

The Hubble Legacy Archive: DR1, DR2, and Beyond

MAST Users Group Meeting, July 18 2008
Brad Whitmore

OUTLINE

- Goals and Philosophy
- DR1, DR2, DR3, and Beyond
- Demo

Operations version - hla.stsci.edu

Development version - hla-ags.stsci.edu

Hubble Legacy Archive - Goals and Philosophy

Our goal is to **optimize the science return** from the Hubble Space Telescope by providing **online, enhanced Hubble products** and advanced **browsing capabilities**.

We take advantage of various **advances in the past decade**:

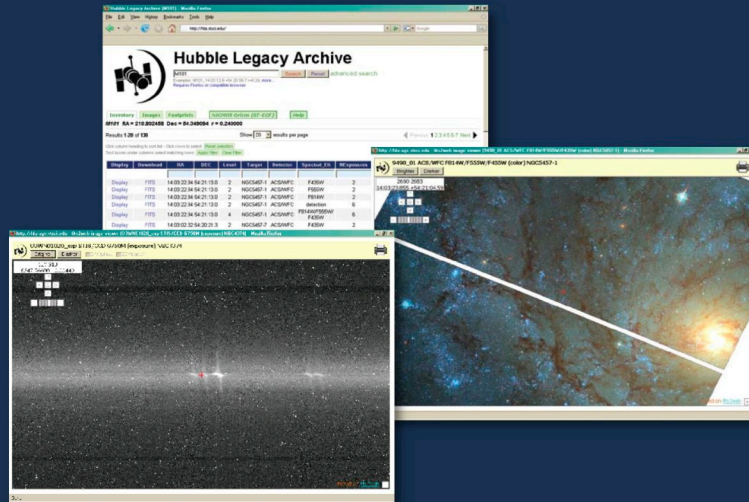
- growing archives (less need to propose oneself)
- cheap disk space
- **improved Hubble products** (e.g., multidrizzled ACS and WFPC2 images, source lists, grism extractions, ...)

Our design **philosophy** is:

- keep it **simple** (e.g., web browser not application)
- use existing software where feasible
- provide only **quick-look tools**
- hierarchial - easy to do simple things; advanced options

SIMPLE ONLINE SEARCH & ACCESS

(includes both tabular inventory and interactive display)



ENHANCED DATA PRODUCTS

(e.g., combined & color images, mosaics, NICMOS grism extractions, ...)

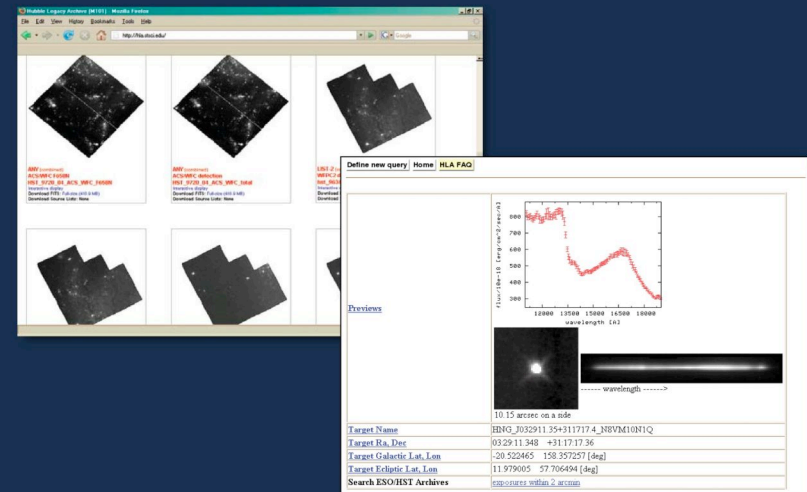
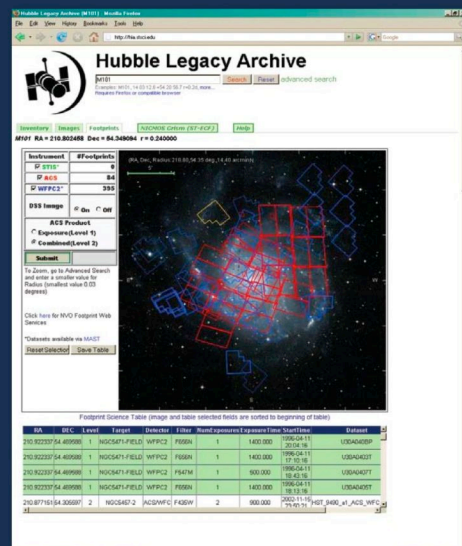


IMAGE & SPECTRAL FOOTPRINTS

(for easier browsing of available data)

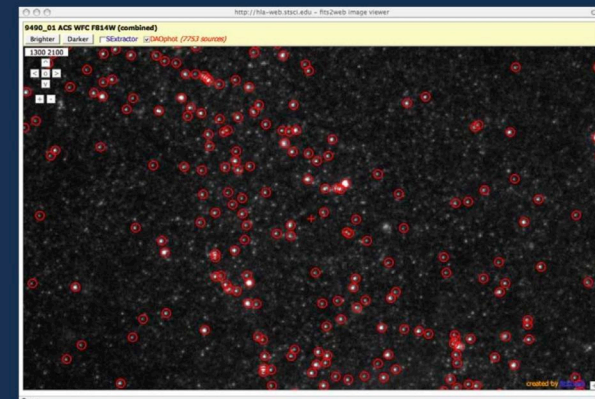


IMPROVED ASTROMETRY

(~0.2" rather than current ~2")

SOURCE LISTS

(eventually an all-HST-sky source list)



What Was in DR1 (Feb. 08)?

Instrument/Product	Source	HLA Enhanced Products	Standard Products	Download	Interactive Display?
ACS/combined images	STScI	~90%		FITS	✓
ACS/DAOPHOT source lists	STScI	~50%, <~2004		Ascii	✓
ACS/SExtractor source lists	STScI	~10%, Beta product ¹		Ascii	✓
WFPC2/combined images	CADC	Coming Soon, Beta product ¹		FITS	✓
WFPC2/single exposures	STScI		100%	DADS ²	
NICMOS/GRISM extractions	ST-ECF	~80%, 1-D & 2-D spectra		FITS	
NICMOS images	STScI		100%	DADS ²	
STIS images and spectra	STScI		100%	FITS	✓
FOS spectra	STScI		100%	Tar	
GHRS spectra	STScI		100%	Tar	

Notes:

1. Beta products are being validated and are not currently recommended for scientific analysis.
2. DADS downloads require a request to the DADS system.

What is New in Data Release 2 (Aug. 31)

New Science Products

- Image data for ~90 % of the WFPC2 data
- Next generation ACS source lists for ~100 % of “useable” images (up from 50% in DR1)
- Reprocessed ACS images (for 30 % originally provided as part of the “Early Release Data”)
- Possibly some ACS GRISM prototypes
- Possibly some ACS mosaics

New User Interface Tools

- Shopping cart (rather than downloading one at a time)
- Enhanced plotting tool
- Overlays of GSC2, 2MASS, SDSS, FIRST
- Much faster footprints
- User defined search list

Preview of DR3 (~ February 2009)

1. NICMOS images
2. ACS mosaics (possibly some WFPC2 also)
3. Possibly WFPC2 reprocessed image ? (e.g. WF4 anomaly fixed, chip-to-chip astrometry improved, ...)
4. GHRS and FOS available in advanced plotting tool
5. Smaller pixel (30 mas rather than 50 mas) images when warranted
6. Combine moving target images
7. Early WFC3 data and COS data ?
8. Various user interface enhancement (e.g., user provided background for footprints)

And Beyond

1. “All-HST-Sky” source list
 2. Advanced “text” search
 3. Better integration with other archives (e.g., SPITZER, CHANDRA)
 4. Make software (and/or tools) accessible to community
 5. Time resolved tools
 6. FOC images ?
 7. STIS slitless spectra extractions
 8. Access to outside-developed products/tools (e.g., photometric redshifts, age dating, ...)
- ...

Google-like “one box”



Hubble Legacy Archive

Search

Reset

[advanced search](#)

Examples: M101, 14 03 12.6 +54 20 56.7 r=0.2d, more...
Requires Firefox or compatible browser

[Inventory](#)

[Images](#)

[Footprints](#)

[NICMOS Grism \(ST-ECF\)](#)

[Help](#)

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[STScI/ST-ECF/CADC](#)

Advanced Search Option



Hubble Legacy Archive

Examples: M101, 14 03 12.6 +54 20 56.7 r=0.2d, [more...](#)
Requires Firefox or compatible browser

Position: RA: Dec: Radius: degrees

Selection: Instruments: *Enhanced Products:* ACS WFPC2 NICGRISM
Standard Products: STIS FOS GHRS NICMOS

Data Product:

[▶ Image preferences](#)

- [Inventory](#)
- [Images](#)
- [Footprints](#)
- [NICMOS Grism \(ST-ECF\)](#)
- [Help](#)

Inventory View



Hubble Legacy Archive

30 Dor

[Search](#)

[Reset](#)

[advanced search](#)

Examples: M101, 14 03 12.6 +54 20 56.7 r=0.2d, more...
Requires Firefox or compatible browser

[Inventory](#)

[Images](#)

[Footprints](#)

[NICMOS Grism \(ST-ECF\)](#)

[Help](#)

30 Dor RA = 84.676663 Dec = -69.100781 r = 0.200000 [05:38:42.399 -69:06:02.81]

Results 1-20 of 1256

Show results per page

[Previous](#) [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) ... [63](#) [Next](#)

Click column heading to sort list - Click rows to select [Reset selection](#)

Text boxes under columns select matching rows [Apply Filter](#) [Clear Filter](#)

Display	Download	RA	DEC	Level	Target	Detector	Aperture	Spectral_Elt	NExposures	ExpTime	StartTime	
Display	FITS	05:37:35.05	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	F606W	3	2513	2004-07-18 06:04:16	HST_
Display	FITS	05:37:35.05	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	F814W	3	2415	2004-07-18 05:40:02	HST_
Display	FITS	05:37:35.05	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	detection	6	4928	2004-07-18 05:40:02	
Display	FITS	05:37:35.05	-69:16:06.8	4	SN1987A-PAR	ACS/WFC	WFC	F814W/F606W	6	4928	2004-07-18 05:40:02	HST_
Display	FITS	05:37:35.01	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	F606W	3	2415	2004-07-18 08:51:42	HST_
Display	FITS	05:37:35.01	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	F814W	3	2513	2004-07-18 09:15:56	HST_
Display	FITS	05:37:35.01	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	detection	6	4928	2004-07-18 08:51:42	
Display	FITS	05:37:35.01	-69:16:06.8	4	SN1987A-PAR	ACS/WFC	WFC	F814W/F606W	6	4928	2004-07-18 08:51:42	HST_
Display	FITS	05:37:35.1	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	F606W	3	2513	2004-07-23 01:05:18	HST_
Display	FITS	05:37:35.1	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	F814W	3	2415	2004-07-23 00:34:35	HST_
Display	FITS	05:37:35.1	-69:16:06.8	2	SN1987A-PAR	ACS/WFC	WFC	detection	6	4928	2004-07-23 00:34:35	
Display	FITS	05:37:35.1	-69:16:06.8	4	SN1987A-PAR	ACS/WFC	WFC	F814W/F606W	6	4928	2004-07-23 00:34:35	HST_
Display	FITS	05:37:34.95	-69:16:06.7	2	SN1987A-PAR	ACS/WFC	WFC	F606W	3	2413	2004-07-23 03:53:56	HST_
Display	FITS	05:37:34.95	-69:16:06.7	2	SN1987A-PAR	ACS/WFC	WFC	F814W	3	2514	2004-07-23 04:17:42	HST_
Display	FITS	05:37:34.95	-69:16:06.7	2	SN1987A-PAR	ACS/WFC	WFC	detection	6	4927	2004-07-23 03:53:56	
Display	FITS	05:37:34.95	-69:16:06.7	4	SN1987A-PAR	ACS/WFC	WFC	F814W/F606W	6	4927	2004-07-23 03:53:56	HST_

Done

Footprints for easier browsing of what Hubble data already exists

[Inventory](#) [Images](#) [Footprints](#) [NICMOS Grism \(ST-ECF\)](#) [Help](#)

30 dor RA = 84.676663 Dec = -69.100781 r = 0.200000 [05:38:42.399 -69:06:02.81]

Instrument	#Footprints
<input checked="" type="checkbox"/> ACS	53
<input checked="" type="checkbox"/> WFPC2	472
<input checked="" type="checkbox"/> STIS	444
<input checked="" type="checkbox"/> NICMOS	399
<input checked="" type="checkbox"/> NICMOS GRISM	0
<input checked="" type="checkbox"/> FOS	199
<input checked="" type="checkbox"/> GHRS	77

DSS Image On Off

Data Product

Exposure(Level 1)

Combined(Level 2)

Best Available

To Zoom, go to Advanced Search and enter a smaller value for Radius (smallest value 0.01 degrees)

Click [here](#) for NVO STC Web Services

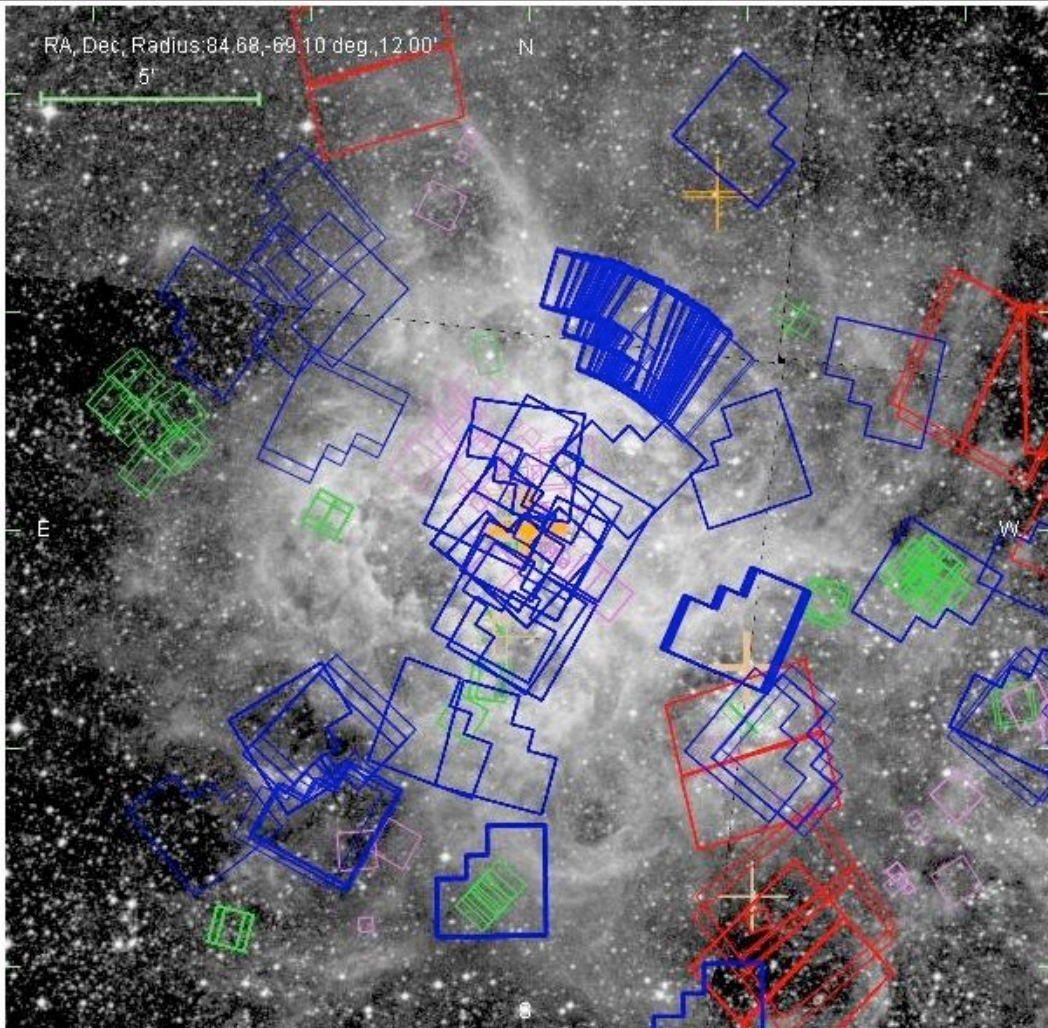
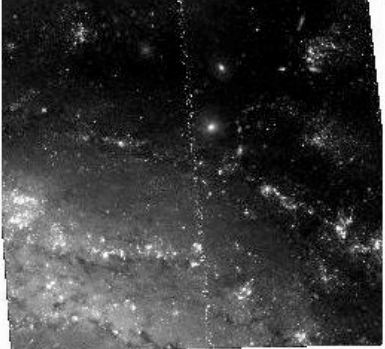


Image View - subset of M101 images.


Find HLA Data (test version)

http://hla-web.stsci.edu/testhlaiview.html###1#/cgi-bin/acsSIAP.cgi?pos=210.8021250,+54.3480833&zoom=0.2

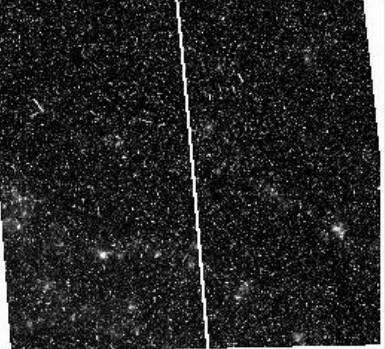
Getting Started Latest Headlines



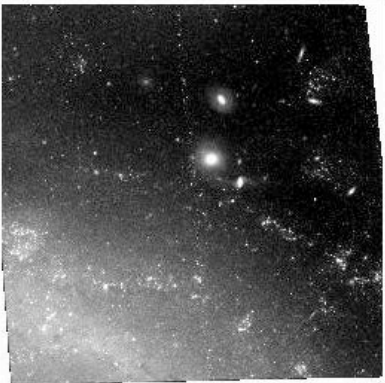
ACS WFC F435W
9492_10_F435W
[Interactive display](#)
[FITS: Full-size](#)
Catalogs: None




ACS WFC F555W
9492_10_F555W
[Interactive display](#)
[FITS: Full-size](#)
Catalogs: None



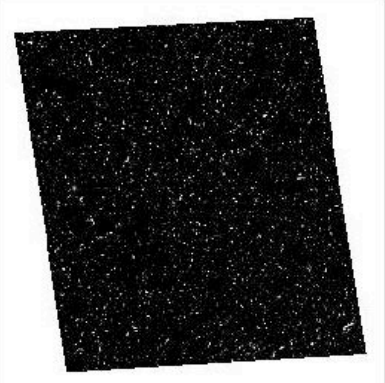
ACS WFC F658N
9492_10_F658N
[Interactive display](#)
[FITS: Full-size](#)
Catalogs: None



ACS WFC F814W
9492_10_F814W
[Interactive display](#)
[FITS: Full-size](#)
Catalogs: None



ACS WFC F814W/F555W/F435W
9492_10
[Interactive display](#)
[FITS: Cutout Full-size](#)
Catalogs: None



ACS HRC F550M
9492_11_F550M
[Interactive display](#)
[FITS: Full-size](#)
Catalogs: None

Done

Interactive Display of M101 image

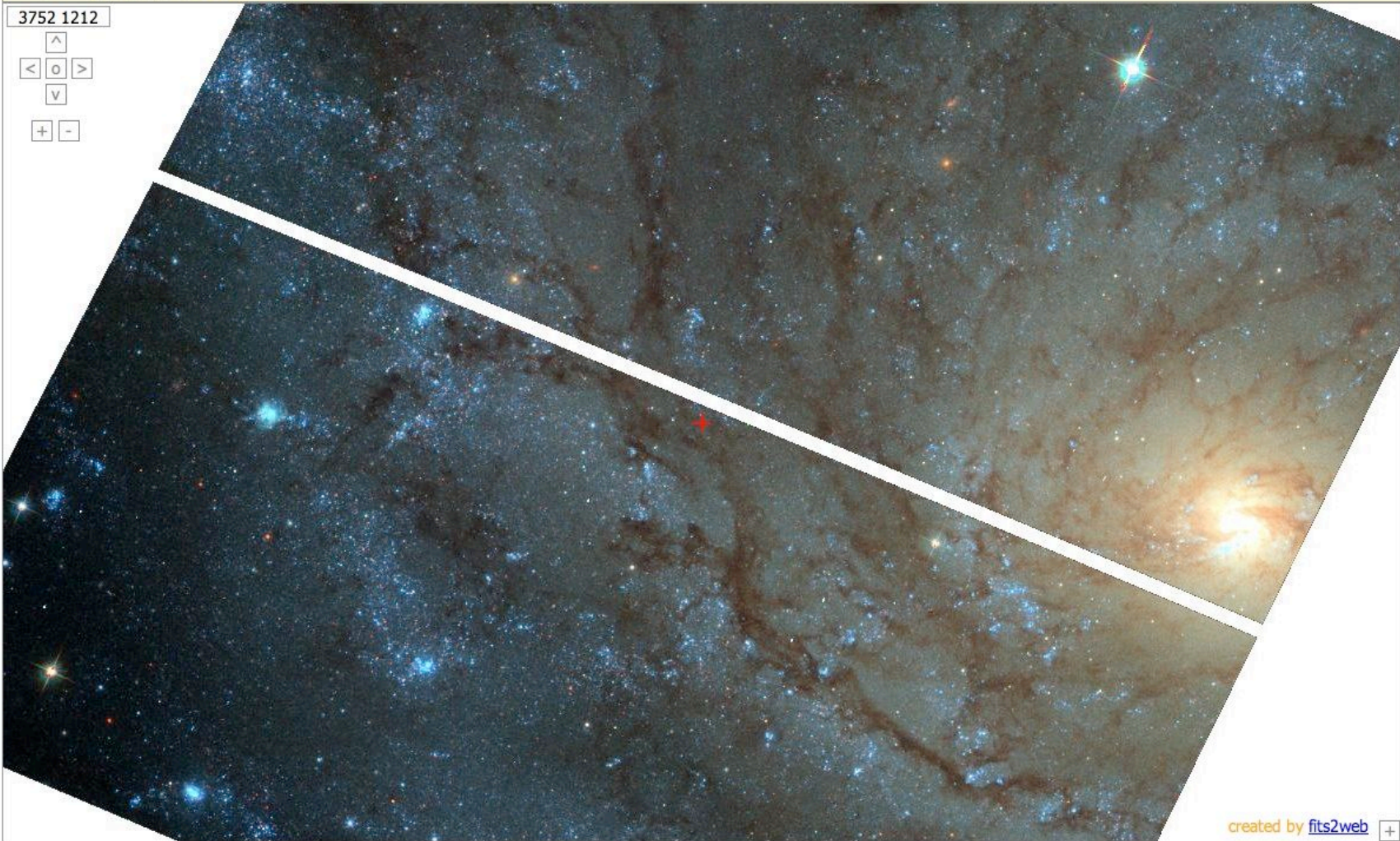
http://hla-web.stsci.edu - fits2web image viewer

9490_01 ACS WFC F814W/F555W/F435W (color)

Brighter Darker SExtractor DAOPhot

3752 1212

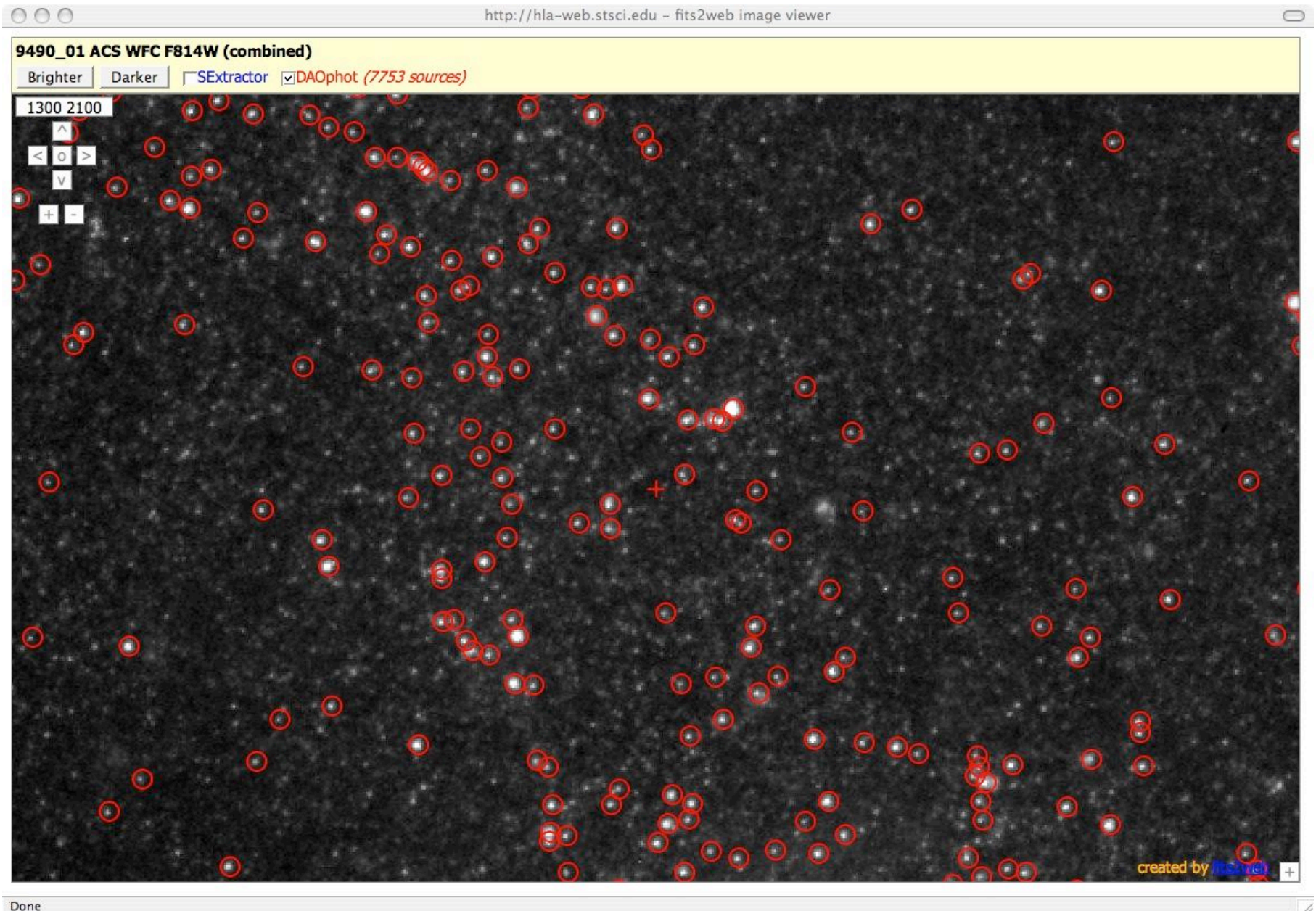
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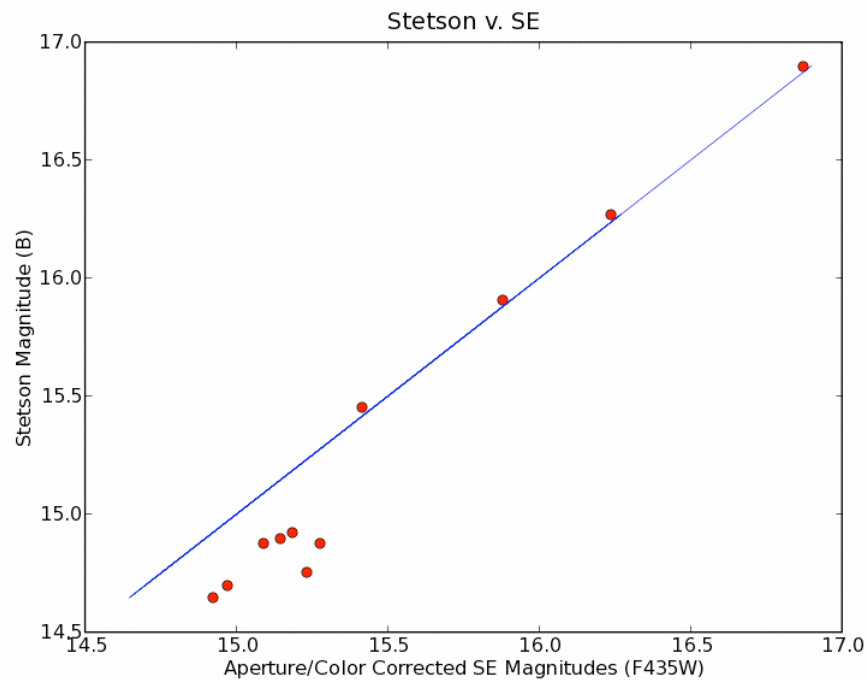
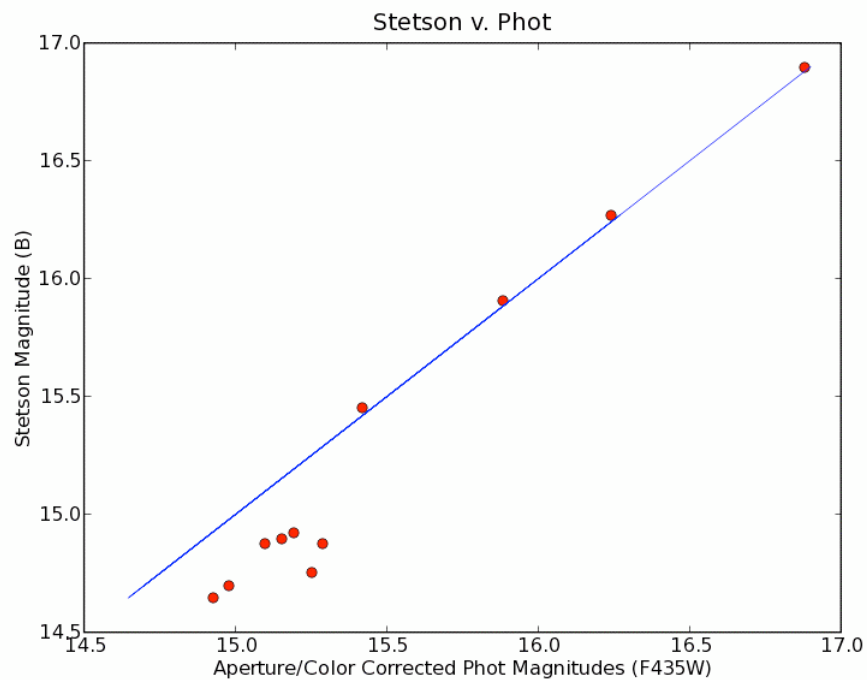


created by fits2web +

Done

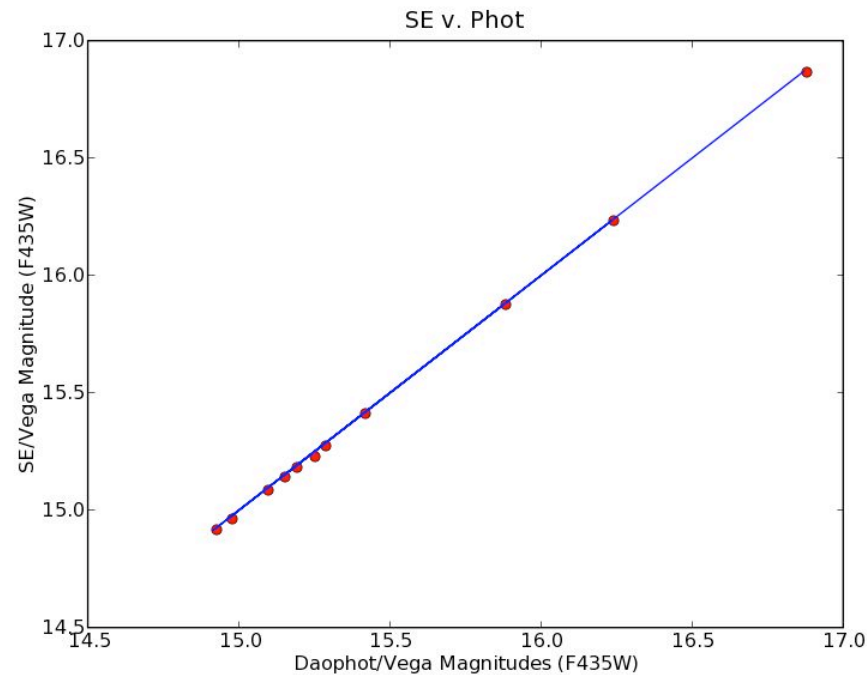
HLA source list overlay for blowup of M101 image



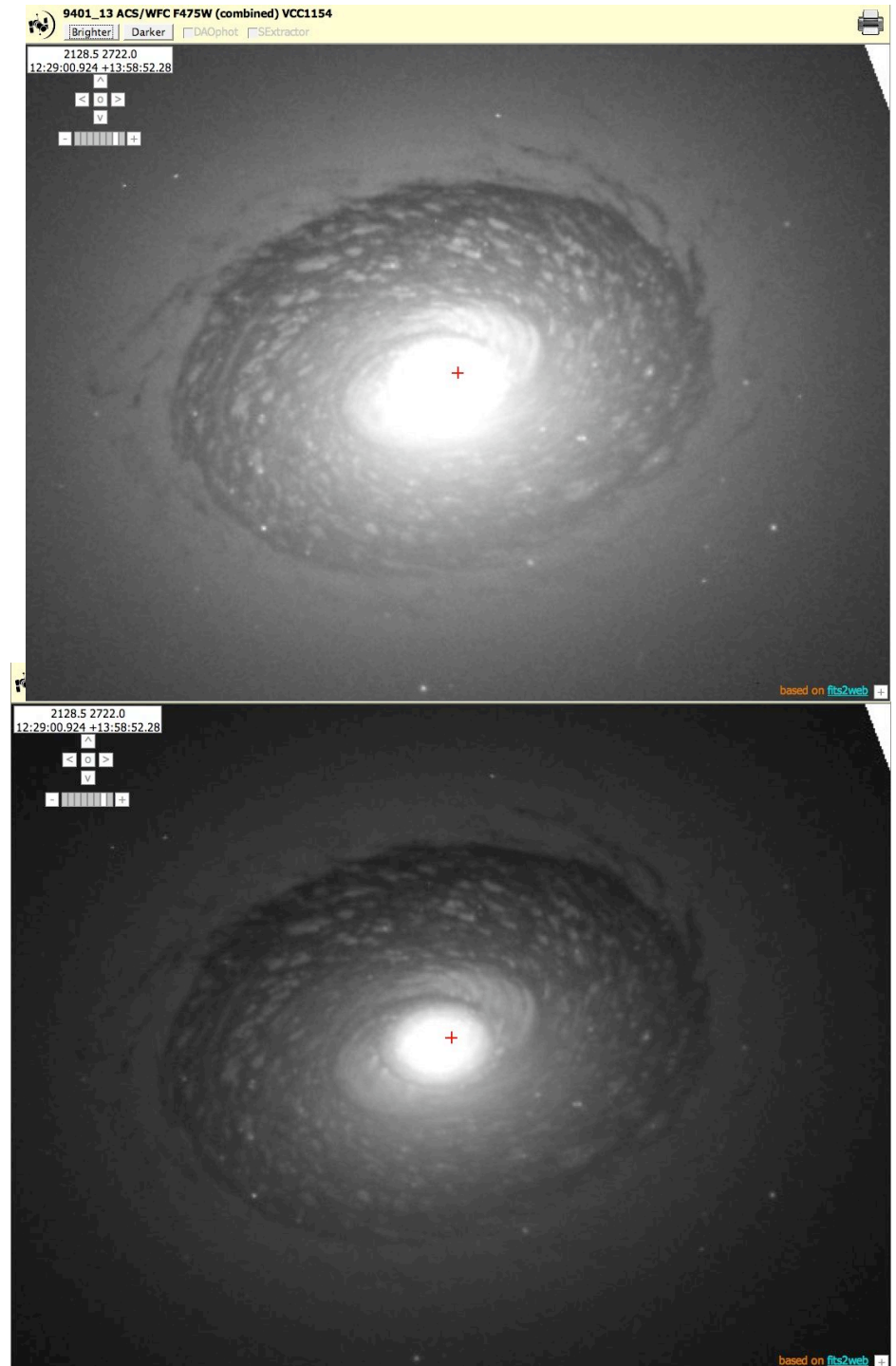


Comparison of HLA source lists
with Stetson ground-based
photometry of 47 TUC.

- offset = 0.02 mag (N=4)
- RMS scatter = 0.007 mag (N=4)



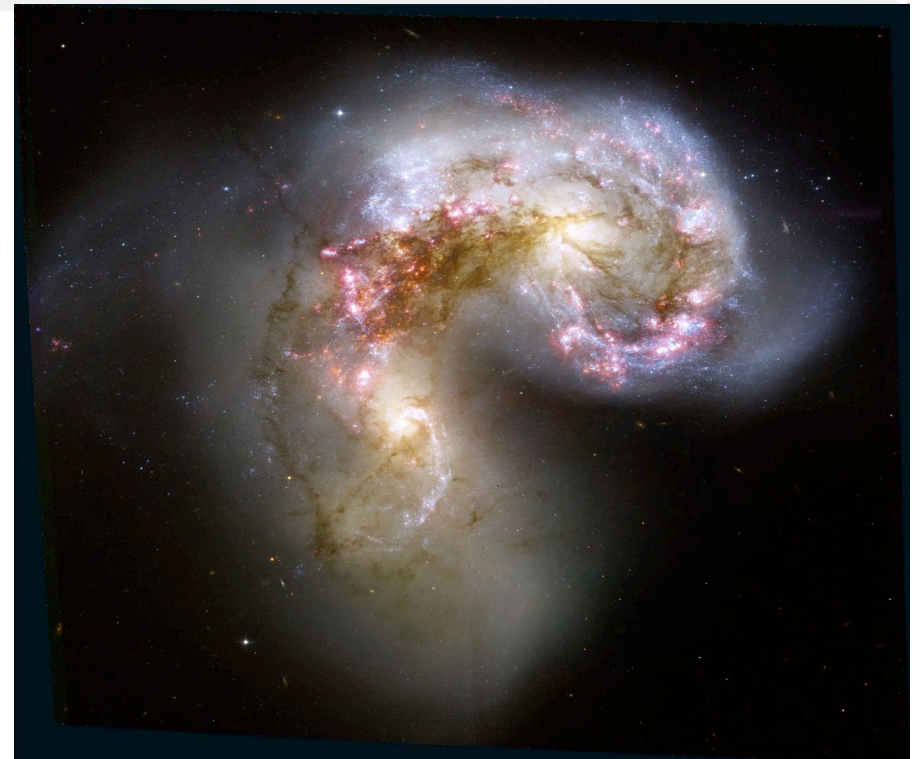
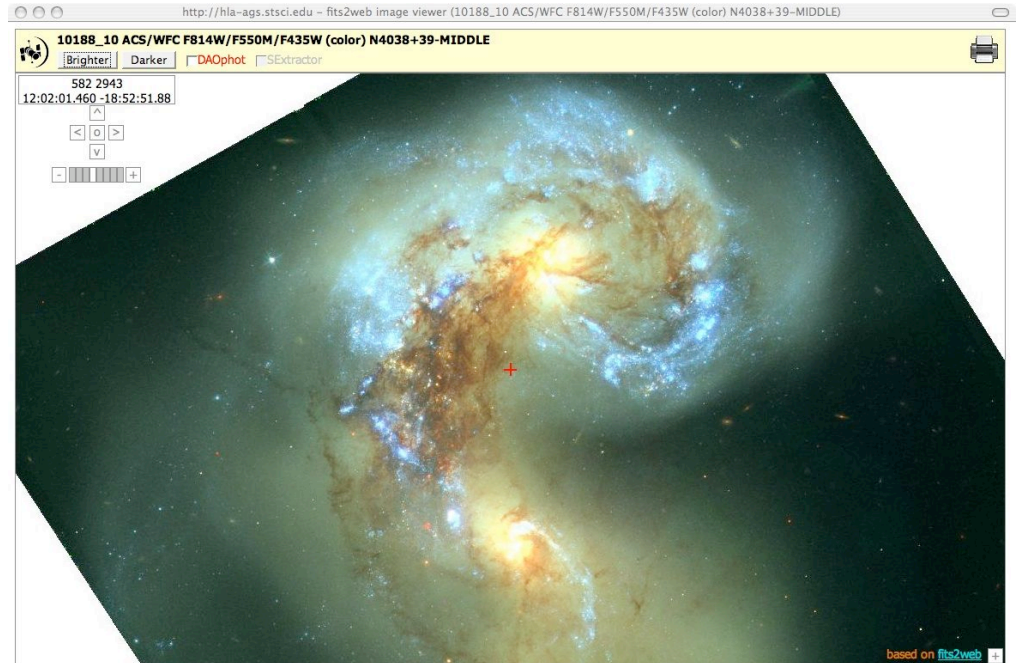
The brighter/darker control can bring out the full dynamic range

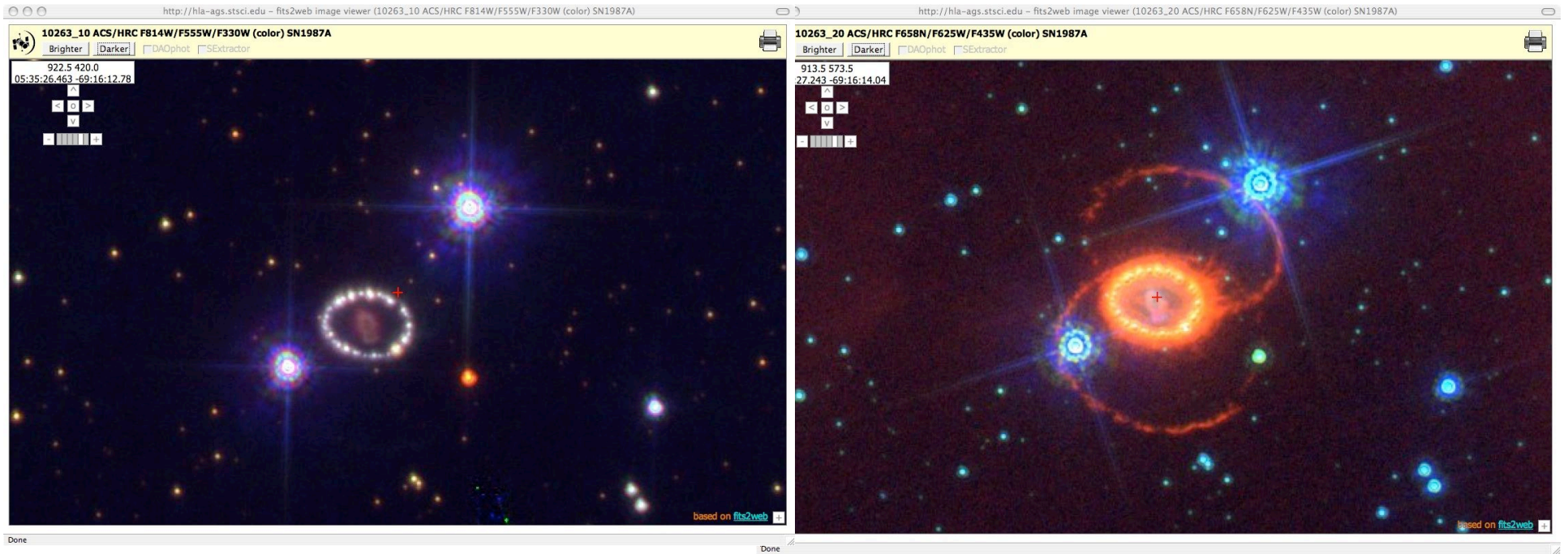


HLA >>>

Color images are automatically produced if observations in two or more filters are available.

Lars Christiansen
(ECF) >>>





Four out of 600 ACS and STIS images of SN1987A

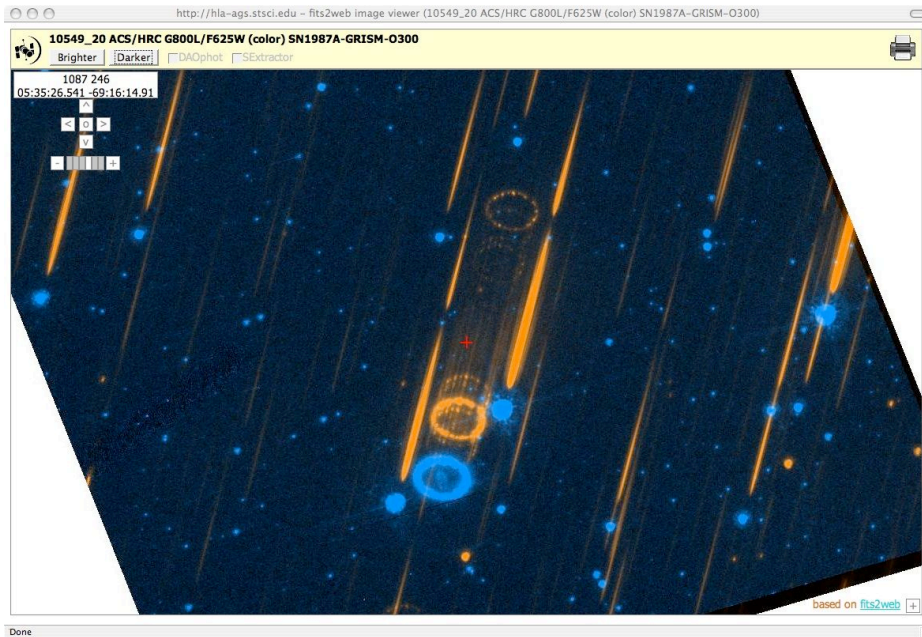
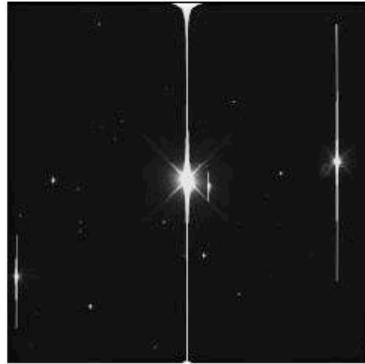
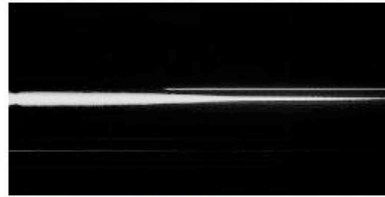


Image view of some STIS data



LOW-LATITUDE-FIELD (*exposure*)
STIS/CCD MIRVIS 50CCD
O4LIAEF7Q
Interactive Display
Download Data: FITS-Science (3.9 MB)
FITS-MEF (11.6 MB)
Download Source Lists: None

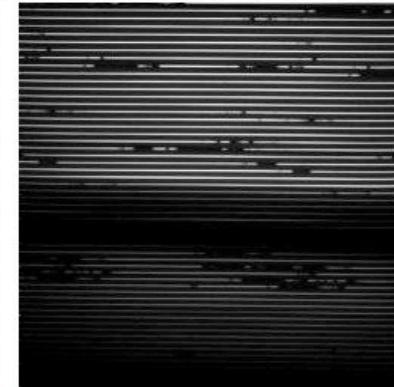
[More...](#)



LOW-LATITUDE-FIELD (*exposure*)
STIS/CCD G750L 50CCD
O4LIAEF8Q

Interactive Display
Download Data: FITS-Science (1.7 MB)
FITS-MEF (5.0 MB)
Download Source Lists: None

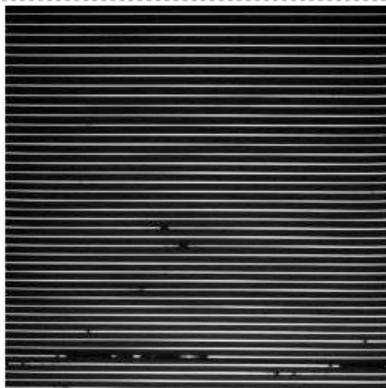
[More...](#)



HD93205 (*combined*)
STIS/FUV-MAMA E140H 0.2X0.09
O4QX01010

Interactive Display
Download Data: FITS-Science (3.3 MB)
FITS-MEF (10.0 MB)
Download Source Lists: None

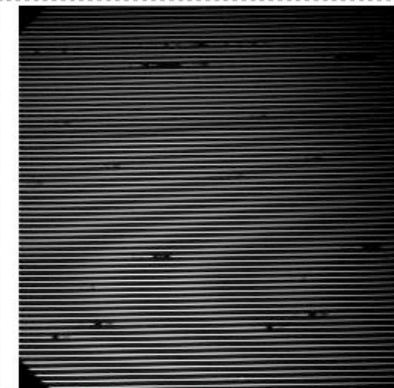
[More...](#)



HD93205 (*combined*)
STIS/FUV-MAMA E140H 0.2X0.09



HD93205 (*combined*)
STIS/FUV-MAMA E140H 0.2X0.09



HD93205 (*combined*)
STIS/NUV-MAMA E230H 0.1X0.09

Image view and interactive display of STIS long-slit spectral data

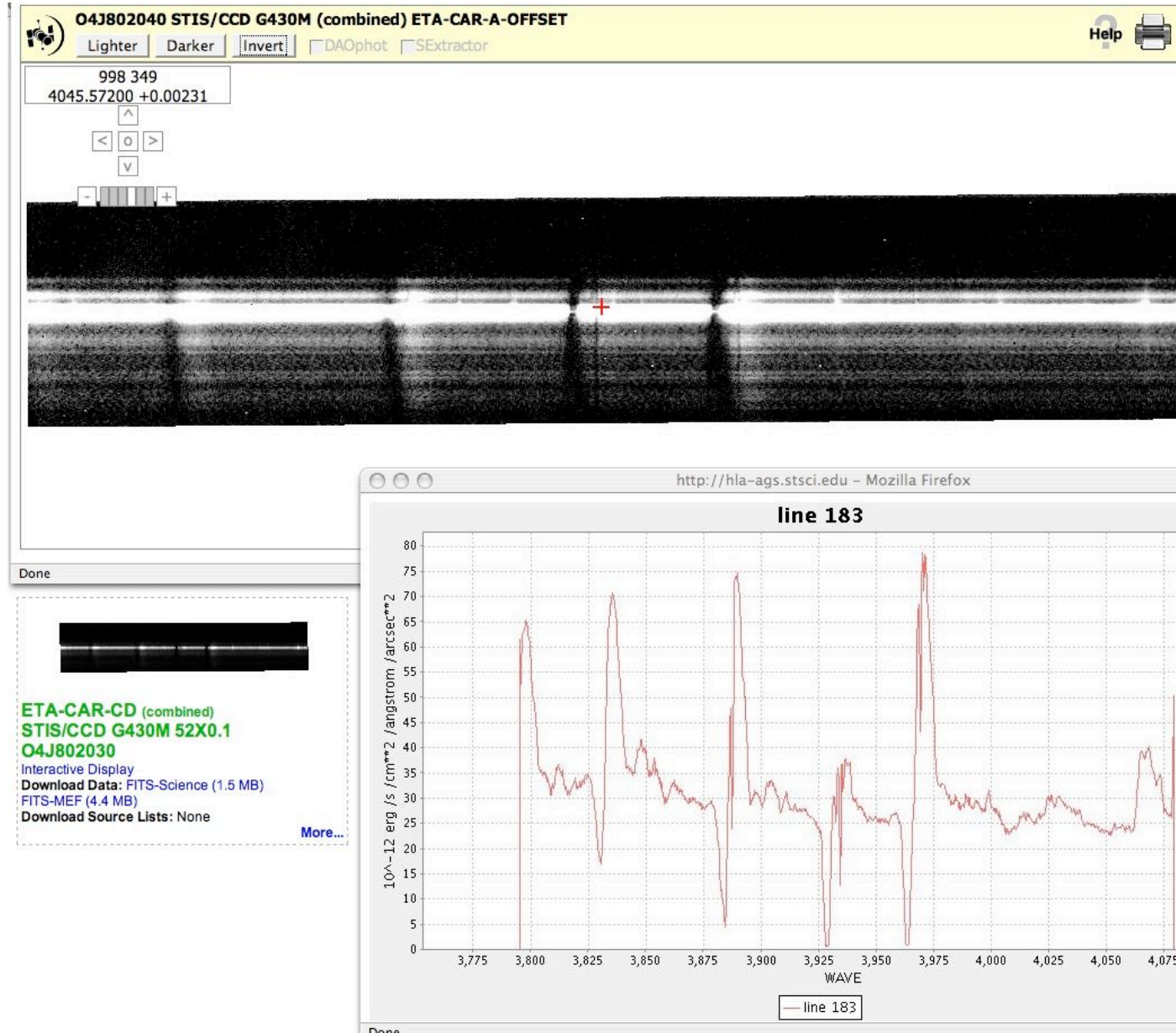
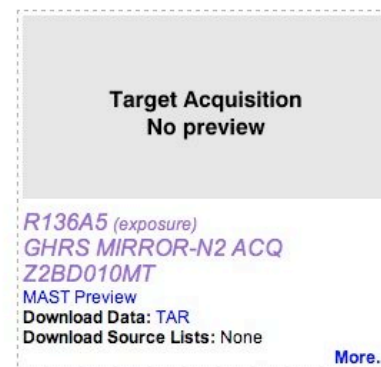
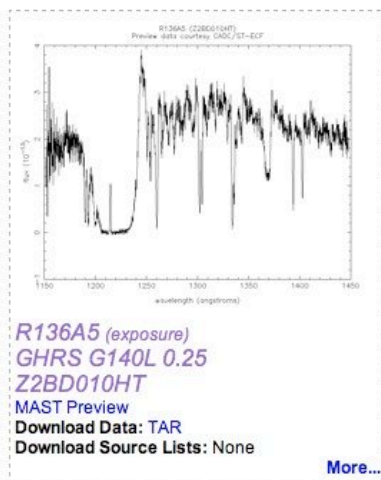
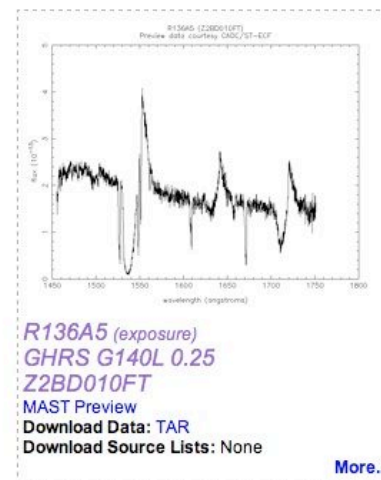
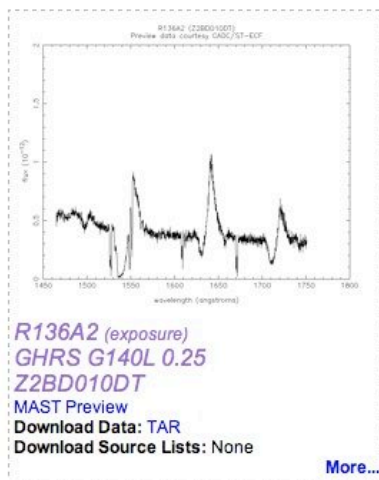
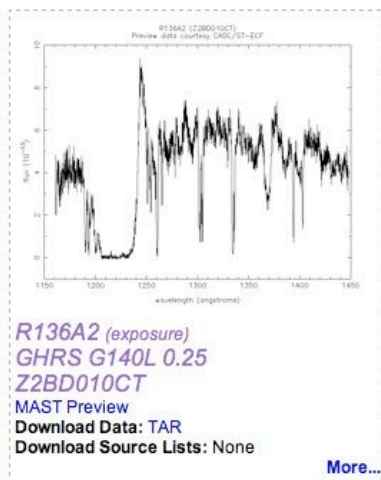


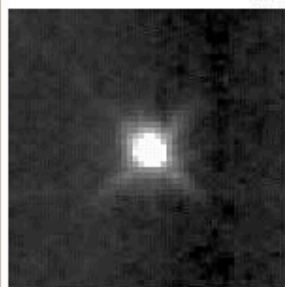
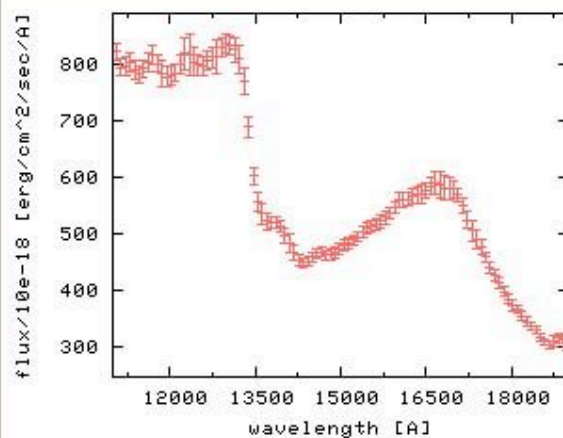
Image view - GHRSS spectral previews



NICMOS GRISM Extractions from ST-ECF

[Define new query](#) [Home](#) [HLA FAQ](#)

[Previews](#)



10.15 arcsec on a side



----- wavelength ----->

Target Name	HNG_J032911.35+311717.4_N8VM10N1Q
Target Ra, Dec	03:29:11.348 +31:17:17.36
Target Galactic Lat, Lon	-20.522465 158.357257 [deg]
Target Ecliptic Lat, Lon	11.979005 57.706494 [deg]
Search ESO/HST Archives	exposures within 2 arcmin

The Team (partial list)

STScI (integration, cutouts, footprints, associations, source lists, interfaces, ...)

- Carl Johnson (Acting Project Manager)
- Brad Whitmore (Project Scientist, source lists)
- Anton Koekemoer (Integration Scientist, multidrizzle pipeline, astrometry)
- Niall Gaffney, Lee Quick (Software Engineer, Test Engineer)
- Rick White (cutouts)
- Steve Lubow, Gretchen Greene (footprints)
- Brian McLean (astrometry, source lists database)
- Kevin Lindsay (source lists), Paul Lee, Matt Stankiewicz, Jessica Evans (quality control)

ECF (spectra, e.g., NICMOS grism extractions)

CADC (WFPC2 images, ...)

- Richard Hook (ECF Proj. Man.)
- Wolfram Freudling (NICMOS lead)
- Alberto Micol (pipeline meta data)
- Martin Kuemmel (grism extraction)
- Harald Kuntschner (science validation)
- David Schade (CADC Proj. Man.)
- Daniel Durand (WFPC2, source list)