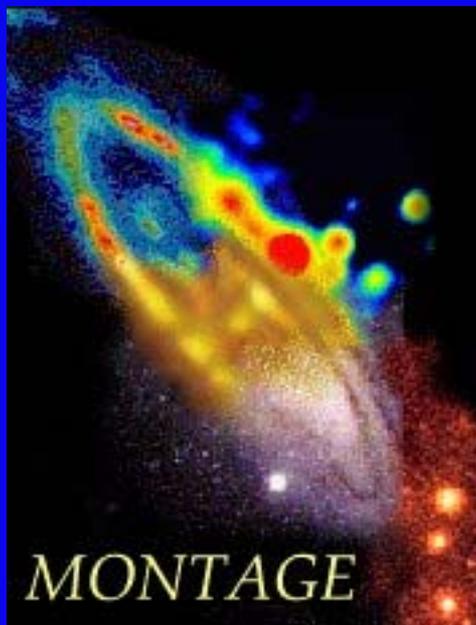




Montage: An On-Demand Image Mosaic Service for the NVO

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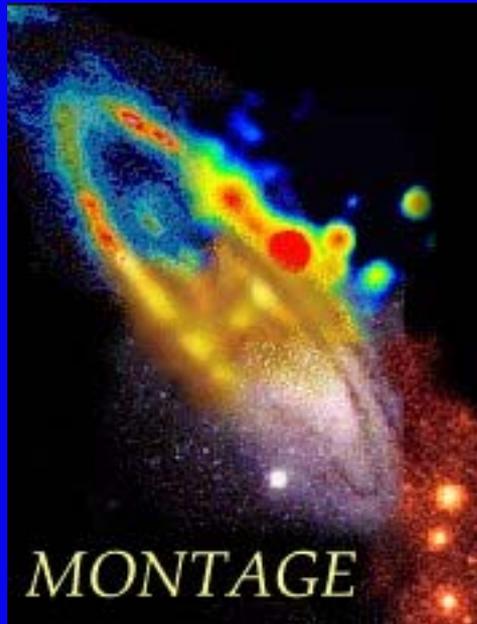
Montage - Custom Image Mosaics

<http://montage.ipac.caltech.edu>

- User specified size, WCS projection, coordinates, spatial sampling, rotation
- Assumes input files are FITS & WCS compliant
- Supports drizzle algorithm

Science Drivers:

- Science Grade Images
- Impact of background rectification on fidelity of input images is understood and documented
- Analyze diverse images as if part of same “multi-wavelength image”



Schedules:

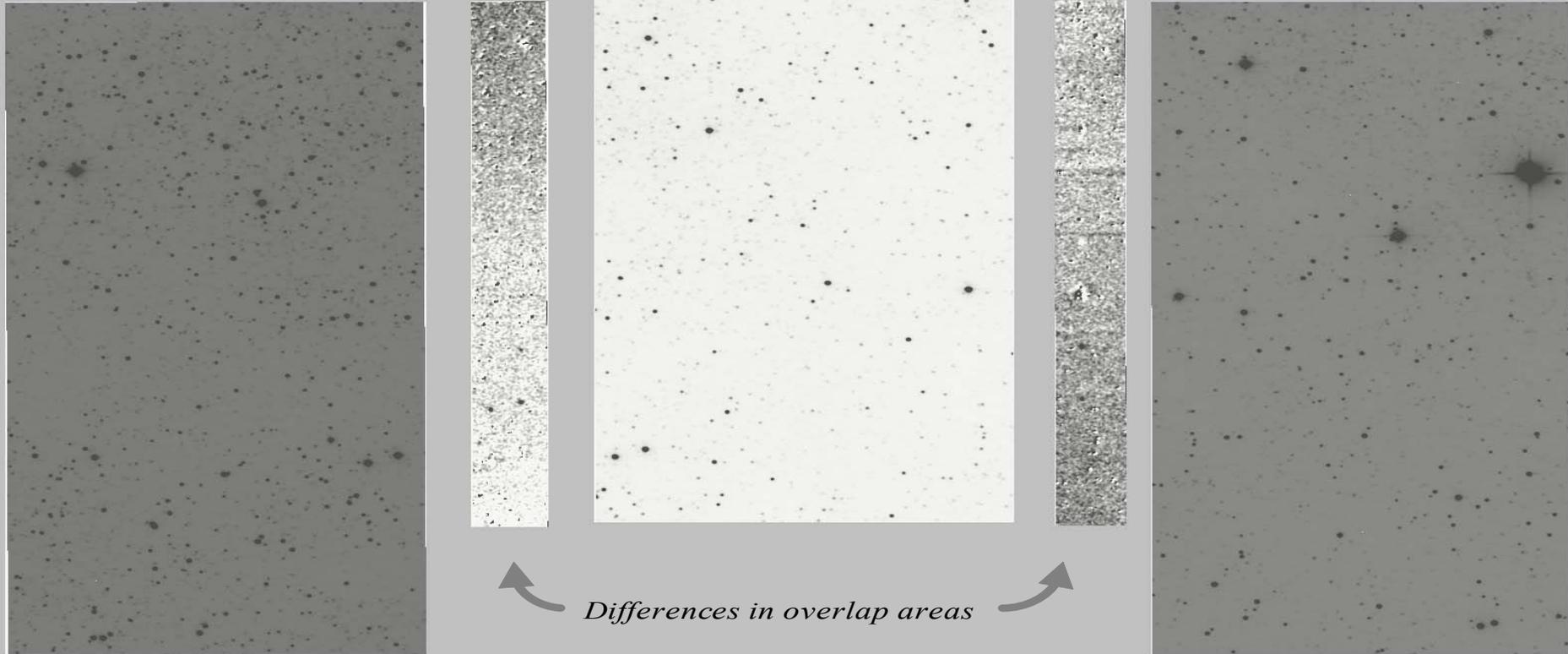
- Semi-annual deliveries of code from Feb 2003
 - Code available for download
- Operational service starting September 2003
 - Order mosaics through existing portals
- Final Delivery Jan 2005
- Early deliveries emphasize accuracy, later ones speed & throughput

Platforms:

- Linux 6.x, 7.x • Solaris 2.7/2.8
- AIX
- ANSI compliant code; design for portability

Montage Background Correction Procedure

Example: *Three overlapping reprojected 2MASS images*

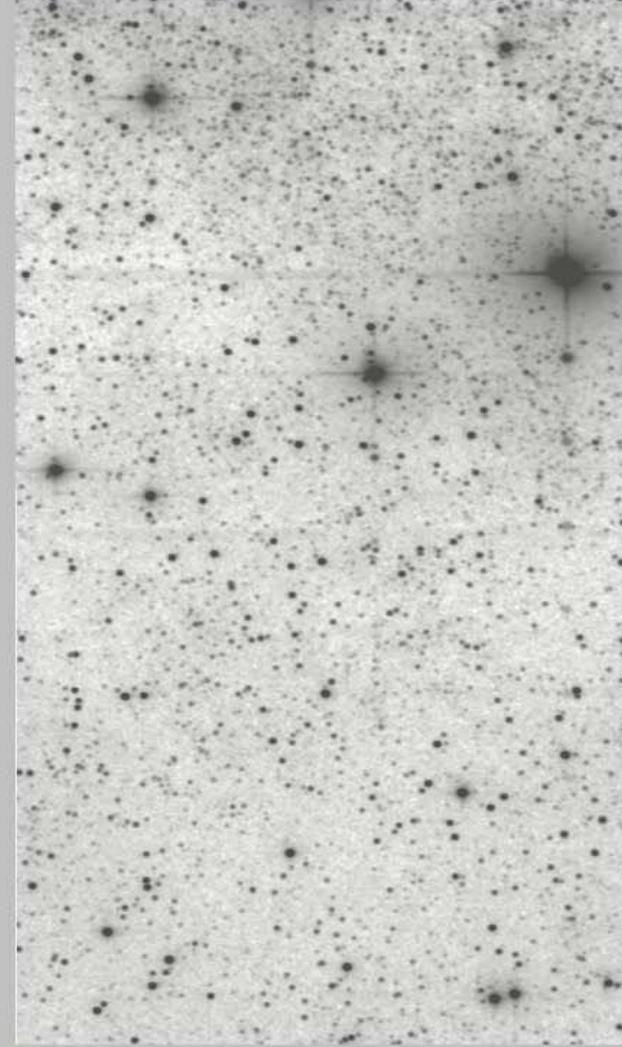
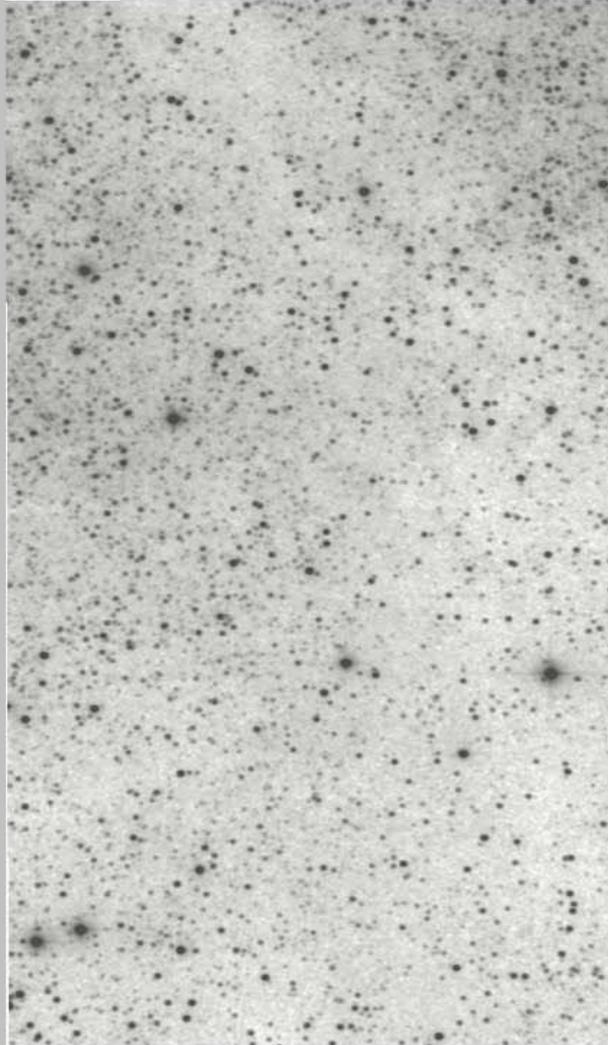
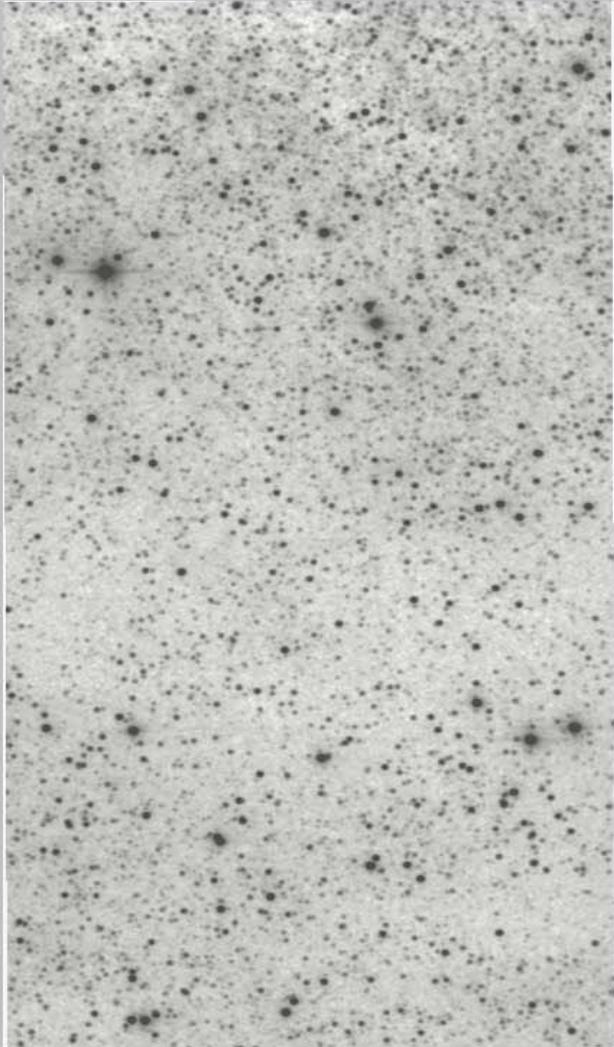


A correction is calculated for each image based on all the differences between it and its neighbors (an approximation to a least squares fit to the difference data with brightness outlier pixels excluded). The correction is currently a plane but could be a higher order surface.

This is done for all images, then half the correction determined is applied (to a parameter database; equivalent numerically to applying it to the images).

The process is iterated until step differences for all images becomes small.

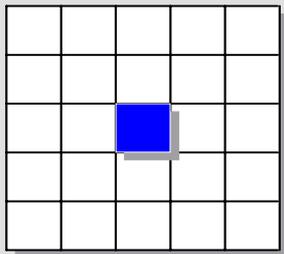
Montage Background Correction Results



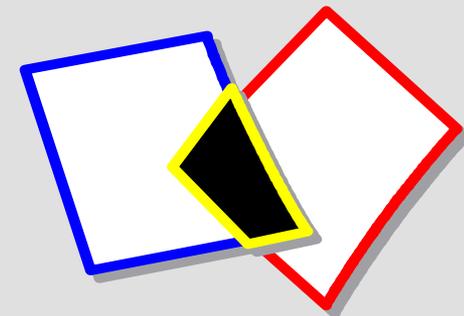
*Reprojected
Background Corrected
Images*

Montage Reprojection Module

Arbitrary
Input
Image



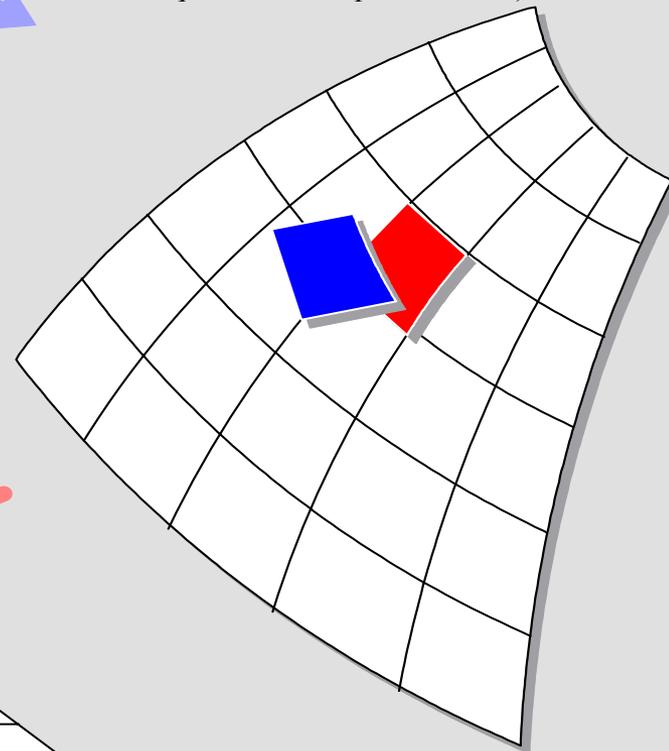
Central to the algorithm is accurate calculation of the area of spherical polygon intersection between two pixels (assumes great circle segments are adequate between pixel vertices)



Input pixels
projected on
celestial sphere

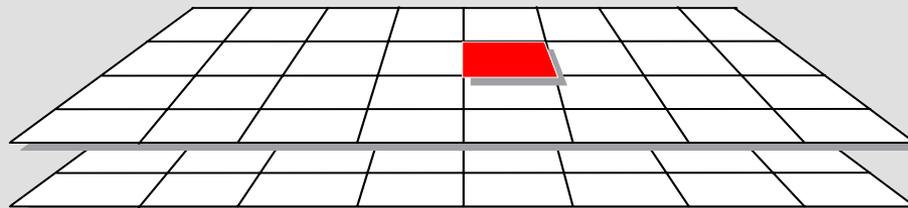
```
SIMPLE = T /  
BITPIX = -64 /  
NAXIS = 2 /  
NAXIS1 = 3000 /  
NAXIS2 = 3000 /  
CDEL1 = -3.333333E-4 /  
CDEL2 = 3.333333E-4 /  
CRPIX1 = 1500.5 /  
CRPIX2 = 1500.5 /  
CTYPE1 = 'RA---TAN' /  
CTYPE2 = 'DEC--TAN' /  
CRVAL1 = 265.91334 /  
CRVAL2 = -29.35778 /  
CROTA2 = 0. /  
END
```

Output pixels
projected on
celestial sphere



FITS header defines output projection

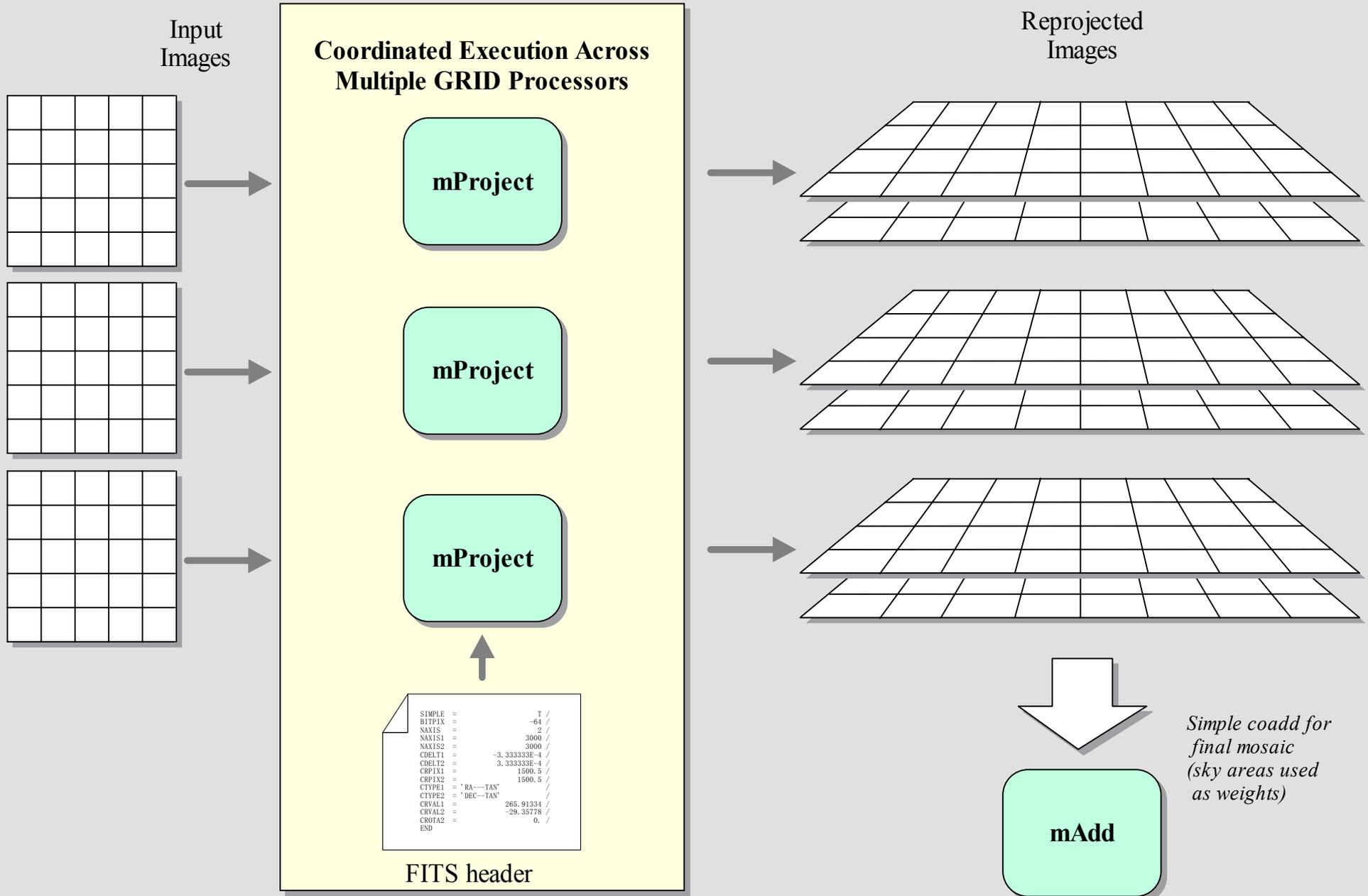
Reprojected
Image



Total Flux

Sky Area Coverage
(steradians)

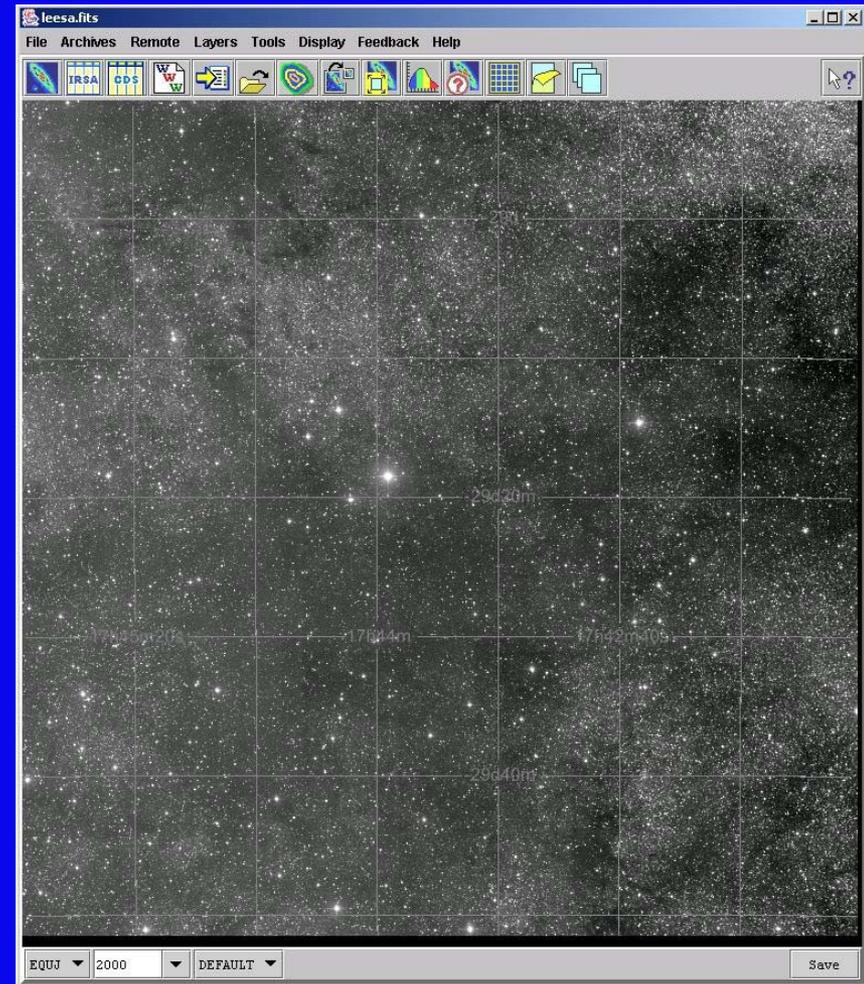
Montage Parallelization



Performance

Collaboration with San Diego
Supercomputer Center

- Leesa Brieger, Reagan Moore
- IBM Blue Horizon
 - 64 nodes
 - *Prototype* Montage v1.2
 - Processing Time: 4 minutes



2MASS Mosaic;
1 sq deg centered at $l=359$, $b=0.2$ (55 images)

