# September 17

## Sample 1A No adjustment

Machine generated alternative text:
Sep 17 T 2 Sample1A **Without Bias Adjustment - ODR Fit 
> 800 
600 
400 
0.2 
0.4 
0.6 
0.8 
1.0 
1.2 
1.4 
1.6 
S -50 
• Data 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
50 
0.2 
0.4 
0.6 
Residuals 
0.8 
1.0 
x = (time ms) 
1.2 
1.4 
1.6 

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ORTHOGONAL DISTANCE REGRESSION

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Fitting 8 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 829.65 +/- 58.712 Guessed: 1100

p[1] = 2.033 +/- 0.33914 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.85602256]

[-0.85602256 1. ]]

Quasi Chi-Squared/dof = 0.43356, Quasi CDF = 85.69559%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 3.7961 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 86.2%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 831.33 +/- 64.153 ; 826.86 + 65.425 - 56.761

p[1] = 2.1002 +/- 0.40184 ; 2.0438 + 0.42918 - 0.30945

Monte Carlo Correlation Matrix

[[ 1. -0.82193859]

[-0.82193859 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.0009351 +/- 0.002948 ( 0.32 SD)

p[1] Bias : -0.004847 +/- 0.007346 ( -0.66 SD)

## Sample 1A With Adjustment by 400 down

Machine generated alternative text:
Sep 17 T 2 Sample1A **With Bias Adjustment - ODR Fit 
S 400 
200 
aans=egq 
0.2 
0.4 
0.6 
0.8 
1.0 
1.2 
1.4 
1.6 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
-50 
0.2 
0.4 
0.6 
Residuals 
0.8 
1.0 
x = (time ms) 
1.2 
1.4 
1.6 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 8 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 606.94 +/- 165.47 Guessed: 1100

p[1] = 0.50146 +/- 0.12491 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.85668108]

[-0.85668108 1. ]]

Quasi Chi-Squared/dof = 0.04585, Quasi CDF = 99.96087%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 2.52494 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 99.9%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 987.15 +/- 6475.3 ; 608.08 + 230.69 - 140.67

p[1] = 0.50729 +/- 0.13517 ; 0.49659 + 0.1357 - 0.11757

Monte Carlo Correlation Matrix

[[ 1. -0.1814282]

[-0.1814282 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.009377 +/- 0.05155 ( 0.18 SD)

p[1] Bias : -0.02255 +/- 0.01055 ( -2.14 SD)

## Sample 5A No adjustment

Machine generated alternative text:
Sep 17 T2 Sample5A **Without Bias Adjustment - 
ODR Fit 
600 
E 500 
400 
300 
200 
0.2 
100 
| -100 
0.2 
0.4 
0.6 
0.8 
1.0 
1.2 
1.4 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
0.4 
0.6 
1.2 
1.4 
1.6 
1.6 
1.0 
0.8 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 6 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 507.11 +/- 66.026 Guessed: 1100

p[1] = 1.444 +/- 0.43556 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.82800208]

[-0.82800208 1. ]]

Quasi Chi-Squared/dof = 1.38754, Quasi CDF = 23.53551%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 3.08264 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 21.8%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 513.36 +/- 64.977 ; 510.12 + 70.285 - 64.462

p[1] = 1.5893 +/- 0.8687 ; 1.4177 + 0.58581 - 0.34275

Monte Carlo Correlation Matrix

[[ 1. -0.63580311]

[-0.63580311 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.005566 +/- 0.004257 ( 1.31 SD)

p[1] Bias : -0.01913 +/- 0.01526 ( -1.25 SD)

## Sample 5A With Adjustment by 250 down

Machine generated alternative text:
Sep 17 T 2 Sample5A **With Bias Adjustment - 
ODR Fit 
300 
200 
100 
-100 
0.2 
-50 
0.2 
0.4 
0.6 
0.8 
1.0 
1.2 
1.4 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
0.4 
0.6 
1.2 
1.4 
1.6 
1.6 
1.0 
0.8 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 6 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 620.03 +/- 291.6 Guessed: 1100

p[1] = 0.20954 +/- 0.087543 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.92580394]

[-0.92580394 1. ]]

Quasi Chi-Squared/dof = 0.02843, Quasi CDF = 99.84438%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 3.97257 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 100.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 1238.1 +/- 5459.7 ; 637.54 + 360.37 - 207.81

p[1] = 0.22579 +/- 0.096592 ; 0.21114 + 0.094527 - 0.065884

Monte Carlo Correlation Matrix

[[ 1. -0.23245909]

[-0.23245909 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.01543 +/- 0.823 ( 0.02 SD)

p[1] Bias : +0.01884 +/- 0.02379 ( 0.79 SD)

# September 20

## T1 Sample 1A

Machine generated alternative text:
Orthogonal Distance Regression Fit to Data 
1200 
1000 
800 
600 
400 
200 
• 
100 
—100 
Data 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 15 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 982.49 +/- 29.468 Guessed: 1100

p[1] = 1.591 +/- 0.057318 Guessed: 1

ODR Correlation Matrix

[[1. 0.6498438]

[0.6498438 1. ]]

Quasi Chi-Squared/dof = 1.35298, Quasi CDF = 17.37673%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 0.992404 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 18.1%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 981.41 +/- 25.626 ; 981.74 + 25.093 - 25.341

p[1] = 1.5881 +/- 0.049611 ; 1.5867 + 0.050957 - 0.047451

Monte Carlo Correlation Matrix

[[1. 0.63539285]

[0.63539285 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.003251 +/- 0.001013 ( 3.21 SD)

p[1] Bias : +0.002761 +/- 0.001211 ( 2.28 SD)

## T2 Sample 1A

Machine generated alternative text:
600 
400 
200 
0.5 
100 
-100 
0.5 
Orthogonal Distance Regression Fit to Data 
2.0 
1.0 
1.5 
2.5 
3.0 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
1.0 
1.5 
2.0 
2.5 
3.0 
3.5 
3.5 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 11 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 1154.2 +/- 301.83 Guessed: 1100

p[1] = 0.77789 +/- 0.1231 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.85776707]

[-0.85776707 1. ]]

Quasi Chi-Squared/dof = 6.31787, Quasi CDF = 0.00000%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.68959 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF is less than 0.1%

and is consistent with 0.0%

For a better limit run with more iterations!

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 1161.5 +/- 118.55 ; 1160.9 + 119.17 - 120.8

p[1] = 0.77821 +/- 0.049285 ; 0.77598 + 0.049581 - 0.046543

Monte Carlo Correlation Matrix

[[ 1. -0.83126671]

[-0.83126671 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.003835 +/- 0.004376 ( 0.88 SD)

p[1] Bias : -0.003968 +/- 0.00259 ( -1.53 SD)

## T2 Sample 5A

Machine generated alternative text:
Orthogonal Distance Regression Fit to Data 
600 
400 
200 
25 
-50 
25 
75 
Best ODR Fit 
Initial guess 
75 
100 
125 
150 
Using mean MC values 
Using median MC values 
Residuals 
100 
125 
150 
175 
175 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 10 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 712.17 +/- 56.081 Guessed: 1100

p[1] = 64.859 +/- 5.8012 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.75611649]

[-0.75611649 1. ]]

Quasi Chi-Squared/dof = 2.96287, Quasi CDF = 0.25698%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.97572 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 0.2%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 714.03 +/- 30.779 ; 713.77 + 32.752 - 31.187

p[1] = 64.882 +/- 2.8649 ; 64.748 + 3.1138 - 2.7122

Monte Carlo Correlation Matrix

[[ 1. -0.71483831]

[-0.71483831 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.0006639 +/- 0.001846 ( 0.36 SD)

p[1] Bias : -0.0004799 +/- 0.00211 ( -0.23 SD)

# September 24

Machine generated alternative text:
Tl Measure Sample 1B - 
ODR Fit 
800 
600 
S 400 
200 
2.0 
S -50 
2.0 
0.5 
0.5 
1.0 
1.0 
1.5 
Best ODR Fit 
Initial guess 
1.5 
2.5 
3.0 
3.5 
Using mean MC values 
Using median MC values 
Residuals 
2.5 
x = (time ms) 
3.0 
3.5 
4.0 
4.0 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 13 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 807.8 +/- 29.64 Guessed: 1000

p[1] = 0.96832 +/- 0.017843 Guessed: 1

ODR Correlation Matrix

[[1. 0.58016596]

[0.58016596 1. ]]

Quasi Chi-Squared/dof = 0.57550, Quasi CDF = 85.04296%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.35846 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 85.3%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 807.45 +/- 29.623 ; 806.9 + 29.473 - 29.752

p[1] = 0.96802 +/- 0.017368 ; 0.9684 + 0.016767 - 0.017659

Monte Carlo Correlation Matrix

[[1. 0.58643169]

[0.58643169 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : -0.001463 +/- 0.001427 ( -1.03 SD)

p[1] Bias : -0.0006791 +/- 0.0007239 ( -0.94 SD)

Machine generated alternative text:
Tl Measure Sample 2B - 
ODR Fit 
E 
1000 
S —50 
800 
600 
400 
200 
50 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 10 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 935.41 +/- 31.092 Guessed: 1000

p[1] = 2.068 +/- 0.062621 Guessed: 1

ODR Correlation Matrix

[[1. 0.68188335]

[0.68188335 1. ]]

Quasi Chi-Squared/dof = 0.23574, Quasi CDF = 98.43119%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.04306 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 98.6%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 937.64 +/- 31.557 ; 937.71 + 30.657 - 32.55

p[1] = 2.0696 +/- 0.064588 ; 2.0699 + 0.064796 - 0.066342

Monte Carlo Correlation Matrix

[[1. 0.68607347]

[0.68607347 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001407 +/- 0.001275 ( 1.10 SD)

p[1] Bias : +0.001032 +/- 0.001132 ( 0.91 SD)

Machine generated alternative text:
Tl Measure Sample 3B - 
1000 
800 
600 
400 
200 
2.5 
100 
5.0 
7.5 
10.0 
12.5 
15.0 
ODR Fit 
17.5 
20.0 
22.5 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
2.5 
7.5 
10.0 12.5 
15.0 17.5 
20.0 22.5 
5.0 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Fitting 12 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 974.37 +/- 30.056 Guessed: 1000

p[1] = 4.8009 +/- 0.1193 Guessed: 1

ODR Correlation Matrix

[[1. 0.63220812]

[0.63220812 1. ]]

Quasi Chi-Squared/dof = 0.29242, Quasi CDF = 98.31509%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.05061 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 98.6%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 975.78 +/- 30.248 ; 974.42 + 32.187 - 29.381

p[1] = 4.8043 +/- 0.11591 ; 4.8029 + 0.11866 - 0.11253

Monte Carlo Correlation Matrix

[[1. 0.63949054]

[0.63949054 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : -0.001228 +/- 0.001167 ( -1.05 SD)

p[1] Bias : +1.687e-05 +/- 0.00099 ( 0.02 SD)

Machine generated alternative text:
Tl Measure Sample 4B - 
> 
> 
g 
1250 
1000 
750 
500 
250 
100 
o 
-100 
ODR Fit 
40 
10 
10 
20 
Best ODR Fit 
Initial guess 
20 
30 
Using mean MC values 
Using median MC values 
Residuals 
30 
x = (time ms) 
50 
50 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 10 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 1084.9 +/- 37.136 Guessed: 1000

p[1] = 11.386 +/- 0.39096 Guessed: 1

ODR Correlation Matrix

[[1. 0.71605716]

[0.71605716 1. ]]

Quasi Chi-Squared/dof = 0.46941, Quasi CDF = 87.85008%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.49132 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 88.3%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 1086.5 +/- 36.69 ; 1084.5 + 40.585 - 35.073

p[1] = 11.386 +/- 0.38884 ; 11.373 + 0.41039 - 0.37718

Monte Carlo Correlation Matrix

[[1. 0.69030597]

[0.69030597 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.0007519 +/- 0.001403 ( 0.54 SD)

p[1] Bias : +0.0009622 +/- 0.001331 ( 0.72 SD)

Machine generated alternative text:
T2 Measure Sample 1B - 
ODR Fit 
600 
400 
7 200 
0.2 
50 
-50 
0.2 
0.4 
• Data 
0.6 
0.8 
1.0 
1.2 
Best ODR Fit 
Initial guess 
0.6 
Using mean MC values 
Using median MC values 
Residuals 
0.4 
1.4 
1.4 
0.8 
x = (time ms) 
1.0 
1.2 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 13 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 782.37 +/- 83.409 Guessed: 1100

p[1] = 0.60584 +/- 0.071983 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.91298696]

[-0.91298696 1. ]]

Quasi Chi-Squared/dof = 0.13785, Quasi CDF = 99.95990%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.18719 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 100.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 787.5 +/- 80.084 ; 785.85 + 81.417 - 78.309

p[1] = 0.61223 +/- 0.072334 ; 0.60556 + 0.076642 - 0.063972

Monte Carlo Correlation Matrix

[[ 1. -0.89470068]

[-0.89470068 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001794 +/- 0.004272 ( 0.42 SD)

p[1] Bias : -0.000273 +/- 0.004785 ( -0.06 SD)

Machine generated alternative text:
T2 Measure Sample 2B - 
600 
400 
200 
0.5 
S -50 
0.5 
ODR Fit 
2.5 
1.0 
Best ODR Fit 
Initial guess 
1.0 
1.5 
2.0 
Using mean MC values 
Using median MC values 
Residuals 
1.5 
2.0 
2.5 
3.0 
3.0 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 11 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 802.24 +/- 53.547 Guessed: 1100

p[1] = 1.3427 +/- 0.11763 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.81901939]

[-0.81901939 1. ]]

Quasi Chi-Squared/dof = 0.05365, Quasi CDF = 99.99738%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 0.557515 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 100.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 802.91 +/- 53.538 ; 801.83 + 56.895 - 52.842

p[1] = 1.3519 +/- 0.1239 ; 1.3409 + 0.13641 - 0.11254

Monte Carlo Correlation Matrix

[[ 1. -0.82003198]

[-0.82003198 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : -0.003645 +/- 0.002606 ( -1.40 SD)

p[1] Bias : +0.007625 +/- 0.003464 ( 2.20 SD)

Machine generated alternative text:
T2 Measure Sample 3B - 
ODR Fit 
800 
600 
200 
50 
S -50 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 12 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 815.55 +/- 33.134 Guessed: 1100

p[1] = 2.8862 +/- 0.20679 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.70270815]

[-0.70270815 1. ]]

Quasi Chi-Squared/dof = 0.20358, Quasi CDF = 99.60580%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.90787 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 99.6%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 815.99 +/- 34.646 ; 814.81 + 36.556 - 34.648

p[1] = 2.8921 +/- 0.21077 ; 2.8814 + 0.22321 - 0.19821

Monte Carlo Correlation Matrix

[[ 1. -0.7182559]

[-0.7182559 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.003354 +/- 0.001638 ( 2.05 SD)

p[1] Bias : -0.005012 +/- 0.002909 ( -1.72 SD)

Machine generated alternative text:
T2 Measure Sample 4B - 
800 
E 600 
400 
Il 200 
0.0 
50 
-50 
0.0 
ODR Fit 
12.5 
15.0 
2.5 
2.5 
5.0 
Best ODR Fit 
Initial guess 
5.0 
7.5 
10.0 
17.5 
Using mean MC values 
Using median MC values 
Residuals 
7.5 
10.0 12.5 
15.0 
17.5 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 12 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 817.57 +/- 35.293 Guessed: 1100

p[1] = 7.0476 +/- 0.51682 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.70787479]

[-0.70787479 1. ]]

Quasi Chi-Squared/dof = 0.19393, Quasi CDF = 99.67847%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.48147 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 99.5%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 819.15 +/- 34.169 ; 819.71 + 33.78 - 35.56

p[1] = 7.0533 +/- 0.5057 ; 7.0139 + 0.52861 - 0.42749

Monte Carlo Correlation Matrix

[[ 1. -0.69186356]

[-0.69186356 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : -0.0001111 +/- 0.001728 ( -0.06 SD)

p[1] Bias : -0.002746 +/- 0.002926 ( -0.94 SD)

# Sep 27

## Concentration vs 1/T1 graph

Machine generated alternative text:
I/TI vs Concentration - 
1.0 
0.8 
0.6 
Il 0.4 
0.2 
— 0.025 
e 0.000 
ODR Fit 
0.150 0.175 0.200 
0.025 
0.025 
0.050 0.075 0.100 
• Data 
Best ODR Fit 
Initial guess 
0.125 
Using mean MC values 
Using median MC values 
0.050 
Residuals 
0.075 0.100 0.125 0.150 
x = (Concentration [g/mL]) 
0.175 
0.200 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 4 Data points from file ConcentrationData.txt this Model function

def linear(x,\*p) :

# A linear function with:

# Constant Background : p[0]

# Slope : p[1]

return p[0]+p[1]\*x

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = -0.048034 +/- 0.0067827 Guessed: 0

p[1] = 5.3222 +/- 0.14553 Guessed: 100

ODR Correlation Matrix

[[ 1. -0.79382304]

[-0.79382304 1. ]]

Quasi Chi-Squared/dof = 2.31006, Quasi CDF = 9.92554%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 0.867483 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 10.8%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = -0.048171 +/- 0.0045196 ; -0.04808 + 0.0043683 - 0.0044501

p[1] = 5.3237 +/- 0.095556 ; 5.3211 + 0.10154 - 0.095801

## Sample 1A T1 testing for change over time

## Machine generated alternative text: Tl Sample IA Sep 27 - ODR Fit 1200 S 1000 > 800 600 400 200 100 —100 Best ODR Fit Initial guess Using mean MC values Using median MC values Residuals x = (time ms)

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 11 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 978.89 +/- 39.644 Guessed: 1000

p[1] = 1.1569 +/- 0.070284 Guessed: 1

ODR Correlation Matrix

[[1. 0.66735871]

[0.66735871 1. ]]

Quasi Chi-Squared/dof = 2.16784, Quasi CDF = 2.11854%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.3472 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 2.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 979.61 +/- 27.188 ; 979.75 + 26.159 - 26.662

p[1] = 1.1568 +/- 0.050549 ; 1.1572 + 0.050596 - 0.051227

Monte Carlo Correlation Matrix

[[1. 0.70020324]

[0.70020324 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001372 +/- 0.001125 ( 1.22 SD)

p[1] Bias : +0.003501 +/- 0.001667 ( 2.10 SD)

## Sample 1A T2 Testing for change over time

Machine generated alternative text:
T2 Measure Sample IA Sep 27 - 
600 
200 
S -50 
ODR Fit 
0.25 
0.50 
0.75 
Best ODR Fit 
Initial guess 
1.00 
1.25 
1.50 
1.75 
Using mean MC values 
Using median MC values 
Residuals 
0.25 
0.50 
0.75 
1.50 
1.75 
2.00 
2.00 
1.00 
1.25 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 11 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 765.11 +/- 47.972 Guessed: 1100

p[1] = 1.0725 +/- 0.085754 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.81033624]

[-0.81033624 1. ]]

Quasi Chi-Squared/dof = 0.61669, Quasi CDF = 78.39564%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.684 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 77.2%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 769.98 +/- 48.378 ; 769.08 + 47.868 - 47.076

p[1] = 1.0717 +/- 0.085682 ; 1.0652 + 0.089686 - 0.077127

Monte Carlo Correlation Matrix

[[ 1. -0.7981338]

[-0.7981338 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001094 +/- 0.00252 ( 0.43 SD)

p[1] Bias : -0.003891 +/- 0.003156 ( -1.23 SD)

# October 1

Machine generated alternative text:
Tl Sample 2B Oct 1 - 
ODR Fit 
S 800 
600 
> 400 
200 
50 
S —50 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 10 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 953.01 +/- 41.677 Guessed: 1000

p[1] = 1.9212 +/- 0.078034 Guessed: 1

ODR Correlation Matrix

[[1. 0.75321251]

[0.75321251 1. ]]

Quasi Chi-Squared/dof = 0.39109, Quasi CDF = 92.60236%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.04353 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 93.3%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 954.28 +/- 40.974 ; 954.17 + 41.792 - 40.692

p[1] = 1.9236 +/- 0.0786 ; 1.9267 + 0.075896 - 0.082956

Monte Carlo Correlation Matrix

[[1. 0.74069101]

[0.74069101 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001561 +/- 0.001736 ( 0.90 SD)

p[1] Bias : +0.001337 +/- 0.001614 ( 0.83 SD)

Machine generated alternative text:
T2 Measure Sample 2B Oct 1 - 
> 600 
200 
0.5 
100 
I -100 
0.5 
ODR Fit 
2.5 
1.0 
Best ODR Fit 
Initial guess 
1.0 
1.5 
2.0 
Using mean MC values 
Using median MC values 
Residuals 
1.5 
x = (time ms) 
2.0 
2.5 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 11 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 826.22 +/- 45.299 Guessed: 1100

p[1] = 1.3814 +/- 0.11548 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.80427548]

[-0.80427548 1. ]]

Quasi Chi-Squared/dof = 0.39662, Quasi CDF = 93.73955%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.11178 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 92.8%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 826.1 +/- 43.733 ; 824.64 + 46.428 - 43.32

p[1] = 1.3877 +/- 0.11344 ; 1.3841 + 0.11967 - 0.11375

Monte Carlo Correlation Matrix

[[ 1. -0.79395648]

[-0.79395648 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001435 +/- 0.00225 ( 0.64 SD)

p[1] Bias : -0.002107 +/- 0.003381 ( -0.62 SD)

Machine generated alternative text:
TI Sample 3B Oct 1 - 
E 
1000 
800 
600 
400 
200 
2.5 
50 
-50 
2.5 
ODR Fit 
15.0 
17.5 
5.0 
5.0 
7.5 
10.0 
12.5 
20.0 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
7.5 
10.0 12.5 
15.0 
x = (time ms) 
17.5 
20.0 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 11 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 948.48 +/- 39.419 Guessed: 1000

p[1] = 4.7429 +/- 0.16505 Guessed: 1

ODR Correlation Matrix

[[1. 0.70316489]

[0.70316489 1. ]]

Quasi Chi-Squared/dof = 0.06580, Quasi CDF = 99.99372%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 0.669708 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 100.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 947.99 +/- 40.08 ; 947.22 + 40.423 - 37.872

p[1] = 4.7418 +/- 0.16401 ; 4.7468 + 0.15464 - 0.17179

Monte Carlo Correlation Matrix

[[1. 0.69603595]

[0.69603595 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.0016 +/- 0.001588 ( 1.01 SD)

p[1] Bias : -0.0002442 +/- 0.001348 ( -0.18 SD)

Machine generated alternative text:
T2 Measure Sample 3B Oct 1 - ODR Fit 
S 600 
400 
Il 200 
Best ODR Fit 
Initial guess 
50 
-50 
Using mean MC values 
Using median MC values 
Residuals 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 10 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 867.59 +/- 71.348 Guessed: 1100

p[1] = 2.8917 +/- 0.29677 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.8430513]

[-0.8430513 1. ]]

Quasi Chi-Squared/dof = 0.04029, Quasi CDF = 99.99753%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 0.870182 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 100.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 870.56 +/- 69.597 ; 865.93 + 73.064 - 65.496

p[1] = 2.9124 +/- 0.29425 ; 2.8859 + 0.30911 - 0.26689

Monte Carlo Correlation Matrix

[[ 1. -0.83175998]

[-0.83175998 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : -0.004011 +/- 0.003211 ( -1.25 SD)

p[1] Bias : +0.006578 +/- 0.004065 ( 1.62 SD)

## Checking for causes of potential bias; pulse sequence in ms (pulse 1, pulse 2)

Machine generated alternative text:
TI Sample 3B with wrong pulse (8,2) Oct 1 - 
800 
600 
400 
200 
10 
S -50 
ODR Fit 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
10 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 12 Data points from file T1Data.txt this Model function

def T1exponential(x,\*p):

M\_0 = p[0]

T\_1 = p[1]

return ( M\_0\*(1-2\*numpy.exp(-1\*x/T\_1)))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 860.31 +/- 48.674 Guessed: 1000

p[1] = 4.6433 +/- 0.21691 Guessed: 1

ODR Correlation Matrix

[[1. 0.83423007]

[0.83423007 1. ]]

Quasi Chi-Squared/dof = 0.13089, Quasi CDF = 99.94176%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.03192 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 100.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 859.11 +/- 47.849 ; 855.64 + 51.816 - 42.385

p[1] = 4.6344 +/- 0.21135 ; 4.6308 + 0.22911 - 0.20613

Monte Carlo Correlation Matrix

[[1. 0.82003601]

[0.82003601 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.0004839 +/- 0.002185 ( 0.22 SD)

p[1] Bias : +0.001708 +/- 0.001847 ( 0.92 SD)

Machine generated alternative text:
T2 Measure Sample 3B (2,8) Oct 1 - 
600 
E 500 
400 
S 300 
Il 200 
100 
0.5 
100 
0.5 
ODR Fit 
3.5 
1.0 
1.0 
1.5 
Best ODR Fit 
Initial guess 
1.5 
2.0 
2.5 
3.0 
Using mean MC values 
Using median MC values 
Residuals 
3.0 
3.5 
4.0 
4.0 
2.0 
2.5 
x = (time ms) 

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ORTHOGONAL DISTANCE REGRESSION

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Fitting 8 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 669.21 +/- 69.276 Guessed: 1100

p[1] = 2.859 +/- 0.51854 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.88624503]

[-0.88624503 1. ]]

Quasi Chi-Squared/dof = 0.43949, Quasi CDF = 85.28349%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 2.0182 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 87.2%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 676.45 +/- 70.31 ; 672.77 + 75.231 - 64.232

p[1] = 2.909 +/- 0.57465 ; 2.8162 + 0.62491 - 0.43755

Monte Carlo Correlation Matrix

[[ 1. -0.85151261]

[-0.85151261 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.001958 +/- 0.004076 ( 0.48 SD)

p[1] Bias : +0.005546 +/- 0.008439 ( 0.66 SD)

Machine generated alternative text:
T2 Measure Sample 3B (4,6) Oct 1 - 
ODR Fit 
600 
400 
200 
-50 
Best ODR Fit 
Initial guess 
Using mean MC values 
Using median MC values 
Residuals 
x = (time ms) 

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ORTHOGONAL DISTANCE REGRESSION

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Fitting 8 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 676.4 +/- 72.249 Guessed: 1100

p[1] = 2.5152 +/- 0.4707 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.88710157]

[-0.88710157 1. ]]

Quasi Chi-Squared/dof = 0.08760, Quasi CDF = 99.75126%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.52841 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 99.2%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 683.88 +/- 73.863 ; 682.15 + 75.834 - 73.903

p[1] = 2.5732 +/- 0.51888 ; 2.4803 + 0.60759 - 0.38349

Monte Carlo Correlation Matrix

[[ 1. -0.85828878]

[-0.85828878 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.006986 +/- 0.004335 ( 1.61 SD)

p[1] Bias : -0.01345 +/- 0.007628 ( -1.76 SD)

## Measuring T2\* on Sample 1B

Machine generated alternative text:
T2* Sample 1B Sep 24 - 
1250 
E 1000 
> 
E 
750 
500 
250 
0.0 
100 
-100 
0.0 
ODR Fit 
0.5 
0.6 
0.7 
0.1 
0.2 
Best ODR Fit 
Initial guess 
0.3 
0.4 
Using mean MC values 
Using median MC values 
0.1 
0.2 
Residuals 
0.3 
0.4 
x = (time ms) 
0.5 
0.6 
0.7 
0.8 
0.8 

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

ORTHOGONAL DISTANCE REGRESSION

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Fitting 13 Data points from file T2Data.txt this Model function

def T2exponential(x,\*p):

I\_0 = p[0]

T\_2 = p[1]

return ( I\_0\*numpy.exp(-1\*x/T\_2))

Systematics

correlated\_offset = False

correlated\_scale = True

x\_true = 0+/-0 + (1+/-0)\*x\_measured

y\_true = 0+/-0 + (1+/-0)\*y\_measured

\*\*\*\* ODR has finished with: Sum of squares convergence

Estimated parameters, uncertainties, and starting guesses

p[0] = 1350.3 +/- 52.74 Guessed: 1100

p[1] = 0.12736 +/- 0.0074441 Guessed: 1

ODR Correlation Matrix

[[ 1. -0.73751102]

[-0.73751102 1. ]]

Quasi Chi-Squared/dof = 0.93972, Quasi CDF = 50.03643%

\*\*\*\* Running Monte Carlo CDF Estimator \*\*\*\*

1001 successful MC simulations in 1.25316 seconds.

Fraction of Monte Carlo quasi-chi-squared values larger than value for ODR fit:

Monte Carlo CDF = 53.0%

MC Fit parameters Average + Standard Deviation; Median and 68.3% interval

p[0] = 1356.7 +/- 53.829 ; 1354.6 + 53.851 - 49.301

p[1] = 0.12681 +/- 0.0073062 ; 0.12673 + 0.0072133 - 0.0071039

Monte Carlo Correlation Matrix

[[ 1. -0.75537569]

[-0.75537569 1. ]]

Check For Bias in MC Fit parameters

(Monte Carlo median)/(fit value) - 1

p[0] Bias : +0.0001757 +/- 0.001515 ( 0.12 SD)

p[1] Bias : -0.0006628 +/- 0.002285 ( -0.29 SD)