



CIAO 2.1.2 Release Notes

Return to: [Version History](#)

Sherpa

- Changes to Optimization Methods resulted in a factor of 2-3 speedup for LEVENBERG-MARQUARDT alone, with speedups of up to an order of magnitude possible, depending on the circumstances of the fit. Here are the details:

- * The RMF convolution function has been rewritten to reduce execution time. (This helps reduce the time-to-convergence for *all* optimization methods, not just LEVENBERG-MARQUARDT.)
- * The LEVENBERG-MARQUARDT function has been rewritten to reduce execution time, with unnecessary model evaluations removed.
- * LEVENBERG-MARQUARDT has three new parameters: `splx`, `splxep`, and `splxiter`. If `splx = 1`, the LM fit is "refined" with a Simplex fit (the default value for `splx` is 0). Simplex refinement can be useful for complicated fitting problems where straight LM does not provide a quick solution. Switchover from LM to simplex occurs when `delta(stat)` from one iteration to the next is less than `lev-mar.splxep`, for `lev-mar.splxiter` iterations in a row. For example, the default is for switchover to occur when `delta chi**2 < 1` for 3 iterations in a row.
- * The convergence criterion algorithm for SIMPLEX was altered so as to reduce the number of iterations needed for a fit.
- * A thread describing the simplex refinement of a lev-marq fit is available at

<http://cxc.harvard.edu/ciao/threads/sherpa.levmar.html>

- Changes to I/O

- * The user can specify parameter step sizes using the DELTA parameter. Step sizes are used by the optimization methods to determine where to sample parameter space: if the value of a parameter is known well (such as would be the case with a line centroid energy), specifying a small delta may lead to a substantially faster and better fit than using the default value (which is 1% of the parameter value).

The user may specify delta

- a) at the model parameter value prompt:

```
gem1.LineE [0.5] 0.552:0.548:0.554:1.e-5
           init min  max  delta
```

CIAO Release Notes – CIAO 3.4

b) on the command-line with other model parameter values:

```
sherpa> gem1.LineE = 0.552:0.548:0.554:1.e-5
          init min max delta
```

c) directly:

```
sherpa> gem1.LineE.delta = 1.e-5
```

* The delta function in one-dimension can no longer be specified as either DELTA or DELTA1D, but only as DELTA1D.

dmextract

- Fixed problem when region extended beyond the edge of field. Currently, counts will be correctly counted; however, the area computation is still incorrect. [5479]
- Users can now extract radial profiles from images whose pixel values are not integers. For example, users trying to create radial profile from mkpsf output were getting incorrect results [5490]
- Restored support for the PHA_MIN/PHA_MAX columns which were inadvertently removed from the type I PHA file output. [5537]
- Dmextract was weighting the images by the binning factor. This was not the correct calculation due to the nature of the exposure maps. Now the weighted maps are weighted by the number of pixels instead of the area.[5538]
- When exposure maps were being used, the area would incorrectly be computed (different from above).[5585]

- Known Issue: A current limitation in dmextract fails to account for regions and x,y subspaces defined in the input file. This limitation also does not account for excluded regions in the input file. It will be fixed in CIAO 2.2. [bug 5475]"

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URL:
http://cxc.harvard.edu/ciao3.4/releasenotes/ciao_2.1.2_release.html
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