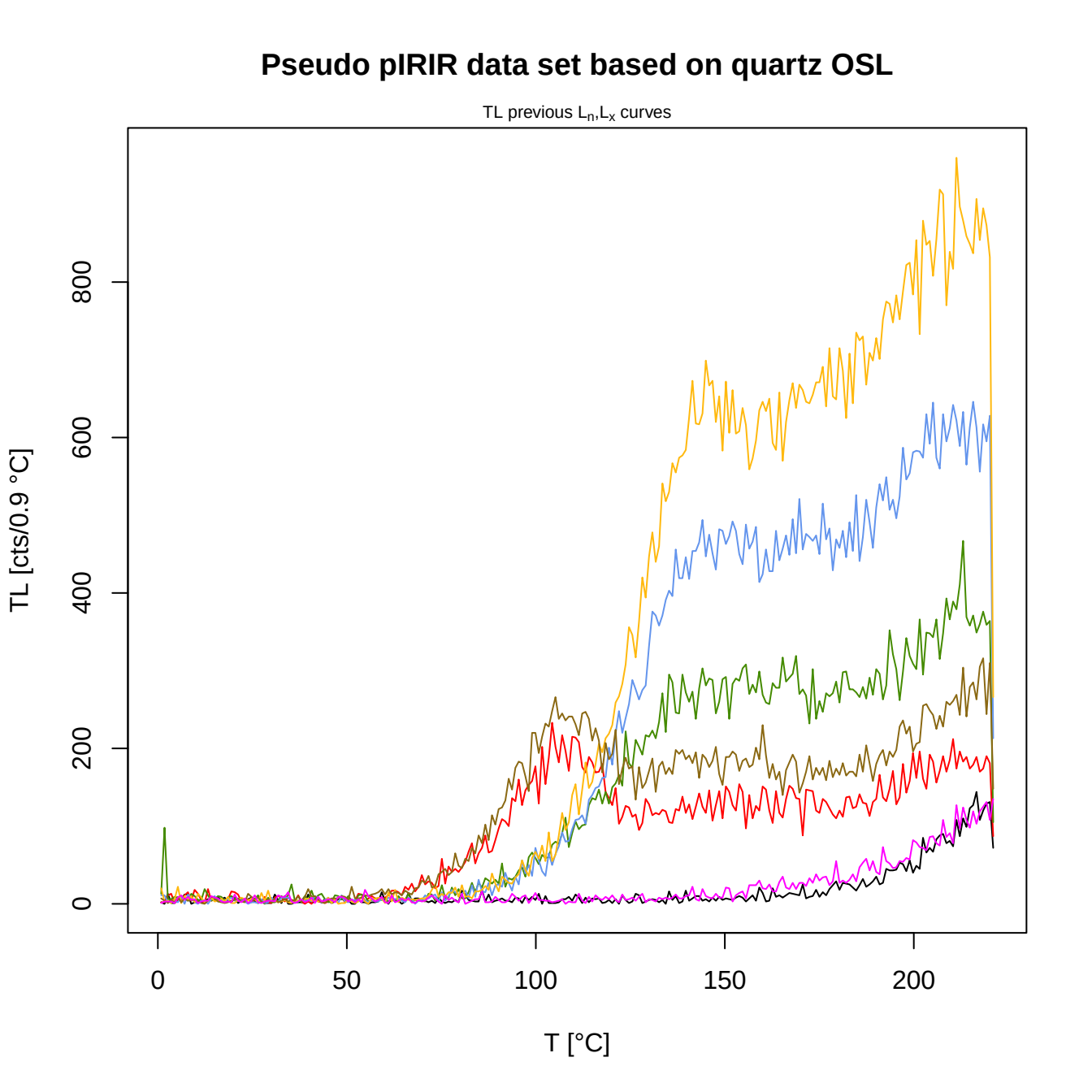
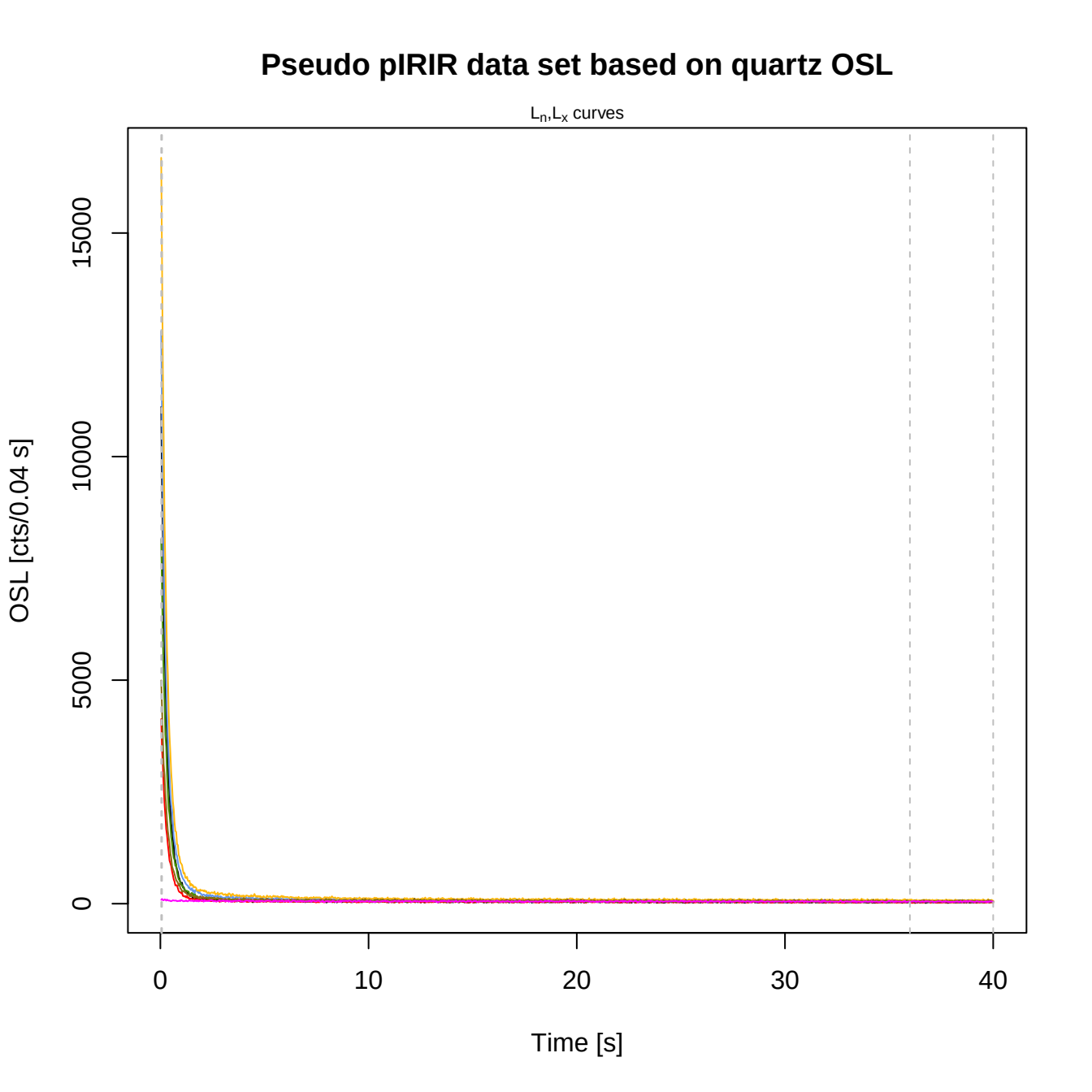
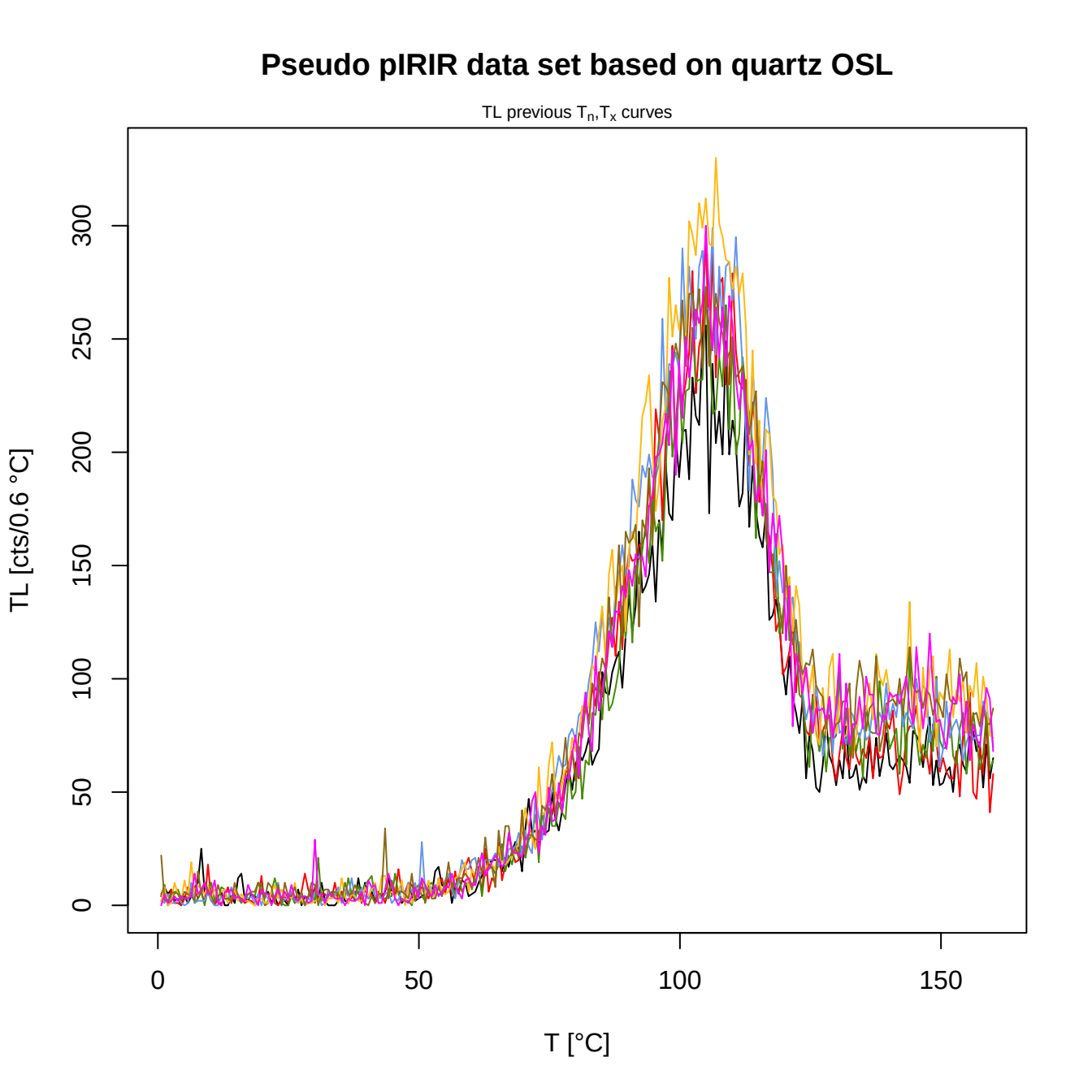
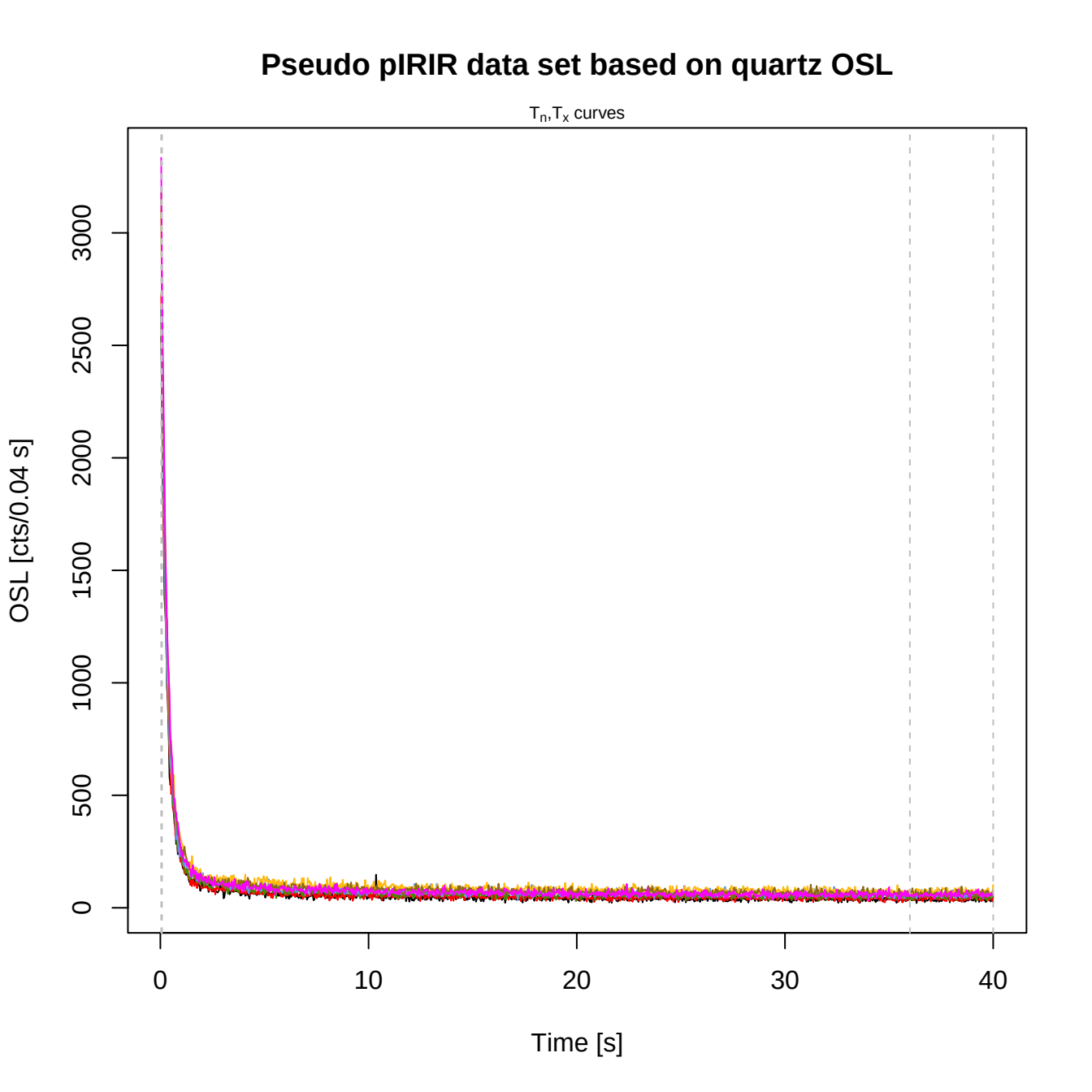
Pseudo pIRIR data set based on quartz OSL

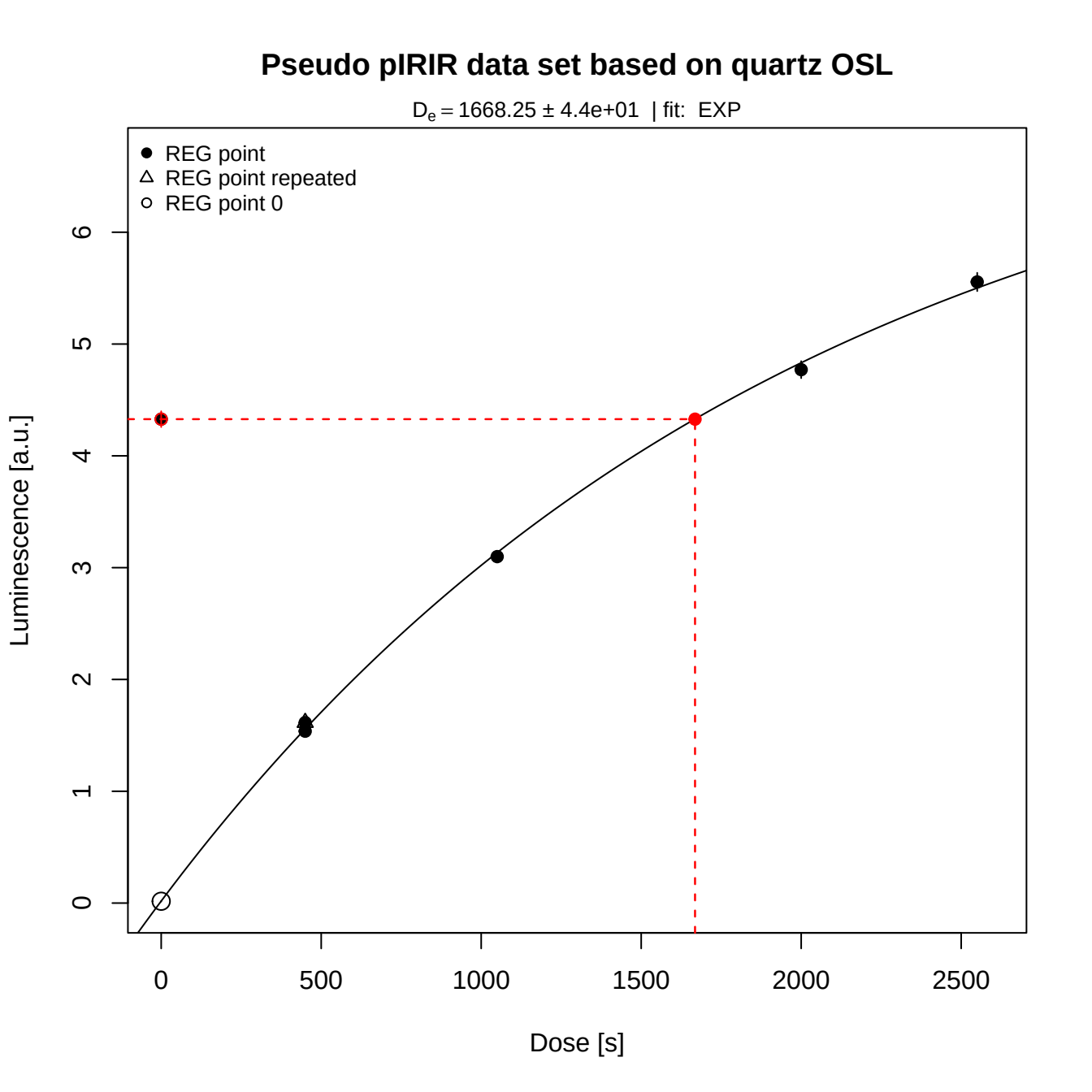
TL
pseudoIRSL1
pseudoIRSL2

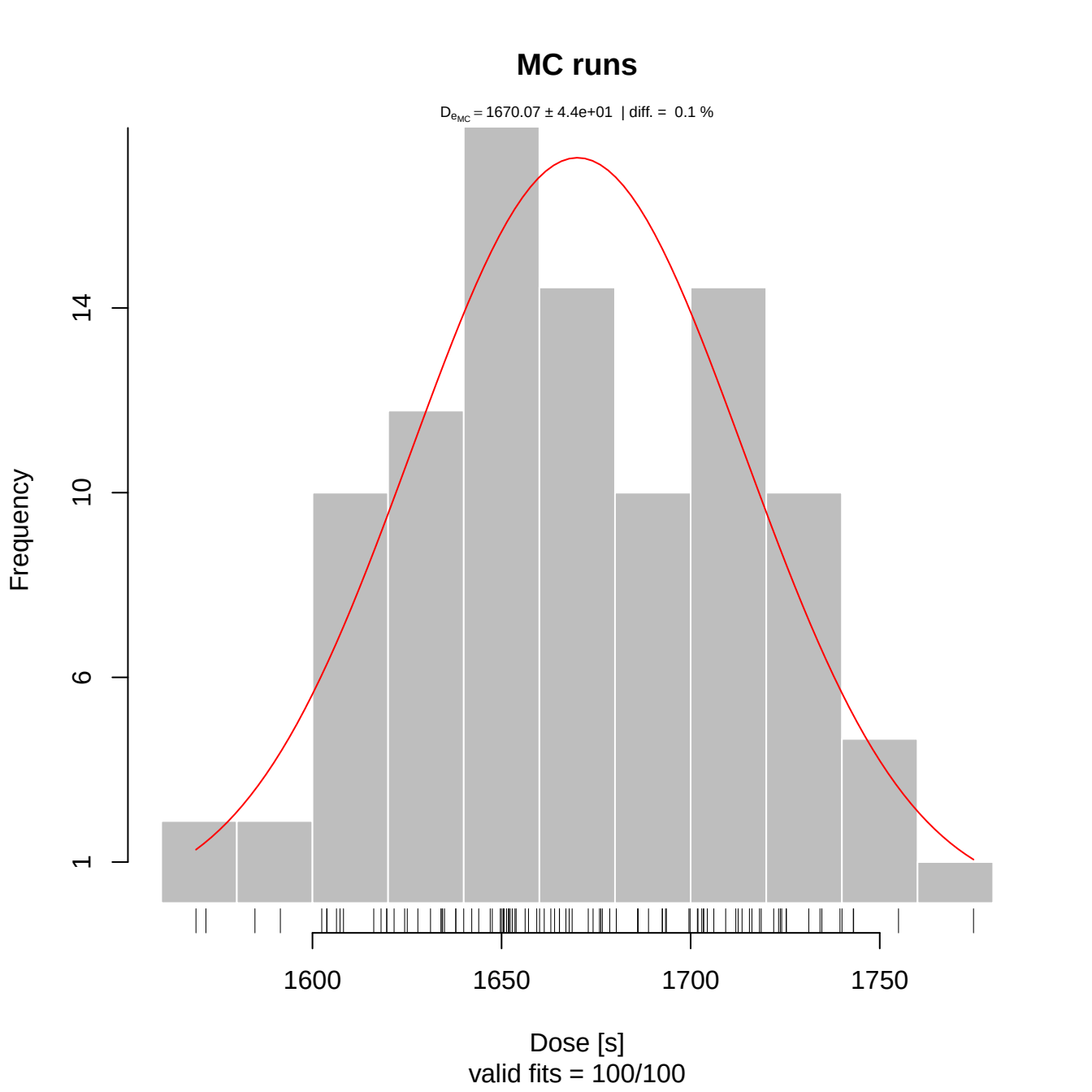

Pseudo pIRIR data set based on quartz OSL
TL previous L_n,L_x curves
TL [cts/0.9 °C]
0
200
400
600
800
0
50
100
150
200
T [°C]

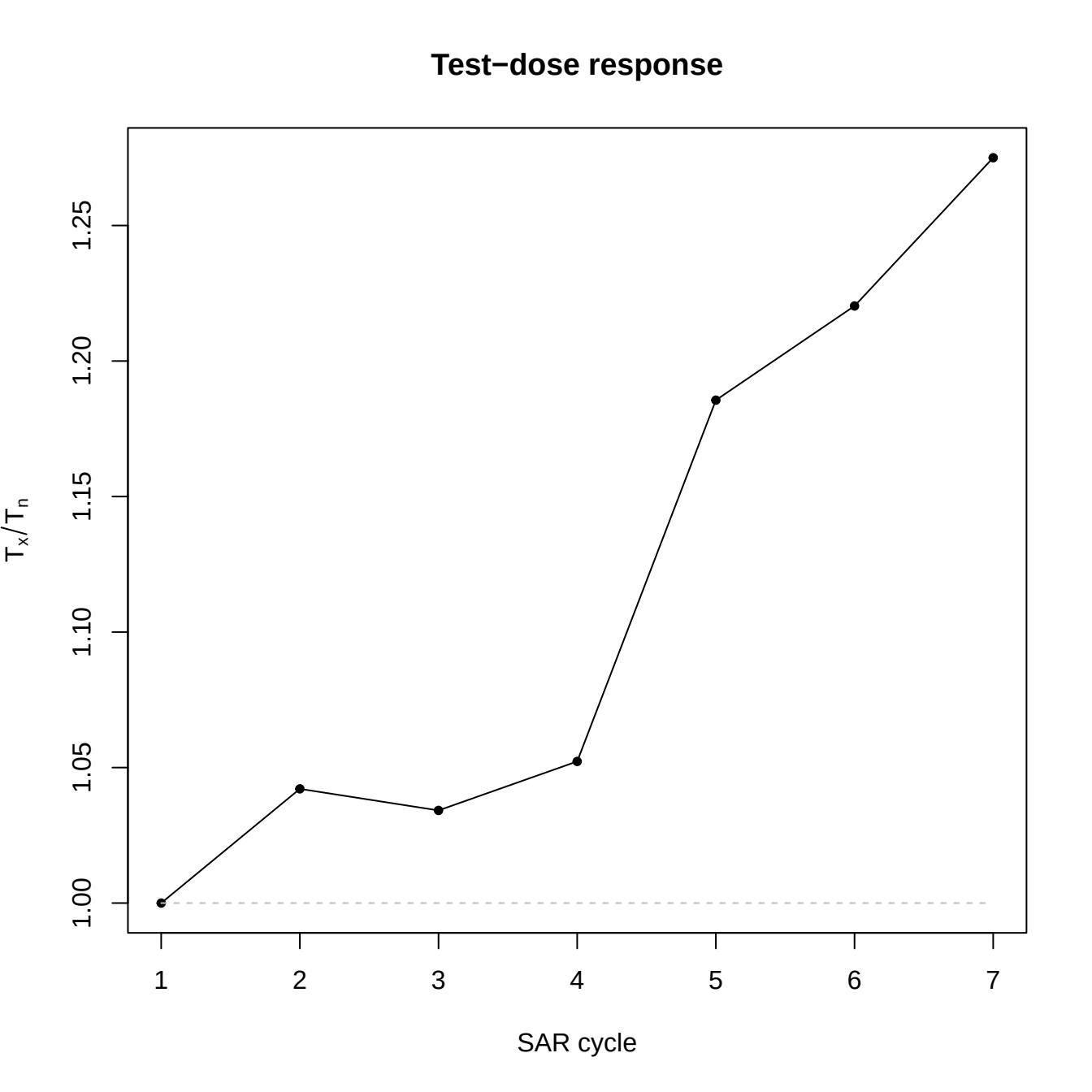

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]

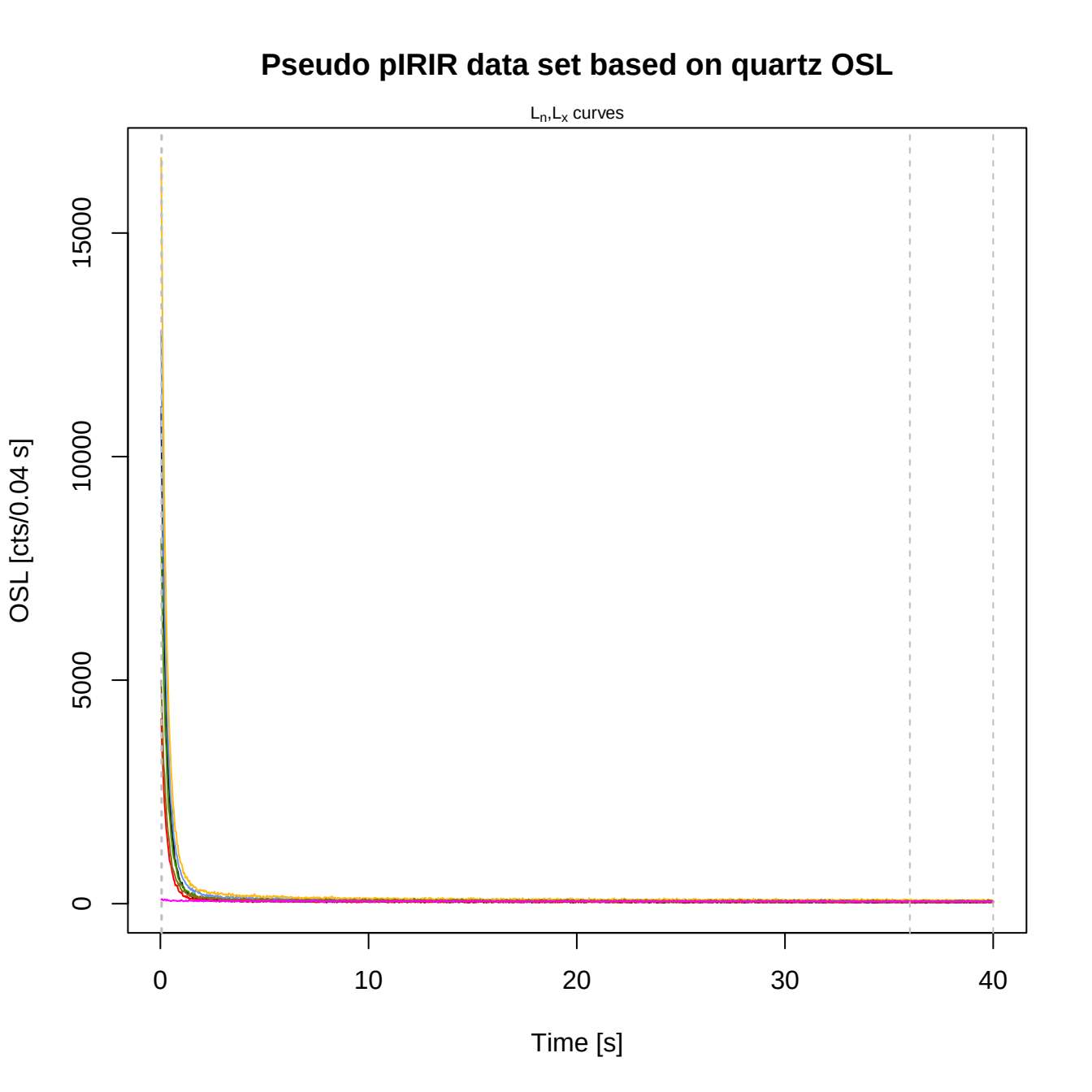

Pseudo pIRIR data set based on quartz OSL
TL previous T_n,T_x curves
TL [cts/0.6 °C]
0
50
100
150
200
250
300
T [°C]
0
50
100
150

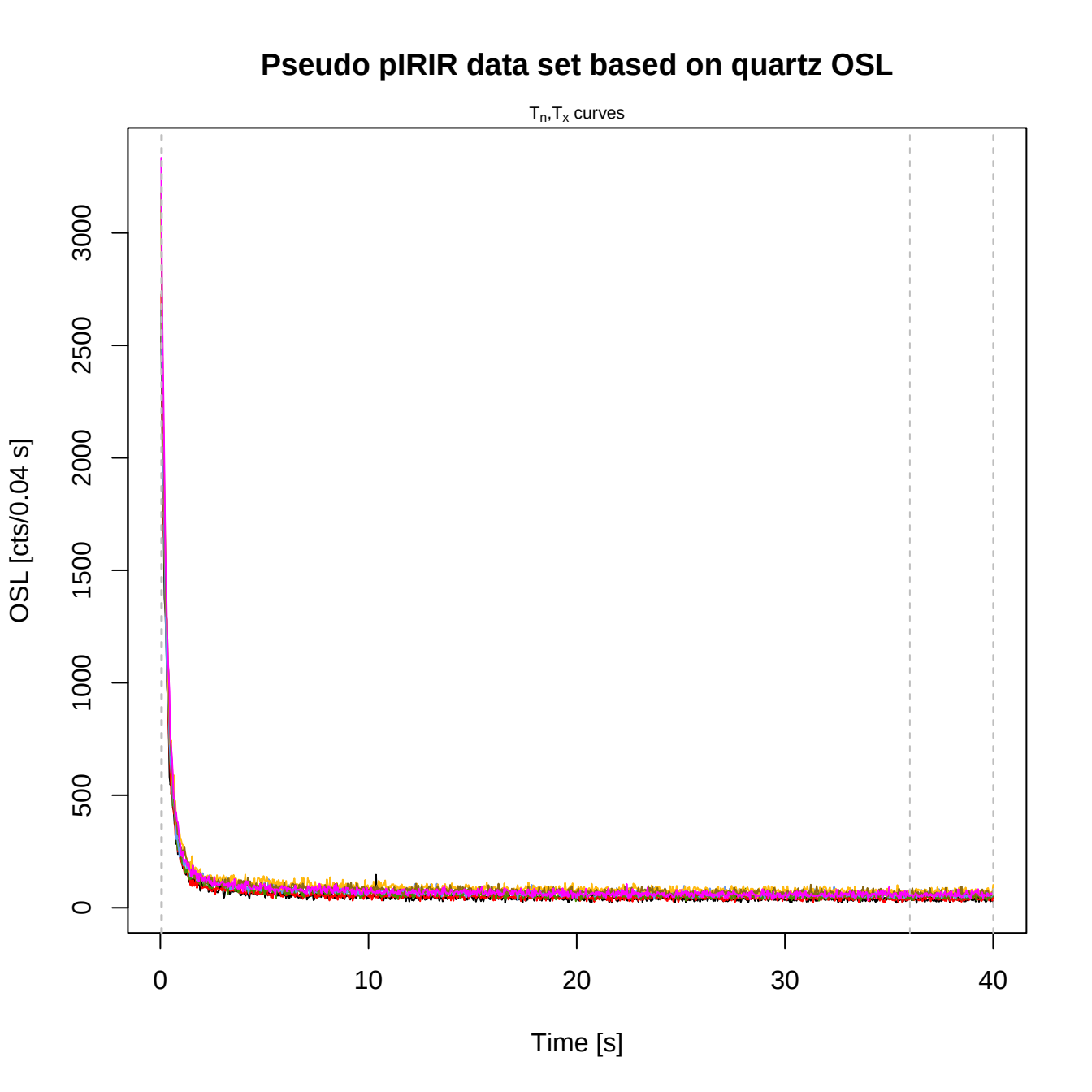

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
0
10
20
30
40
Time [s]


Pseudo pIRIR data set based on quartz OSL
D_e = 1668.25 ± 4.4e+01 | 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]

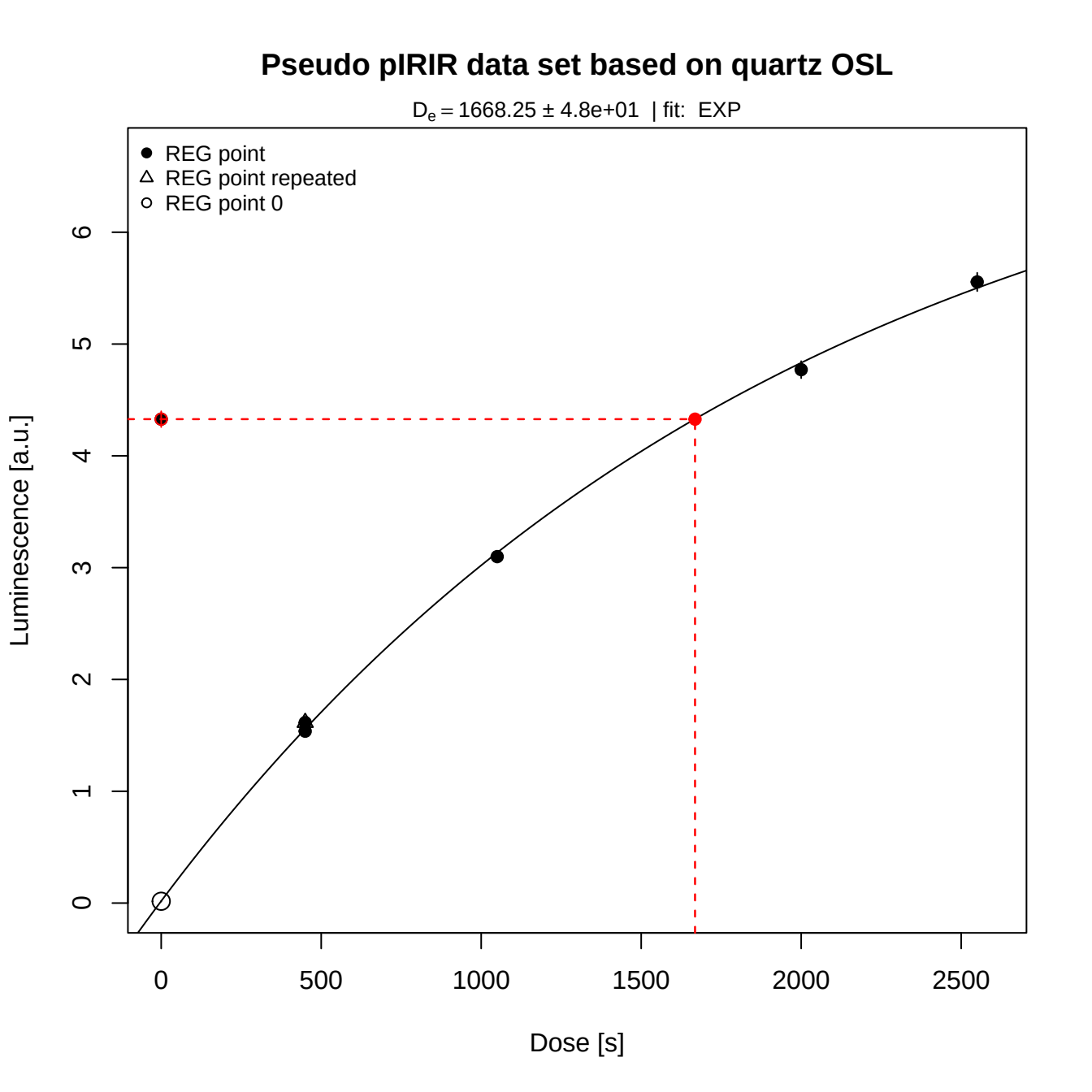

MC runs
D$_{e_{MC}}$ = 1670.07 ± 4.4e+01 | diff. = 0.1 %
Frequency
1
6
10
14
1600
1650
1700
1750
Dose [s]
valid fits = 100/100

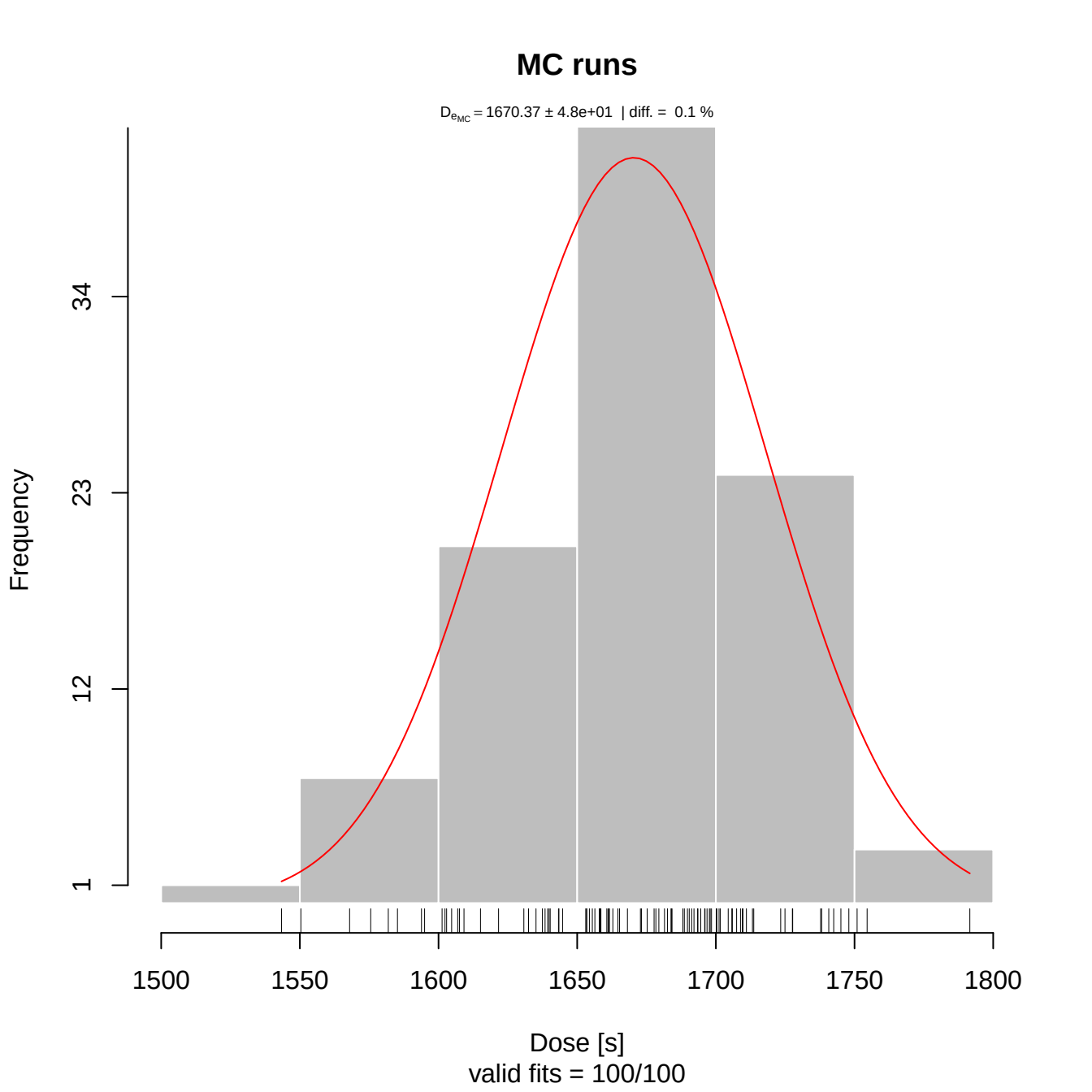

Test−dose response
1.00
1.05
1.10
1.15
1.20
1.25
T_x/T_n
1
2
3
4
5
6
7
SAR cycle

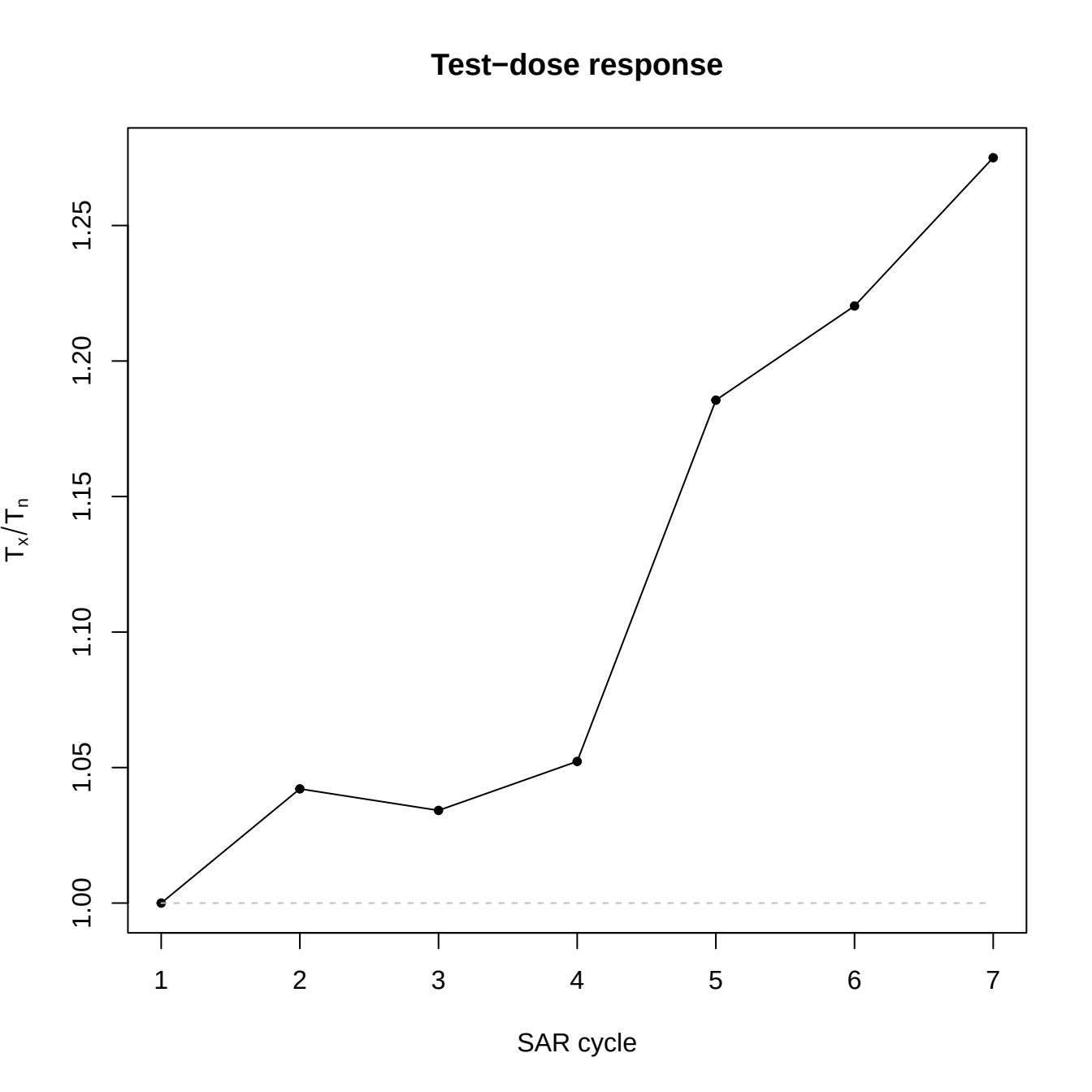

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]

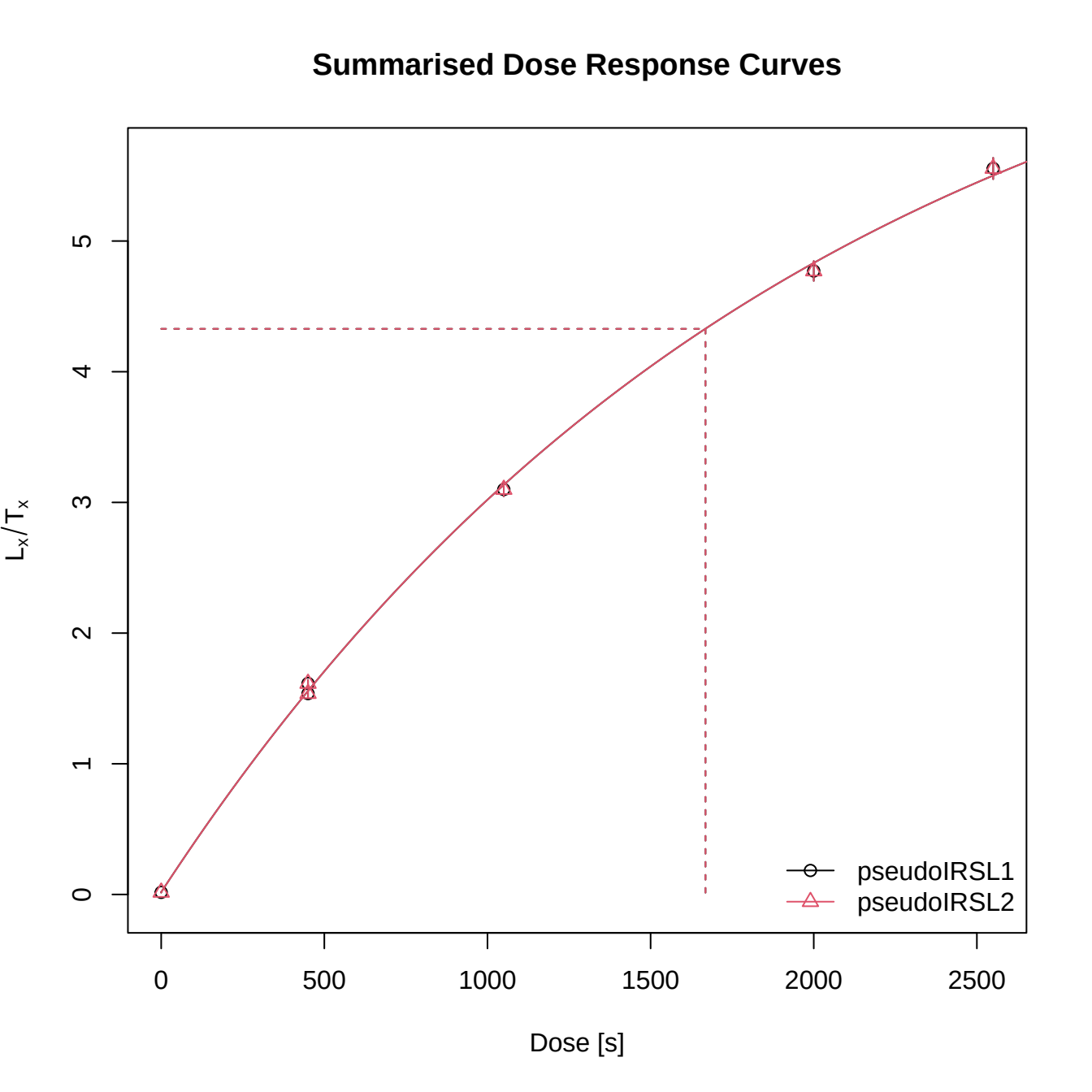

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
0
10
20
30
40
Time [s]

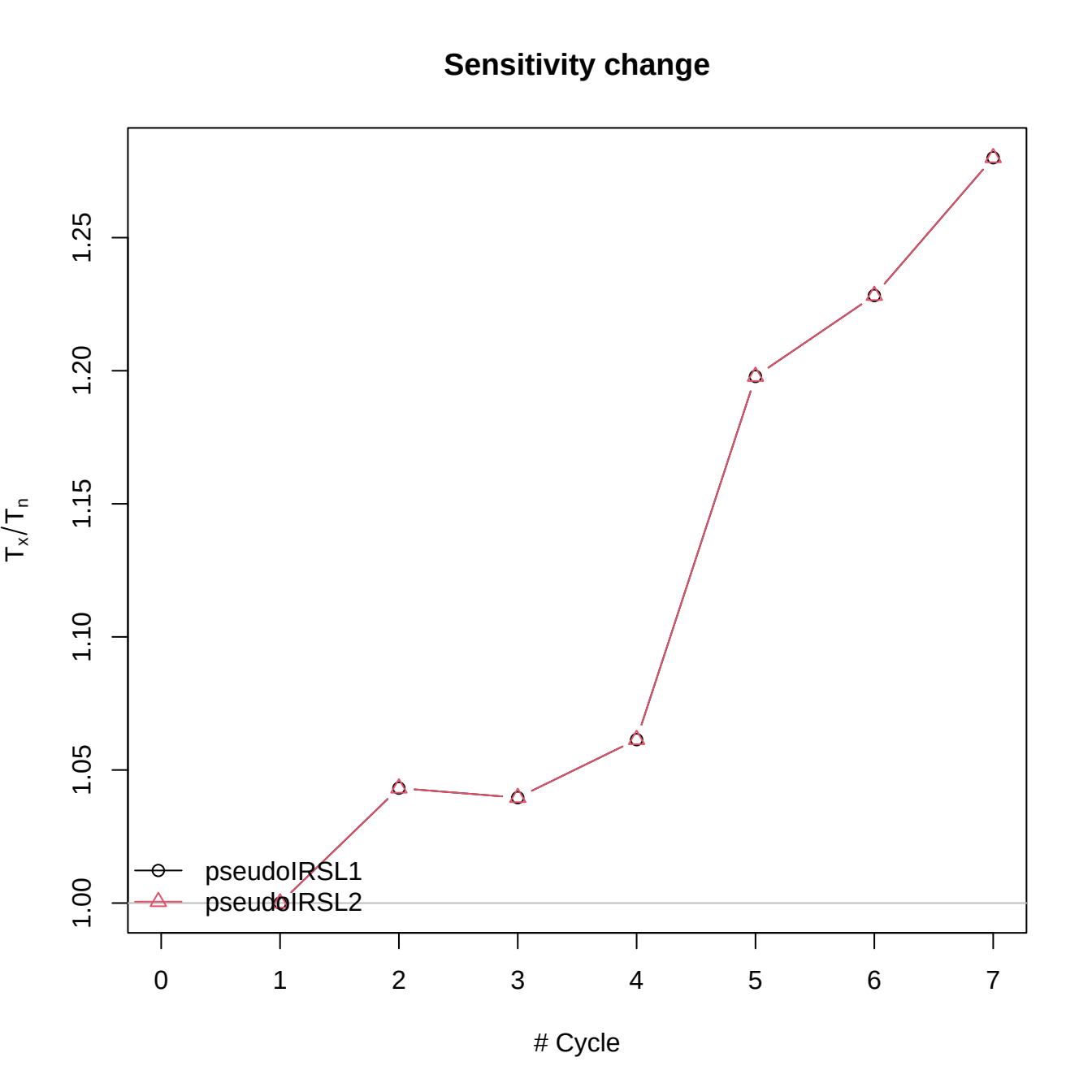

Natural
(0)
R1
(450)
R2
(1050)
R3
(2000)
R4
(2550)
R5
(450)
R0
(0)

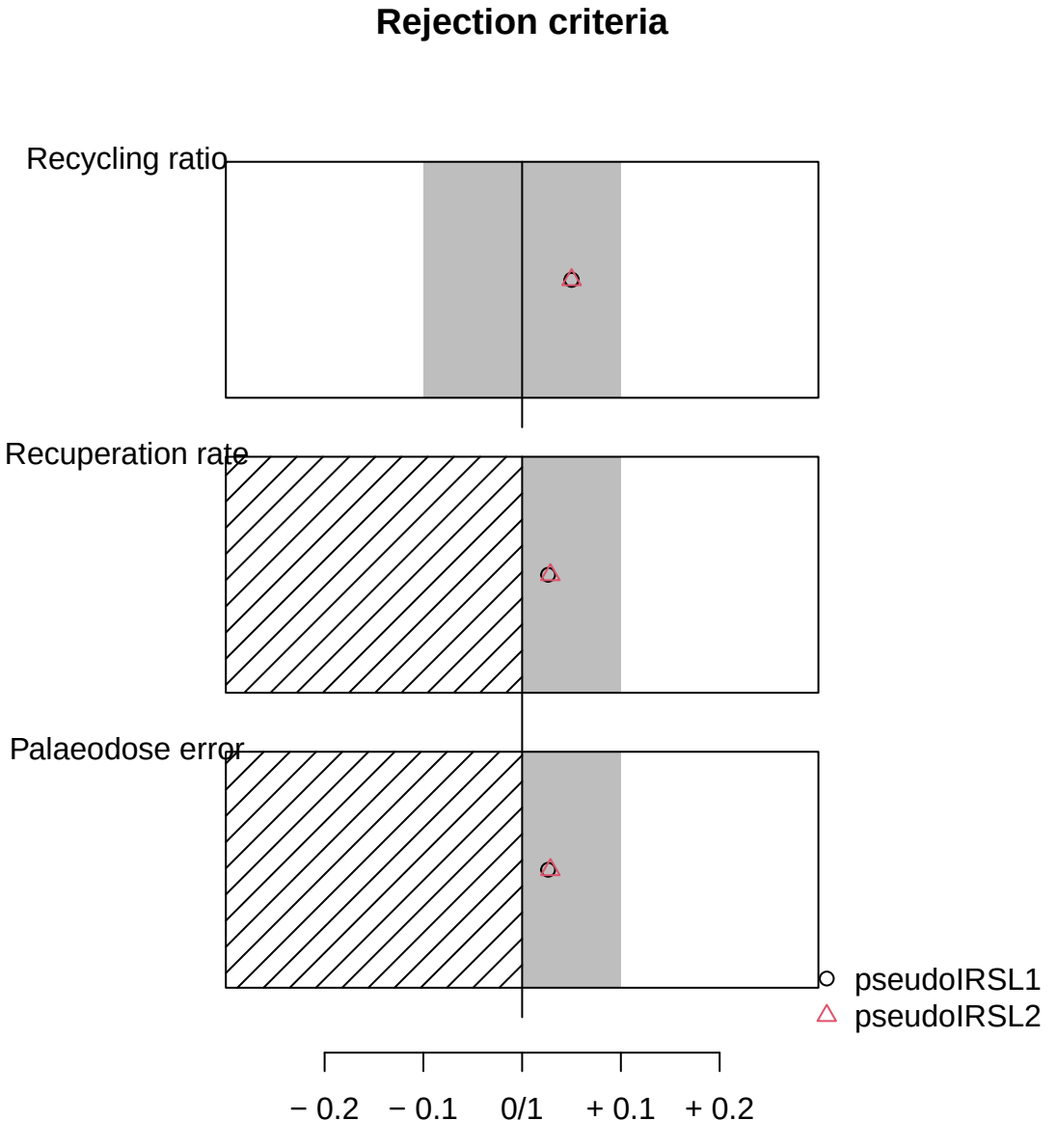

Pseudo pIRIR data set based on quartz OSL
D_e = 1668.25 ± 4.8e+01 | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]


MC runs
$D_{e_{MC}}$ = 1670.37 ± 4.8e+01 | diff. = 0.1 %
Frequency
1
12
23
34
1500
1550
1600
1650
1700
1750
1800
Dose [s]
valid fits = 100/100


Test−dose response
1.00
1.05
1.10
1.15
1.20
1.25
T_x/T_n
1
2
3
4
5
6
7
SAR cycle

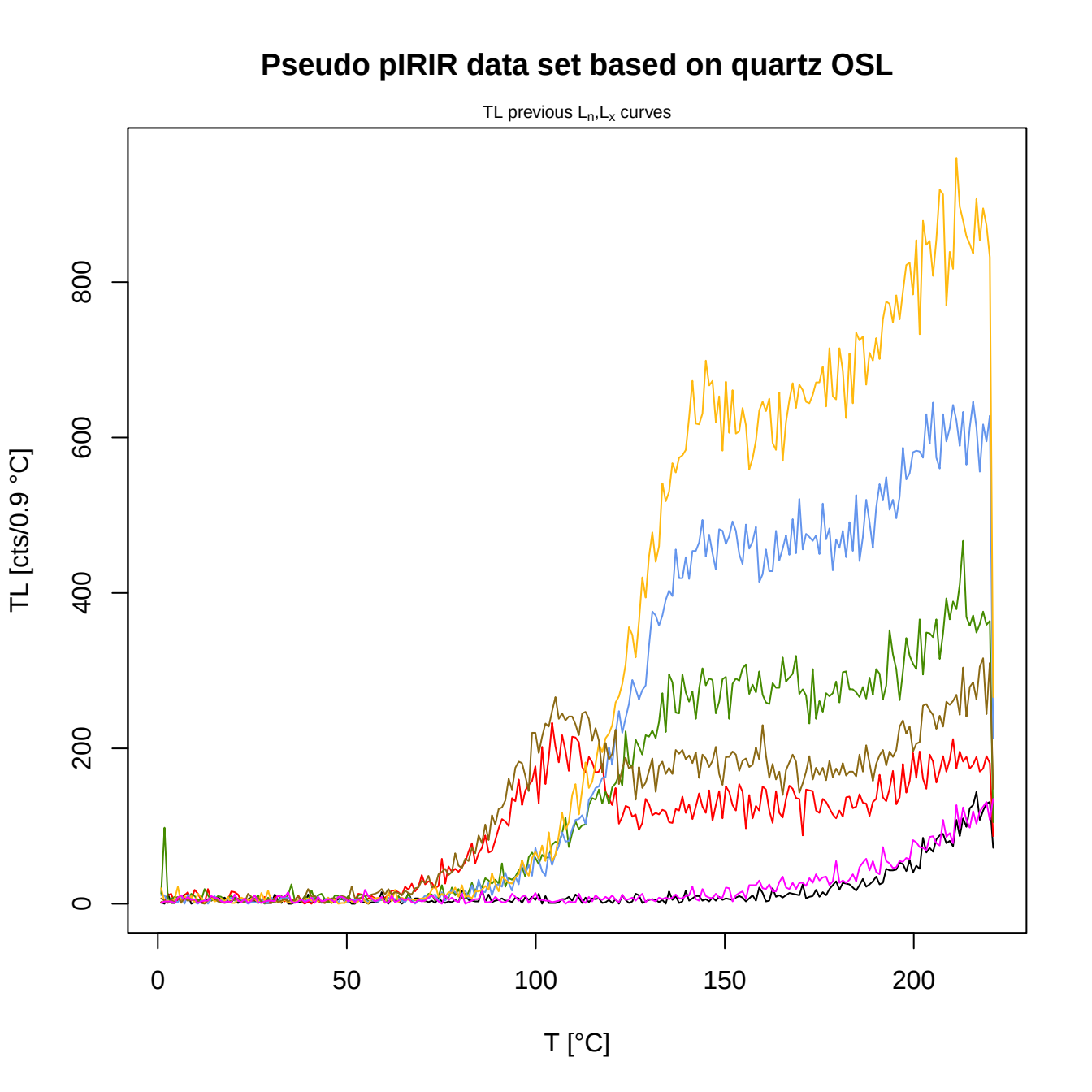

Summarised Dose Response Curves
L_x/T_x
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose [s]
pseudoIRSL1
pseudoIRSL2

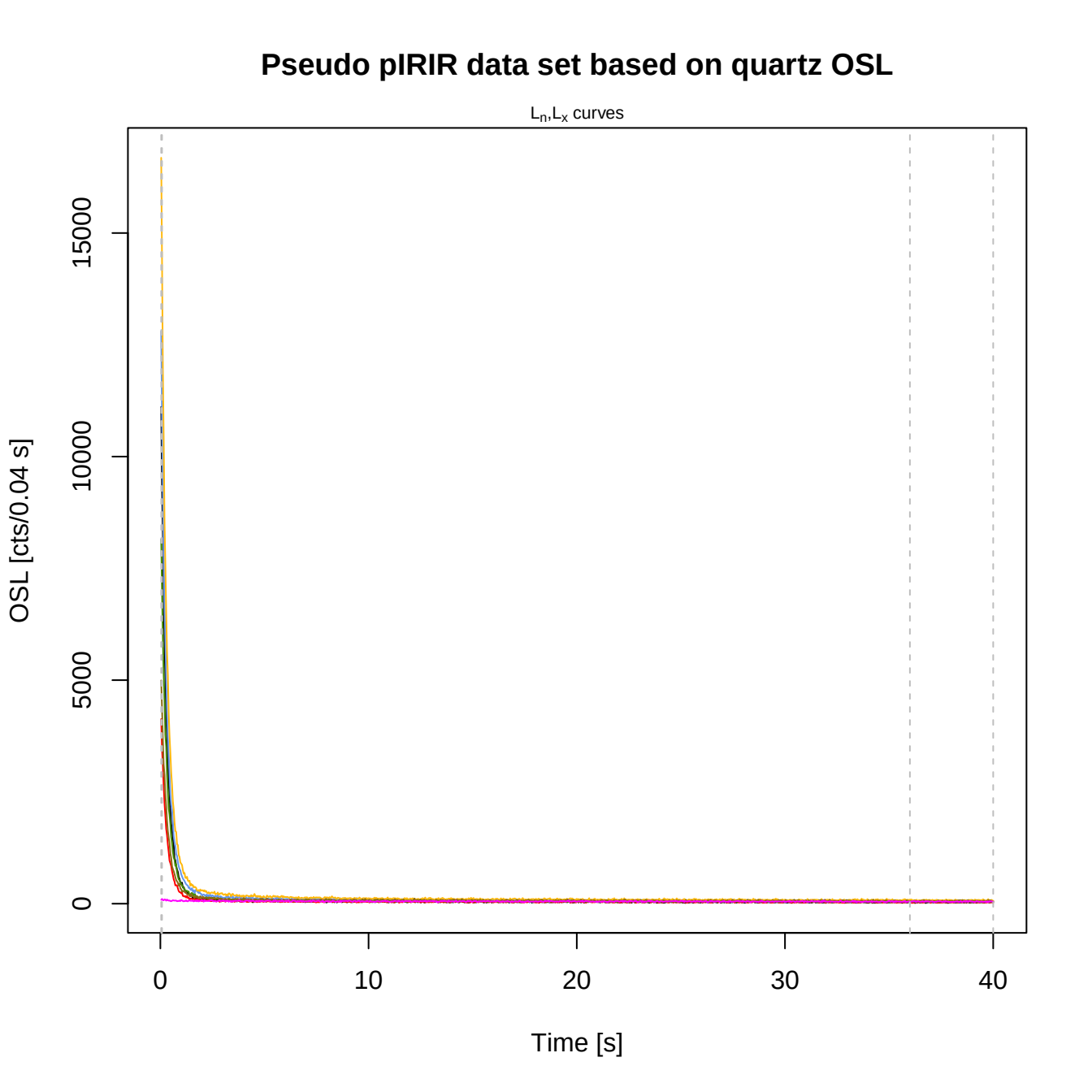

Sensitivity change
T_x/T_n
1.00
1.05
1.10
1.15
1.20
1.25
0
1
2
3
4
5
6
7
Cycle
pseudoIRSL1
pseudoIRSL2

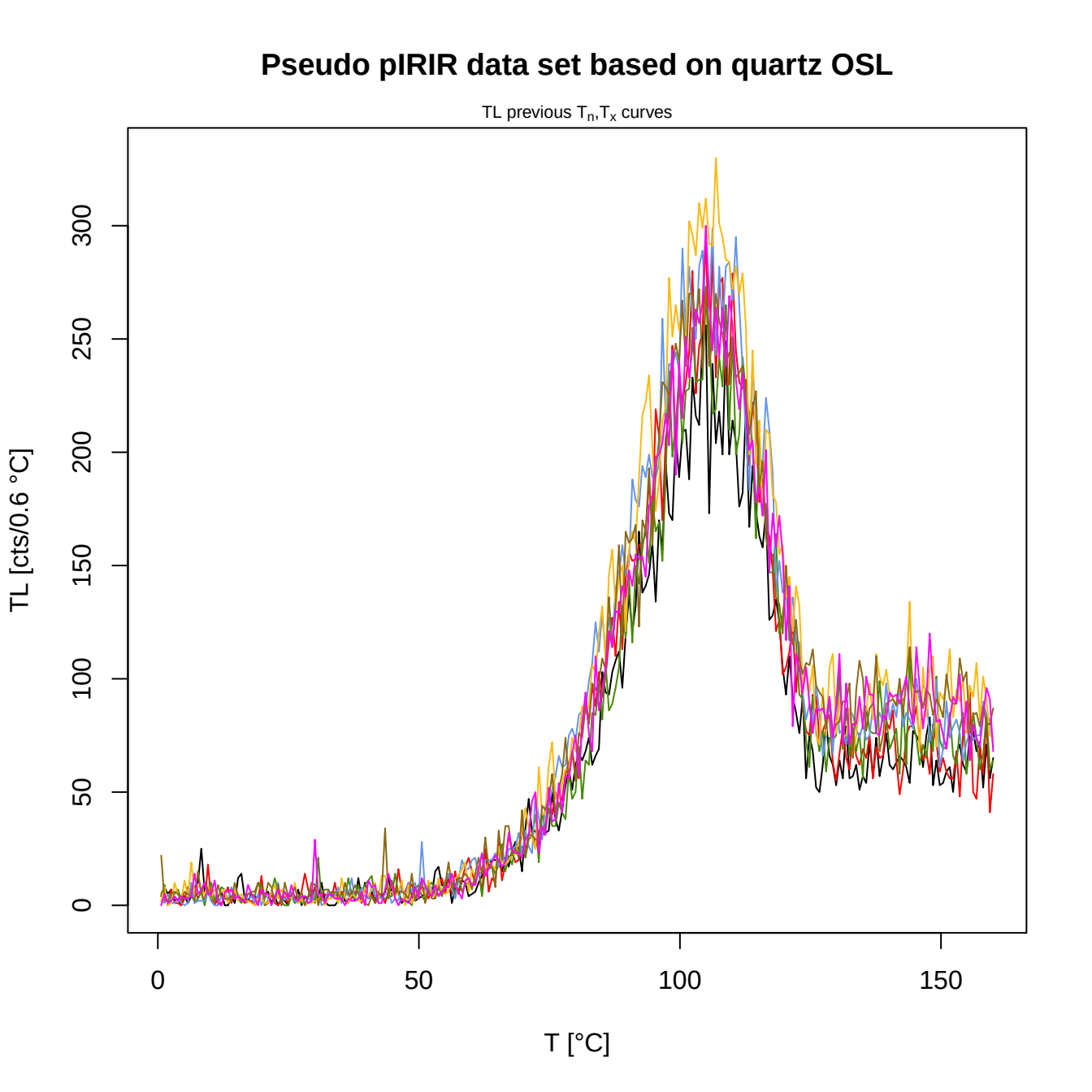

Rejection criteria
Recycling ratio
Recuperation rate
Palaeodose error
pseudoIRSL1
pseudoIRSL2
− 0.2
− 0.1
0/1
+ 0.1
+ 0.2

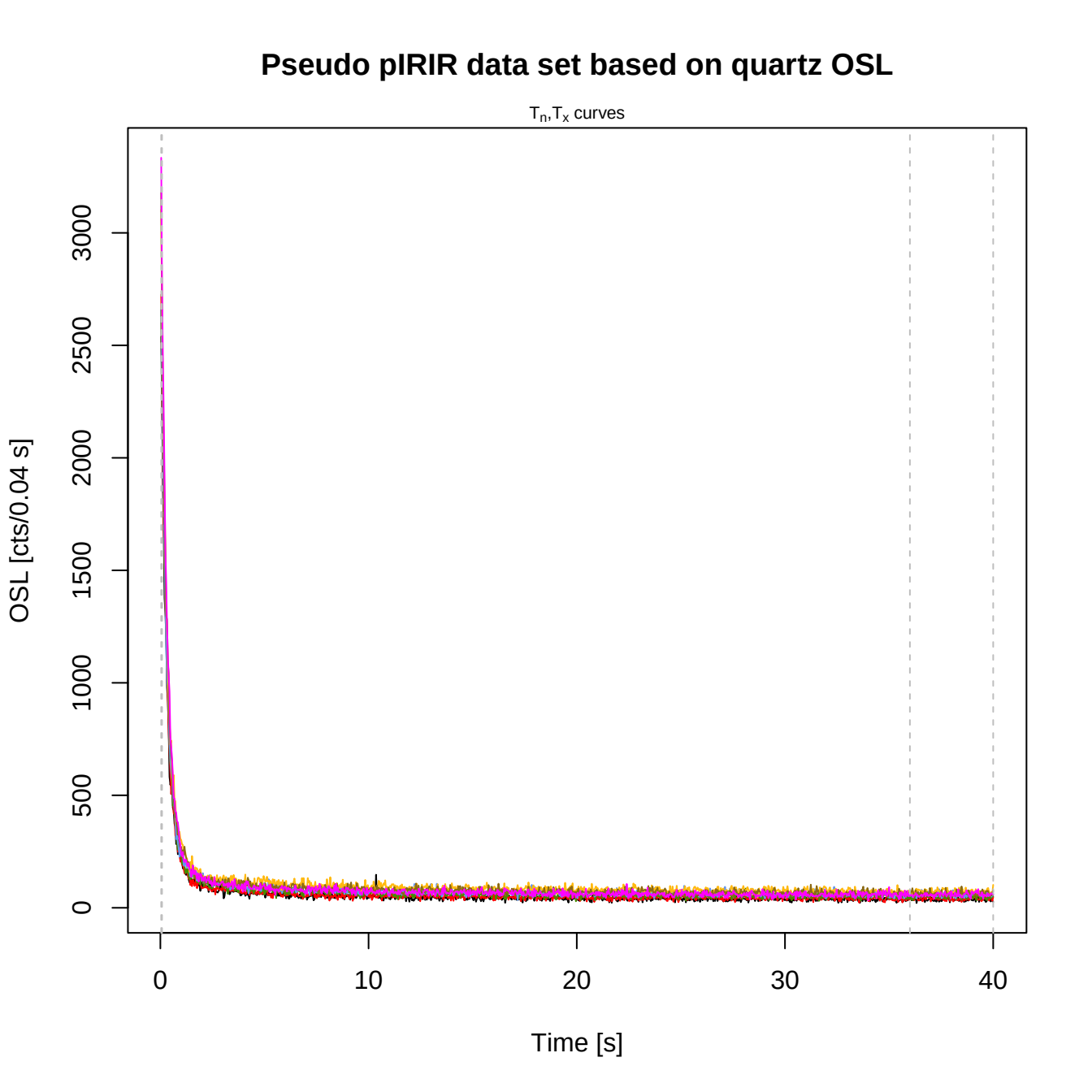
Pseudo pIRIR data set based on quartz OSL

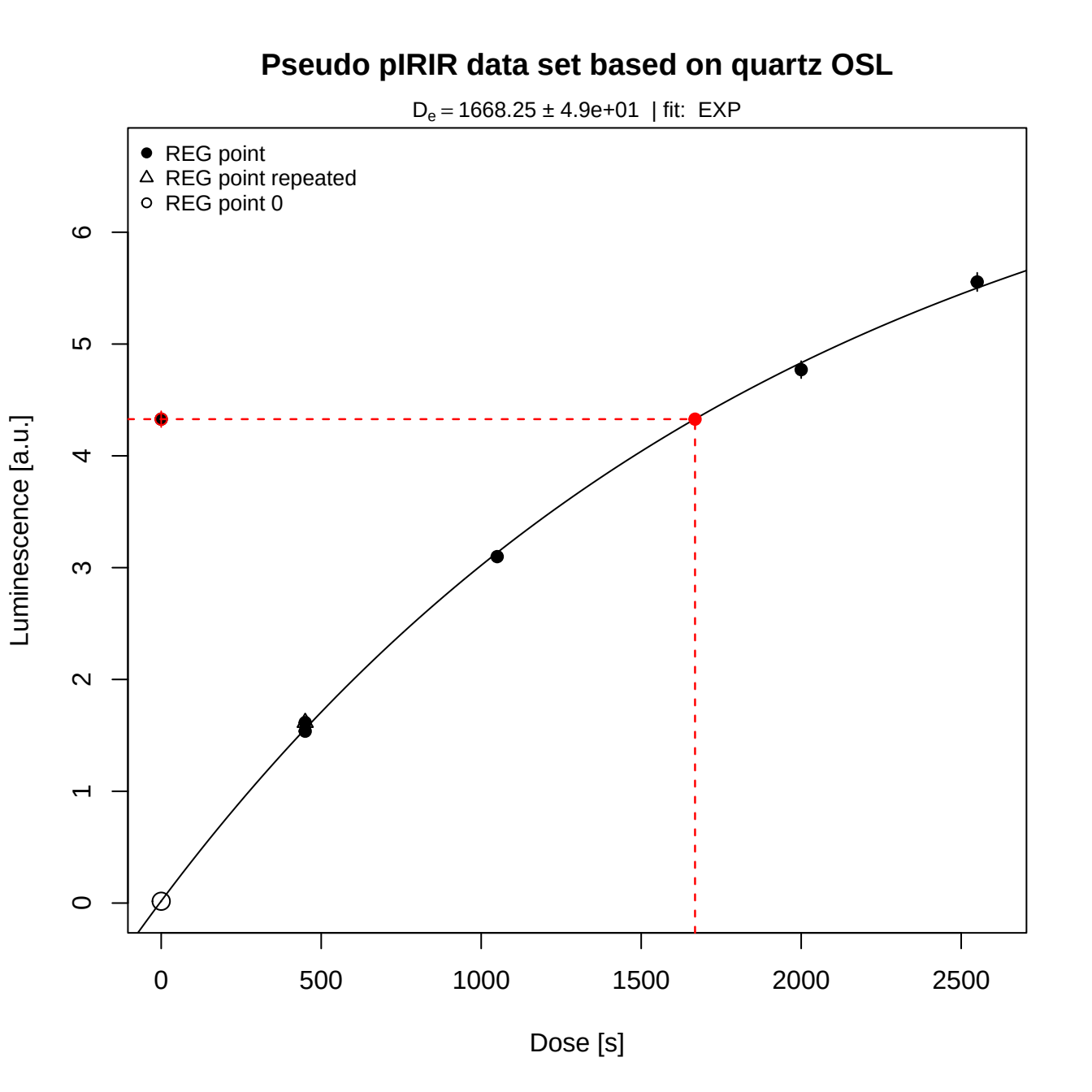
TL
pseudoIRSL1
pseudoIRSL2

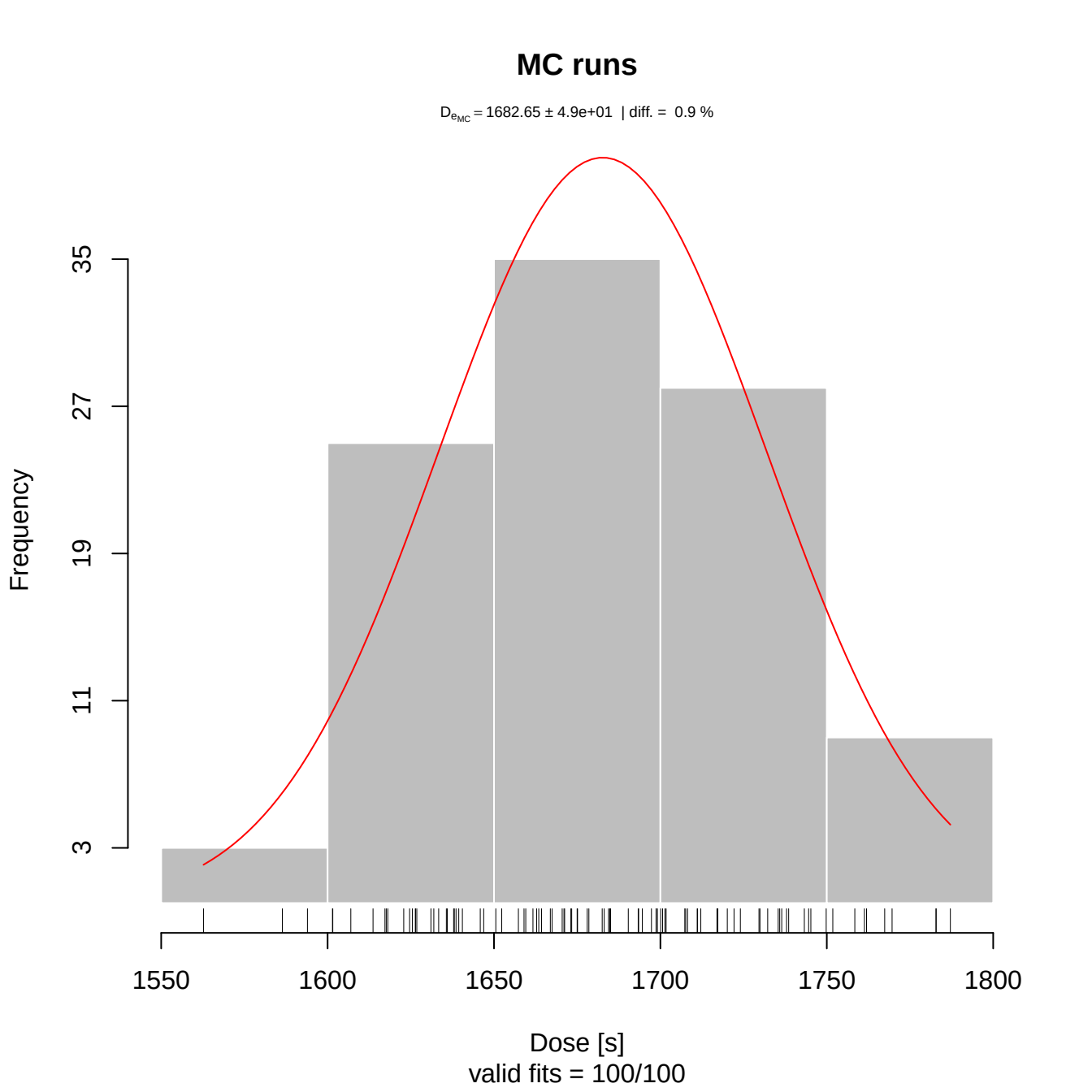

Pseudo pIRIR data set based on quartz OSL
TL previous L_n,L_x curves
TL [cts/0.9 °C]
0
200
400
600
800
0
50
100
150
200
T [°C]

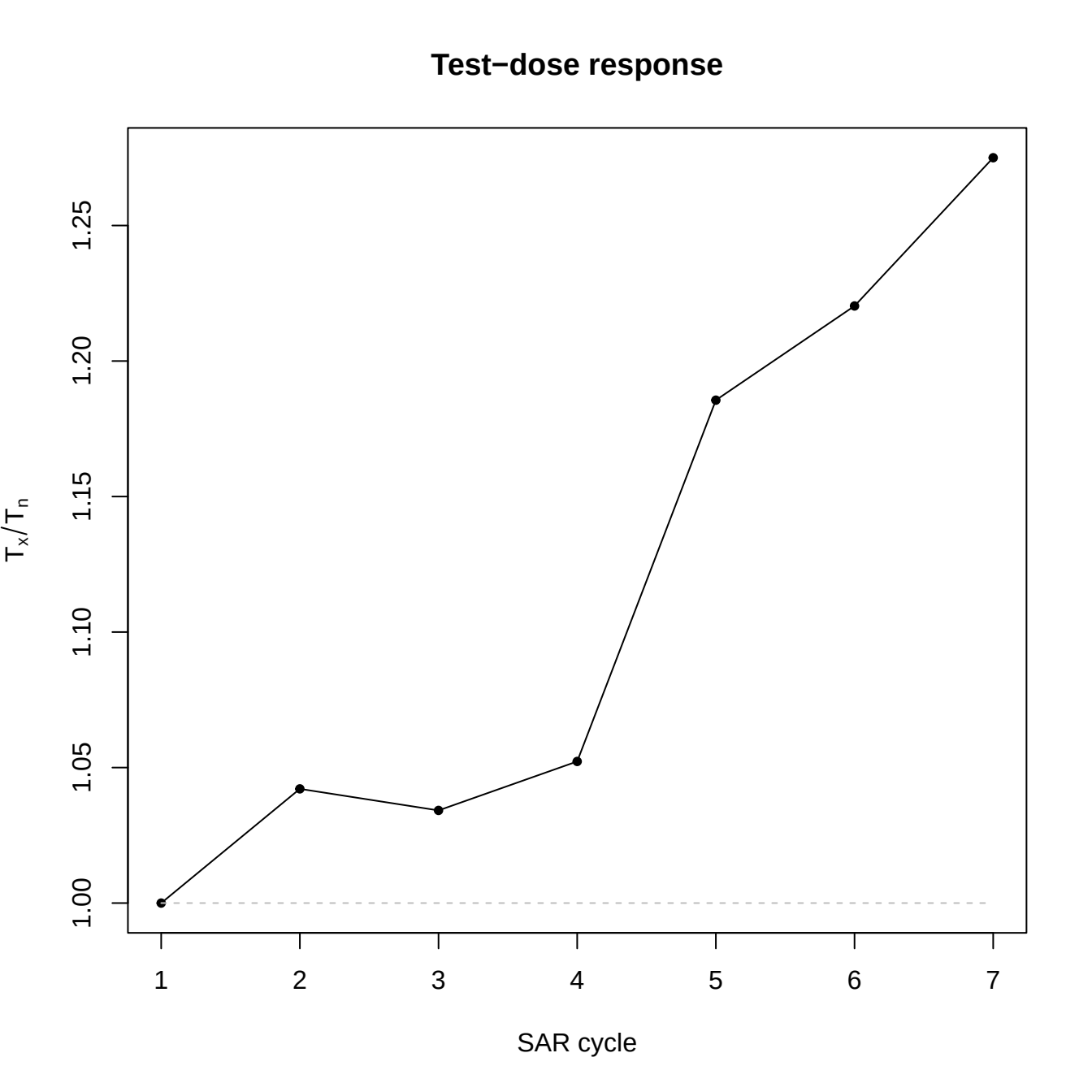

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]

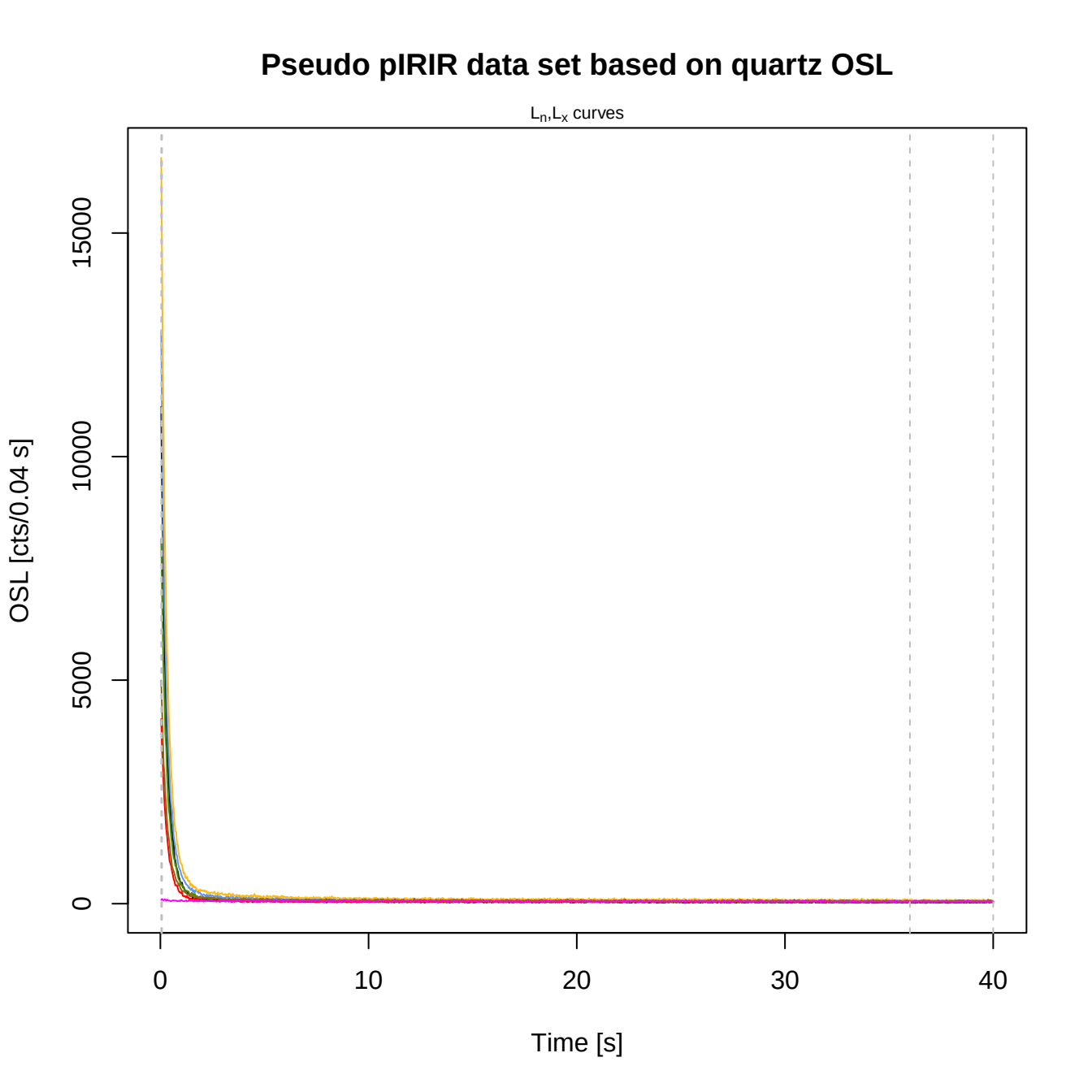

Pseudo pIRIR data set based on quartz OSL
TL previous T_n,T_x curves
TL [cts/0.6 °C]
0
50
100
150
200
250
300
T [°C]
0
50
100
150

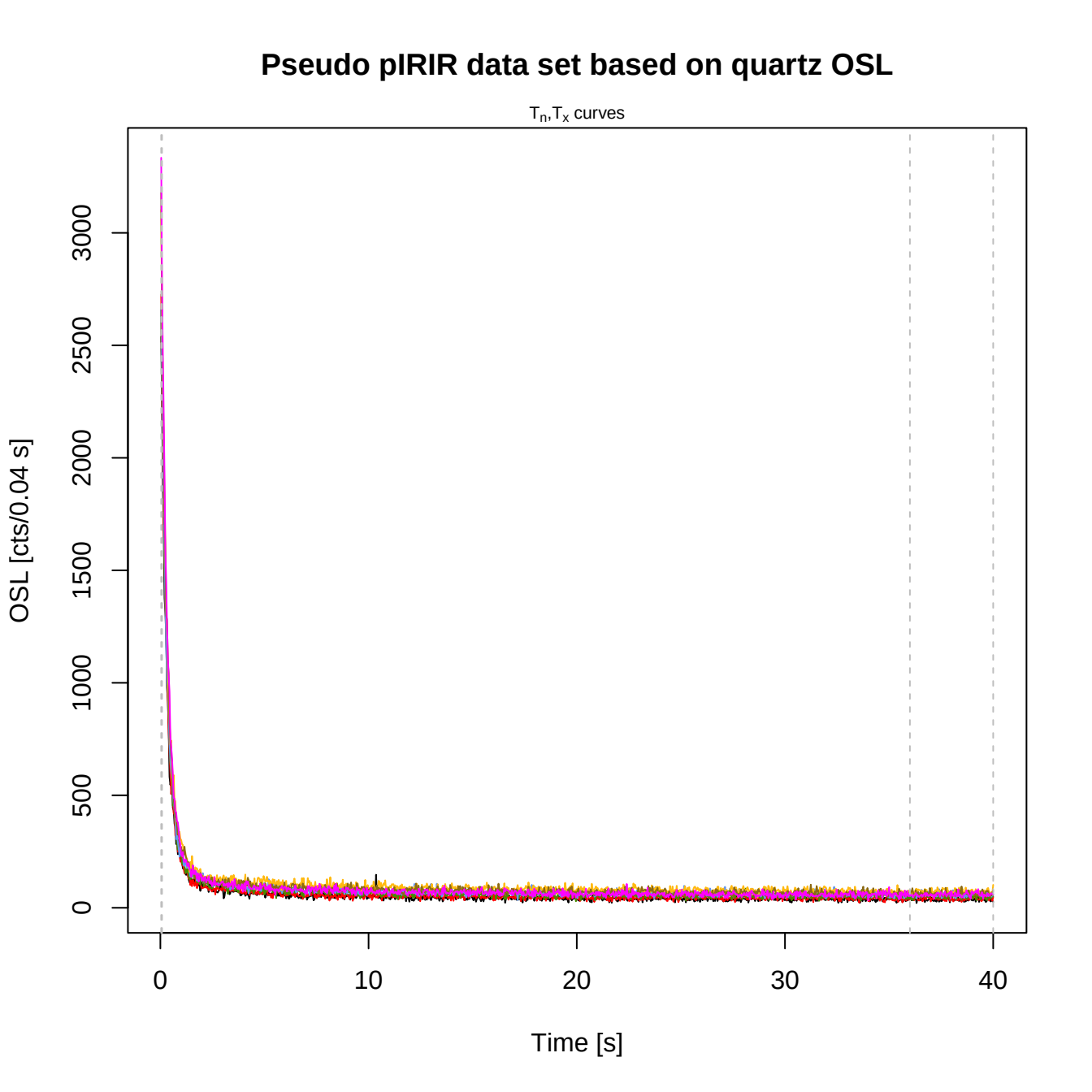

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
0
10
20
30
40
Time [s]


Pseudo pIRIR data set based on quartz OSL
D_e = 1668.25 ± 4.9e+01 | 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]

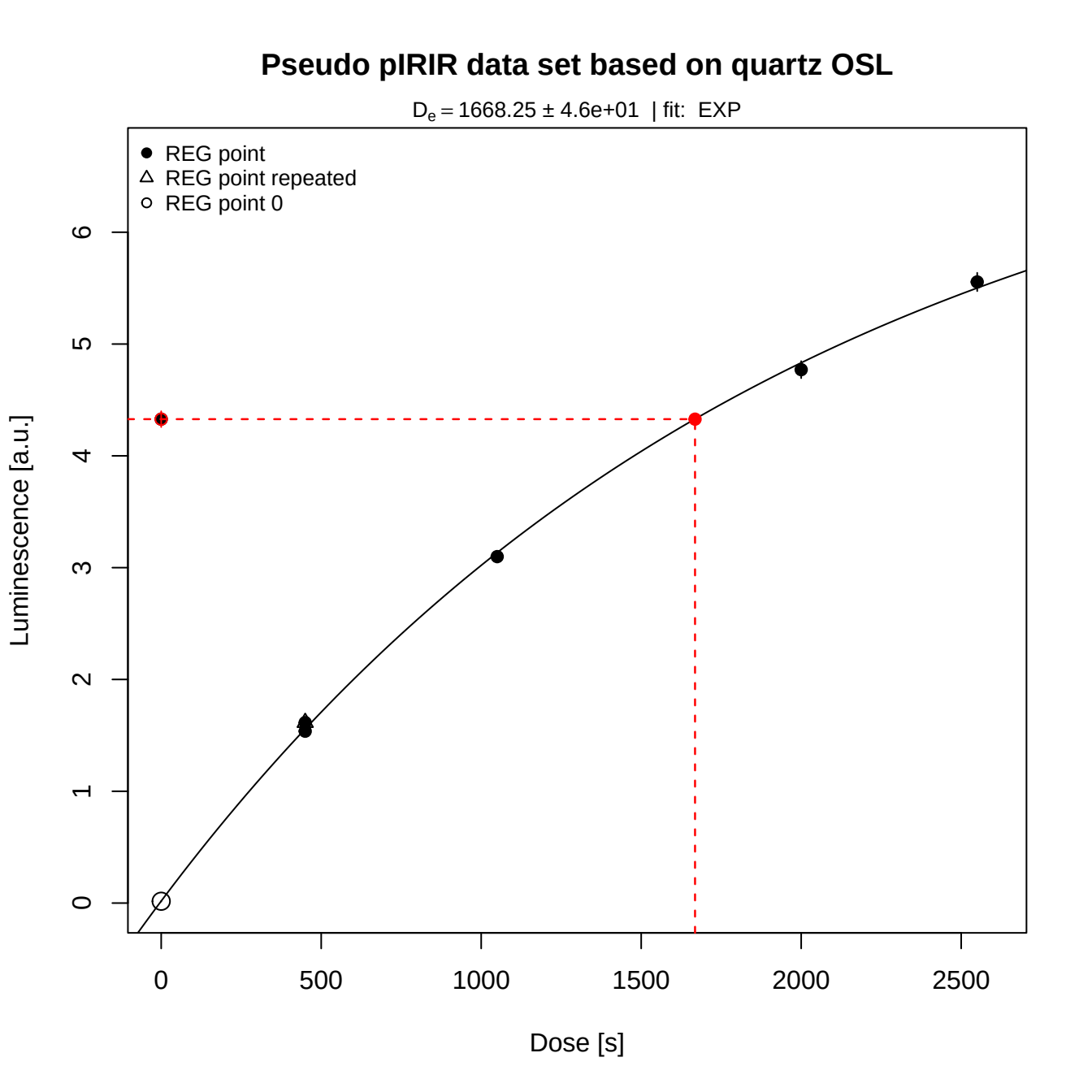

MC runs
$D_{e_{MC}}$ = 1682.65 ± 4.9e+01 | diff. = 0.9 %
Frequency
3
11
19
27
35
1550
1600
1650
1700
1750
1800
Dose [s]
valid fits = 100/100

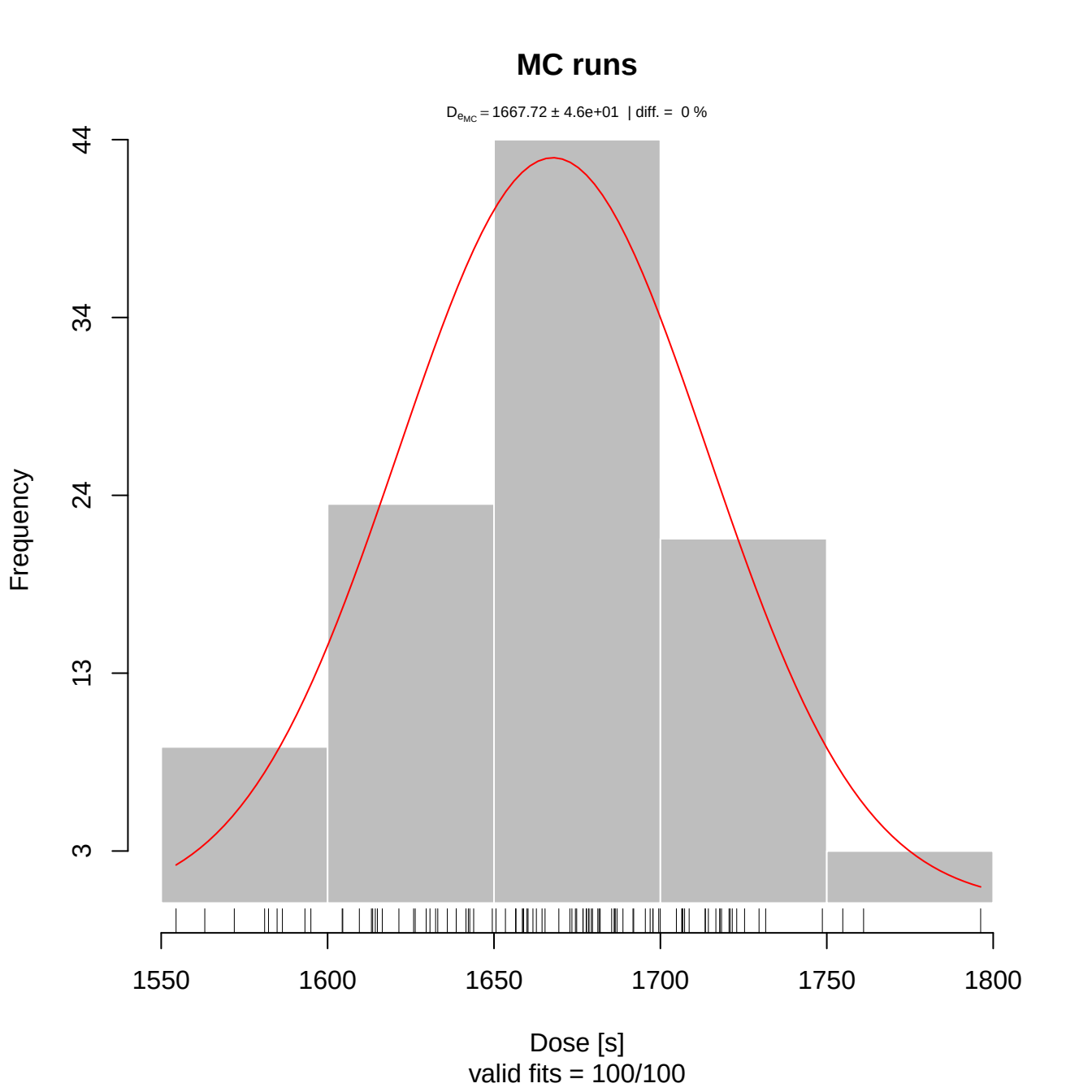

Test−dose response
1.00
1.05
1.10
1.15
1.20
1.25
T_x/T_n
1
2
3
4
5
6
7
SAR cycle

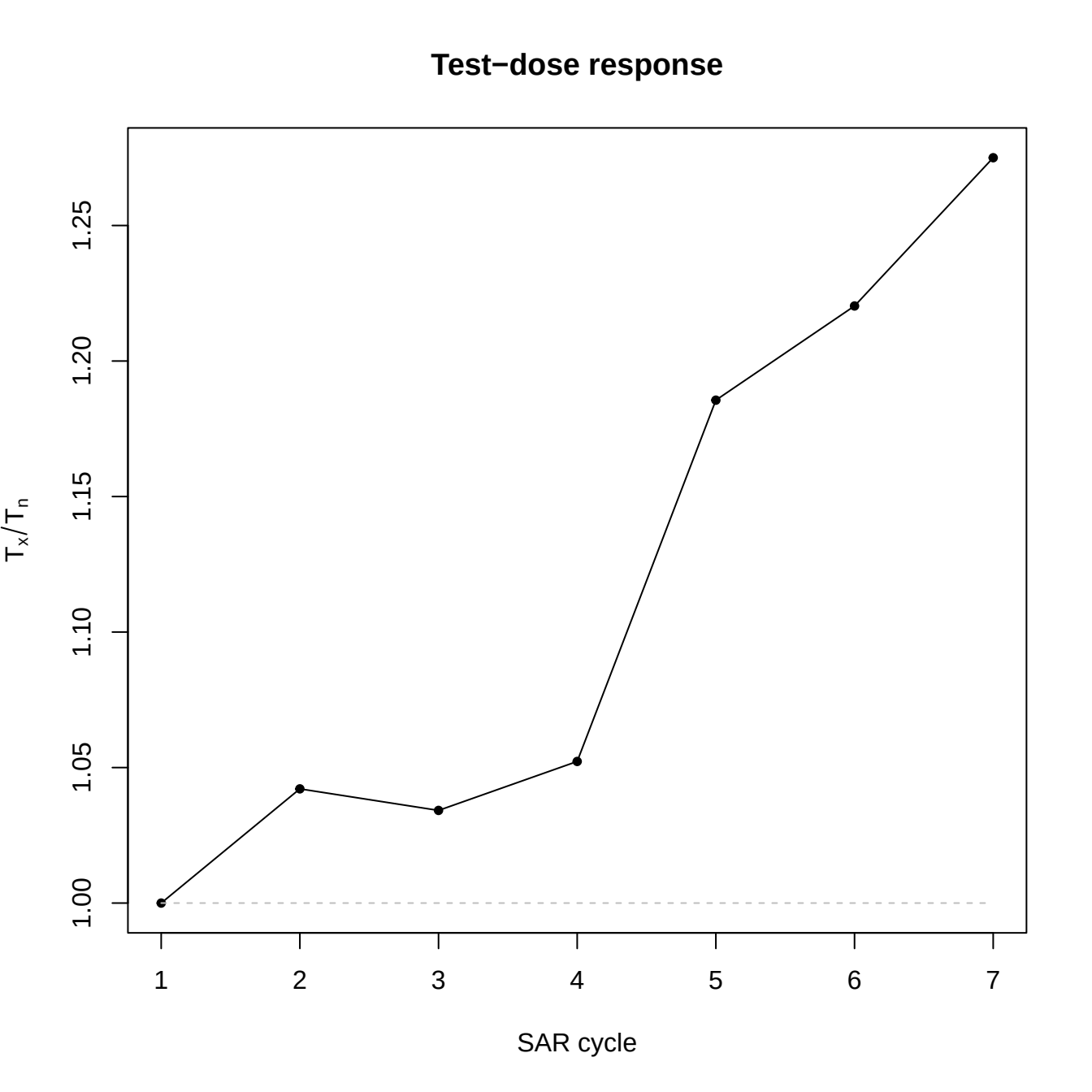

Pseudo pIRIR data set based on quartz OSL
L_n,L_x curves
OSL [cts/0.04 s]
0
5000
10000
15000
0
10
20
30
40
Time [s]

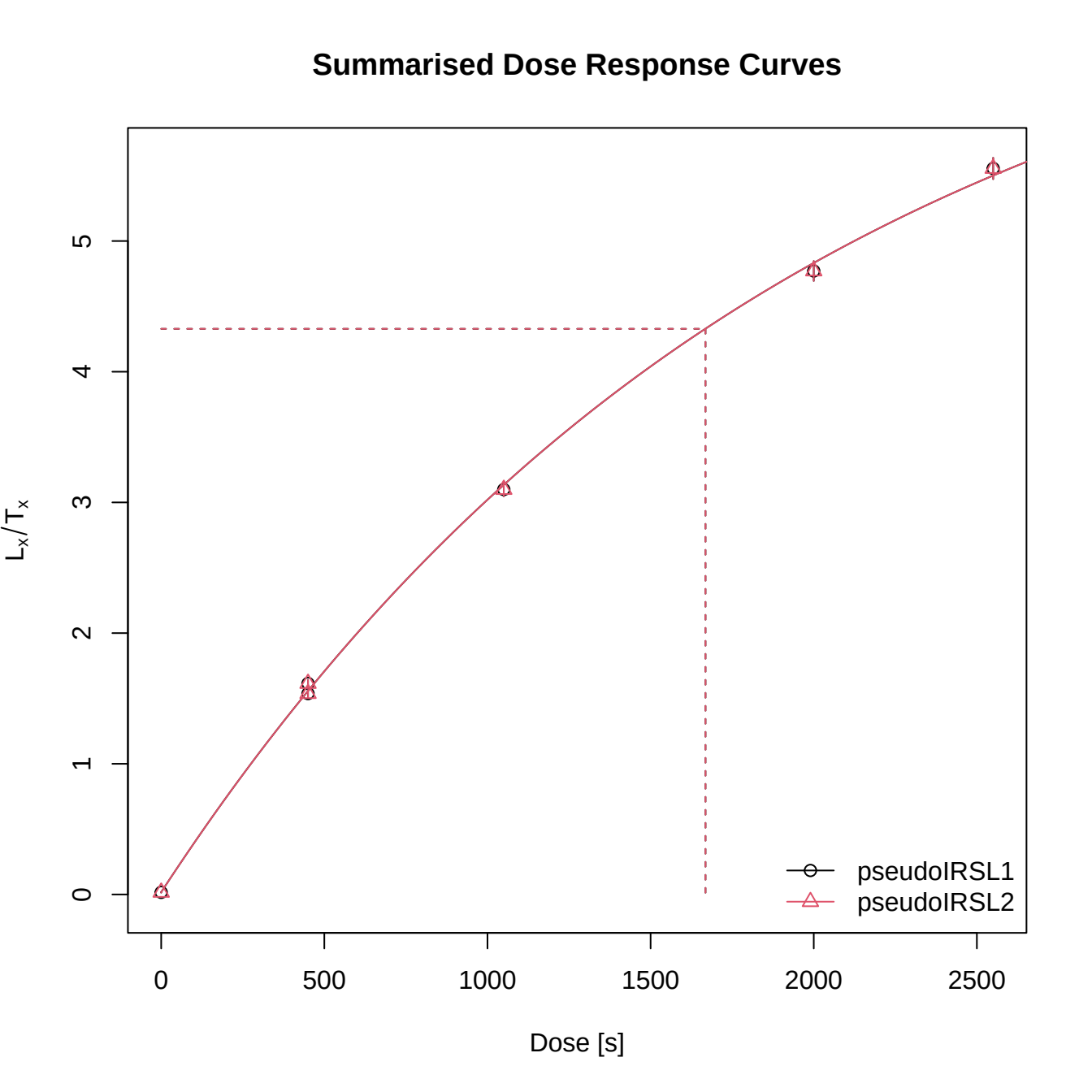

Pseudo pIRIR data set based on quartz OSL
T_n,T_x curves
OSL [cts/0.04 s]
0
500
1000
1500
2000
2500
3000
0
10
20
30
40
Time [s]

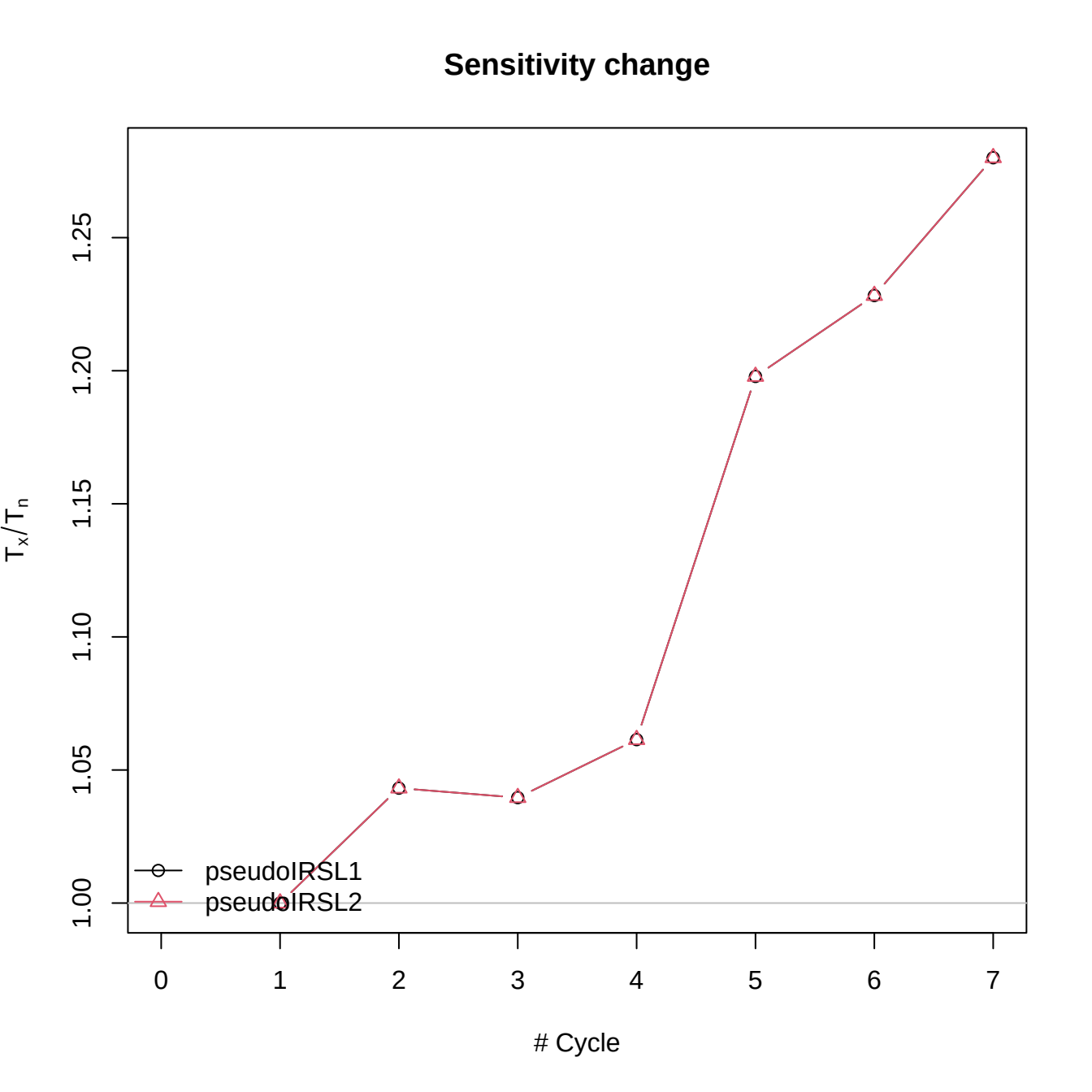

Natural
(0)
R1
(450)
R2
(1050)
R3
(2000)
R4
(2550)
R5
(450)
R0
(0)

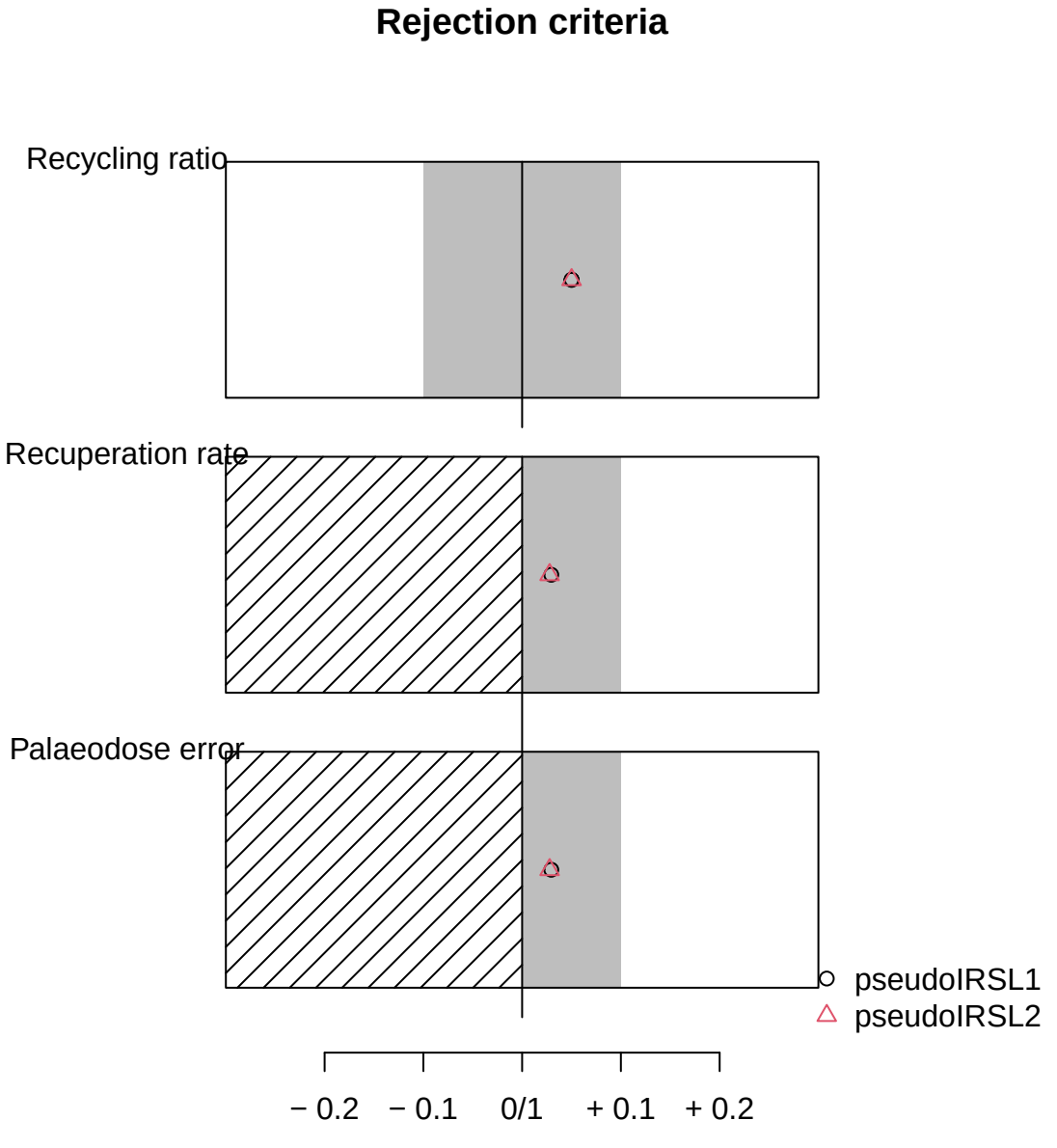

Pseudo pIRIR data set based on quartz OSL
D_e = 1668.25 ± 4.6e+01 | fit: EXP
REG point
REG point repeated
REG point 0
Luminescence [a.u.]
0
1
2
3
4
5
6
0
500
1000
1500
2000
2500
Dose [s]

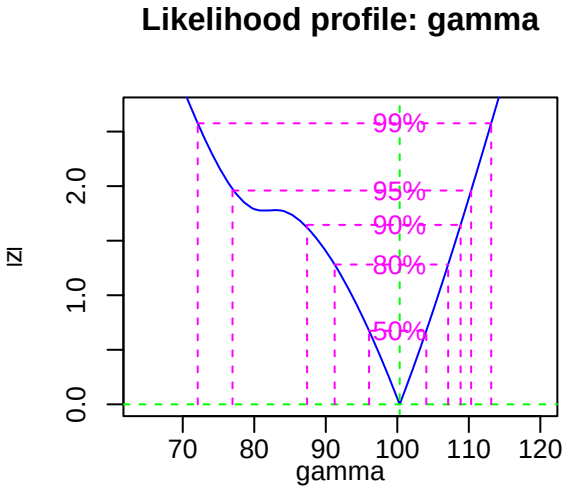

MC runs
$D_{e_{MC}}$ = 1667.72 ± 4.6e+01 | diff. = 0 %
Frequency
3
13
24
34
44
1550
1600
1650
1700
1750
1800
Dose [s]
valid fits = 100/100

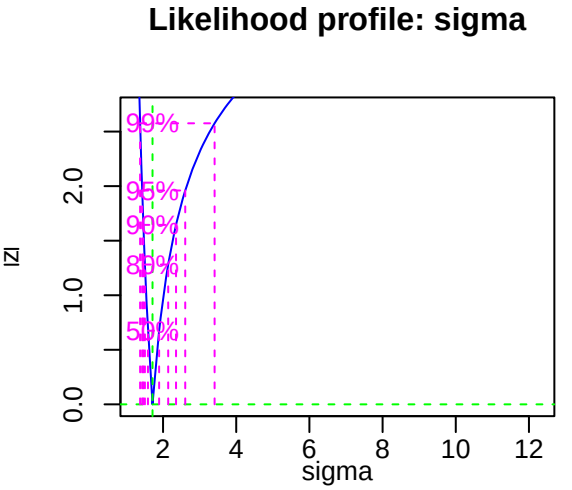

Test−dose response
1.00
1.05
1.10
1.15
1.20
1.25
T_x/T_n
1
2
3
4
5
6
7
SAR cycle

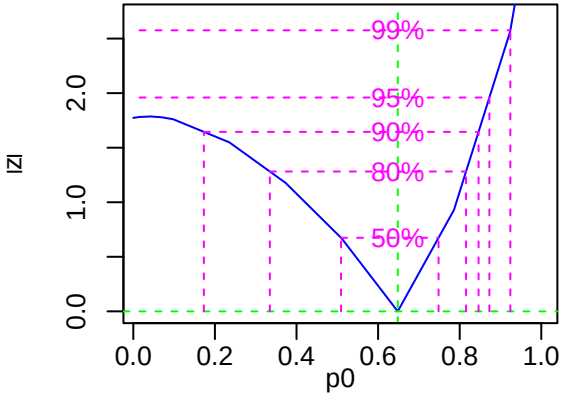

Summarised Dose Response Curves
L_x/T_x
0
1
2
3
4
5
0
500
1000
1500
2000
2500
Dose [s]
pseudoIRSL1
pseudoIRSL2

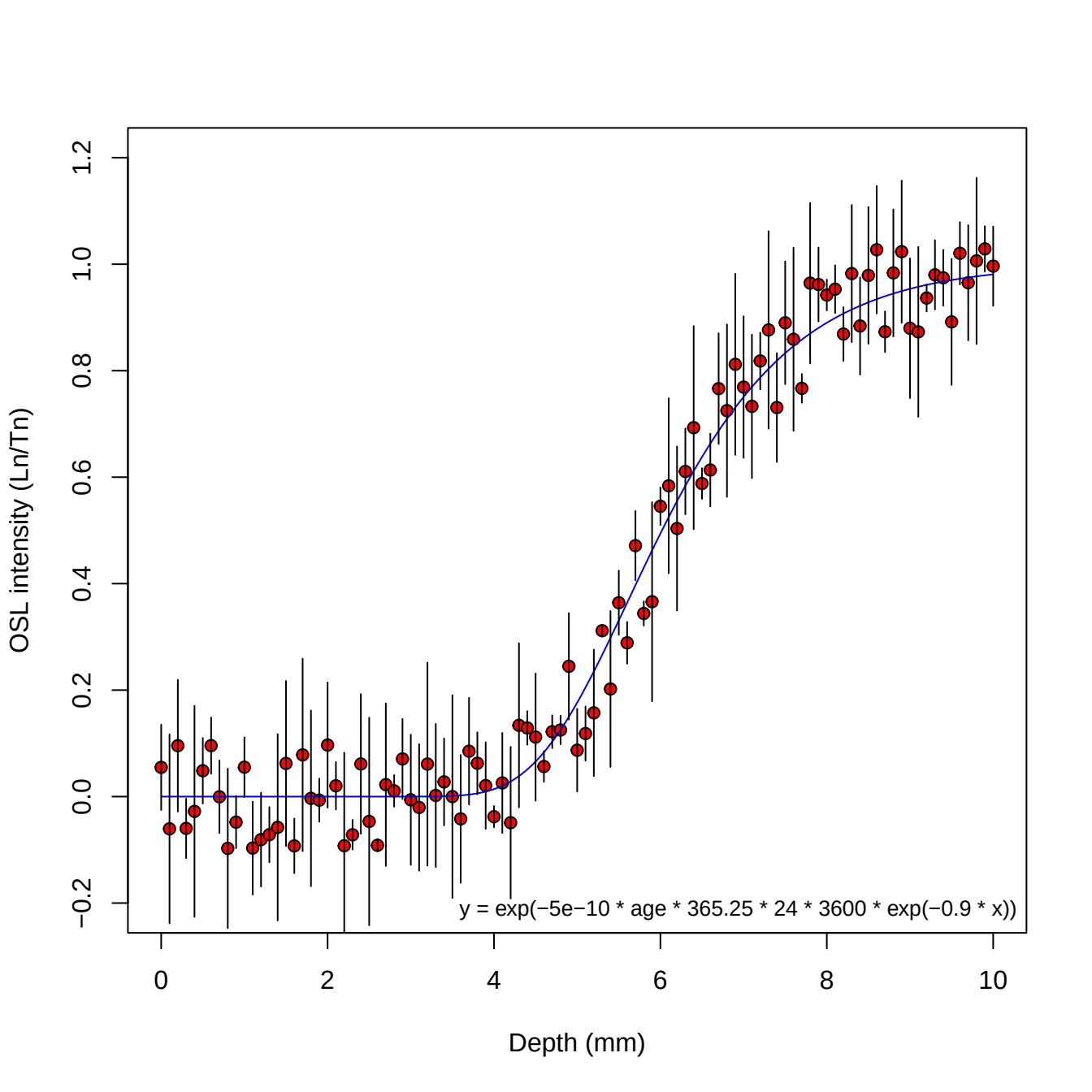

Sensitivity change
T_x/T_n
1.00
1.05
1.10
1.15
1.20
1.25
0
1
2
3
4
5
6
7
Cycle
pseudoIRSL1
pseudoIRSL2

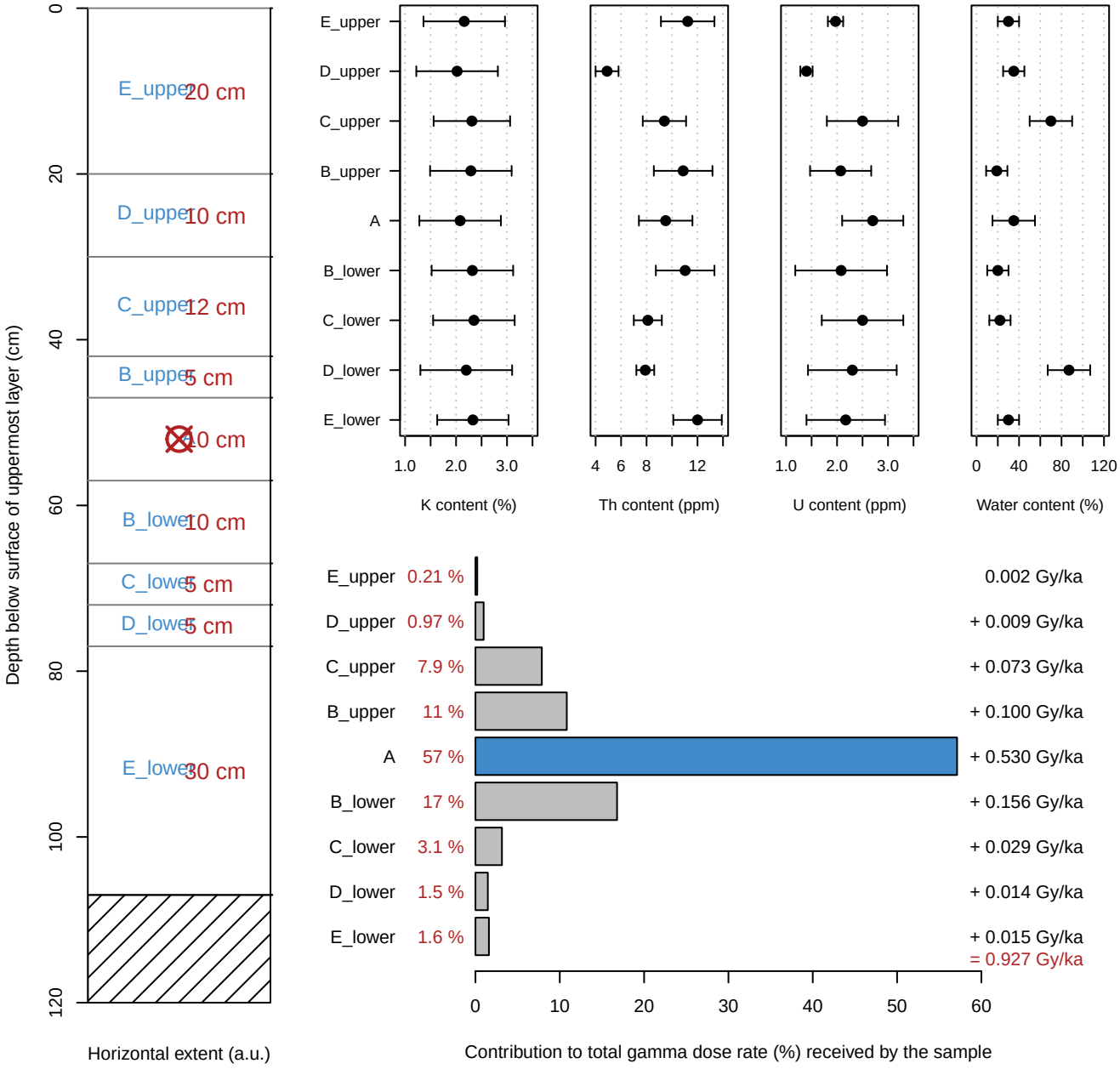

Rejection criteria
Recycling ratio
Recuperation rate
Palaeodose error
pseudoIRSL1
pseudoIRSL2
− 0.2
− 0.1
0/1
+ 0.1
+ 0.2

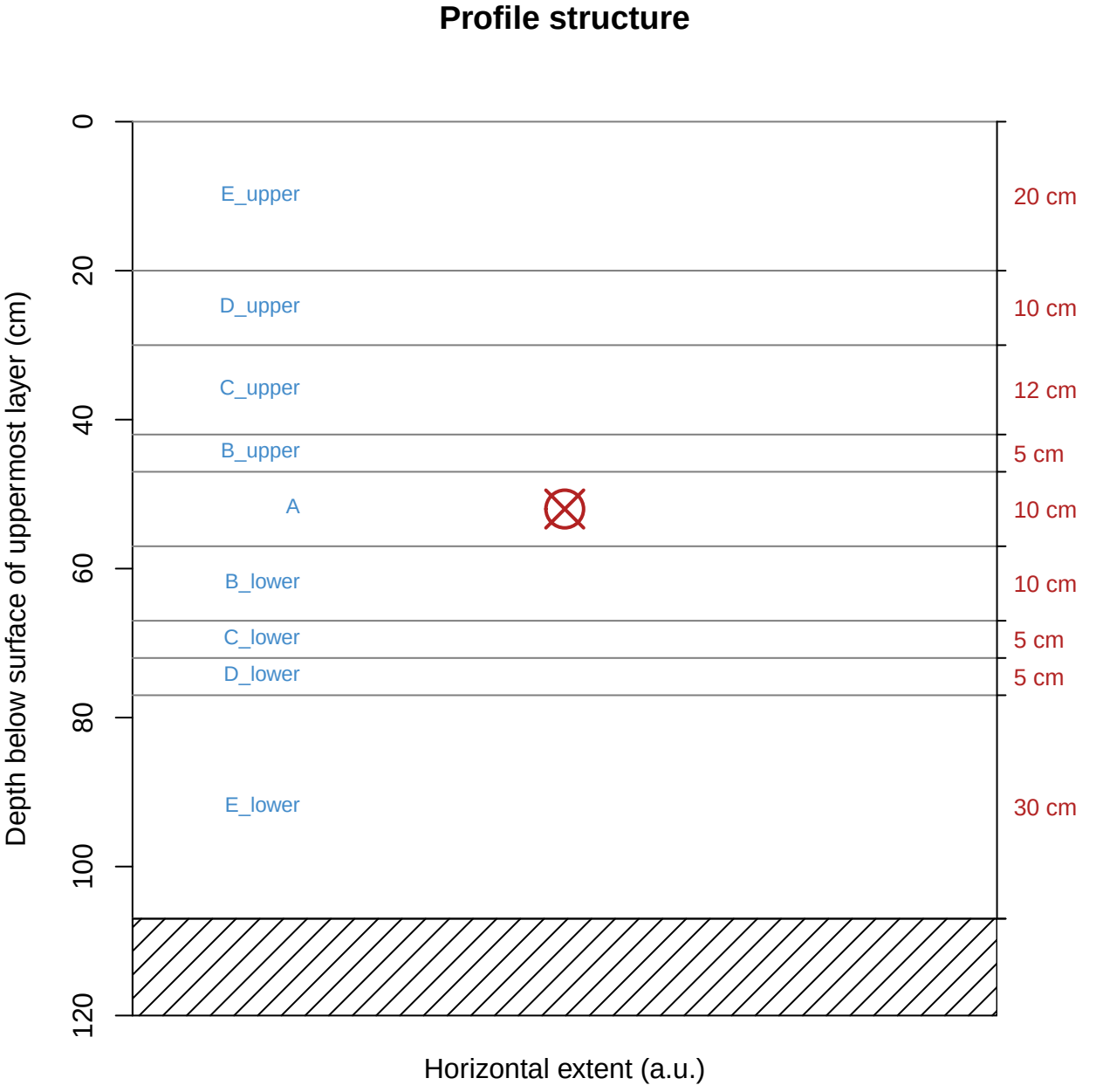

Likelihood profile: gamma
99%
95%
90%
80%
50%
0.0
1.0
2.0
70
80
90
100
110
120
gamma

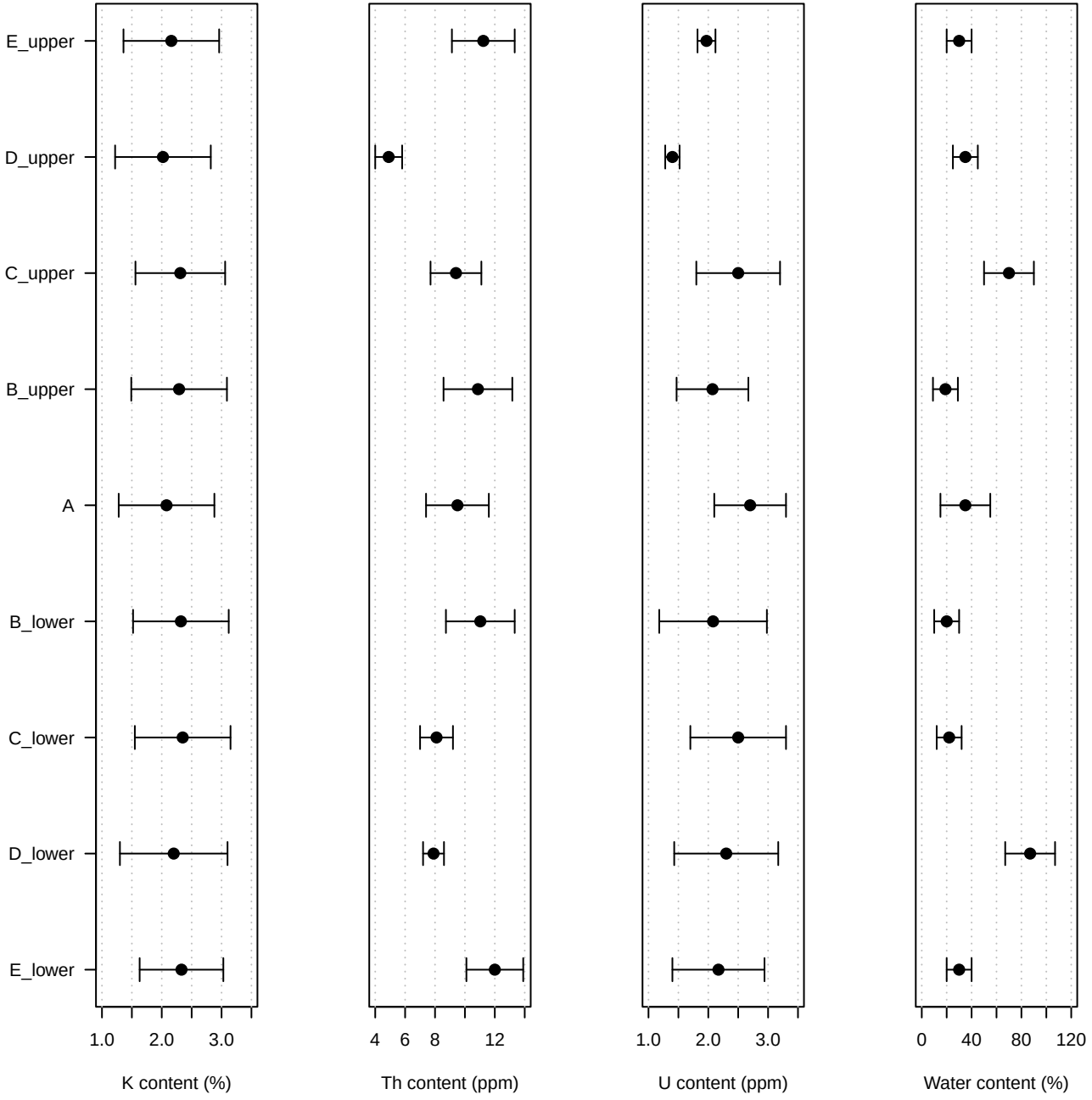

Likelihood profile: sigma
99%
95%
90%
80%
50%
0.0
1.0
2.0
2
4
6
8
10
12
sigma

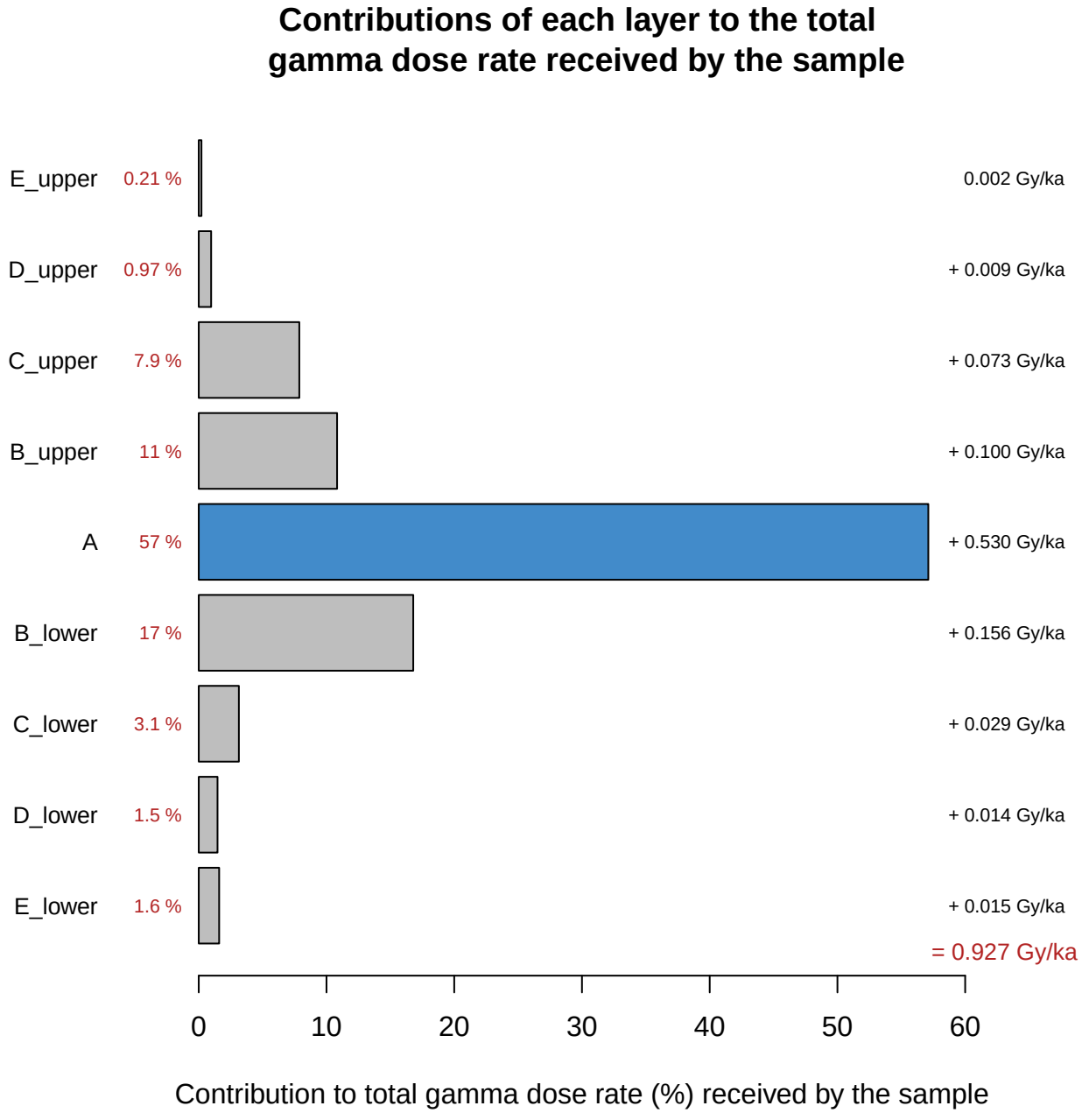

Likelihood profile: p0
99%
95%
90%
80%
50%
0.0
1.0
2.0
0.0
0.2
0.4
0.6
0.8
1.0
p0


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


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
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 (%)
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


Profile structure
Depth below surface of uppermost layer (cm)
0
20
40
60
80
100
120
E_upper
D_upper
C_upper
B_upper
A
B_lower
C_lower
D_lower
E_lower
20 cm
10 cm
12 cm
5 cm
10 cm
10 cm
5 cm
5 cm
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 (%)


Contributions of each layer to the total gamma dose rate received by the sample
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