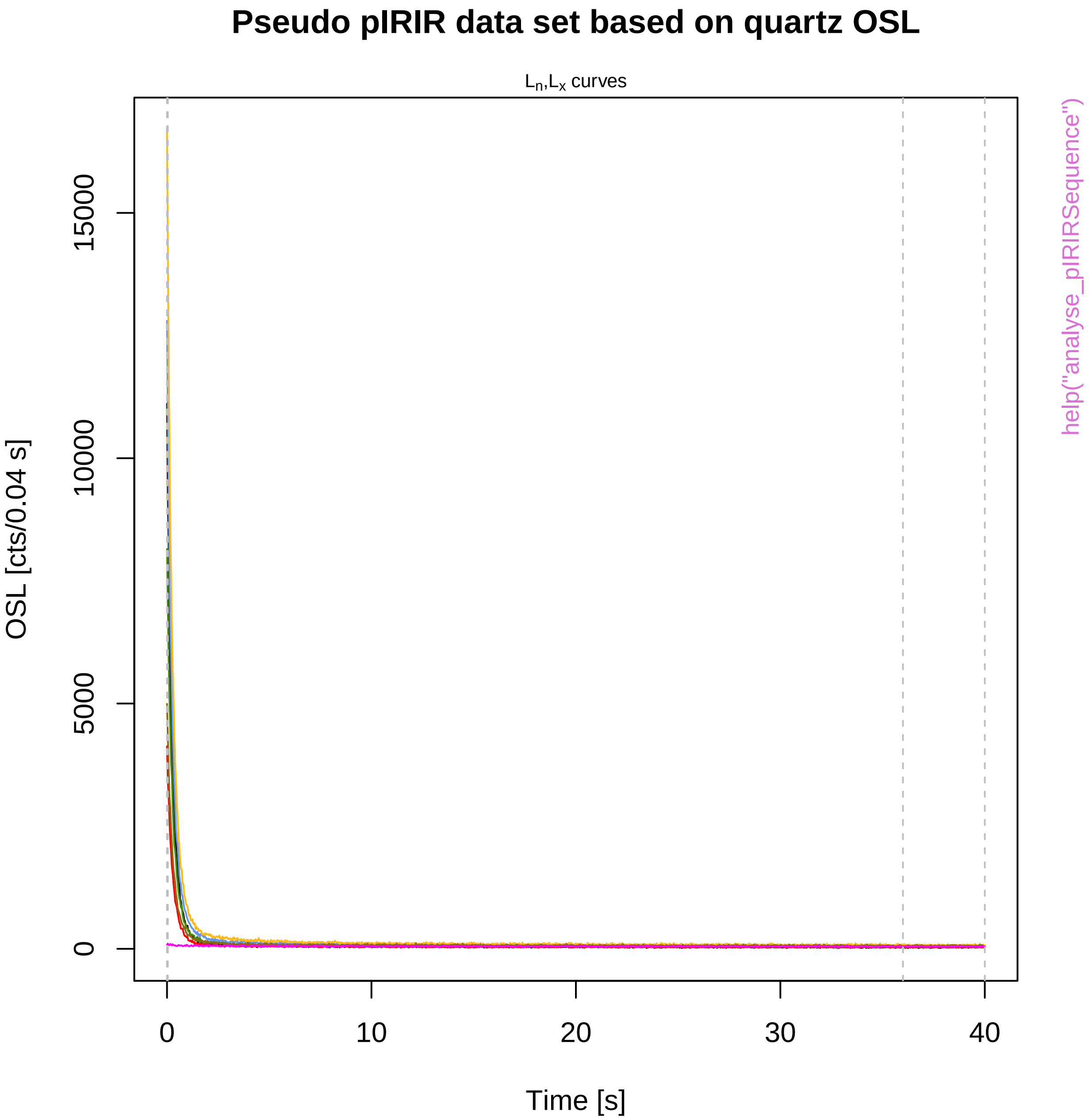

Growth curve
$D_e = 406.8 \pm 46.54$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
2
4
6
0
200
400
600
800
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 403.34 \pm 46.54$ | quality = 99.1 %
Frequency
2
8
14
25
300
400
500
Dose [s]
n = 100 , valid fits = 67
Test dose response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

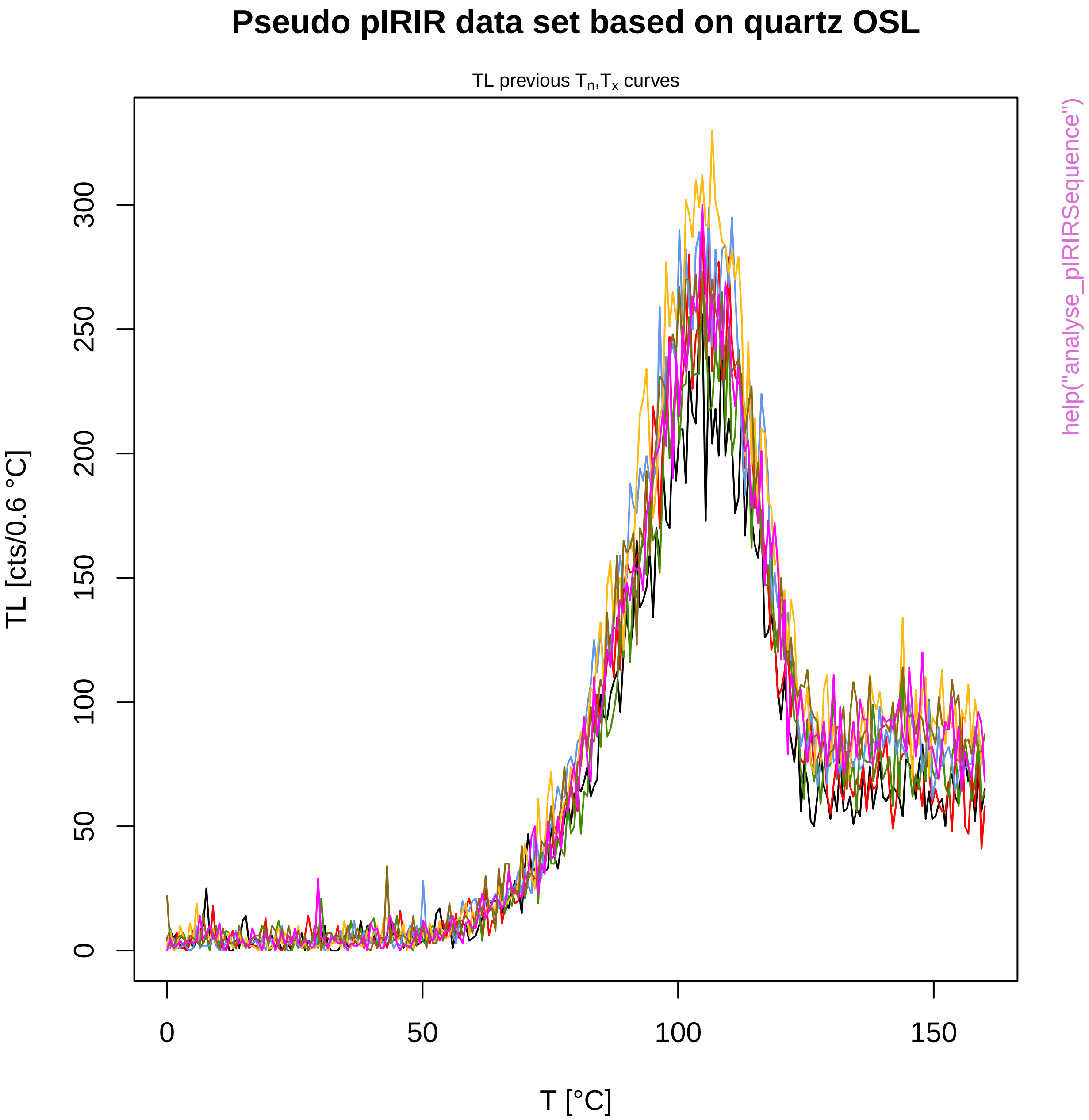
Pseudo pIRIR data set based on quartz OSL

help("analyse_pIRIRSequence")

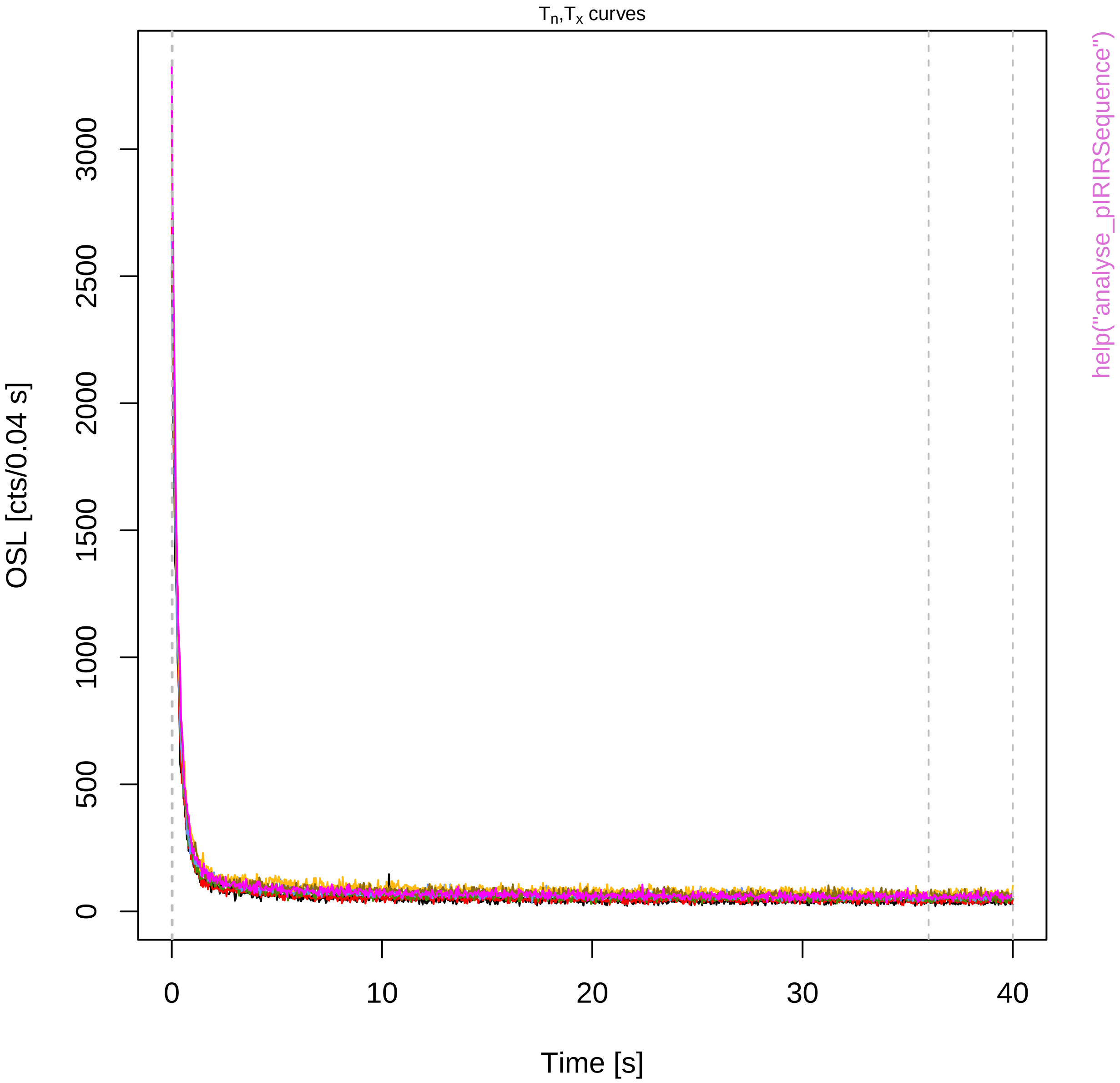
TL
pseudoIRSL1
pseudoIRSL2

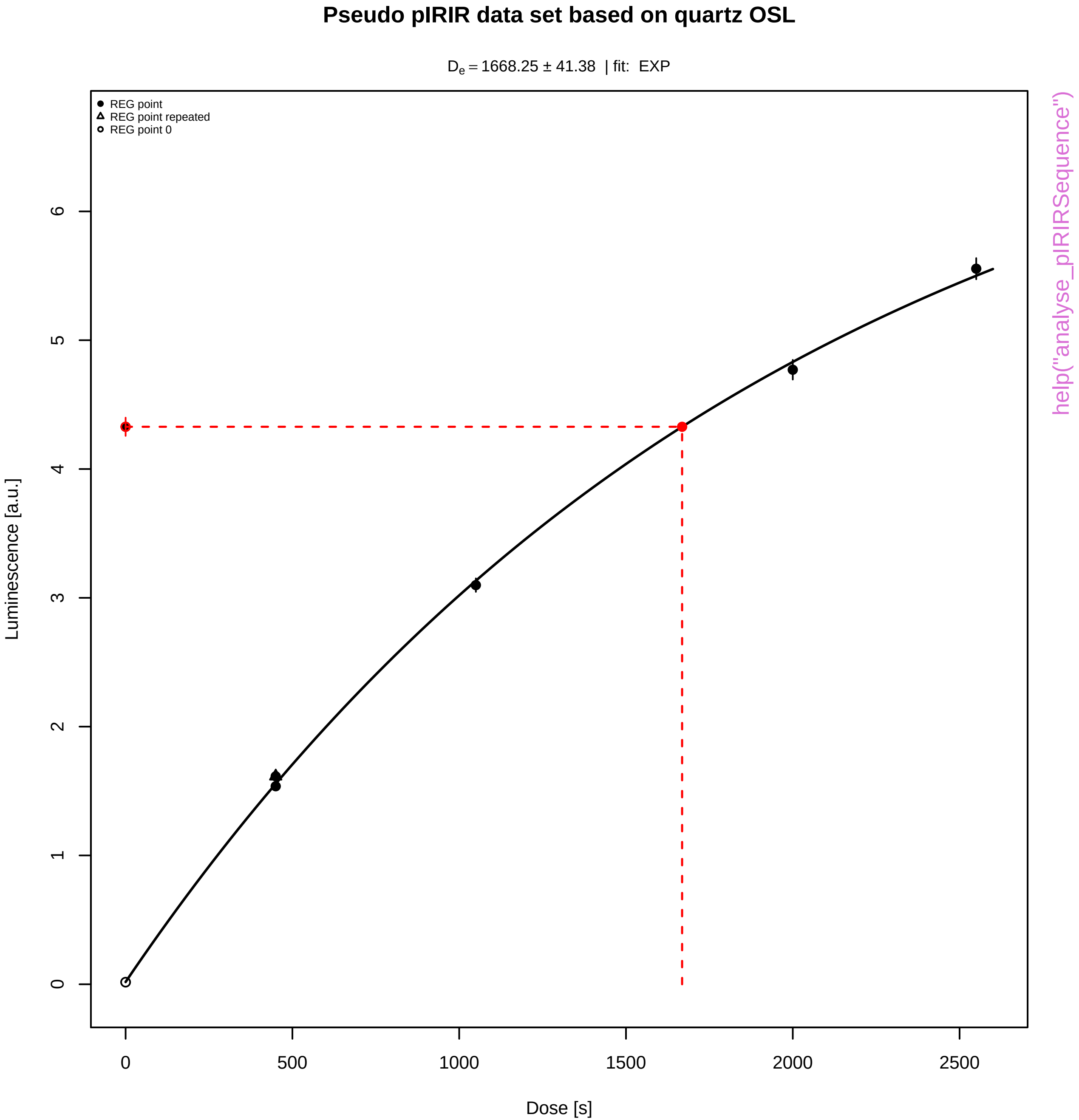

Pseudo pIRIR data set based on quartz OSL
TL previous L_n,L_x curves
TL [cts/0.9 °C]
0
200
400
600
800
0
50
100
150
200
T [°C]
help("analyse_pIRIRSequence")

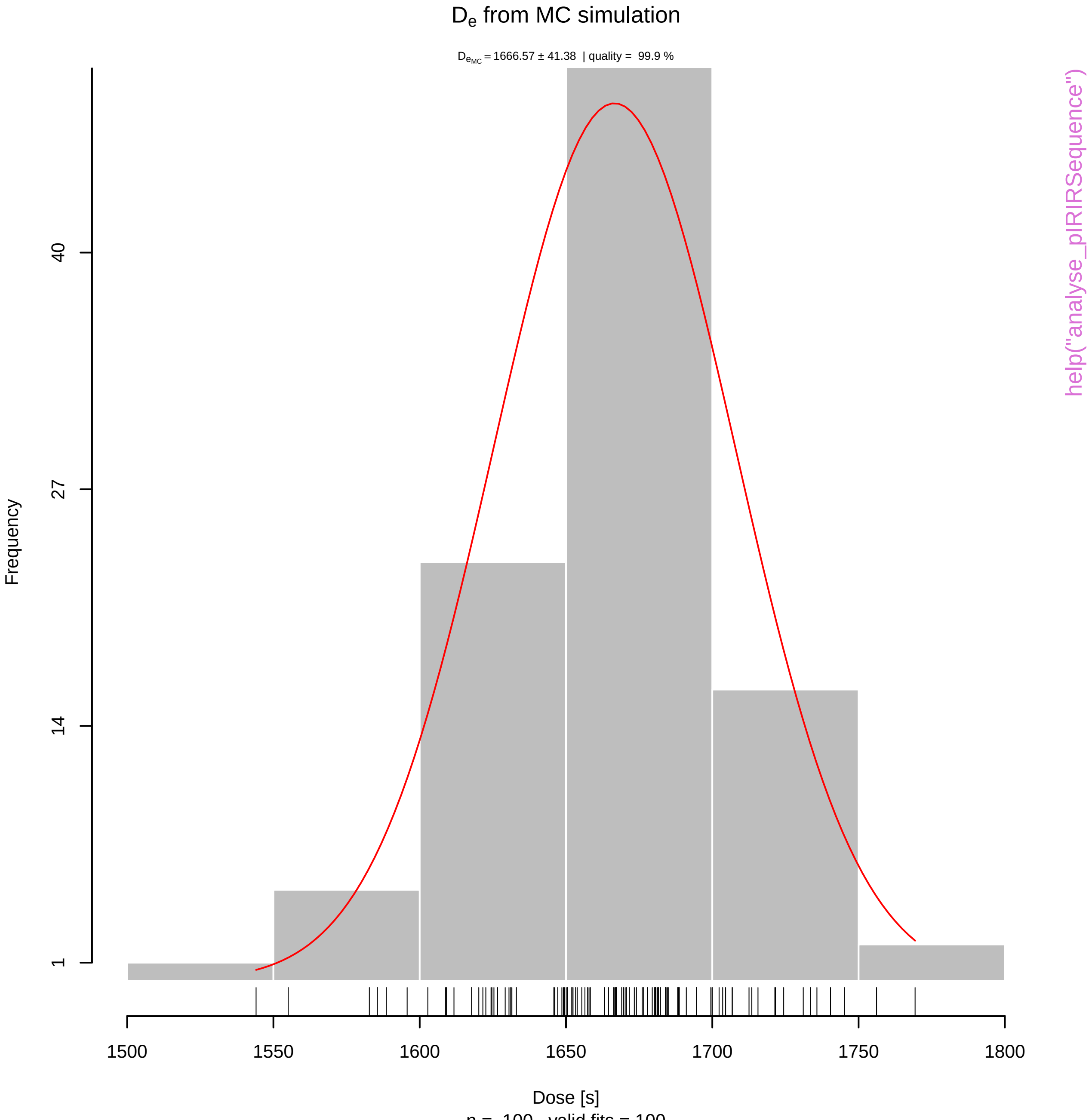

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]
help("analyse_pIRIRSequence")

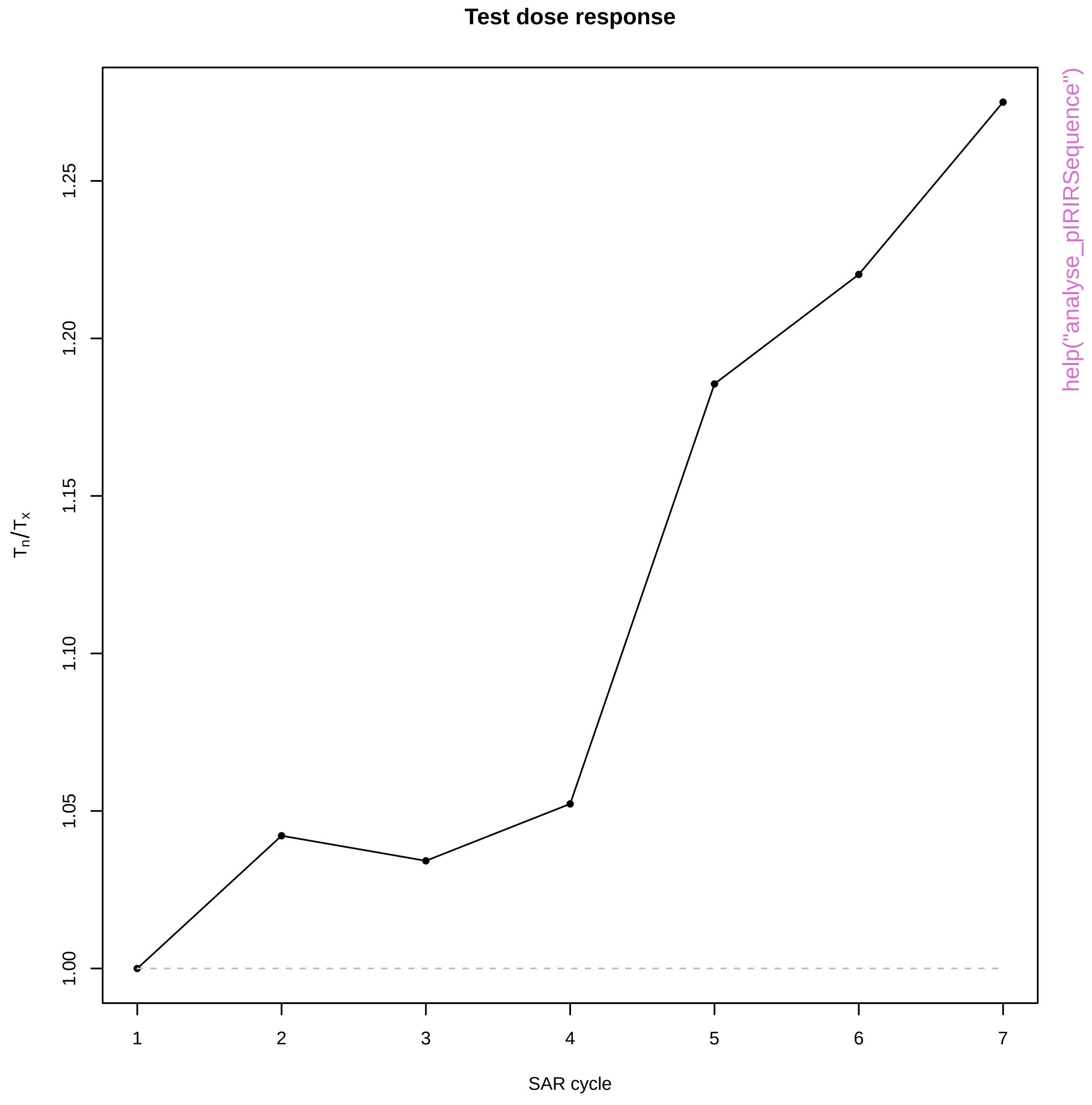

Pseudo pIRIR data set based on quartz OSL
TL previous T$_n$,T$_x$ curves
TL [cts/0.6 °C]
T [°C]
0
50
100
150
200
250
300
0
50
100
150
help("analyse_pIRIRSequence")

Pseudo pIRIR data set based on quartz OSL

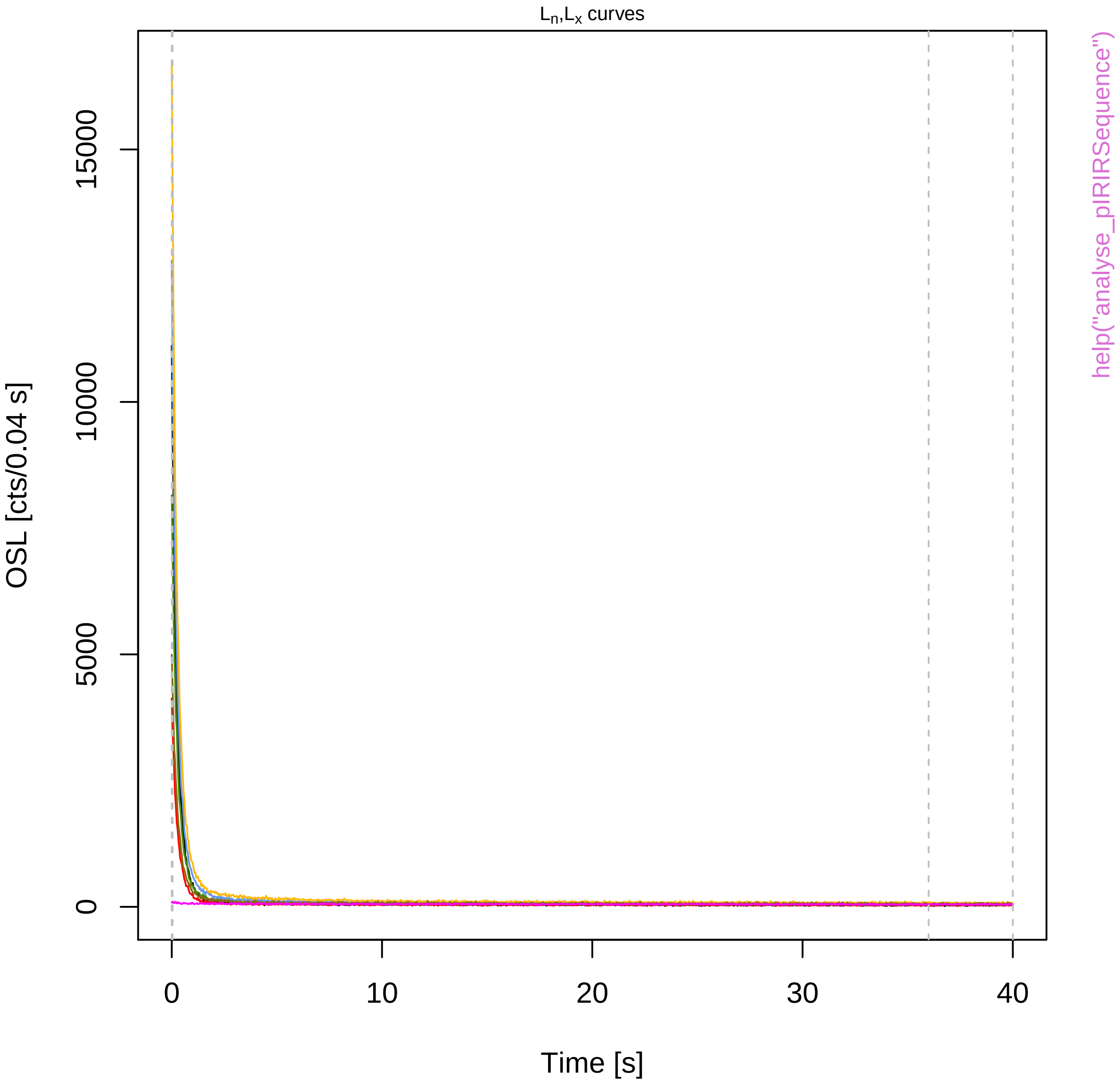



Pseudo pIRIR data set based on quartz OSL
$D_e = 1668.25 \pm 41.38$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
help("analyse_pIRIRSequence")
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]

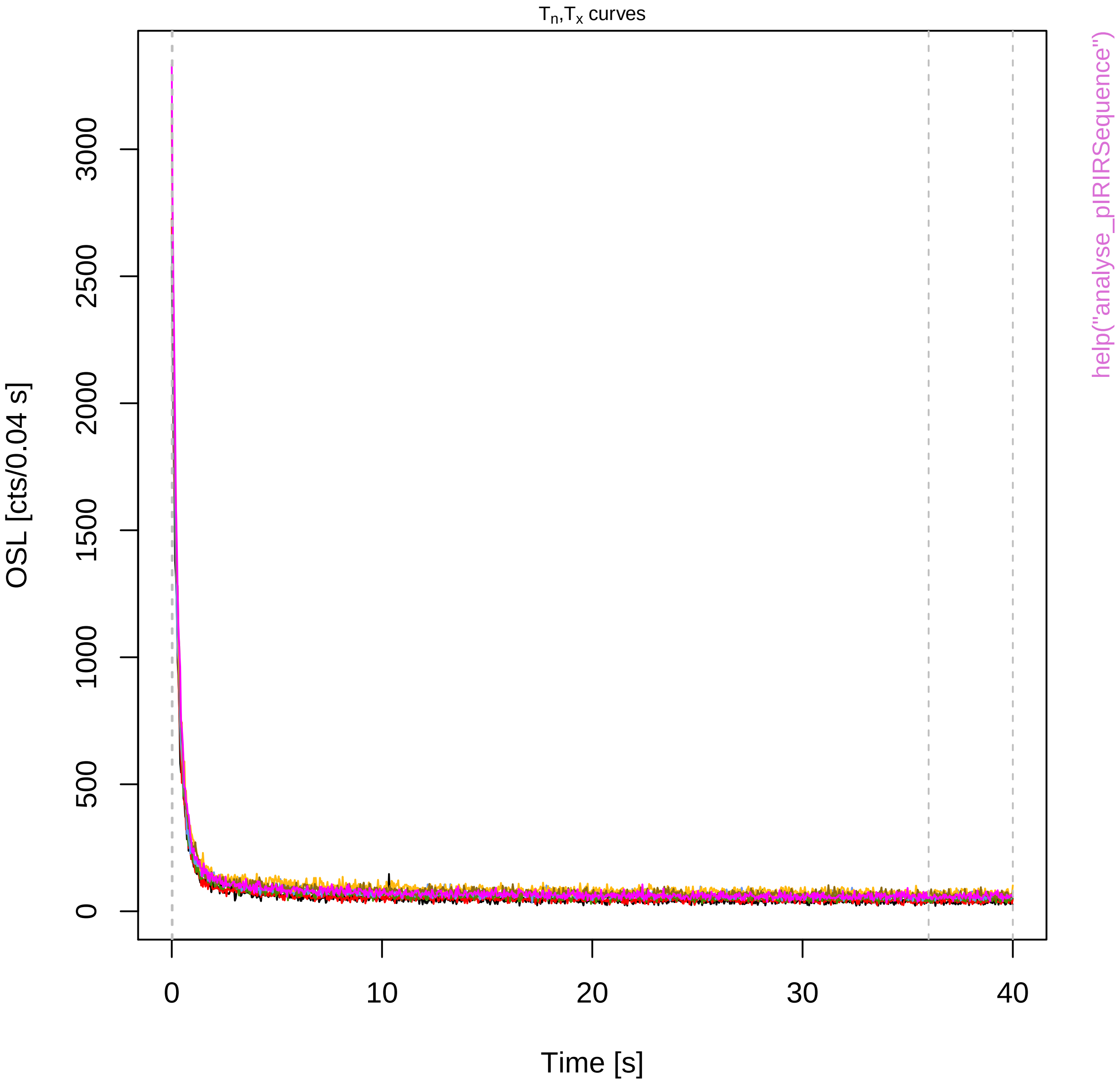

D_e from MC simulation
$D_{e_{MC}}$ = 1666.57 ± 41.38 | quality = 99.9 %
Frequency
1
14
27
40
1500
1550
1600
1650
1700
1750
1800
Dose [s]
n = 100 , valid fits = 100
help("analyse_pIRIRSequence")

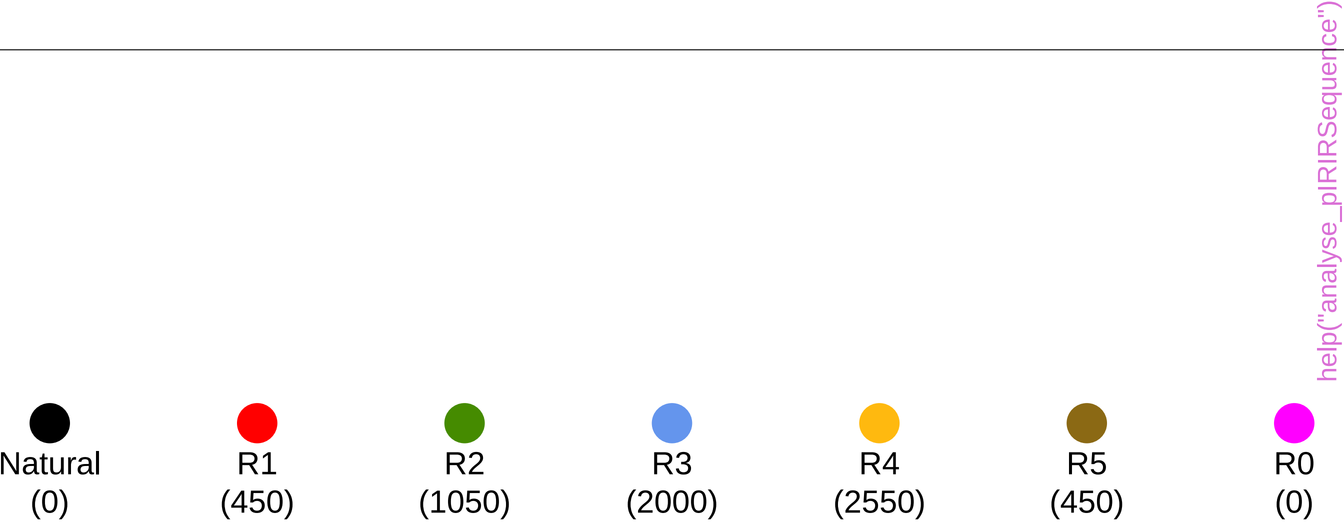

Test dose response
1.00
1.05
1.10
1.15
1.20
1.25
T_n/T_x
1
2
3
4
5
6
7
SAR cycle
help("analyse_pIRIRSequence")

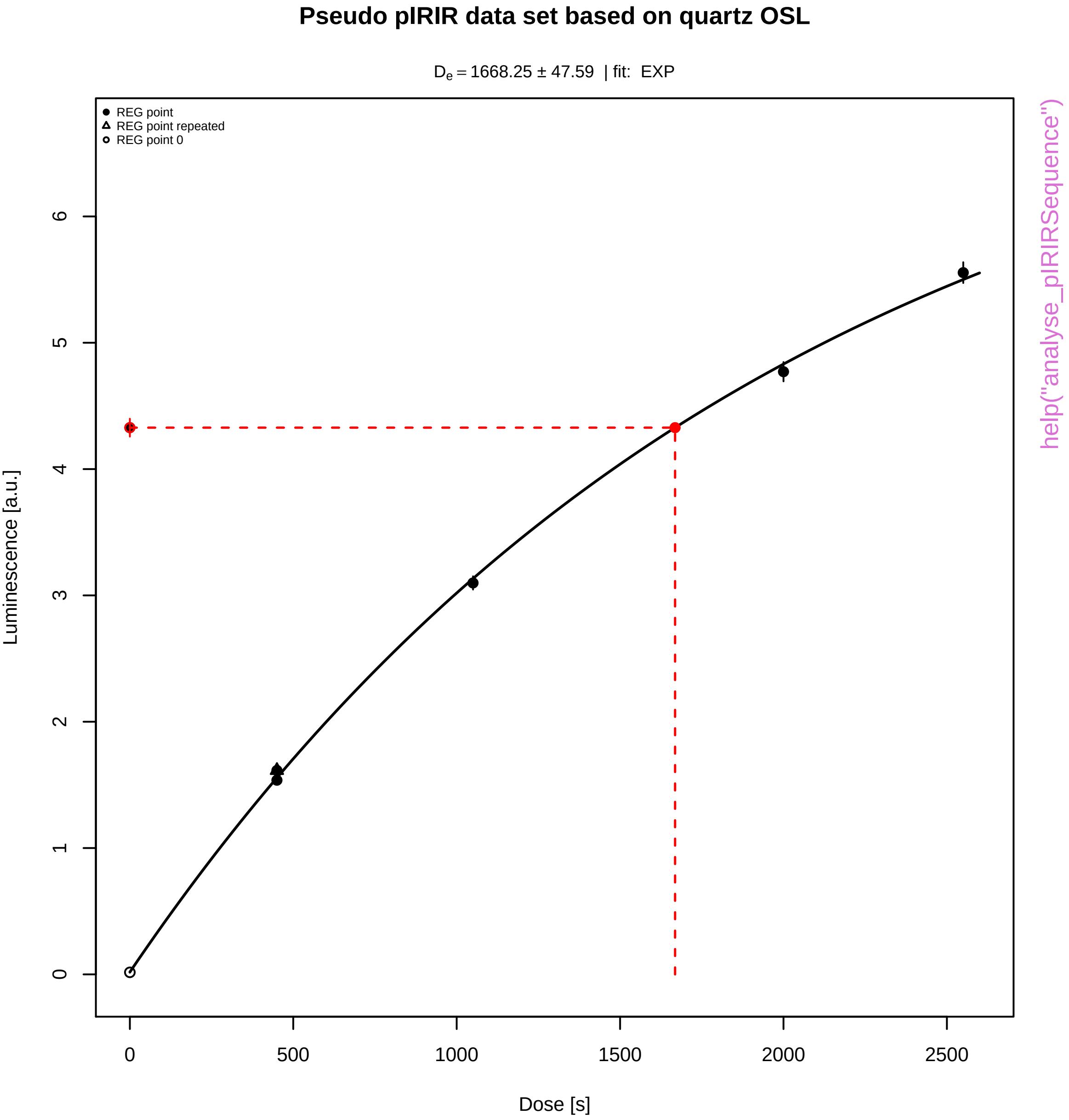
Pseudo pIRIR data set based on quartz OSL

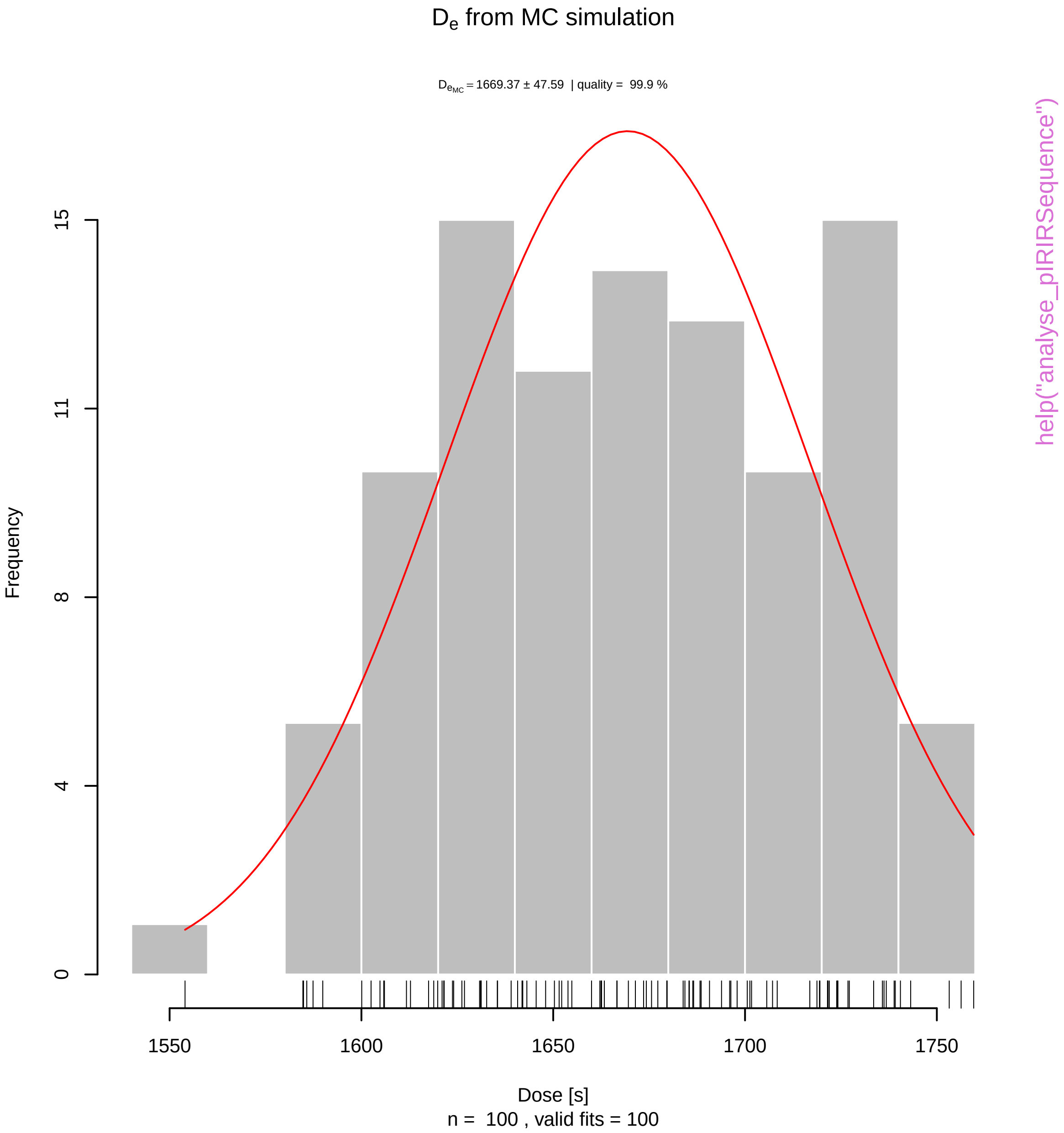


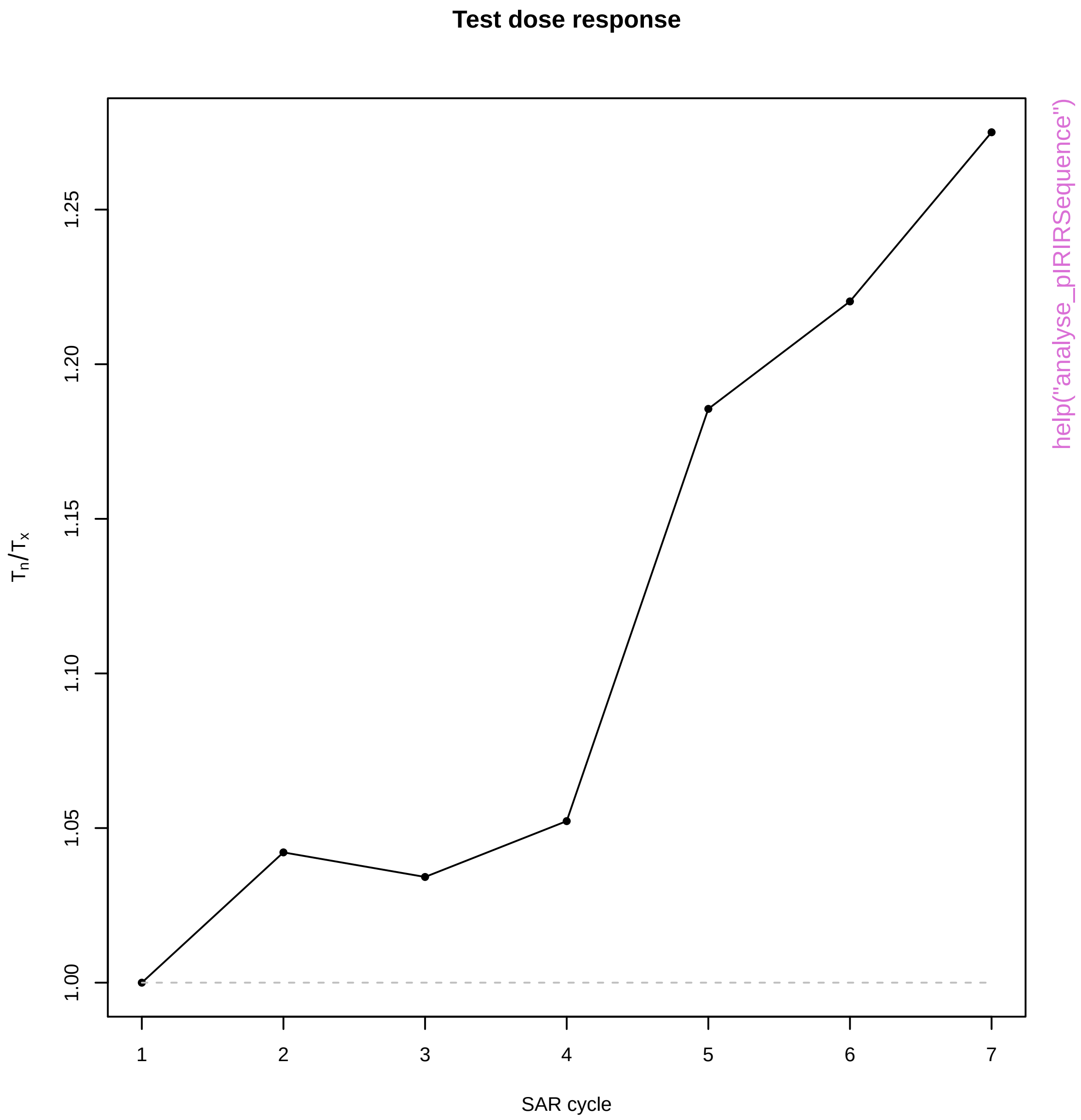
Pseudo pIRIR data set based on quartz OSL

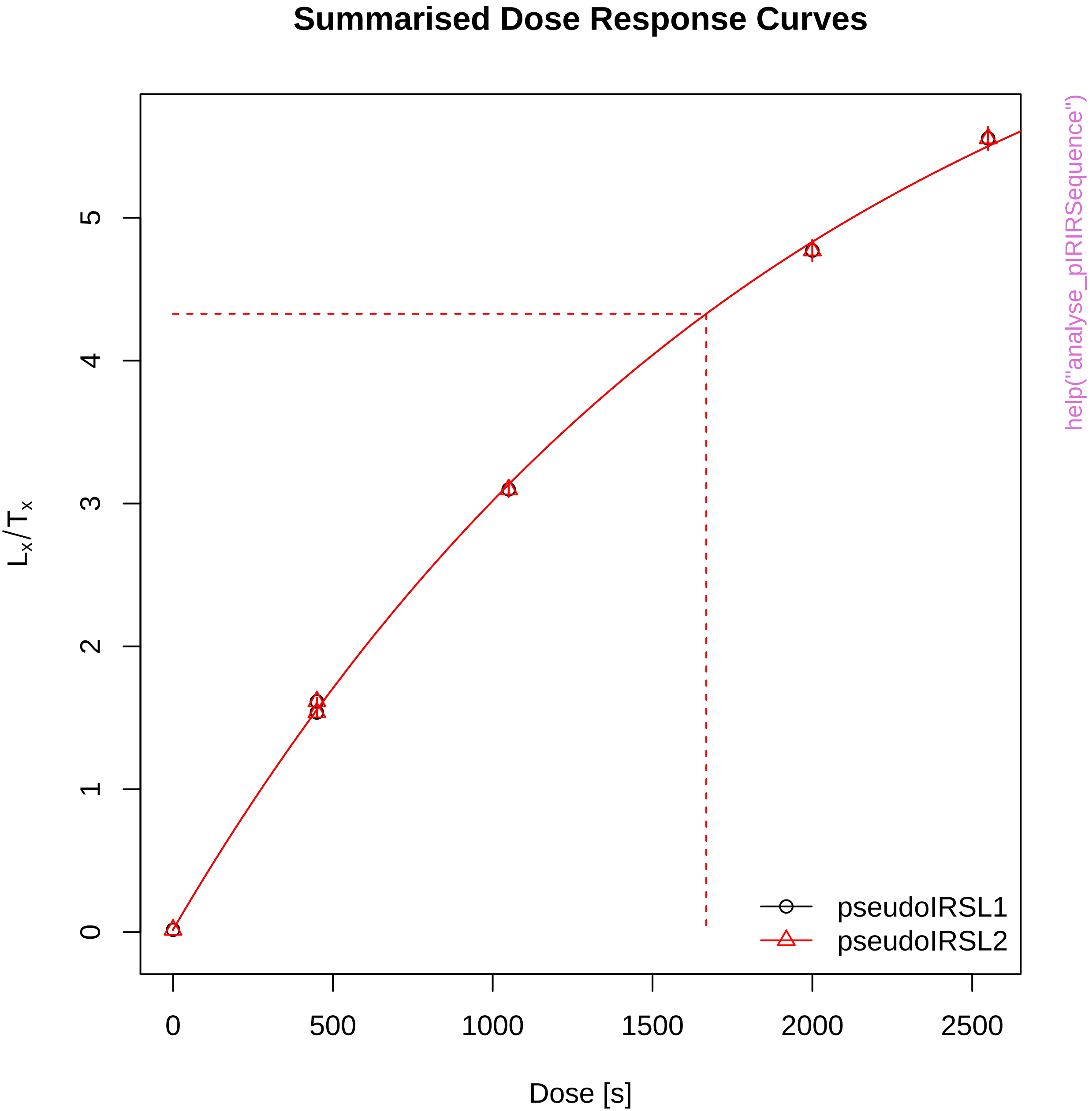


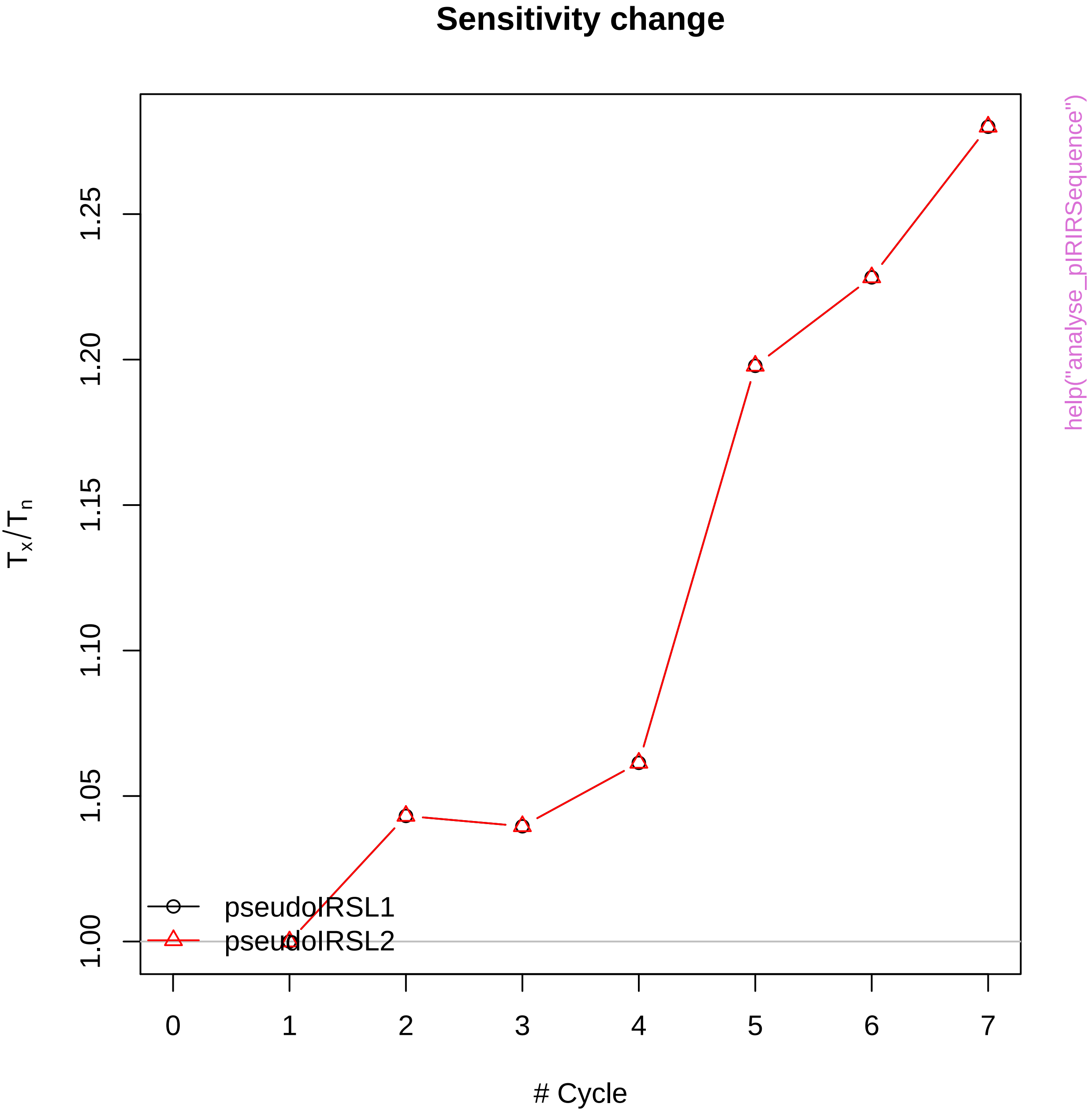

help("analyse_pIRIRSequence")
● Natural (0)
● R1 (450)
● R2 (1050)
● R3 (2000)
● R4 (2550)
● R5 (450)
● R0 (0)

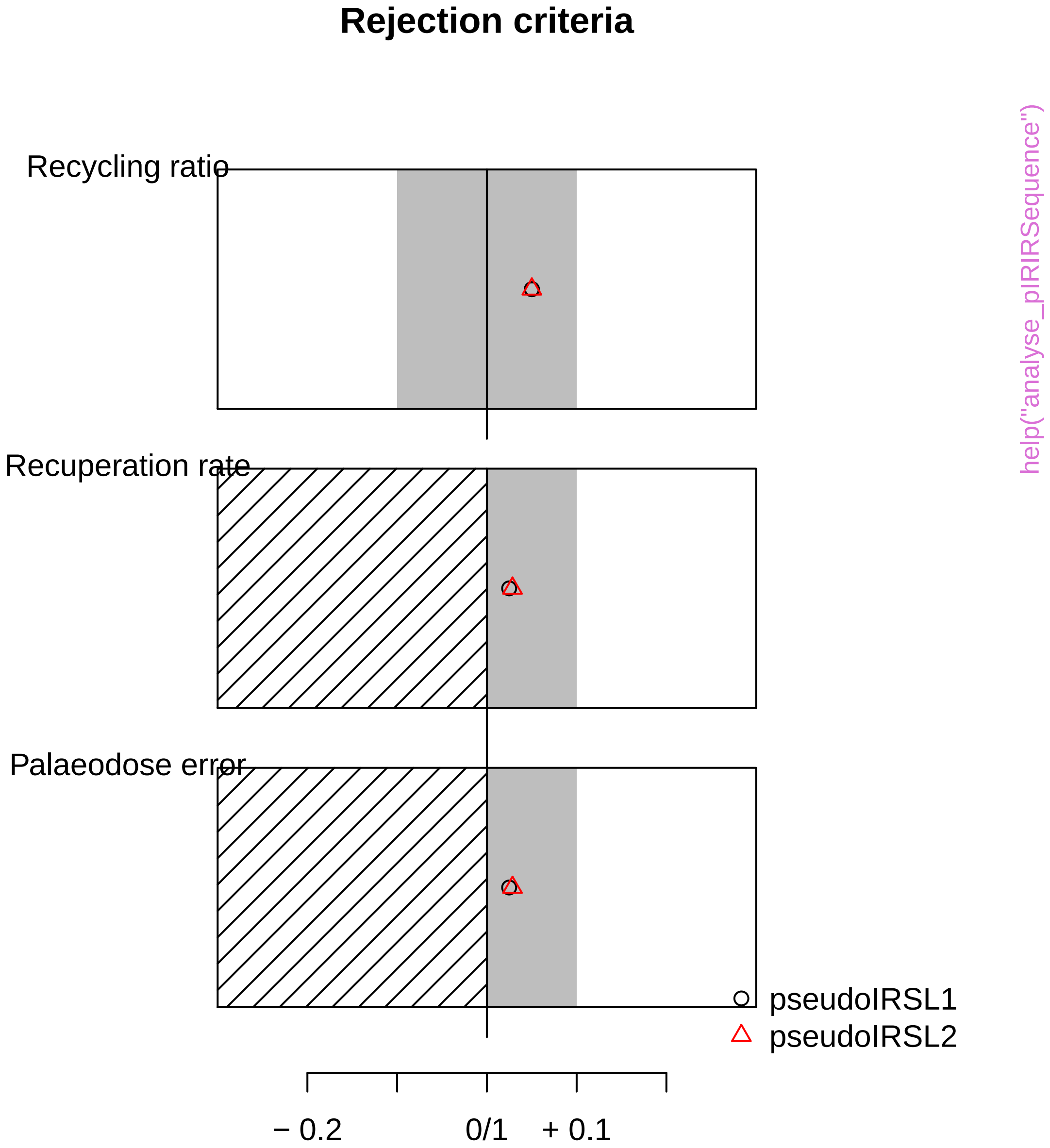

Pseudo pIRIR data set based on quartz OSL
$D_e = 1668.25 \pm 47.59$ | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
Dose [s]
0
500
1000
1500
2000
2500
help("analyse_pIRIRSequence")

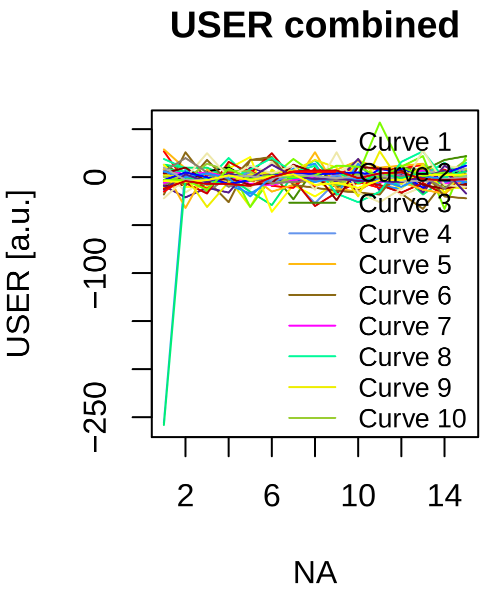

D_e from MC simulation
$D_{e_{MC}}$ = 1669.37 ± 47.59 | quality = 99.9 %
Frequency
0
4
8
11
15
1550
1600
1650
1700
1750
Dose [s]
n = 100 , valid fits = 100
help("analyse_pIRIRSequence")

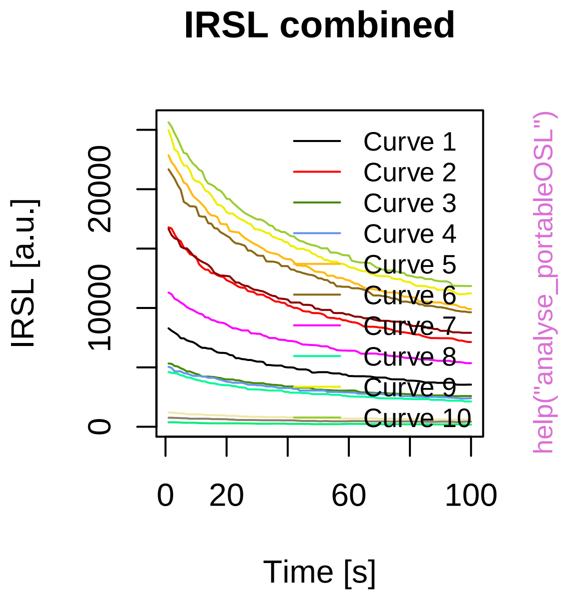

Test dose response
T_n/T_x
1.00
1.05
1.10
1.15
1.20
1.25
1
2
3
4
5
6
7
SAR cycle
help("analyse_pIRIRSequence")

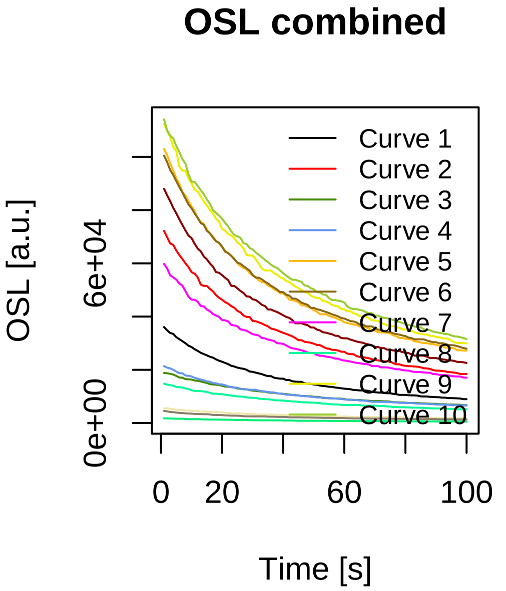

Summarised Dose Response Curves
Lx/Tx
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose [s]
pseudoIRSL1
pseudoIRSL2
help("analyse_pIRIRSequence")

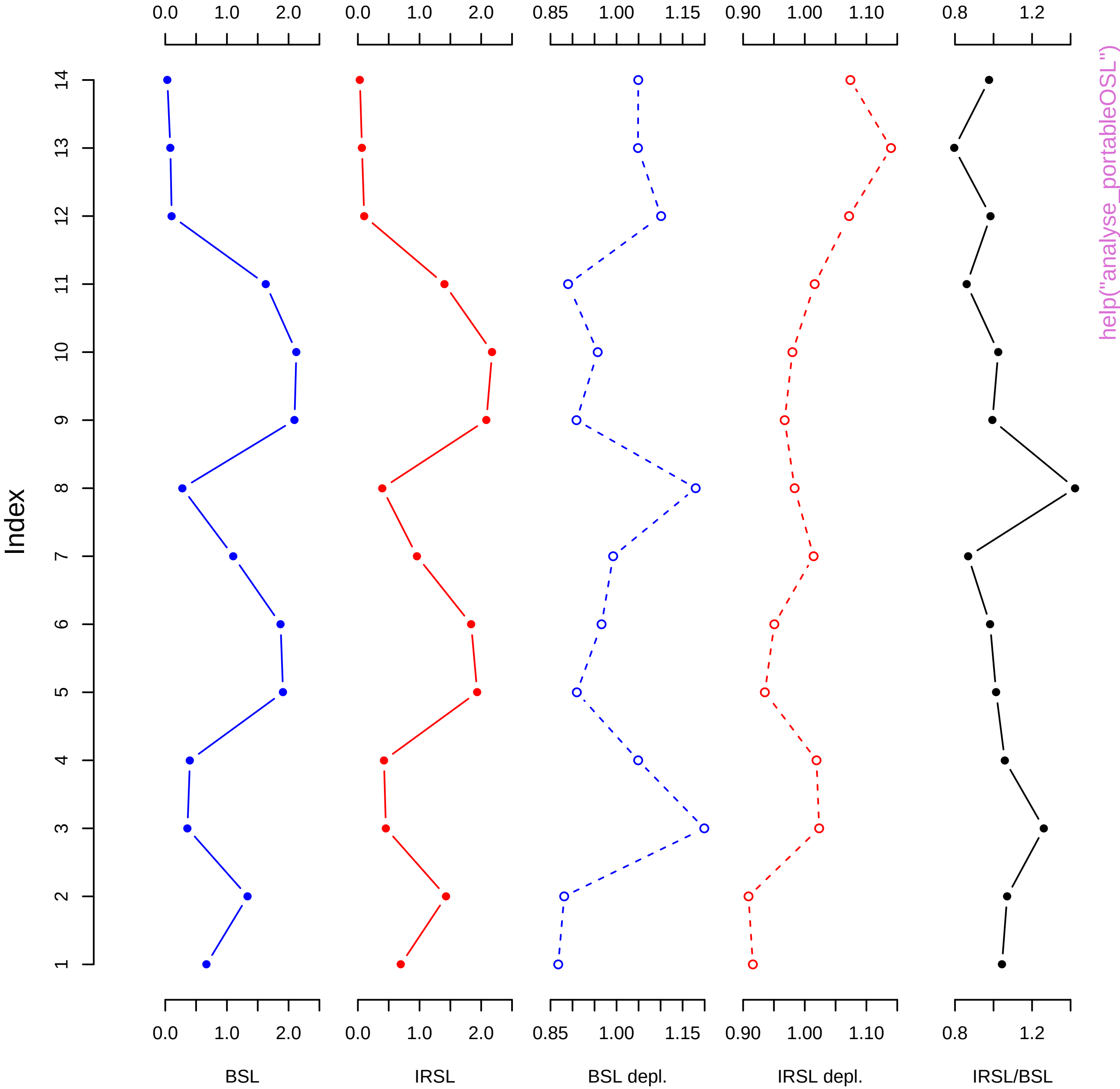

Sensitivity change
T_x/T_n
1.00
1.05
1.10
1.15
1.20
1.25
0
1
2
3
4
5
6
7
# Cycle
pseudoIRSL1
pseudoIRSL2
help("analyse_pIRIRSequence")

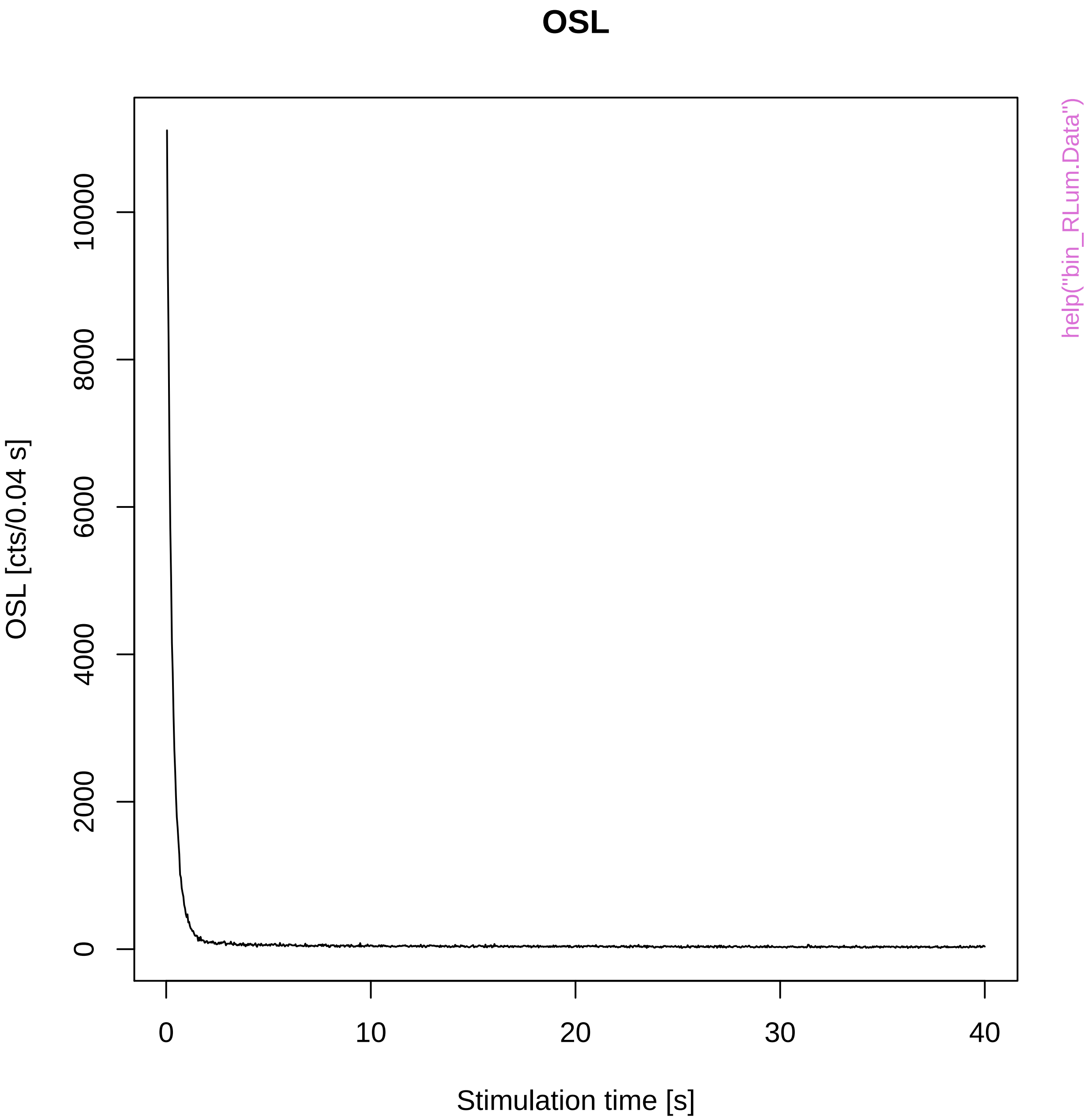

Rejection criteria
Recycling ratio
Recuperation rate
Palaeodose error
pseudoIRSL1
pseudoIRSL2
− 0.2
0/1
+ 0.1
help("analyse_pIRIRSequence")

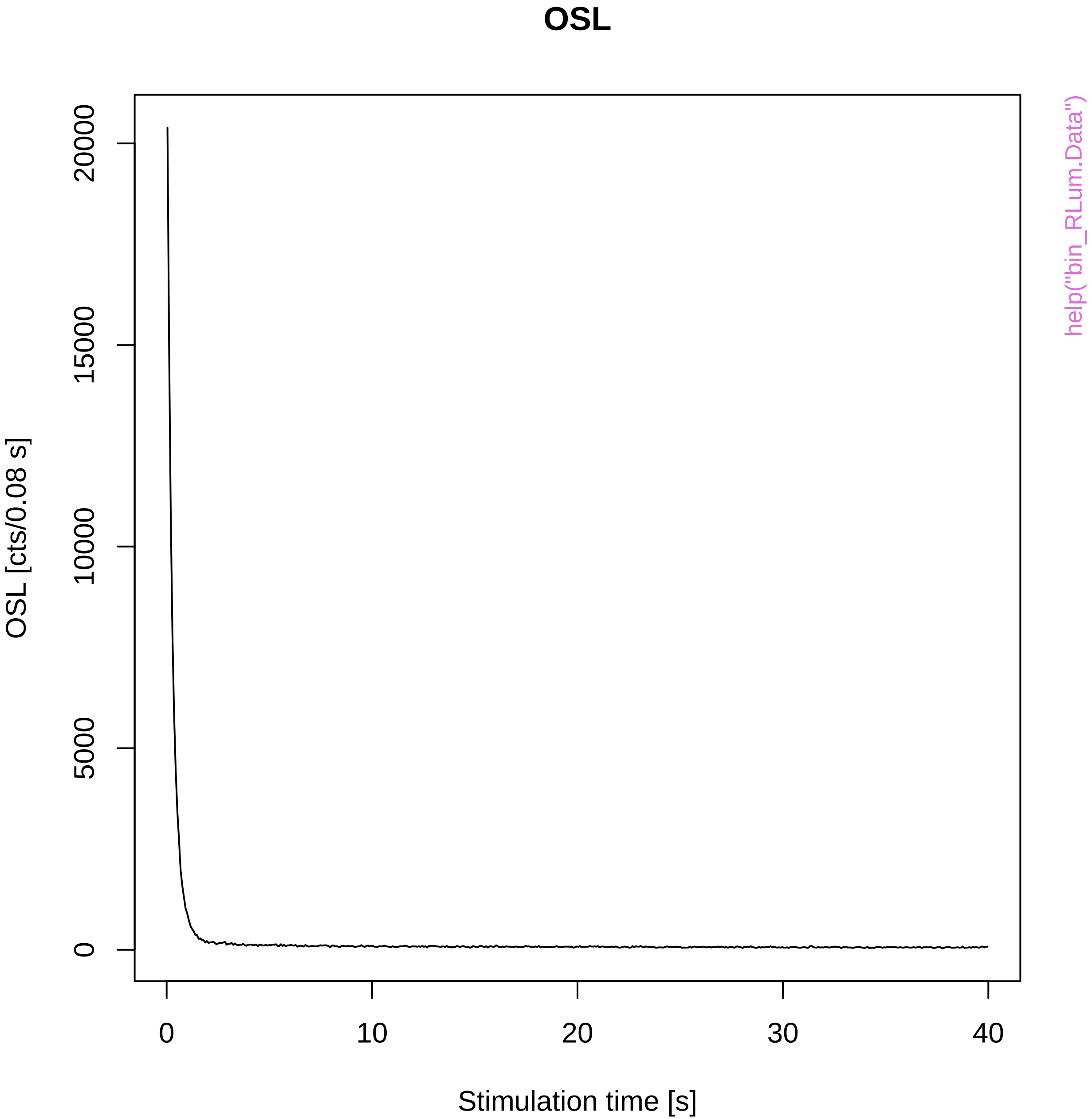

USER combined
USER [a.u.]
0
−100
−250
2
6
10
14
NA
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10

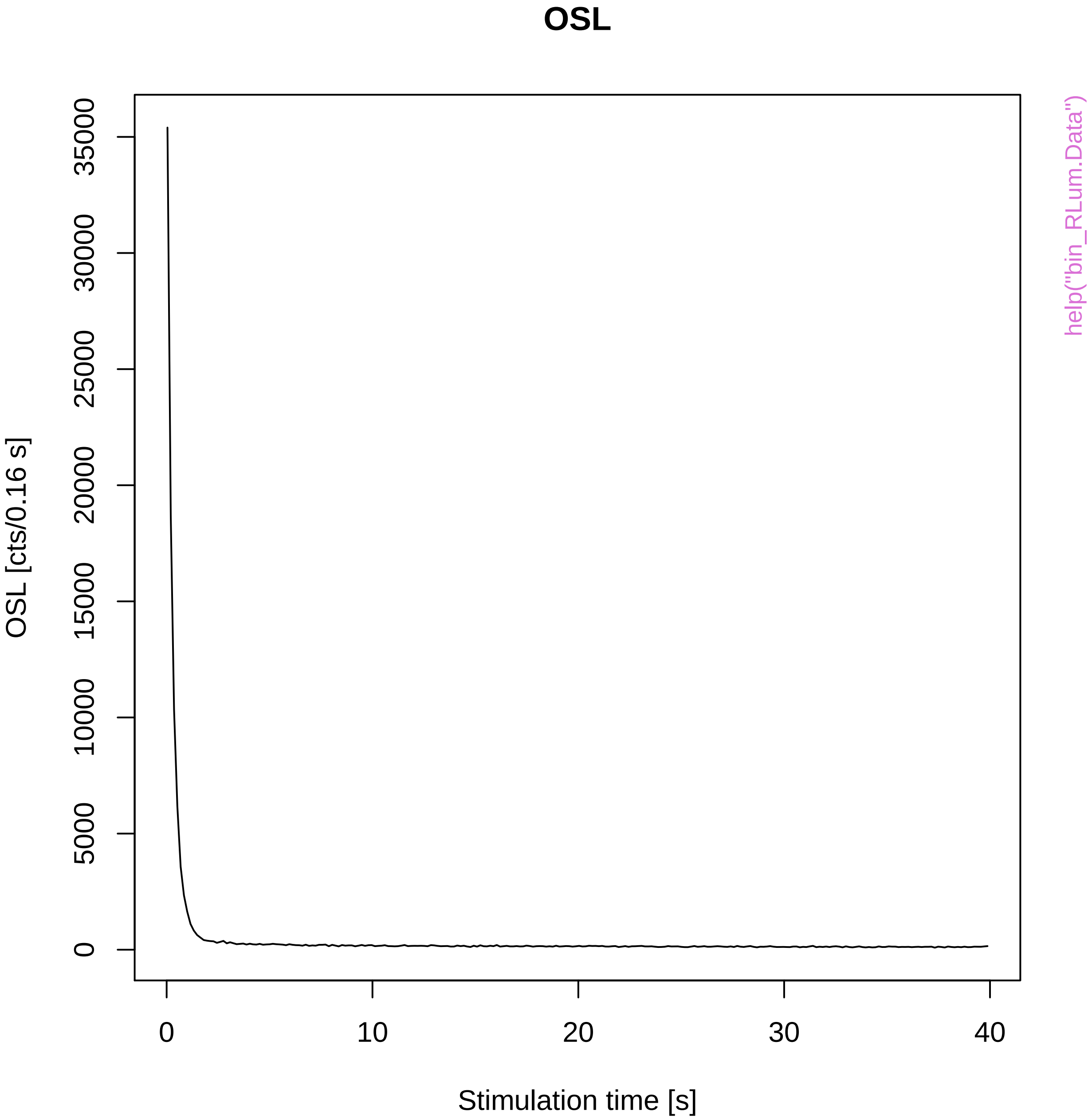

IRSL combined
IRSL [a.u.]
0
10000
20000
0
20
60
100
Time [s]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
help("analyse_portableOSL")

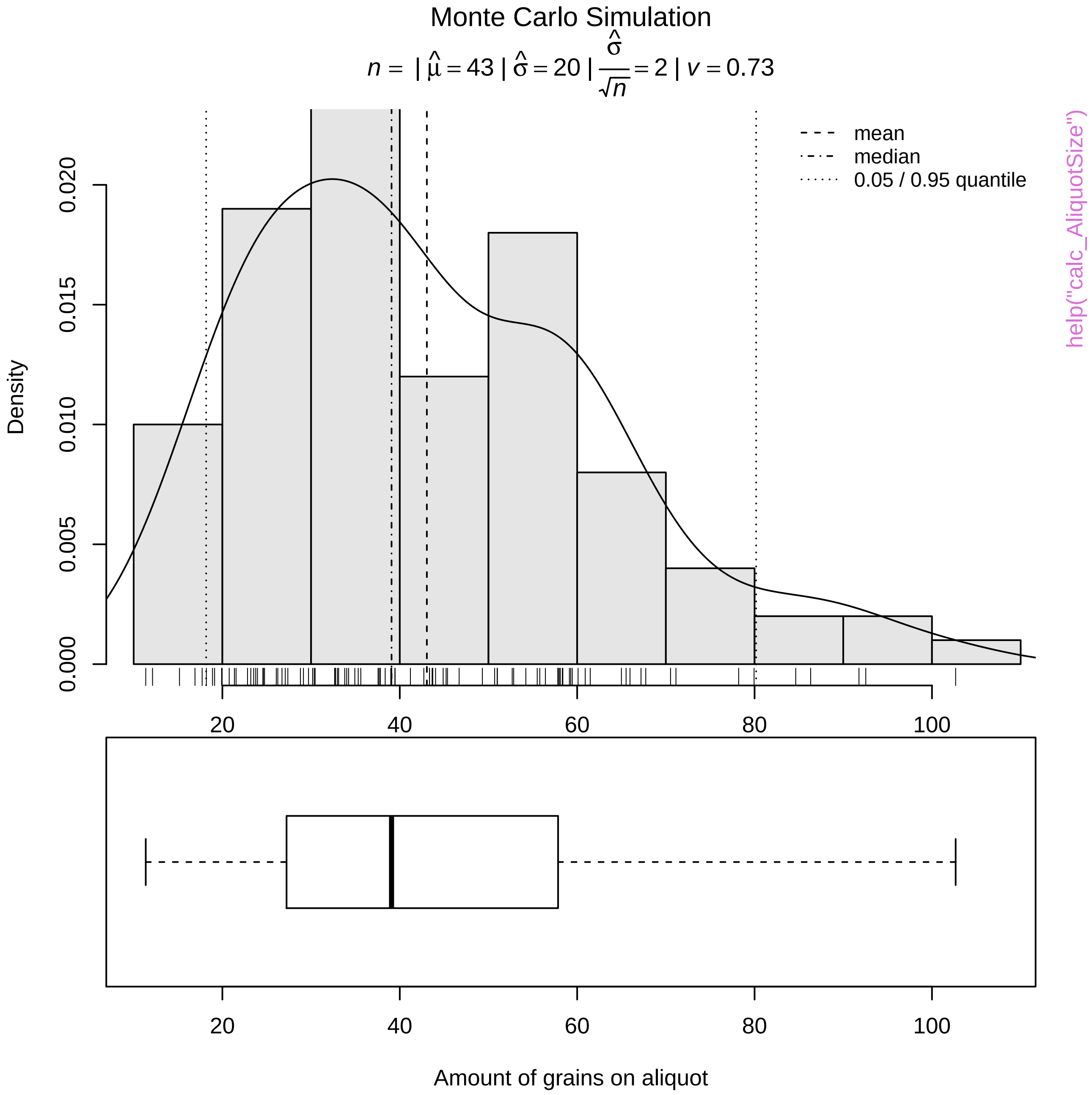

OSL combined
OSL [a.u.]
0e+00
6e+04
0
20
60
100
Time [s]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10


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")

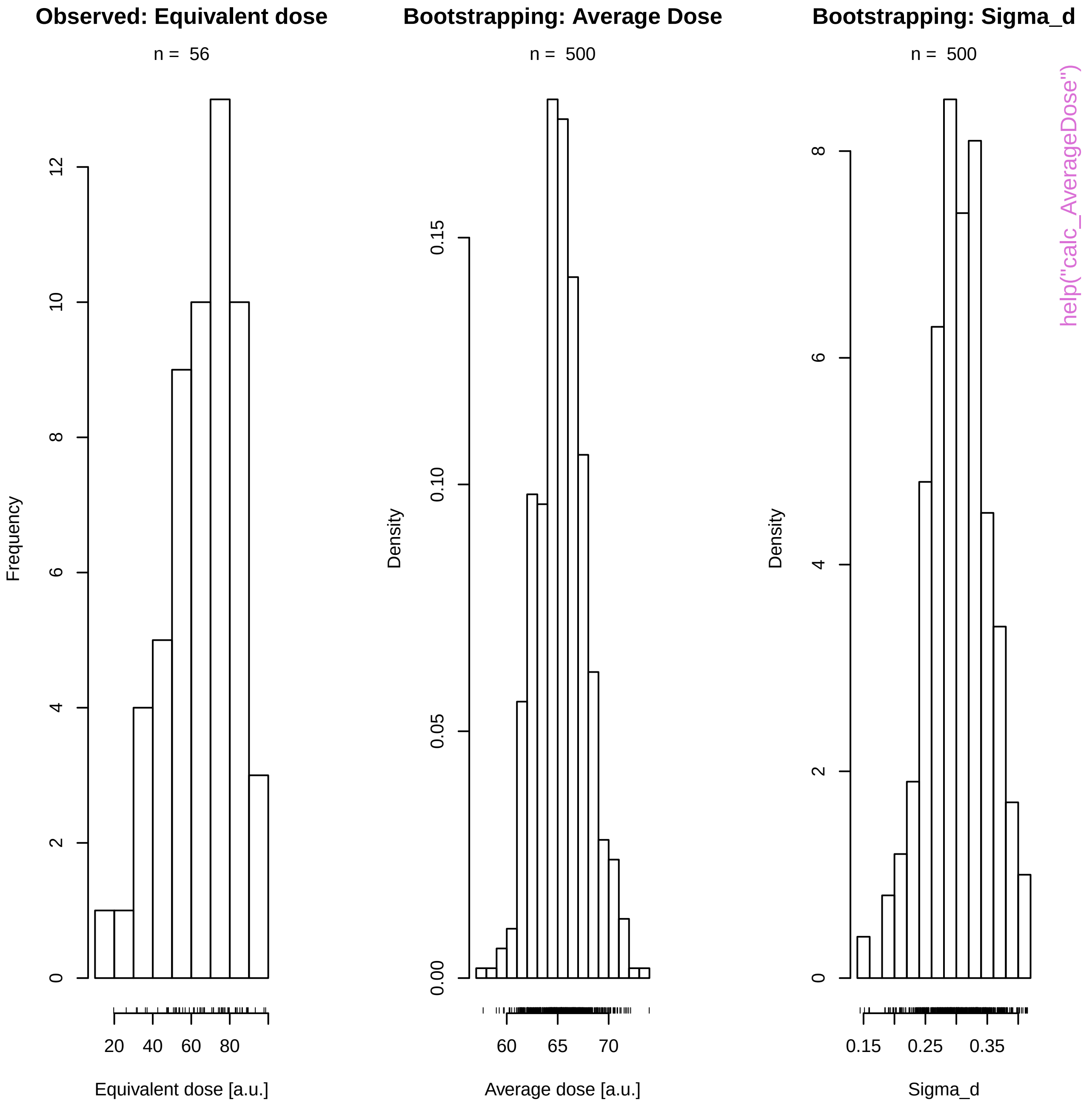

OSL
OSL [cts/0.04 s]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

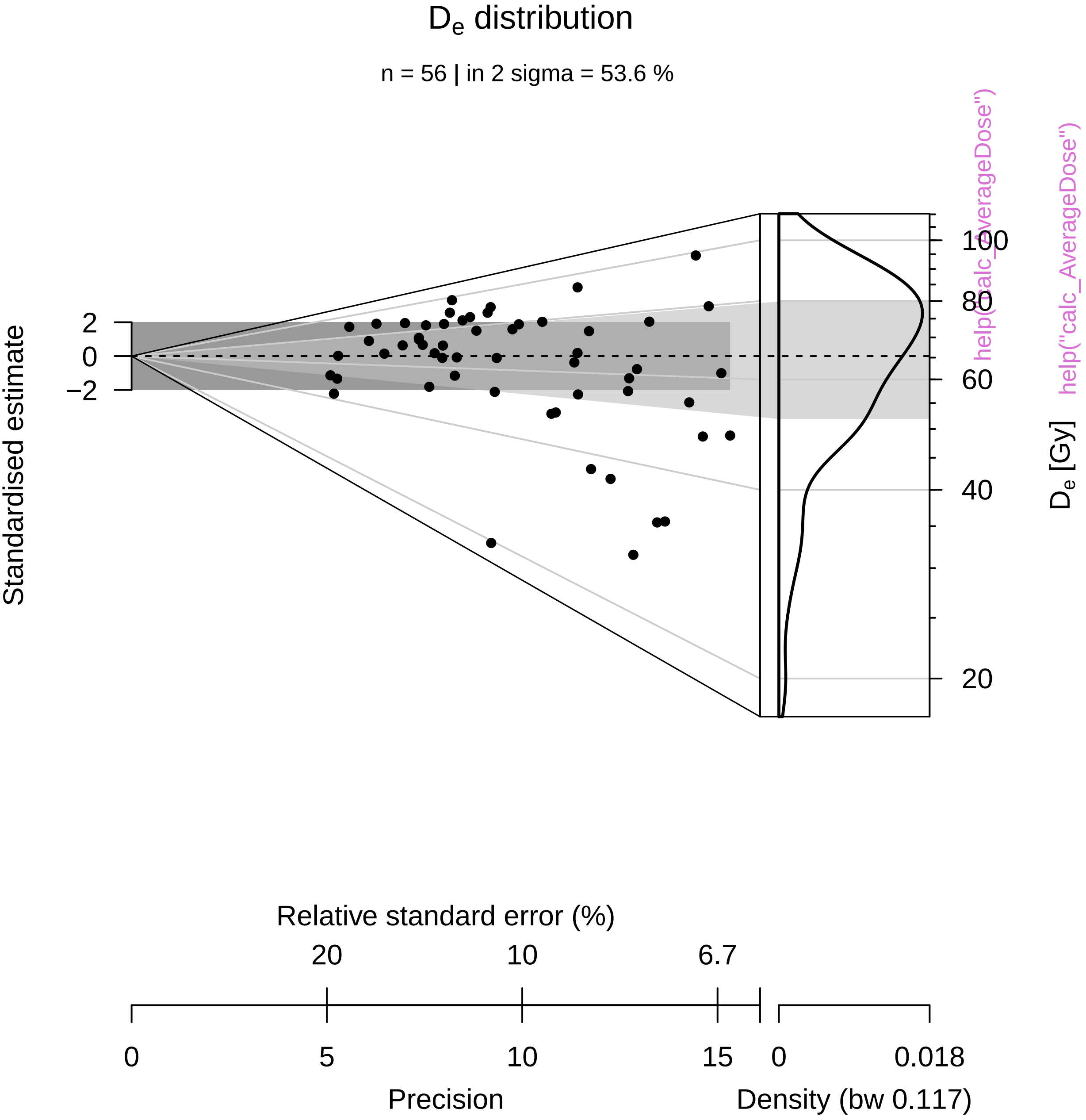

OSL
OSL [cts/0.08 s]
0
5000
10000
15000
20000
Stimulation time [s]
0
10
20
30
40
help("bin_RLum.Data")

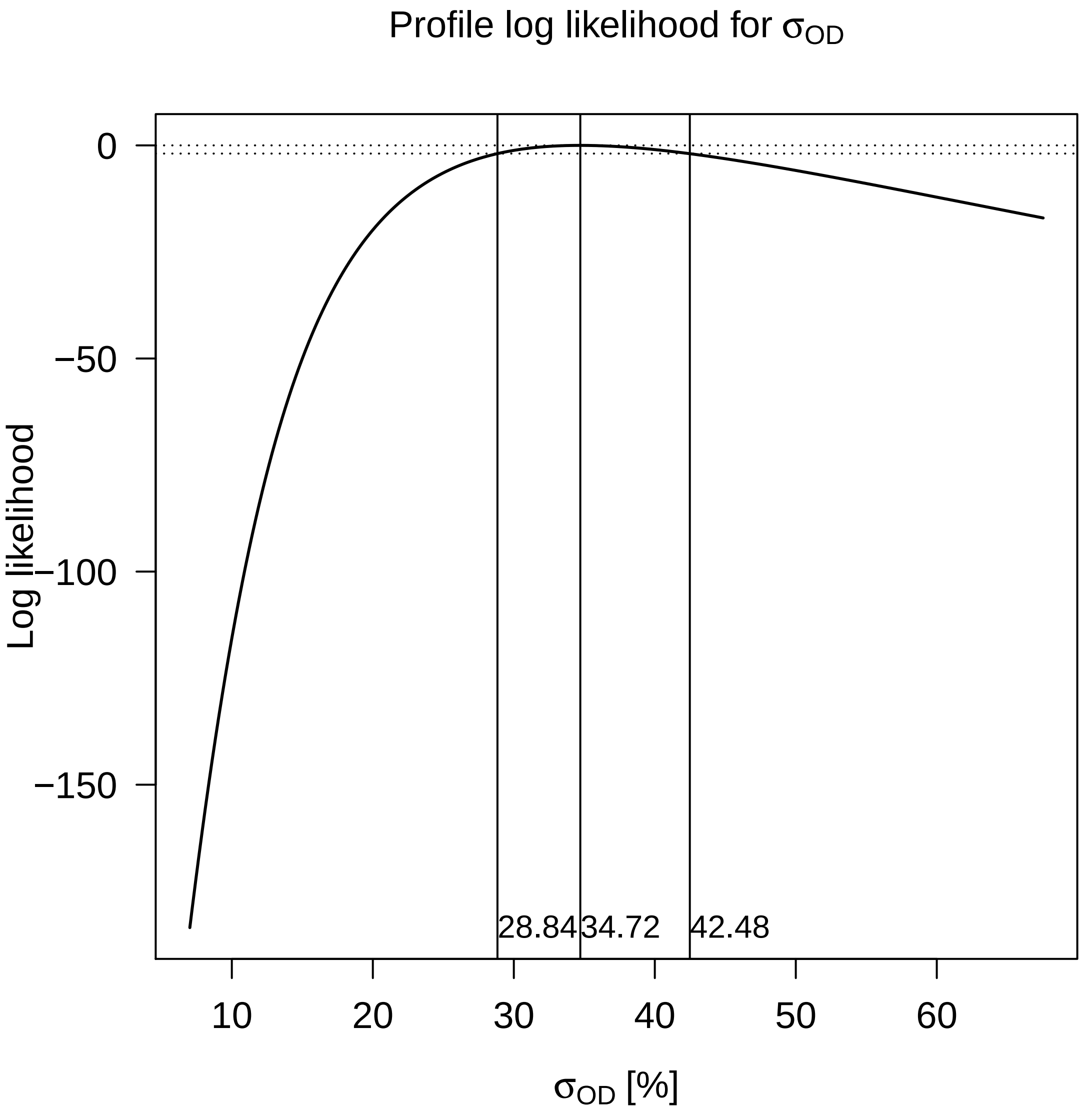

OSL
OSL [cts/0.16 s]
0
5000
10000
15000
20000
25000
30000
35000
0
10
20
30
40
Stimulation time [s]
help("bin_RLum.Data")

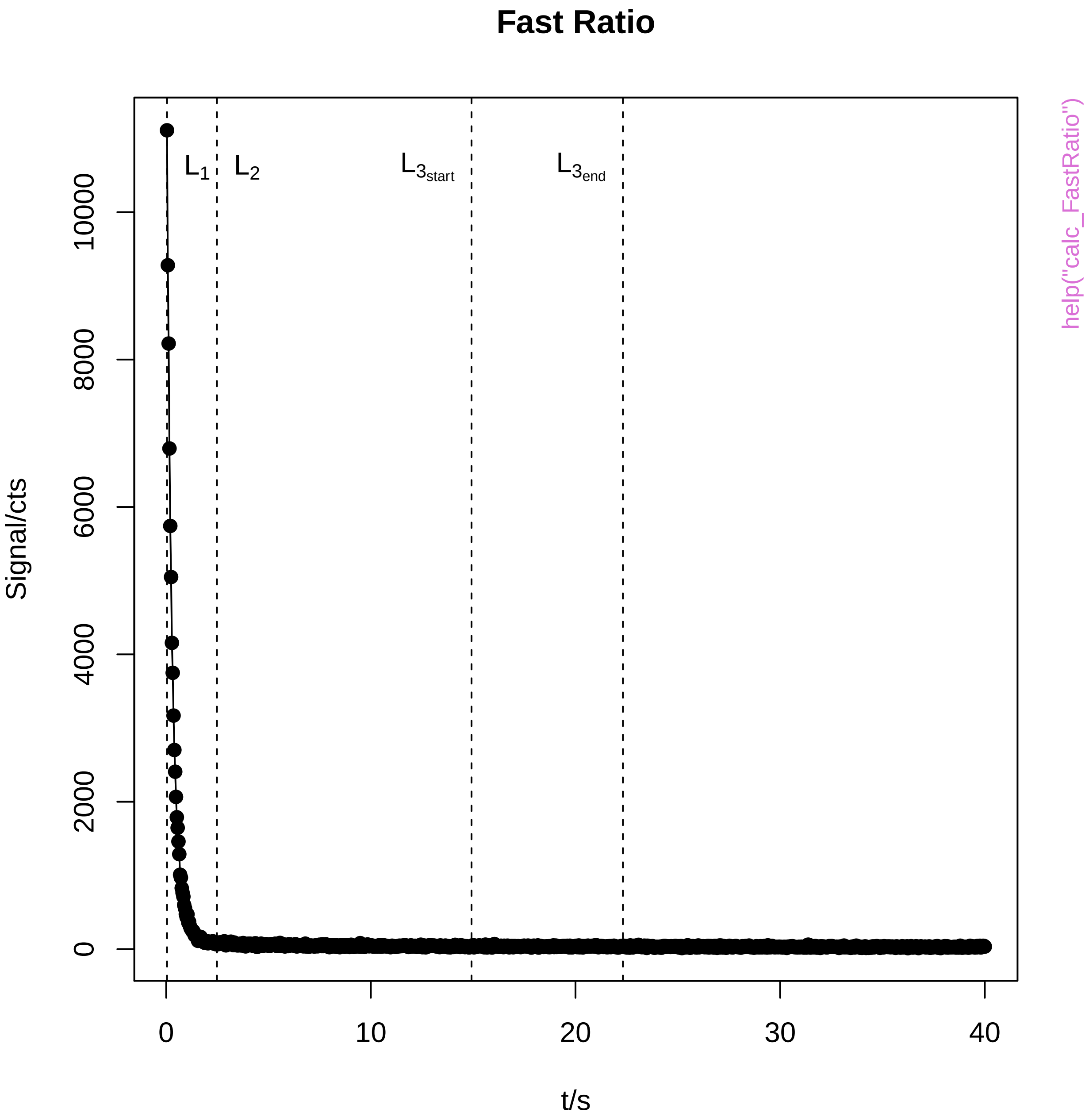


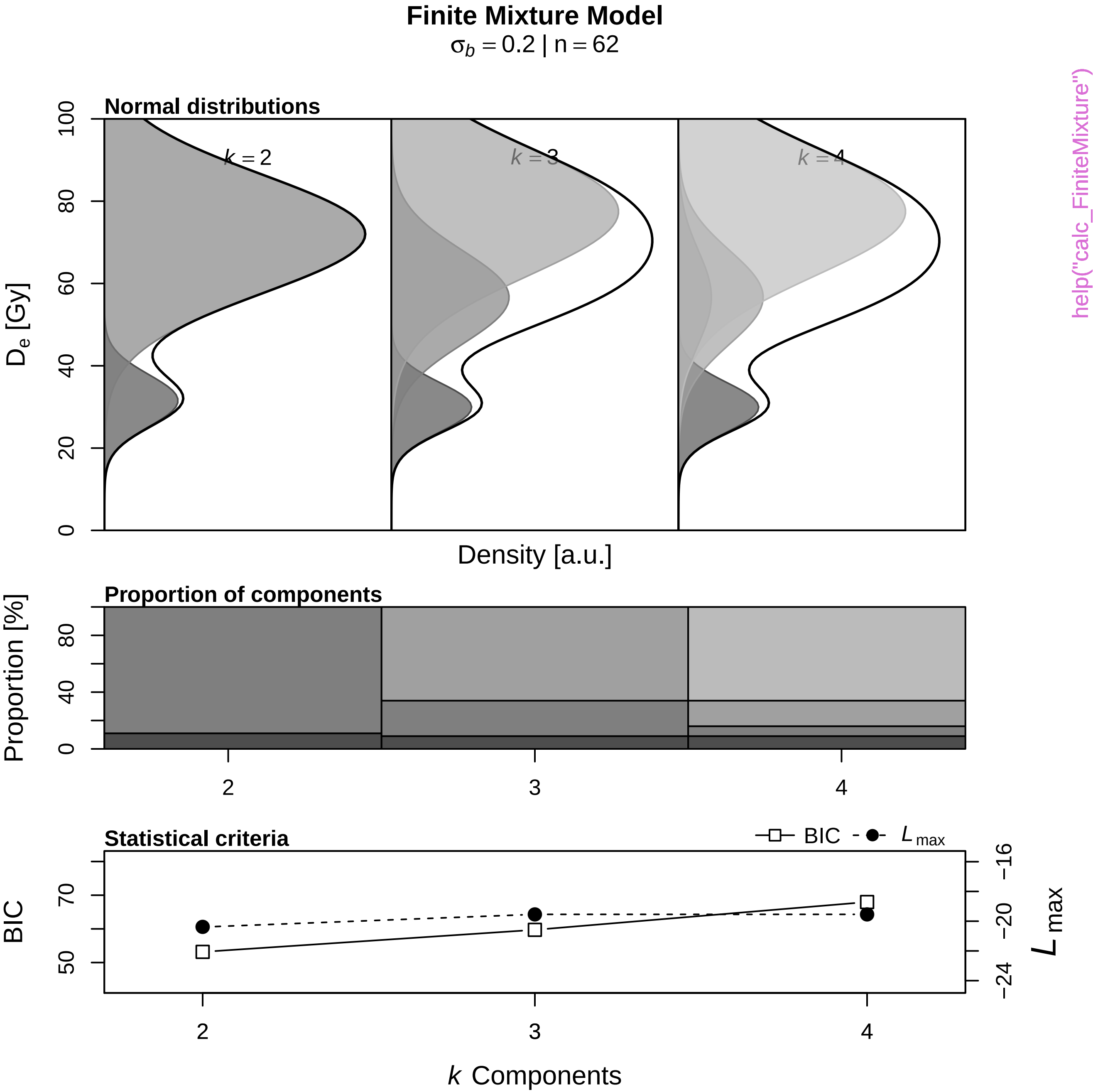
Monte Carlo Simulation
$n = \ | \ \hat{\mu} = 43 \ | \ \hat{\sigma} = 20 \ | \ \frac{\hat{\sigma}}{\sqrt{n}} = 2 \ | \ v = 0.73$
mean
median
0.05 / 0.95 quantile
help("calc_AliquotSize")
Density
0.000
0.005
0.010
0.015
0.020
20
40
60
80
100
20
40
60
80
100
Amount of grains on aliquot

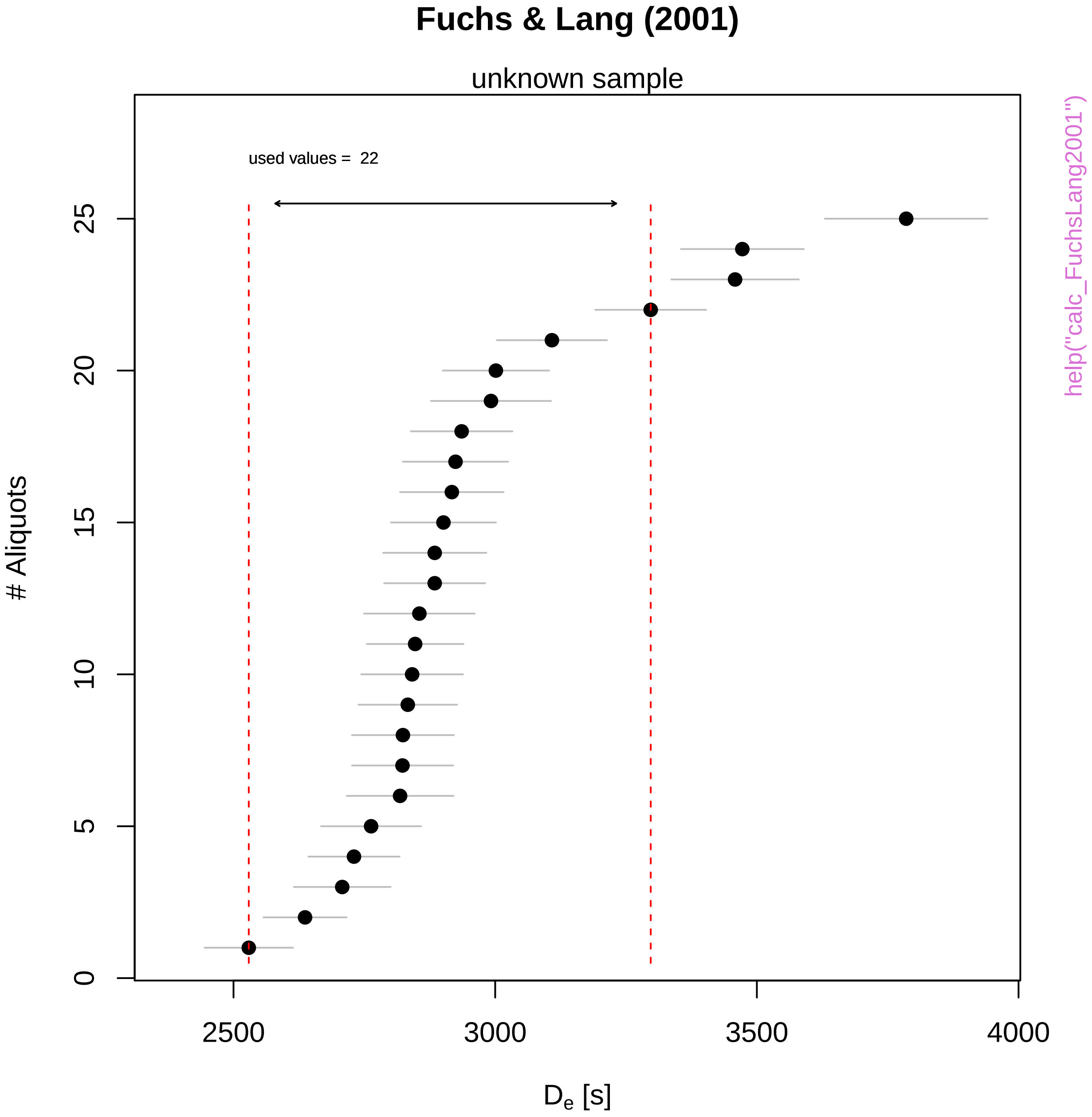

Observed: Equivalent dose
n = 56
Frequency
0
2
4
6
8
10
12
20
40
60
80
Equivalent dose [a.u.]
Bootstrapping: Average Dose
n = 500
Density
0.00
0.05
0.10
0.15
60
65
70
Average dose [a.u.]
Bootstrapping: Sigma_d
n = 500
Density
0
2
4
6
8
0.15
0.25
0.35
Sigma_d
help("calc_AverageDose")

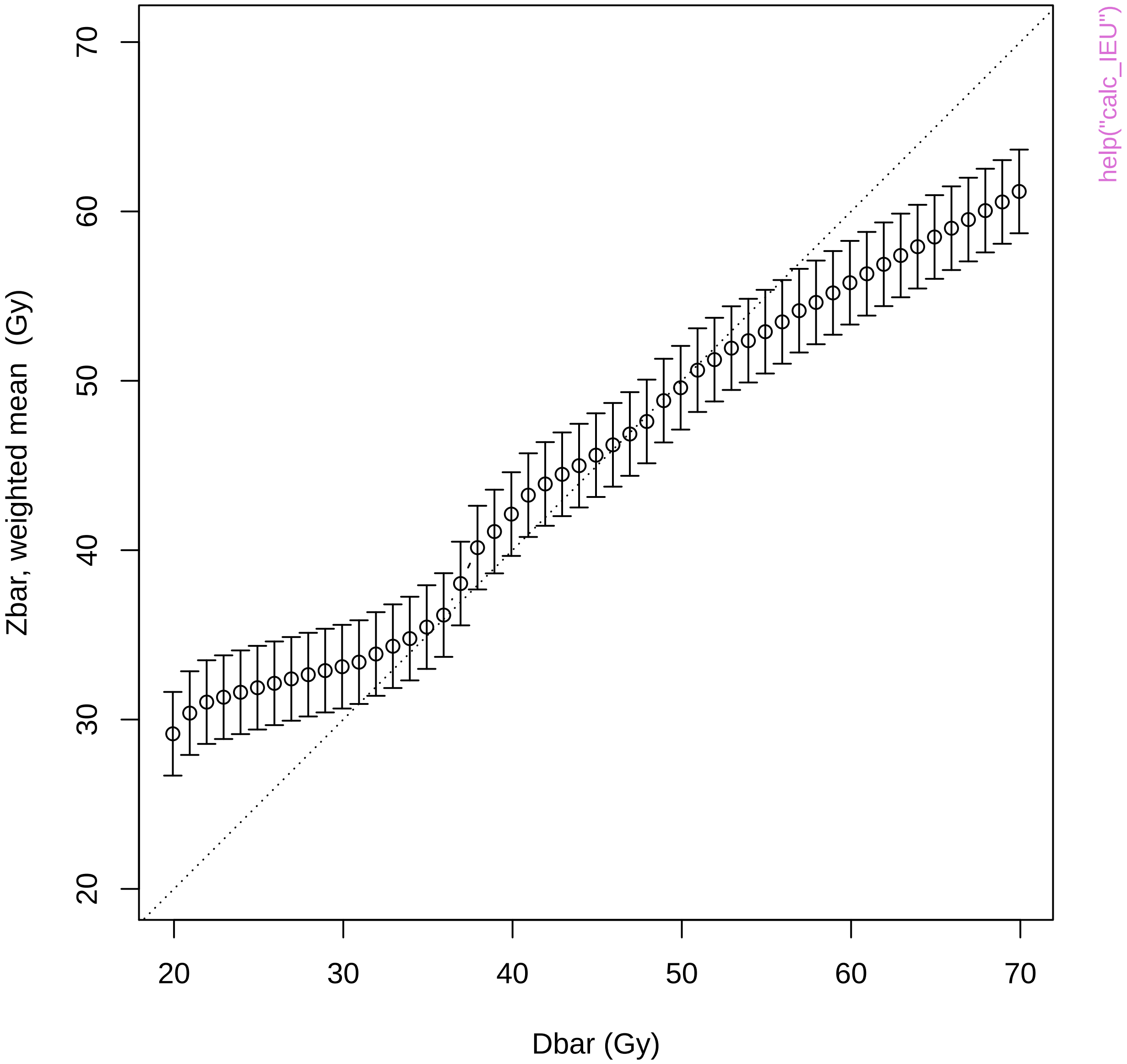

D_e distribution
n = 56 | in 2 sigma = 53.6 %
Standardised estimate
2
0
−2
help("calc_AverageDose")
help("calc_AverageDose")
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.018
Density (bw 0.117)

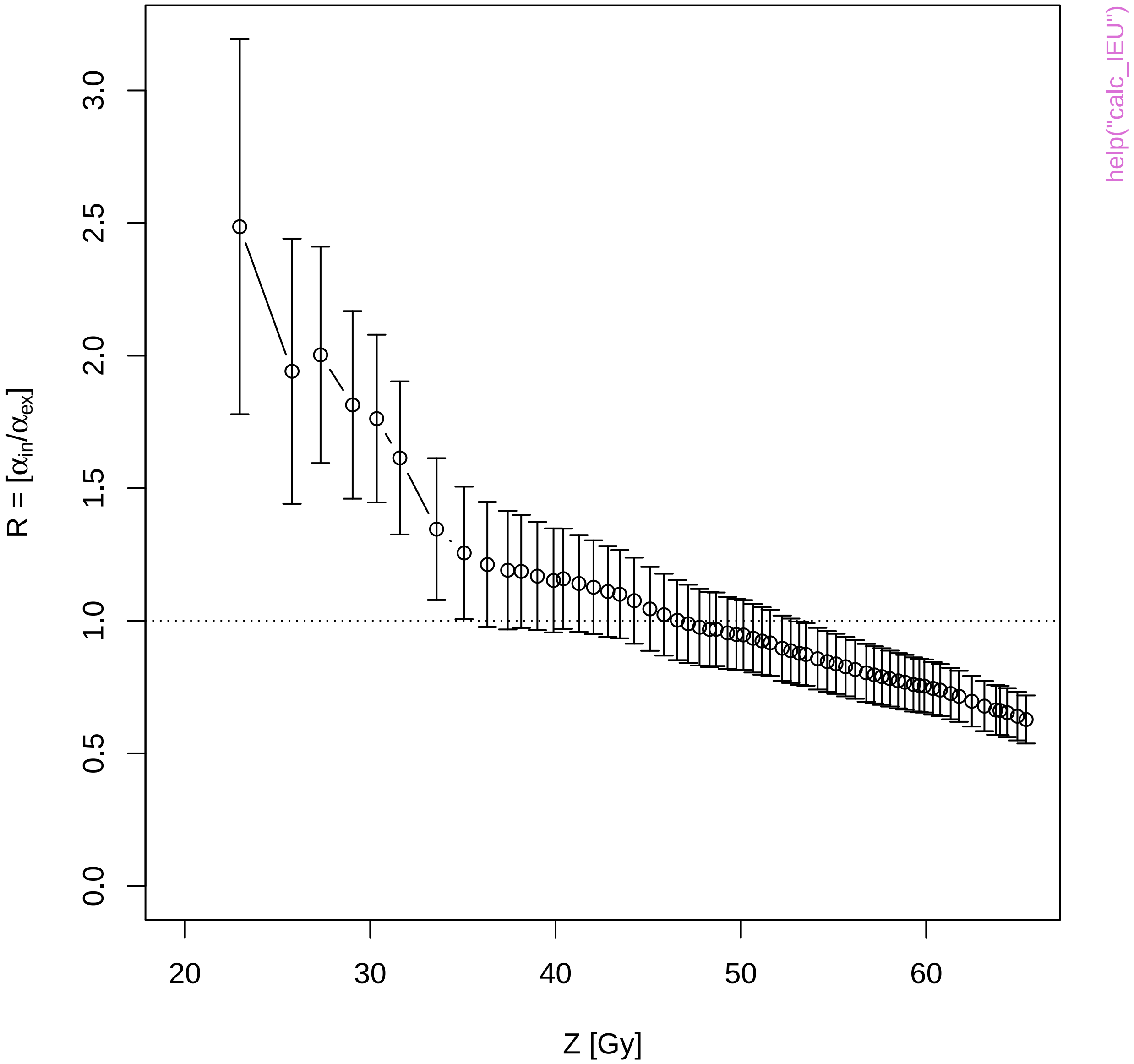

Profile log likelihood for σ_{OD}
Log likelihood
0
−50
−100
−150
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]


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

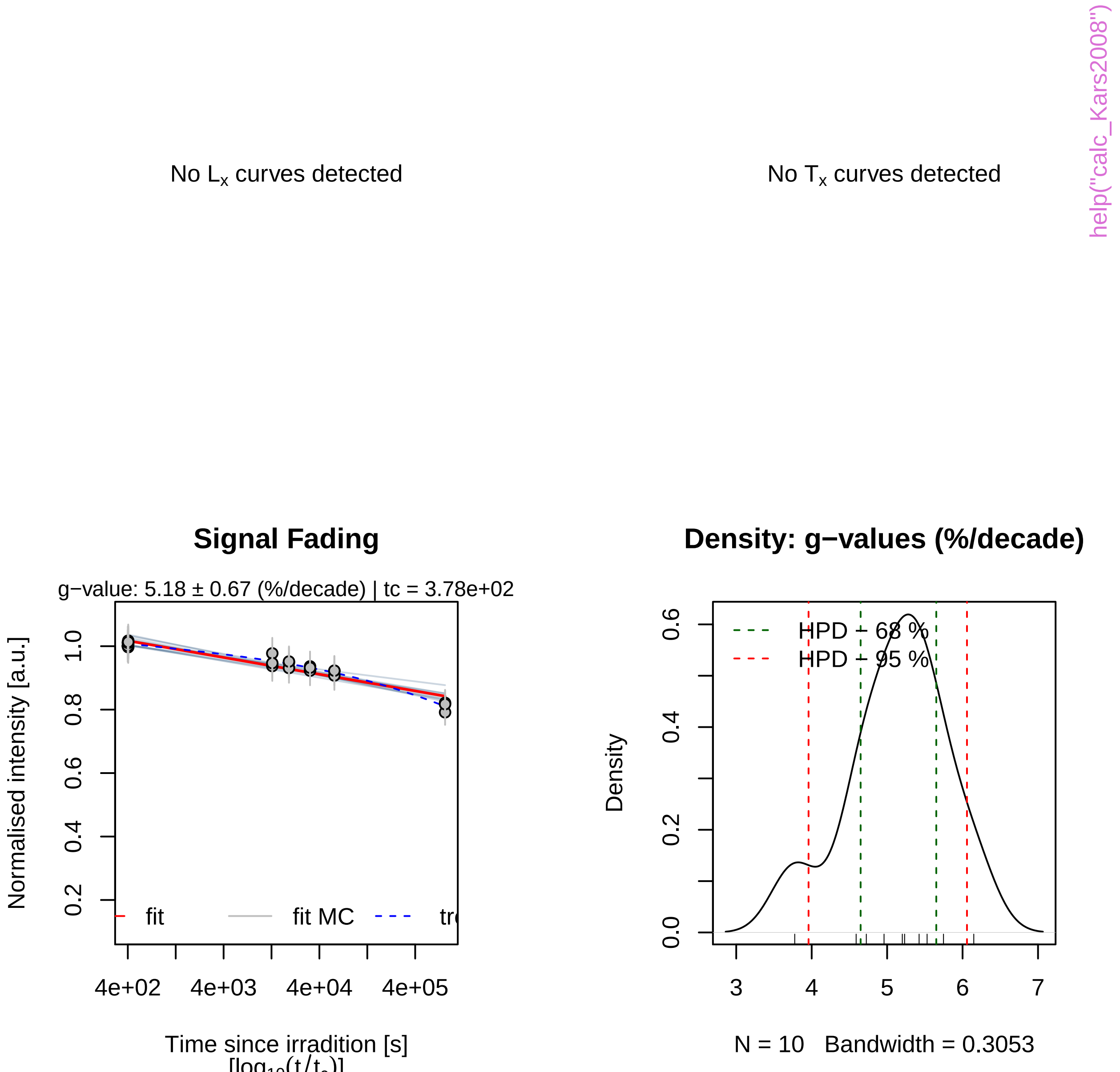

Finite Mixture Model
$\sigma_b = 0.2$ | n = 62
Normal distributions
k = 2
k = 3
k = 4
D_e [Gy]
0
20
40
60
80
100
Density [a.u.]
Proportion of components
Proportion [%]
0
40
80
2
3
4
Statistical criteria
BIC
L_{max}
BIC
50
70
−24
−20
−16
L_{max}
2
3
4
k Components
help("calc_FiniteMixture")

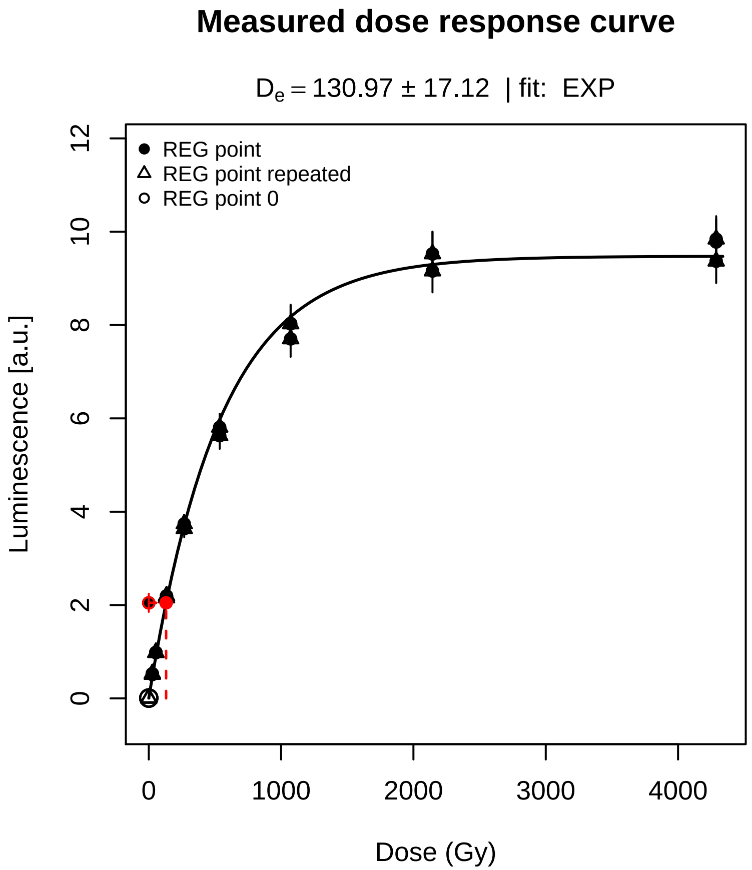

Fuchs & Lang (2001)
unknown sample
used values = 22
# Aliquots
0
5
10
15
20
25
2500
3000
3500
4000
De [s]
help("calc_FuchsLang2001")

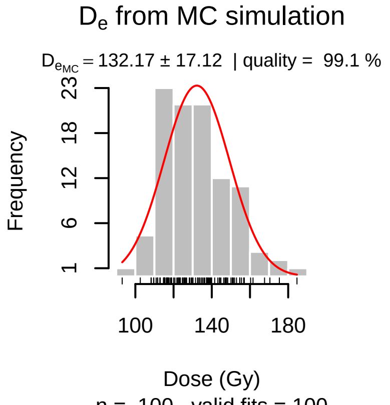

Zbar, weighted mean (Gy)
Dbar (Gy)
20
30
40
50
60
70
20
30
40
50
60
70
help("calc_IEU")

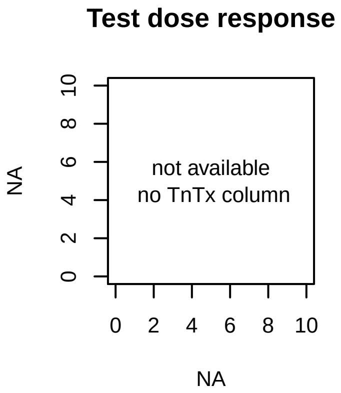


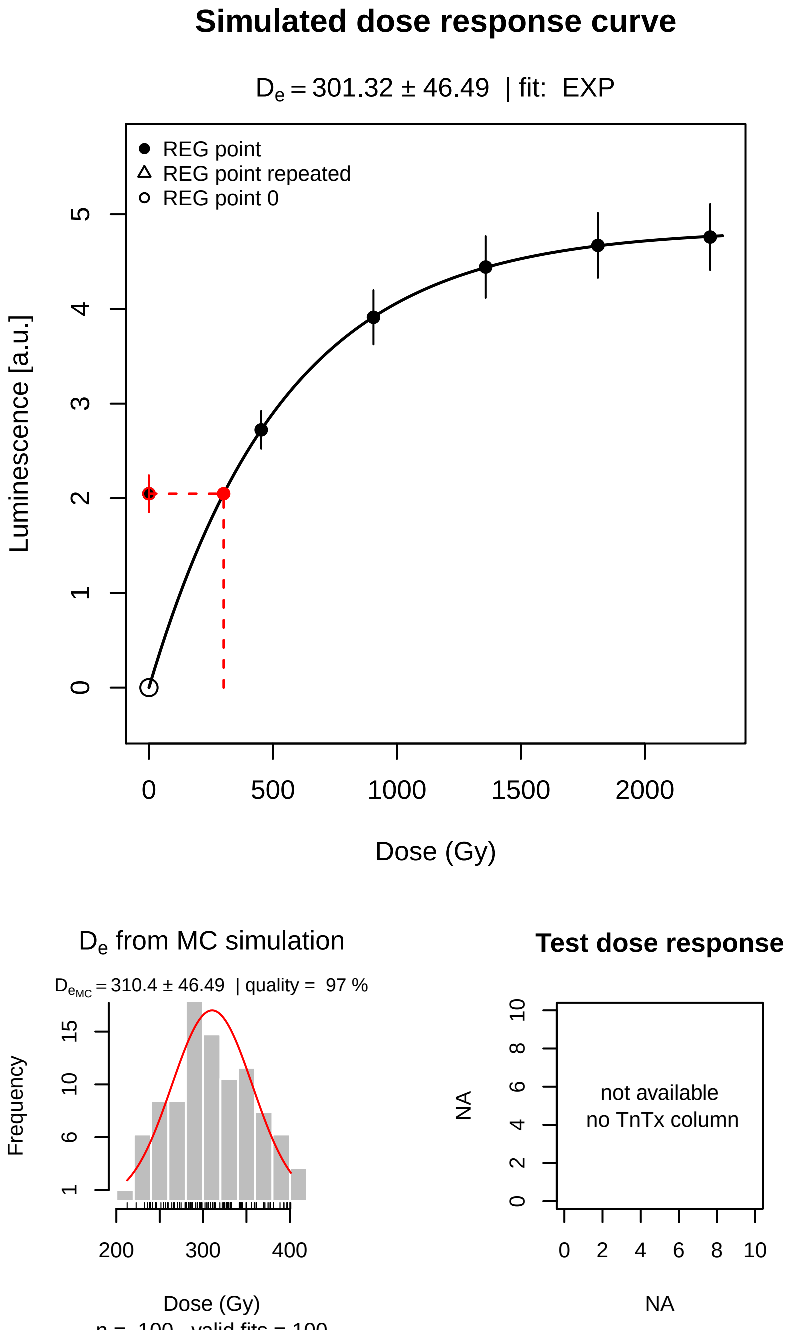
R = [α_{in}/α_{ex}]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
20
30
40
50
60
Z [Gy]
help("calc_IEU")

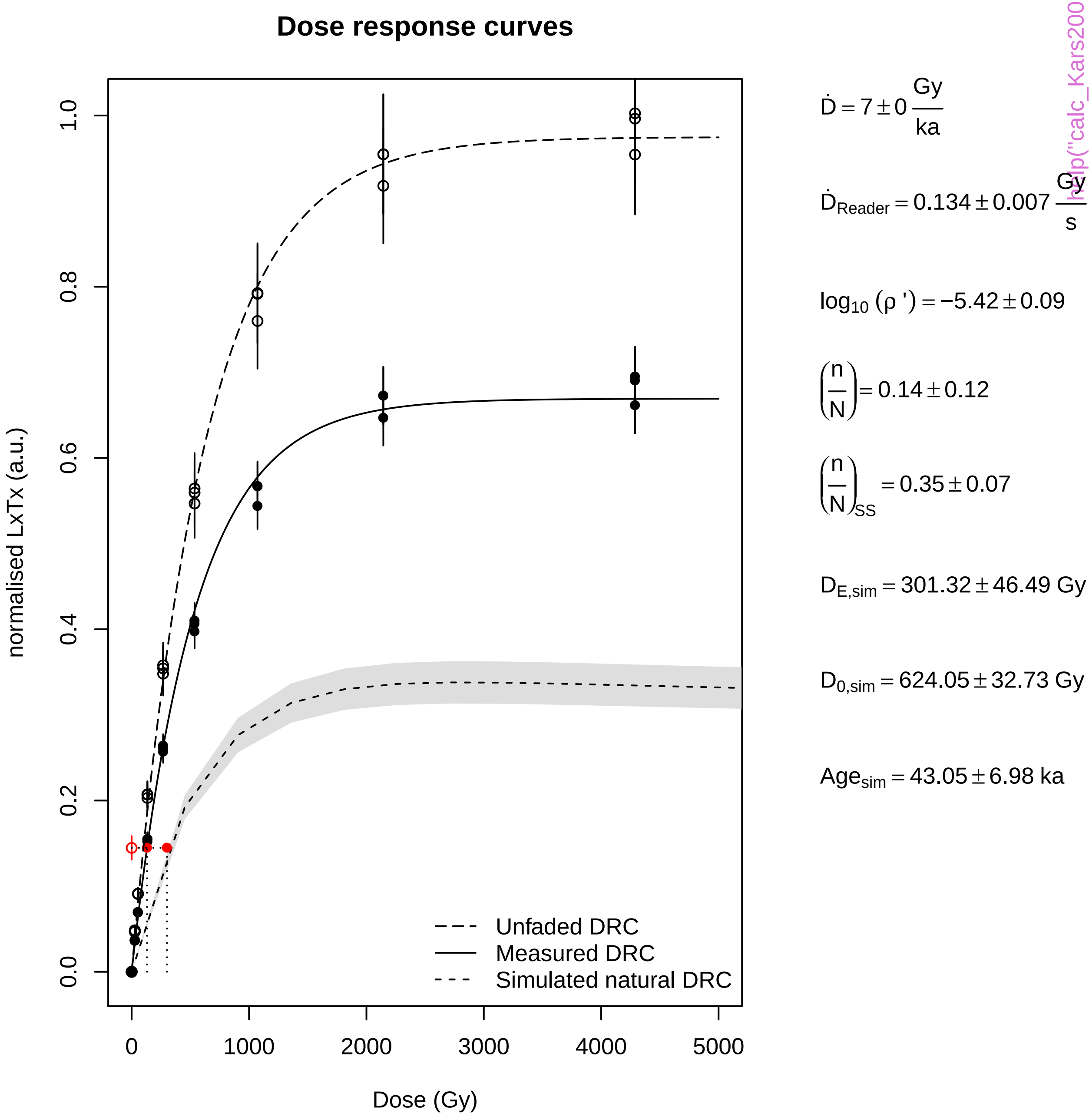

No L_x curves detected
No T_x curves detected
help("calc_Kars2008")
Signal Fading
g−value: 5.18 ± 0.67 (%/decade) | tc = 3.78e+02
Normalised intensity [a.u.]
0.2
0.4
0.6
0.8
1.0
fit
fit MC
tr
4e+02
4e+03
4e+04
4e+05
Time since irradition [s]
$[\log_{10}(t/t_c)]$
Density: g−values (%/decade)
HPD − 68 %
HPD − 95 %
Density
0.0
0.2
0.4
0.6
3
4
5
6
7
N = 10 Bandwidth = 0.3053


Measured dose response curve
$D_e = 130.97 \pm 17.12$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
2
4
6
8
10
12
0
1000
2000
3000
4000
Dose (Gy)

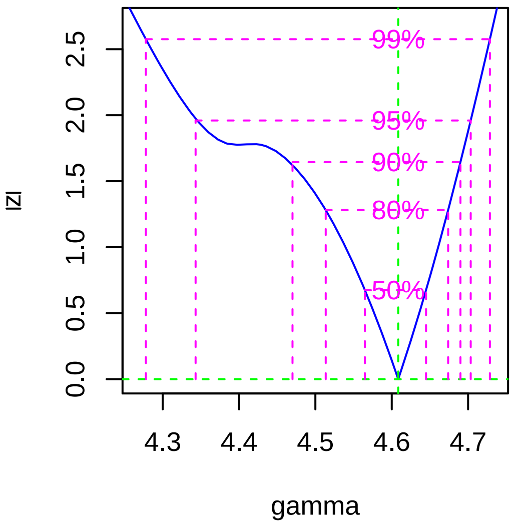

D_e from MC simulation
$D_{e_{MC}} = 132.17 \pm 17.12$ | quality = 99.1 %
Frequency
1
6
12
18
23
100
140
180
Dose (Gy)
n = 100 , valid fits = 100


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

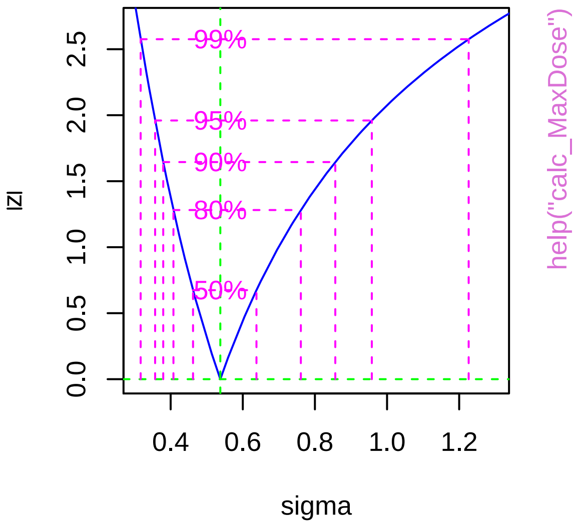

Simulated dose response curve
$D_e = 301.32 \pm 46.49$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
0
500
1000
1500
2000
Dose (Gy)
D_e from MC simulation
$D_{e_{MC}} = 310.4 \pm 46.49$ | quality = 97 %
Frequency
1
6
10
15
200
300
400
Dose (Gy)
Test dose response
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
$\dot{D} = 7 \pm 0 \frac{Gy}{ka}$
$\dot{D}_{Reader} = 0.134 \pm 0.007 \frac{Gy}{s}$
$\log_{10}(\rho') = -5.42 \pm 0.09$
$\left(\frac{n}{N}\right) = 0.14 \pm 0.12$
$\left(\frac{n}{N}\right)_{SS} = 0.35 \pm 0.07$
$D_{E,sim} = 301.32 \pm 46.49$ Gy
$D_{0,sim} = 624.05 \pm 32.73$ Gy
$Age_{sim} = 43.05 \pm 6.98$ ka
help("calc_Kars2008")

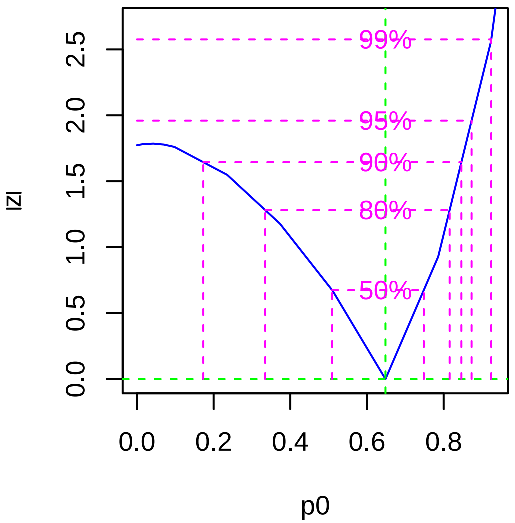
Likelihood profile: gamma

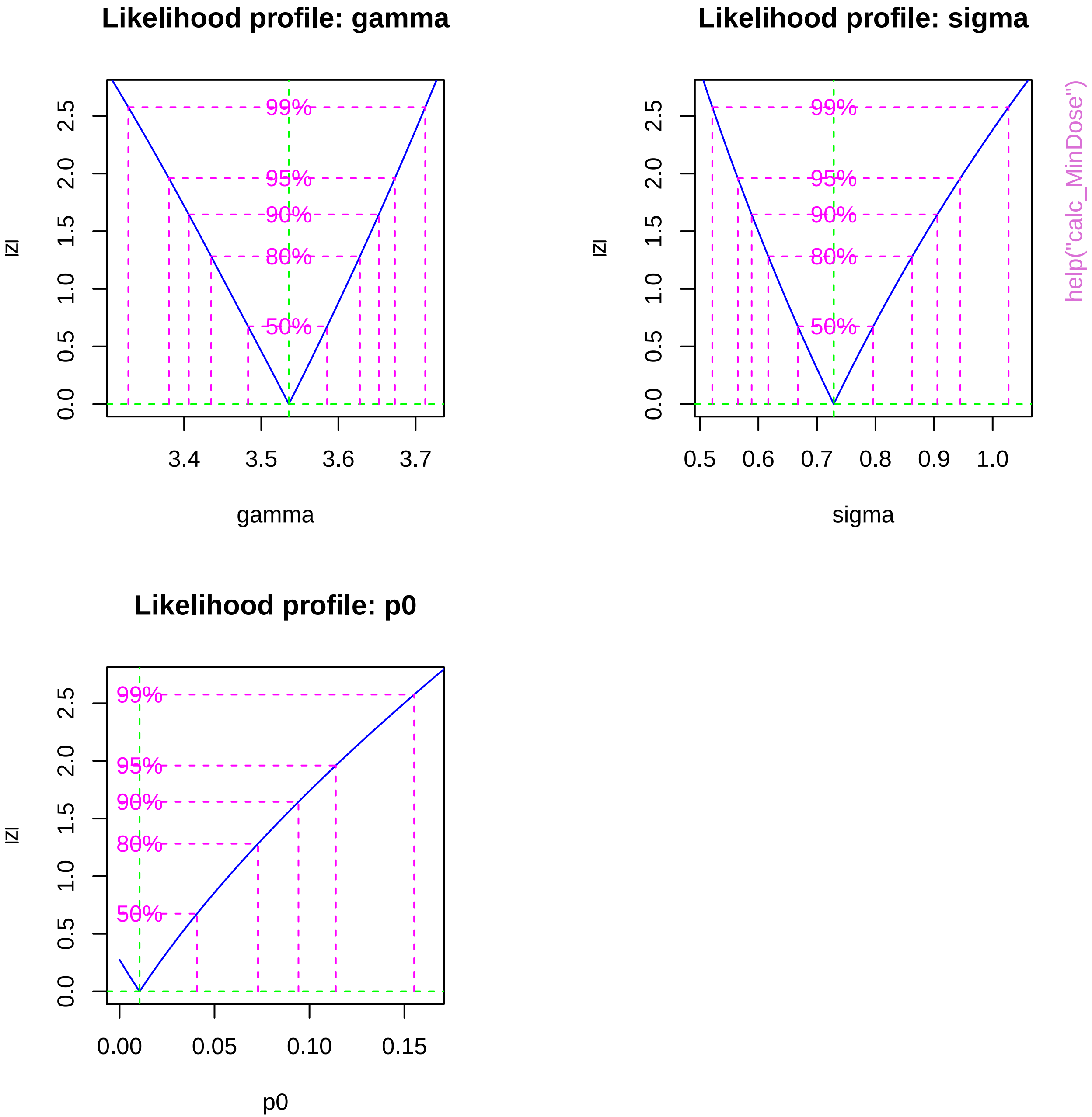


Likelihood profile: sigma



Likelihood profile: p0

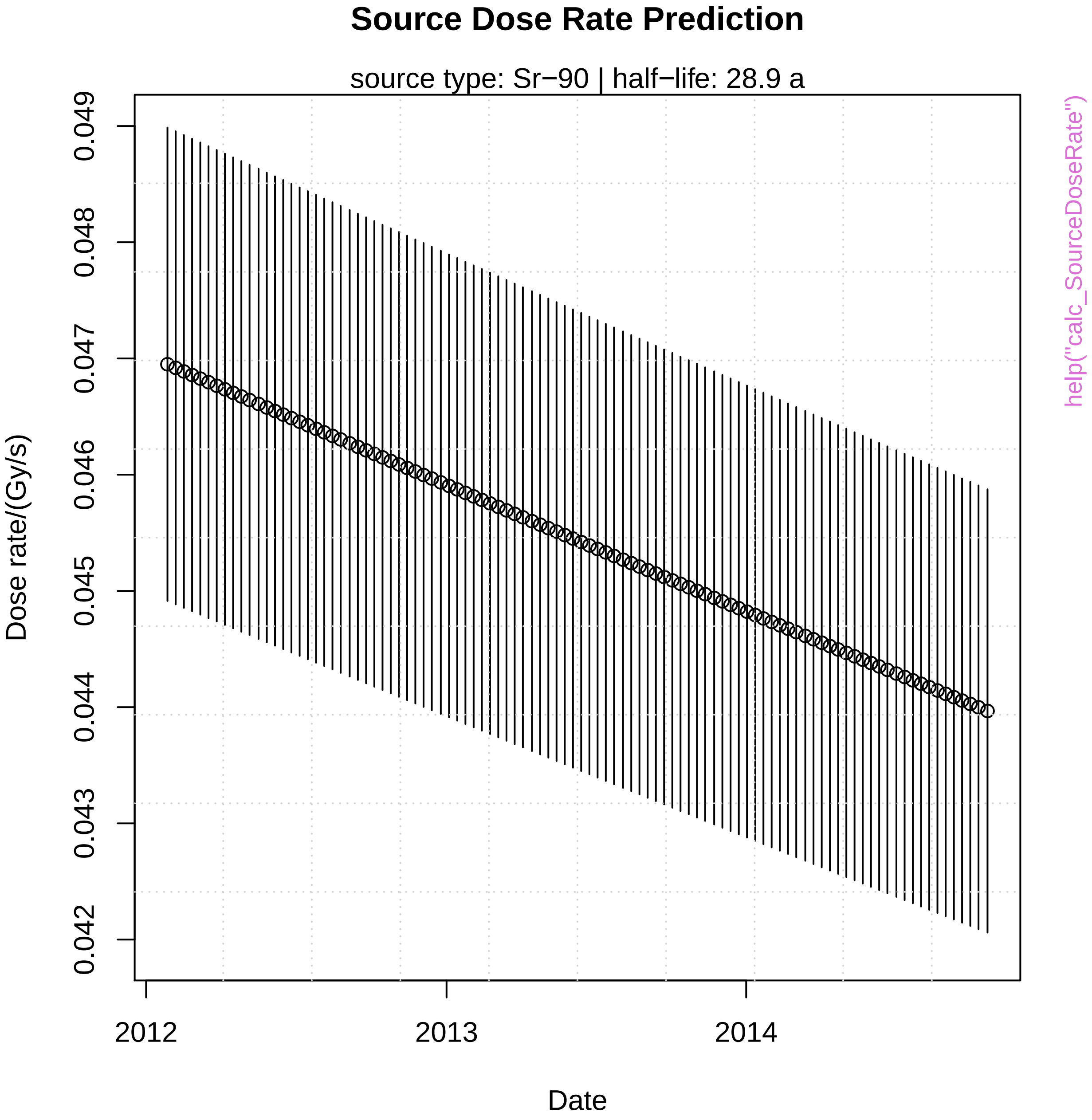


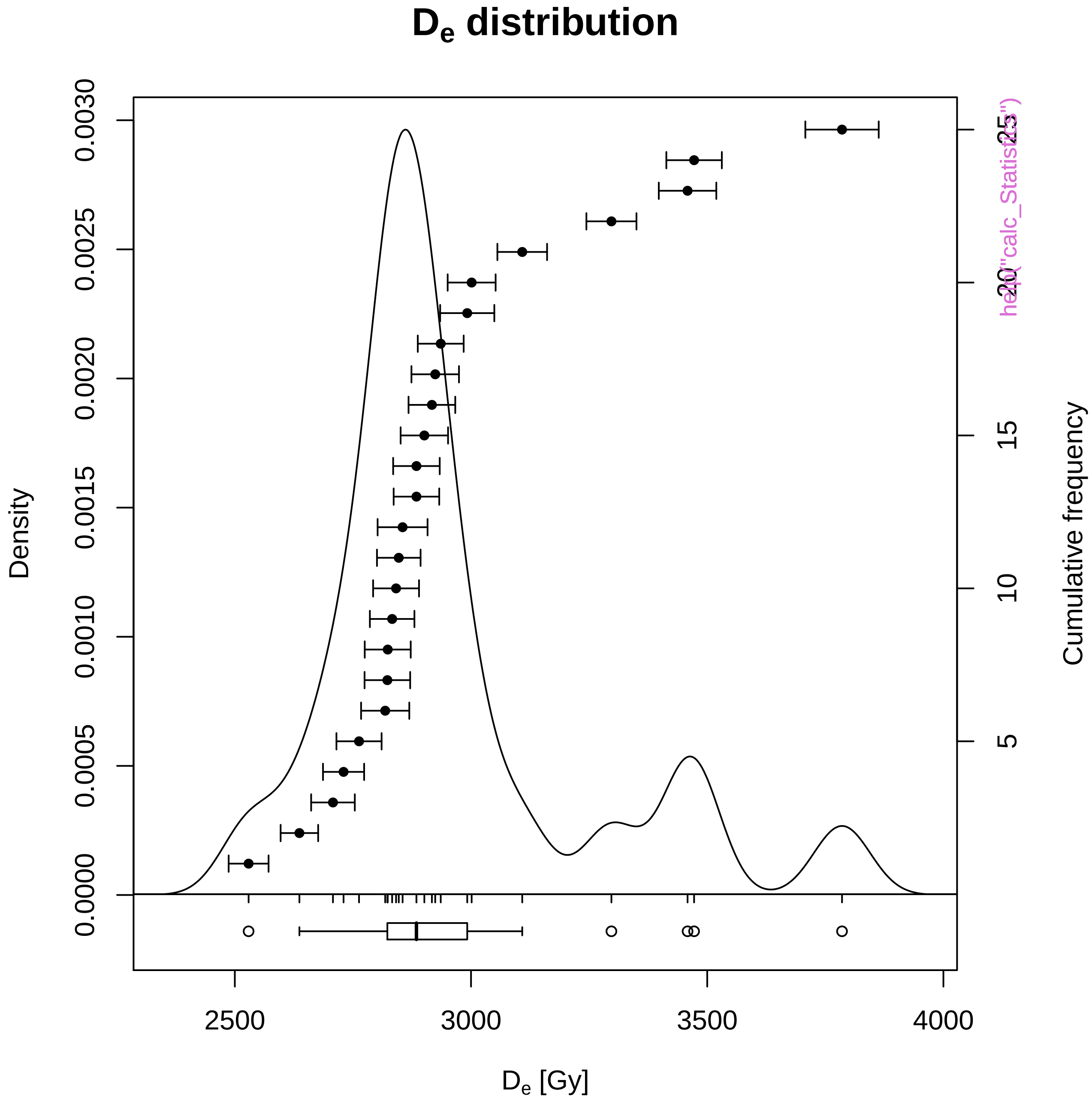


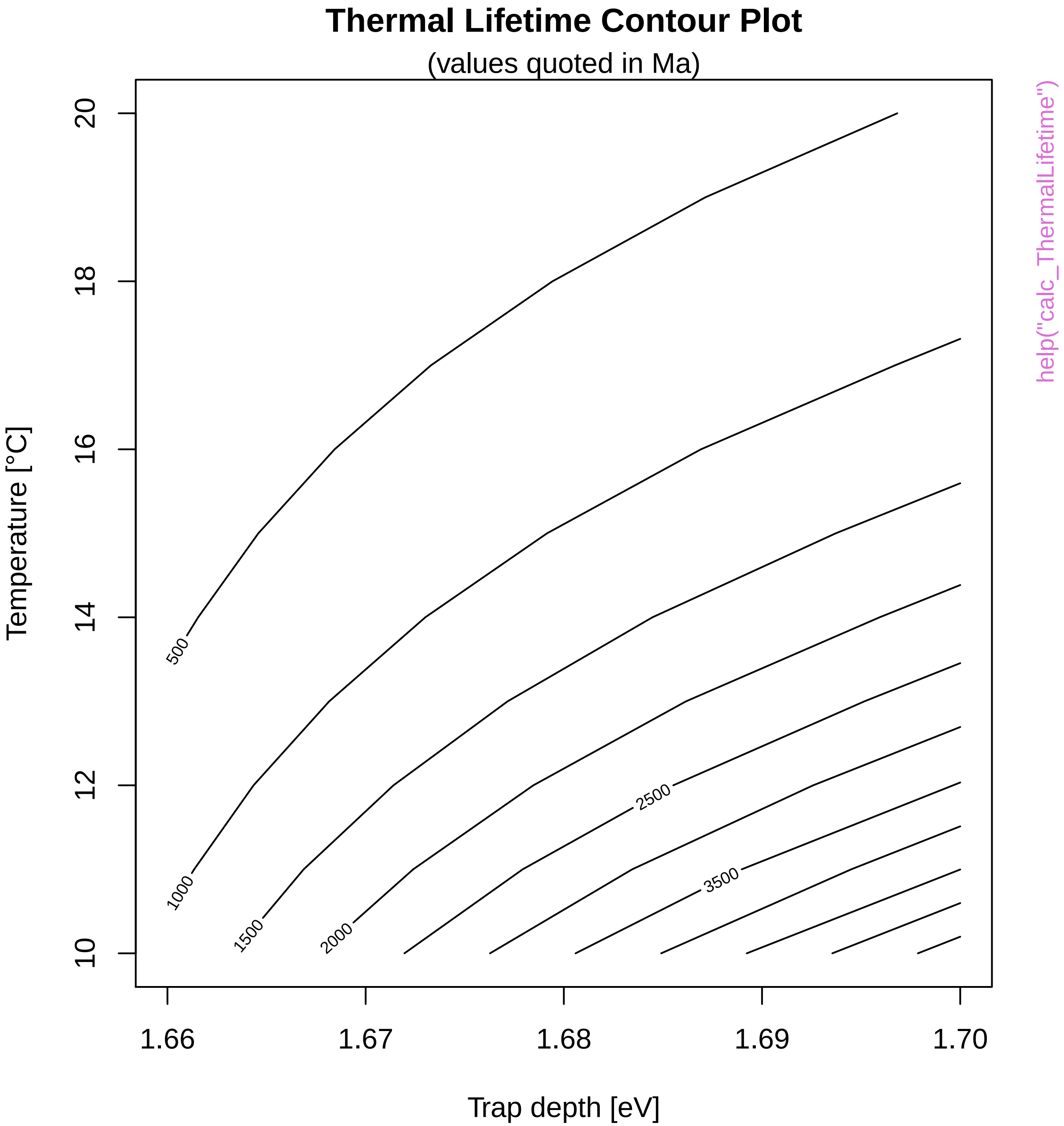
Likelihood profile: gamma

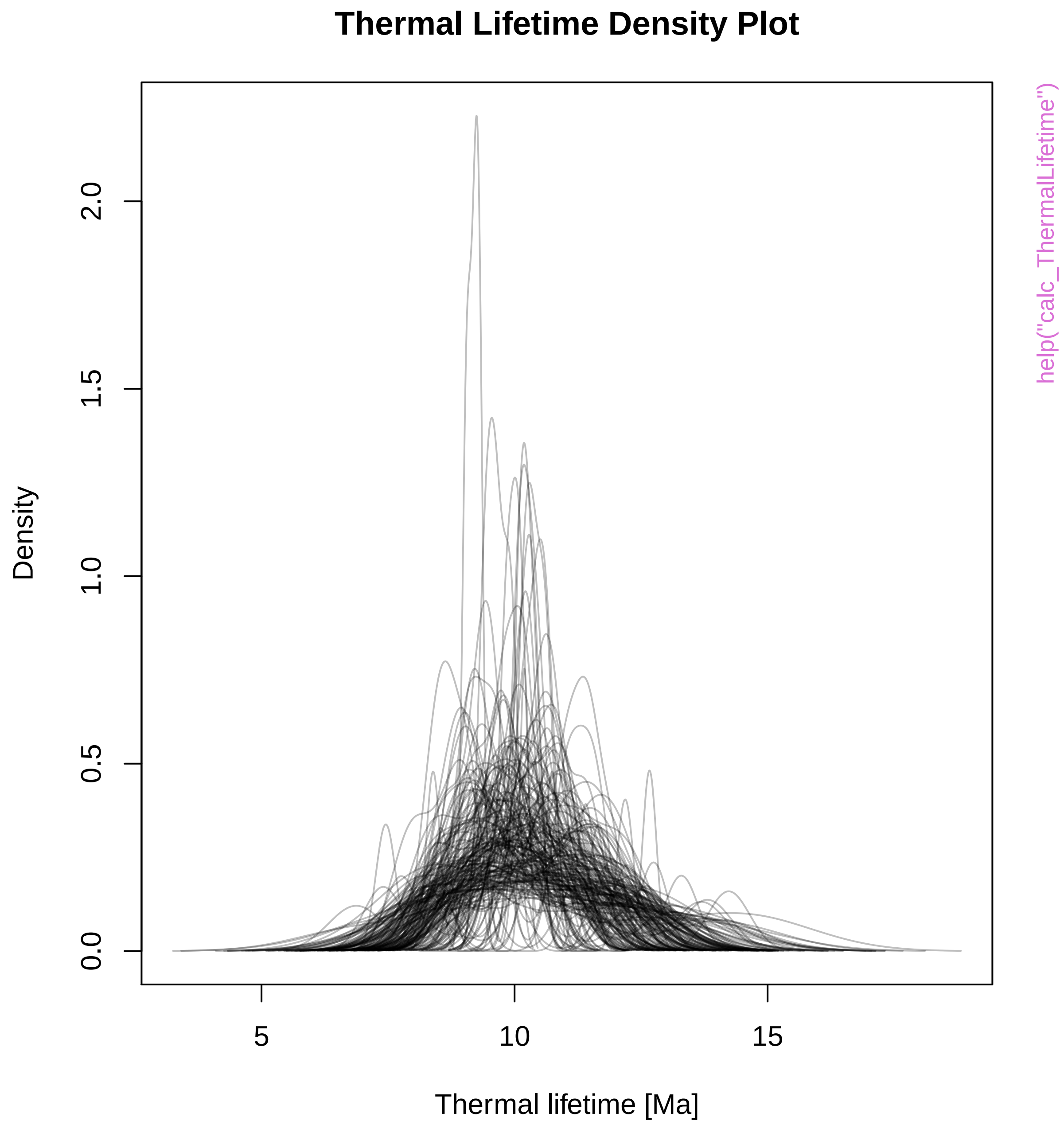
Likelihood profile: sigma

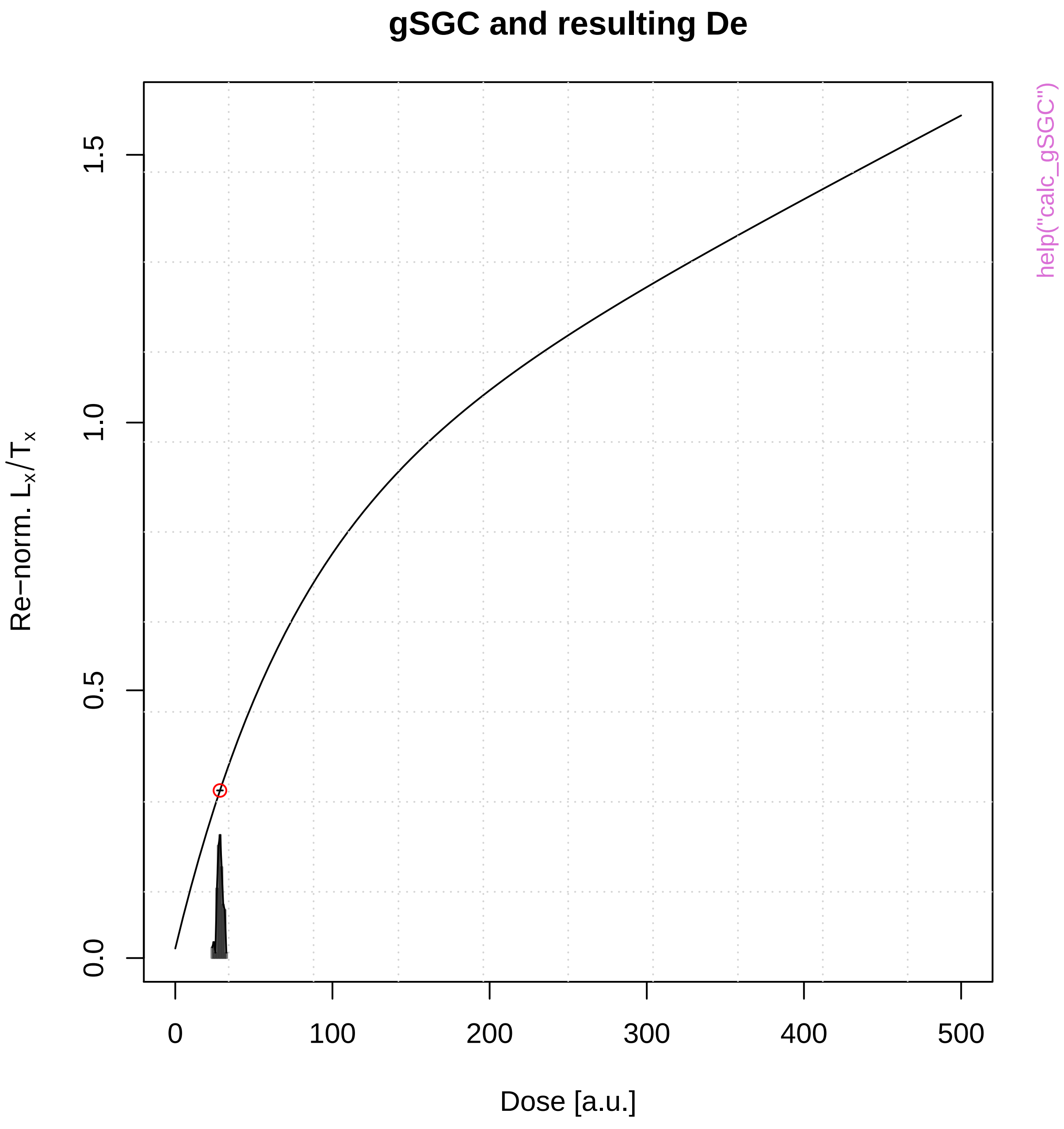
Likelihood profile: p0

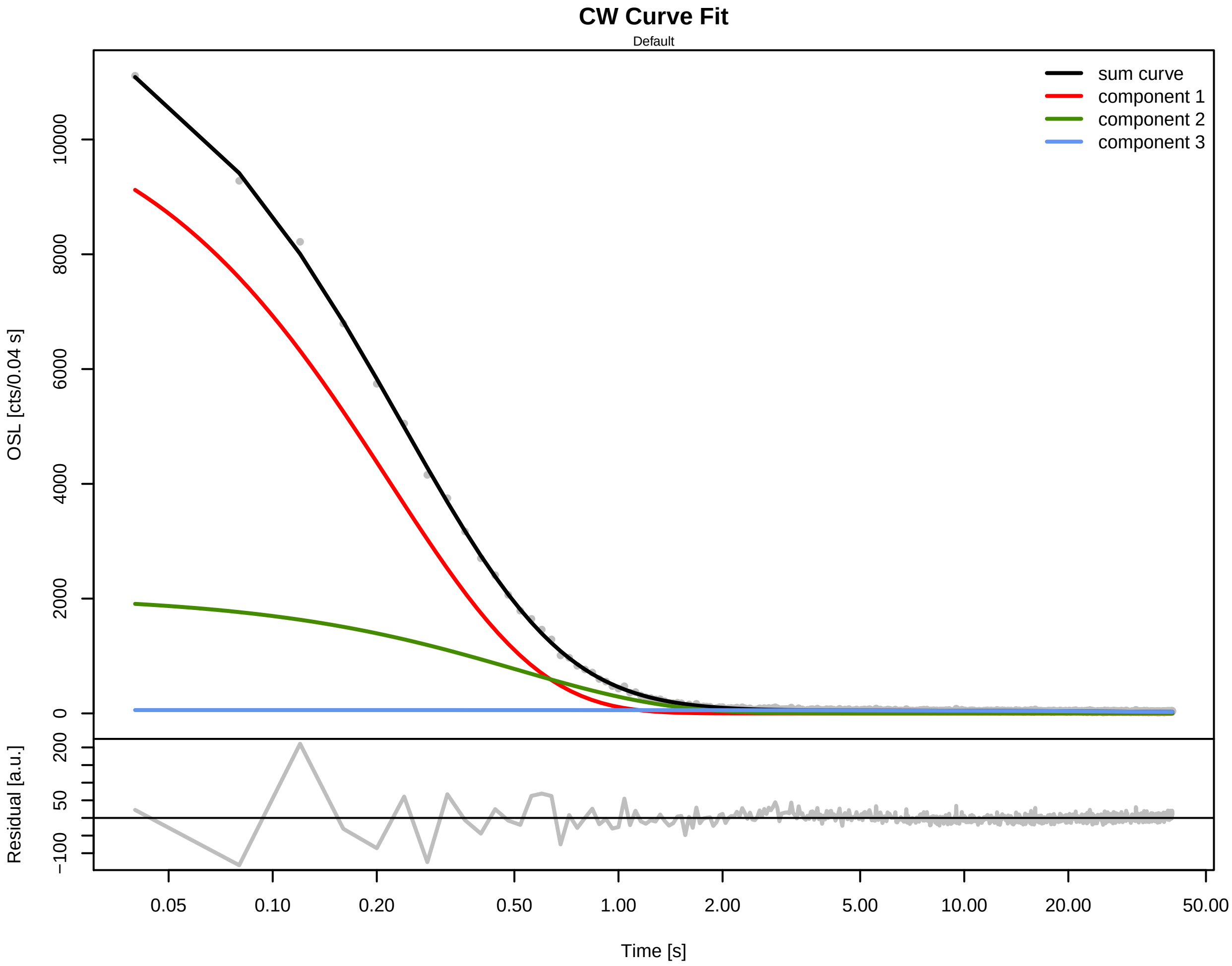

Source Dose Rate Prediction
source type: Sr−90 | half−life: 28.9 a
help("calc_SourceDoseRate")
Dose rate/(Gy/s)
0.042
0.043
0.044
0.045
0.046
0.047
0.048
0.049
2012
2013
2014
Date

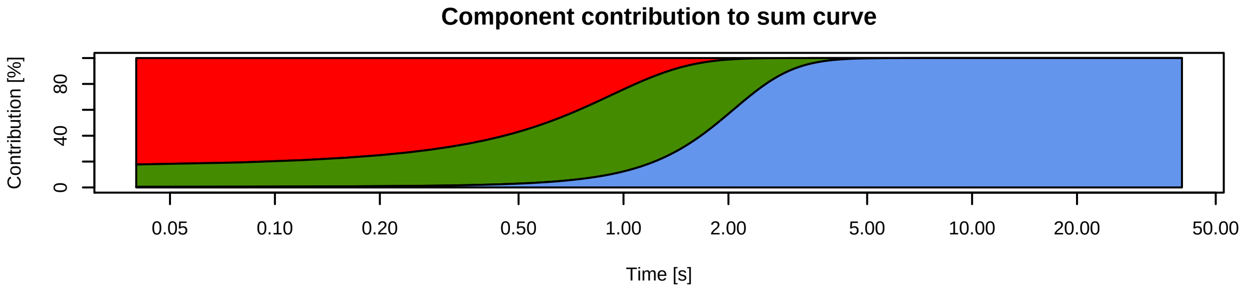

D_e distribution
Density
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
Cumulative frequency
25
20
15
10
5
help("calc_Statistics")
2500
3000
3500
4000
D_e [Gy]

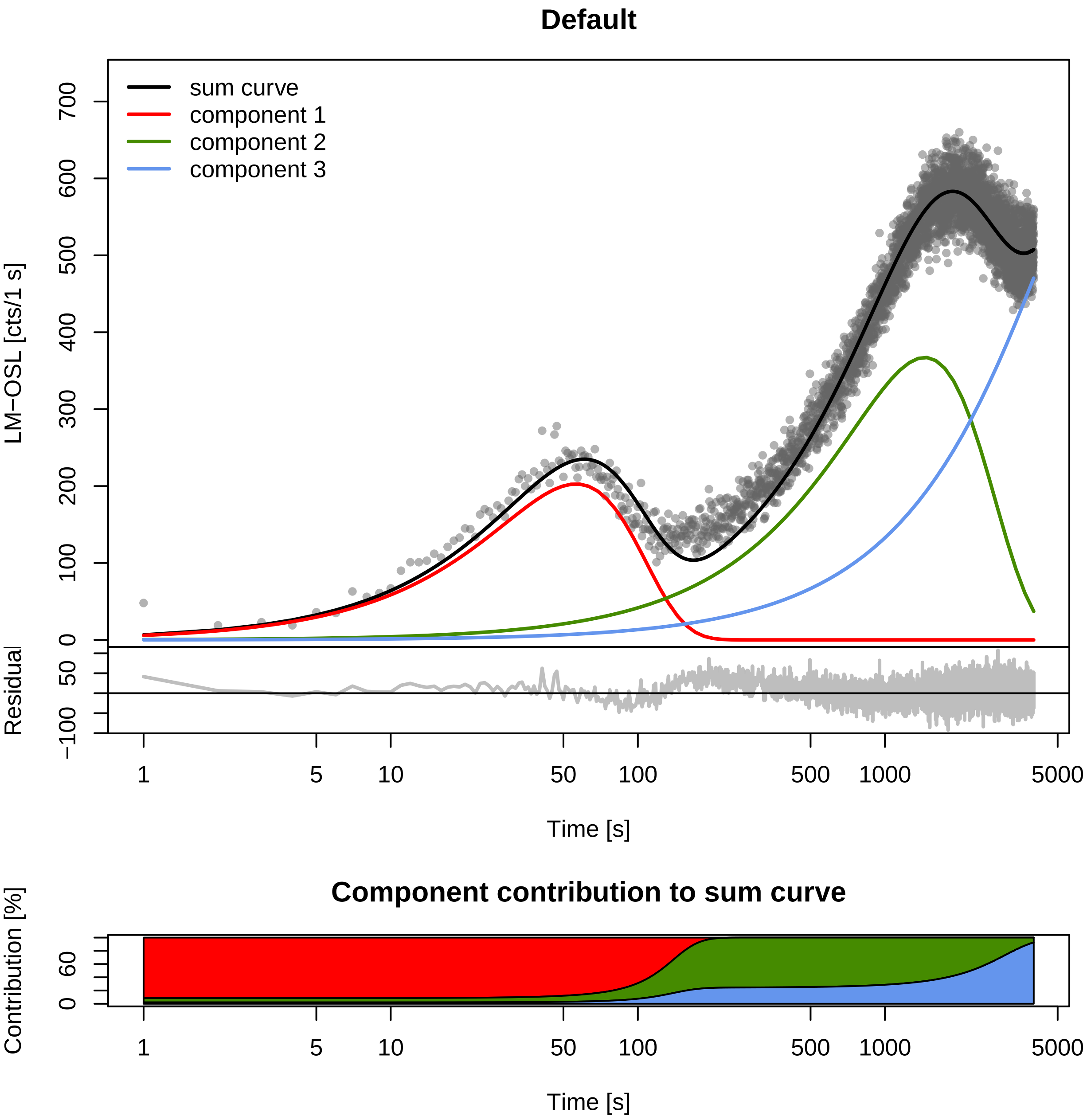

Thermal Lifetime Contour Plot
(values quoted in Ma)
help("calc_ThermalLifetime")
Temperature [°C]
20
18
16
14
12
10
Trap depth [eV]
1.66
1.67
1.68
1.69
1.70
500
1000
1500
2000
2500
3500

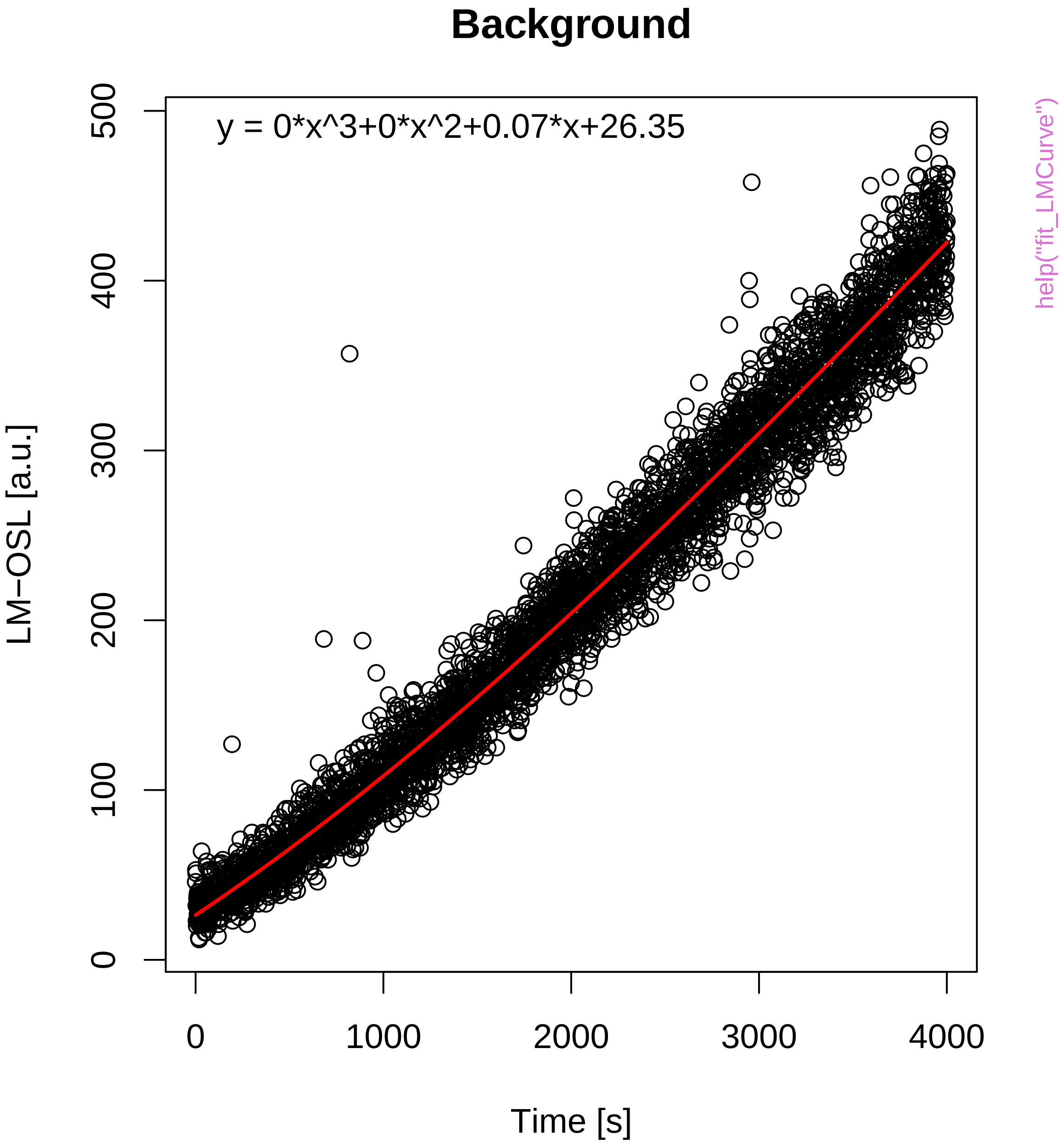

Thermal Lifetime Density Plot
Density
0.0
0.5
1.0
1.5
2.0
5
10
15
Thermal lifetime [Ma]
help("calc_ThermalLifetime")

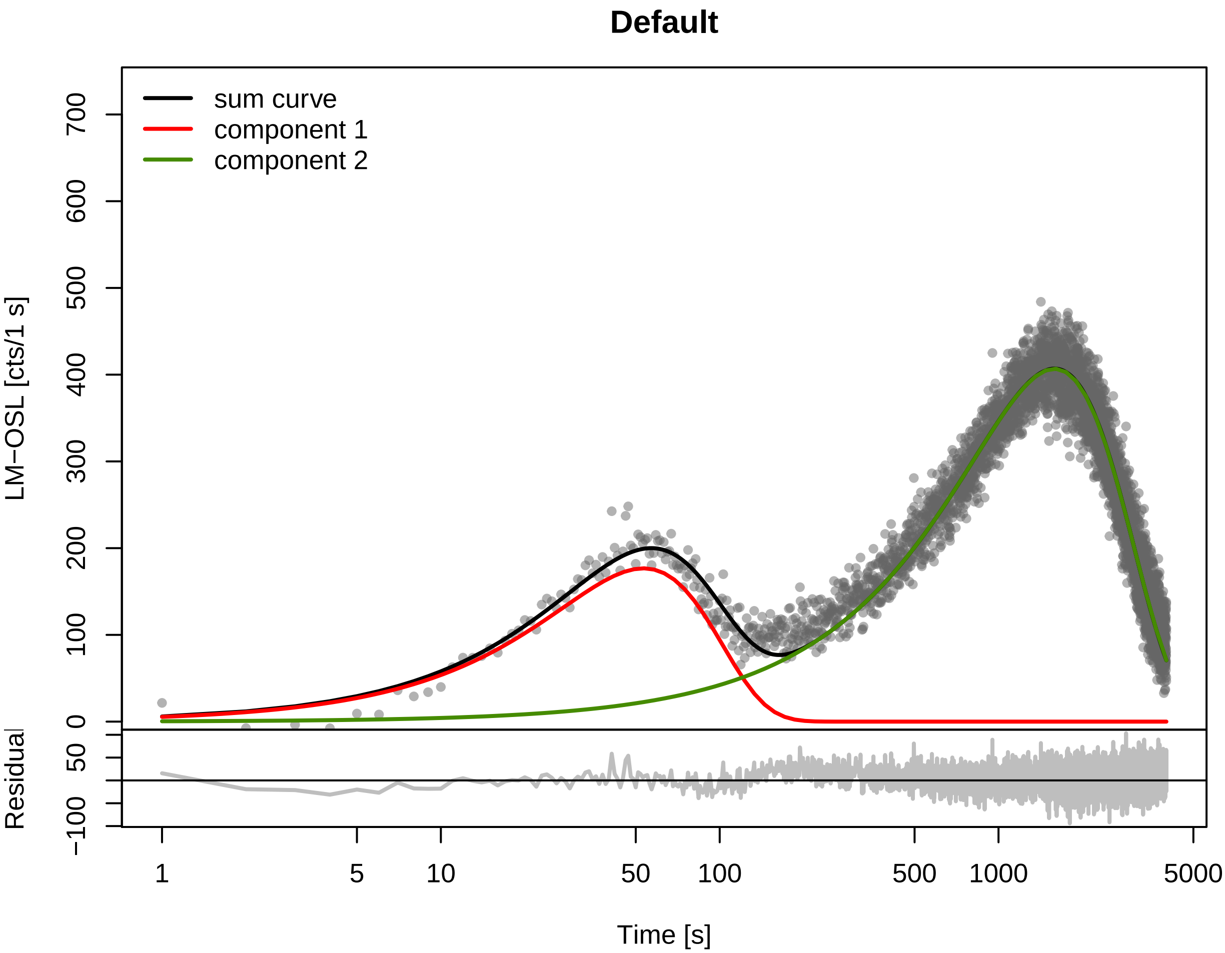

gSGC and resulting De
Re−norm. L_x/T_x
Dose [a.u.]
0.0
0.5
1.0
1.5
0
100
200
300
400
500
help("calc_gSGC")

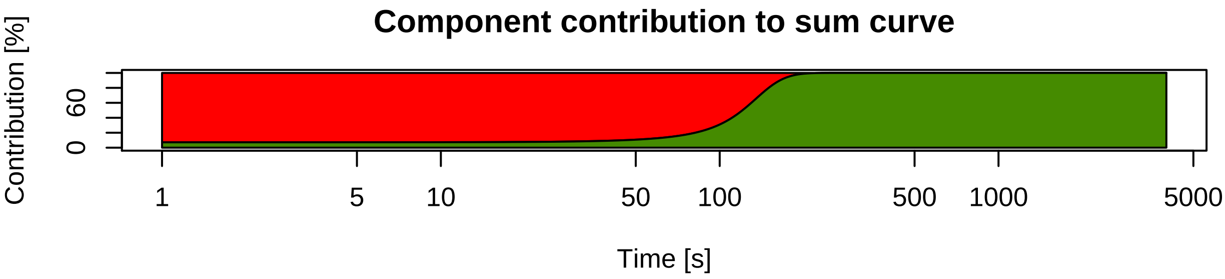

CW Curve Fit
Default
sum curve
component 1
component 2
component 3
OSL [cts/0.04 s]
0
2000
4000
6000
8000
10000
Residual [a.u.]
200
50
−100
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
20.00
50.00
Time [s]

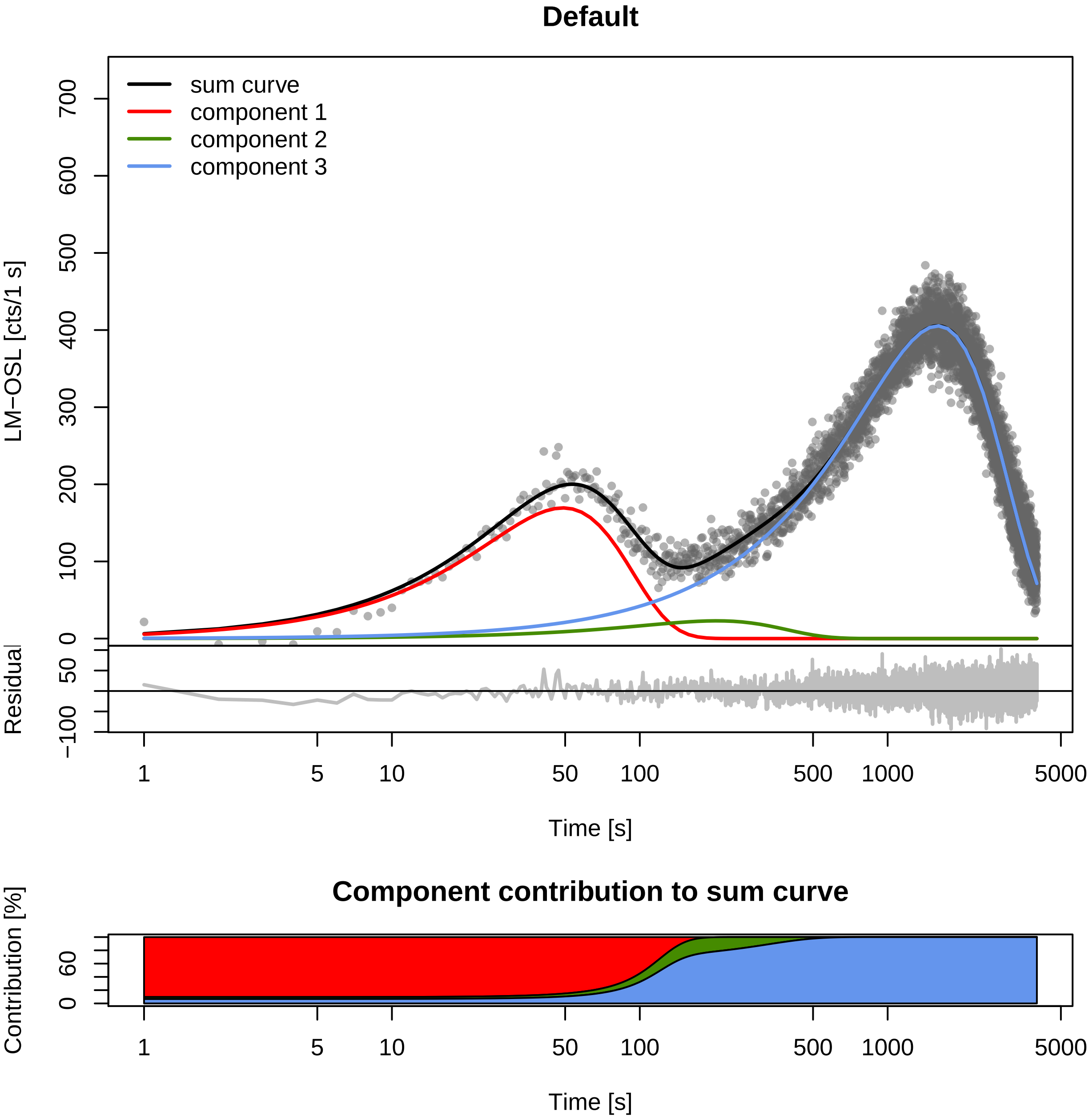

Component contribution to sum curve
Contribution [%]
0
40
80
0.05
0.10
0.20
0.50
1.00
2.00
5.00
10.00
20.00
50.00
Time [s]

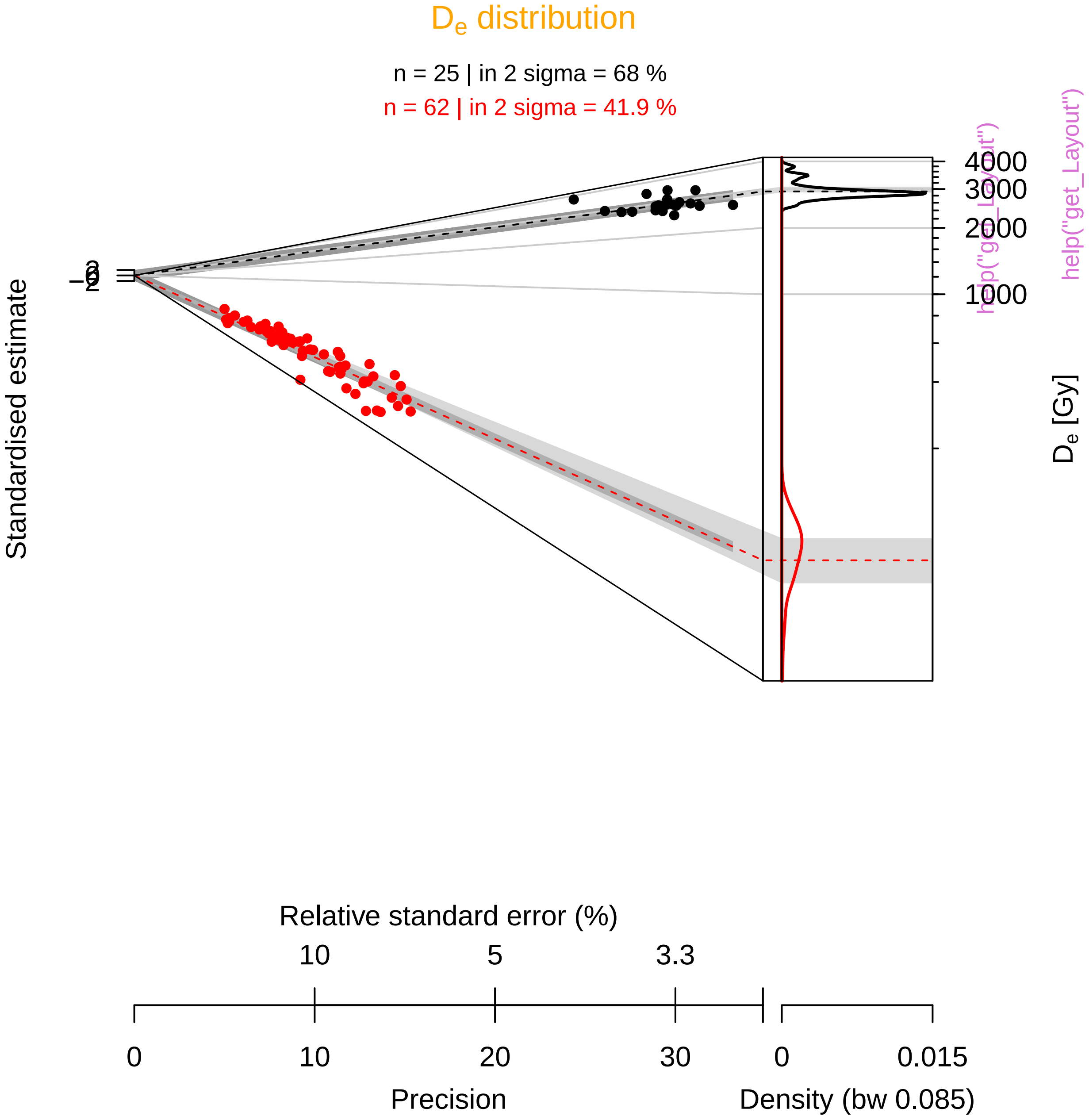

Default
sum curve
component 1
component 2
component 3
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
−100
50
1
5
10
50
100
500
1000
5000
Time [s]
Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

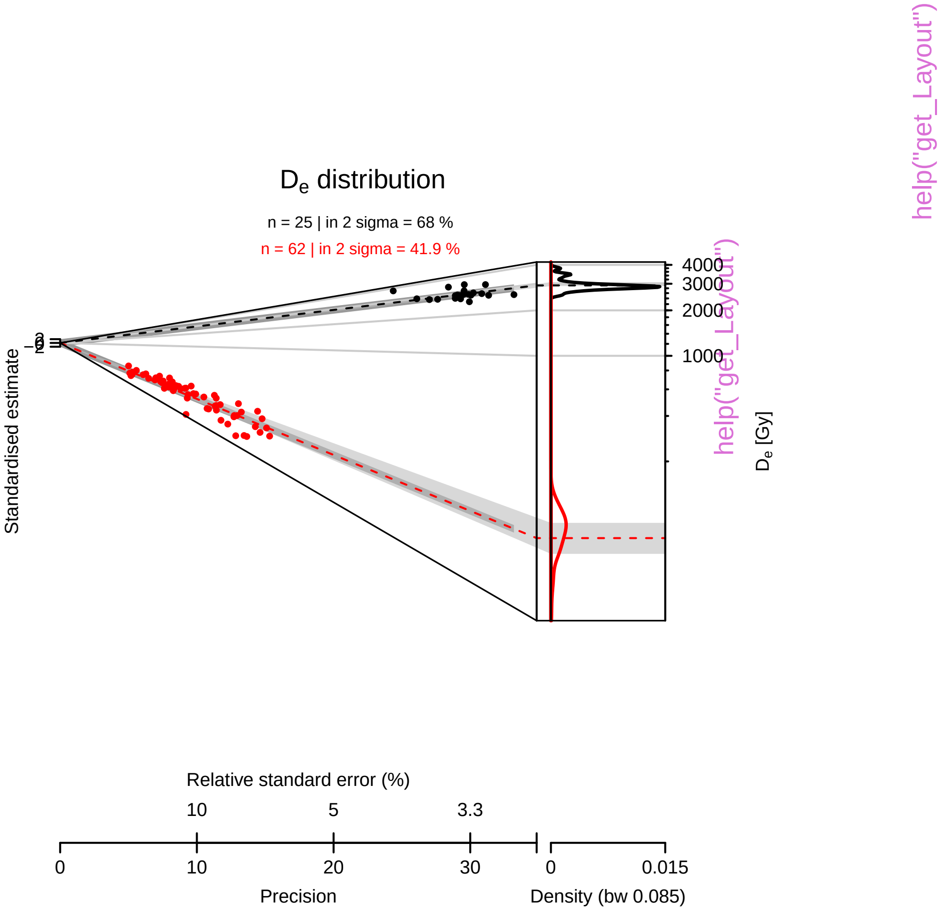

Background
y = 0*x^3+0*x^2+0.07*x+26.35
LM−OSL [a.u.]
0
100
200
300
400
500
Time [s]
0
1000
2000
3000
4000
help("fit_LMCurve")

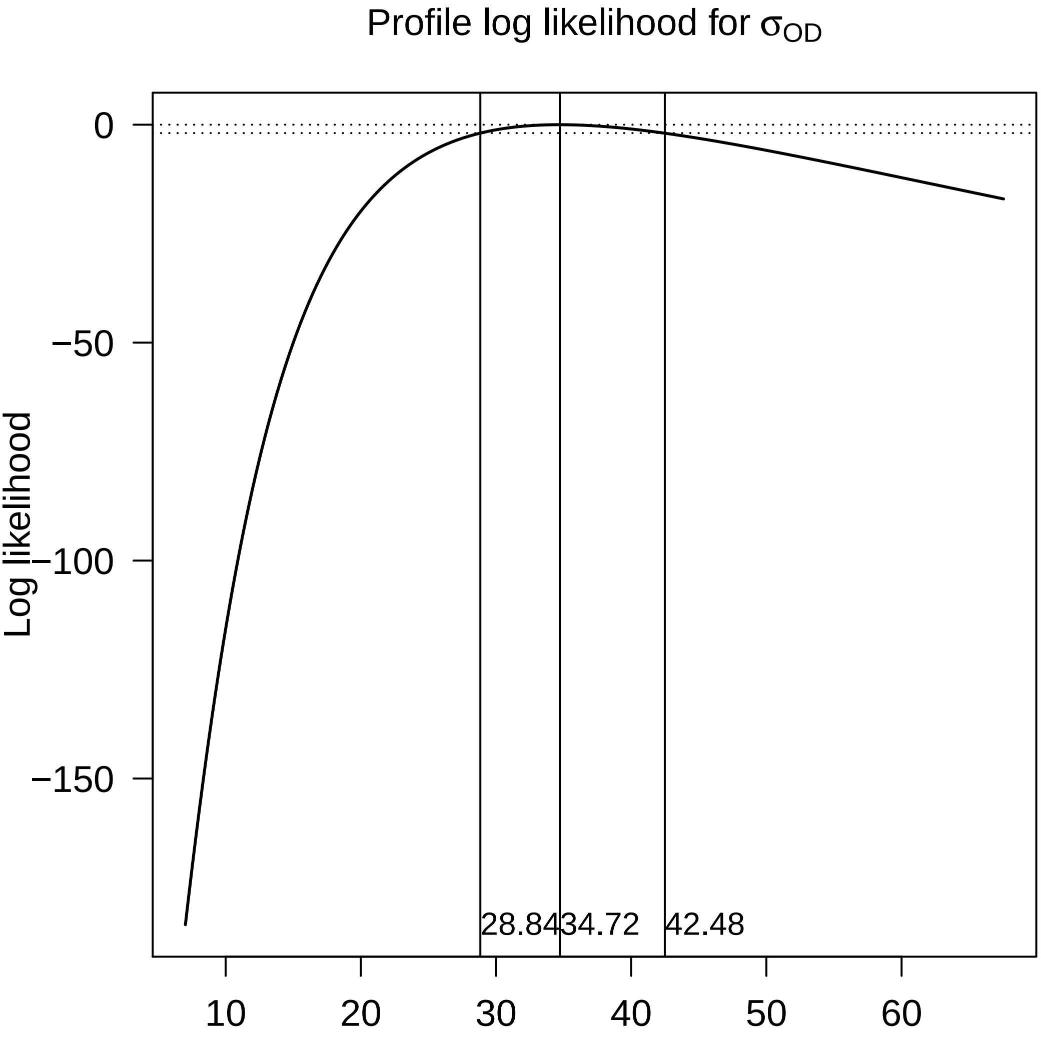

Default
sum curve
component 1
component 2
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
50
−100
1
5
10
50
100
500
1000
5000
Time [s]

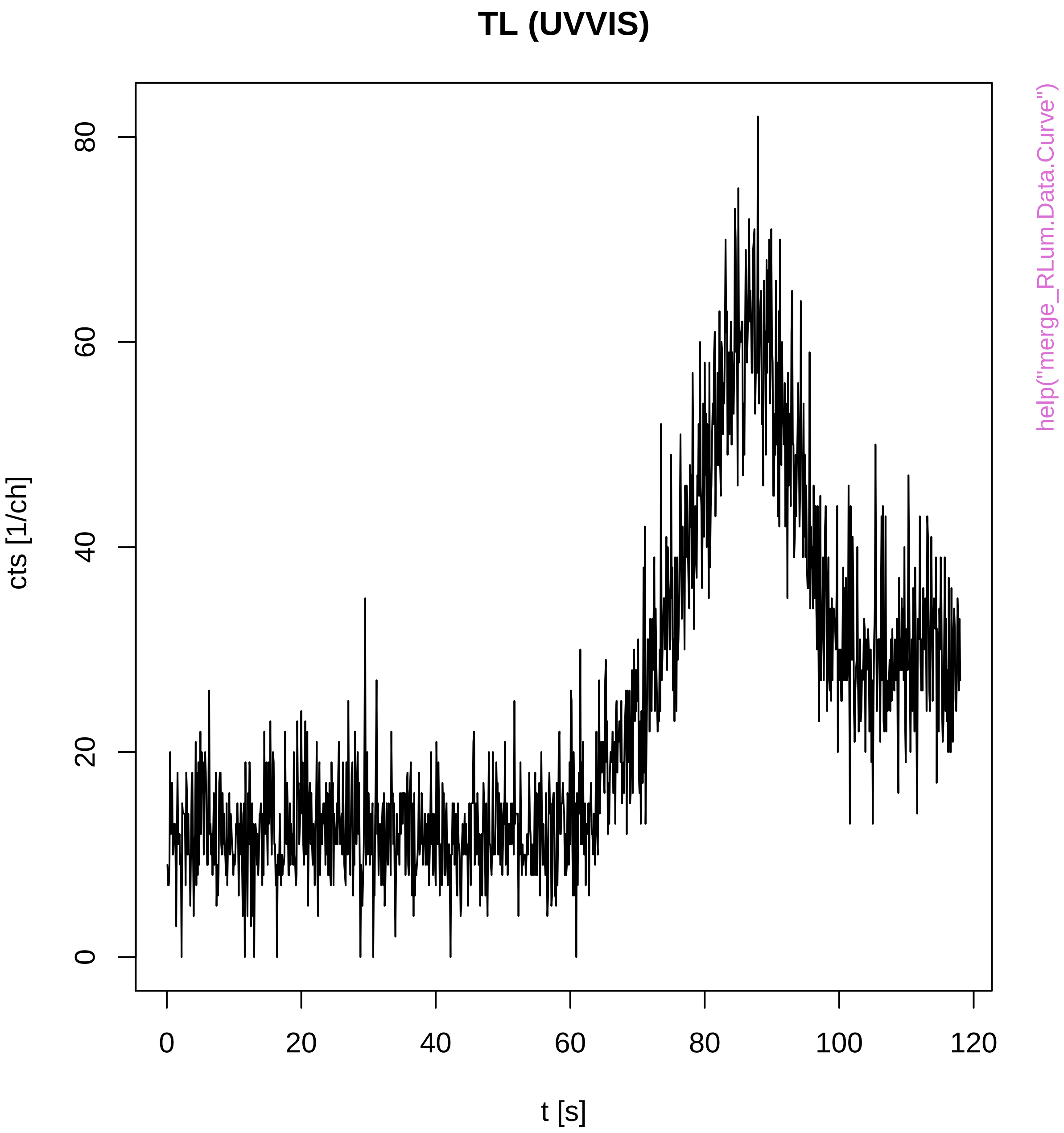

Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

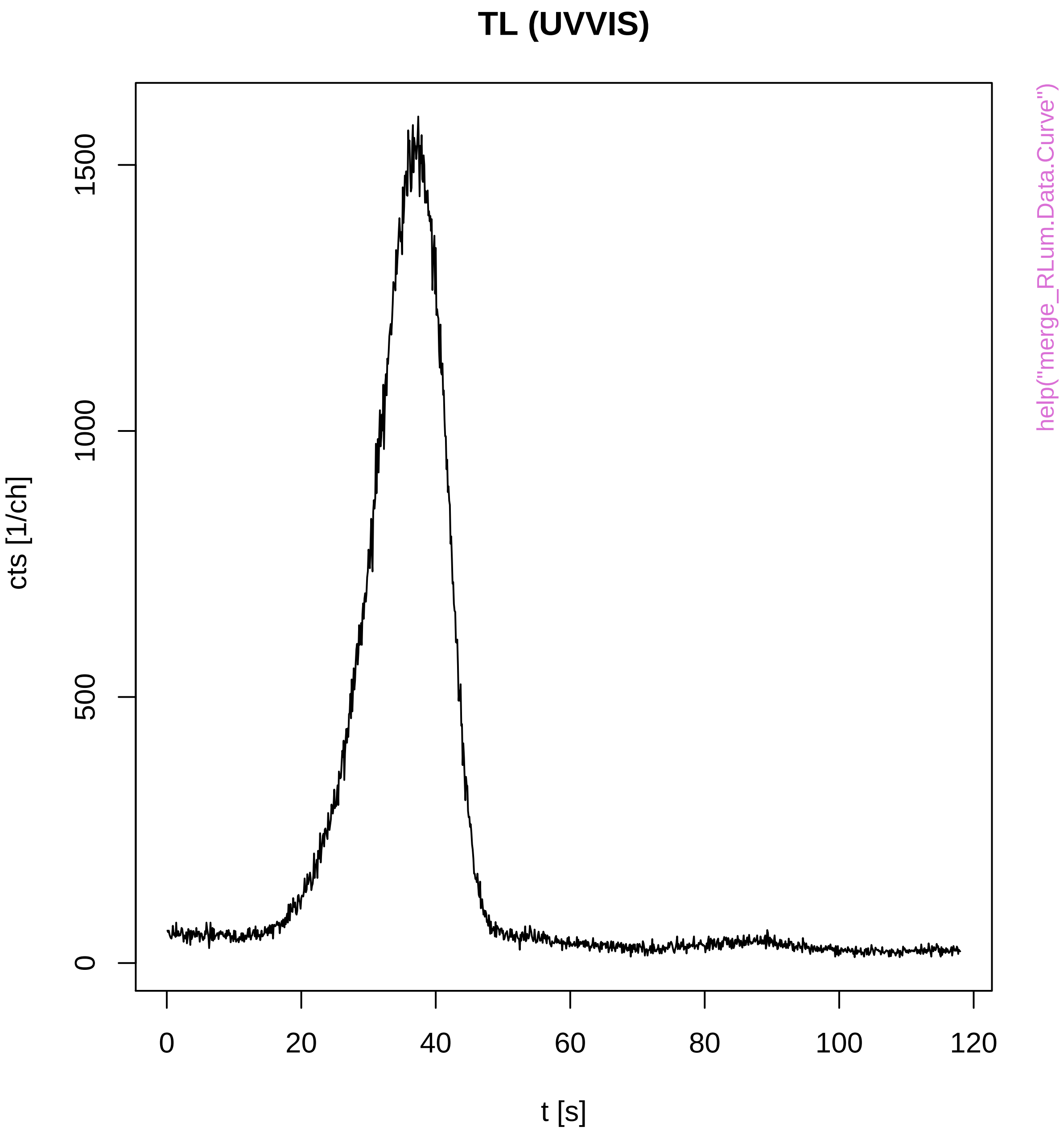

Default
sum curve
component 1
component 2
component 3
LM−OSL [cts/1 s]
0
100
200
300
400
500
600
700
Residual
50
0
−100
1
5
10
50
100
500
1000
5000
Time [s]
Component contribution to sum curve
Contribution [%]
0
60
1
5
10
50
100
500
1000
5000
Time [s]

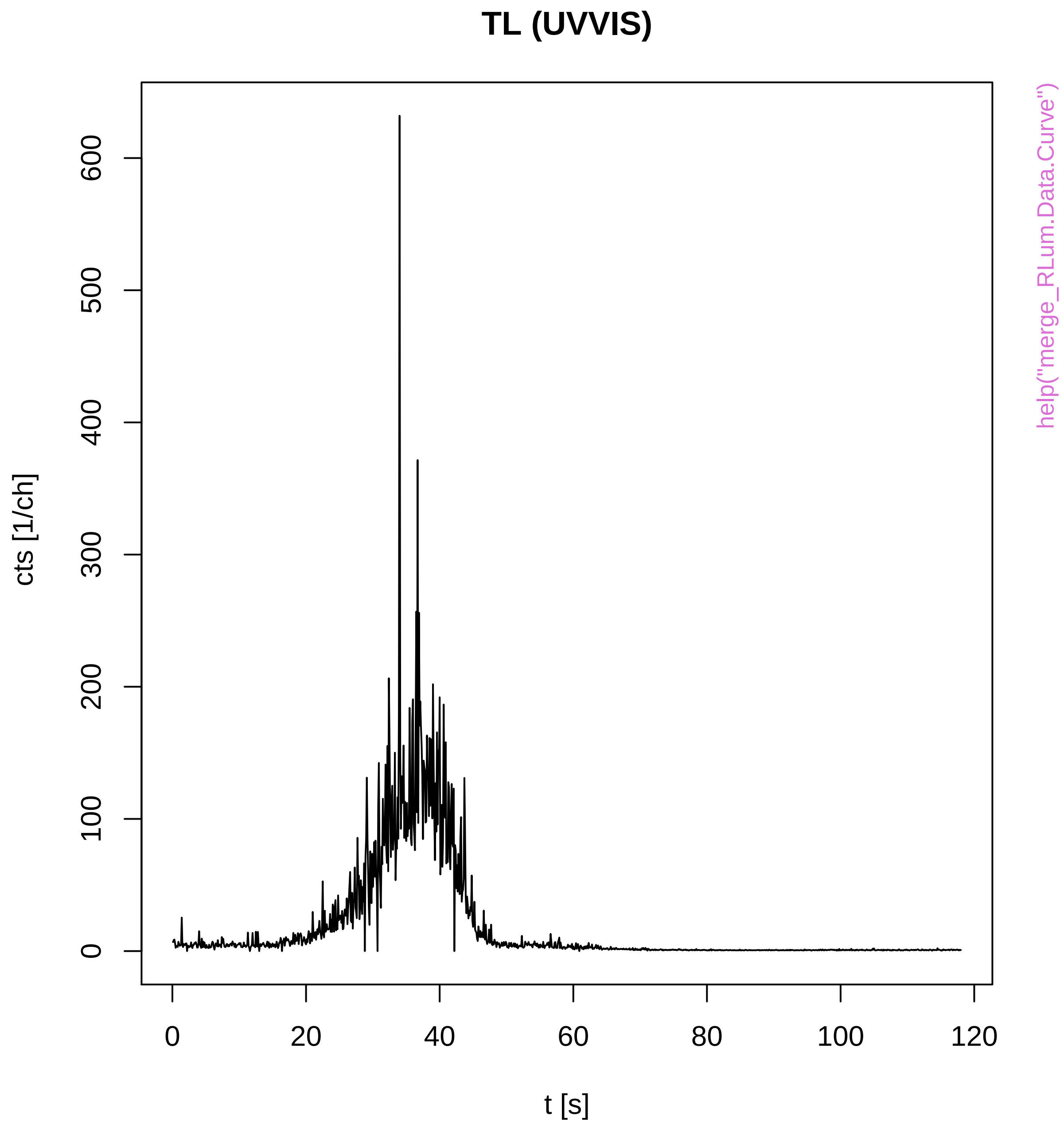

D_e distribution
n = 25 | in 2 sigma = 68 %
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
4000
3000
2000
1000
help("get_Layout")
help("get_Layout")
D_e [Gy]
Relative standard error (%)
10
5
3.3
0
10
20
30
0
0.015
Precision
Density (bw 0.085)

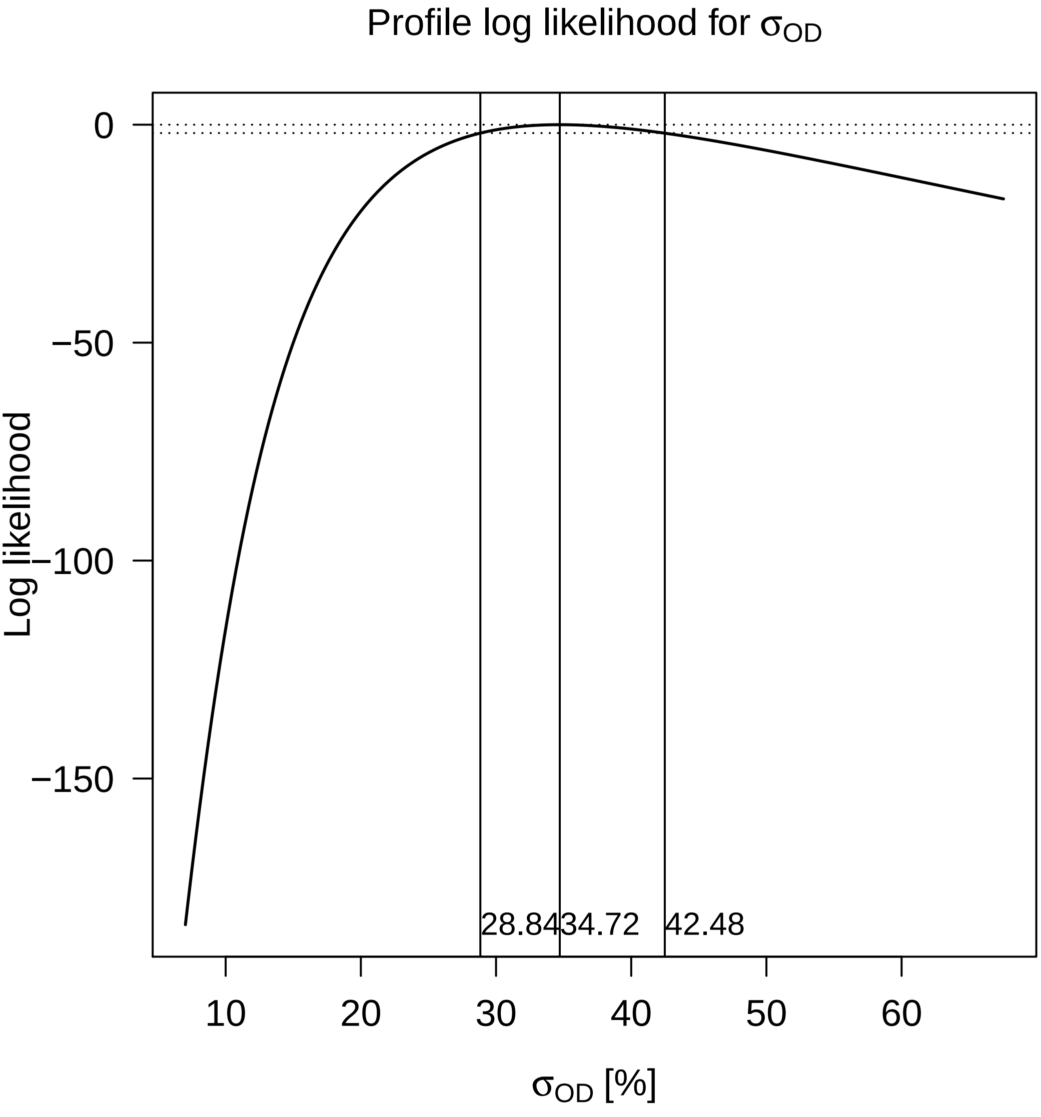

help("get_Layout")
D_e distribution
n = 25 | in 2 sigma = 68 %
n = 62 | in 2 sigma = 41.9 %
4000
3000
2000
1000
help("get_Layout")
D_e [Gy]
2
0
−2
Standardised estimate
Relative standard error (%)
10
5
3.3
0
10
20
30
0
0.015
Precision
Density (bw 0.085)

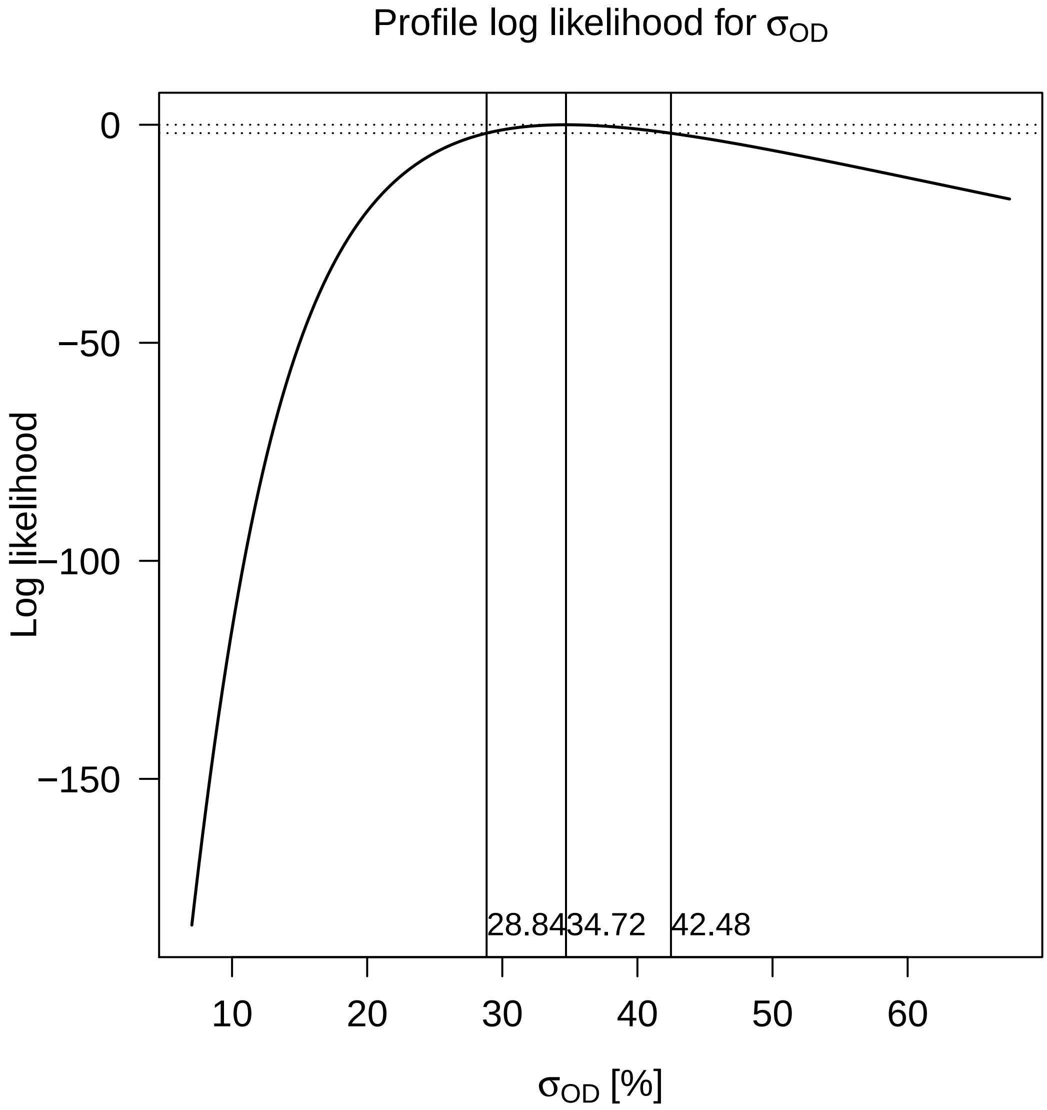

Profile log likelihood for σ_{OD}
Log likelihood
0
−50
−100
−150
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]

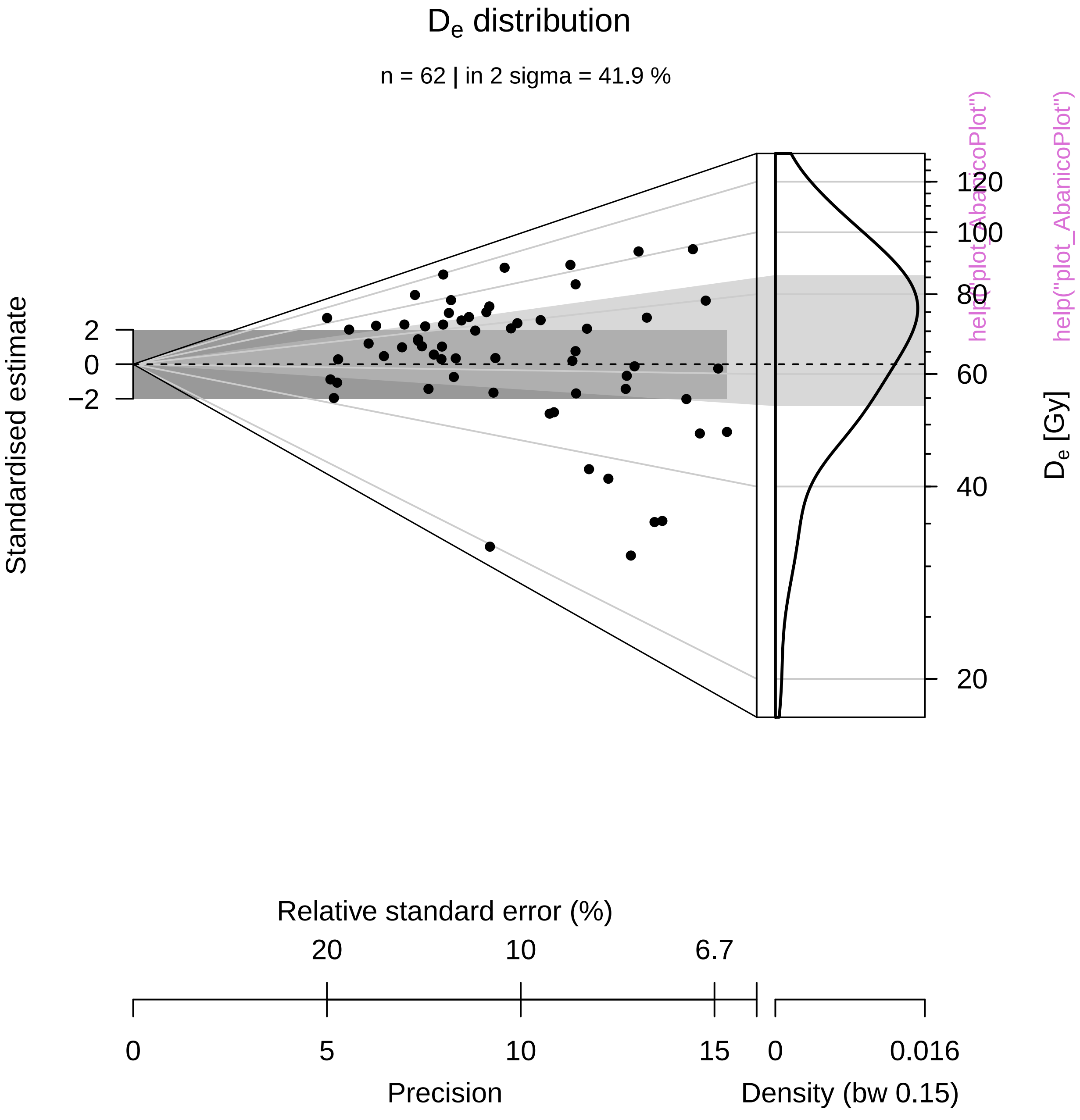

TL (UVVIS)
cts [1/ch]
t [s]
0
20
40
60
80
0
20
40
60
80
100
120
help("merge_RLum.Data.Curve")

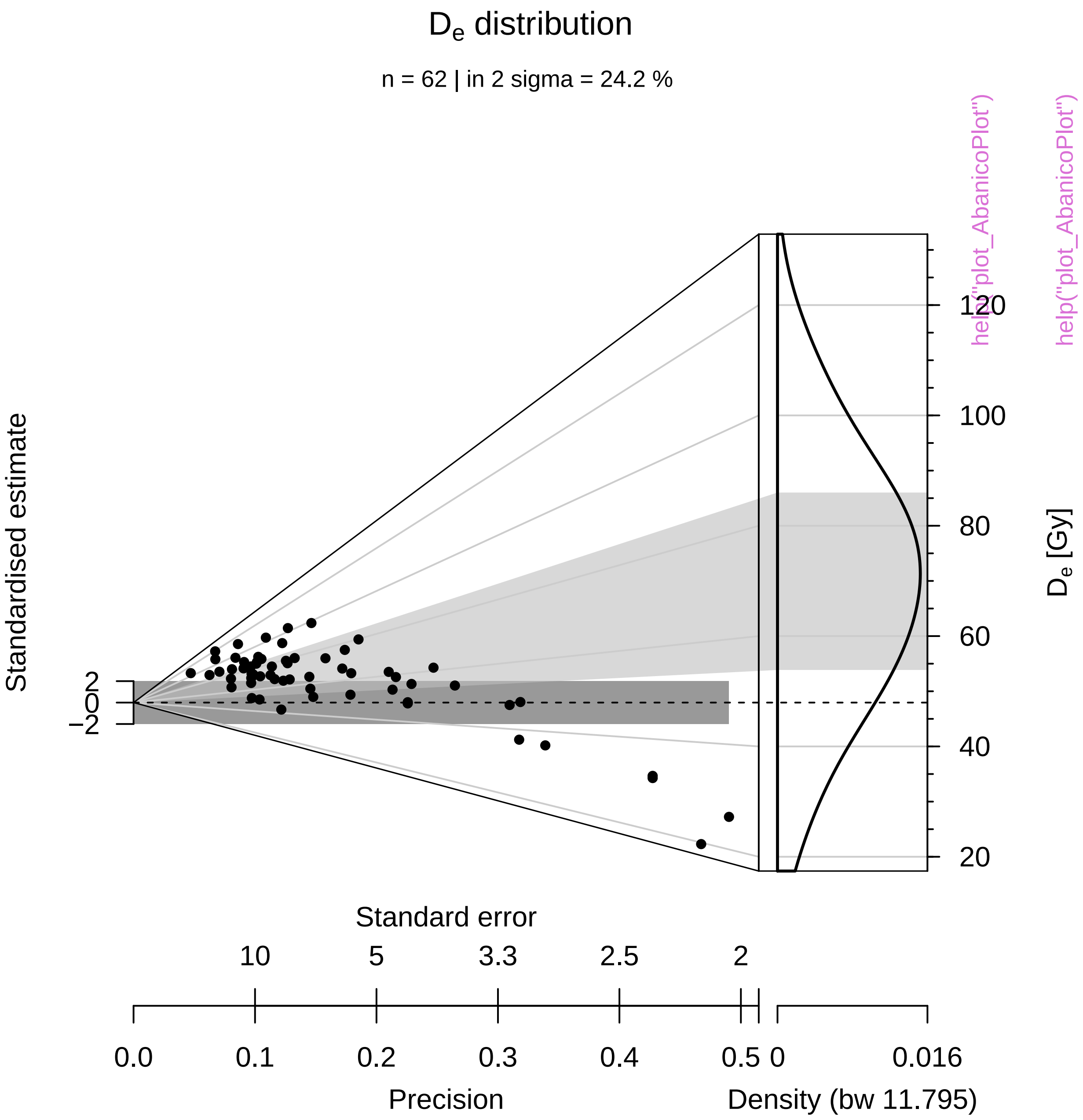

TL (UVVIS)
cts [1/ch]
0
500
1000
1500
0
20
40
60
80
100
120
t [s]
help("merge_RLum.Data.Curve")


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

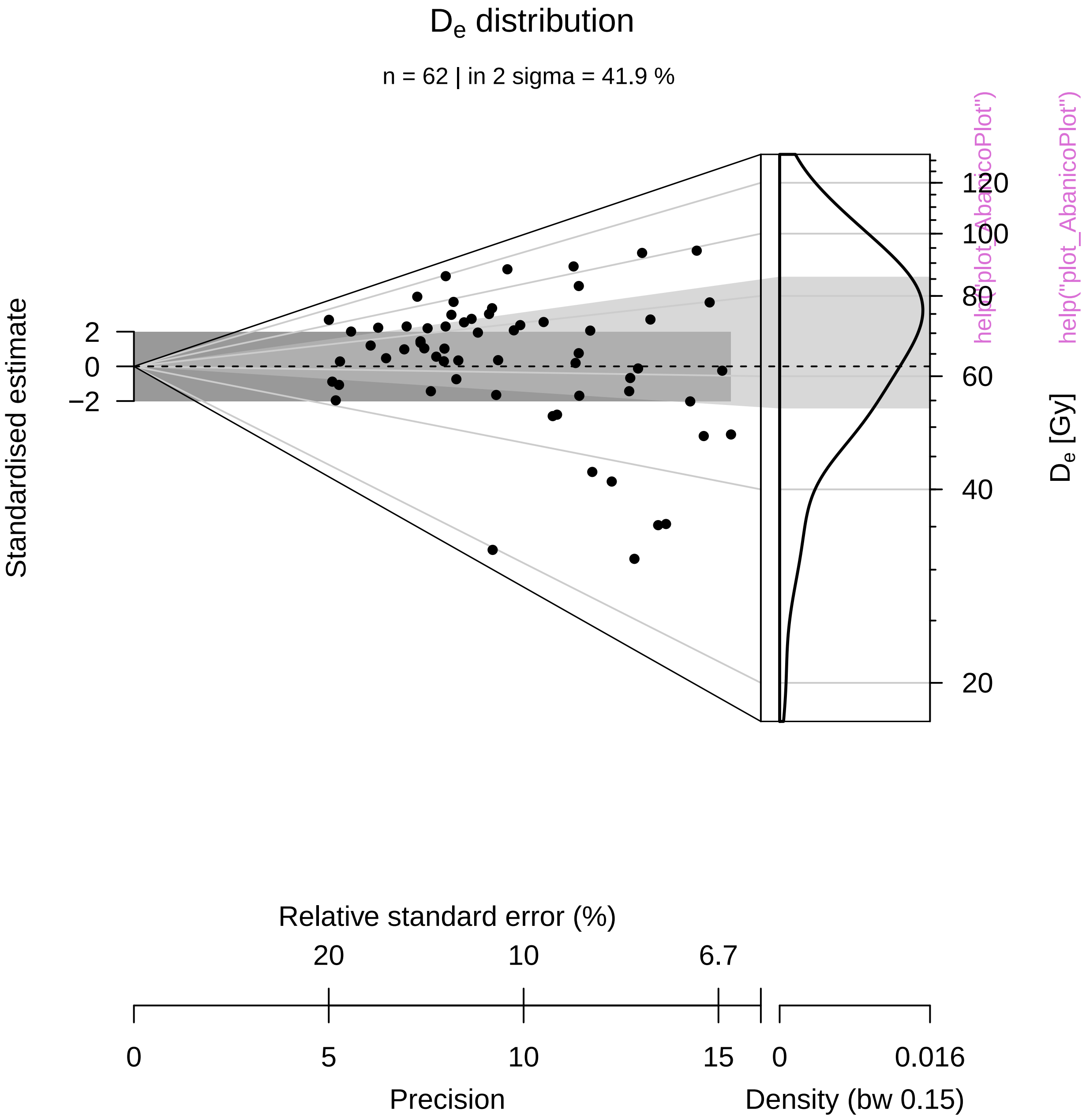

Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]

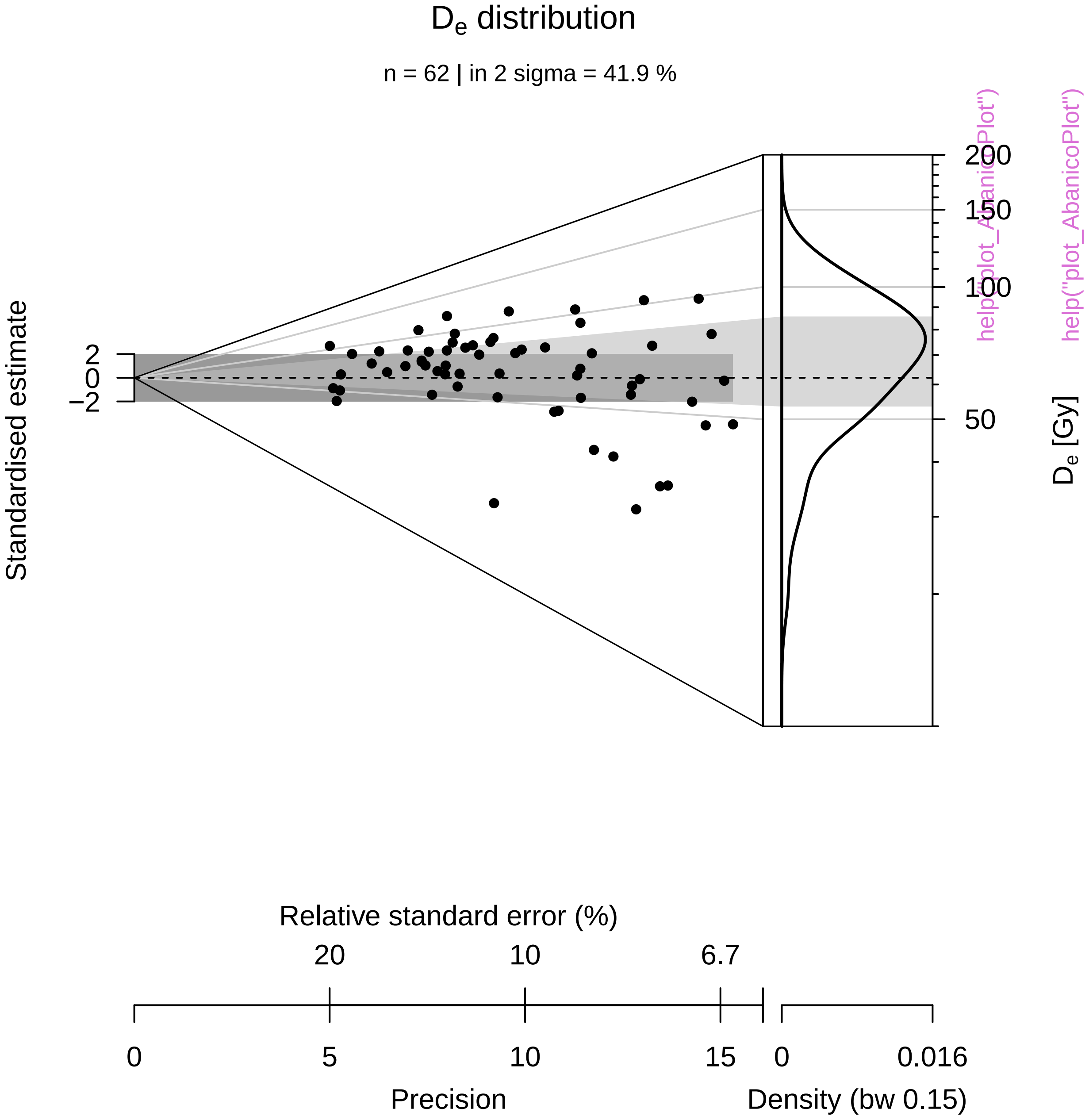

Profile log likelihood for σ_{OD}
0
−50
−100
−150
Log likelihood
28.84
34.72
42.48
10
20
30
40
50
60
σ_{OD} [%]

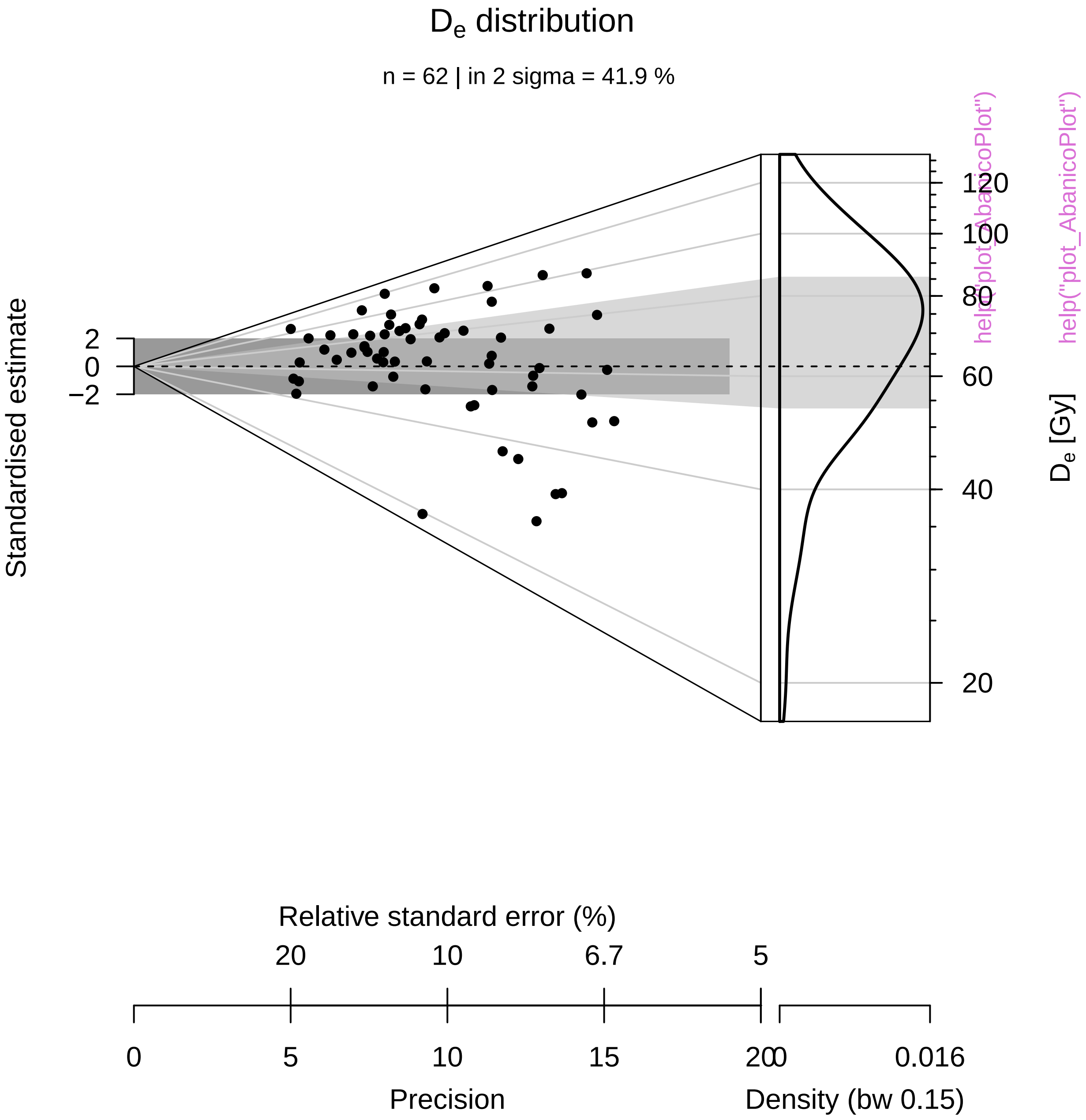

De distribution
n = 62 | in 2 sigma = 41.9 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

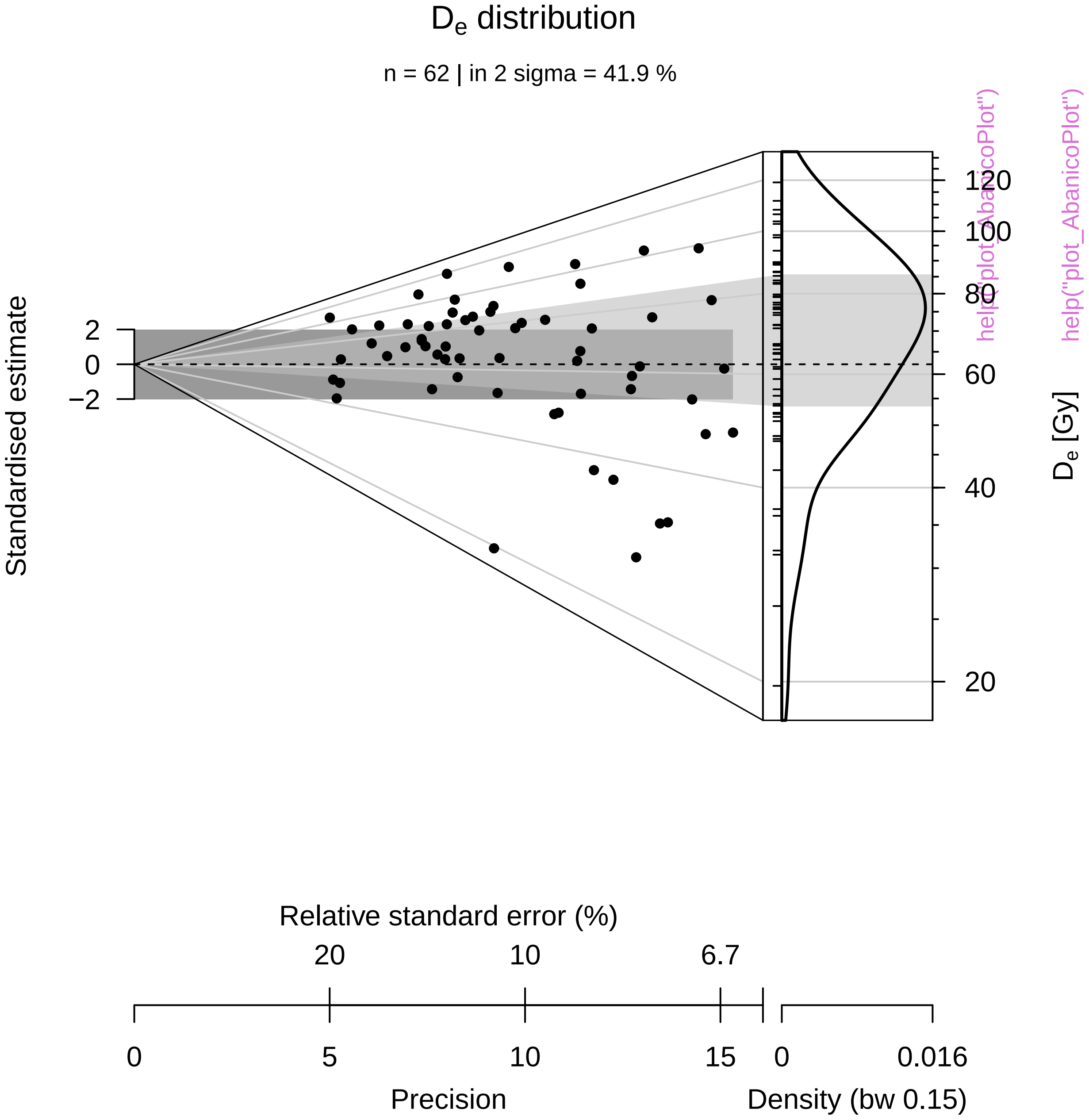


D_e distribution
n = 62 | in 2 sigma = 24.2 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
0
-2
120
100
80
60
40
20
D_e [Gy]
Standard error
10
5
3.3
2.5
2
0.0
0.1
0.2
0.3
0.4
0.5
0
0.016
Precision
Density (bw 11.795)

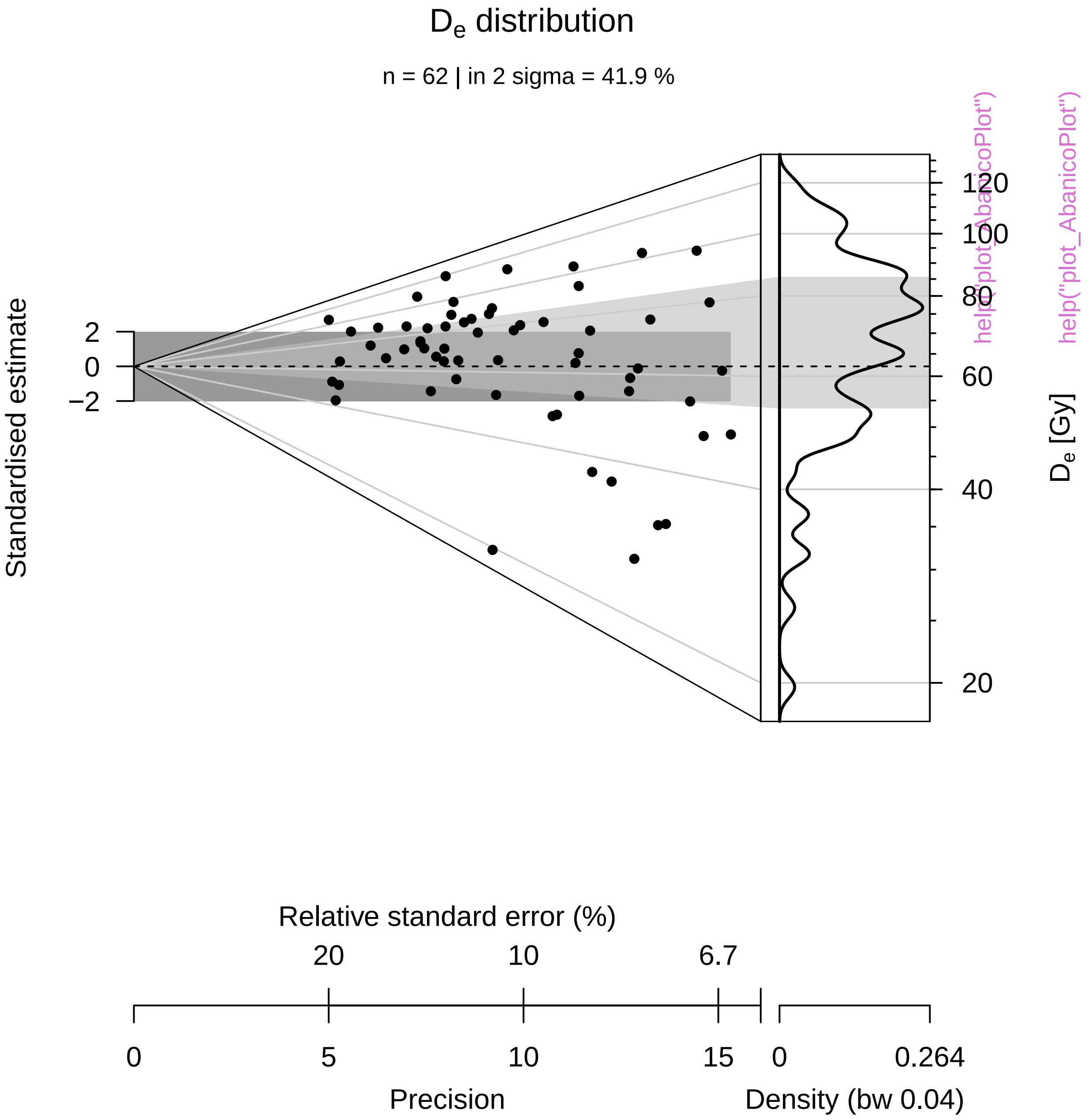

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

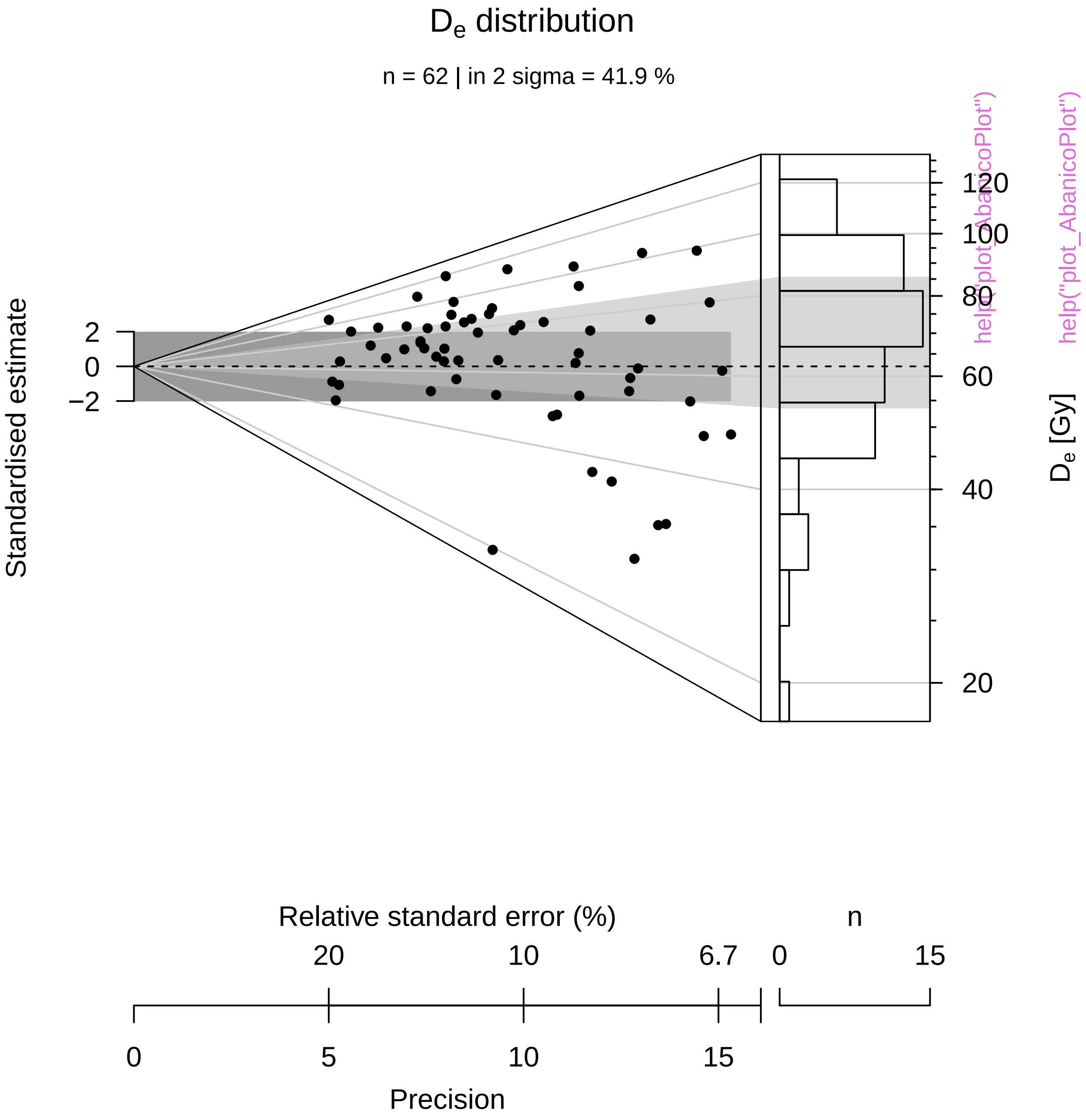

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
-2
200
150
100
50
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

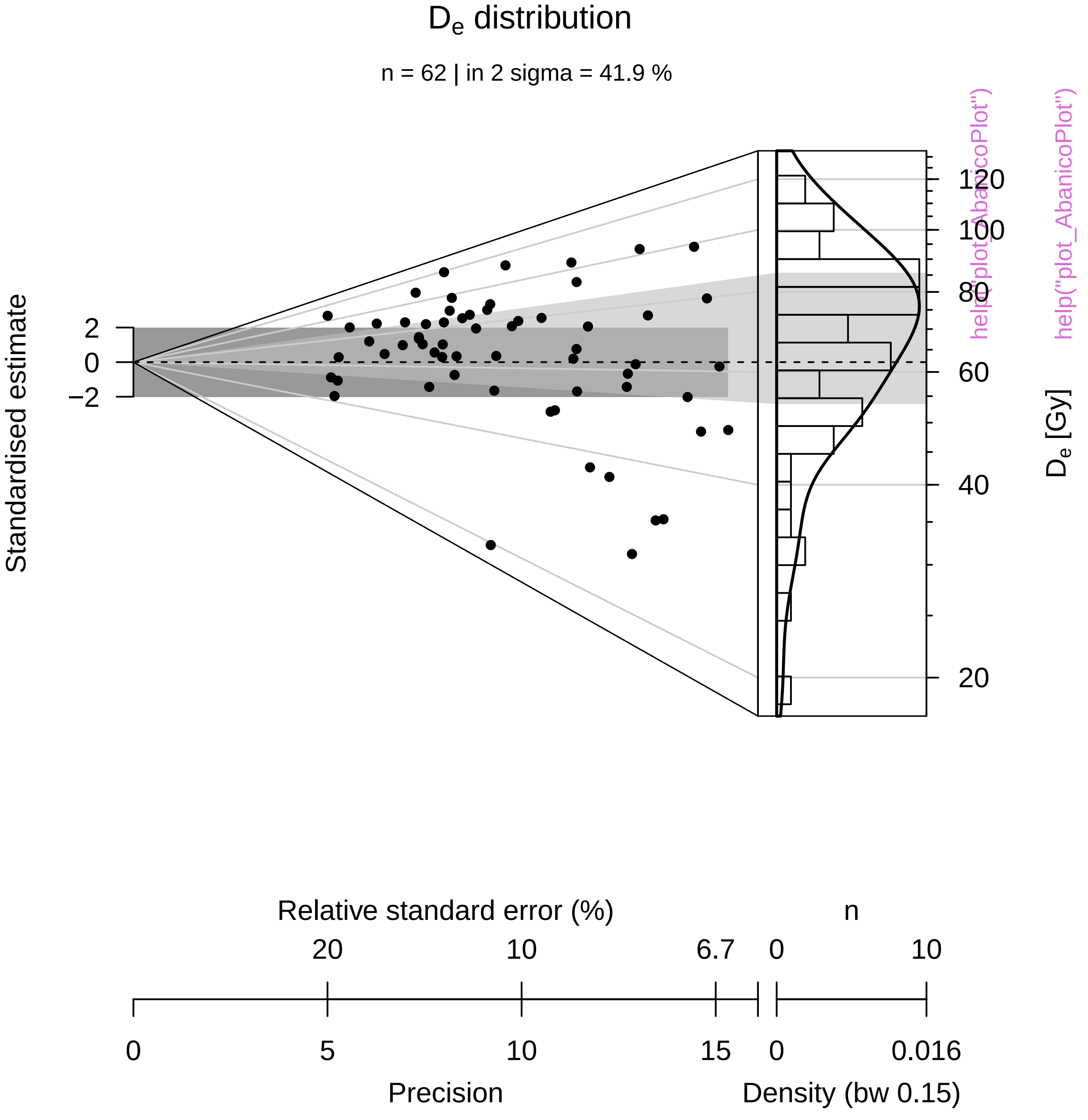

D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
Relative standard error (%)
20
10
6.7
5
0
5
10
15
20
0
0.016
Precision
Density (bw 0.15)

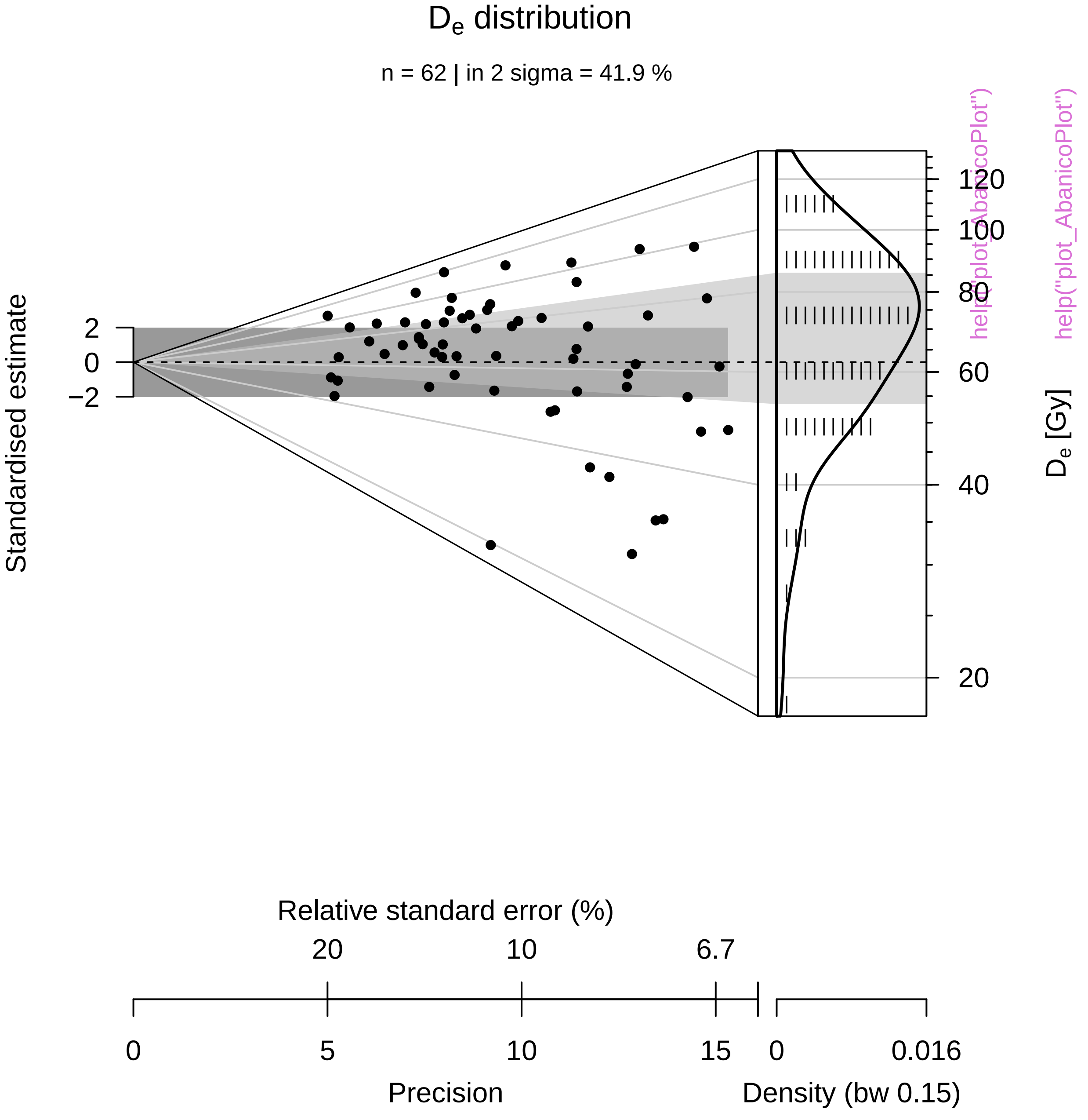


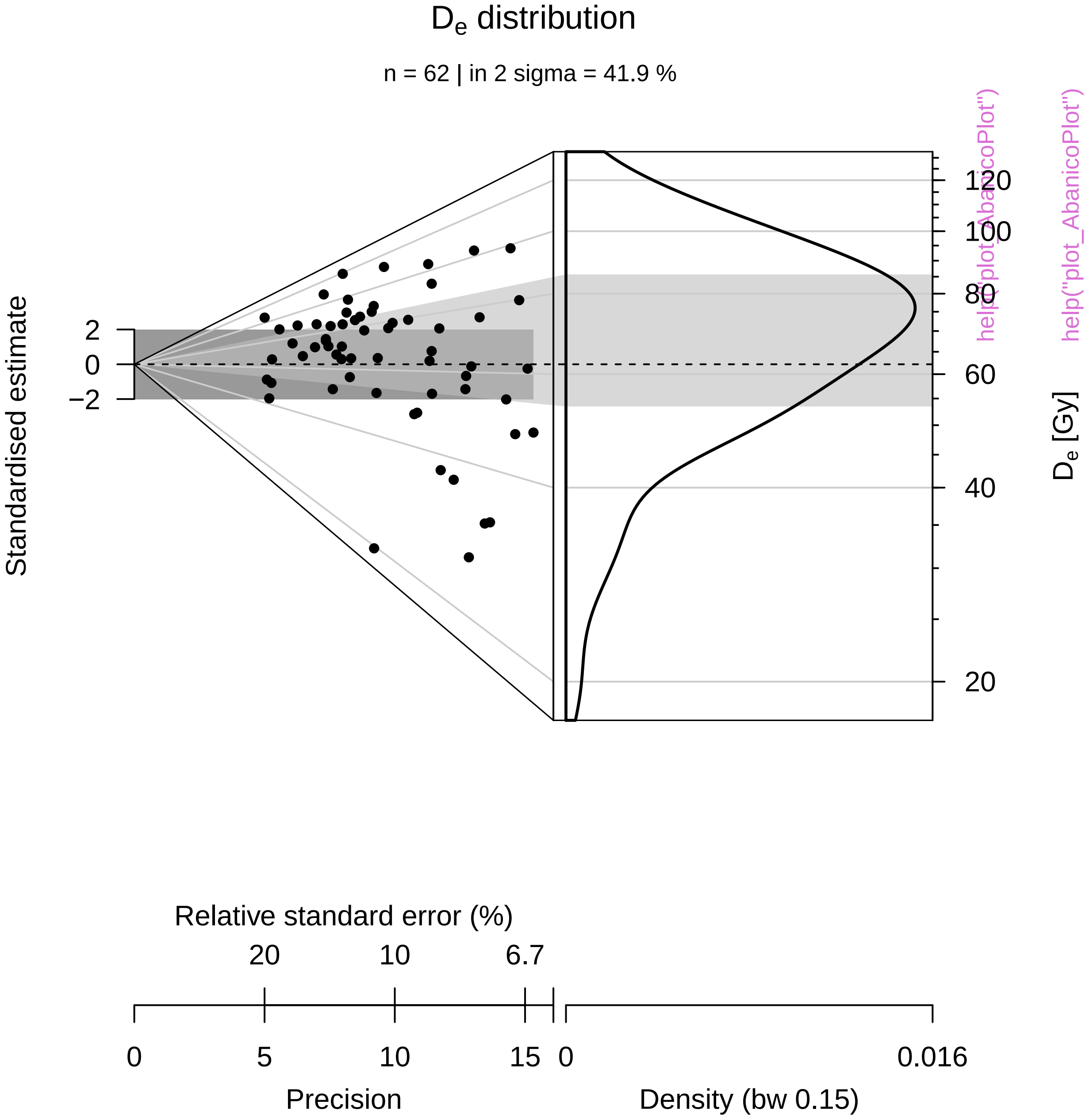
D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

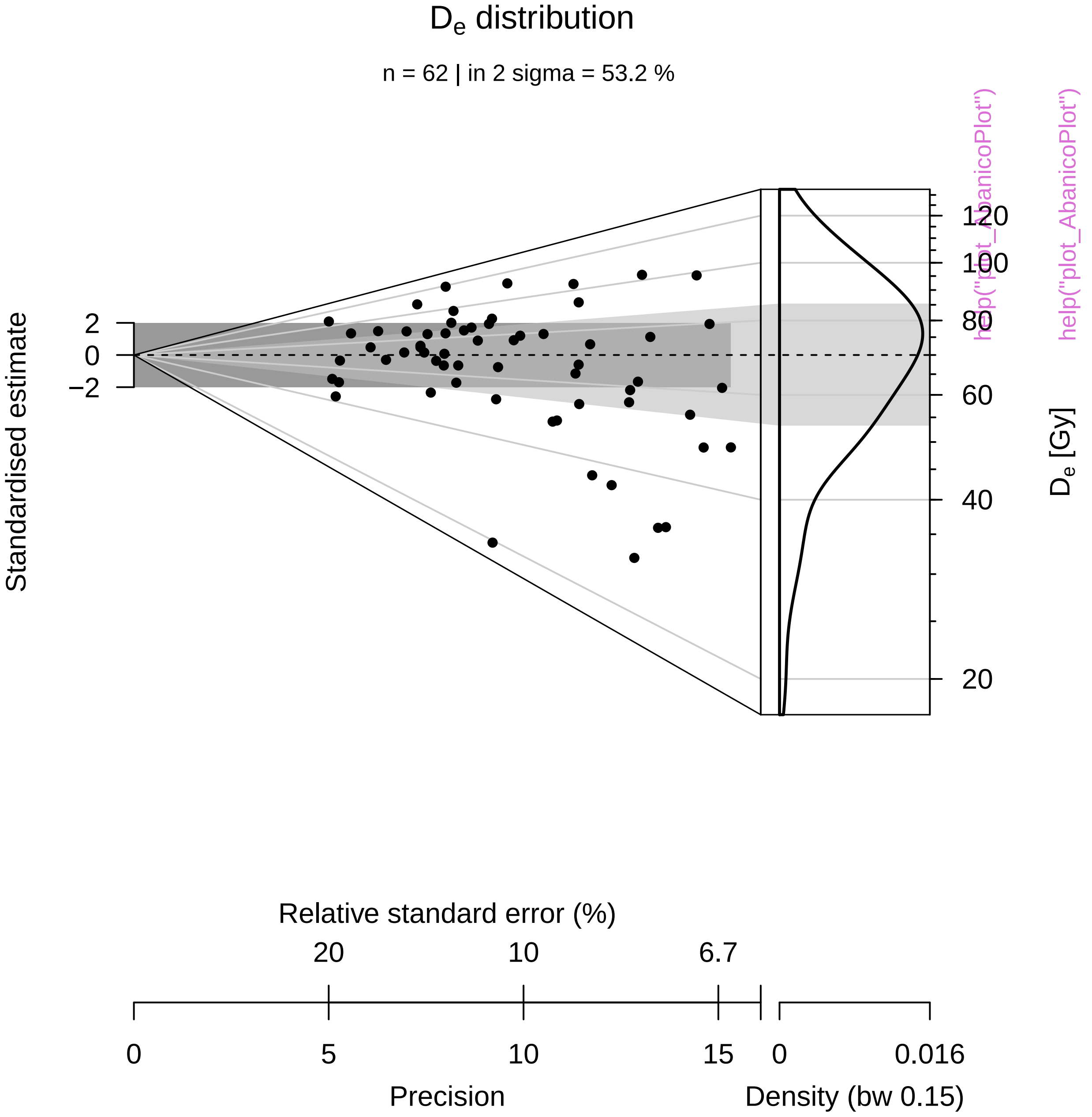

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.264
Density (bw 0.04)

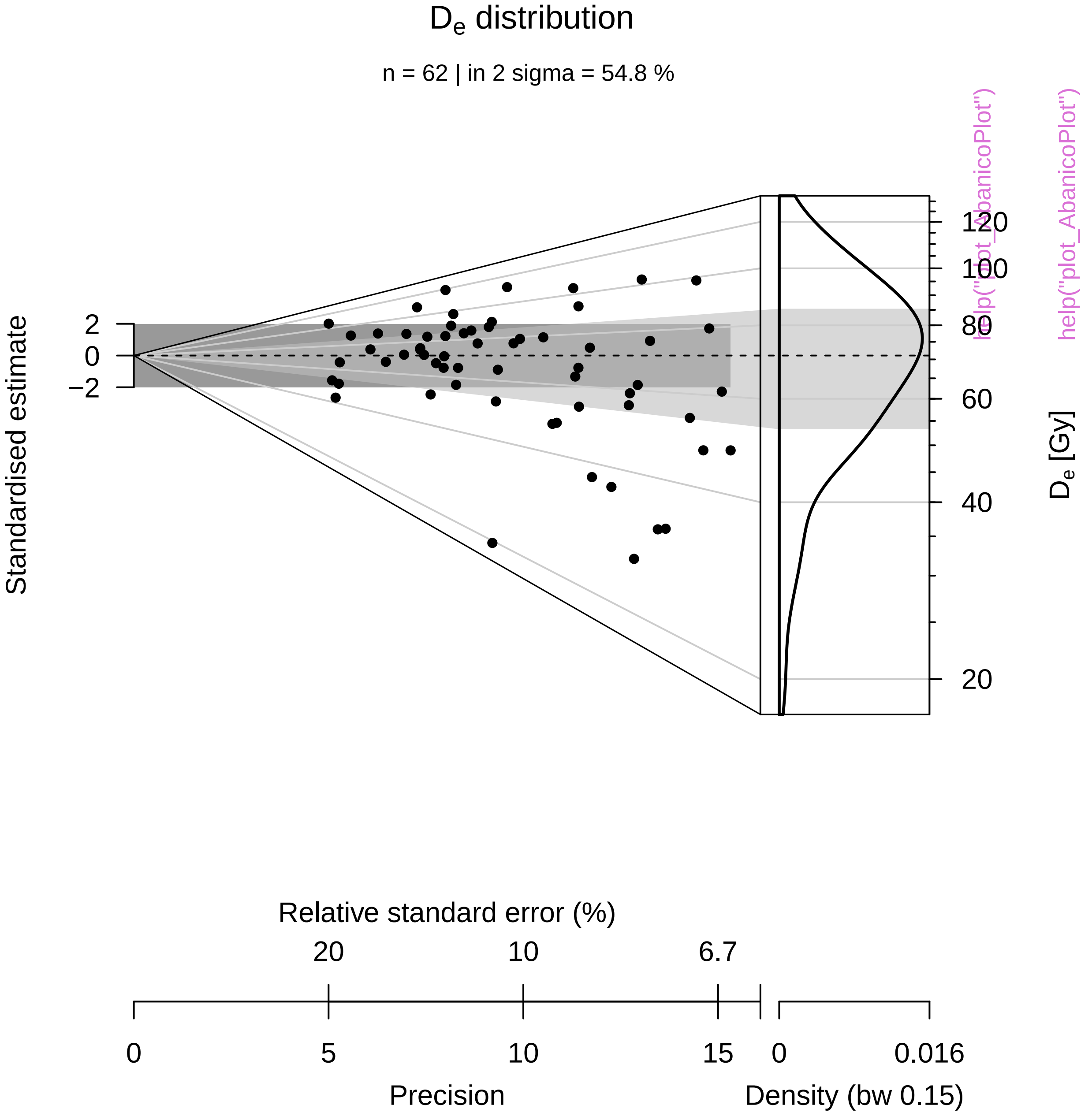
D$_e$ distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
n
0
15
0
5
10
15
Precision


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
10
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

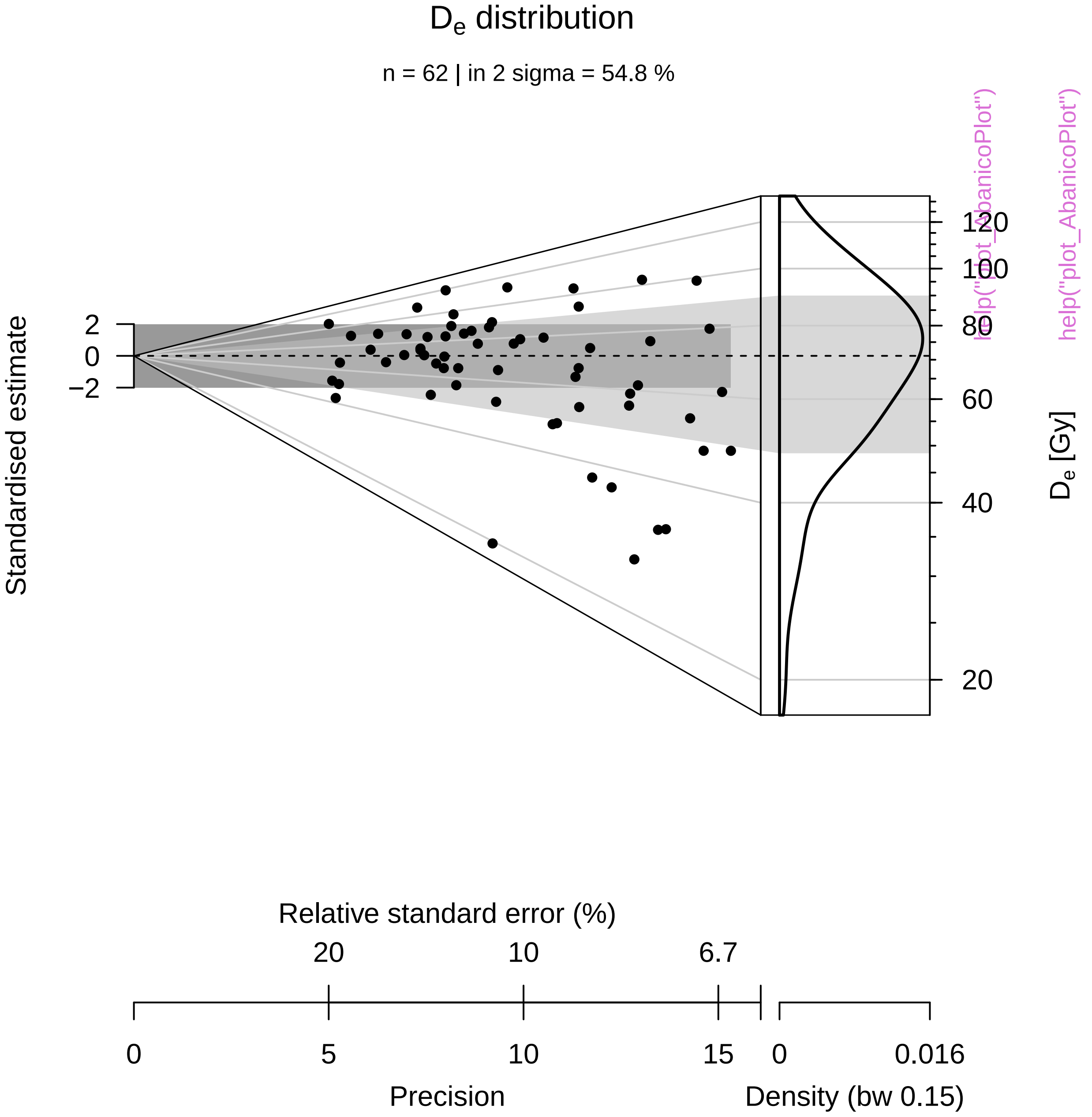

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)


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)

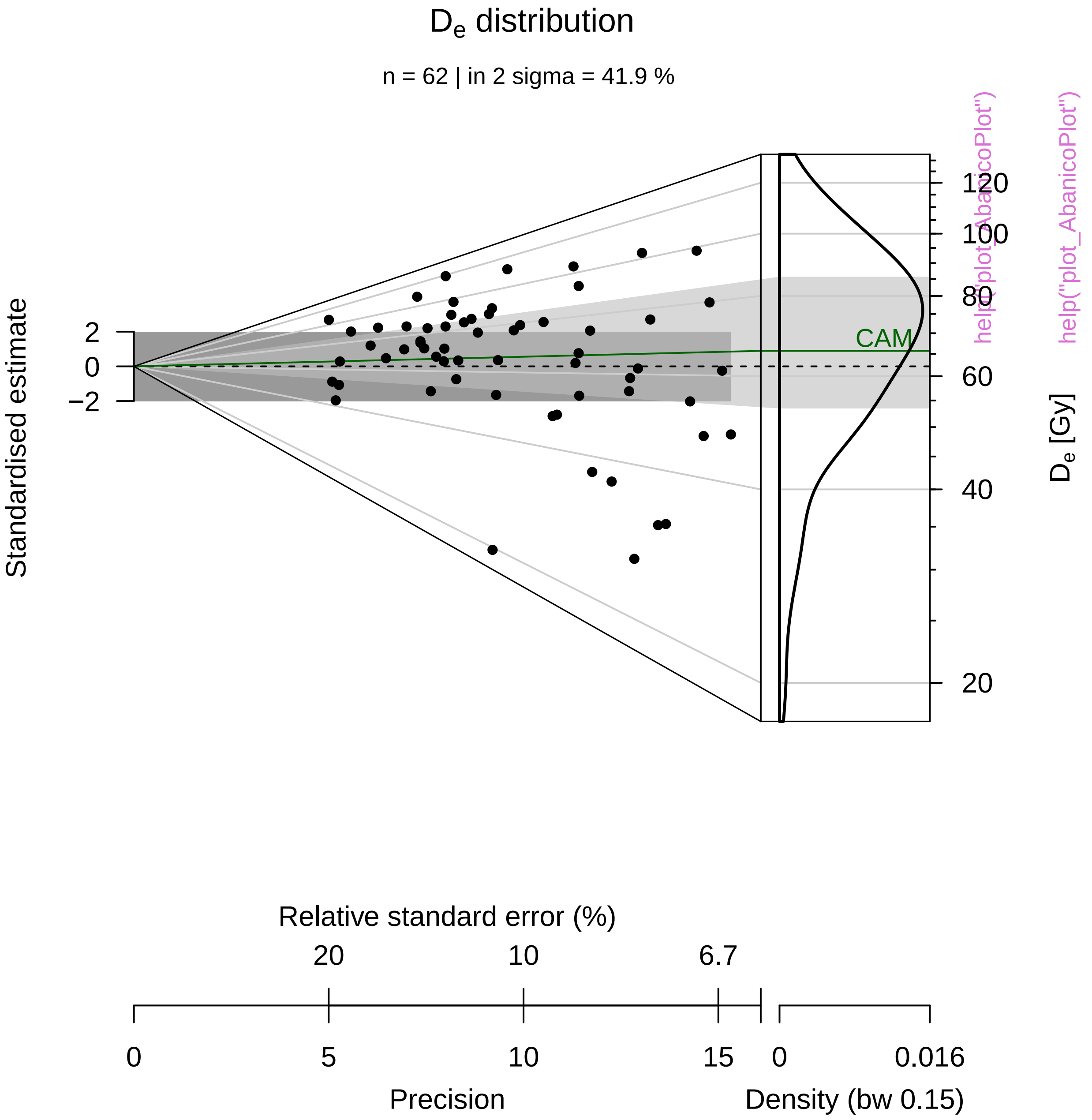

D_e distribution
n = 62 | in 2 sigma = 53.2 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

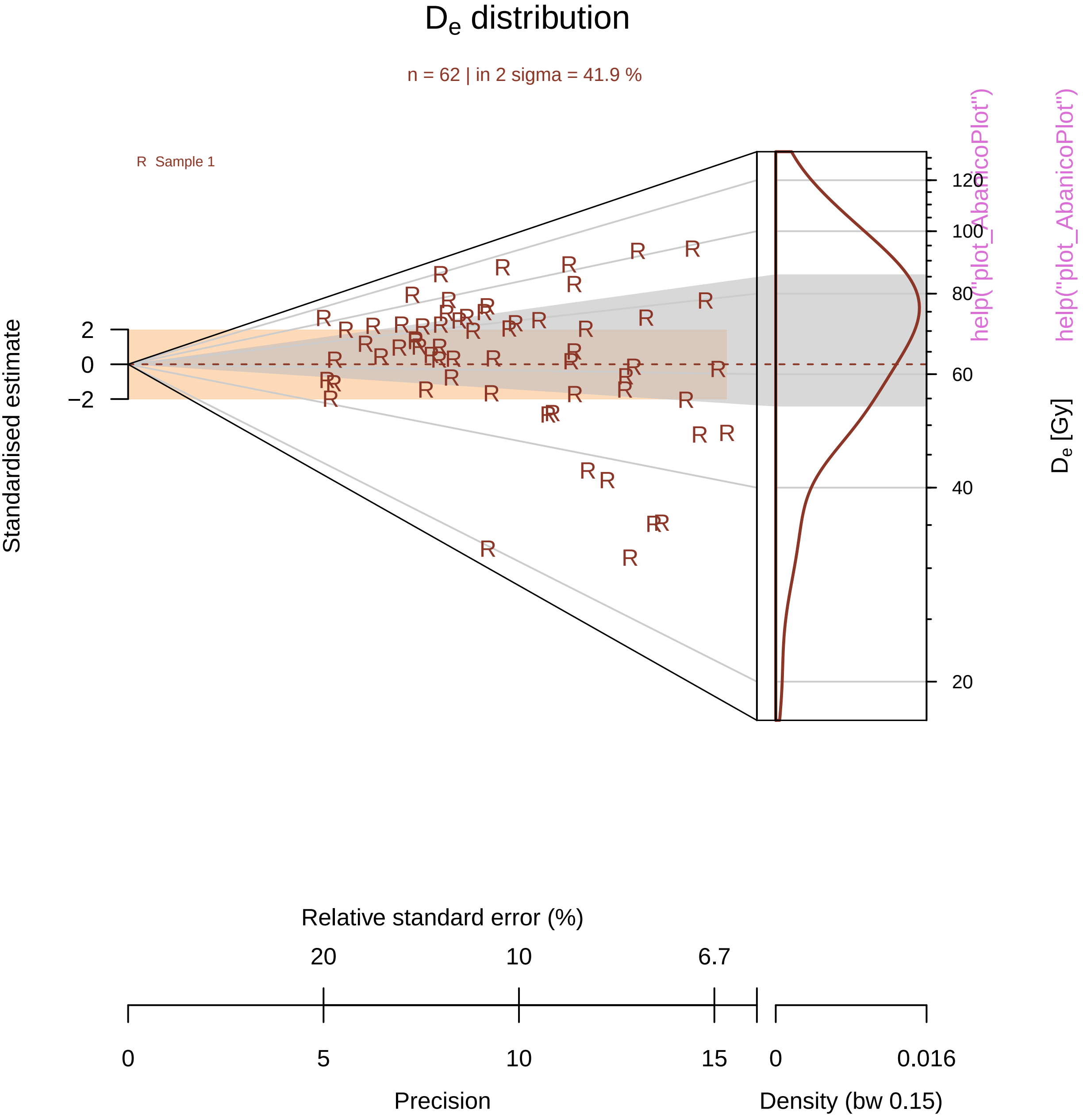


D$_e$ distribution
n = 62 | in 2 sigma = 54.8 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

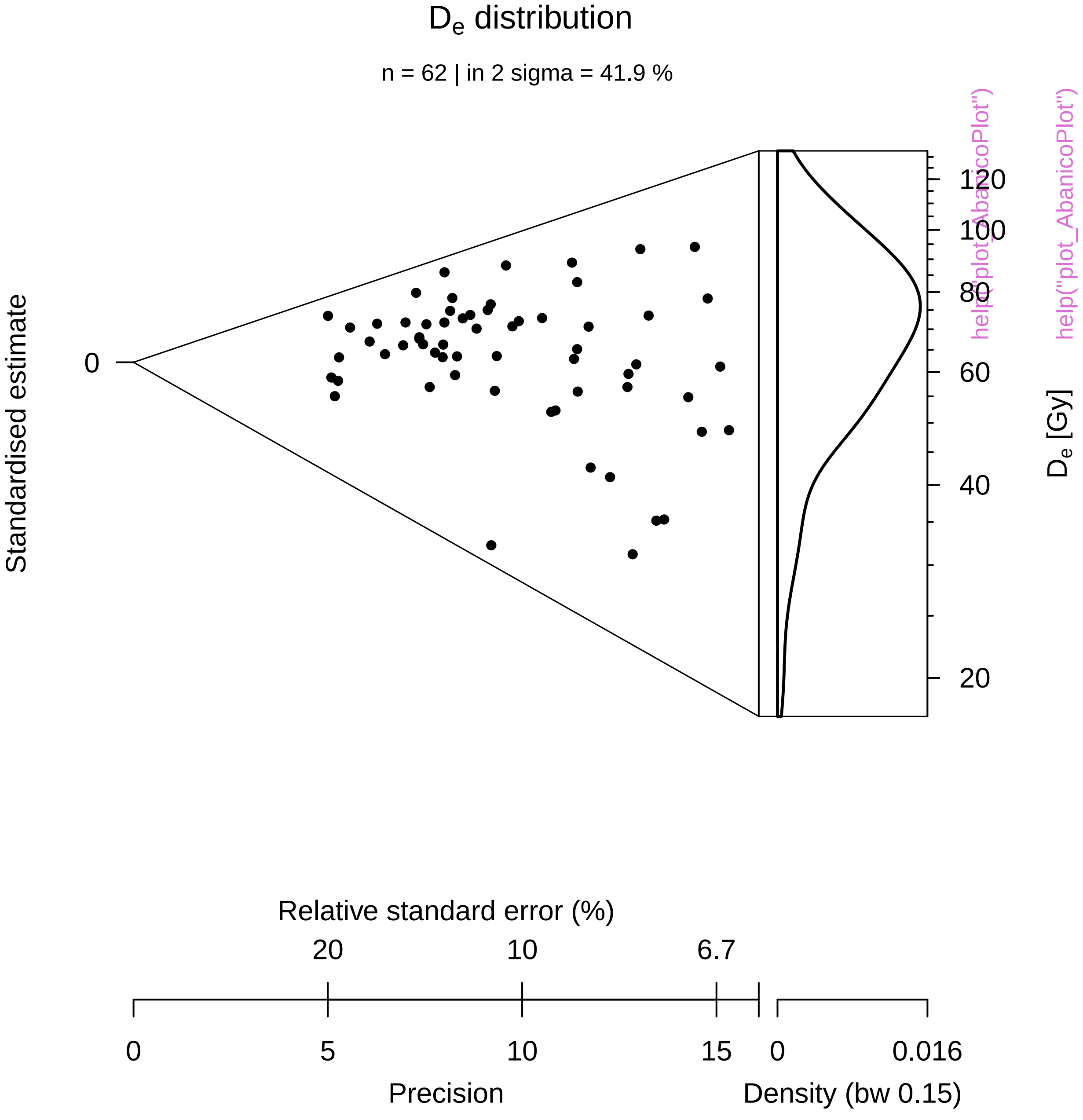


D_e distribution
n = 62 | in 2 sigma = 54.8 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

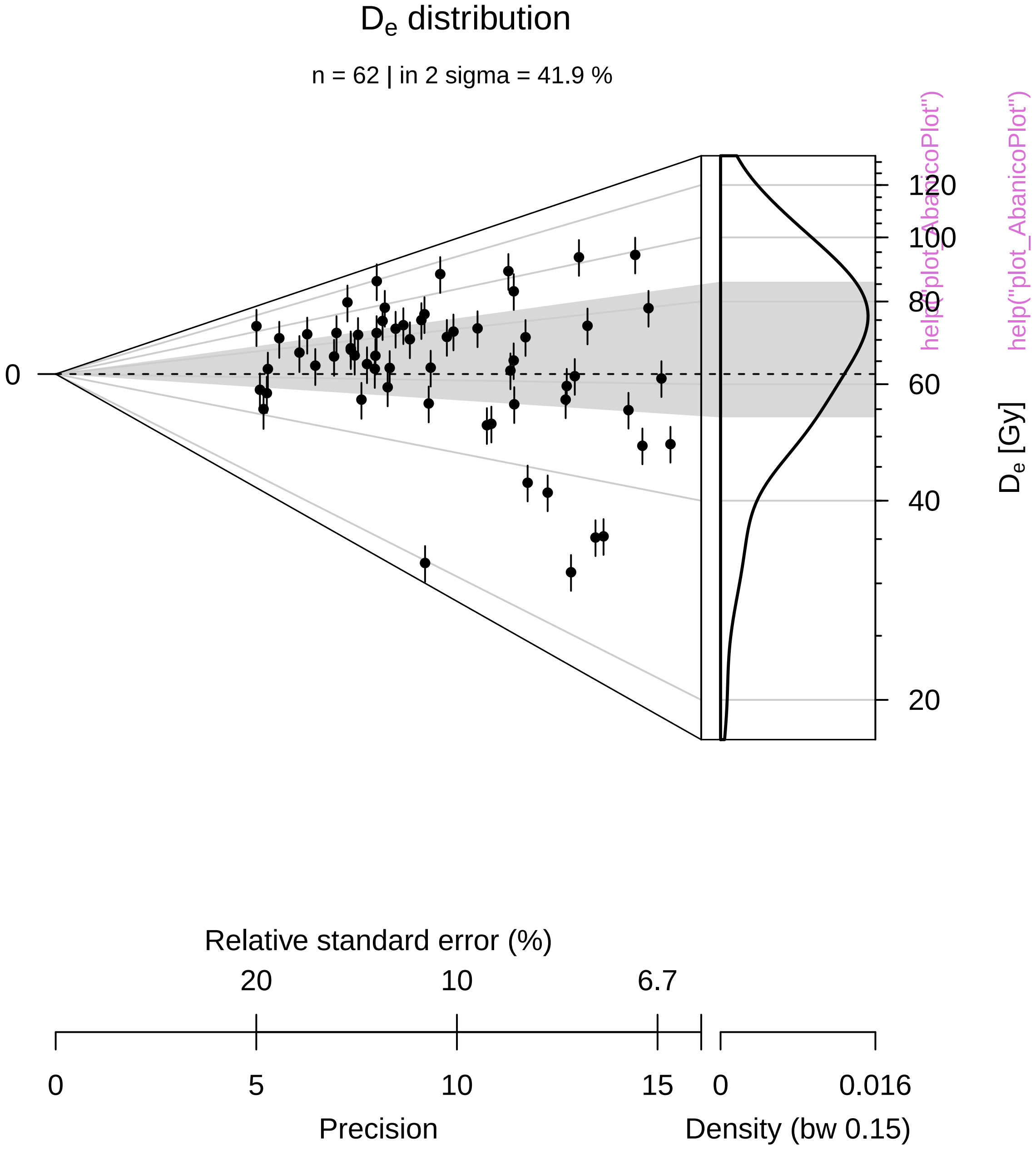

De distribution
n = 62 | in 2 sigma = 41.9 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
0
−2
CAM
120
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

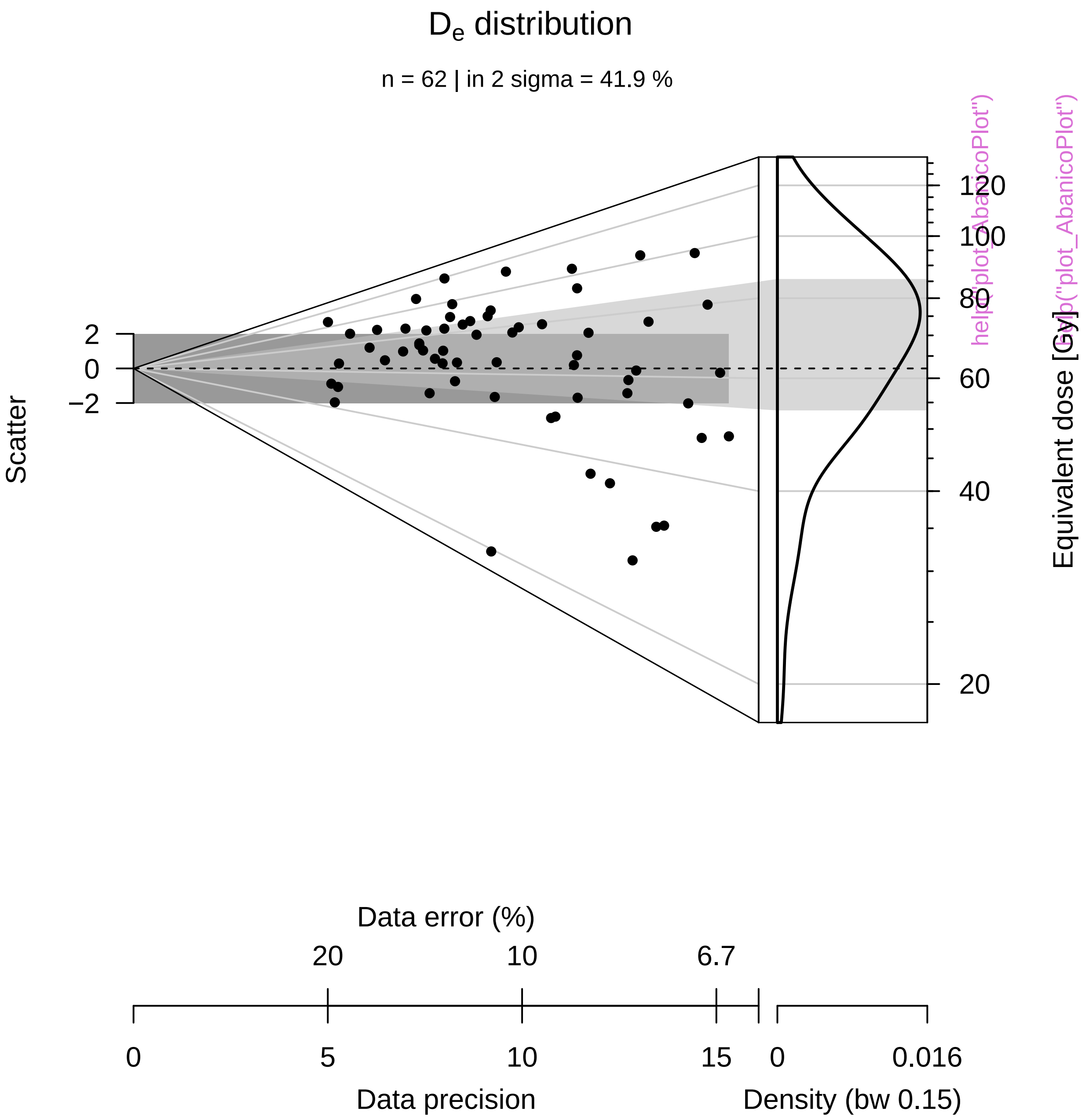


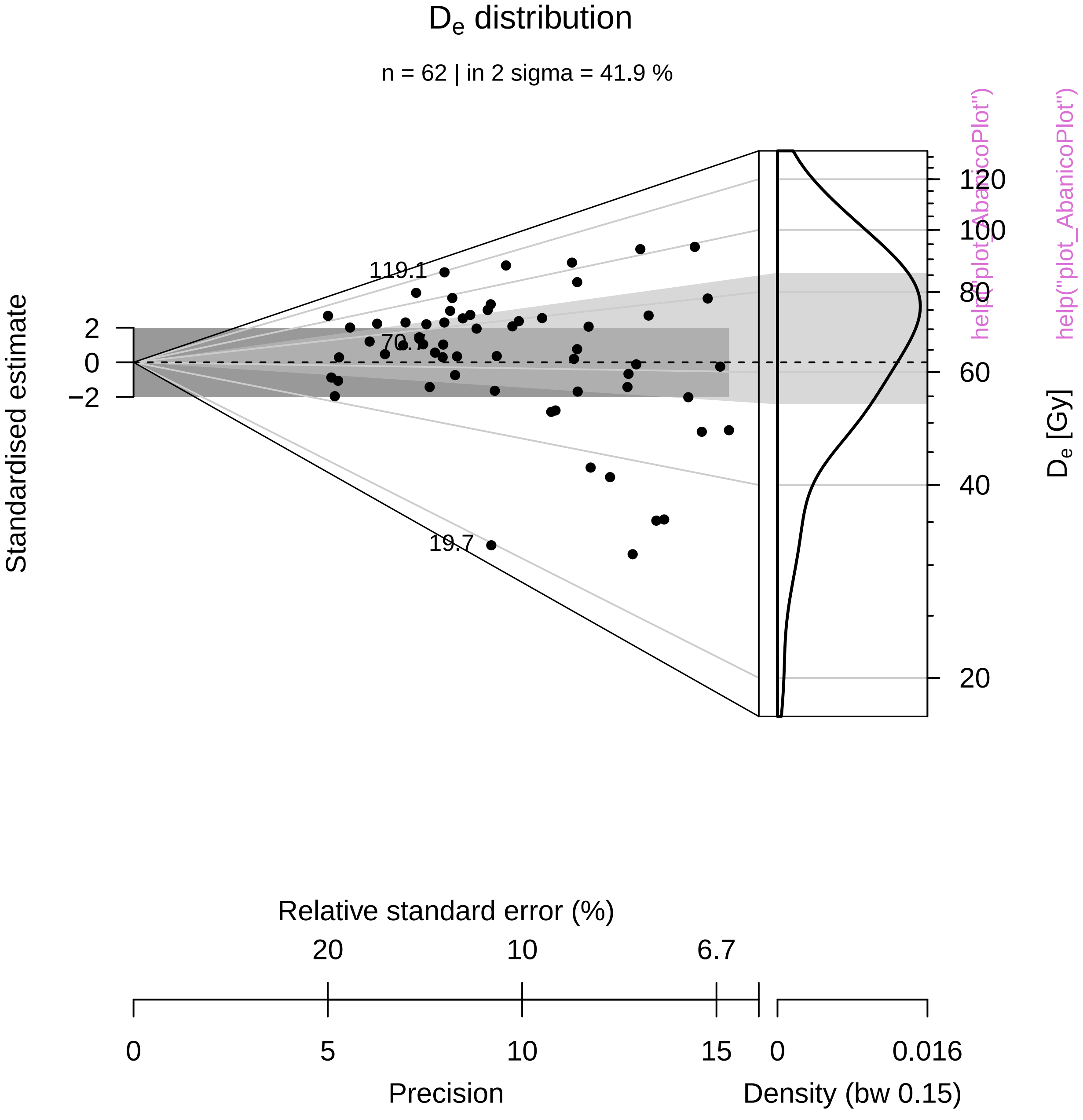
De distribution
n = 62 | in 2 sigma = 41.9 %
R Sample 1
Standardised estimate
2
0
−2
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

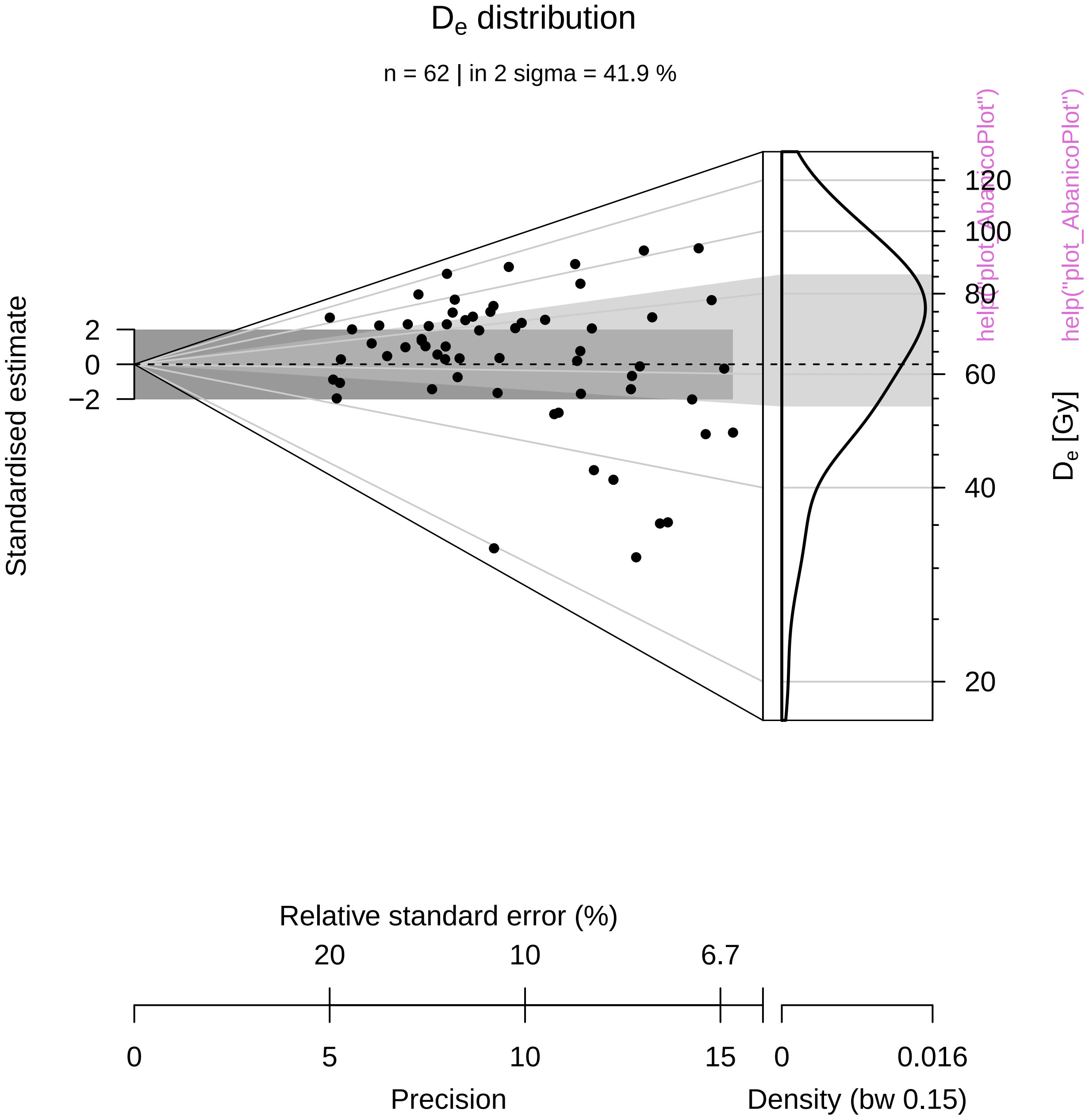


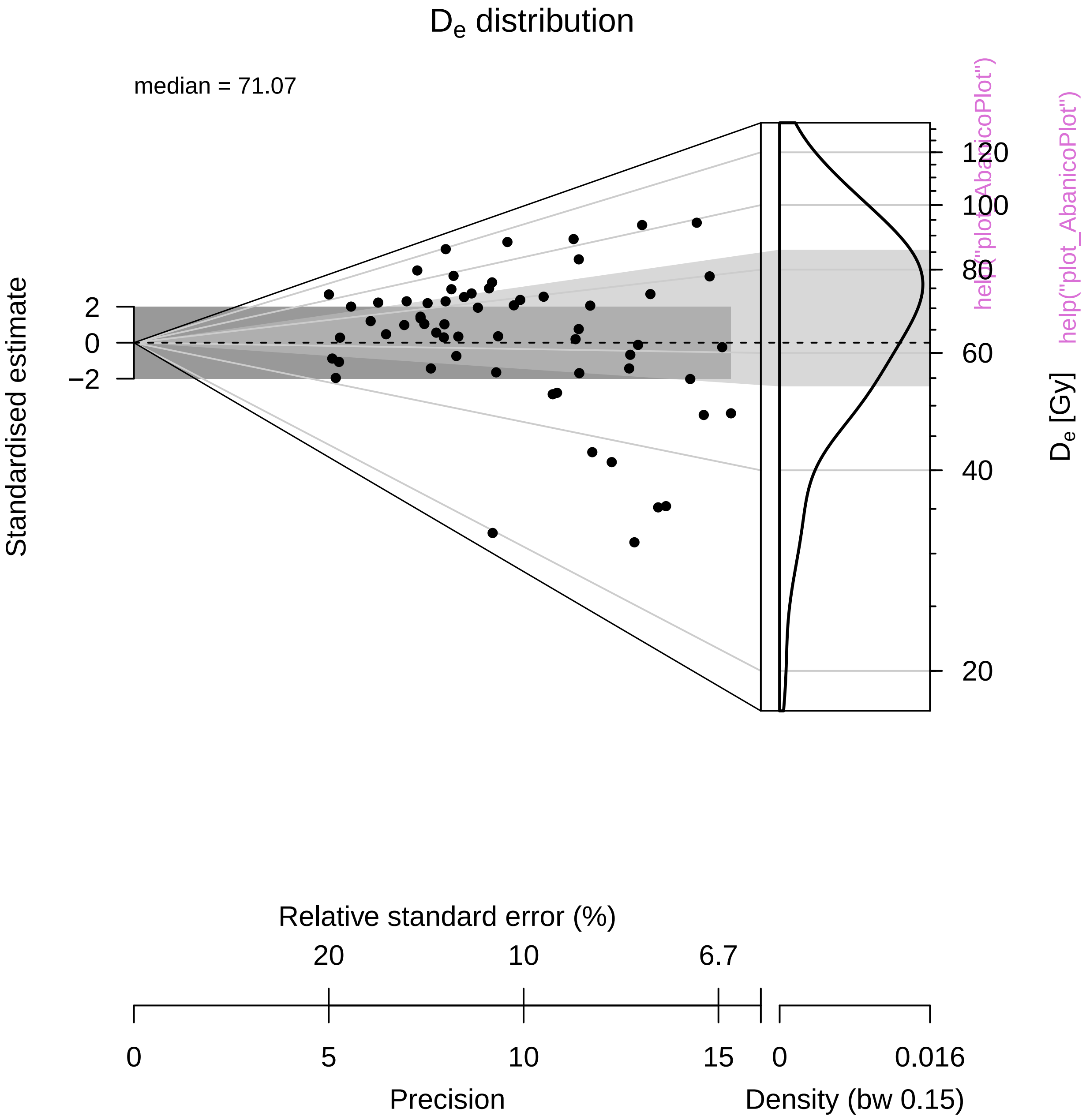
D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
0
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

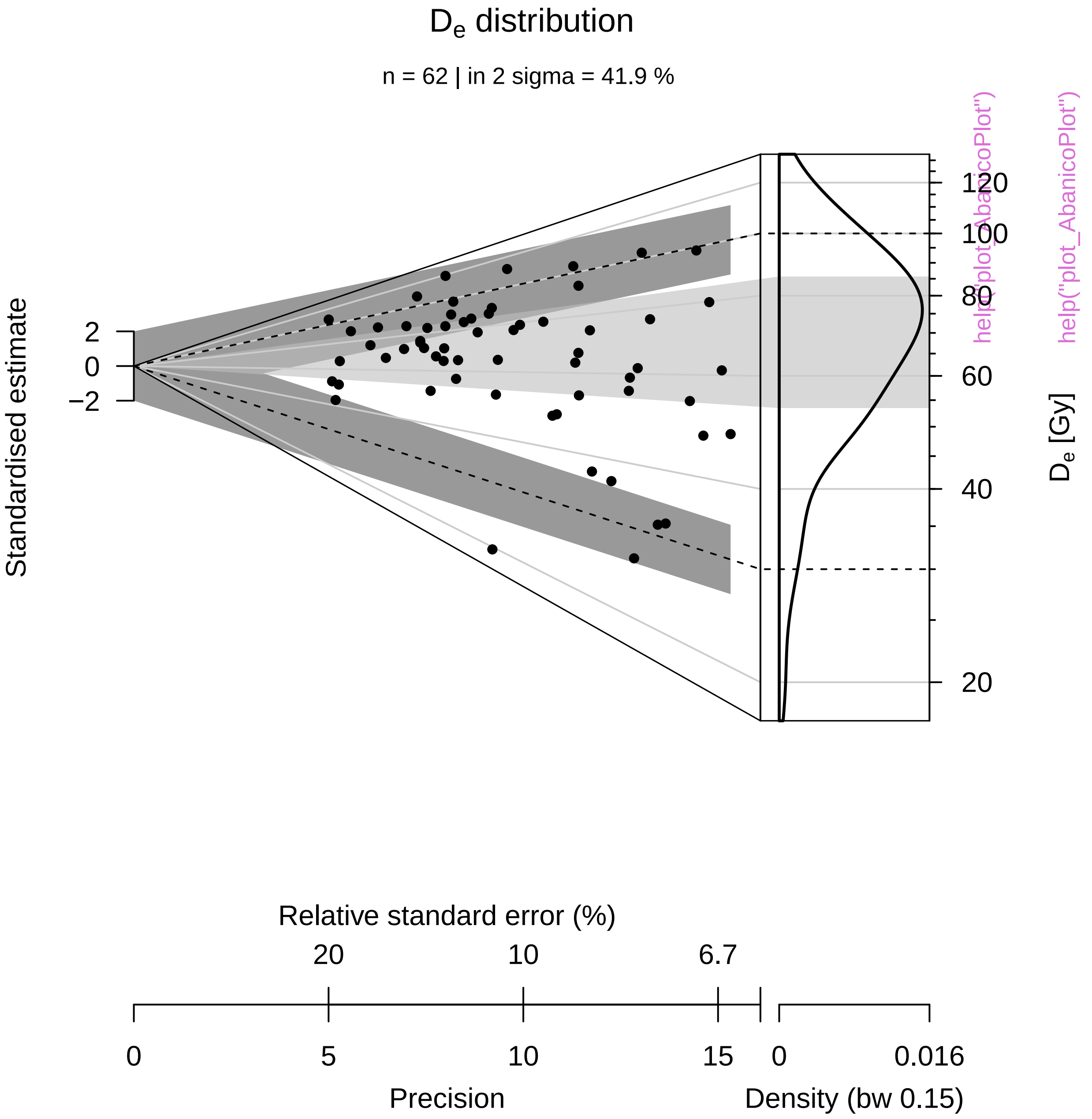

D_e distribution
n = 62 | in 2 sigma = 41.9 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
0
120
100
80
60
40
20
D_e [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

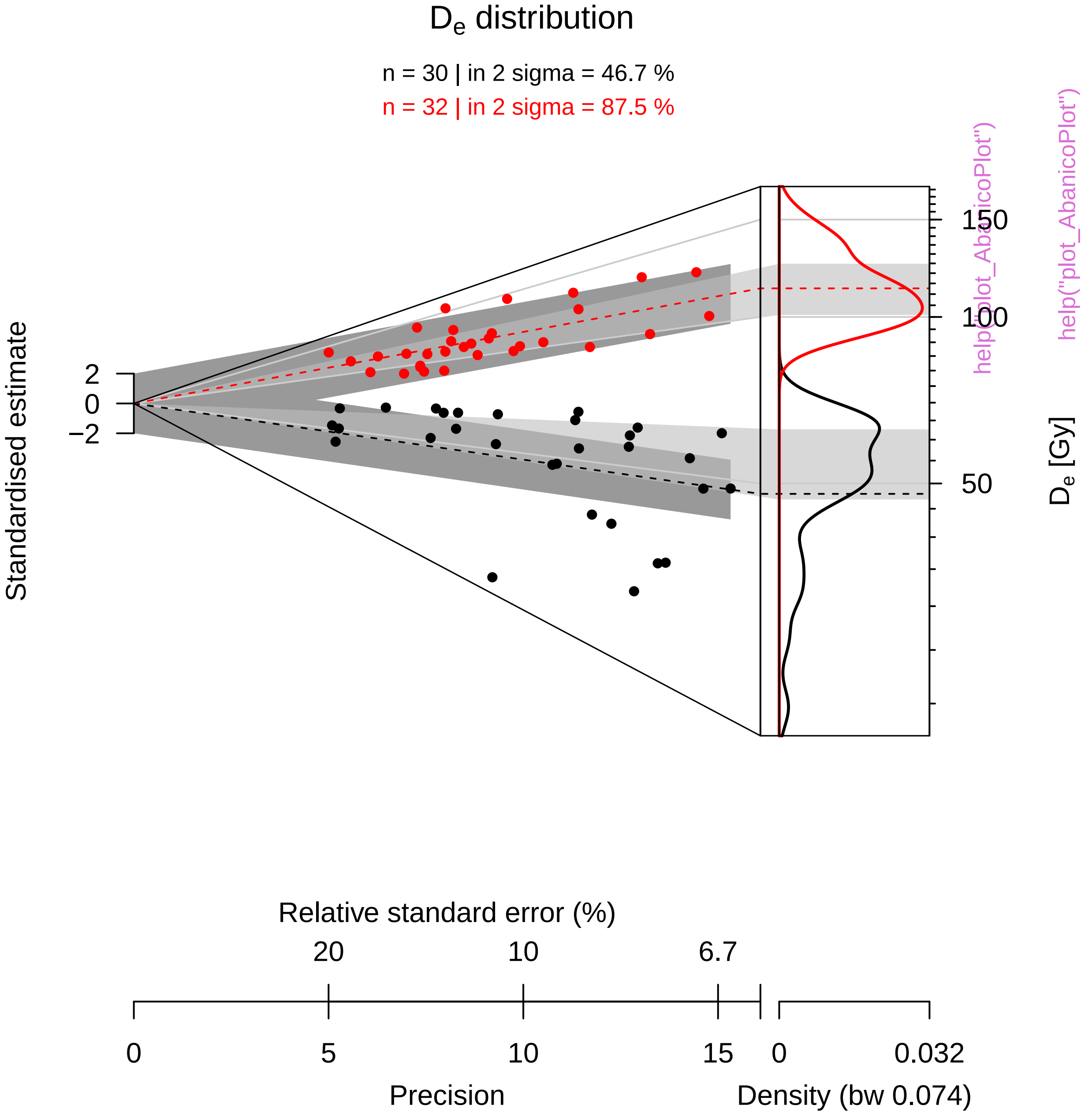

De distribution
n = 62 | in 2 sigma = 41.9 %
Scatter
2
0
−2
120
100
80
60
40
20
Equivalent dose [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Data error (%)
20
10
6.7
0
5
10
15
Data precision
0
0.016
Density (bw 0.15)

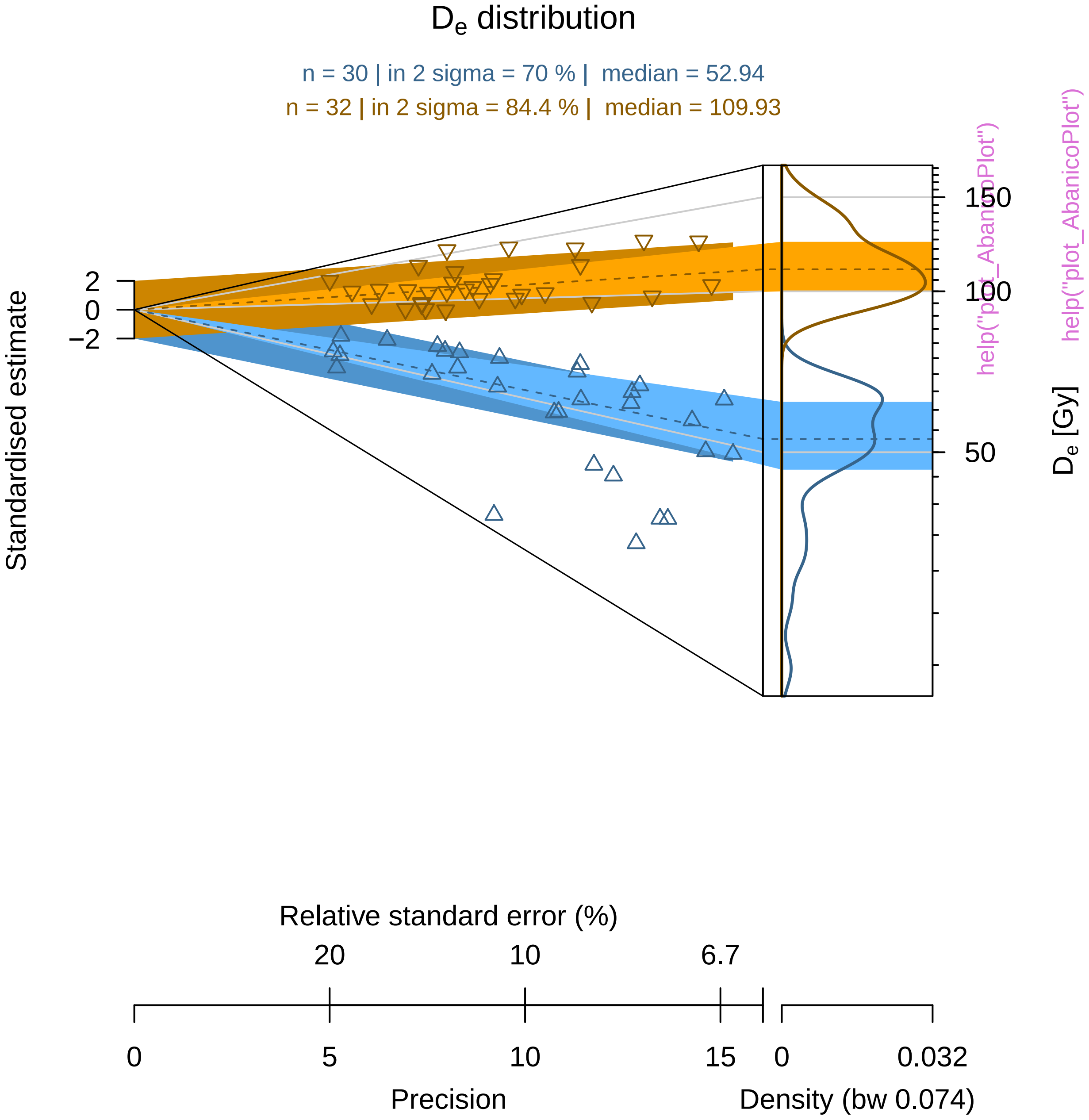

Dₑ distribution
n = 62 | in 2 sigma = 41.9 %
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Standardised estimate
2
0
−2
119.1
70.7
19.7
120
100
80
60
40
20
Dₑ [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

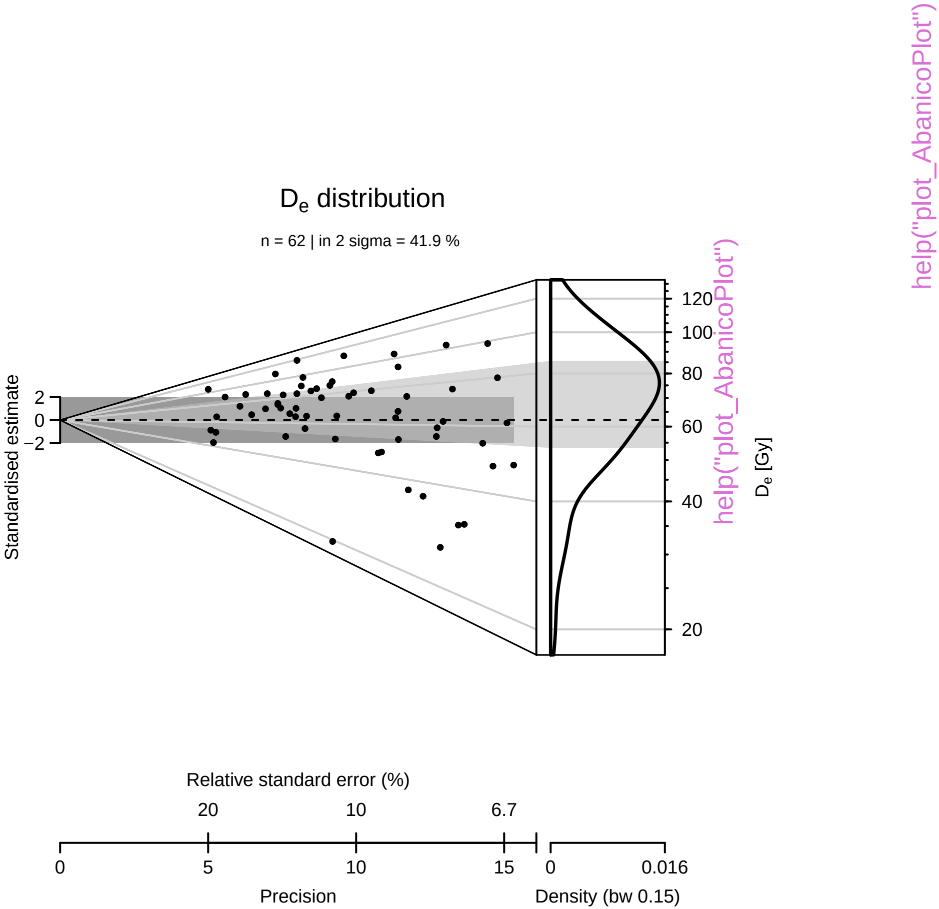

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

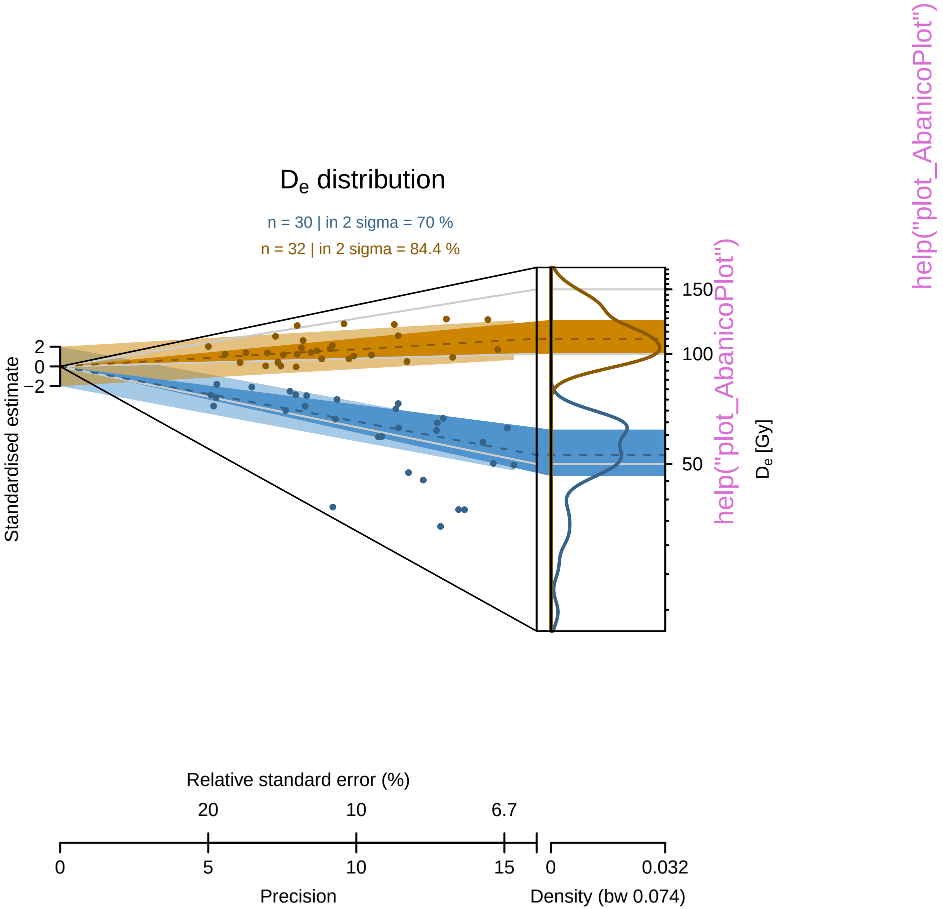

De distribution
median = 71.07
Standardised estimate
2
0
−2
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
120
100
80
60
40
20
De [Gy]
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.016
Precision
Density (bw 0.15)

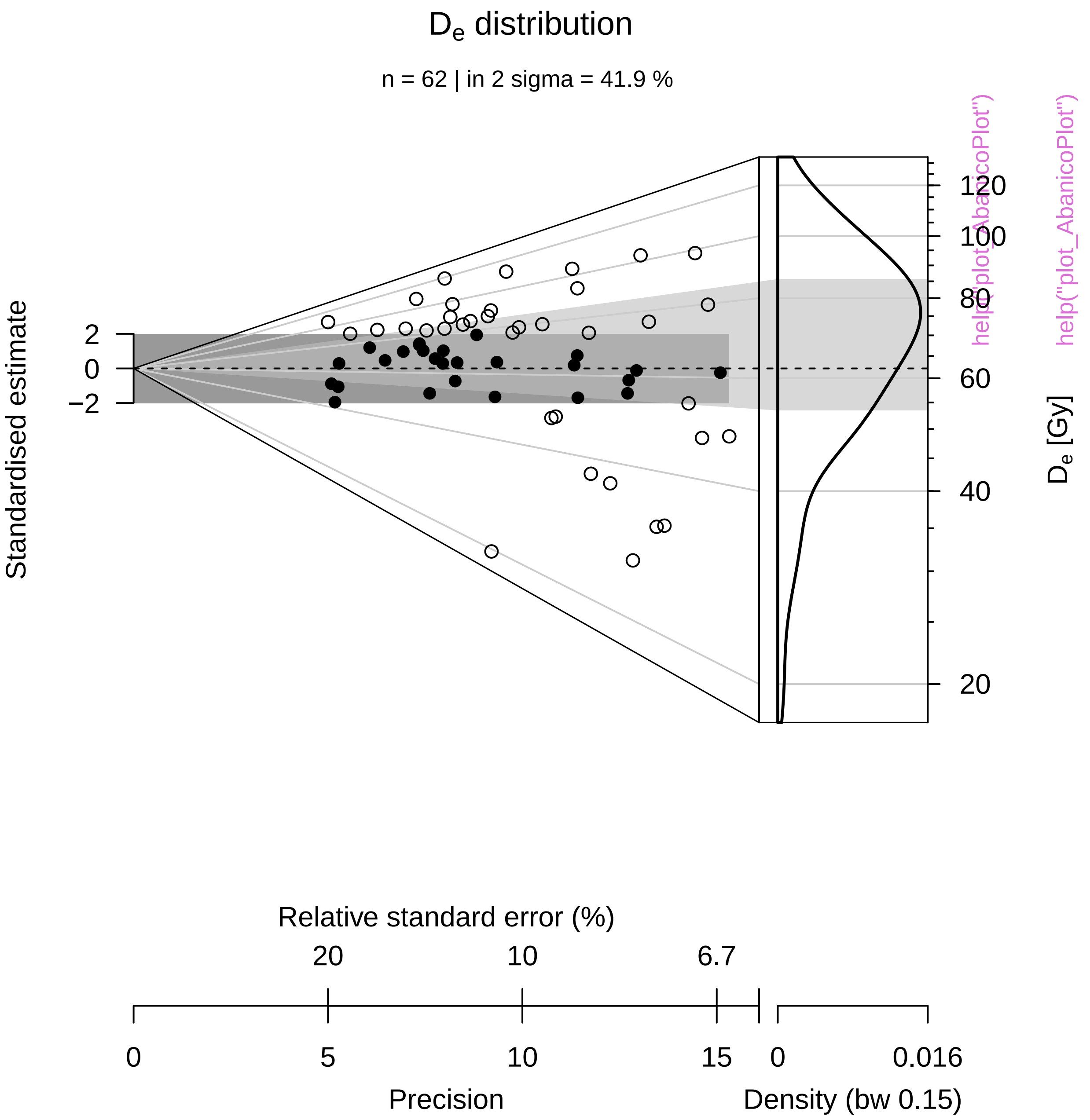

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

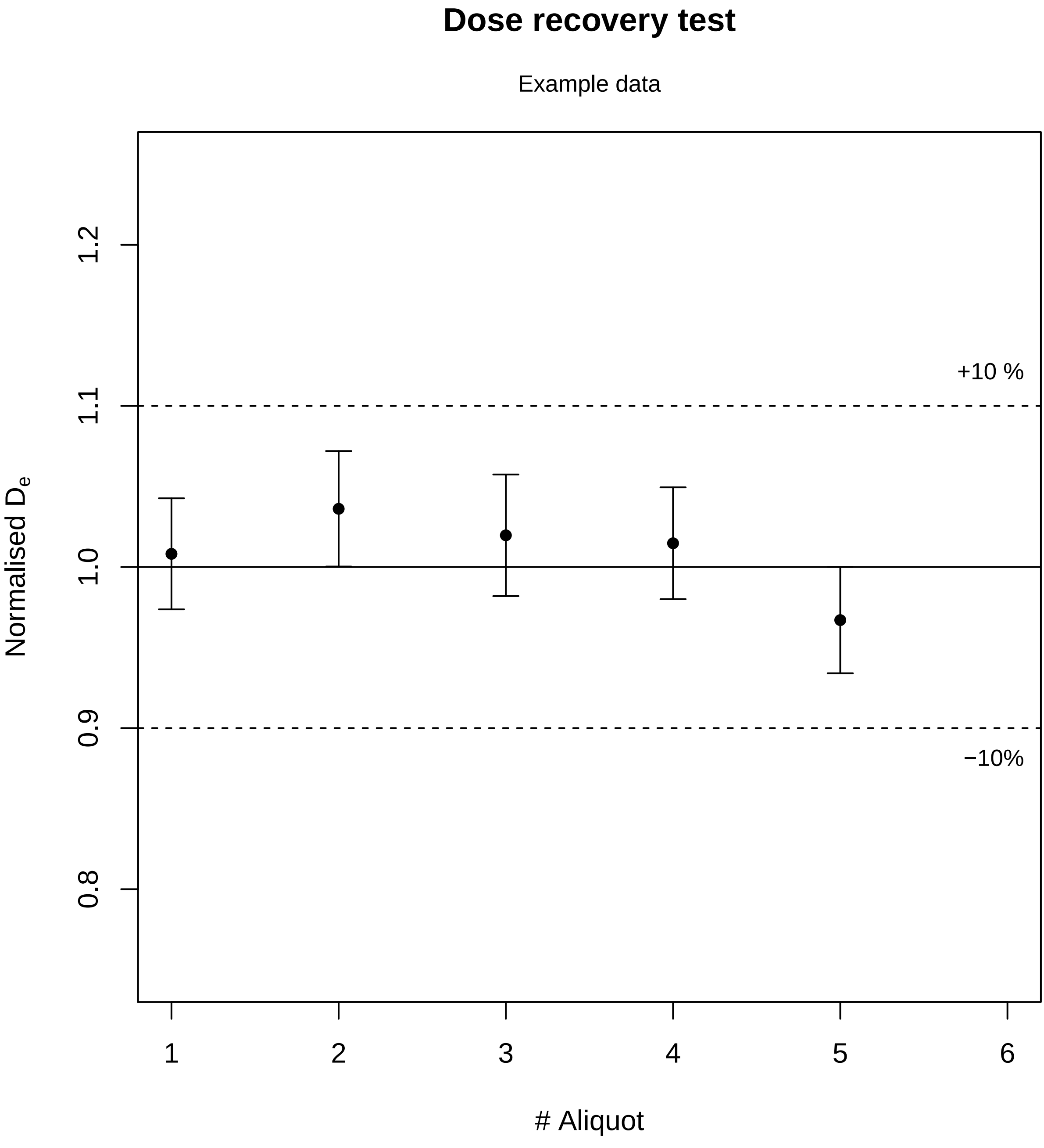

D_e distribution
n = 30 | in 2 sigma = 46.7 %
n = 32 | in 2 sigma = 87.5 %
Standardised estimate
2
0
−2
150
100
50
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.032
Density (bw 0.074)

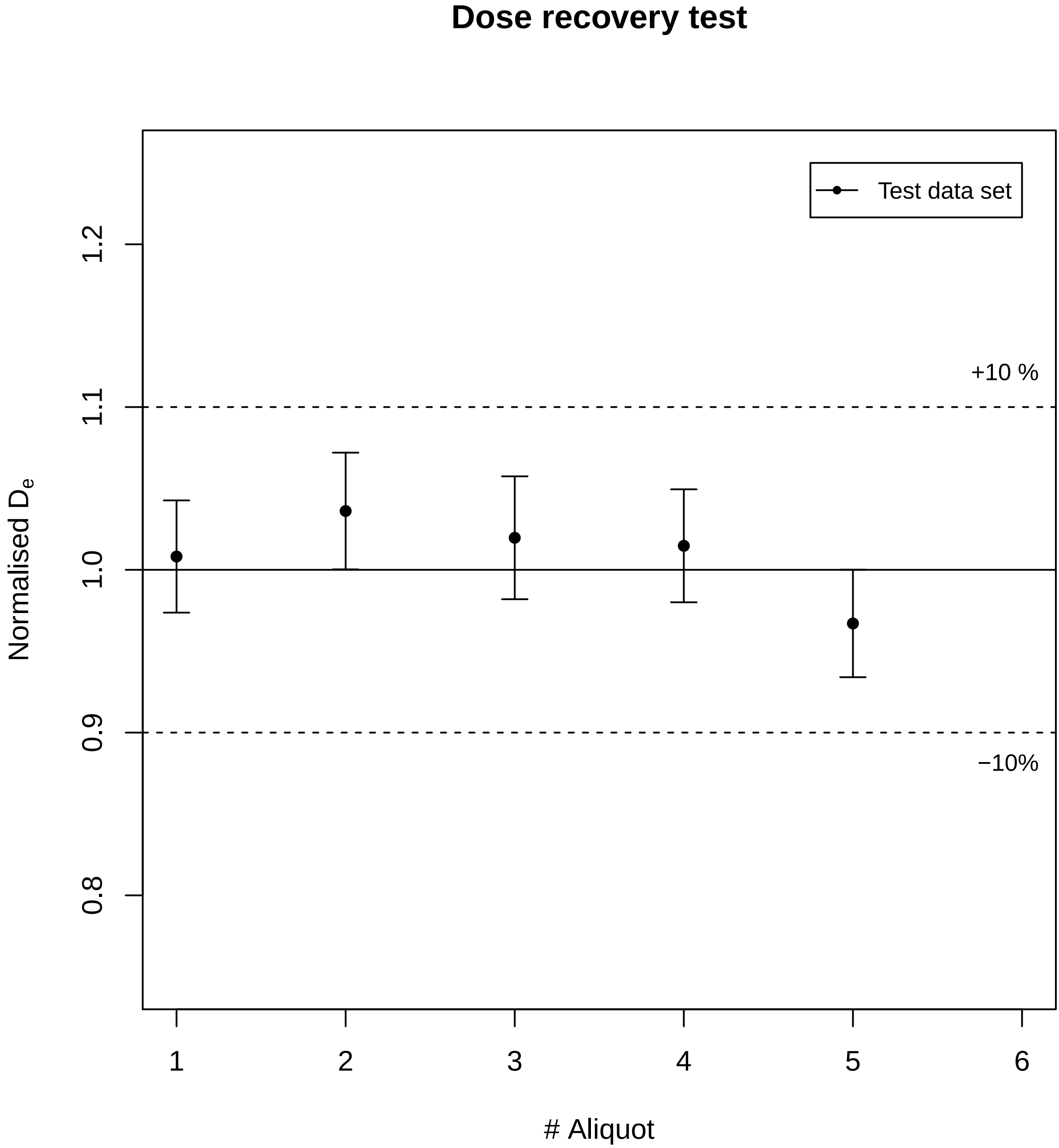

D$_e$ distribution
n = 30 | in 2 sigma = 70 % | median = 52.94
n = 32 | in 2 sigma = 84.4 % | median = 109.93
Standardised estimate
2
0
−2
150
100
50
D$_e$ [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.032
Density (bw 0.074)

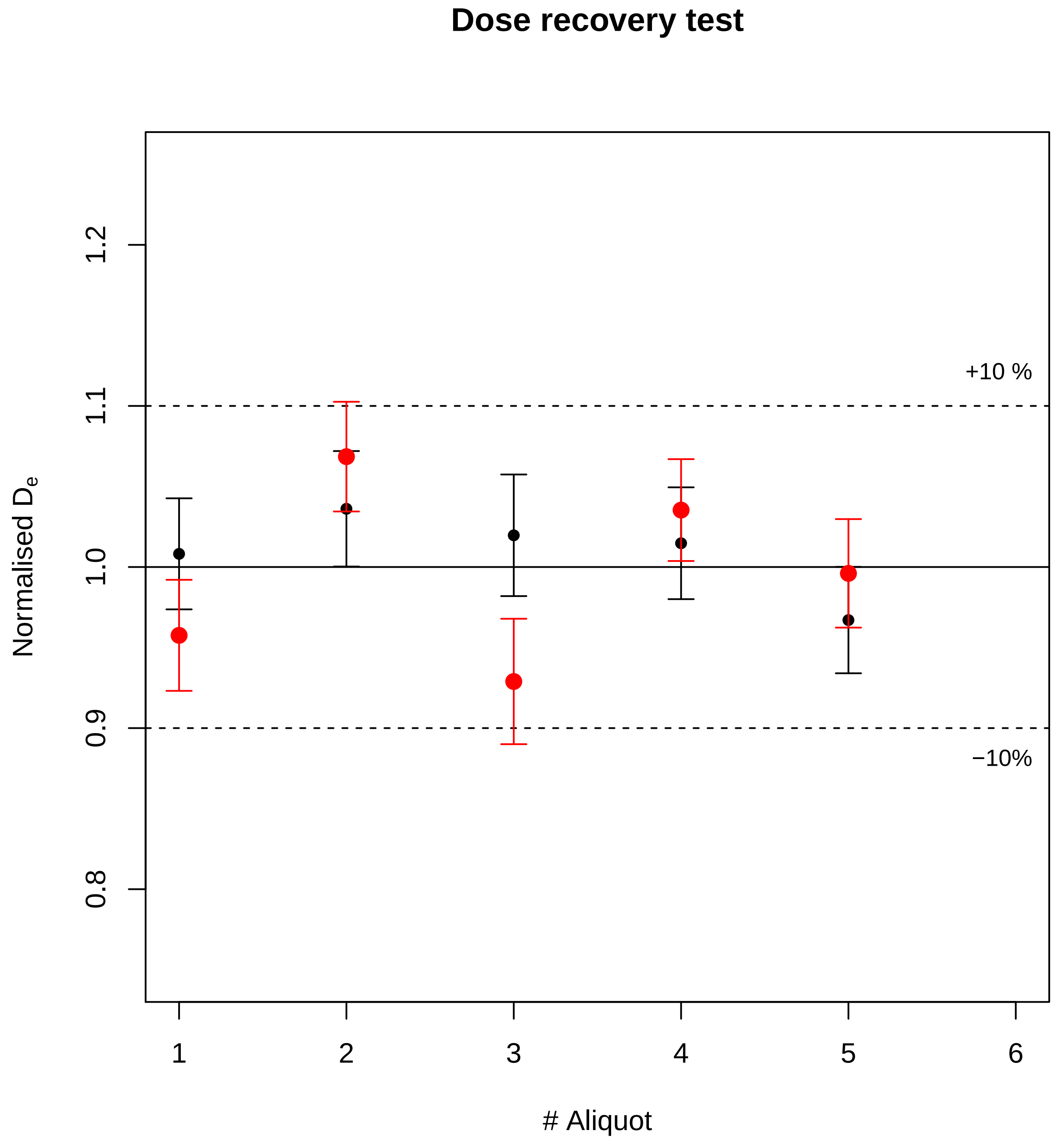

D_e distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

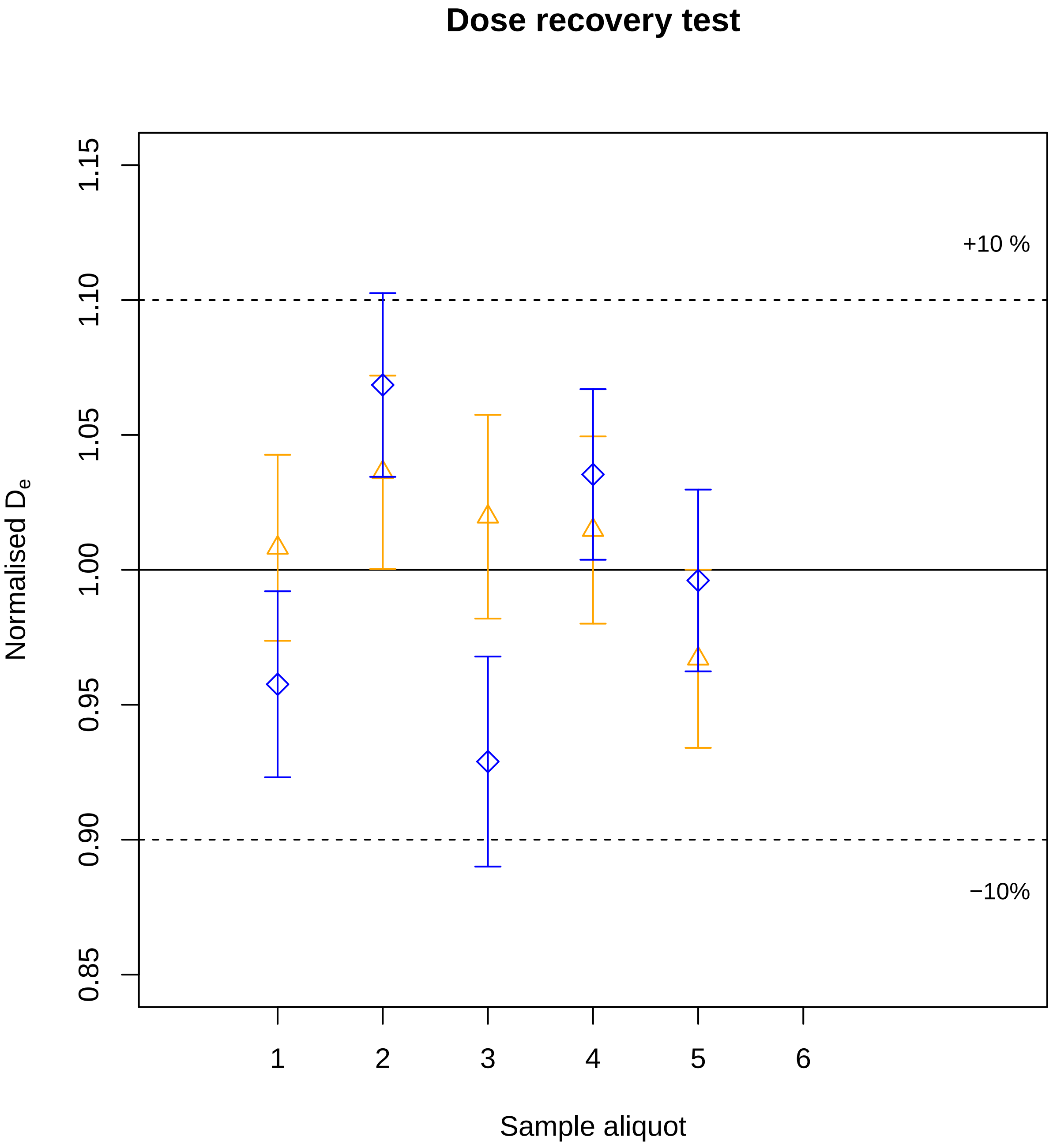

D_e distribution
n = 30 | in 2 sigma = 70 %
n = 32 | in 2 sigma = 84.4 %
Standardised estimate
2
0
−2
150
100
50
D_e [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
0
0.032
Precision
Density (bw 0.074)

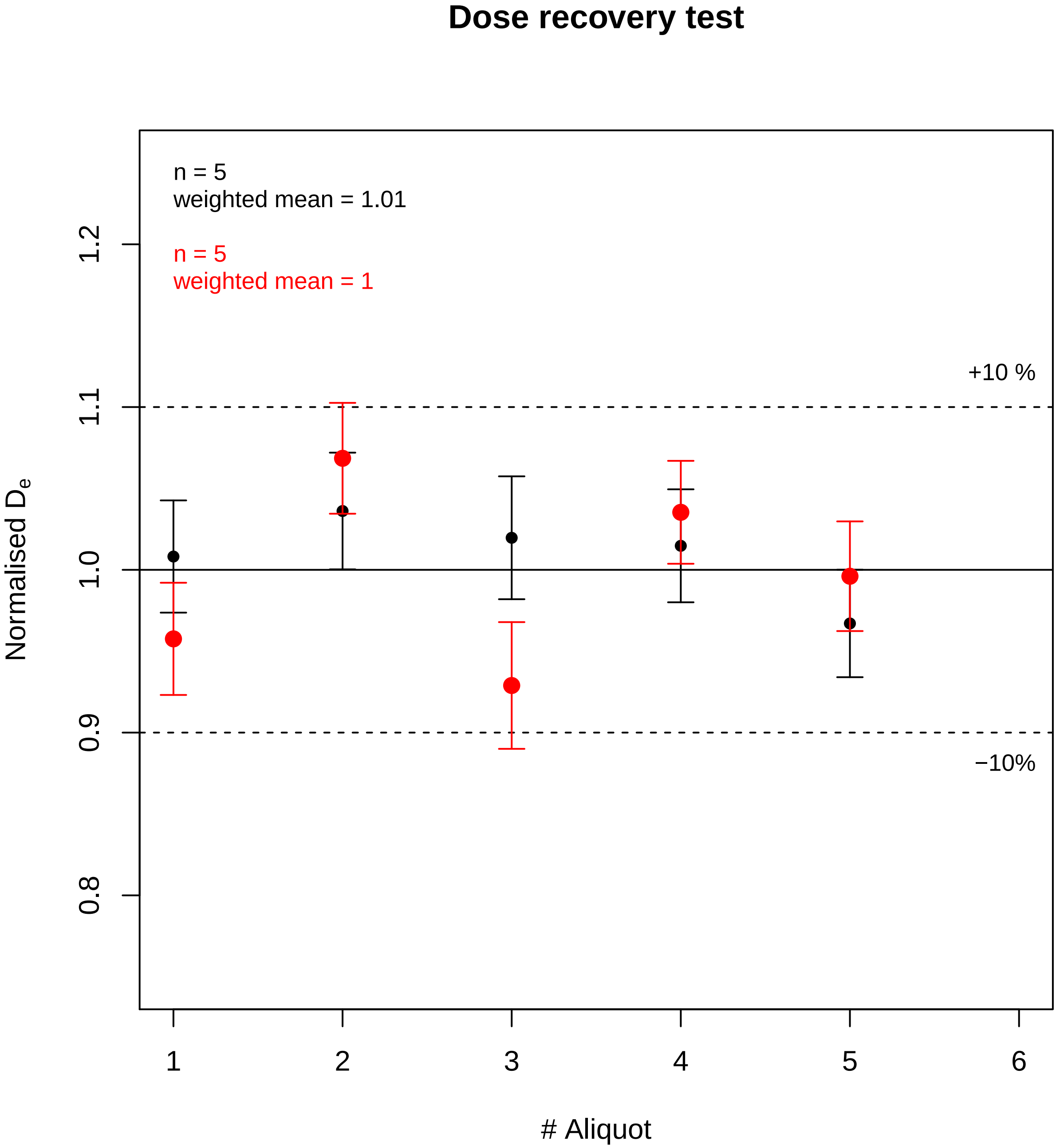

De distribution
n = 62 | in 2 sigma = 41.9 %
Standardised estimate
2
0
−2
120
100
80
60
40
20
De [Gy]
help("plot_AbanicoPlot")
help("plot_AbanicoPlot")
Relative standard error (%)
20
10
6.7
0
5
10
15
Precision
0
0.016
Density (bw 0.15)

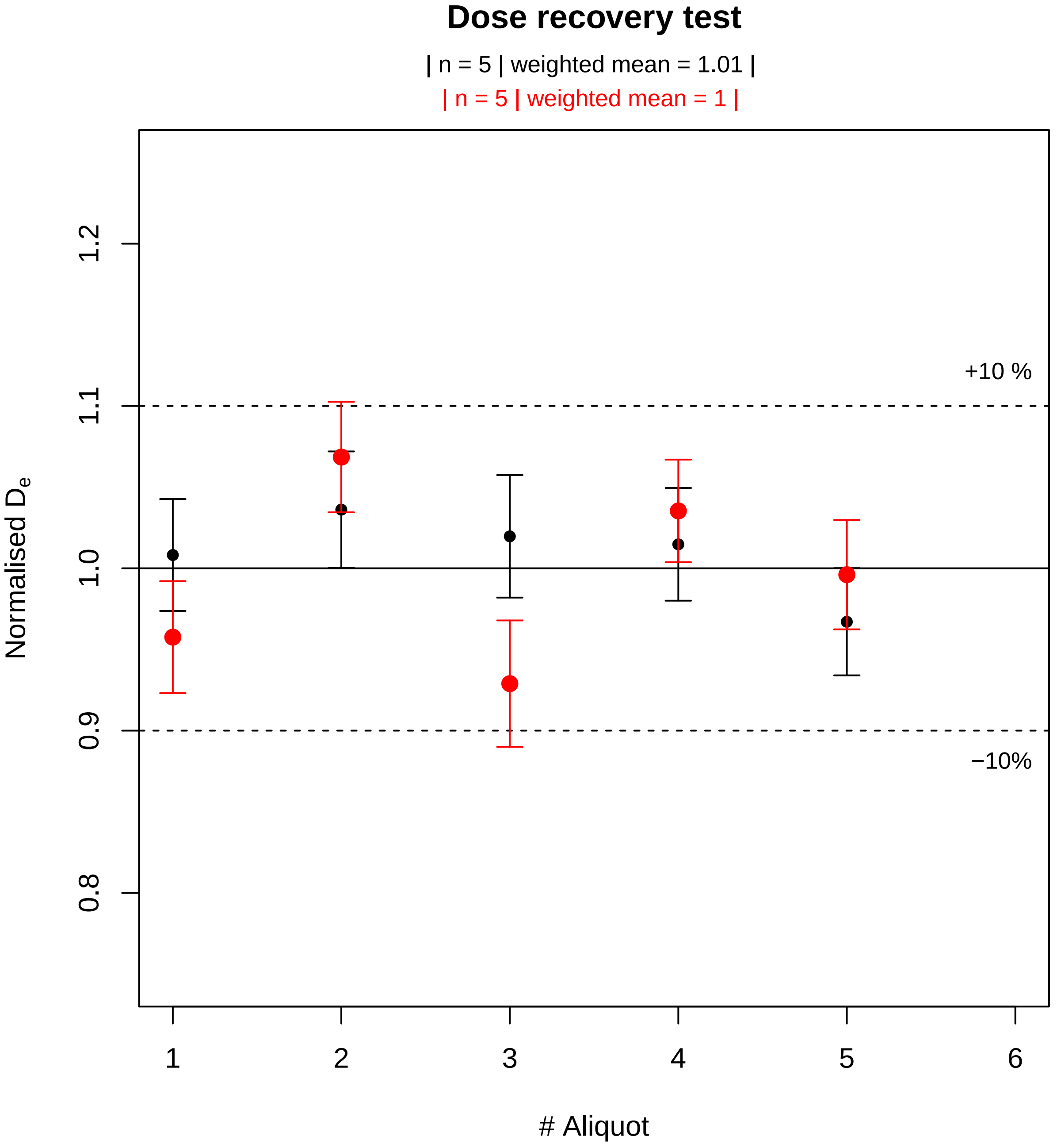

Dose recovery test
Example data
+10 %
−10%
1.2
1.1
1.0
0.9
0.8
Normalised D_e
1
2
3
4
5
6
# Aliquot

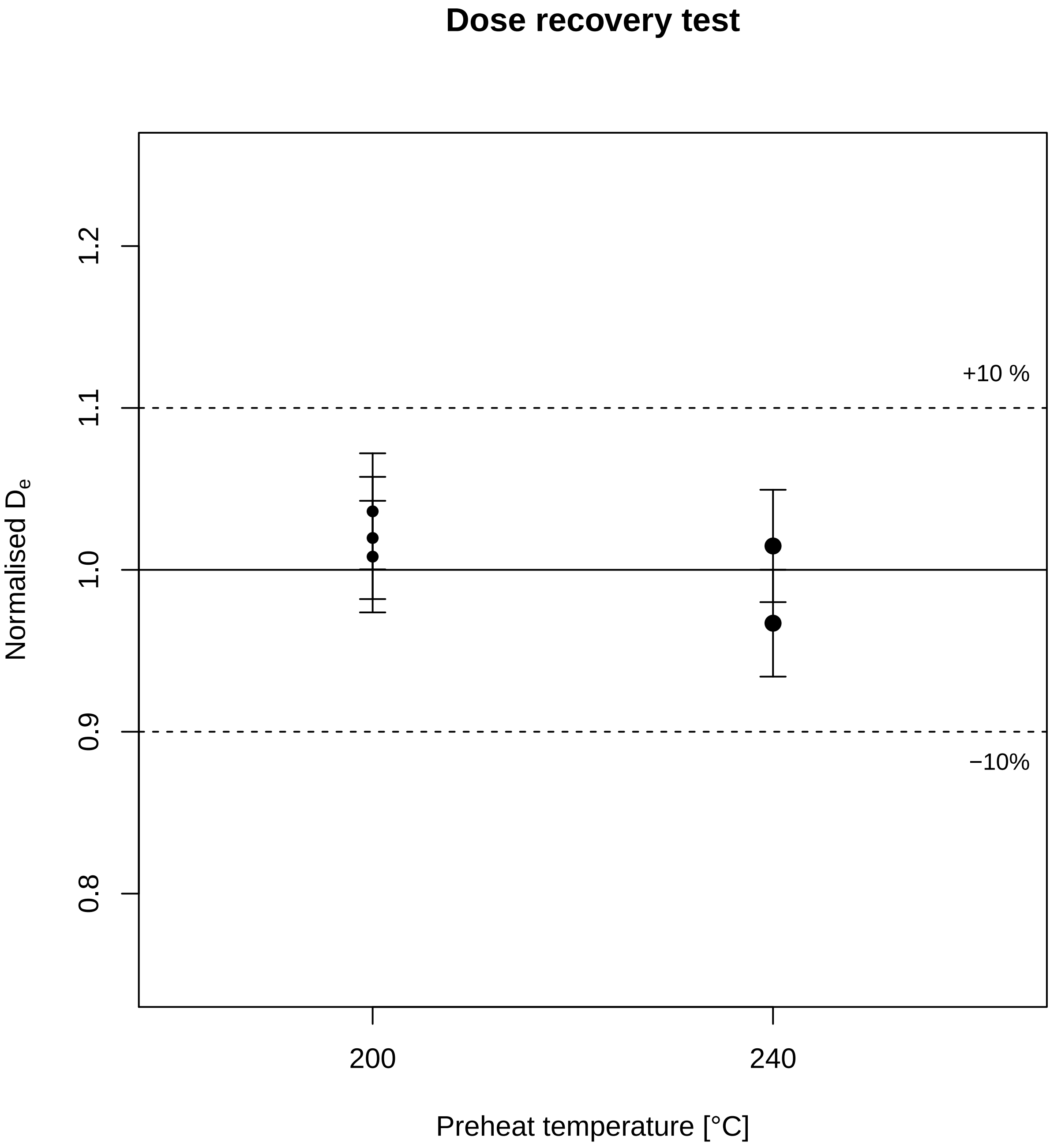

Dose recovery test
Test data set
+10 %
−10%
1.2
1.1
1.0
0.9
0.8
Normalised D_e
1
2
3
4
5
6
# Aliquot

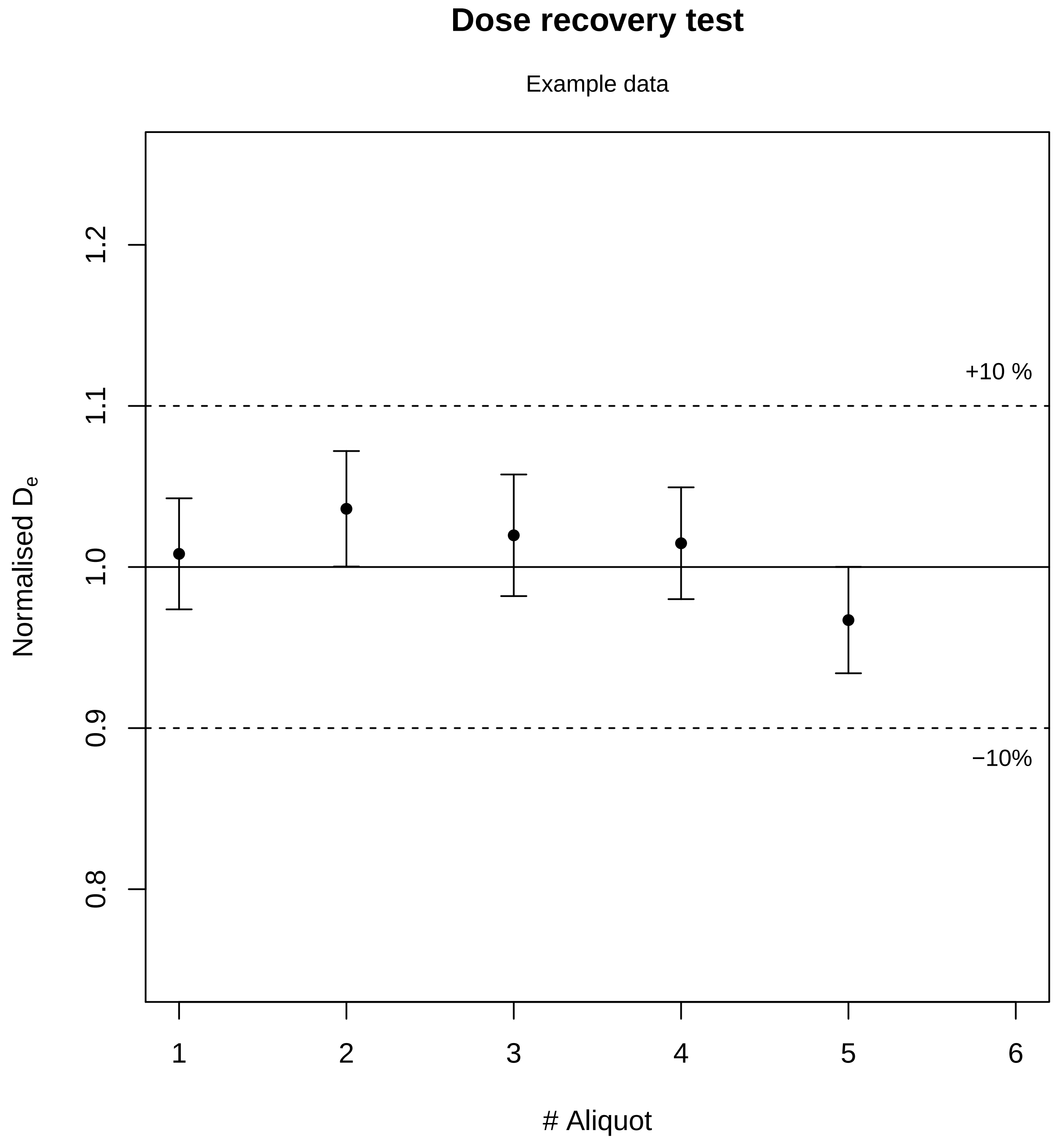

Dose recovery test
+10 %
−10%
Normalised D_e
1.2
1.1
1.0
0.9
0.8
1
2
3
4
5
6
# Aliquot

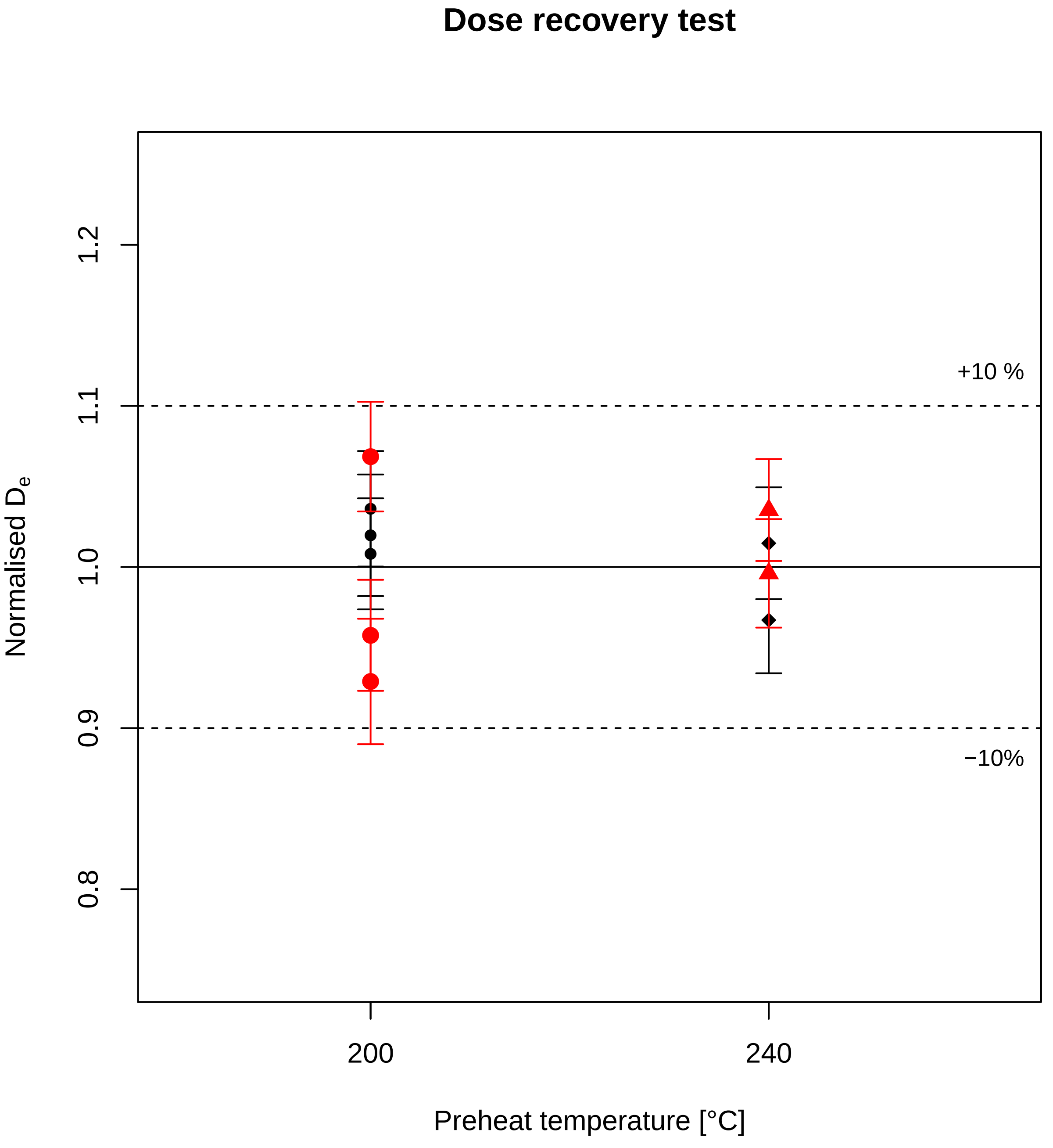

Dose recovery test
+10 %
−10%
1.15
1.10
1.05
1.00
0.95
0.90
0.85
Normalised D_e
1
2
3
4
5
6
Sample aliquot

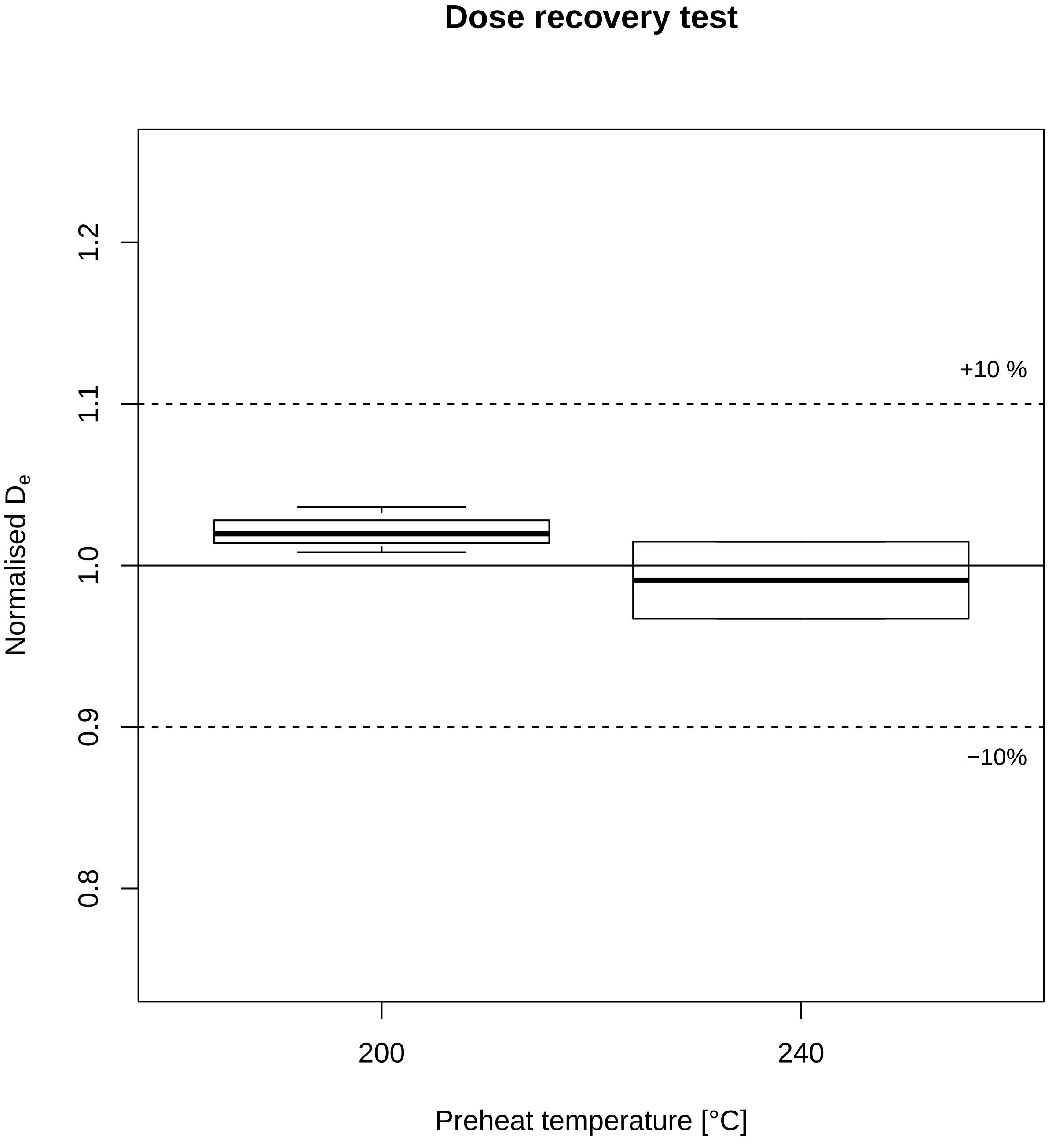

Dose recovery test
n = 5
weighted mean = 1.01
n = 5
weighted mean = 1
+10 %
−10%
Normalised D_e
1.2
1.1
1.0
0.9
0.8
1
2
3
4
5
6
# Aliquot

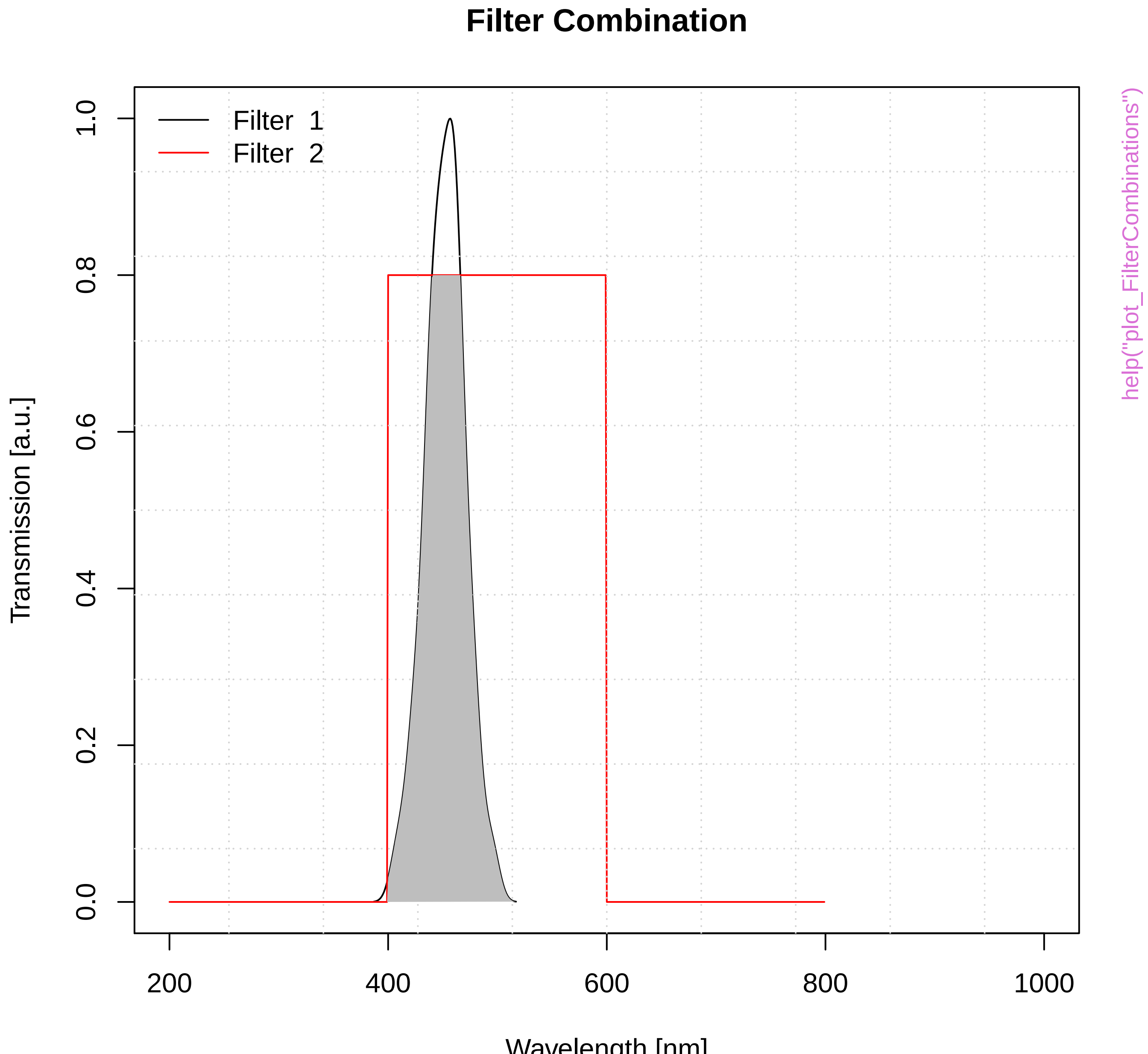

Dose recovery test
| n = 5 | weighted mean = 1.01 |
| n = 5 | weighted mean = 1 |
+10 %
−10%
1.2
1.1
1.0
0.9
0.8
Normalised D_e
1
2
3
4
5
6
# Aliquot

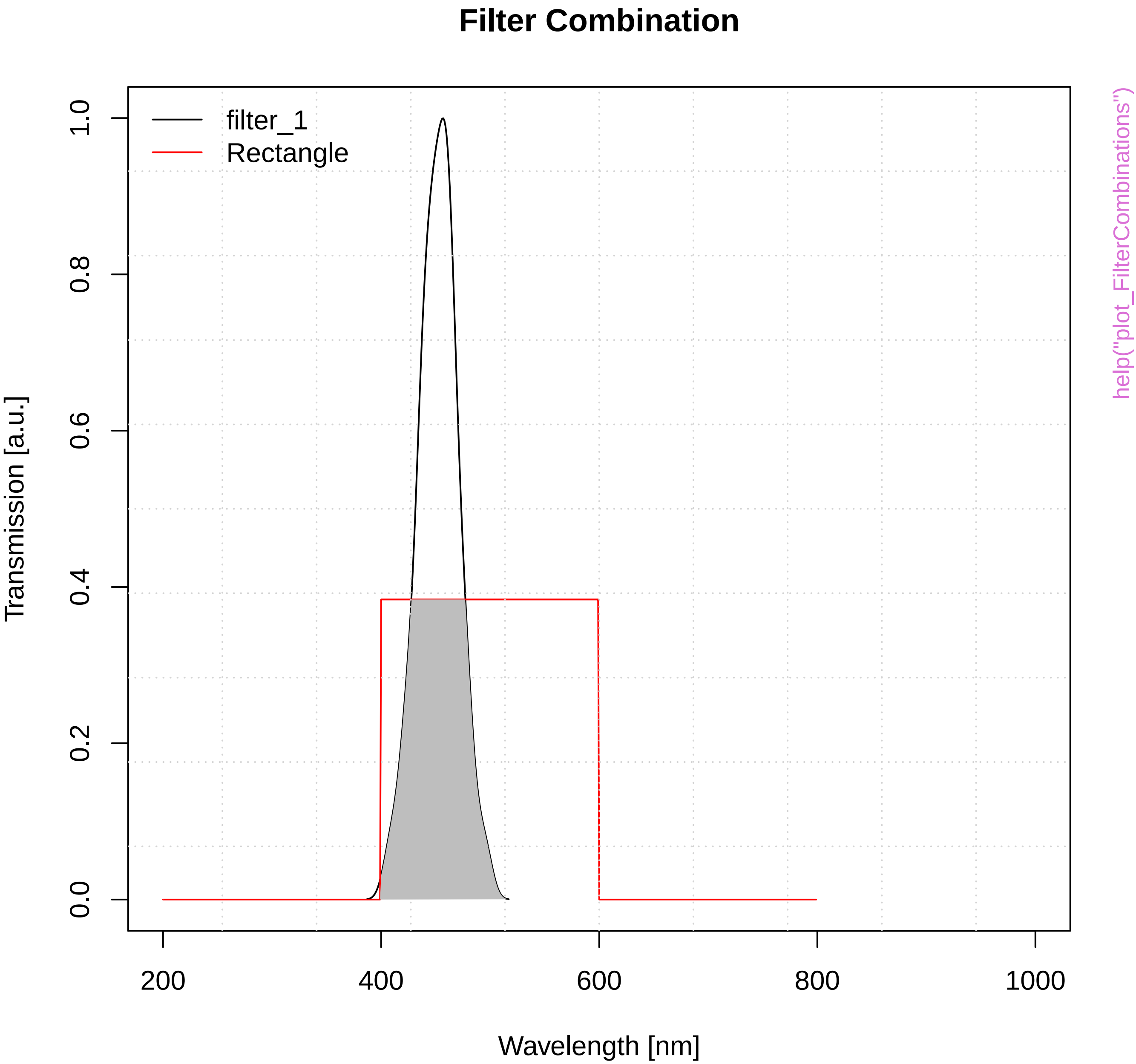

Dose recovery test
+10 %
−10%
Normalised D_e
1.2
1.1
1.0
0.9
0.8
200
240
Preheat temperature [°C]

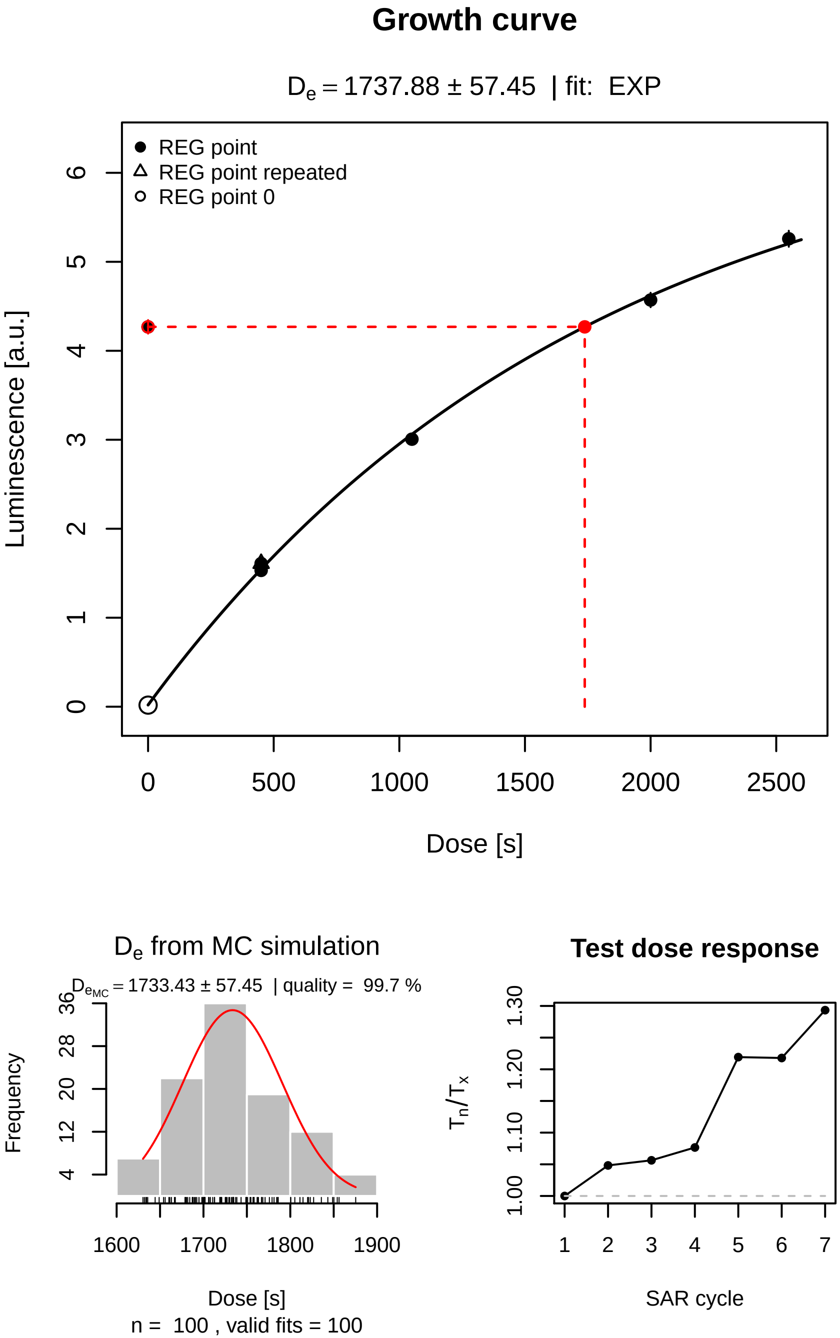

Dose recovery test
Example data
Normalised D_e
# Aliquot
1.2
1.1
1.0
0.9
0.8
1
2
3
4
5
6
+10 %
−10%

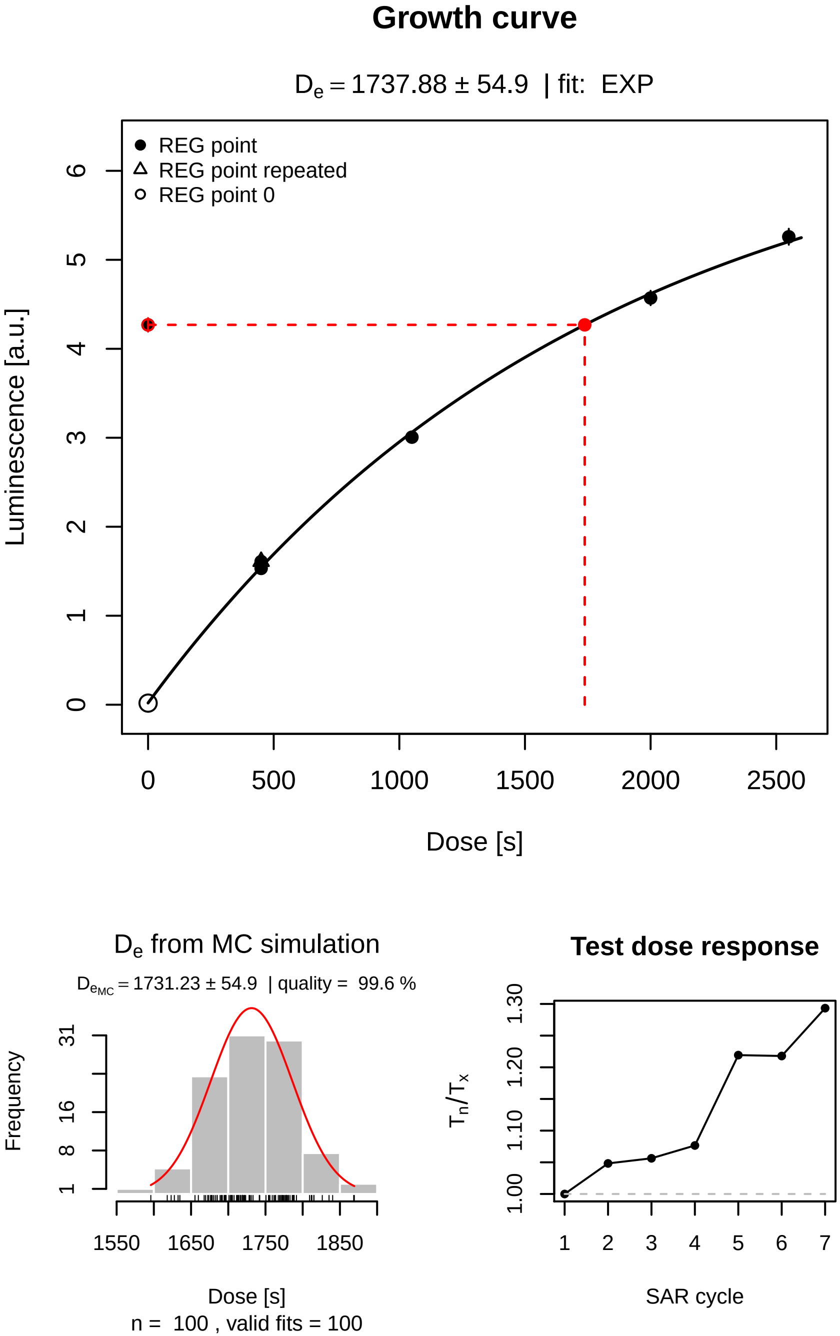

Dose recovery test
+10 %
−10%
1.2
1.1
1.0
0.9
0.8
Normalised D_e
200
240
Preheat temperature [°C]

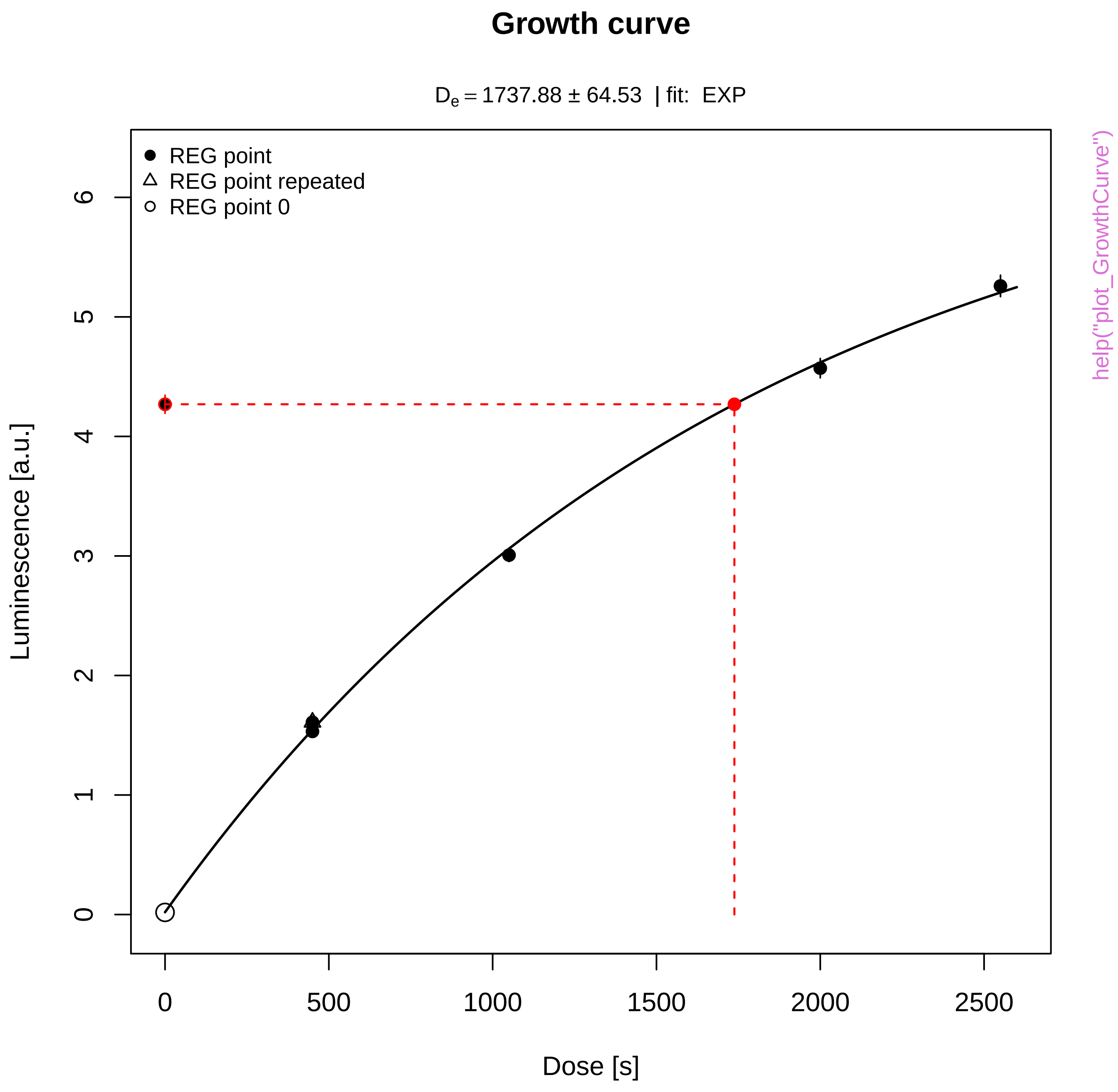

Dose recovery test
1.2
1.1
1.0
0.9
0.8
Normalised D_e
+10 %
−10%
200
240
Preheat temperature [°C]

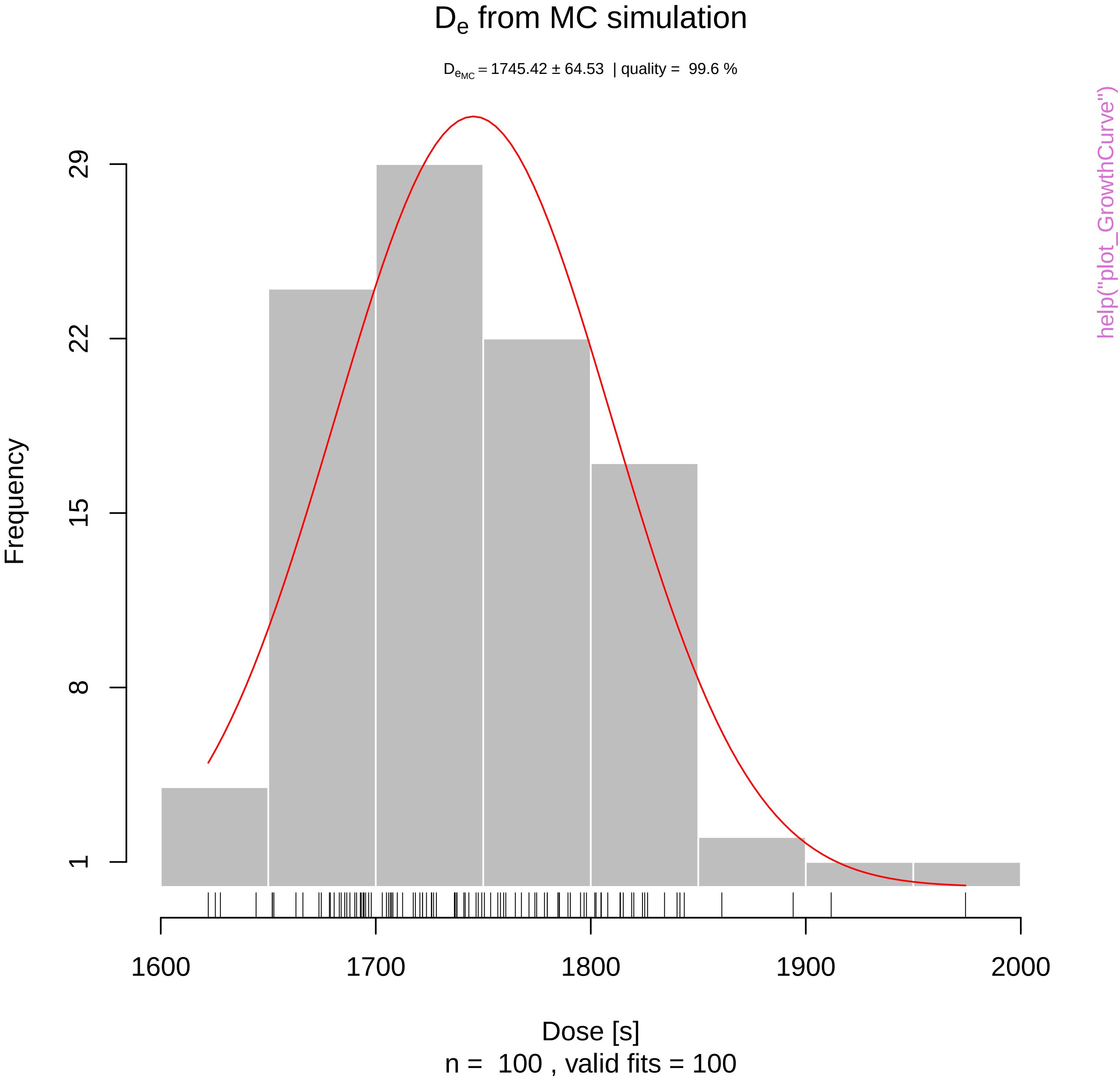

Filter Combination
Filter 1
Filter 2
Transmission [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
200
400
600
800
1000
Wavelength [nm]
help("plot_FilterCombinations")

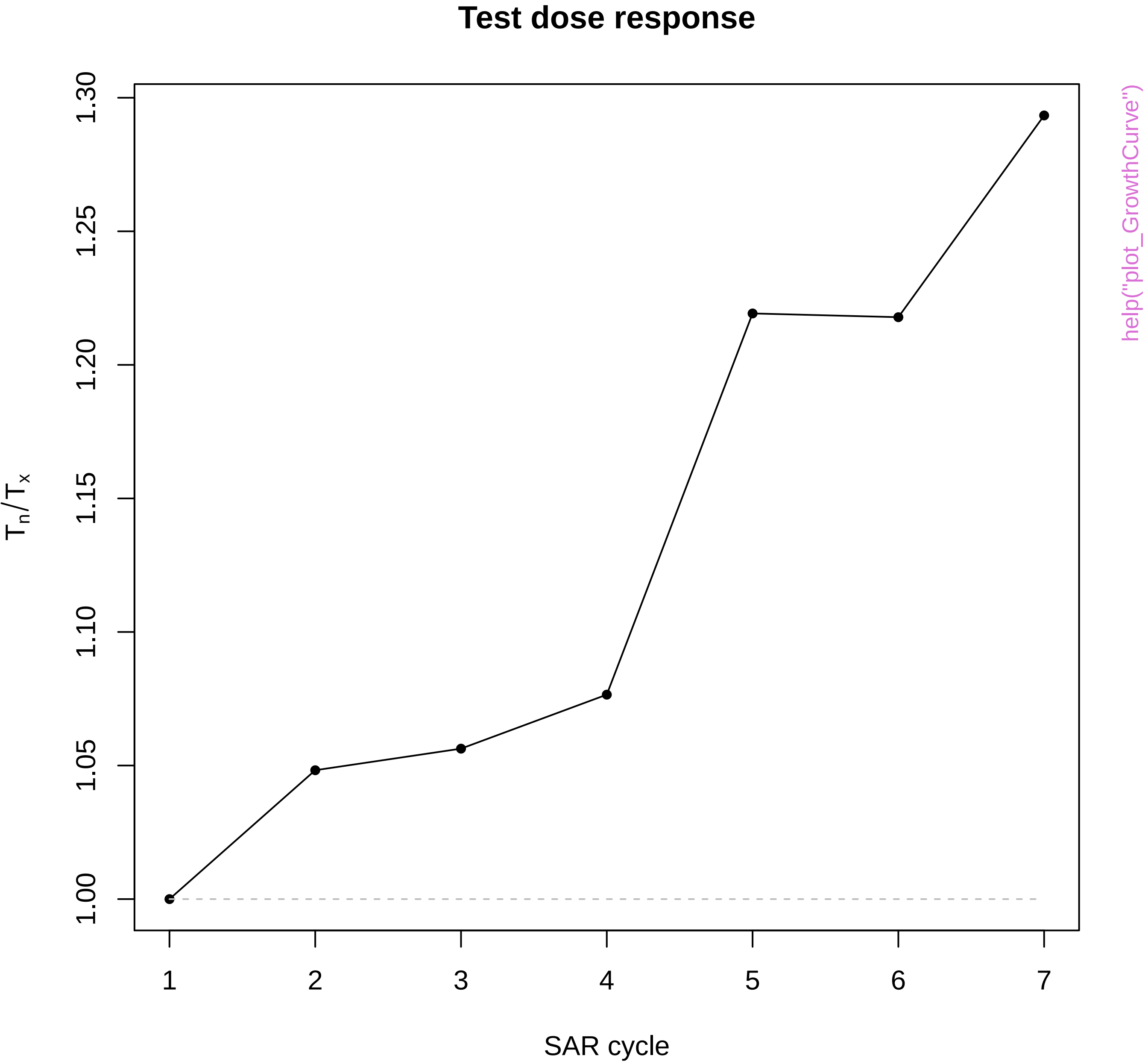

Filter Combination
filter_1
Rectangle
Transmission [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
200
400
600
800
1000
Wavelength [nm]
help("plot_FilterCombinations")

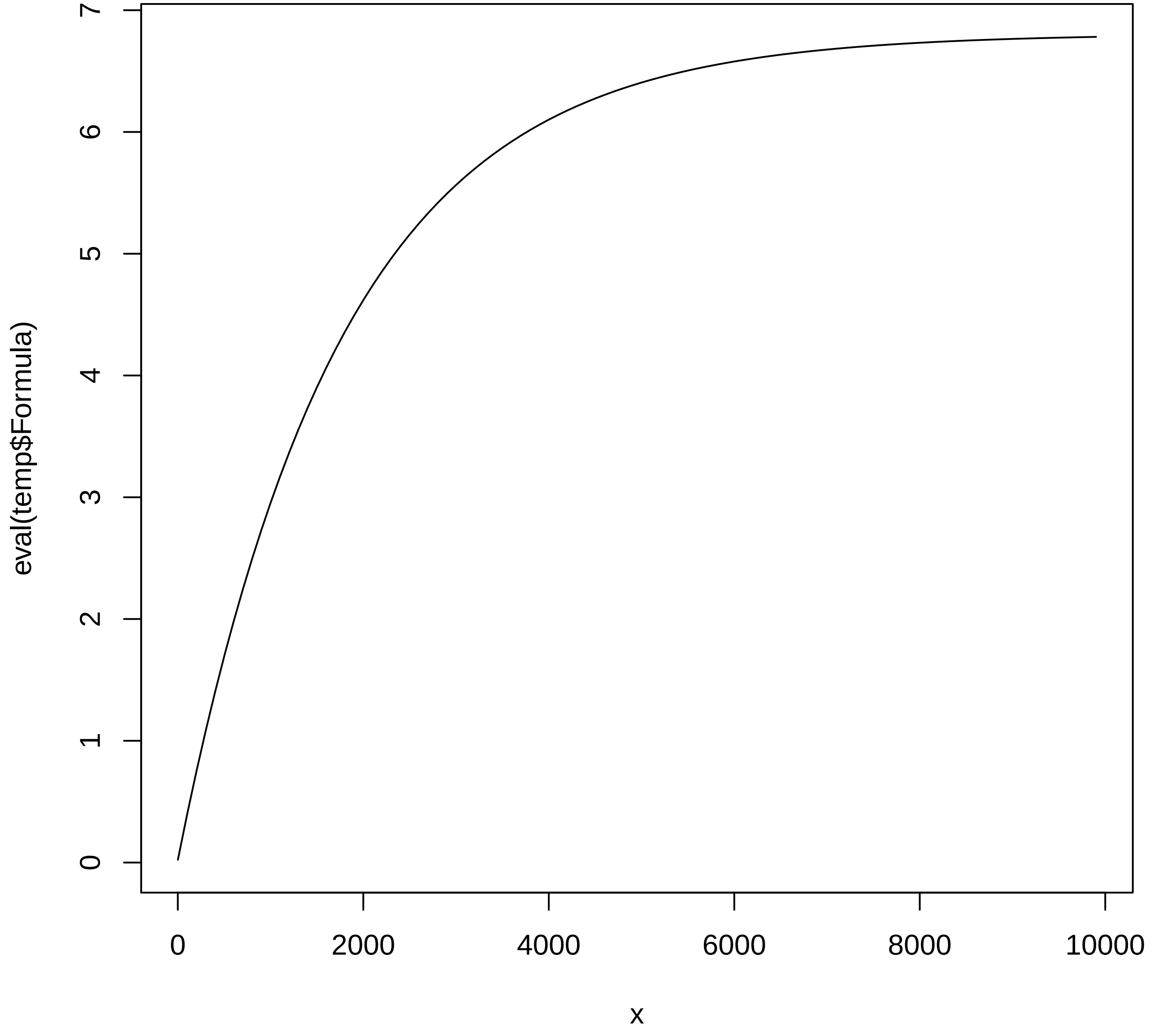

Growth curve
$D_e = 1737.88 \pm 57.45$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 1733.43 \pm 57.45$ | quality = 99.7 %
Frequency
4
12
20
28
36
1600
1700
1800
1900
Dose [s]
n = 100 , valid fits = 100
Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle


Growth curve
$D_e = 1737.88 \pm 54.9$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]
D_e from MC simulation
$D_{e_{MC}} = 1731.23 \pm 54.9$ | quality = 99.6 %
Frequency
1
8
16
31
1550
1650
1750
1850
Dose [s]
n = 100 , valid fits = 100
Test dose response
T_n/T_x
1.00
1.10
1.20
1.30
1
2
3
4
5
6
7
SAR cycle

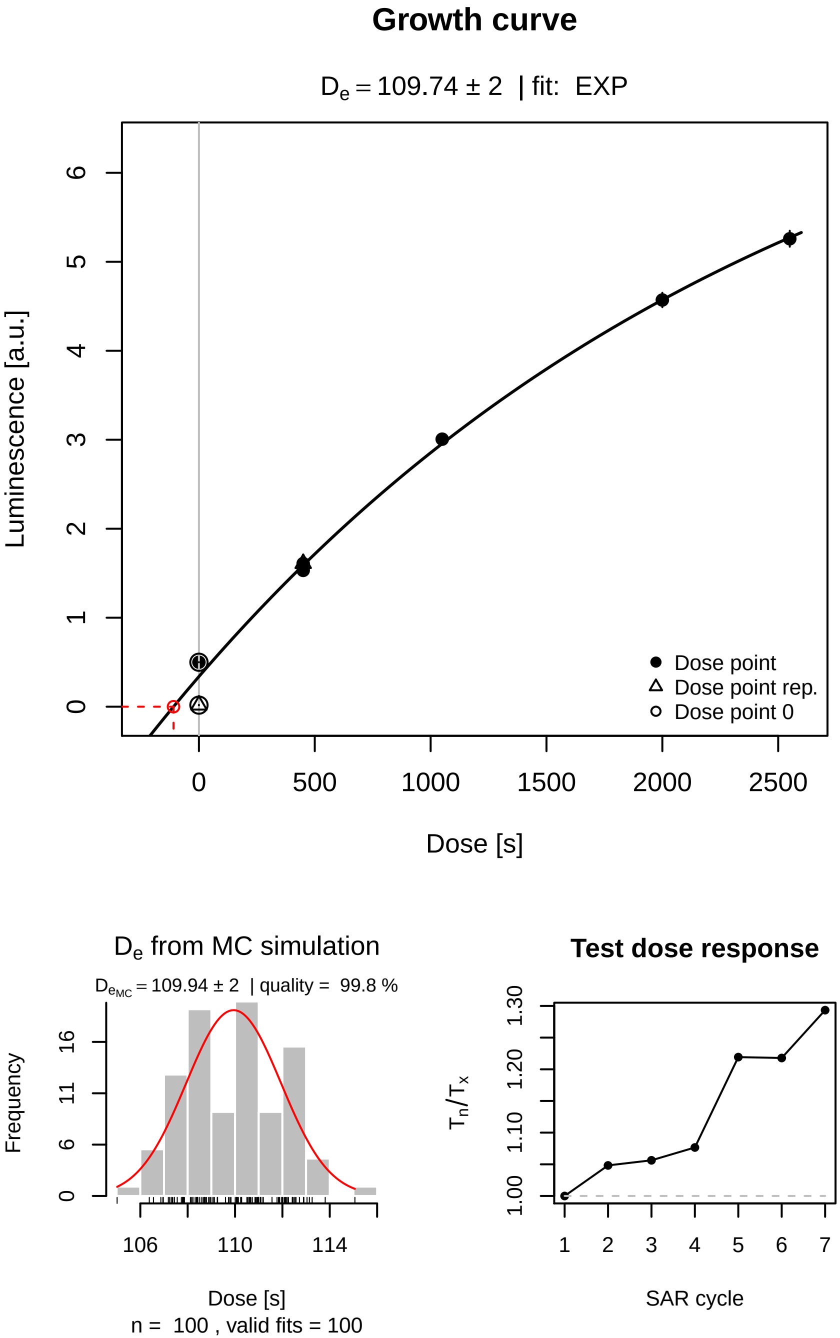

Growth curve
$D_e = 1737.88 \pm 64.53$ | fit: EXP
● REG point
△ REG point repeated
○ REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
Dose [s]
0
500
1000
1500
2000
2500
help("plot_GrowthCurve")

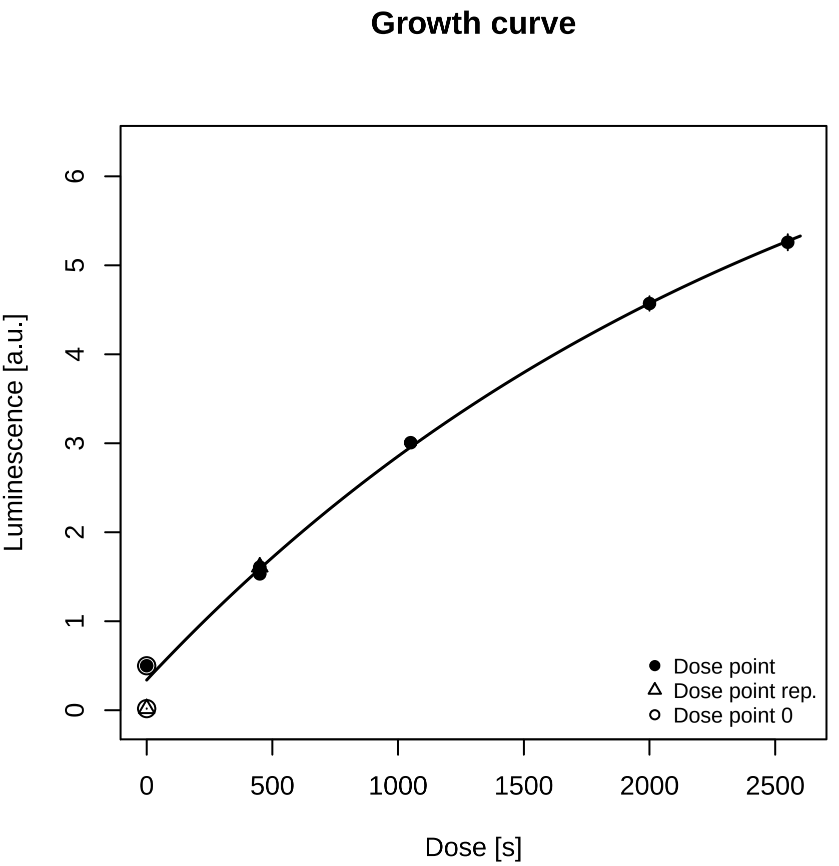

D_e from MC simulation
$D_{e_{MC}} = 1745.42 \pm 64.53$ | quality = 99.6 %
help("plot_GrowthCurve")
Frequency
29
22
15
8
1
1600
1700
1800
1900
2000
Dose [s]
n = 100 , valid fits = 100


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

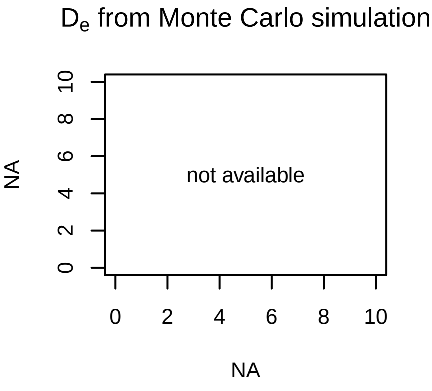


help("plot_GrowthCurve")

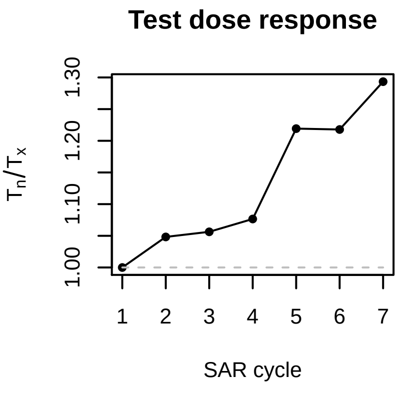

Growth curve
$D_e = 109.74 \pm 2$ | fit: EXP
Luminescence [a.u.]
0
1
2
3
4
5
6
Dose [s]
0
500
1000
1500
2000
2500
● Dose point
△ Dose point rep.
○ Dose point 0
D_e from MC simulation
$D_{e_{MC}} = 109.94 \pm 2$ | quality = 99.8 %
Frequency
0
6
11
16
106
110
114
Dose [s]
n = 100 , valid fits = 100
Test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



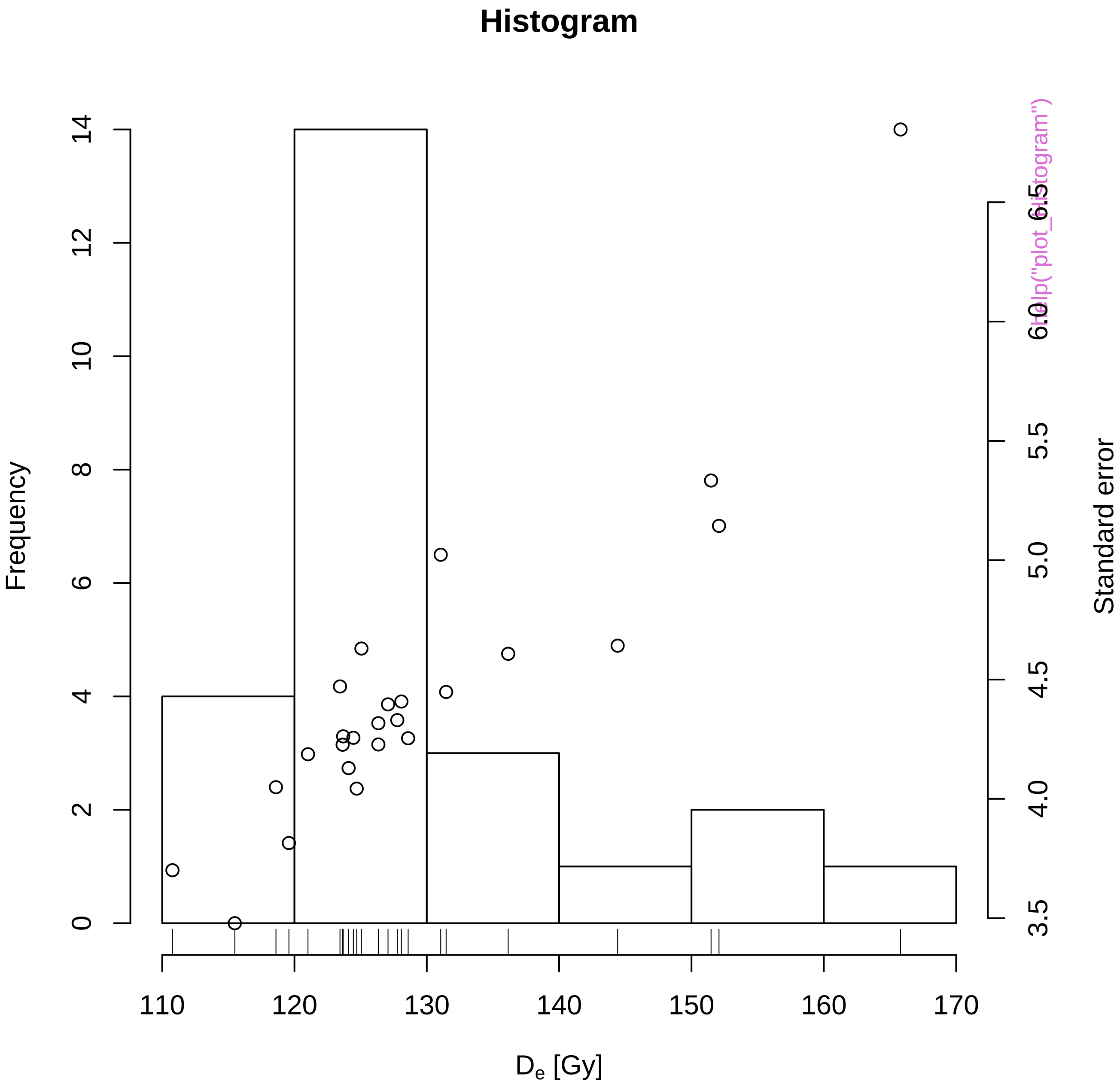
Growth curve

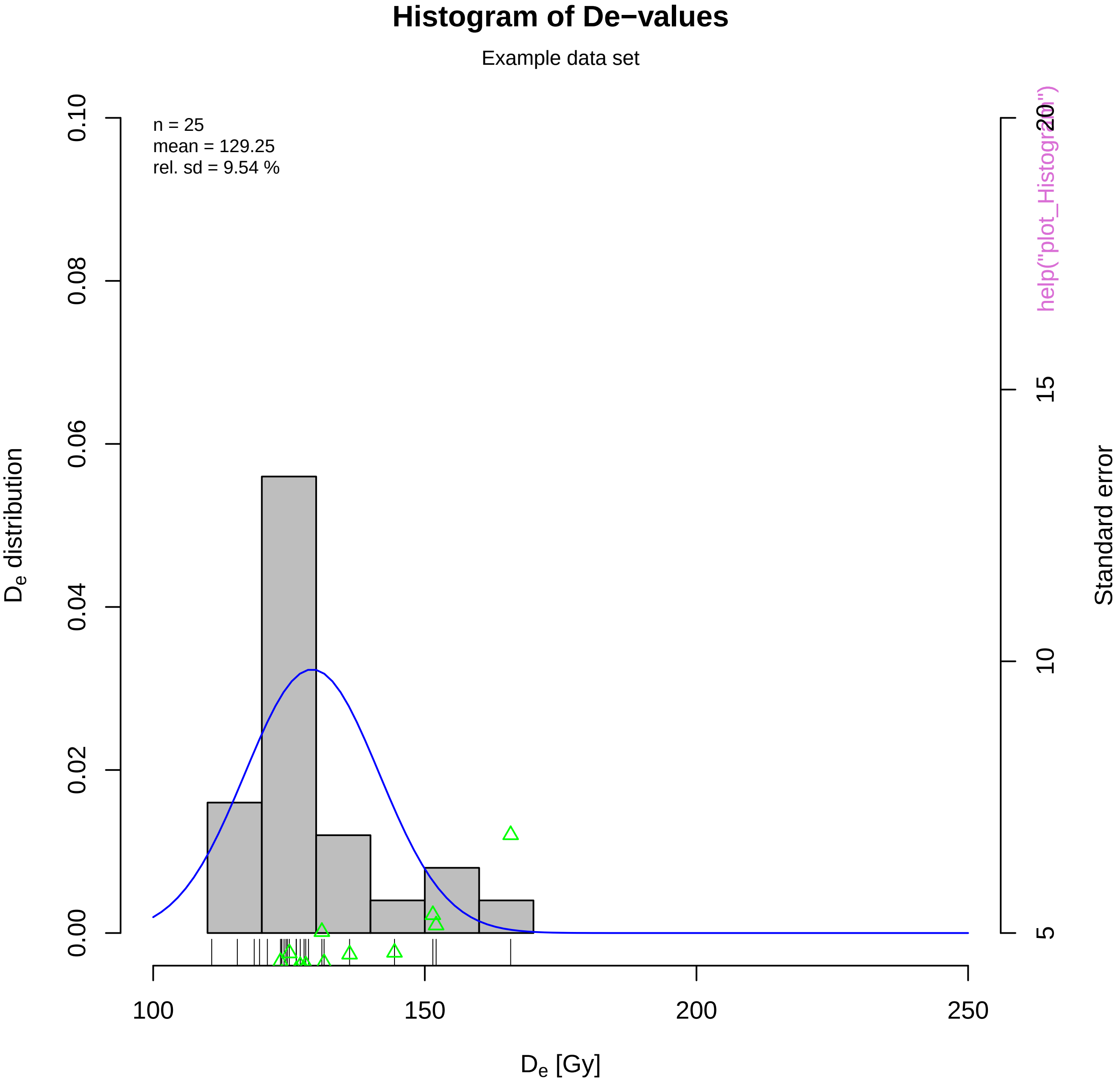


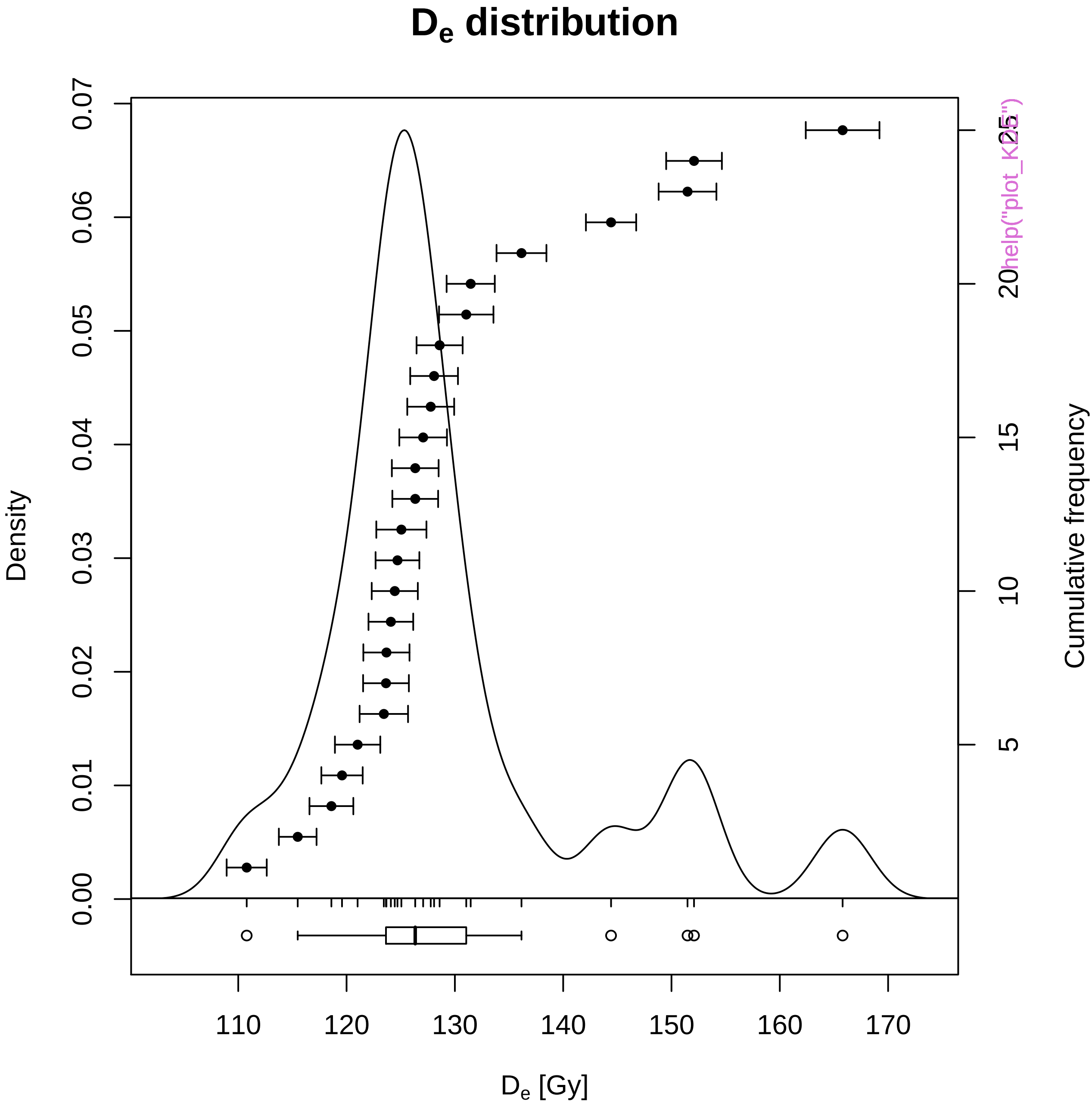
D_e from Monte Carlo simulation



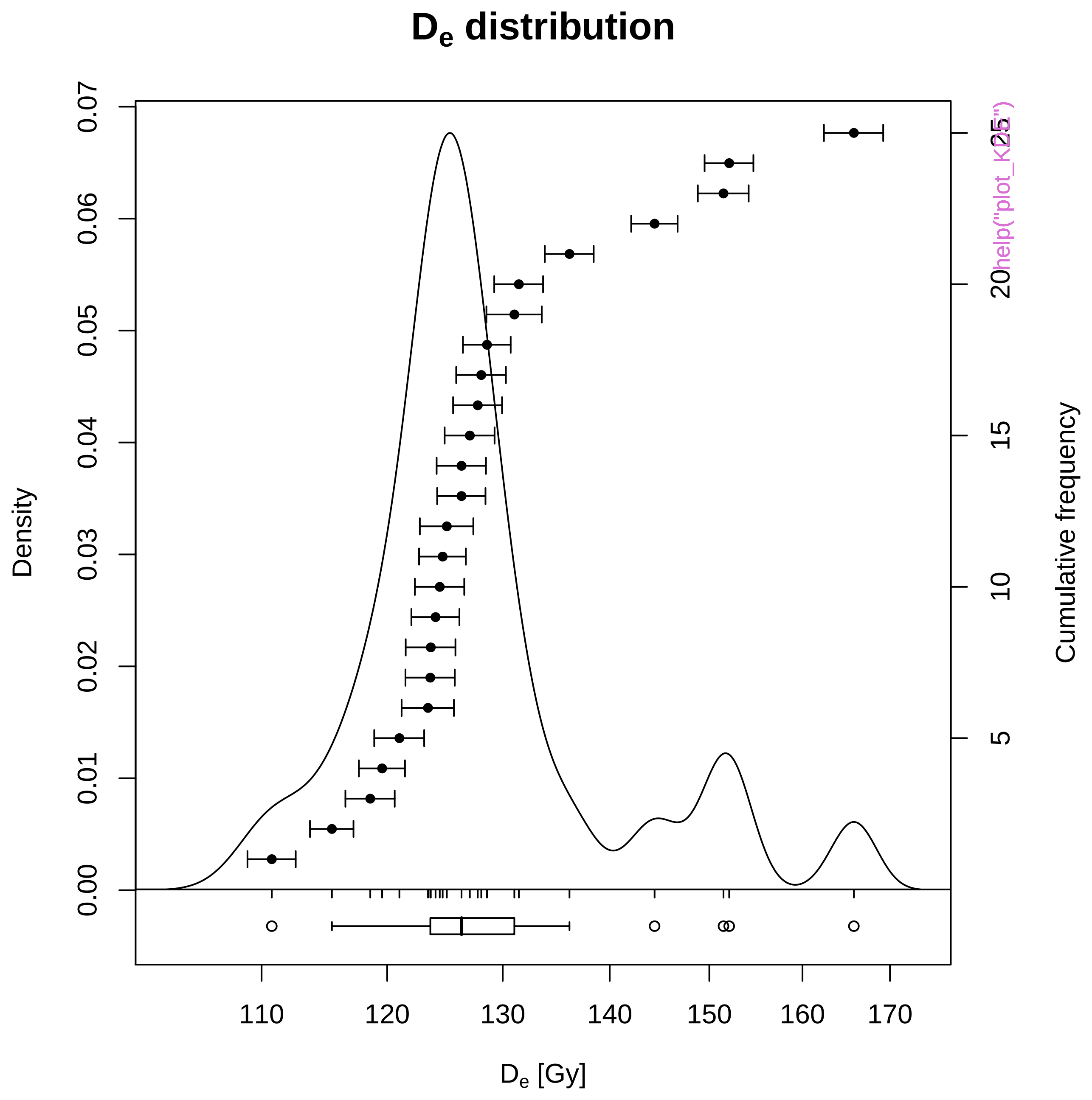
Test dose response

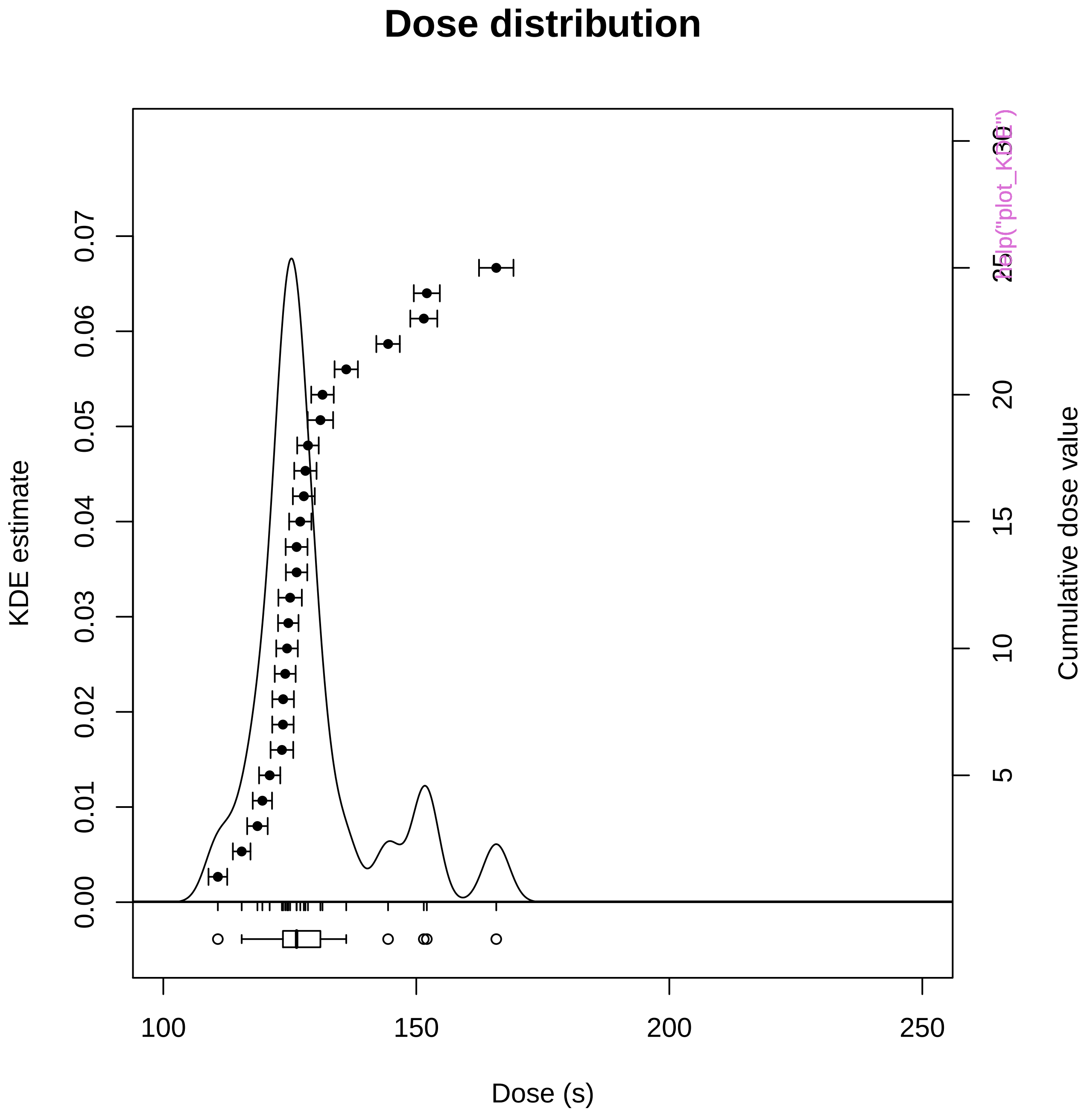

Histogram
Frequency
0
2
4
6
8
10
12
14
110
120
130
140
150
160
170
D_e [Gy]
Standard error
3.5
4.0
4.5
5.0
5.5
6.0
6.5
help("plot_Histogram")

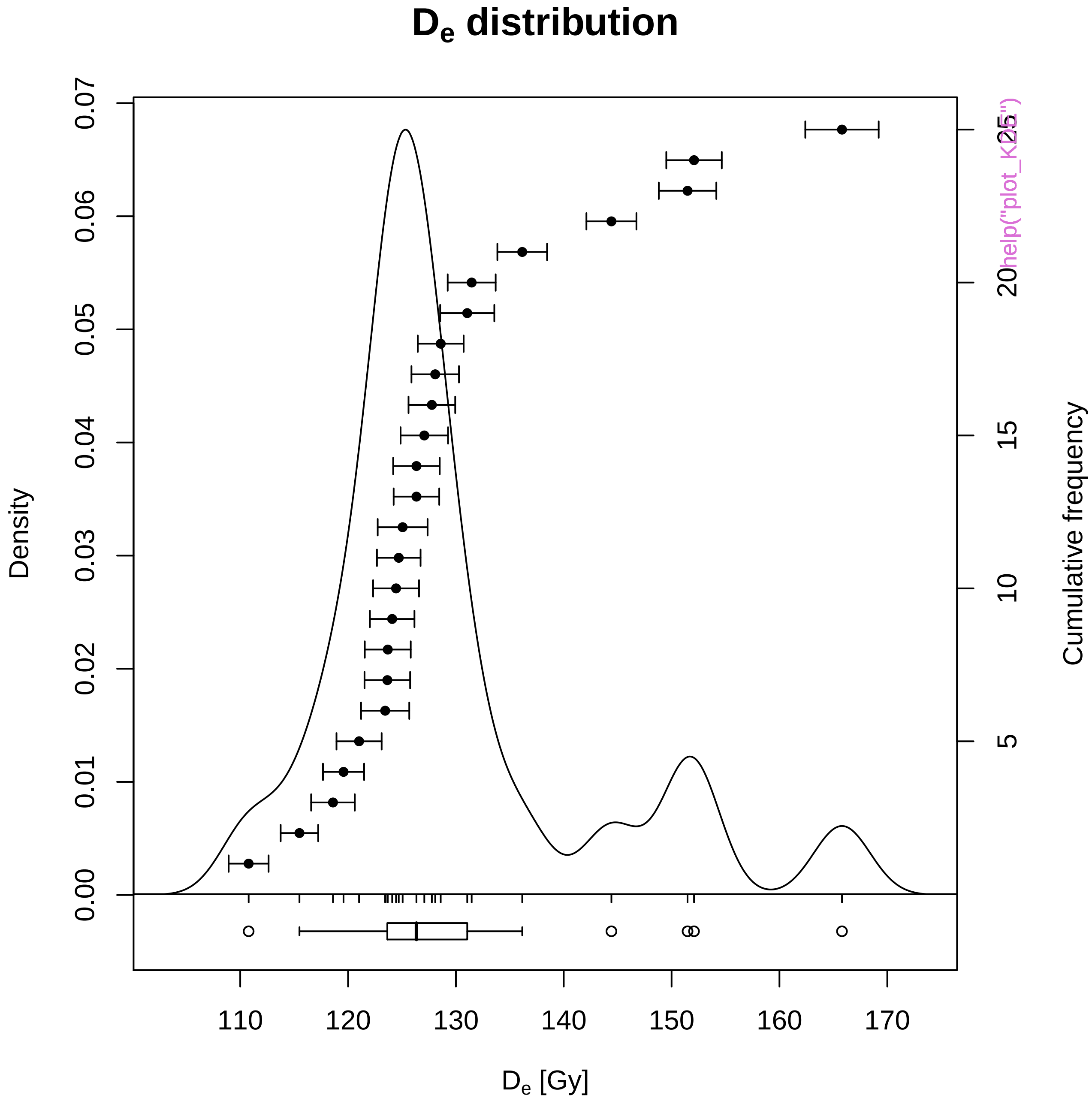

Histogram of De−values
Example data set
n = 25
mean = 129.25
rel. sd = 9.54 %
help("plot_Histogram")
D_e distribution
0.00
0.02
0.04
0.06
0.08
0.10
Standard error
5
10
15
20
100
150
200
250
D_e [Gy]

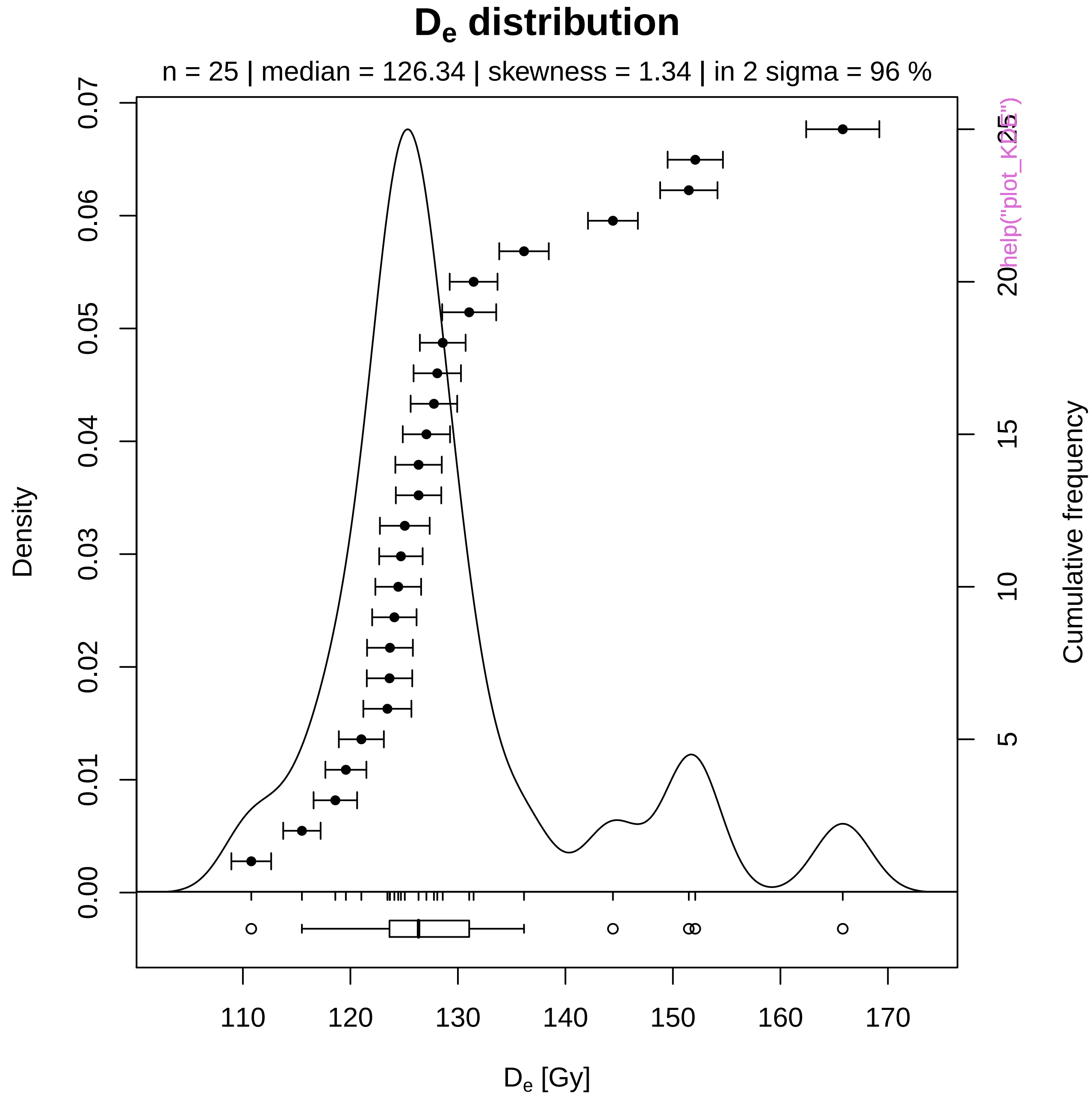


D_e distribution
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D_e [Gy]

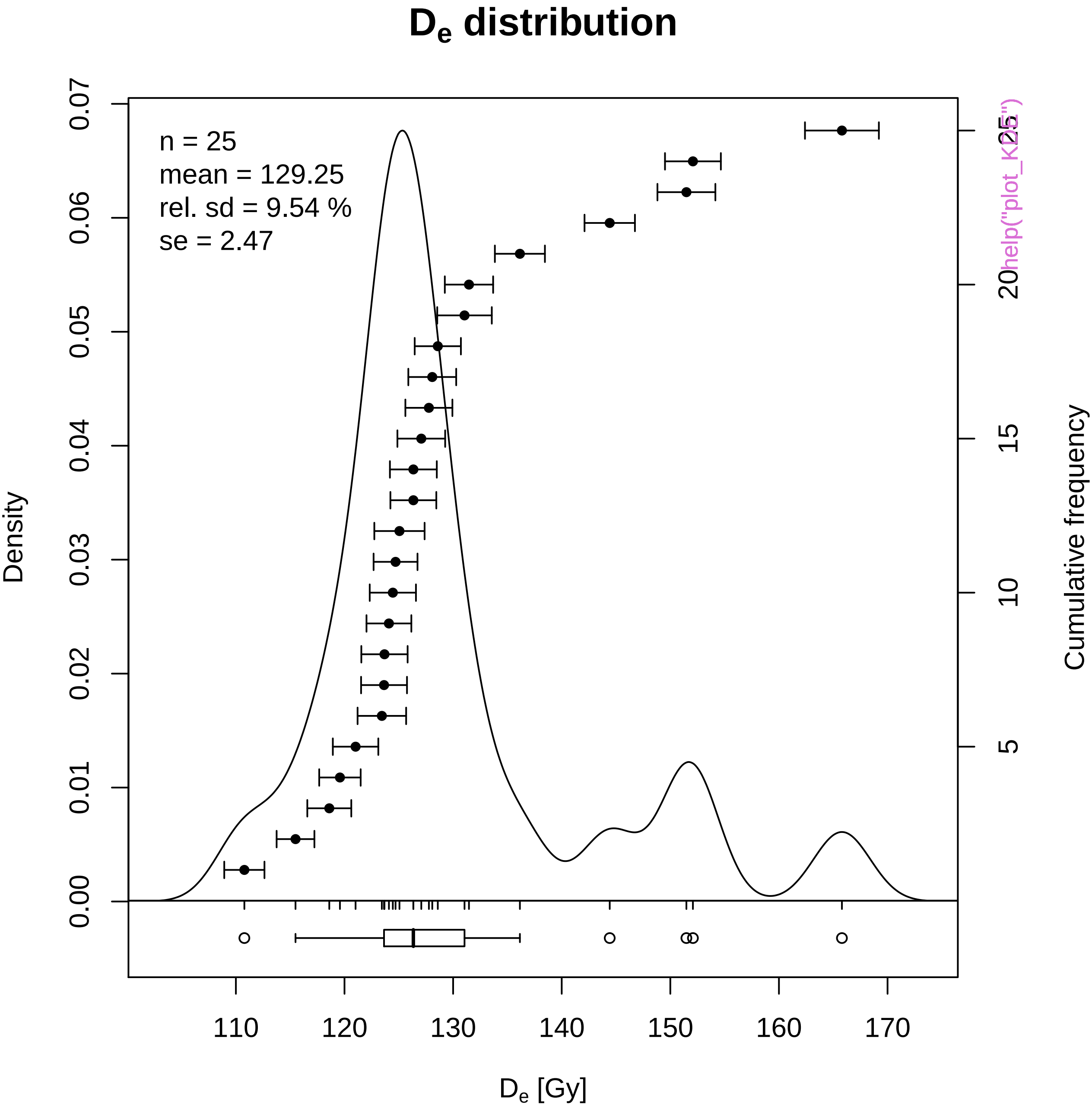

De distribution
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
De [Gy]

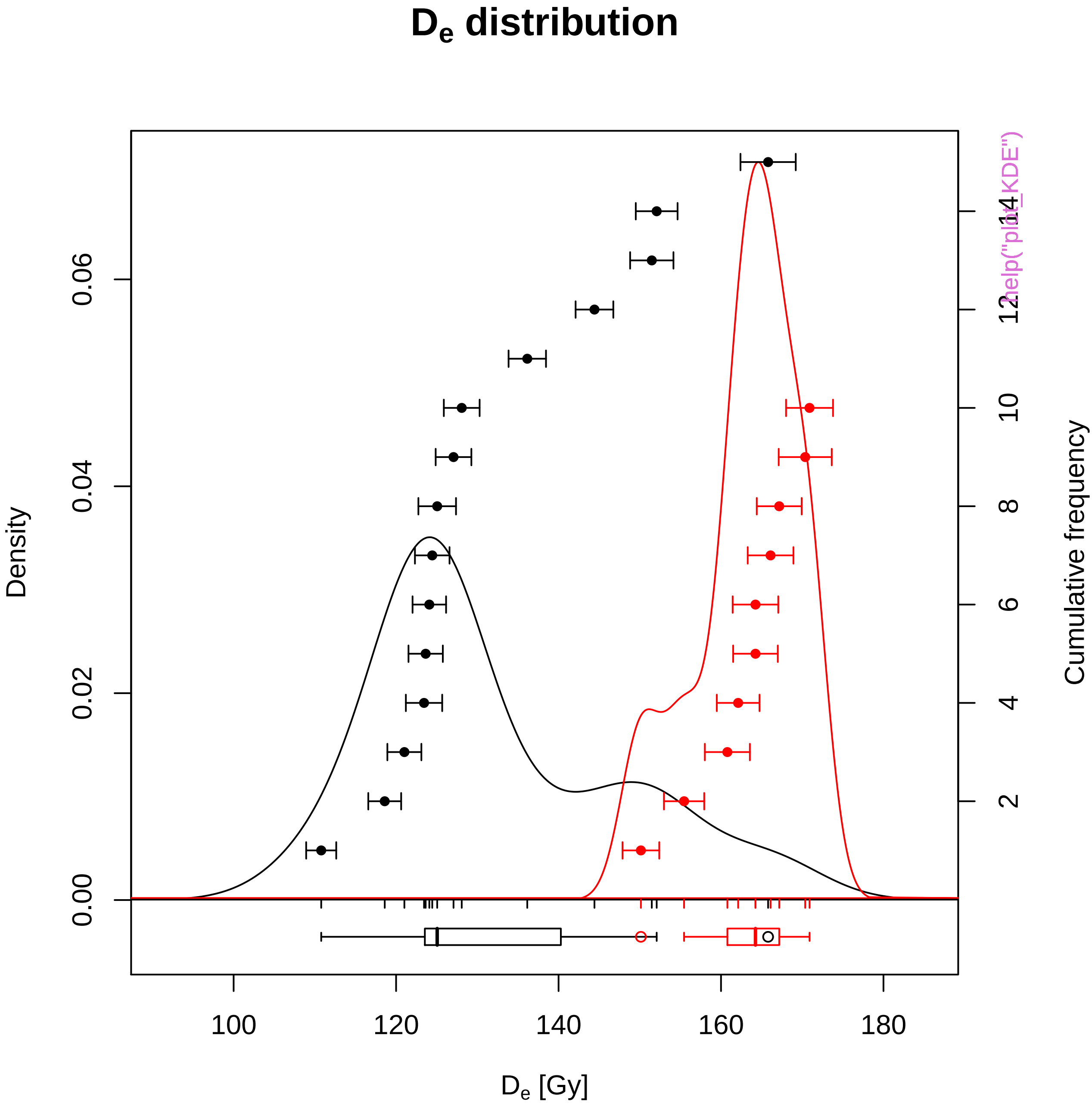

Dose distribution
KDE estimate
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative dose value
5
10
15
20
25
30
help("plot_KDE")
100
150
200
250
Dose (s)

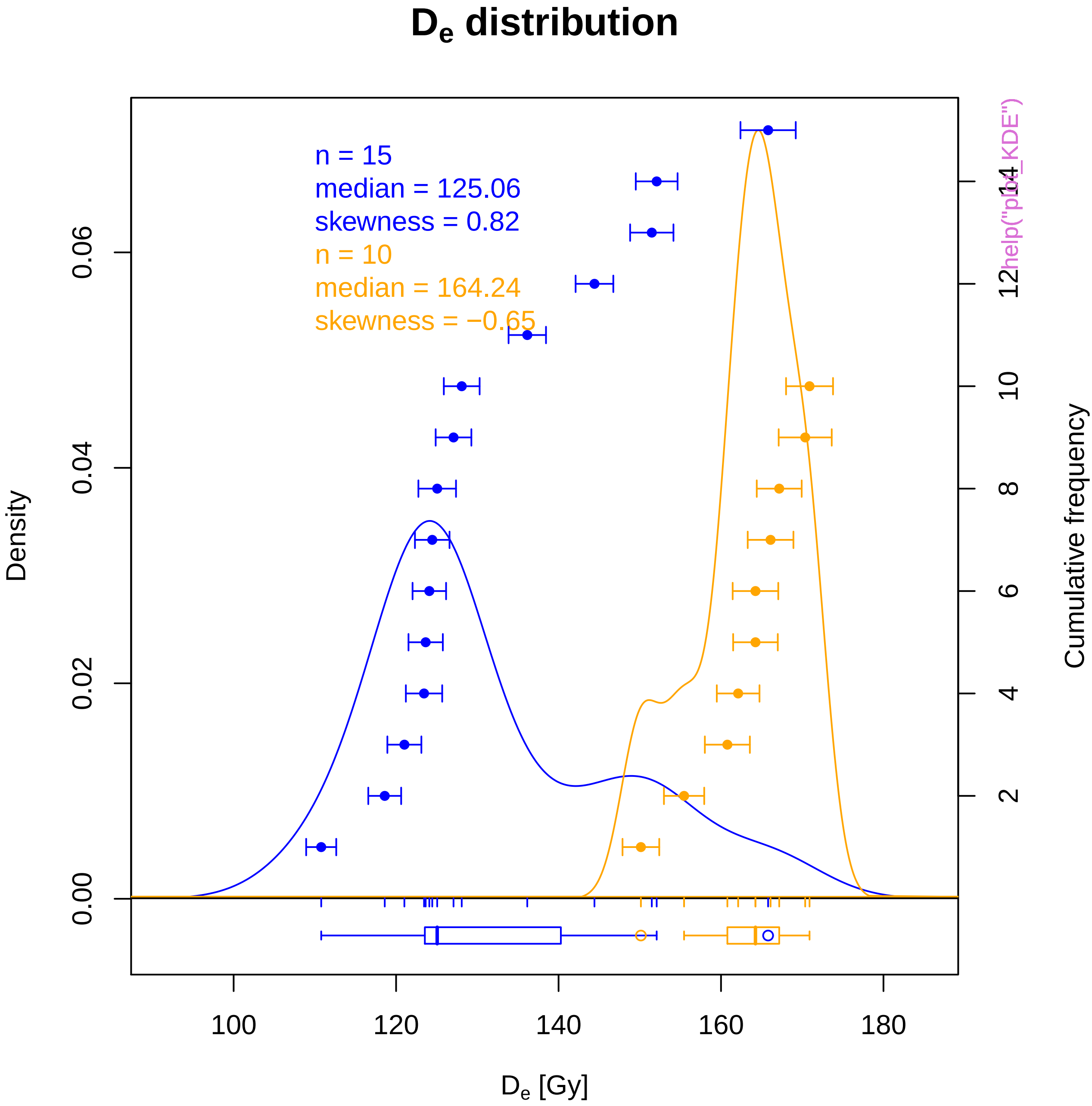

D$_e$ distribution
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D$_e$ [Gy]

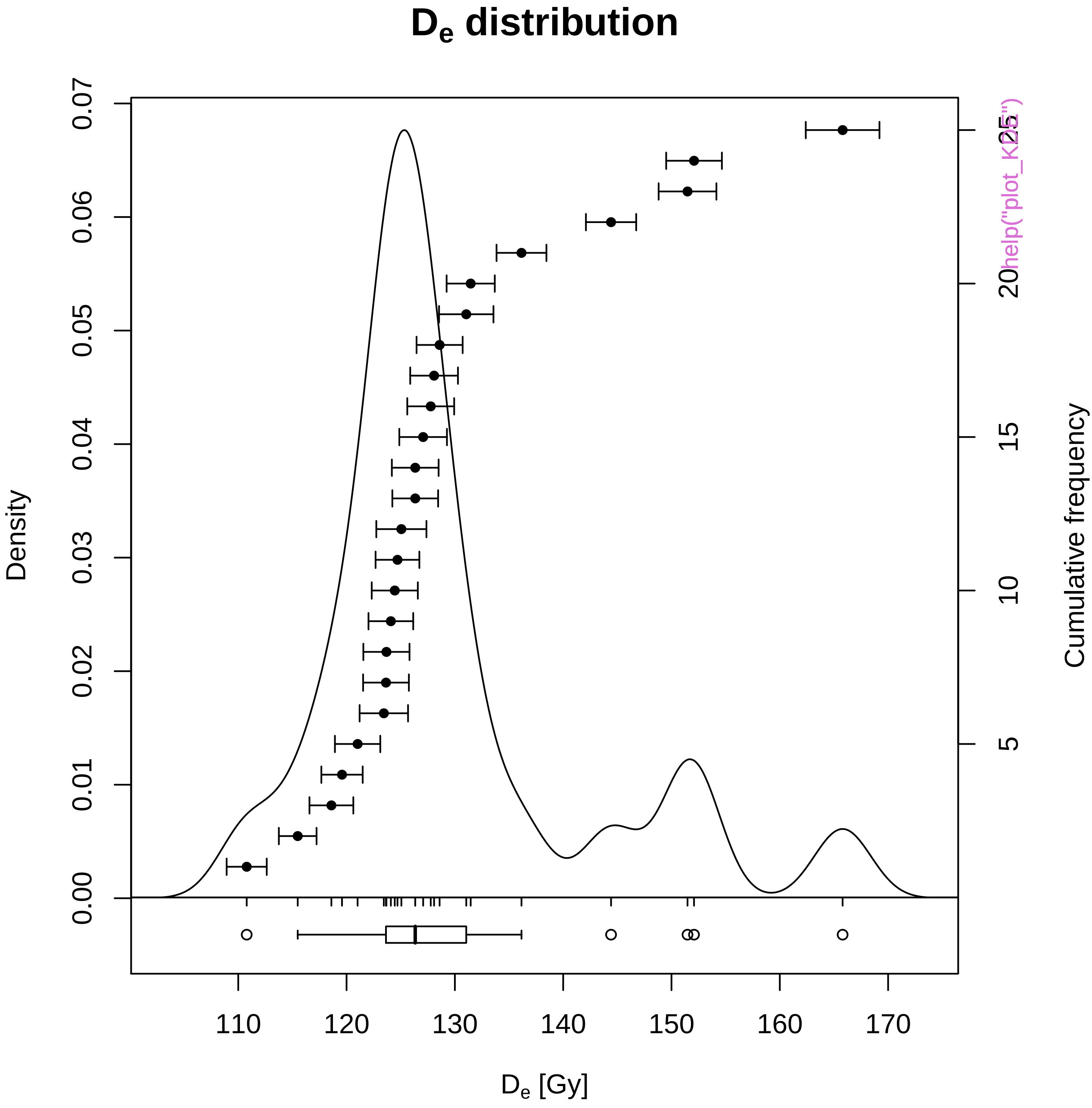


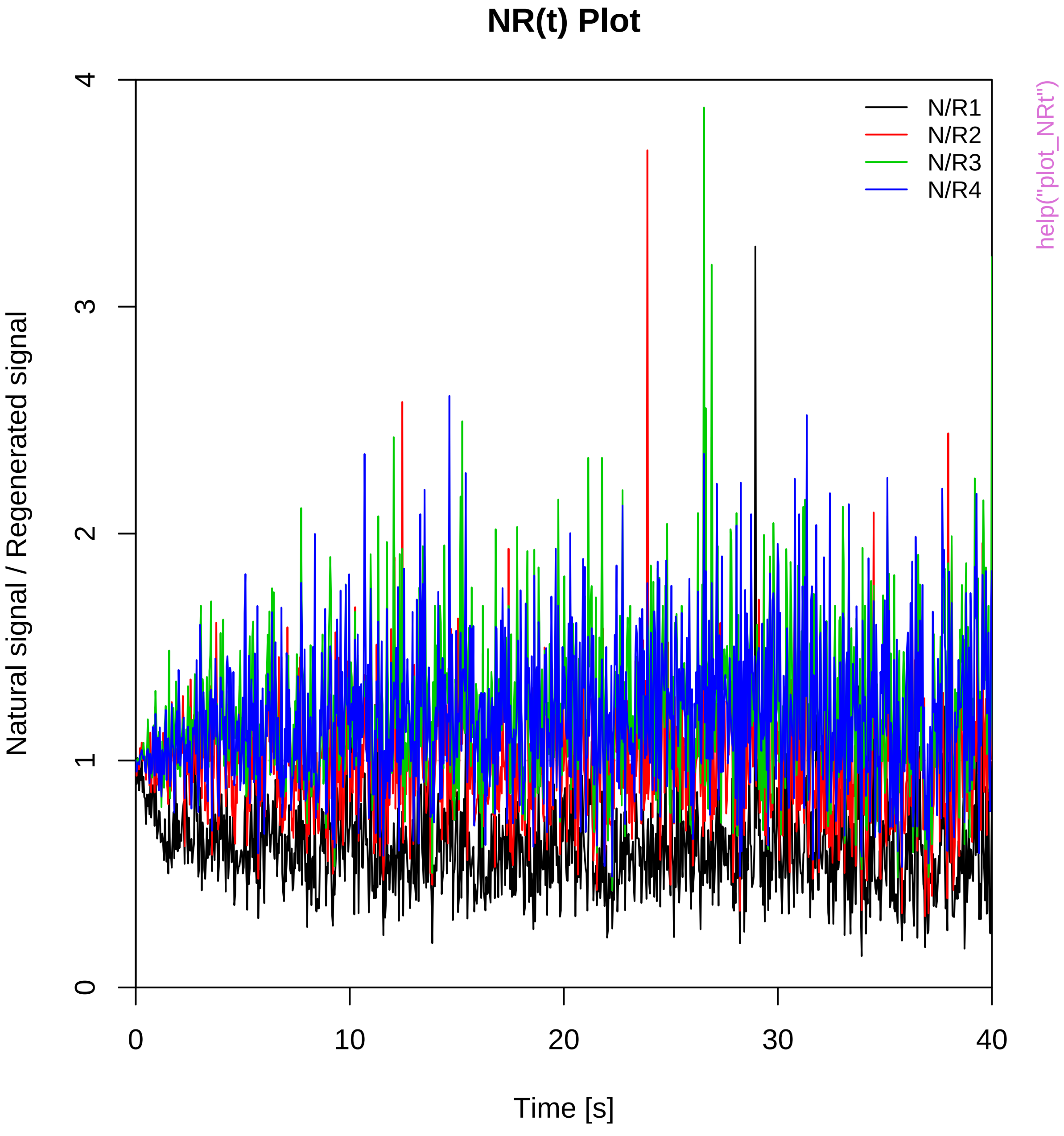
D_e distribution
n = 25 | median = 126.34 | skewness = 1.34 | in 2 sigma = 96 %
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D_e [Gy]

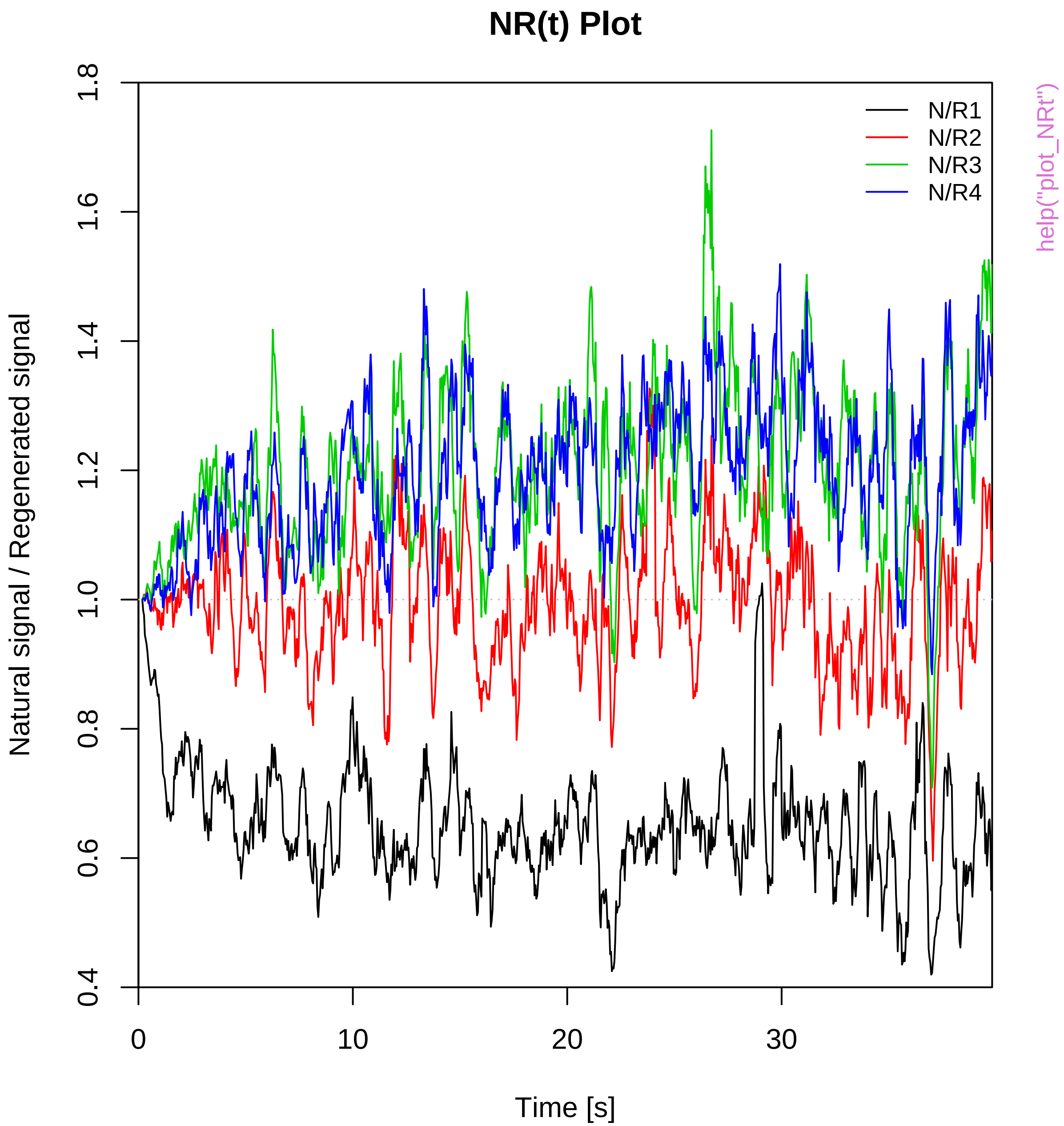

De distribution
n = 25
mean = 129.25
rel. sd = 9.54 %
se = 2.47
help("plot_KDE")
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
110
120
130
140
150
160
170
De [Gy]

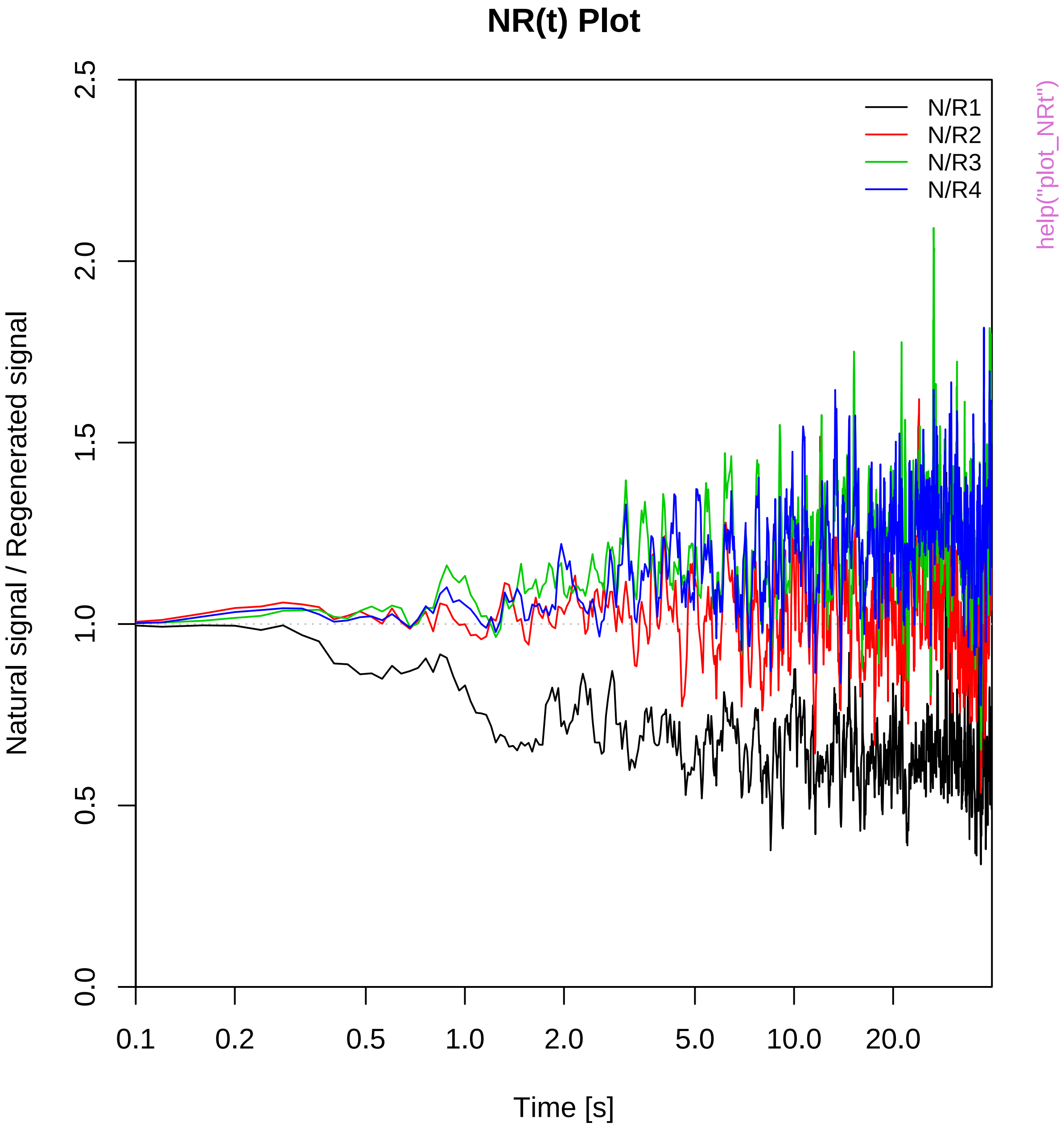

D_e distribution
Density
0.00
0.02
0.04
0.06
100
120
140
160
180
D_e [Gy]
Cumulative frequency
2
4
6
8
10
12
14
help("plot_KDE")

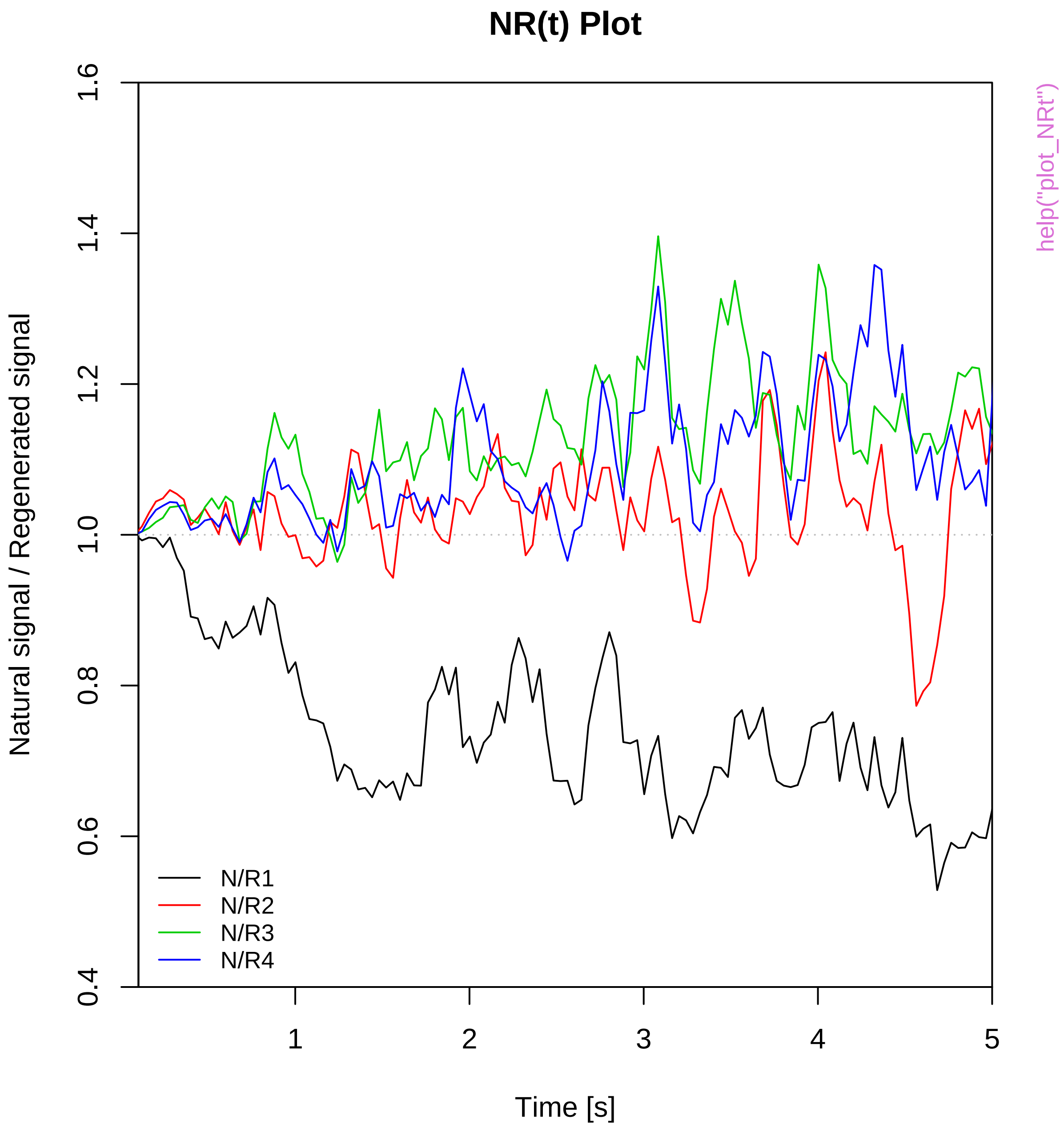

D_e distribution
n = 15
median = 125.06
skewness = 0.82
n = 10
median = 164.24
skewness = −0.65
help("plot_KDE")
Density
0.00
0.02
0.04
0.06
Cumulative frequency
2
4
6
8
10
12
14
100
120
140
160
180
D_e [Gy]

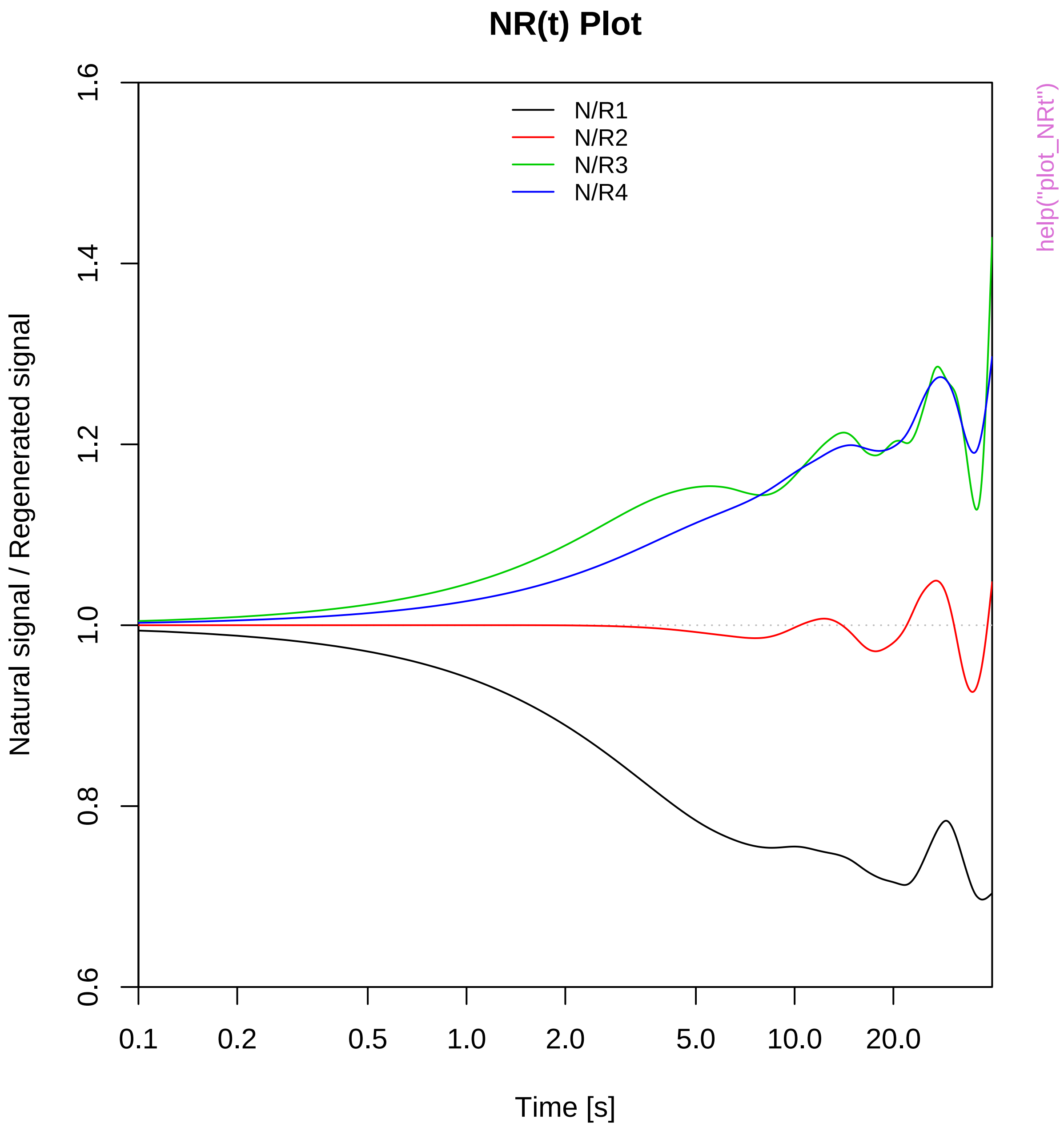

D_e distribution
Density
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Cumulative frequency
5
10
15
20
25
help("plot_KDE")
110
120
130
140
150
160
170
D_e [Gy]

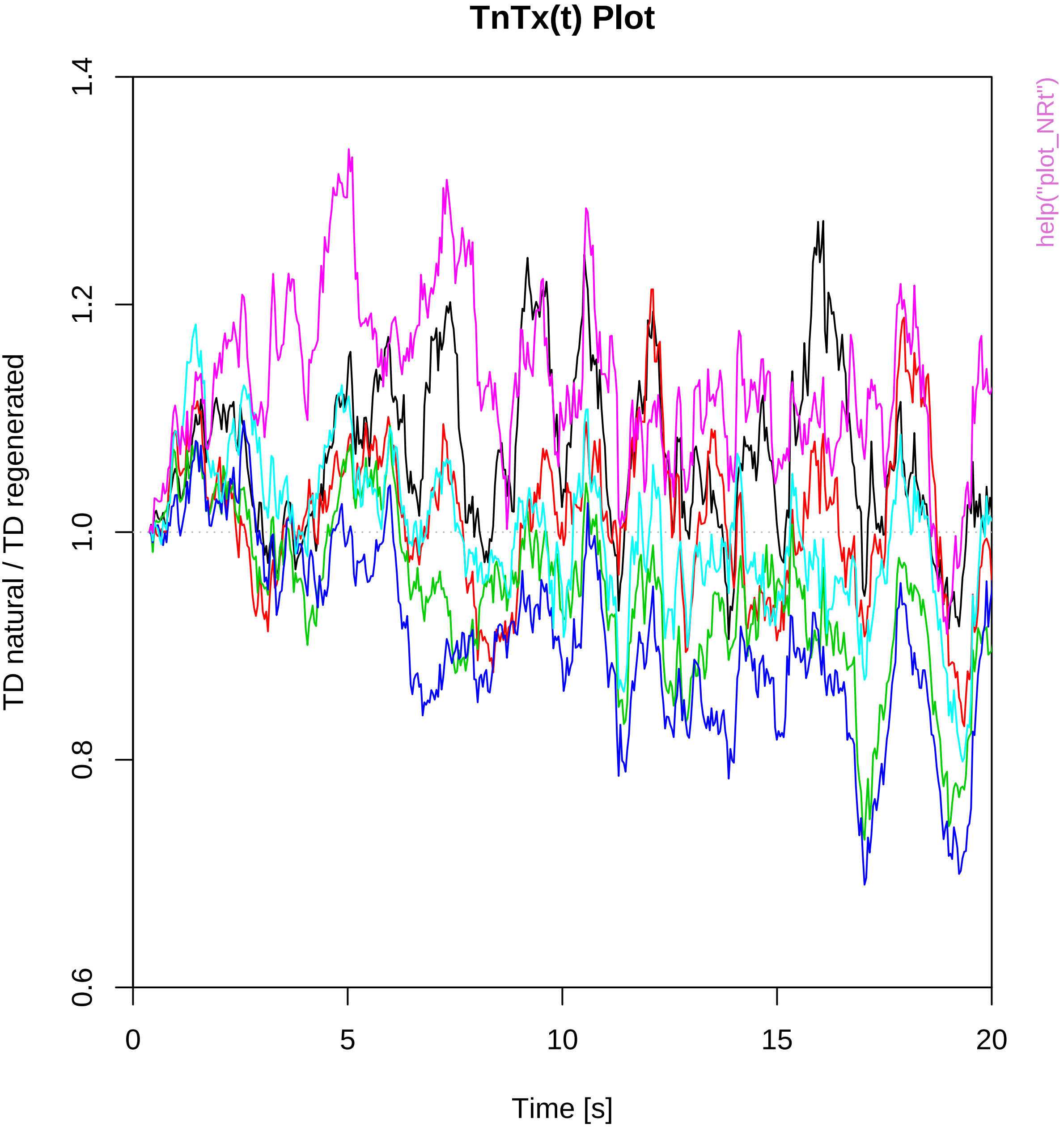

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0
1
2
3
4
0
10
20
30
40
Time [s]

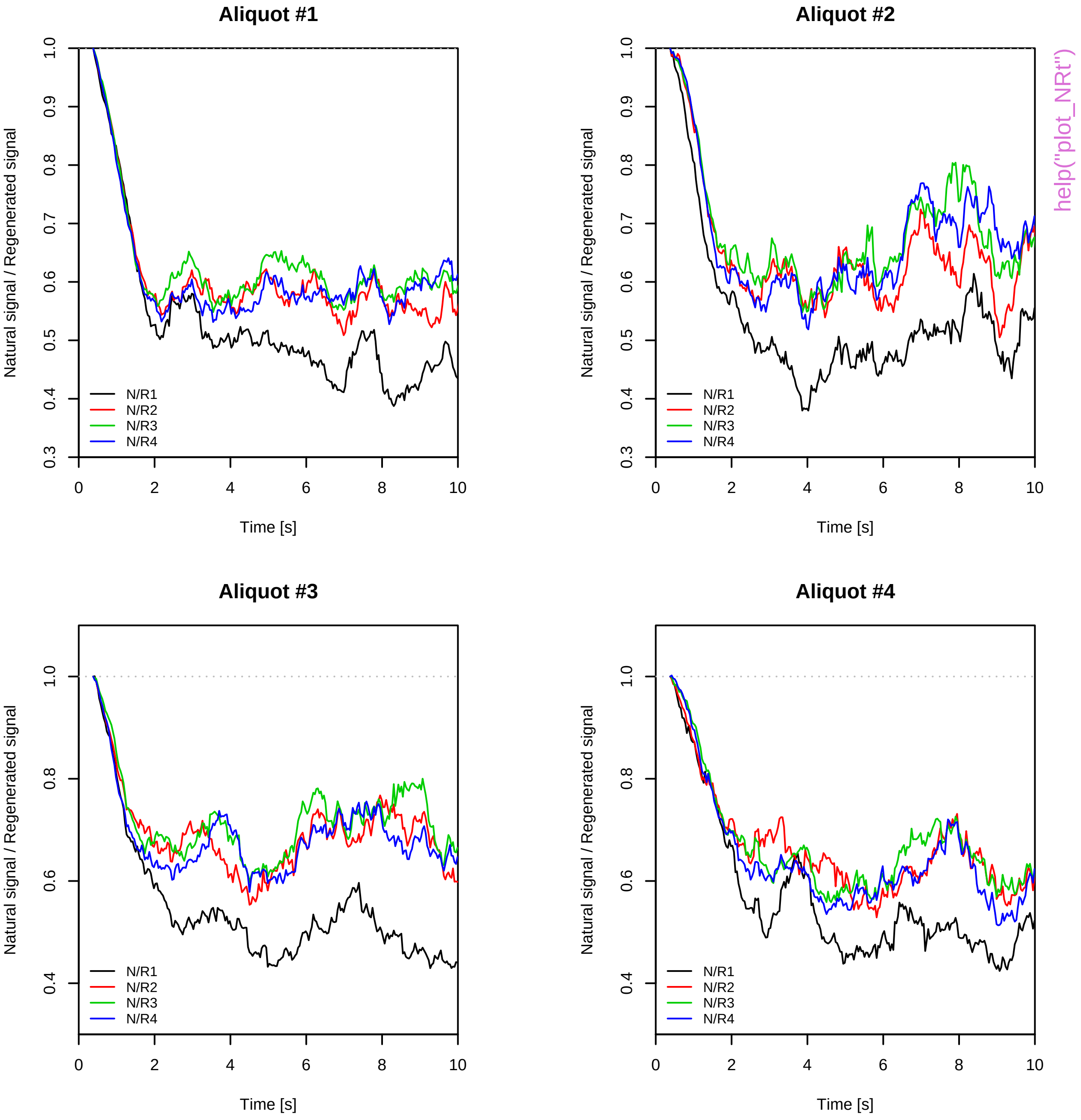

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0
10
20
30
Time [s]

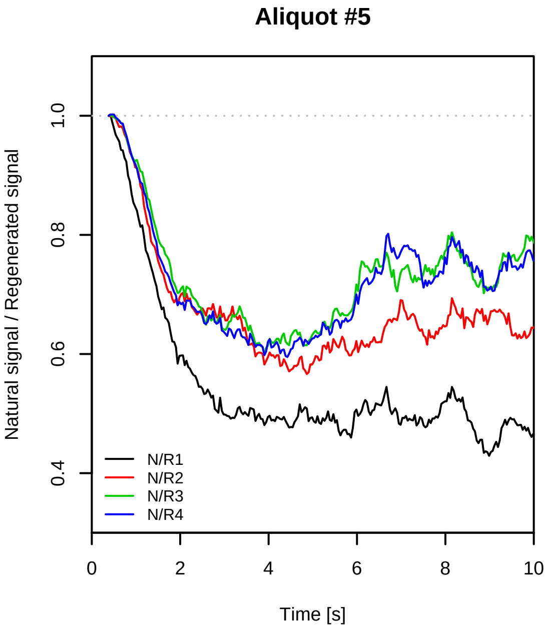

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0.0
0.5
1.0
1.5
2.0
2.5
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0
Time [s]

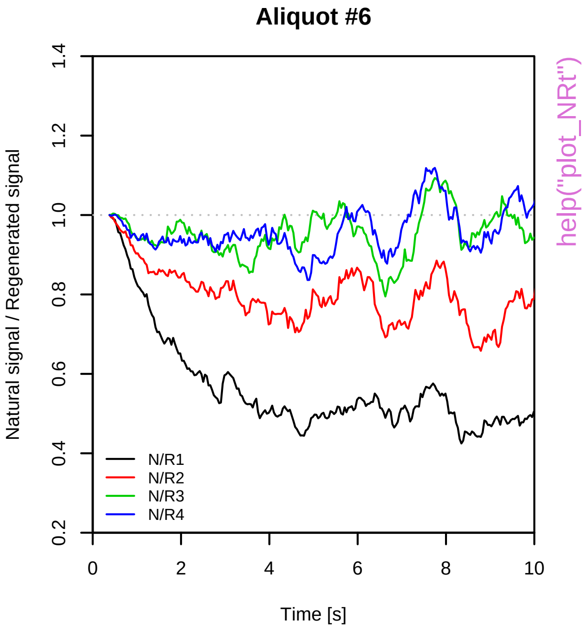

NR(t) Plot
help("plot_NRt")
Natural signal / Regenerated signal
Time [s]
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1
2
3
4
5
N/R1
N/R2
N/R3
N/R4

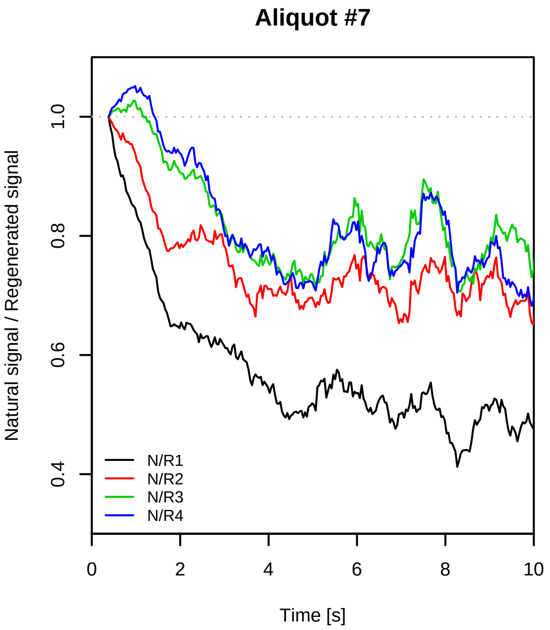

NR(t) Plot
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")
Natural signal / Regenerated signal
0.6
0.8
1.0
1.2
1.4
1.6
0.1
0.2
0.5
1.0
2.0
5.0
10.0
20.0
Time [s]

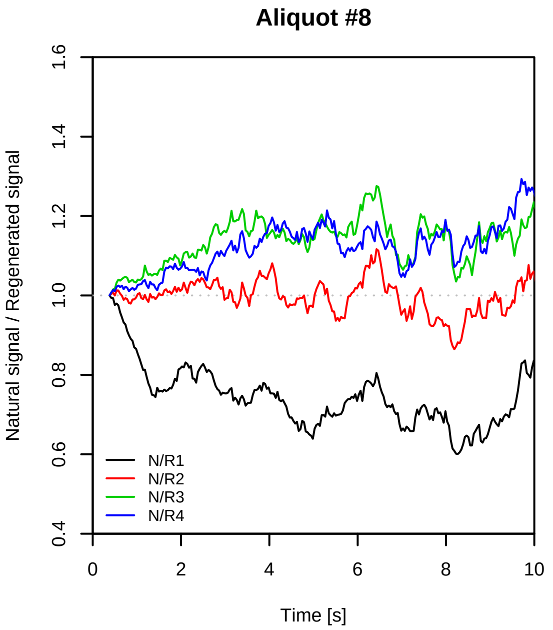

TnTx(t) Plot
TD natural / TD regenerated
1.4
1.2
1.0
0.8
0.6
0
5
10
15
20
Time [s]
help("plot_NRt")

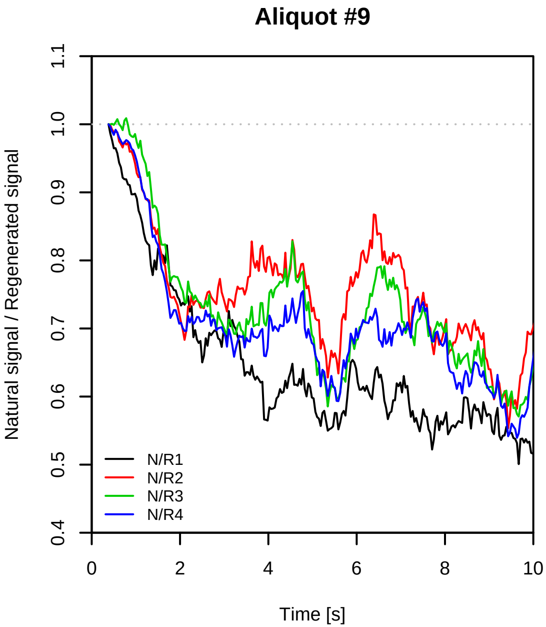

Aliquot #1
Aliquot #2
Aliquot #3
Aliquot #4
help("plot_NRt")
Natural signal / Regenerated signal
Time [s]
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4

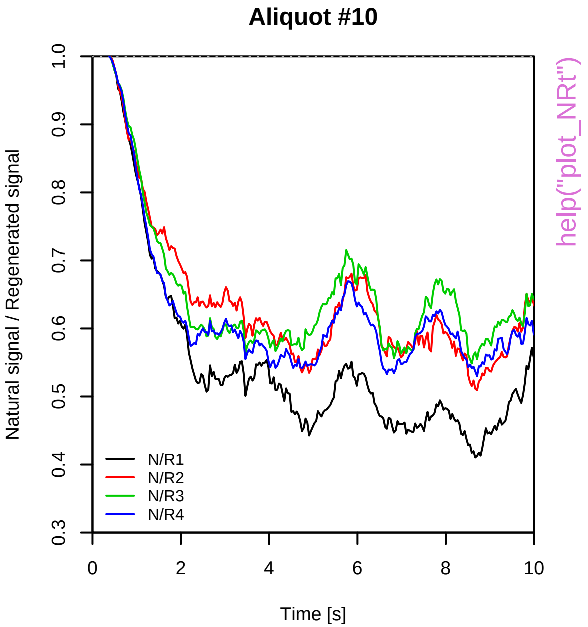

Aliquot #5
Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
Time [s]
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4

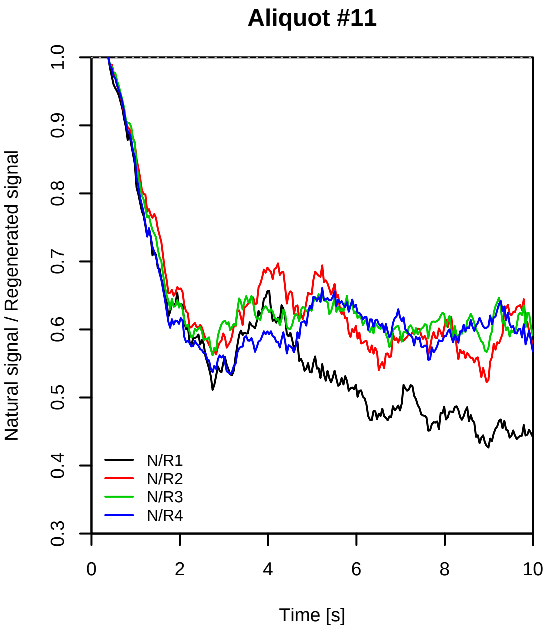

Aliquot #6
help("plot_NRt")
Natural signal / Regenerated signal
0.2
0.4
0.6
0.8
1.0
1.2
1.4
Time [s]
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4

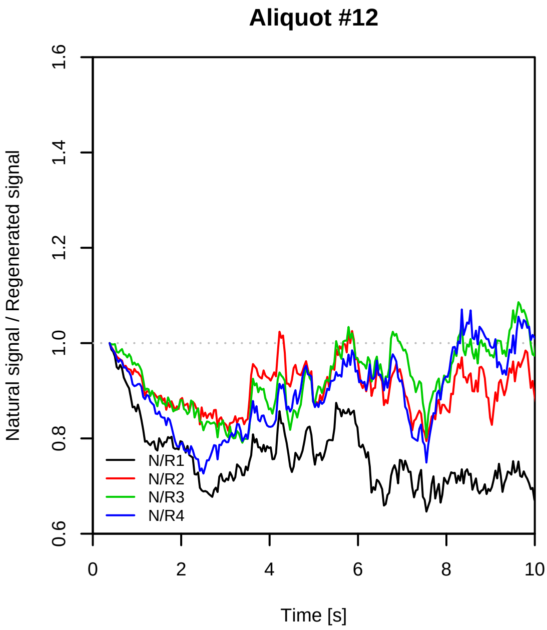

Aliquot #7
Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
Time [s]
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4

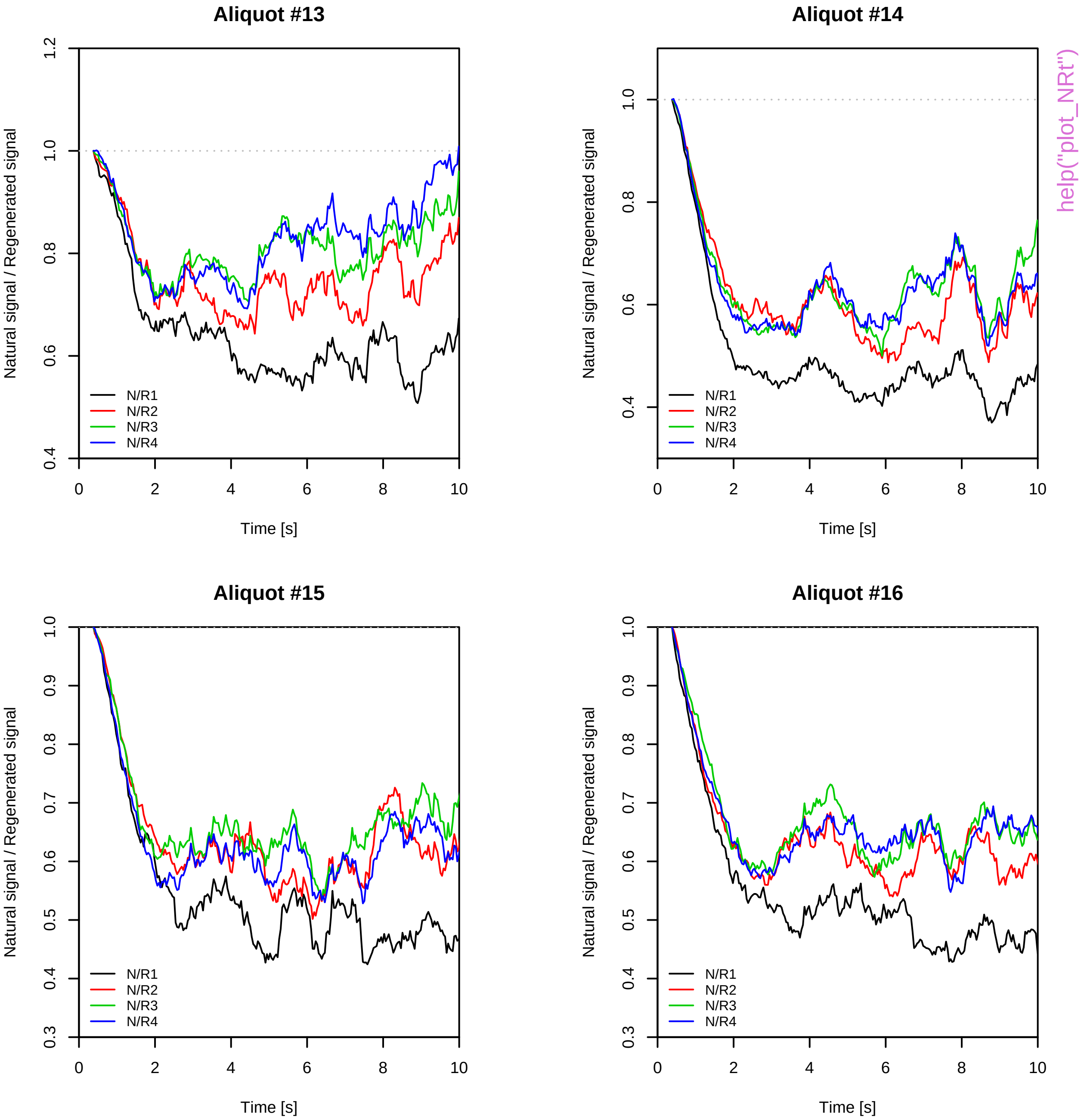

Aliquot #8
Natural signal / Regenerated signal
0.4
0.6
0.8
1.0
1.2
1.4
1.6
Time [s]
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4

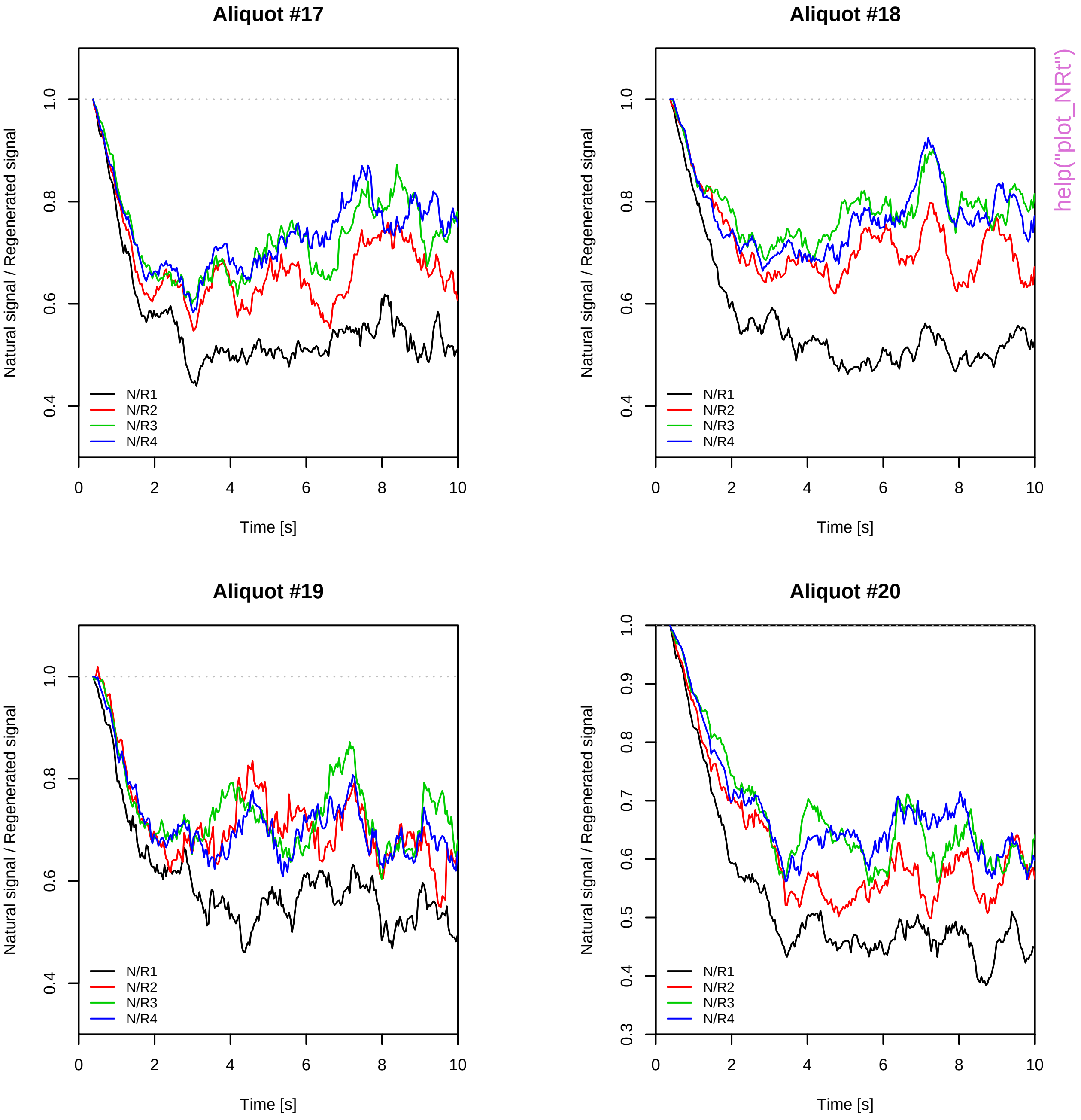

Aliquot #9

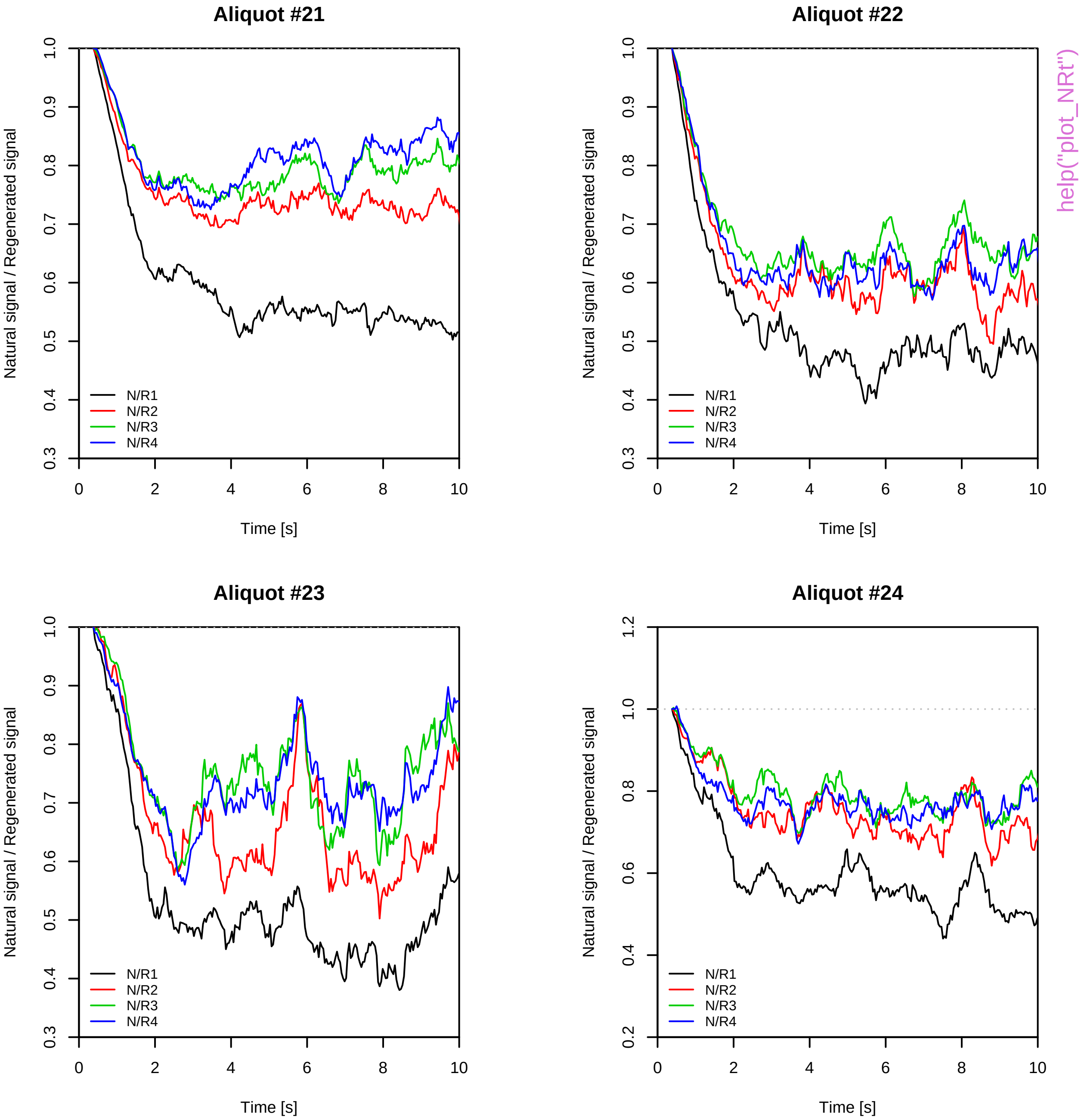

Aliquot #10

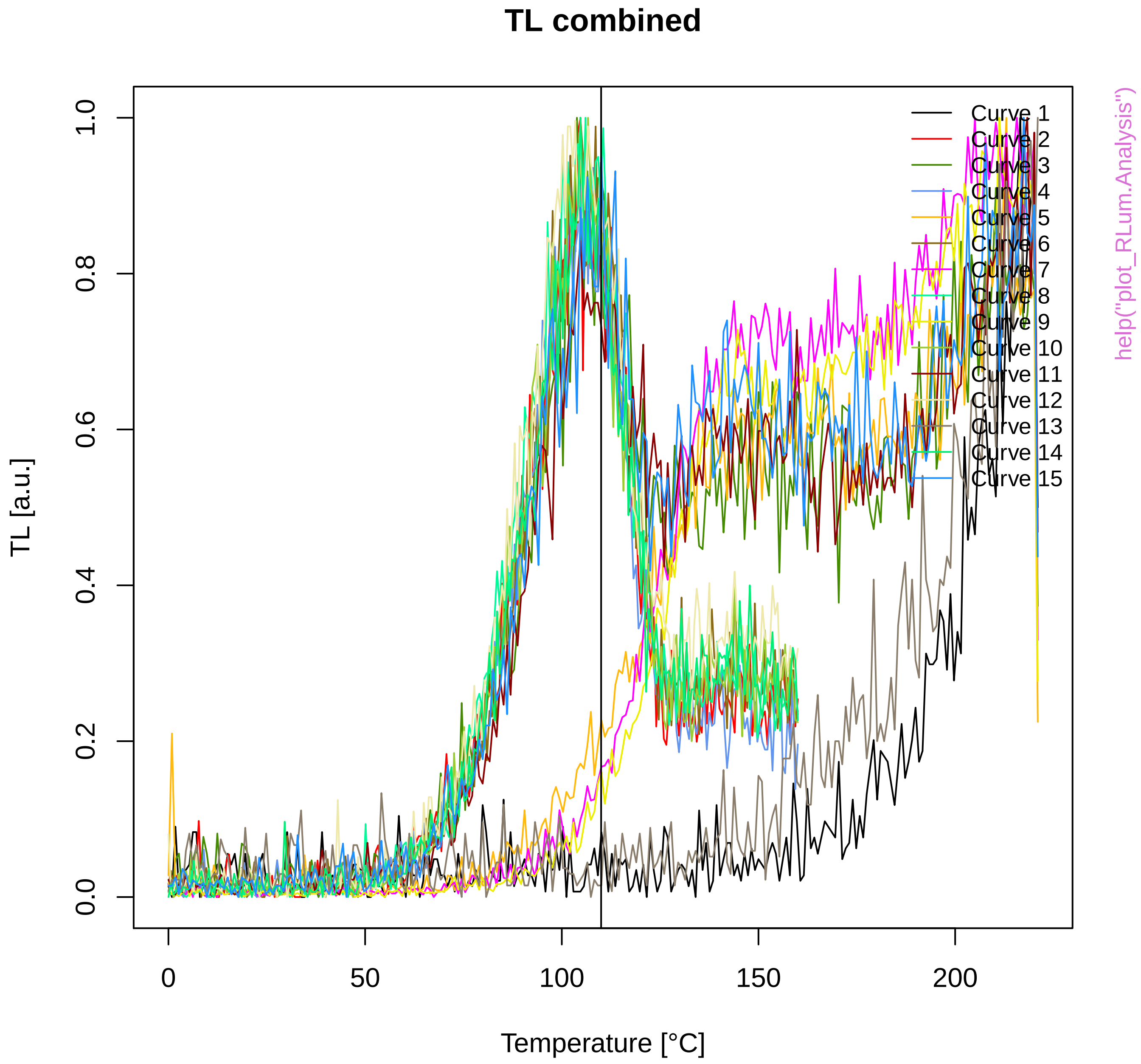

Aliquot #11

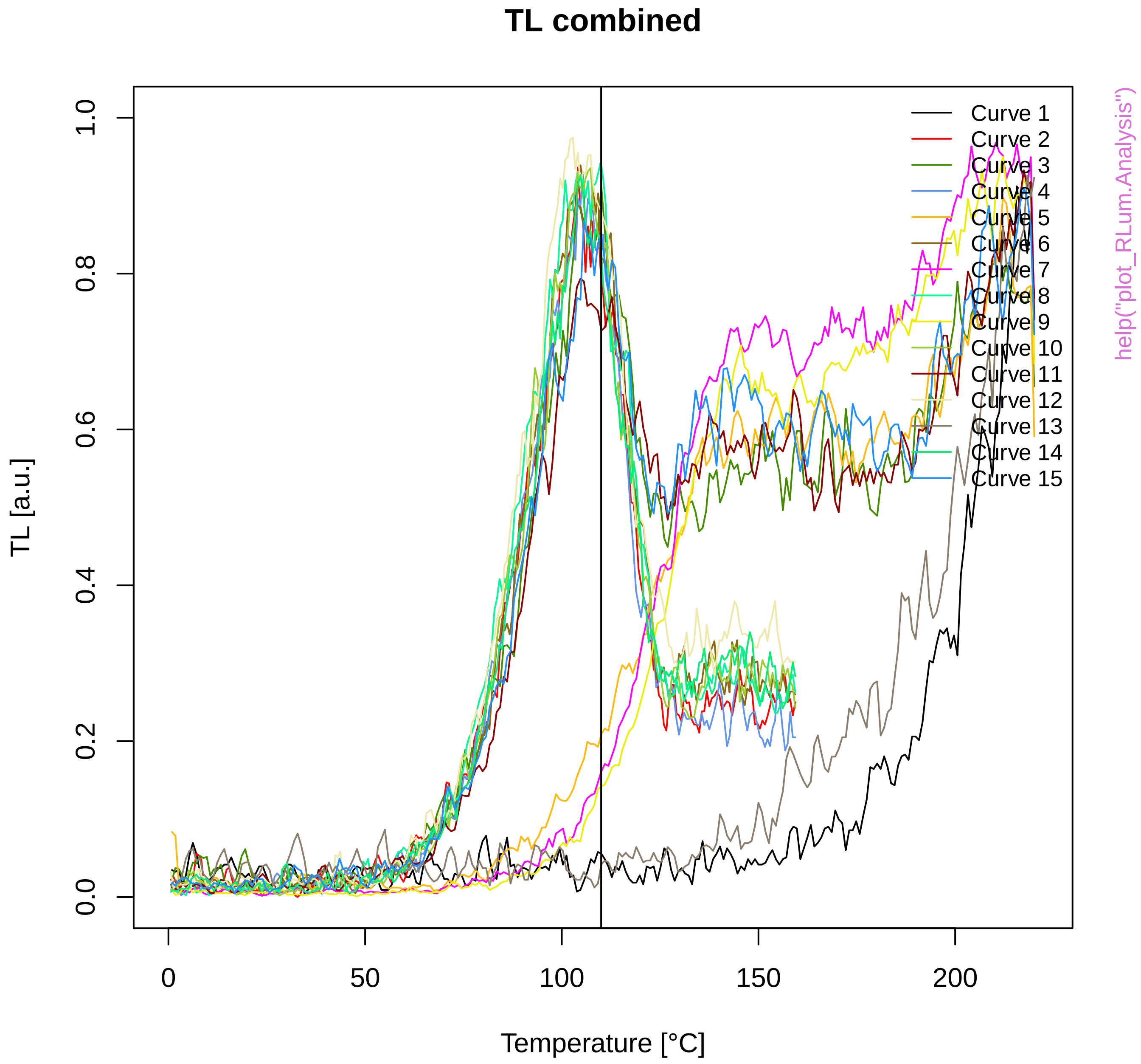

Aliquot #12

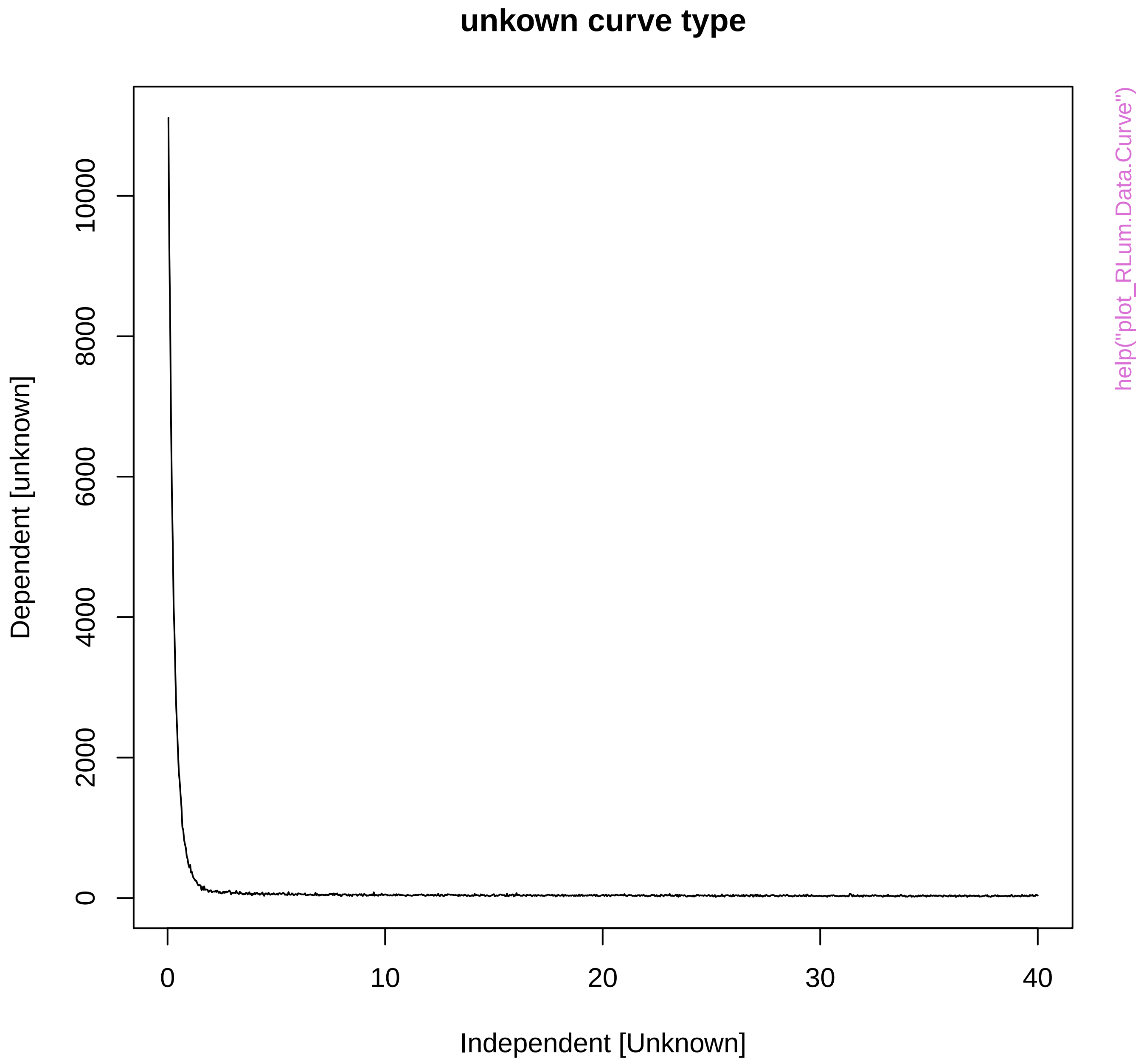

Aliquot #13
Aliquot #14
Aliquot #15
Aliquot #16
Natural signal / Regenerated signal
Time [s]
N/R1
N/R2
N/R3
N/R4
0
2
4
6
8
10
0.4
0.6
0.8
1.0
1.2
0.3
0.5
0.7
0.9
help("plot_NRt")

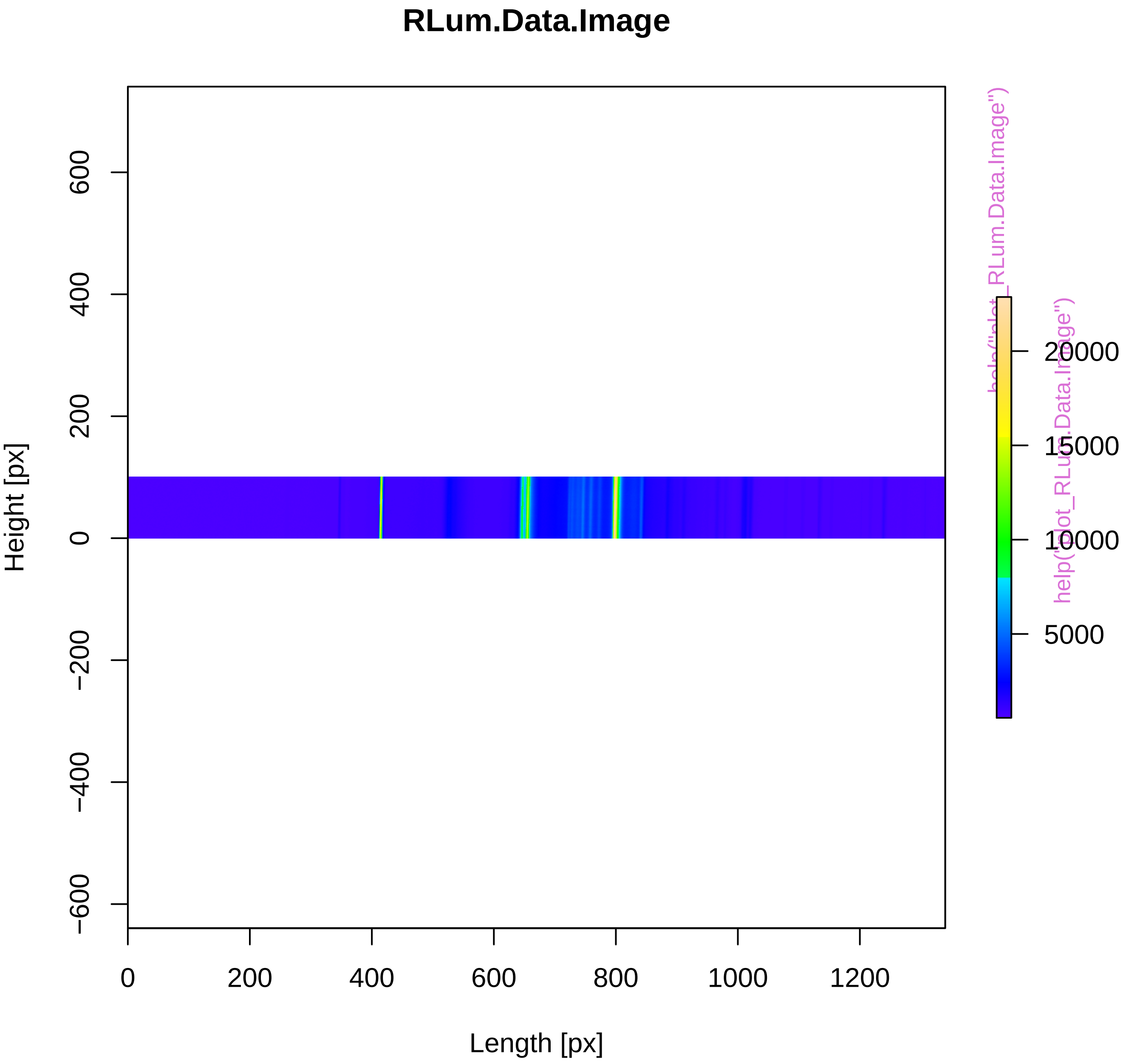

Aliquot #17
Aliquot #18
Aliquot #19
Aliquot #20
Natural signal / Regenerated signal
Time [s]
0
2
4
6
8
10
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")

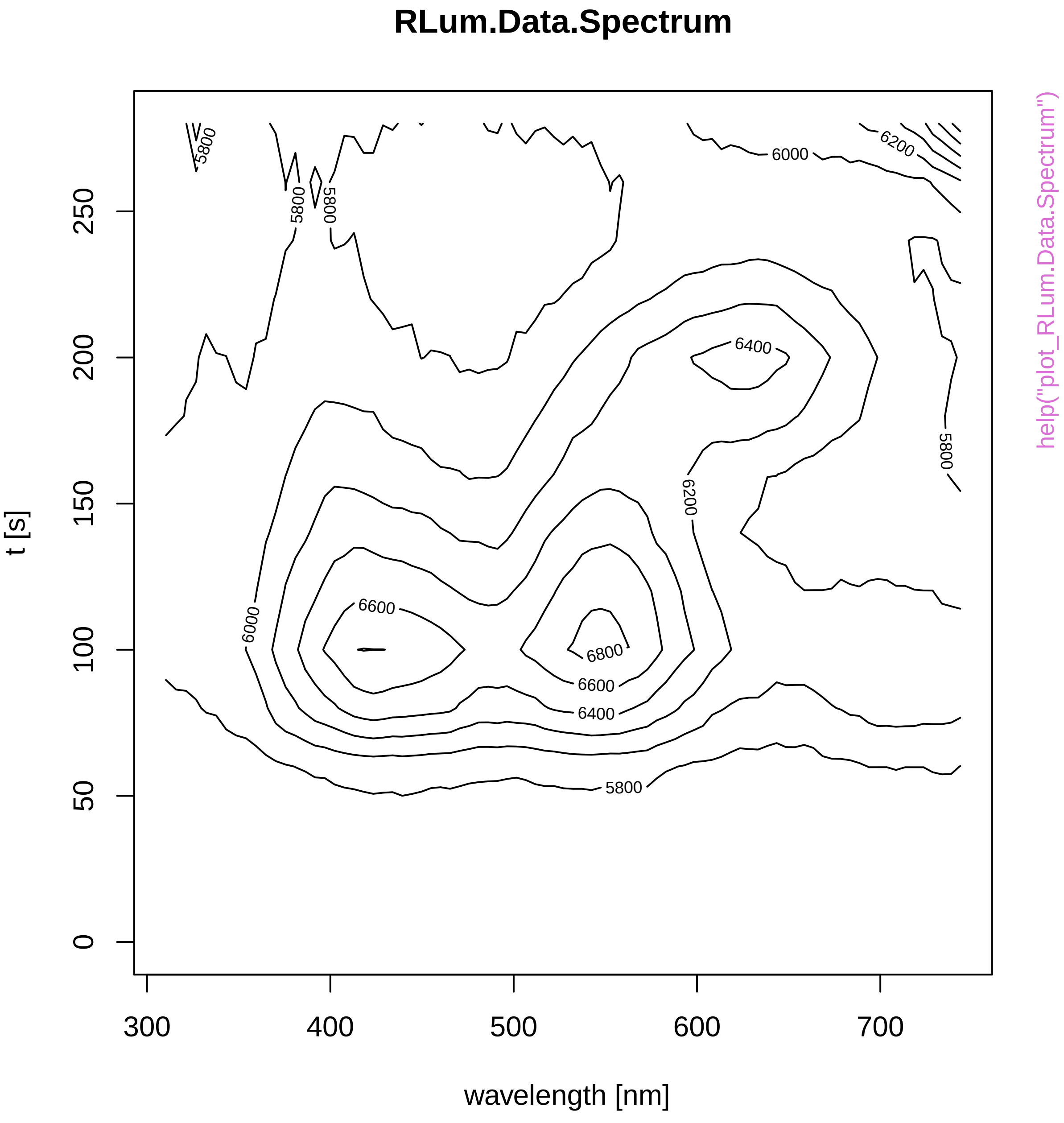

Aliquot #21
Aliquot #22
Aliquot #23
Aliquot #24
Natural signal / Regenerated signal
Time [s]
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
0.2
0.4
0.6
0.8
1.0
1.2
0
2
4
6
8
10
N/R1
N/R2
N/R3
N/R4
help("plot_NRt")


TL combined
TL [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Temperature [°C]
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")

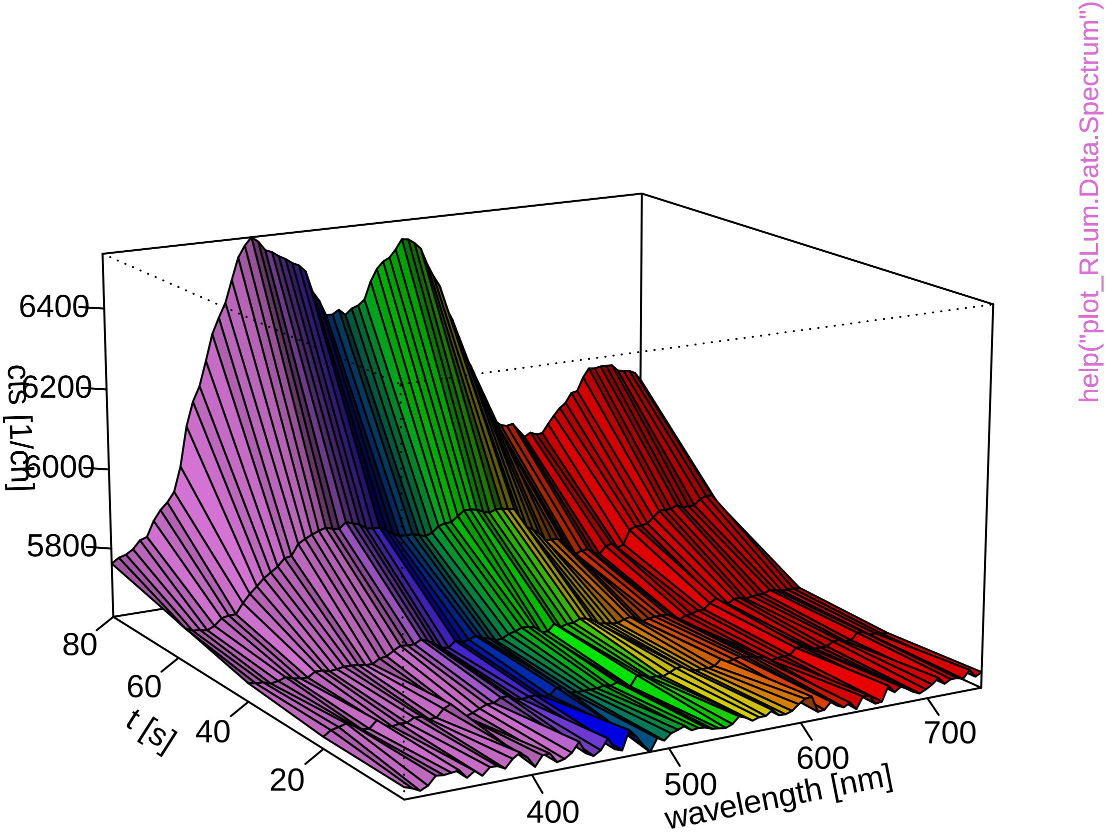

TL combined
TL [a.u.]
0.0
0.2
0.4
0.6
0.8
1.0
0
50
100
150
200
Temperature [°C]
Curve 1
Curve 2
Curve 3
Curve 4
Curve 5
Curve 6
Curve 7
Curve 8
Curve 9
Curve 10
Curve 11
Curve 12
Curve 13
Curve 14
Curve 15
help("plot_RLum.Analysis")

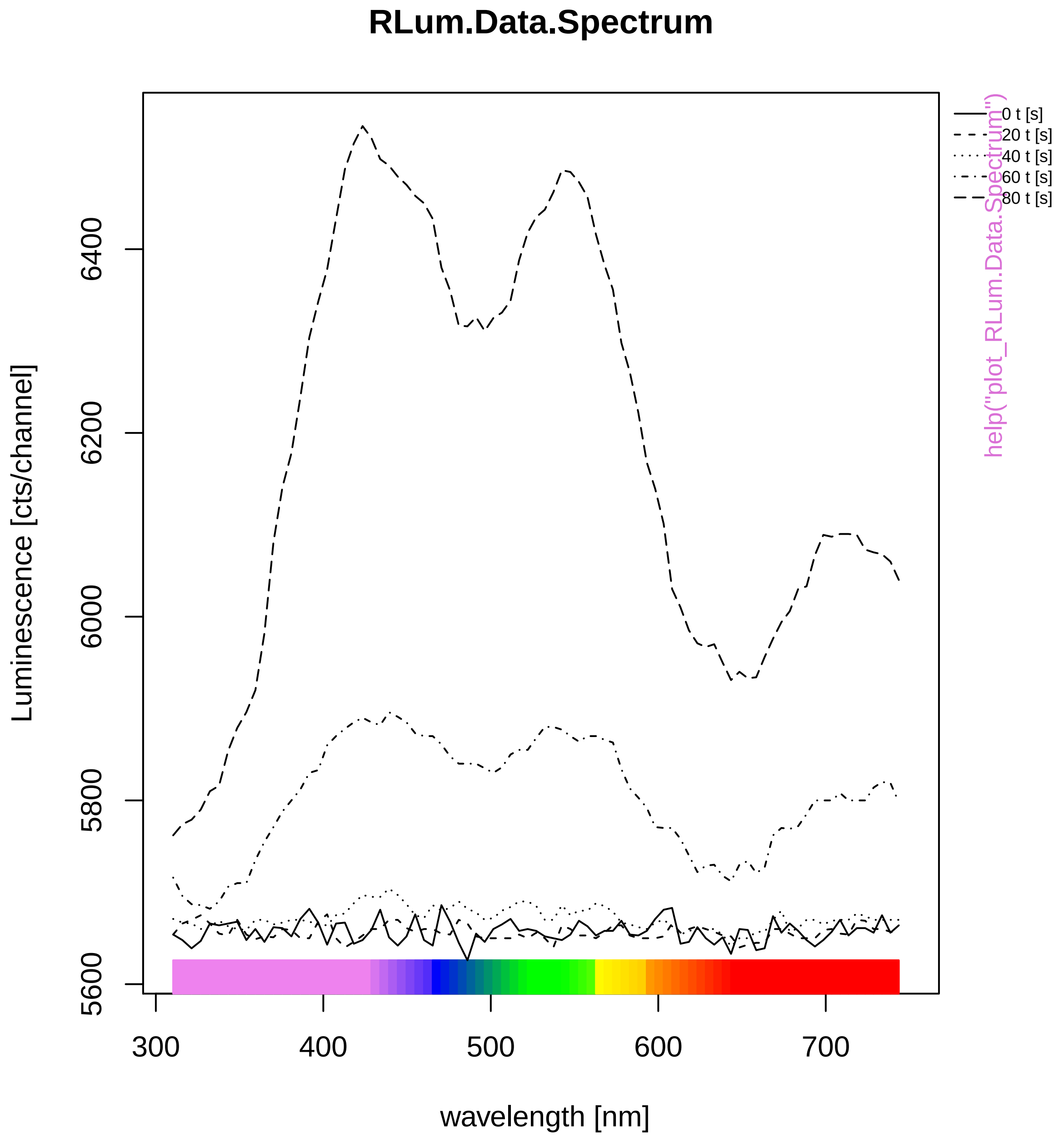

unkown curve type
Dependent [unknown]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Independent [Unknown]
help("plot_RLum.Data.Curve")

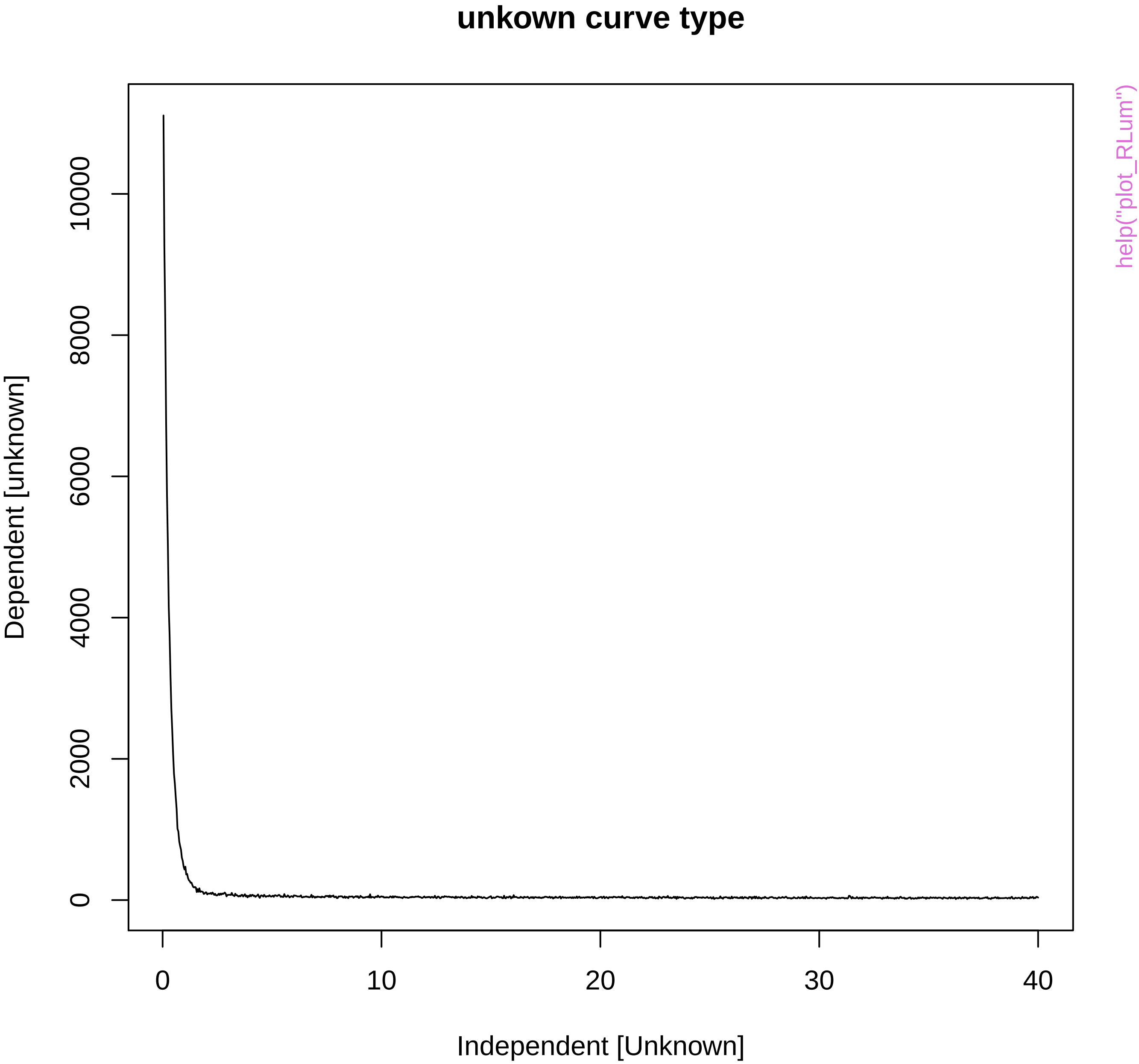

RLum.Data.Image
Height [px]
600
400
200
0
−200
−400
−600
Length [px]
0
200
400
600
800
1000
1200
20000
15000
10000
5000
help("plot_RLum.Data.Image")
help("plot_RLum.Data.Image")

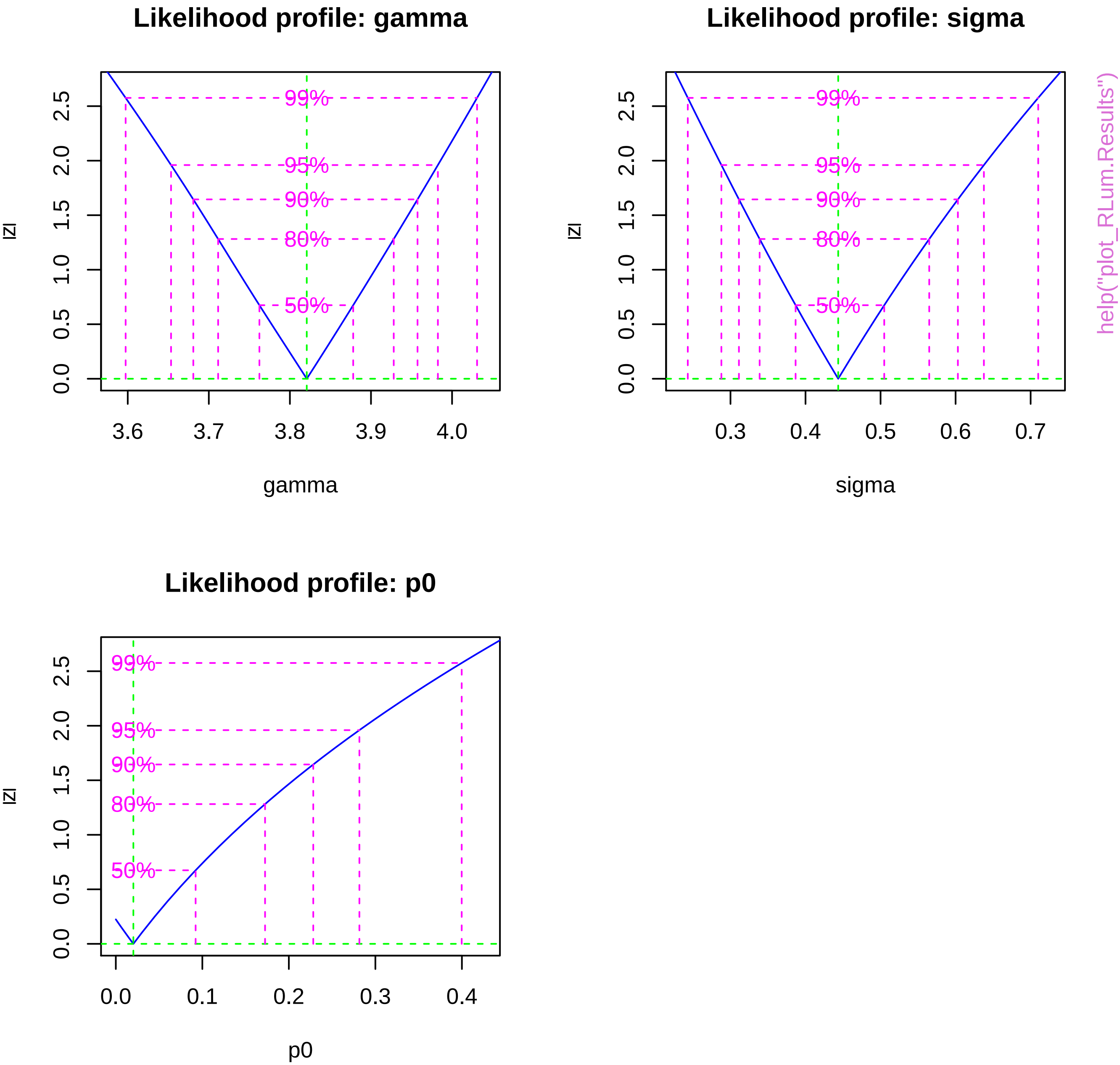

RLum.Data.Spectrum
t [s]
0
50
100
150
200
250
300
400
500
600
700
wavelength [nm]
5800
6000
6200
6400
6600
6800
help("plot_RLum.Data.Spectrum")

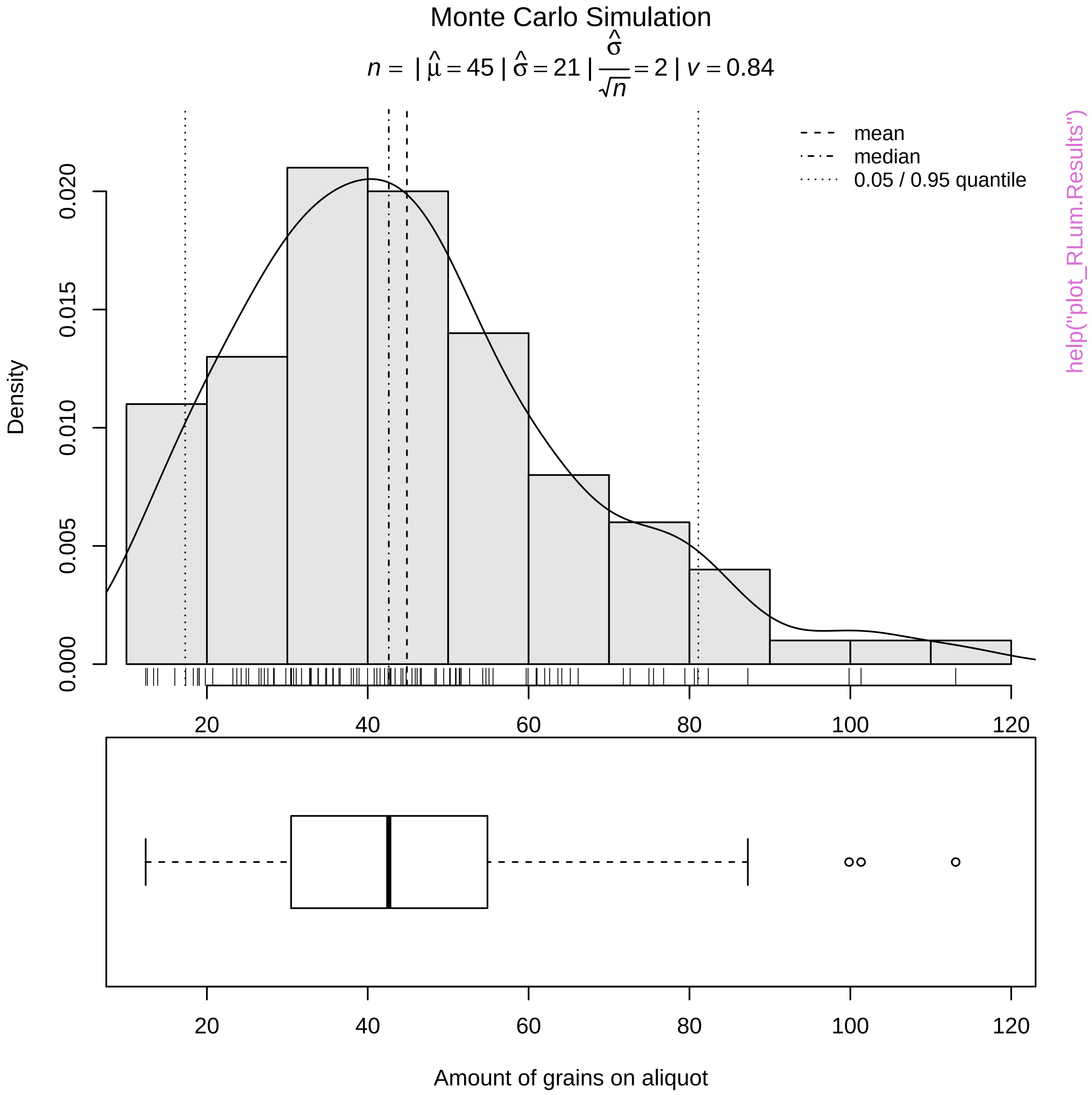
RLum.Data.Spectrum

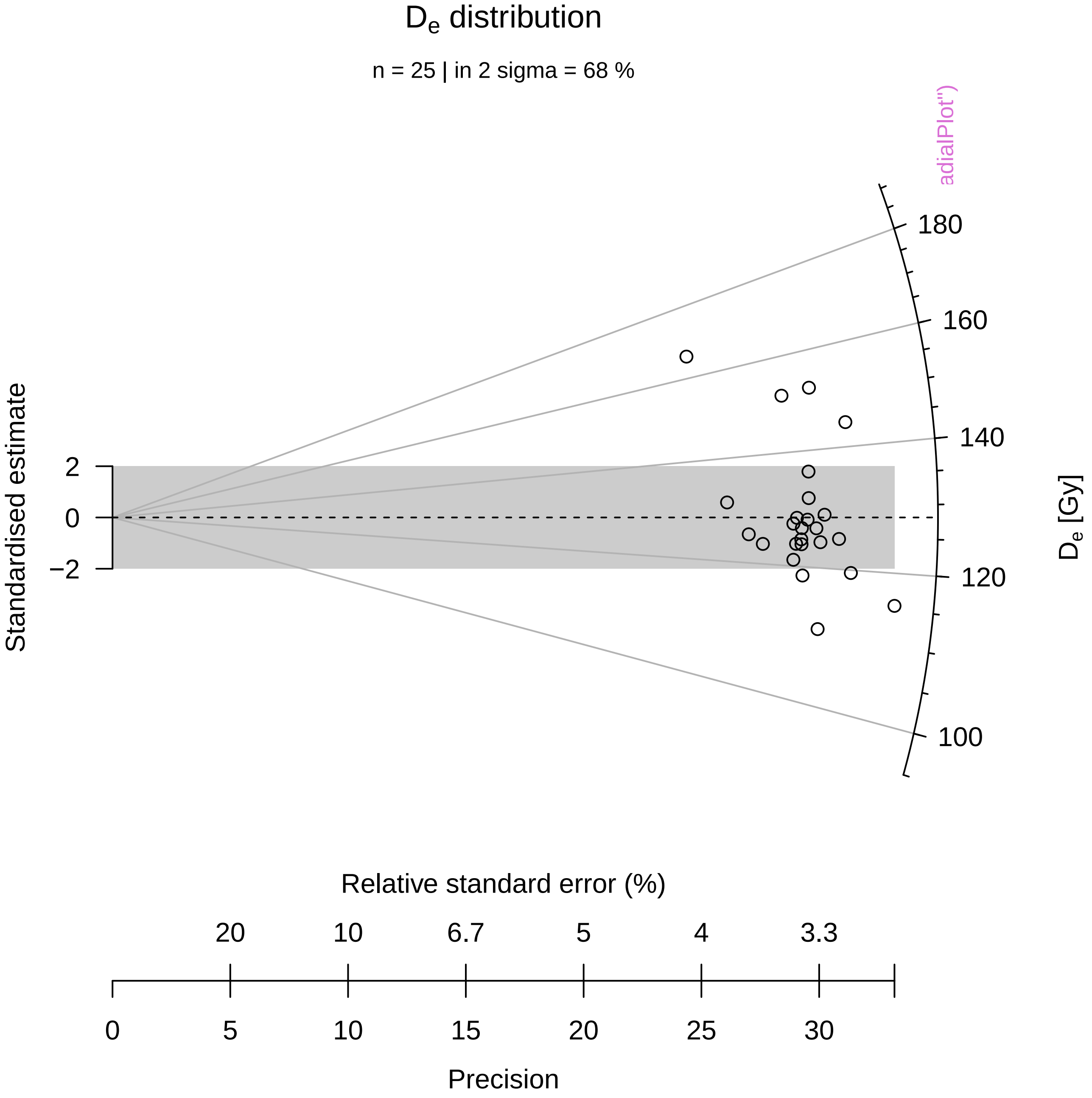


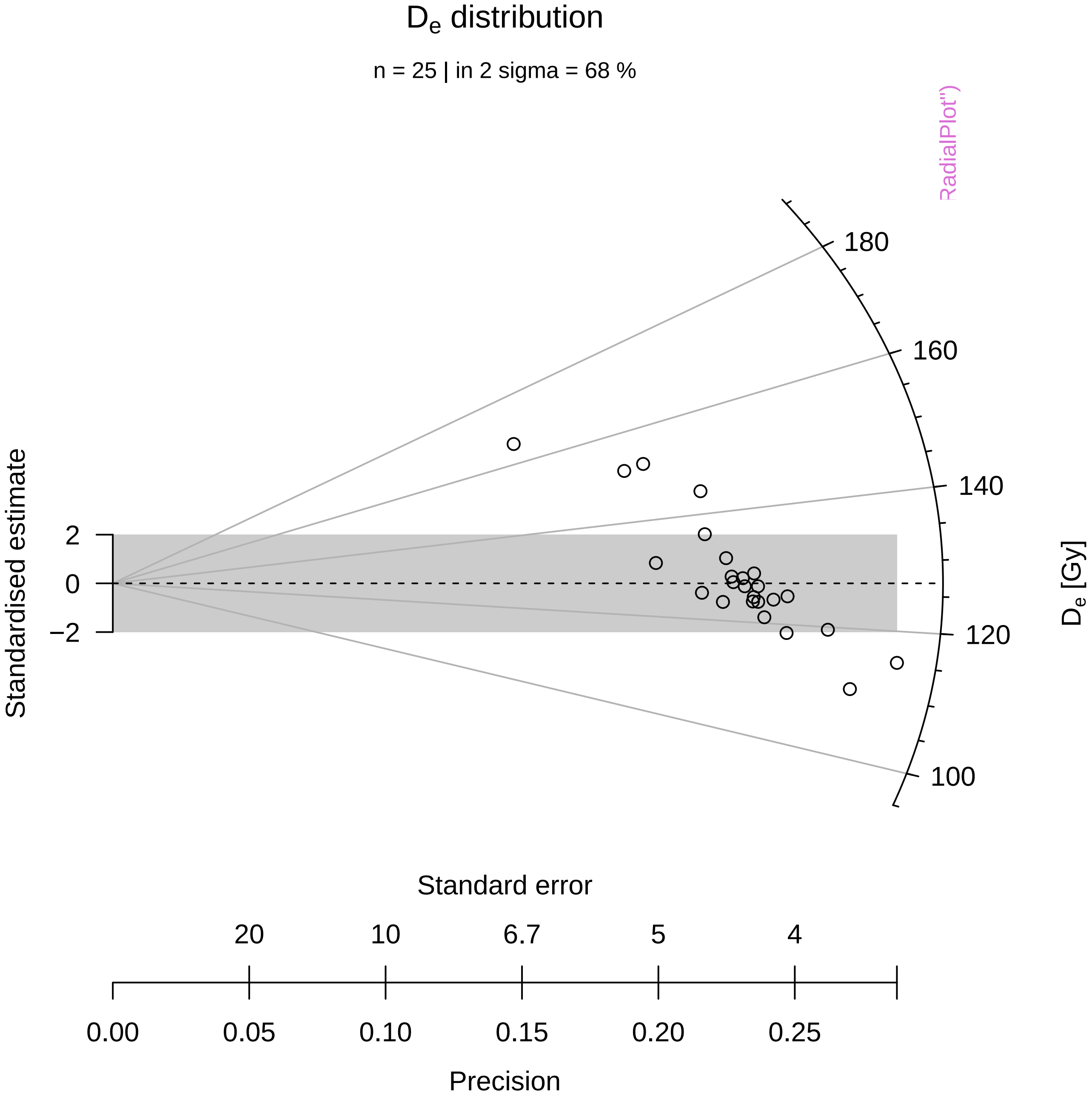

RLum.Data.Spectrum
Luminescence [cts/channel]
wavelength [nm]
5600
5800
6000
6200
6400
300
400
500
600
700
0 t [s]
20 t [s]
40 t [s]
60 t [s]
80 t [s]
help("plot_RLum.Data.Spectrum")

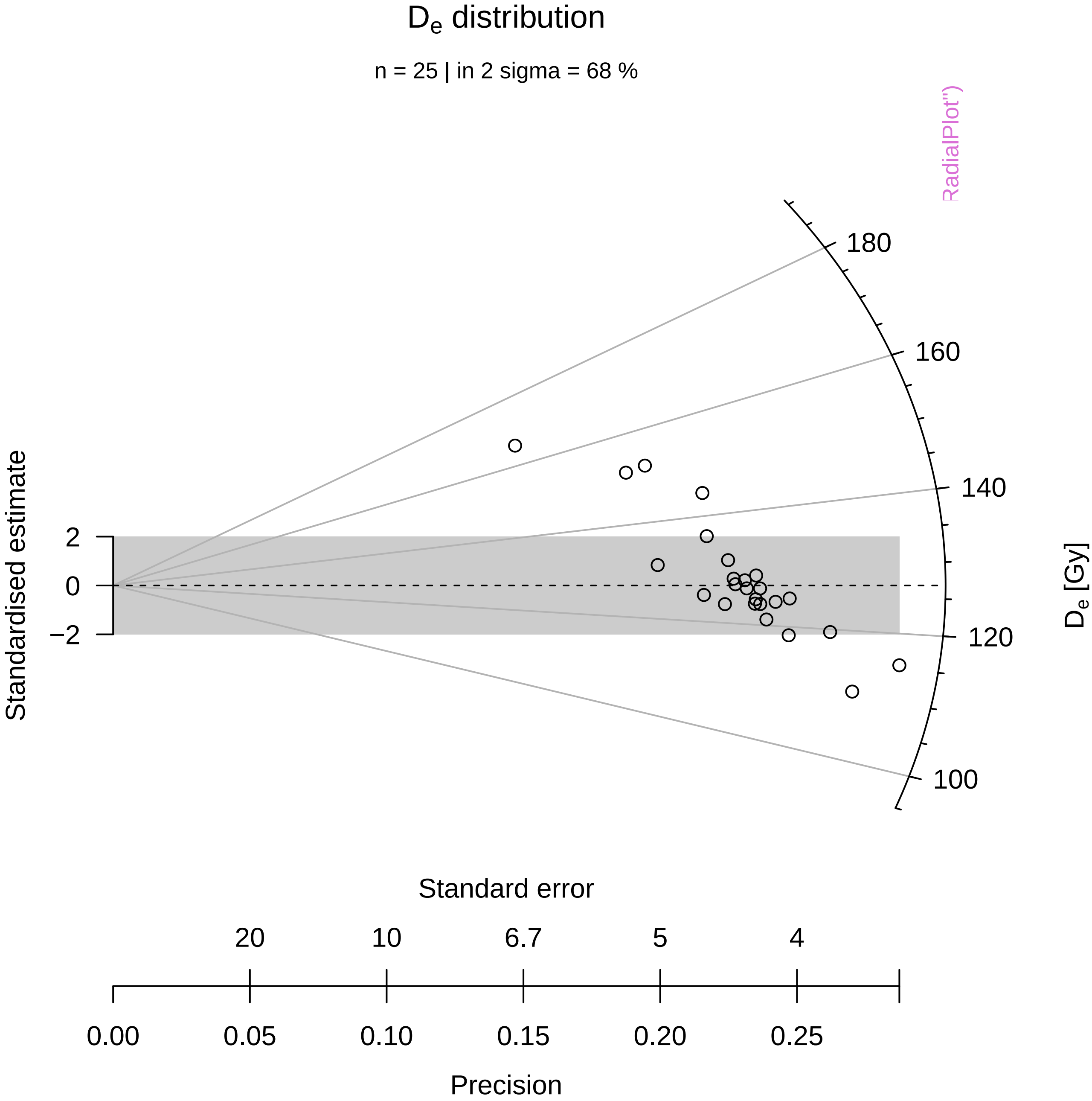

unkown curve type
Dependent [unknown]
0
2000
4000
6000
8000
10000
0
10
20
30
40
Independent [Unknown]
help("plot_RLum")

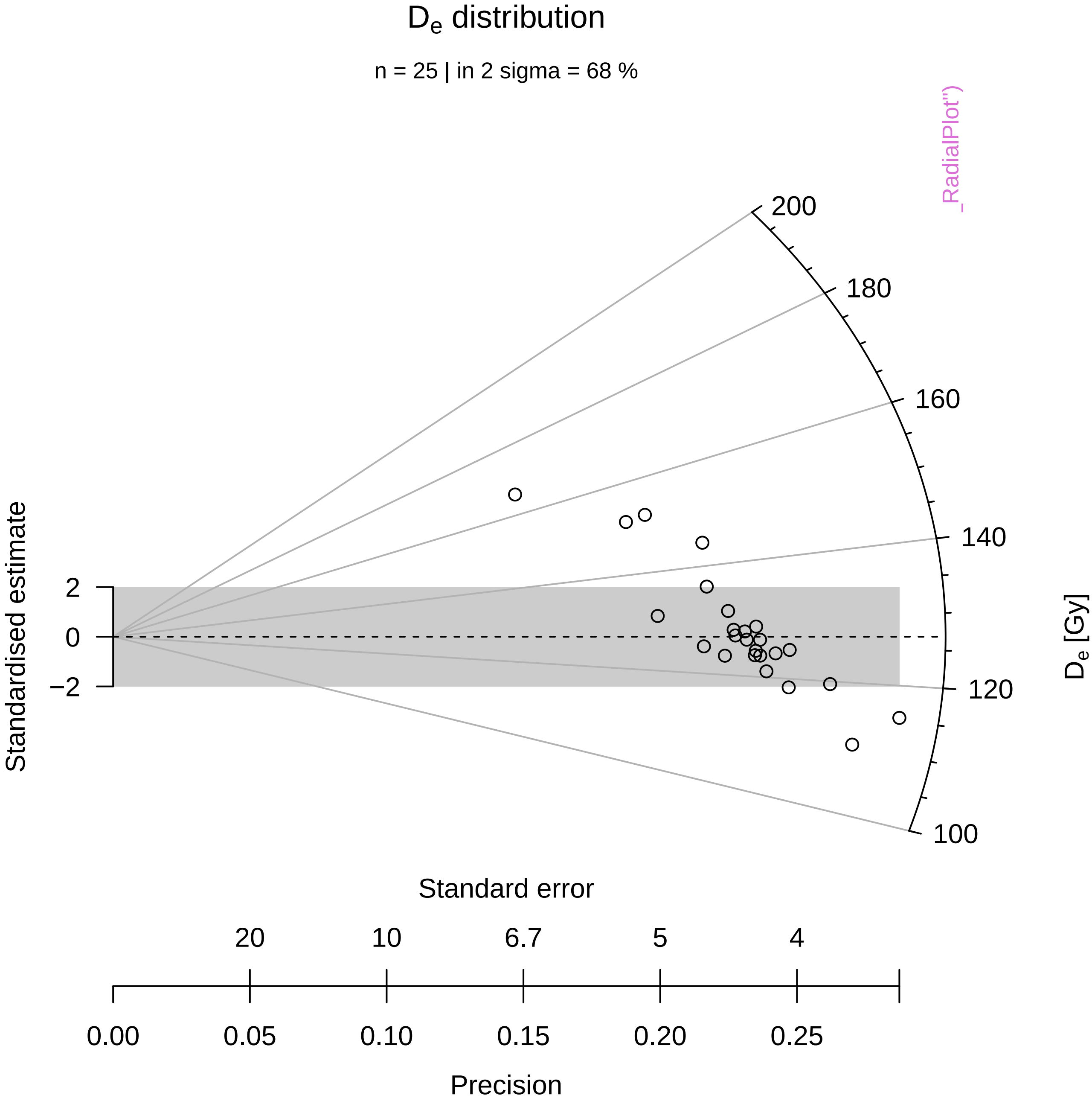

Likelihood profile: gamma
|z|
0.0
0.5
1.0
1.5
2.0
2.5
3.6
3.7
3.8
3.9
4.0
gamma
99%
95%
90%
80%
50%
Likelihood profile: sigma
|z|
0.0
0.5
1.0
1.5
2.0
2.5
0.3
0.4
0.5
0.6
0.7
sigma
99%
95%
90%
80%
50%
help("plot_RLum.Results")
Likelihood profile: p0
|z|
0.0
0.5
1.0
1.5
2.0
2.5
0.0
0.1
0.2
0.3
0.4
p0
99%
95%
90%
80%
50%

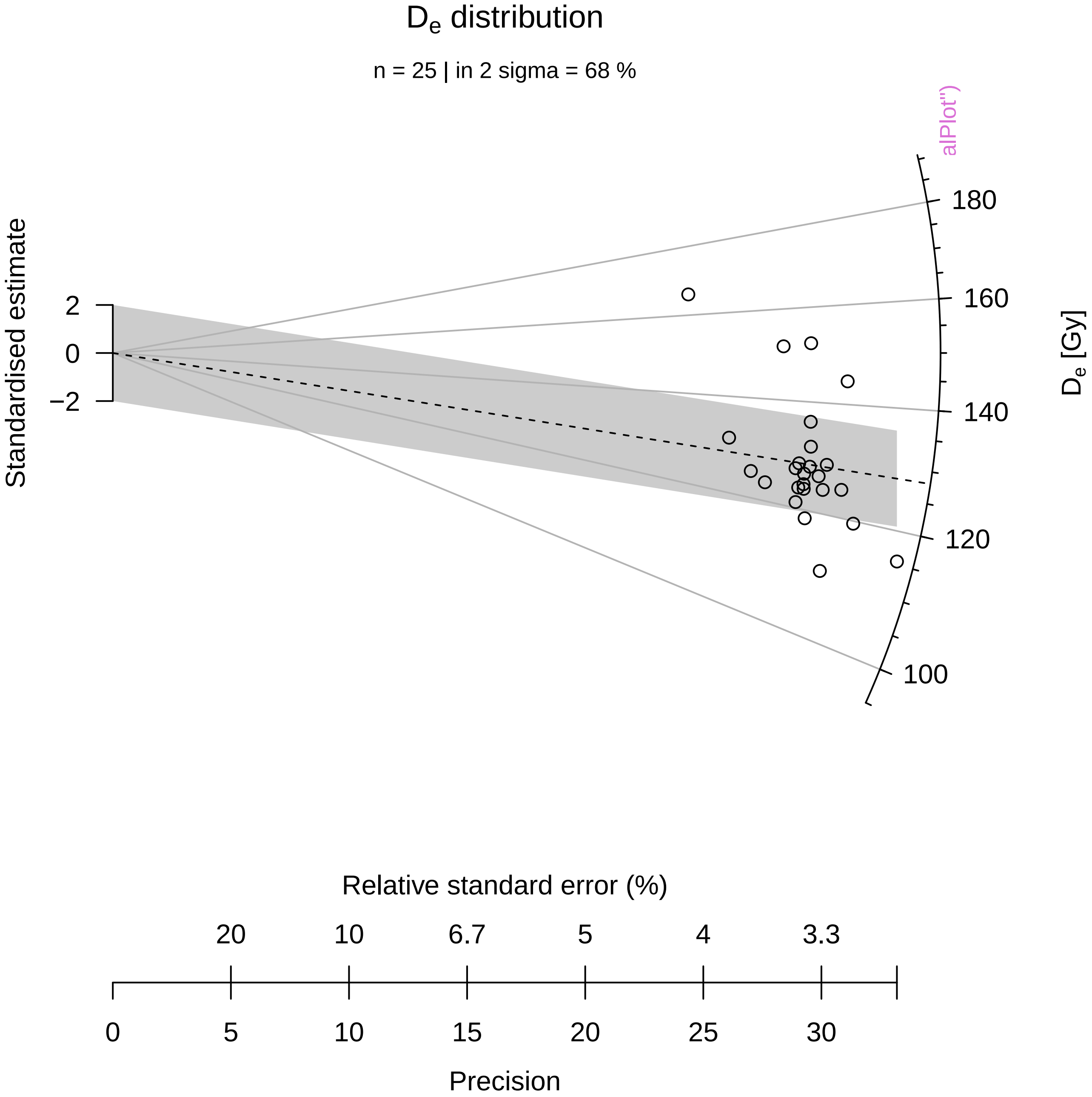

Monte Carlo Simulation
$n = \ | \ \hat{\mu} = 45 \ | \ \hat{\sigma} = 21 \ | \ \frac{\hat{\sigma}}{\sqrt{n}} = 2 \ | \ v = 0.84$
mean
median
0.05 / 0.95 quantile
help("plot_RLum.Results")
Density
0.000
0.005
0.010
0.015
0.020
20
40
60
80
100
120
20
40
60
80
100
120
Amount of grains on aliquot

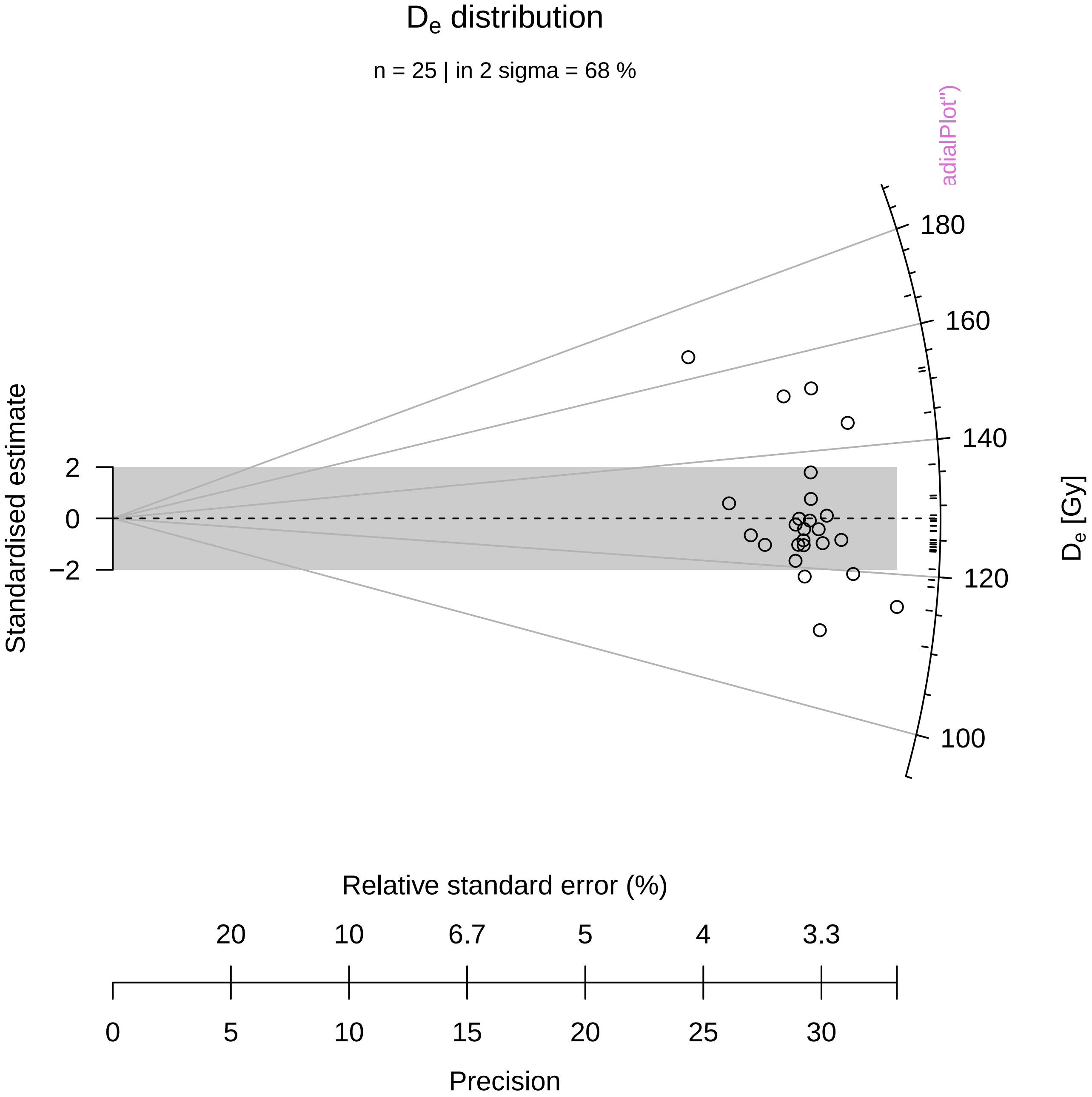

D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

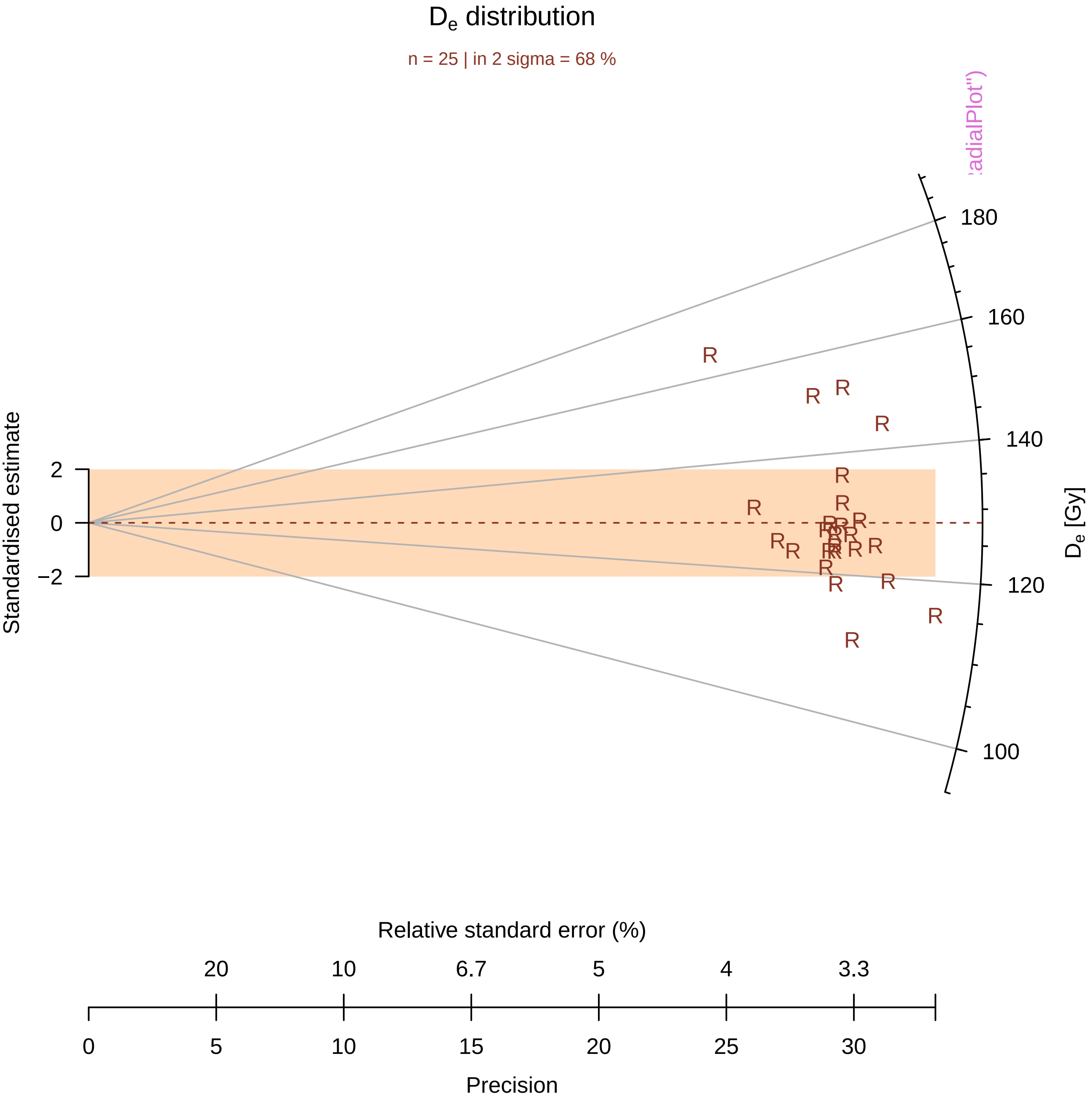

De distribution
n = 25 | in 2 sigma = 68 %
RadialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
De [Gy]
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision

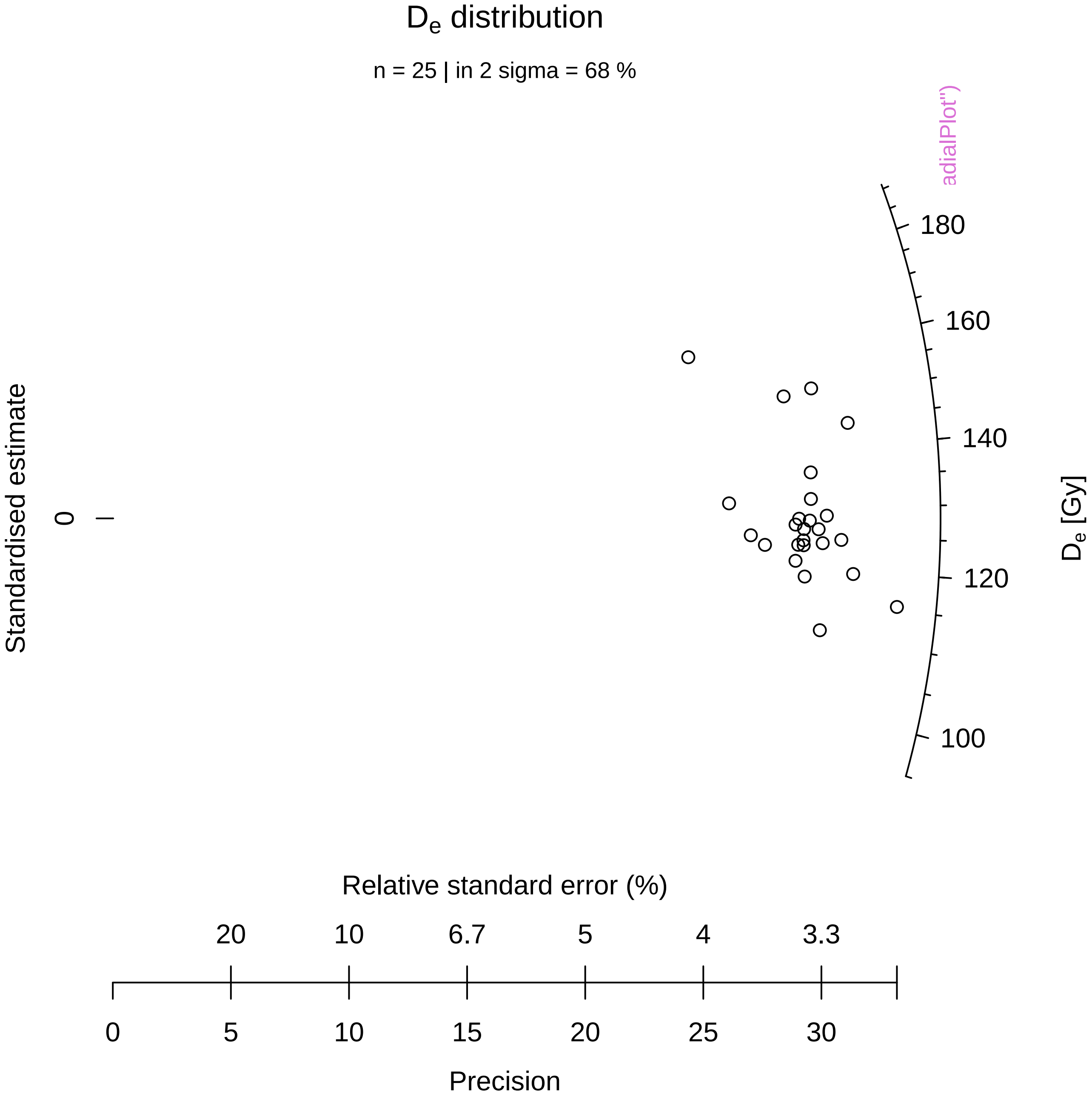

D_e distribution
n = 25 | in 2 sigma = 68 %
RadialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision

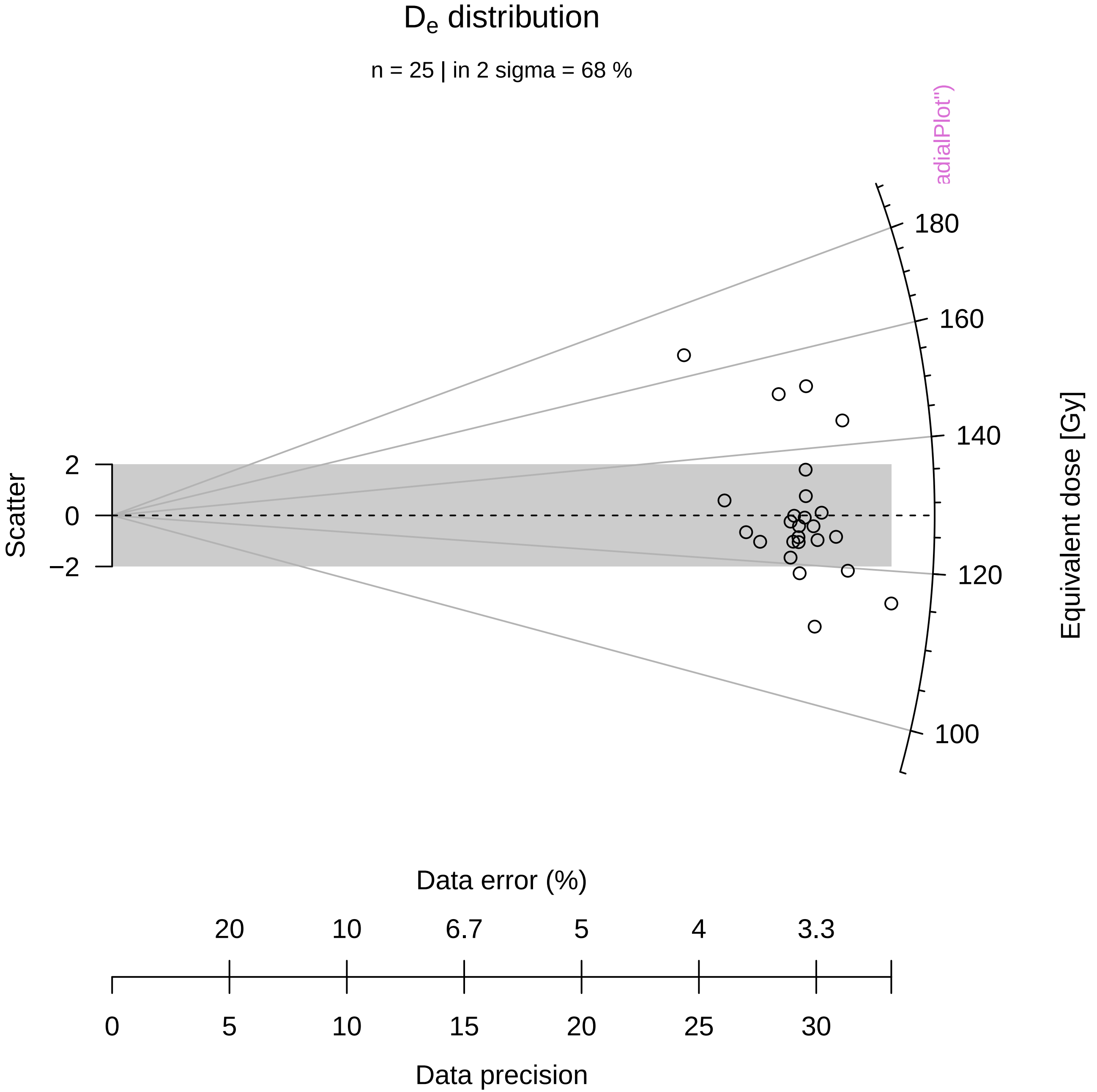

D_e distribution
n = 25 | in 2 sigma = 68 %
_RadialPlot")
Standardised estimate
2
0
−2
200
180
160
140
120
100
D_e [Gy]
Standard error
20
10
6.7
5
4
0.00
0.05
0.10
0.15
0.20
0.25
Precision

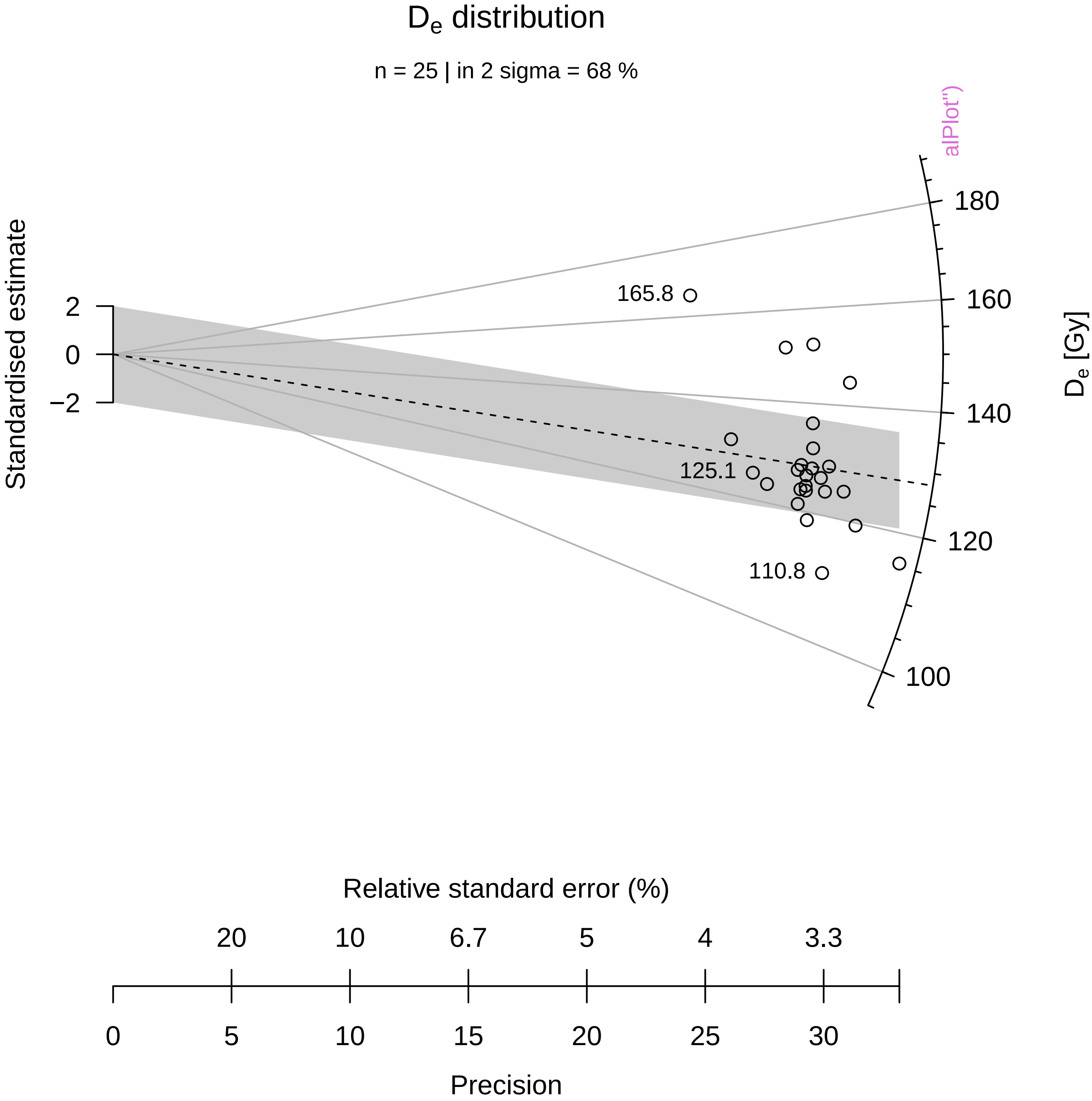

D_e distribution
n = 25 | in 2 sigma = 68 %
alPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

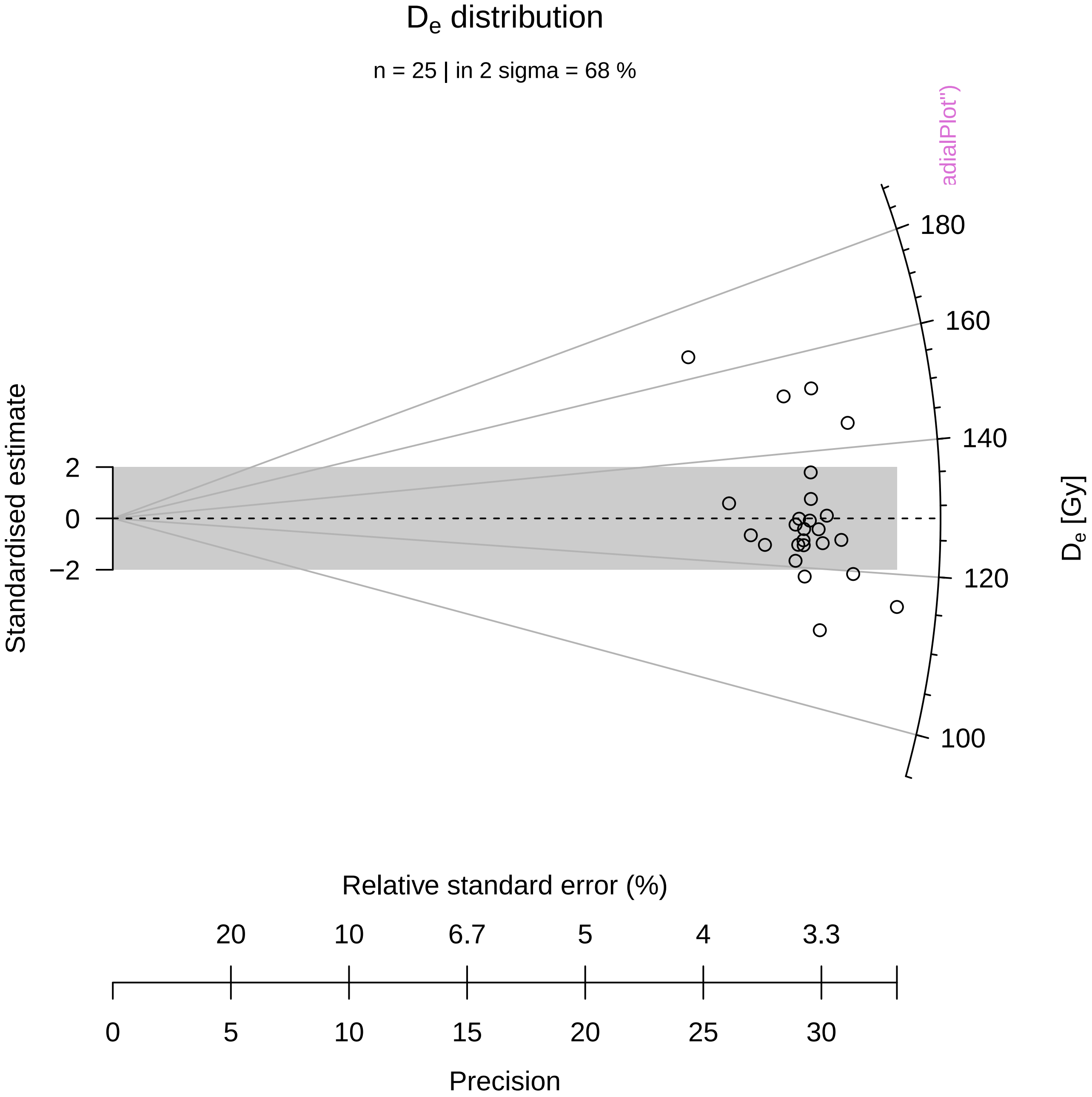

D$_e$ distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D$_e$ [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

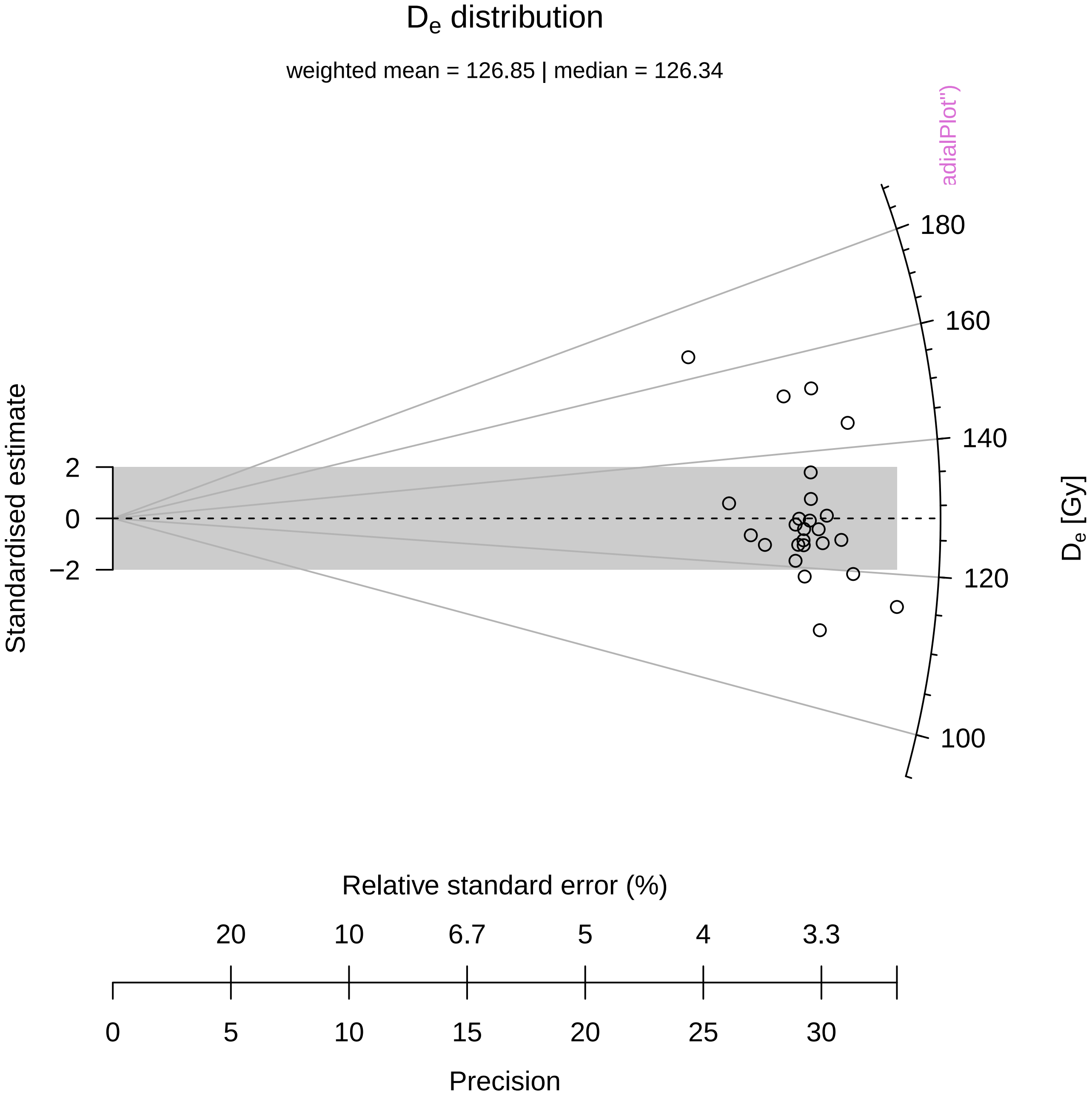

D_e distribution
n = 25 | in 2 sigma = 68 %
radialPlot")
180
160
140
120
100
D_e [Gy]
Standardised estimate
2
0
−2
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

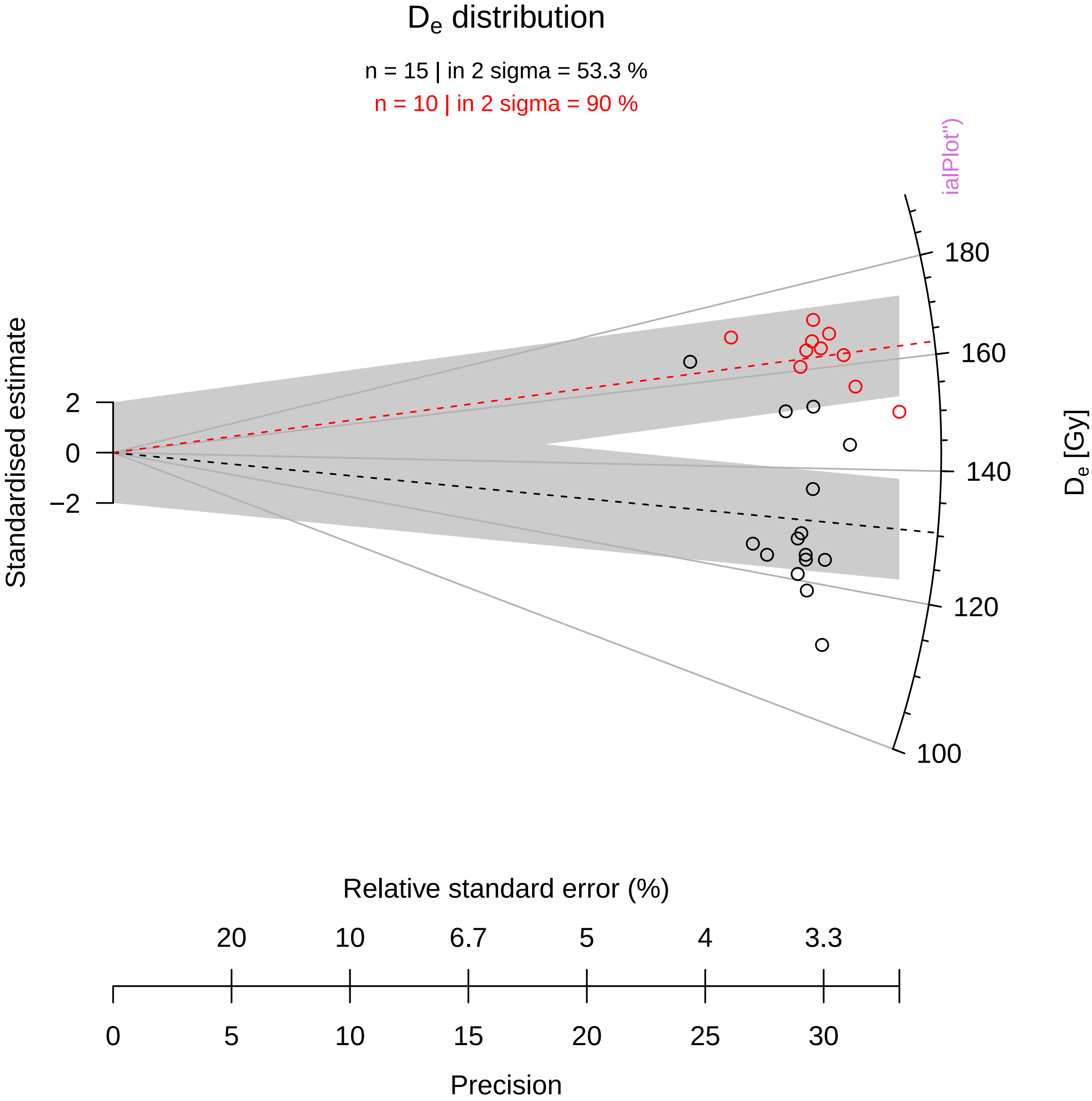

D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
0
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

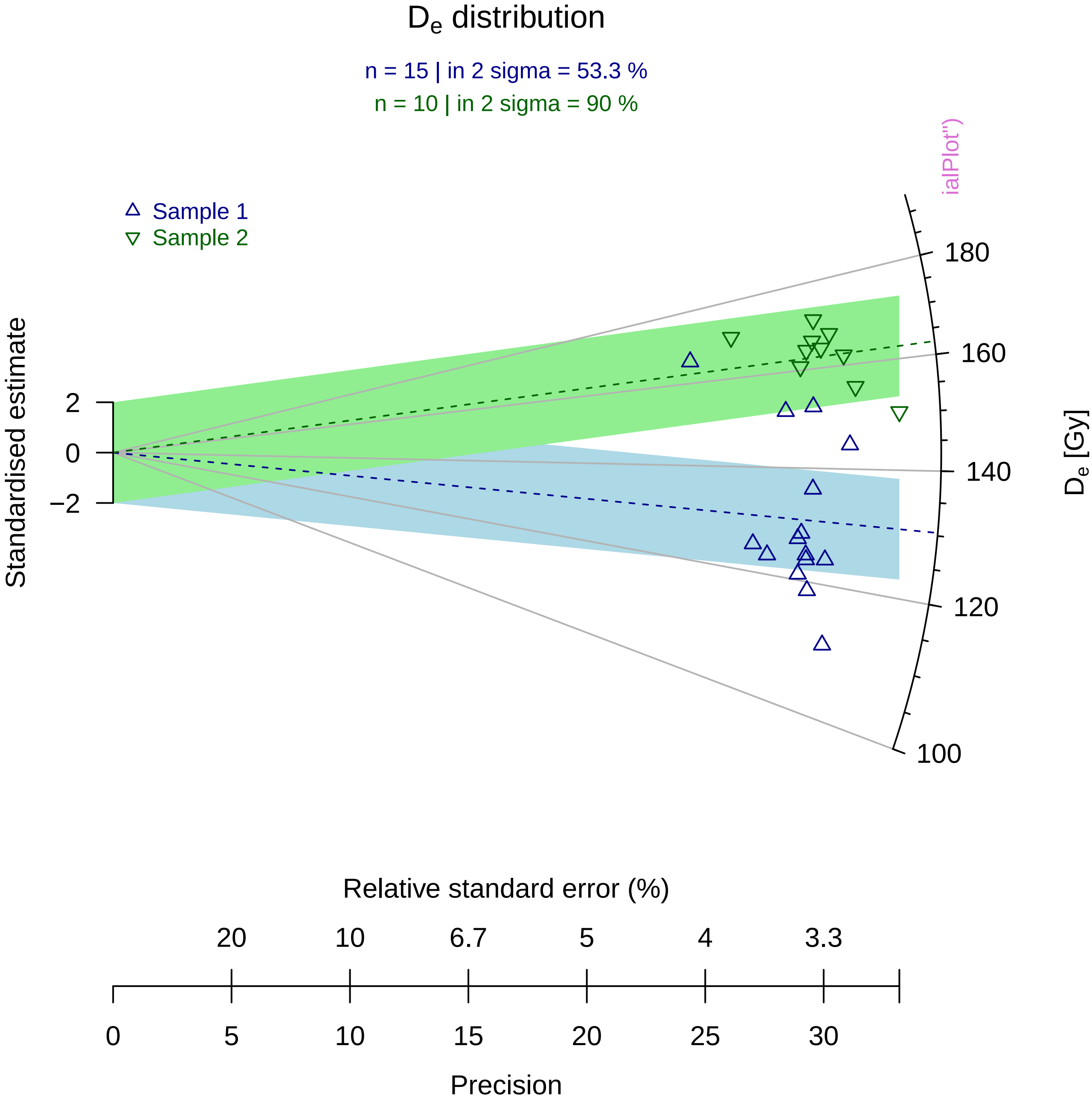

D_e distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
180
160
140
120
100
Equivalent dose [Gy]
Scatter
2
0
−2
Data error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Data precision

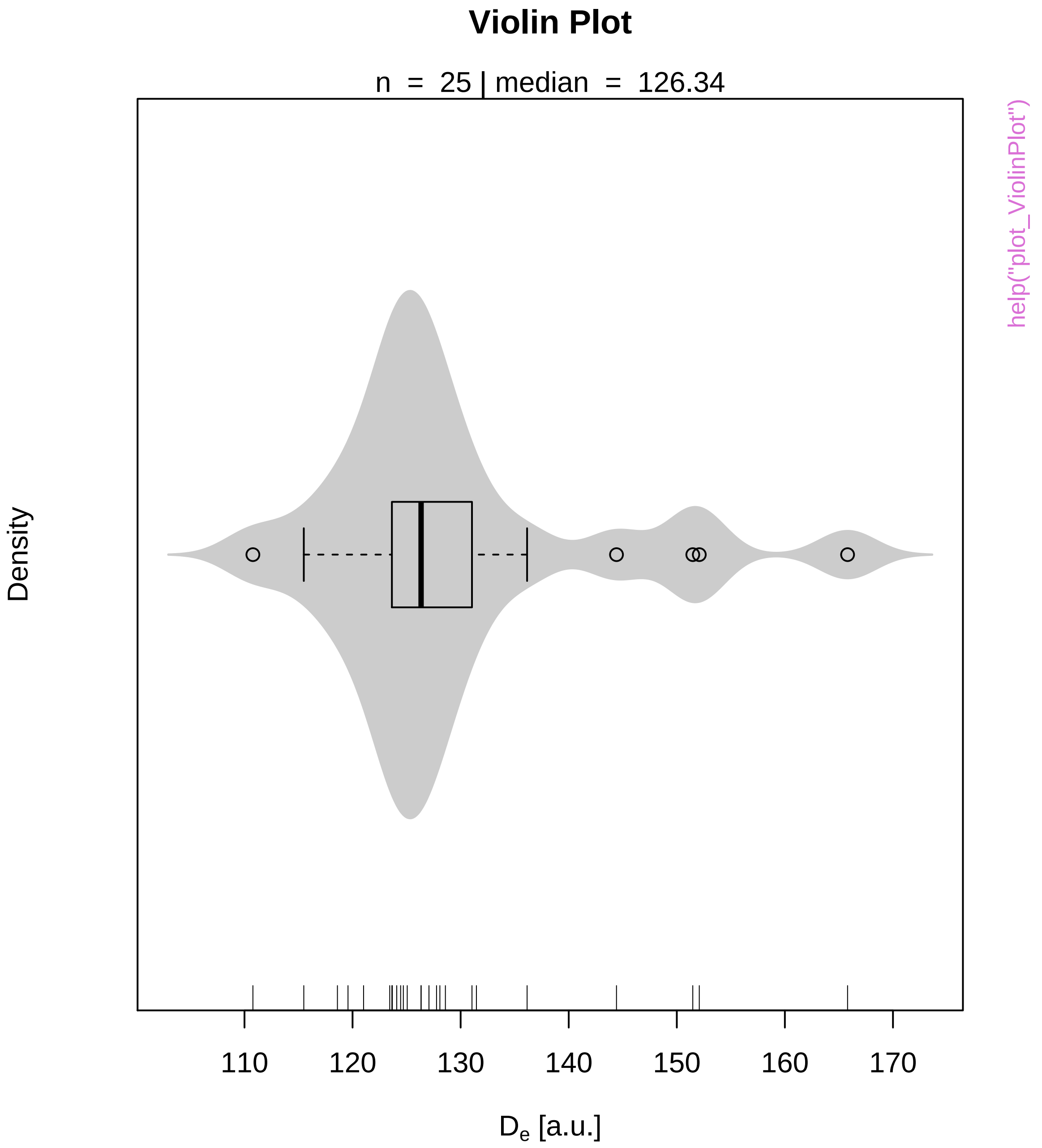

D$_e$ distribution
n = 25 | in 2 sigma = 68 %
alPlot")
Standardised estimate
2
0
−2
165.8
125.1
110.8
180
160
140
120
100
D$_e$ [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

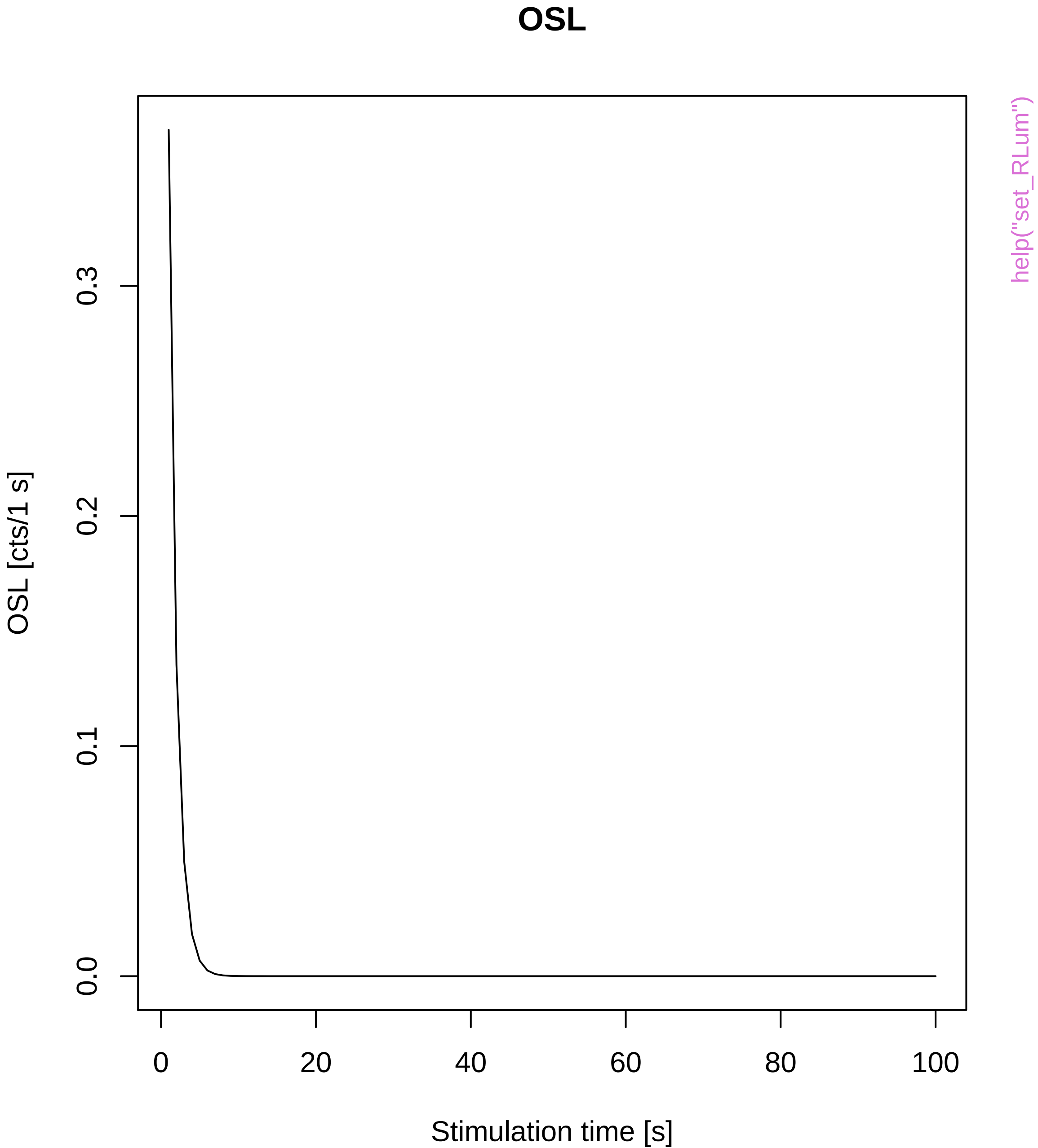

D$_e$ distribution
n = 25 | in 2 sigma = 68 %
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D$_e$ [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

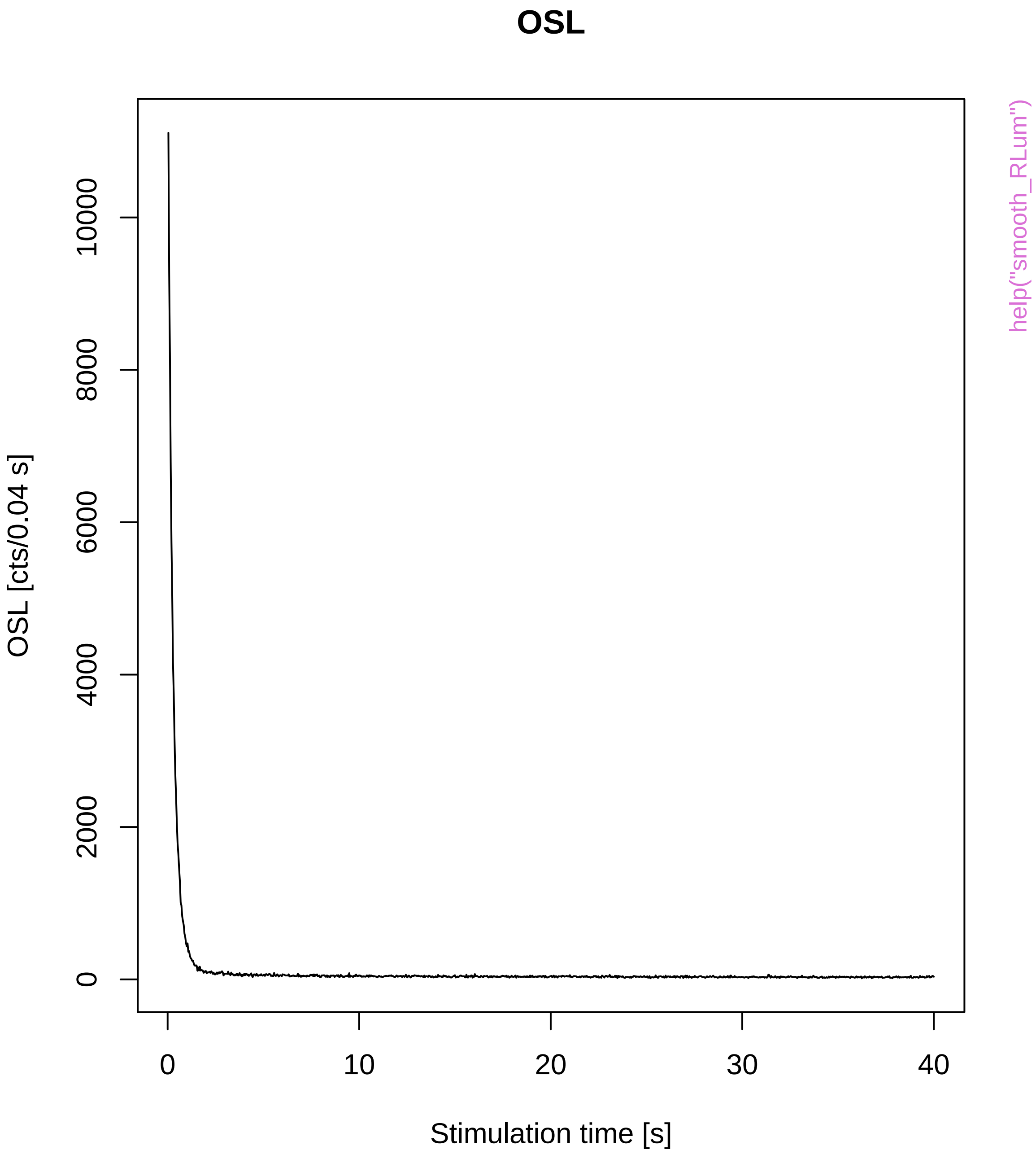

De distribution
weighted mean = 126.85 | median = 126.34
adialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
De [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

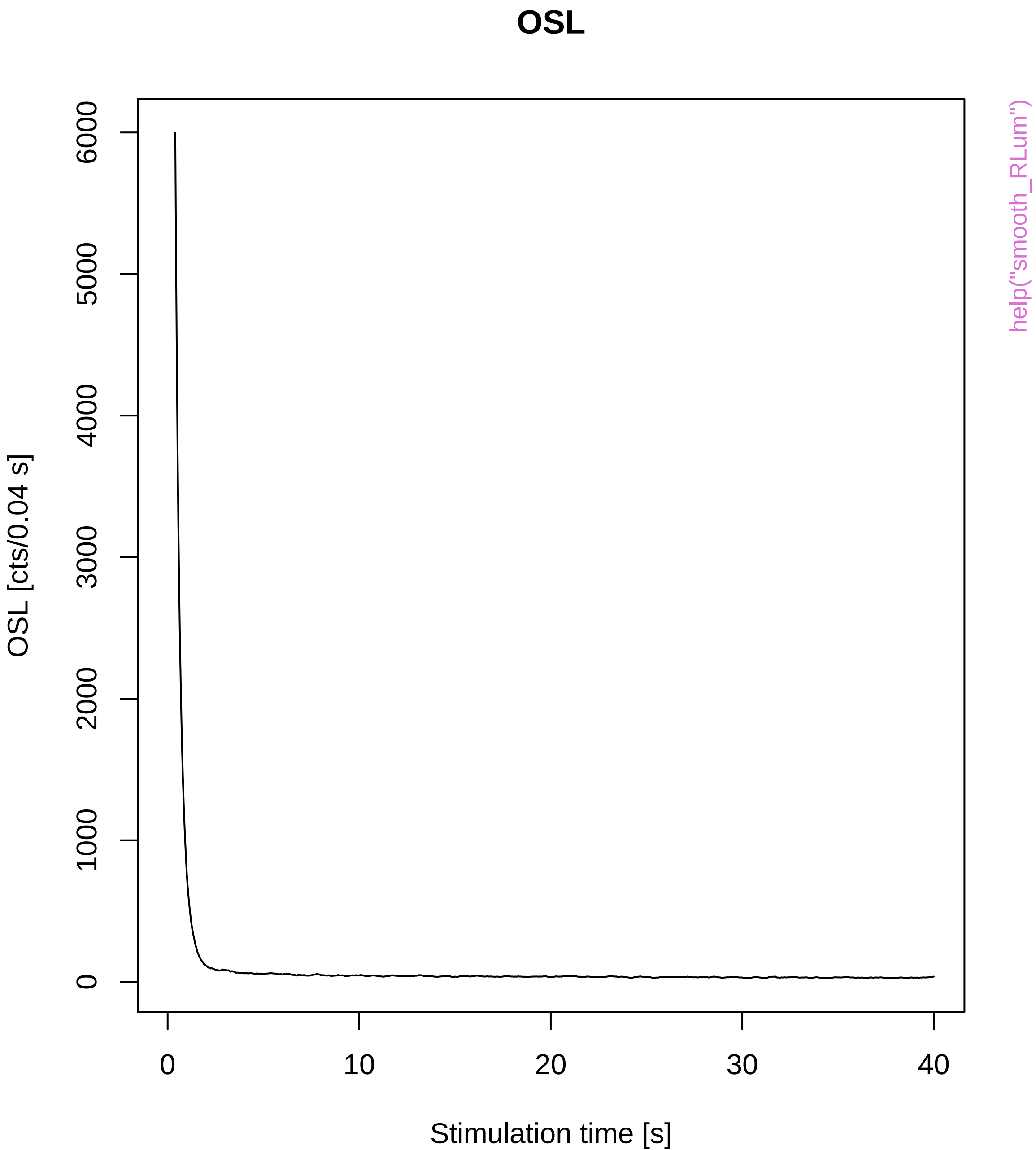

D_e distribution
n = 15 | in 2 sigma = 53.3 %
n = 10 | in 2 sigma = 90 %
ialPlot")
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

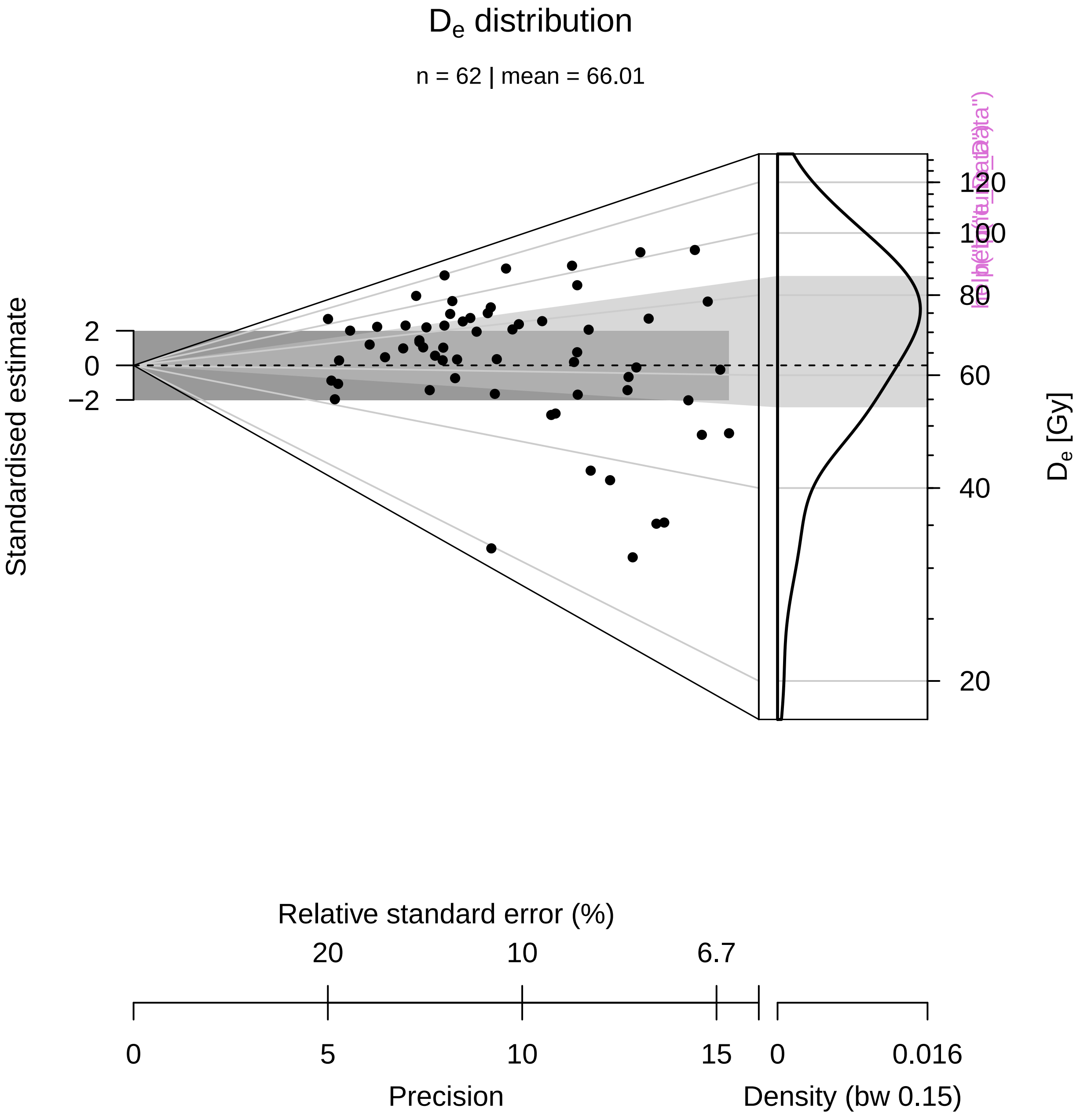

D_e distribution
n = 15 | in 2 sigma = 53.3 %
n = 10 | in 2 sigma = 90 %
ialPlot")
△ Sample 1
▽ Sample 2
Standardised estimate
2
0
−2
180
160
140
120
100
D_e [Gy]
Relative standard error (%)
20
10
6.7
5
4
3.3
0
5
10
15
20
25
30
Precision

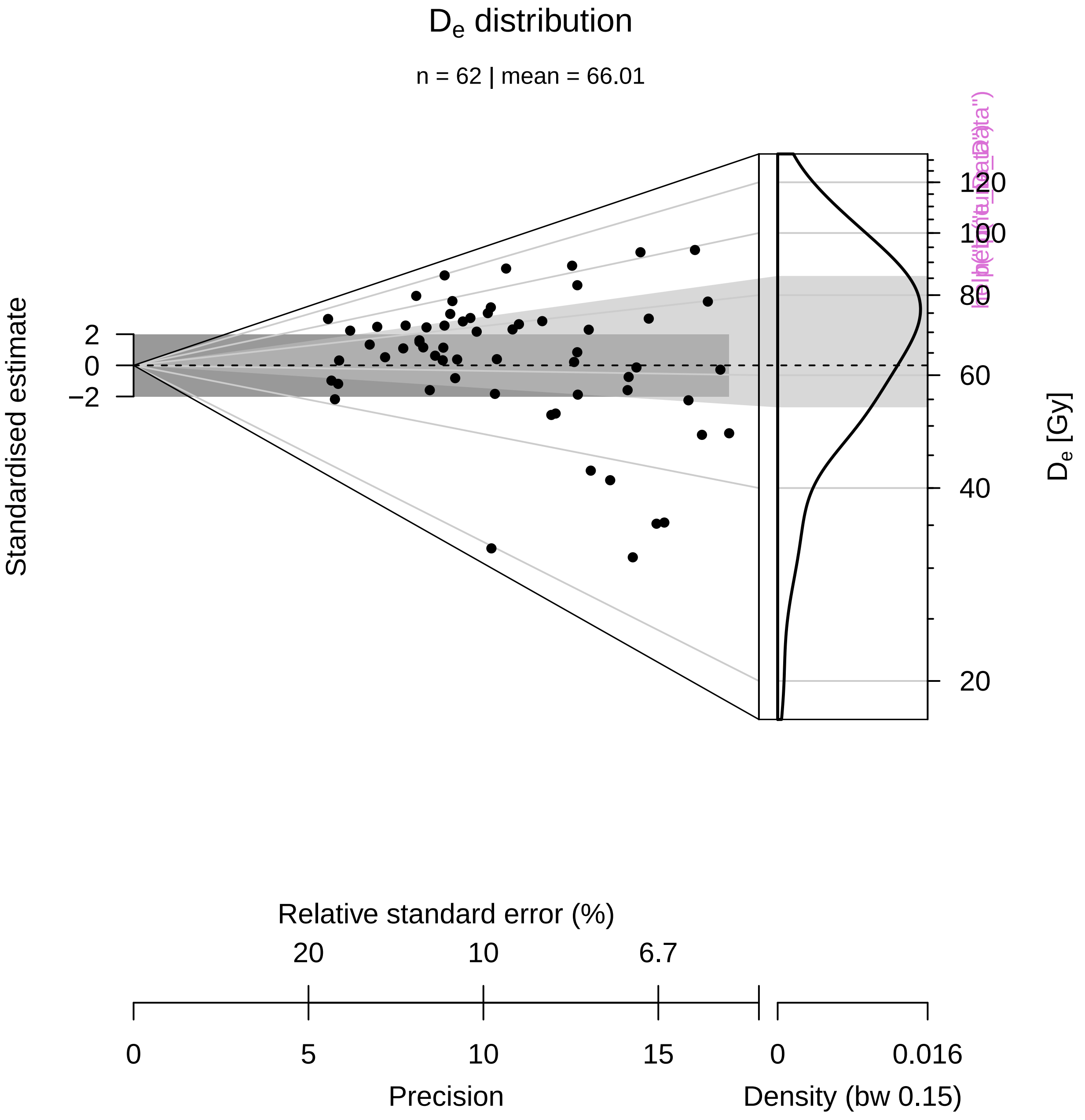

Violin Plot
n = 25 | median = 126.34
help("plot_ViolinPlot")
Density
110
120
130
140
150
160
170
D_e [a.u.]


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


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)