SLIM-Curve testing in TRI2

P. Barber, 20/10/2011, Version 2

Testing TRI2 the old NR based libraries against the new SLIM-Curve library converted by LOCI.

TRI2 version 2.5.3.1 FI_port (free image port)
SLIM-Curve (http://dev.loci.wisc.edu/svn/software/trunk/projects/slim-curve, rev. 7794), in version 2.6.1.1

** = obvious significant difference found between the methods

Test1: Csarseven.ics

Mono-exp model, Poisson Estimate, Cursors: 0.24 2.30 2.62 8.98 -0.57 0.43, bin 1x1

NR	SLIM-Curve

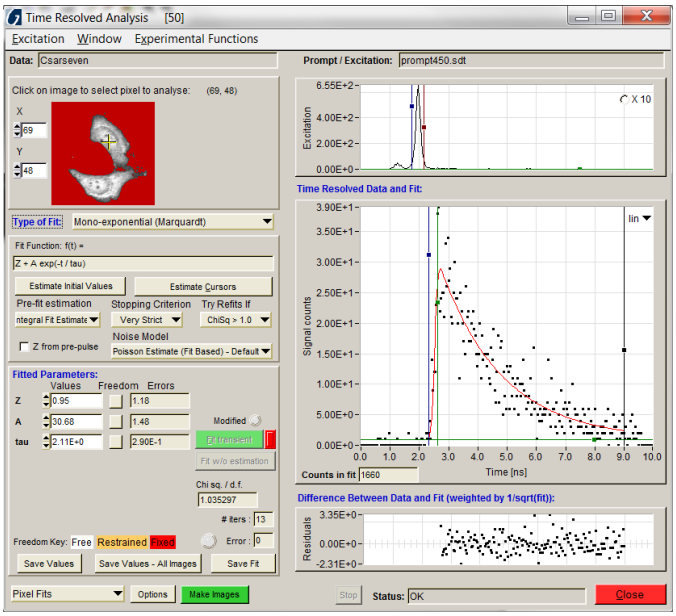
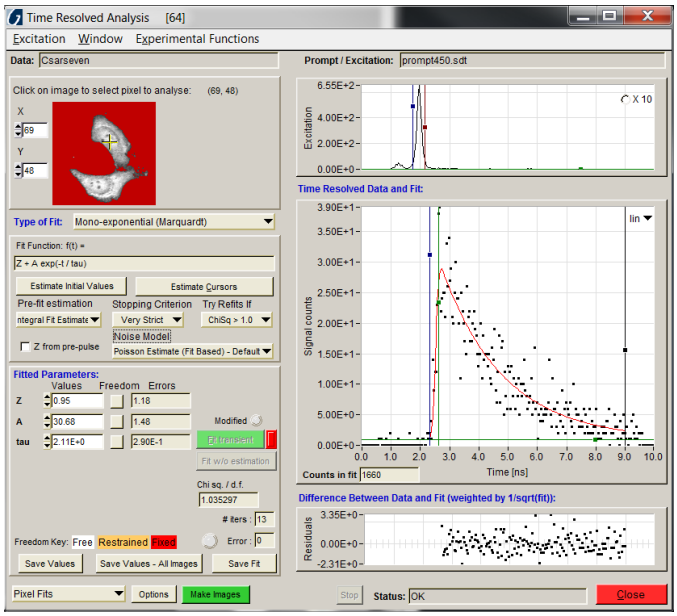
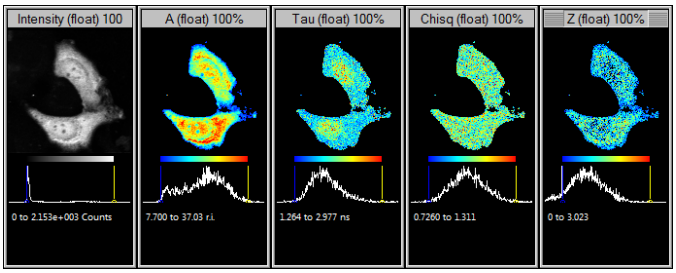
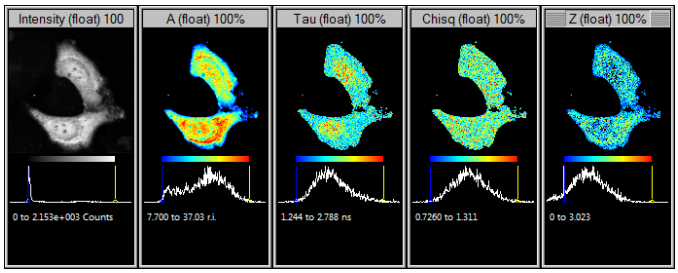

	
	

image in 2.9 secs tau: 1.8920 ± 0.2893	image in 2.6 secs tau: 1.8884 ± 0.2853

Test2: Csarseven.ics

Mono-exp model, Maximum likelihood, Cursors: 0.24 2.30 2.62 8.98 -0.57 0.43, bin 1x1

NR	SLIM-Curve

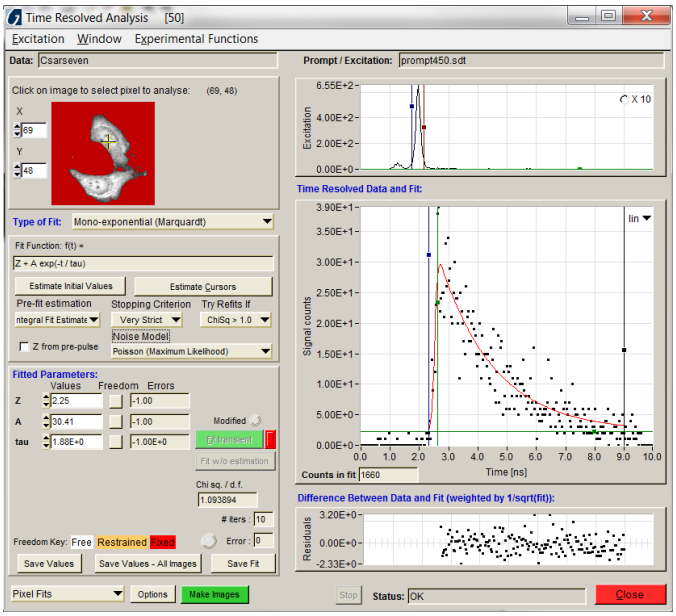
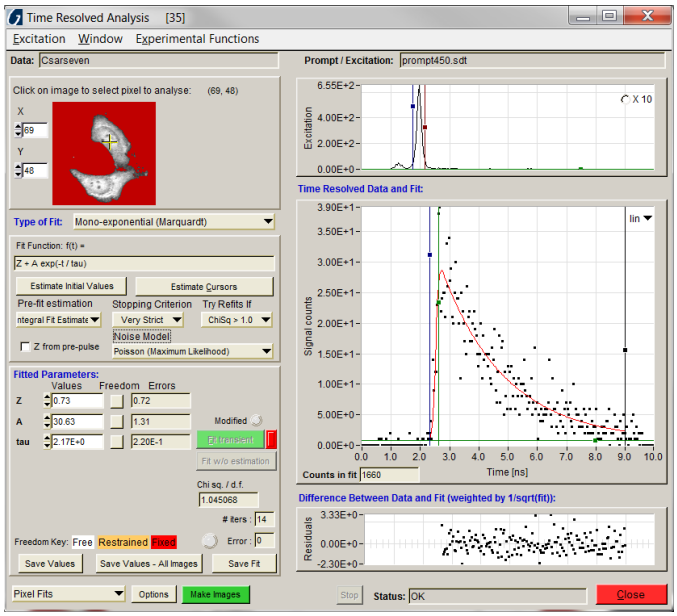
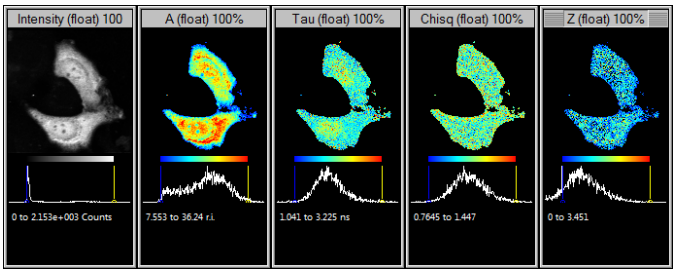
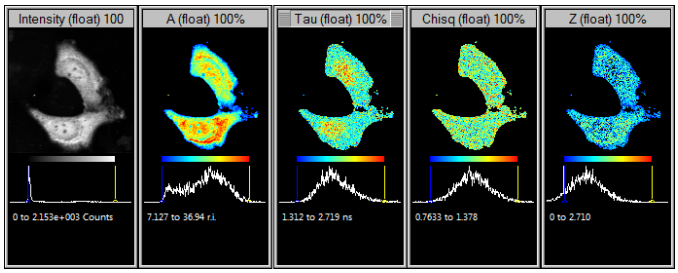
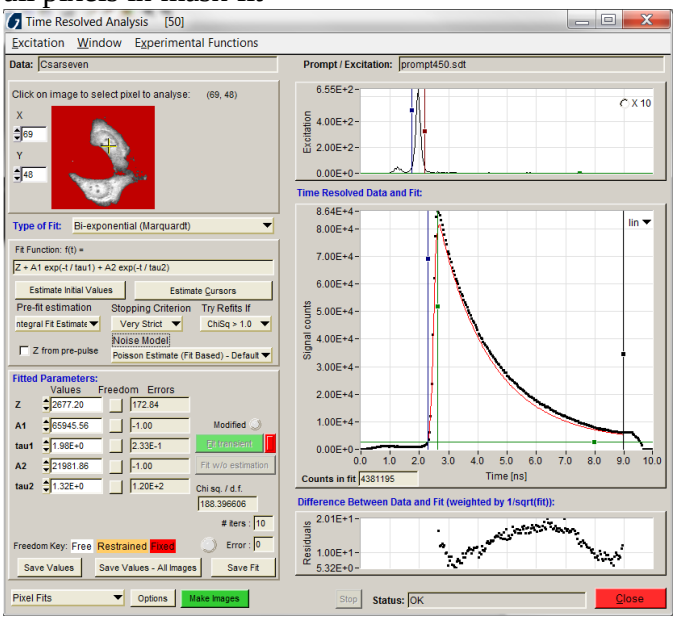

	
	

image in 32.8 secs tau: 1.9356 ± 0.3466	image in 3.6 secs ** tau: 1.9431 ± 0.2489

Test3: Csarseven.ics

Bi-exp model, Poisson Estimate, Cursors: 0.24 2.30 2.62 8.98 -0.57 0.43, bin 3x3

NR
all pixels in mask fit



(bad Z estimate has caused bad fit here)**

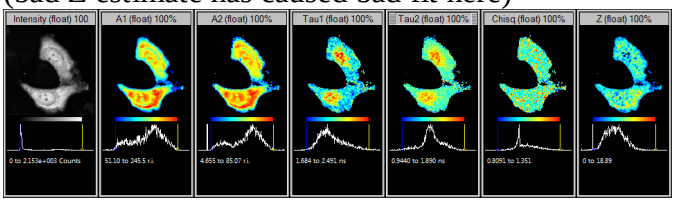
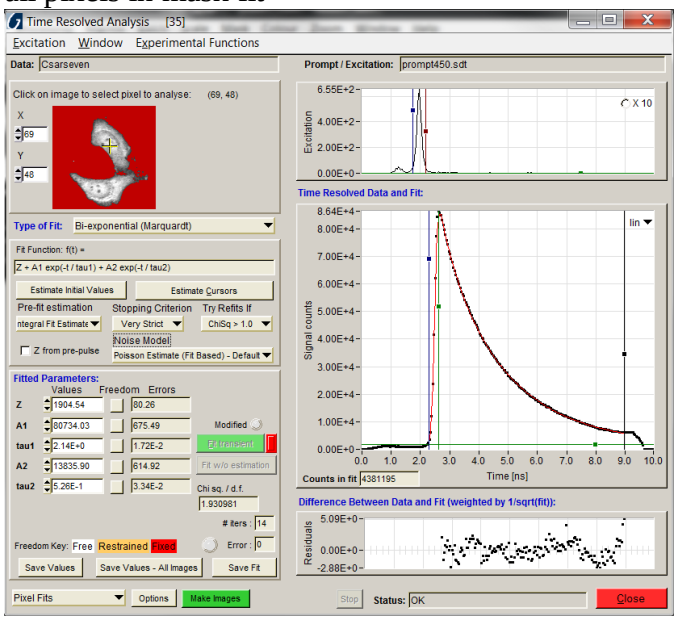


image in 6.1 secs
tau1: 2.0123 ± 0.1576
tau2: 1.4066 ± 0.1536

If Z is fixed when analysing all pixels in mask to the SC value you get a much better fit.

SLIM-Curve
all pixels in mask fit



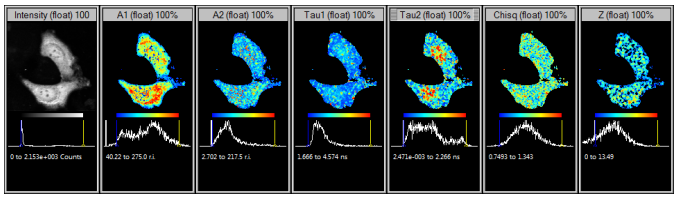


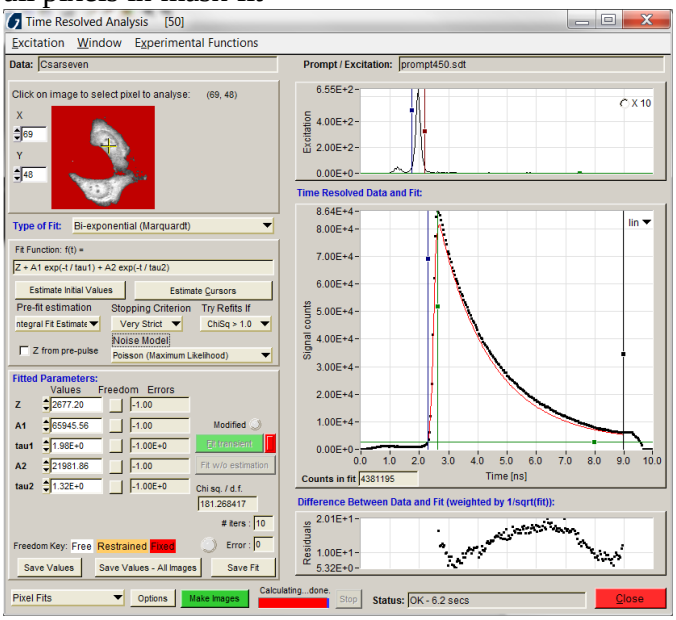
image in 4.7 secs
tau1: 2.3272 ± 0.4082 **
tau2: 0.89132 ± 0.5437 **

These averages depend on many things. Although the taus are ordered for each pixel before building the images, if not every pixel is clearly bi-exponential then some of ‘tau1’ may leak into the tau2 image and vice versa (note the tau2 histogram above). We really need some analysis to tell which pixels are clearly bi-exp (like Bayesian model selection).

Test4: Csarseven.ics

Bi-exp model, Maximum likelihood, Cursors: 0.24 2.30 2.62 8.98 -0.57 0.43, bin 3x3

NR
all pixels in mask fit



(bad Z estimate has caused bad fit here) **

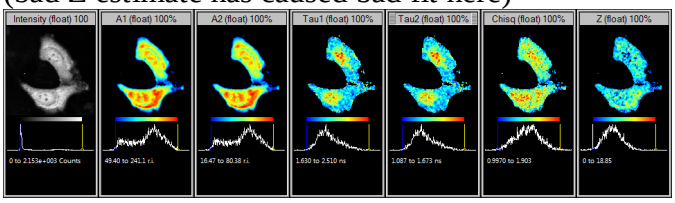
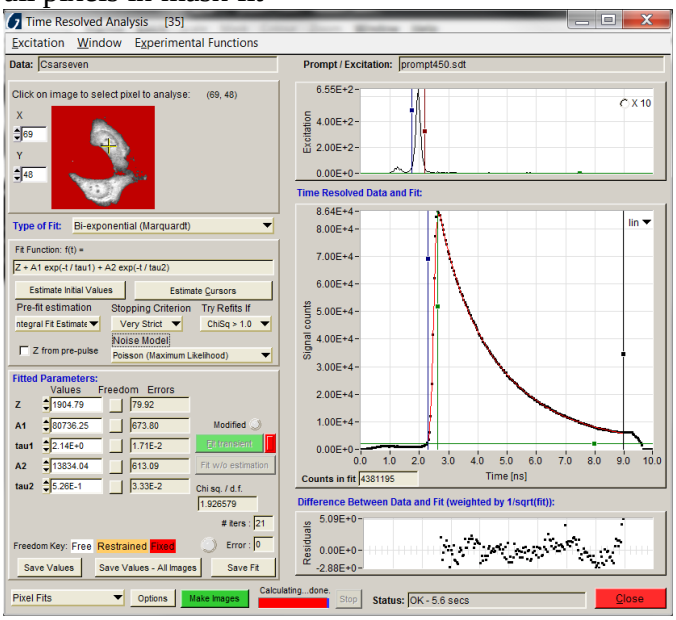


image in 62.8 secs
tau1: 1.9620 ± 0.1597
tau2: 1.3080 ± 0.1065

SLIM-Curve
all pixels in mask fit



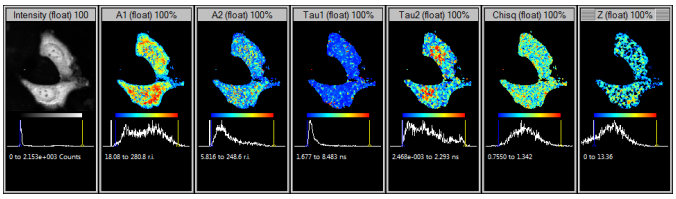


image in 6.7 secs **
tau1: 2.5284 ± 0.9373
tau2: 0.89030 ± 0.5888

Test5: Csarseven.ics

Global Bi-exp model, Poisson Estimate, Cursors: 0.24 2.30 2.62 8.98 -0.54 0.43, bin 3x3

NR

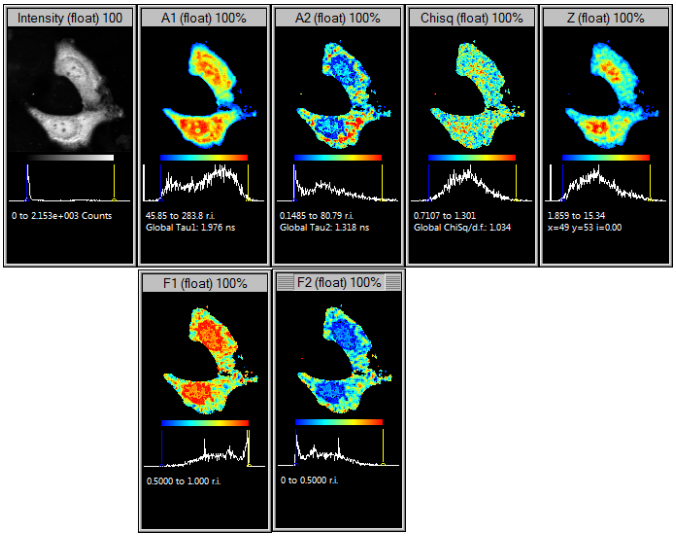


image in 1.8 secs

SLIM-Curve

**

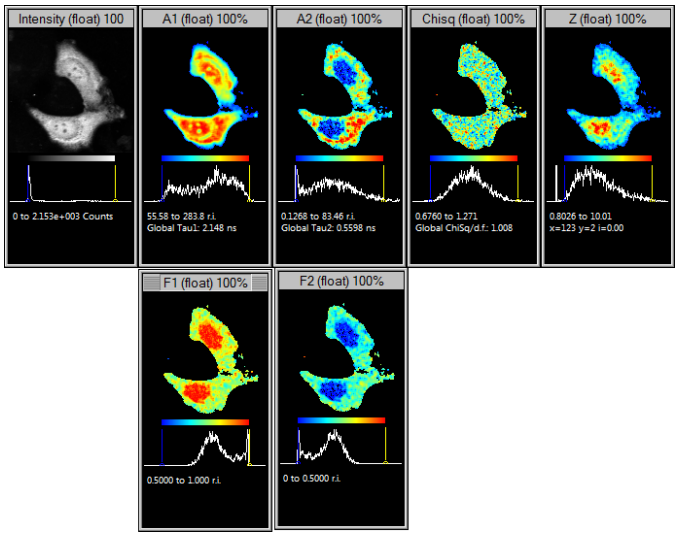


image in 2.2 secs

This has clearly picked out two distinct taus here and as a result the Fractional Intensity images are better.

Test6: Csarseven.ics

Global Bi-exp model, Maximum likelihood, Cursors: 0.24 2.30 2.62 8.98 -0.54 0.43, bin 3x3

NR

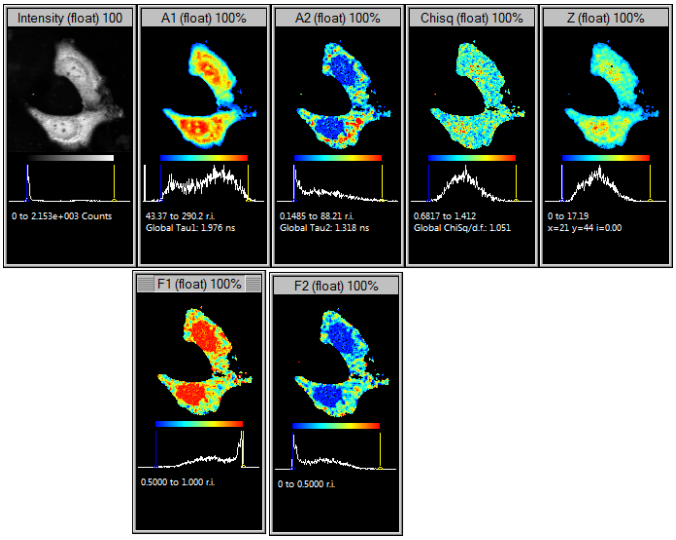


image in 2.4 secs

SLIM-Curve

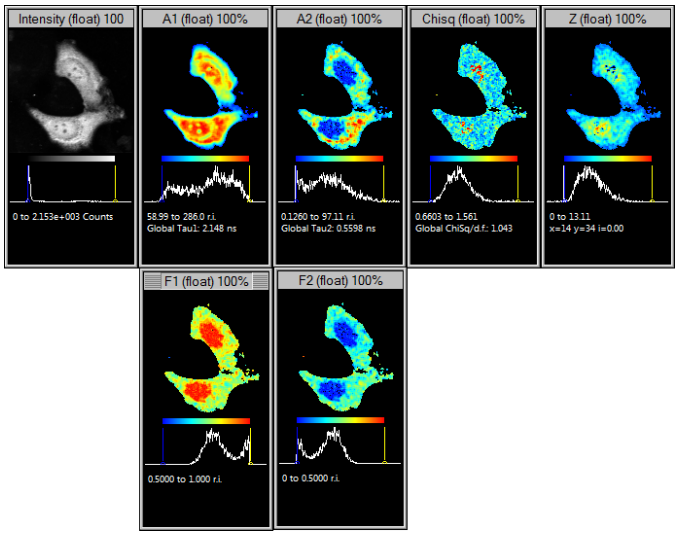
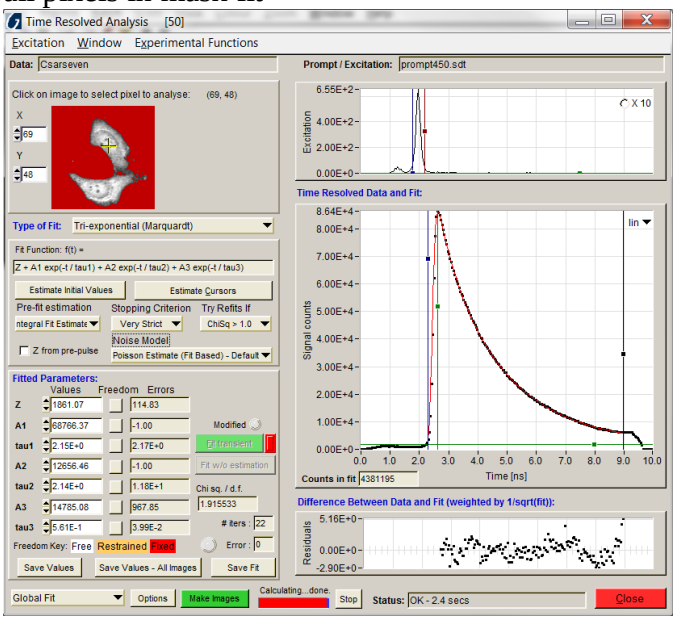


image in 2.6 secs

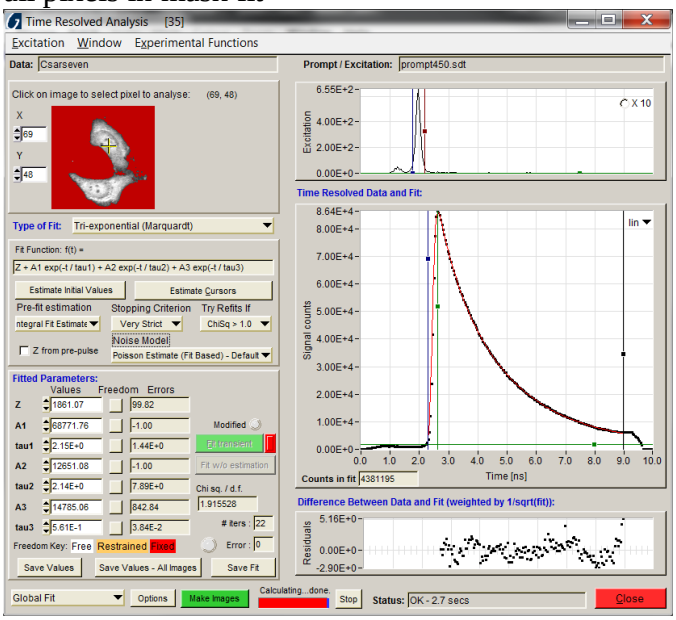
Test7: Csarseven.ics

Tri-exp model, Poisson Estimate, Cursors: 0.24 2.30 2.62 8.98 -0.54 0.43, bin 11x11

NR
all pixels in mask fit



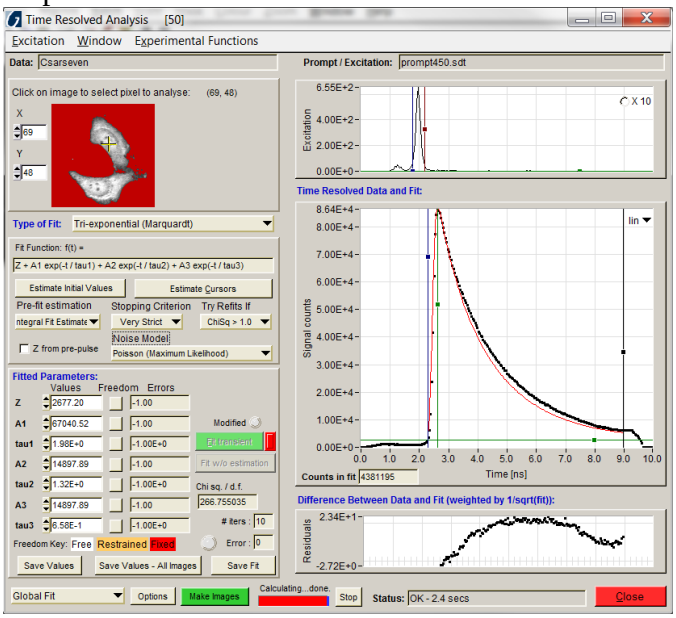
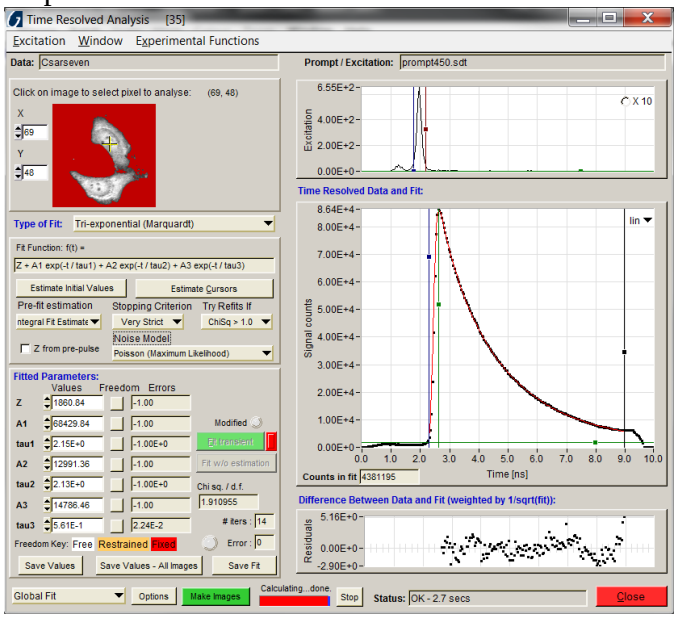
SLIM-Curve
all pixels in mask fit



Data is not really tri-exp so to continue is kind of meaningless.

Test8: Csarseven.ics

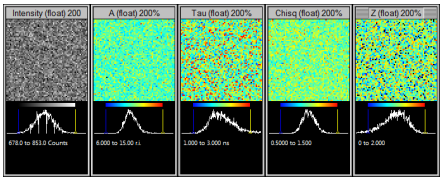
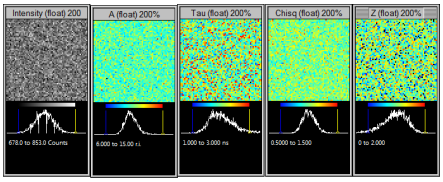
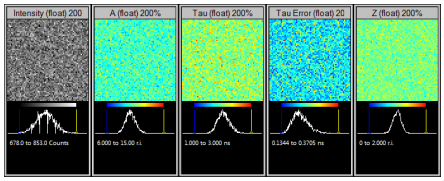
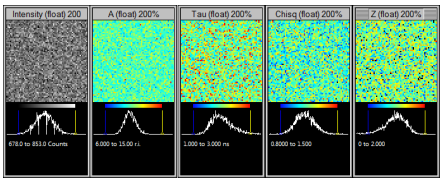
Tri-exp model, Maximum likelihood, Cursors: 0.24 2.30 2.62 8.98 -0.54 0.43, bin 3x3

NR all pixels in mask fit	SLIM-Curve all pixels in mask fit
	
Bad Z estimate again lets it down. **	

Data is not really tri-exp so to continue is kind of meaningless.

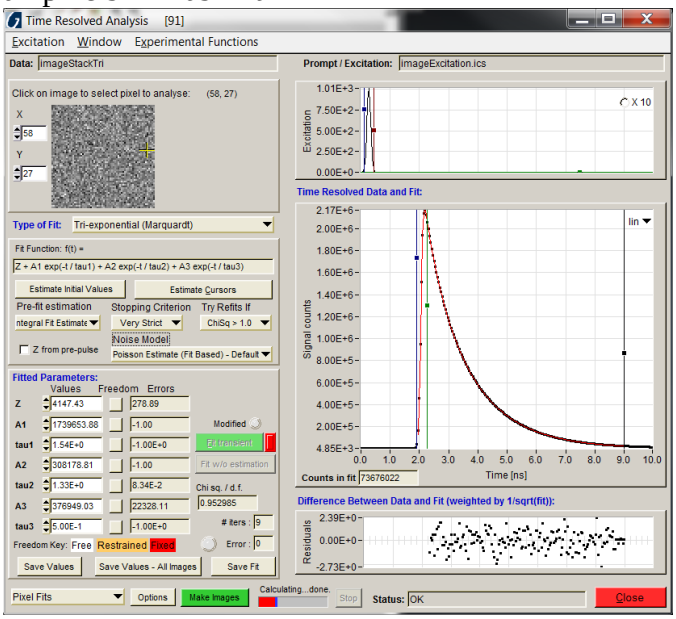
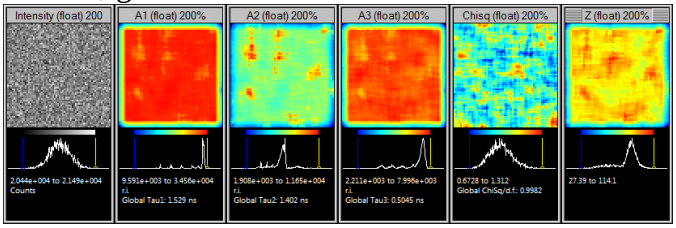
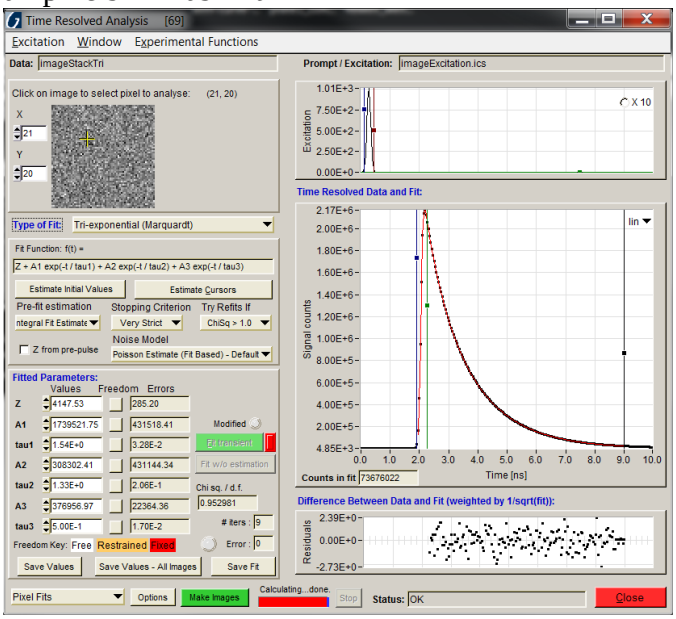
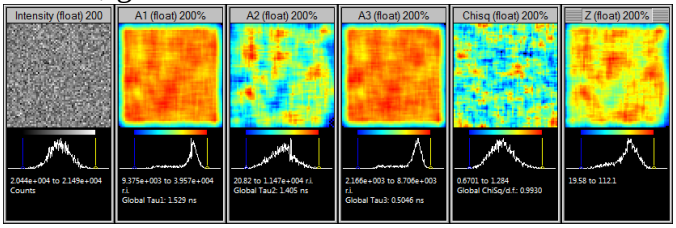
Test9: Simulated Mono-exp, n = 700 photons, tau = 2.00 ns

Poisson estimate, estimated cursors (tau average taken from 0-5 ns data)

NR	SLIM-Curve	Bayes
		
tau: 2.0585 ± 0.4582	tau: 2.0586 ± 0.4582 Maximum Likelihood  tau: 2.0450 ± 0.3964	tau: 2.0472 ± 0.2134

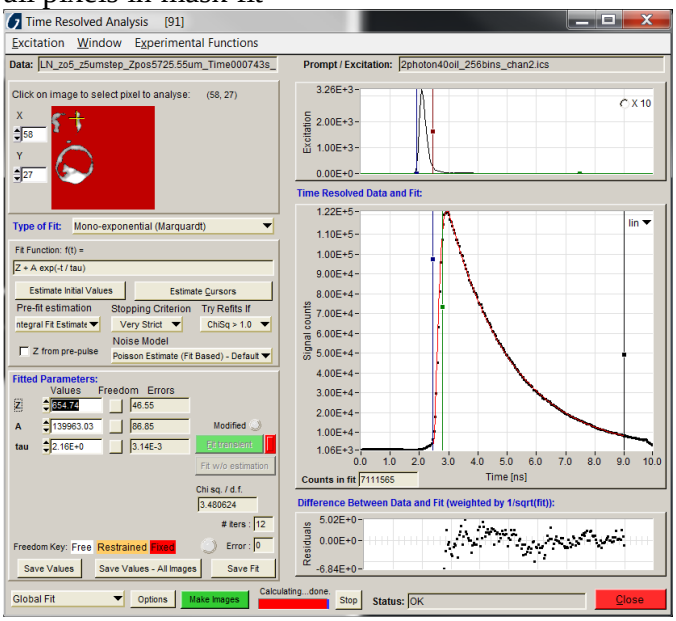
Test10: Simulated Tri-exp, n = 20,000 photons, taus = 0.5, 1.5, 2.0 ns

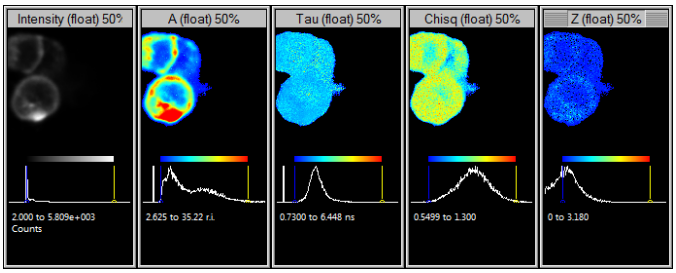
Tri-exp model, Poisson estimate

NR	SLIM-Curve
all pixels in mask fit  9x9 bin, global  image in 4.4 secs	all pixels in mask fit  9x9 bin, global  image in 4.4 secs

Test11: LN_zo5_z5umstep_Zpos5725.55um_Time000743s_chan1

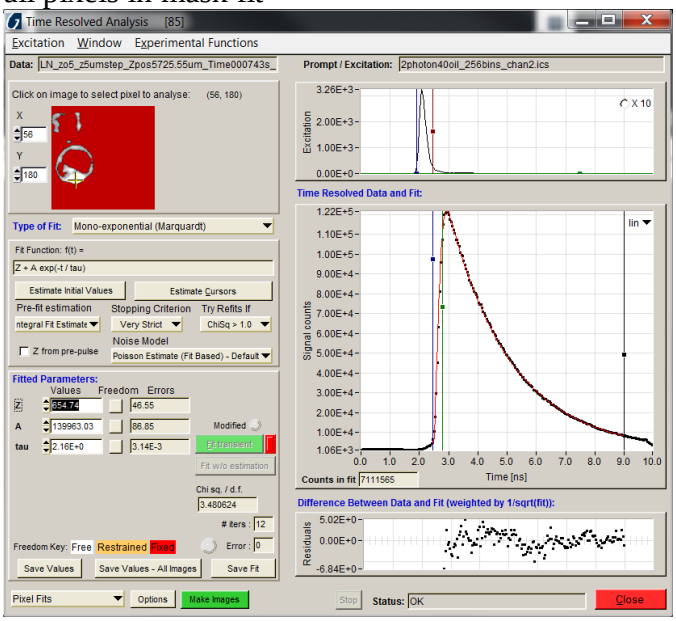
NR
all pixels in mask fit

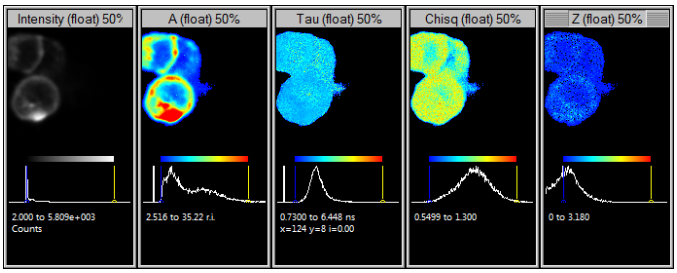




7.6 secs

SLIM-Curve
all pixels in mask fit





7.6 secs