HST Mission Reports

Reprocessing Updates
 - WFPC2
 - NICMOS
Hubble Legacy Archive Update

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Reprocessing Update

Close-Out and Reprocessing

- Identify necessary close-out analyses
  - Complete
- Implement necessary enhancements to calibration pipelines
  - Complete (except for fixes to issues discovered during reprocessing)
- Update documentation (Instrument and Data Handbooks)
- Data reprocessing
  - Implements "best" calibration
  - Allows to shut off On-The-Fly Reprocessing (OTFR) and to fulfill requests from the static archive
  - Provides best data set for use in HLA

- Reported in detail on enhancements for close-out and reprocessing at last STUC meeting (November 2008)
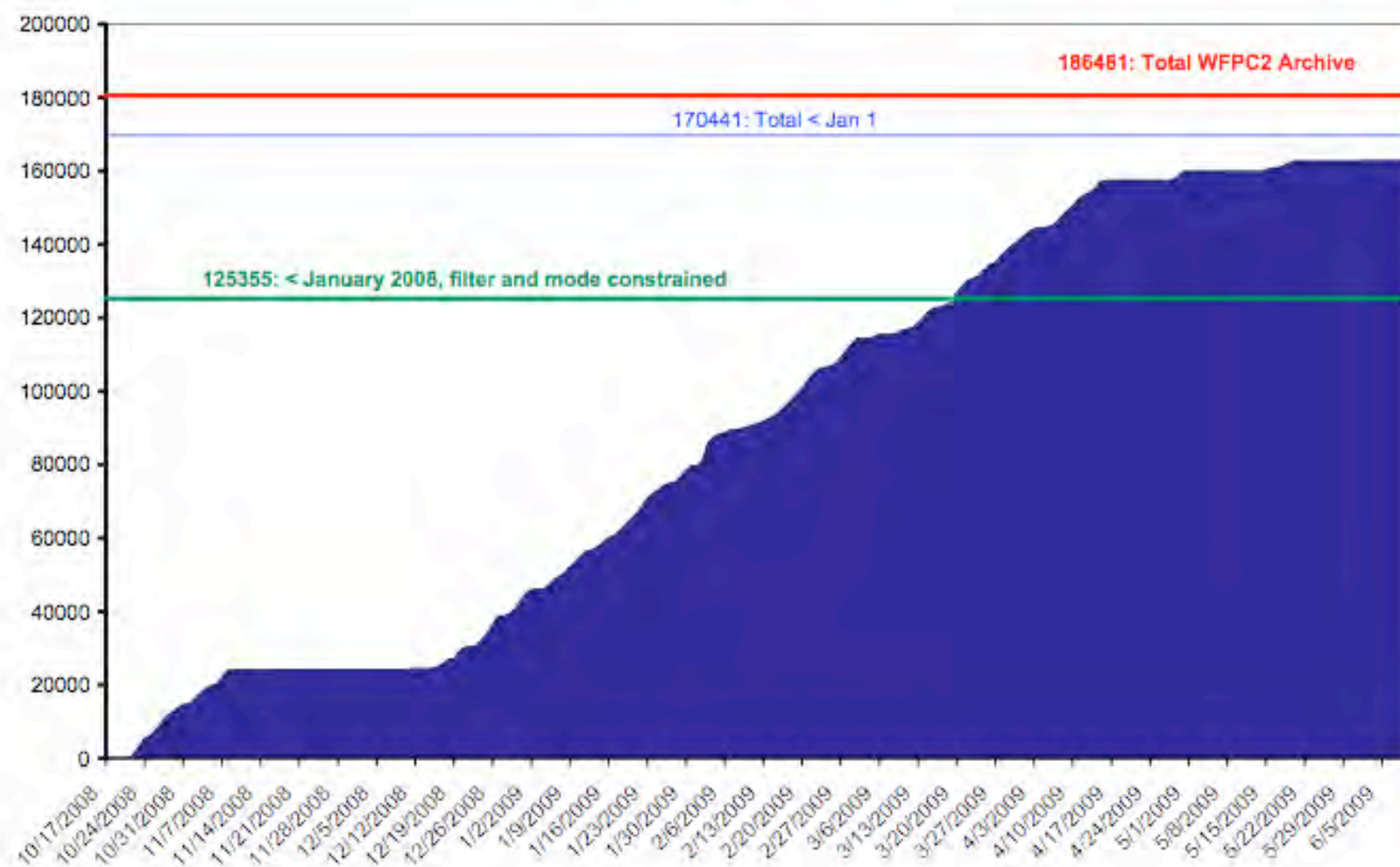- This presentation provides an incremental update

WFPC2

- ## Documentation
  - Instrument Handbook published in August 2008
  - Data Handbook under development; expected to be published at the end of September 2009
- ## Reprocessing
  - 87.3% (162,861 of 186,481) of datasets reprocessed and ingested (as of 11 June)
  - Working on remaining 2008 and 2009 calibrations
    - Weekly dark files, contamination table, …
  - Identified possible issue with some of the WF4 low-bias (<100DN) images from 2005 to 2007
    - Improved correction table delivered last week
    - After successful testing, about 650 images may have to be reprocessed again

WFPC2 datasets processed

186461: Total WFPC2 Archive

170441: Total < Jan 1

125355: < January 2008, filter and mode constrained

NICMOS

- Documentation
  - Data Handbook published in May 2009
  - Instrument Handbook completed and in final review
- Reprocessing
  - 45.6% (52,205 of 114,451) of products reprocessed and ingested (as of 11 June)
  - Completeness was ~63%, but...
  - NICMOS team identified issue with a photometry keyword (PHOTFLAM) related to PHOTTAB files used in reprocessing
    - ~18% of NICMOS dataset (~23,000 products) need to be reprocessed again
    - Updates to pipeline and calibration files completed last week
    - Reprocessing has resumed
  - Expected completion by ~July 2009

NICMOS Products processed

114451: Total NICMOS Archive

41010: Pre-NCS

24969:NIC1,NIC3,Pre-NCS
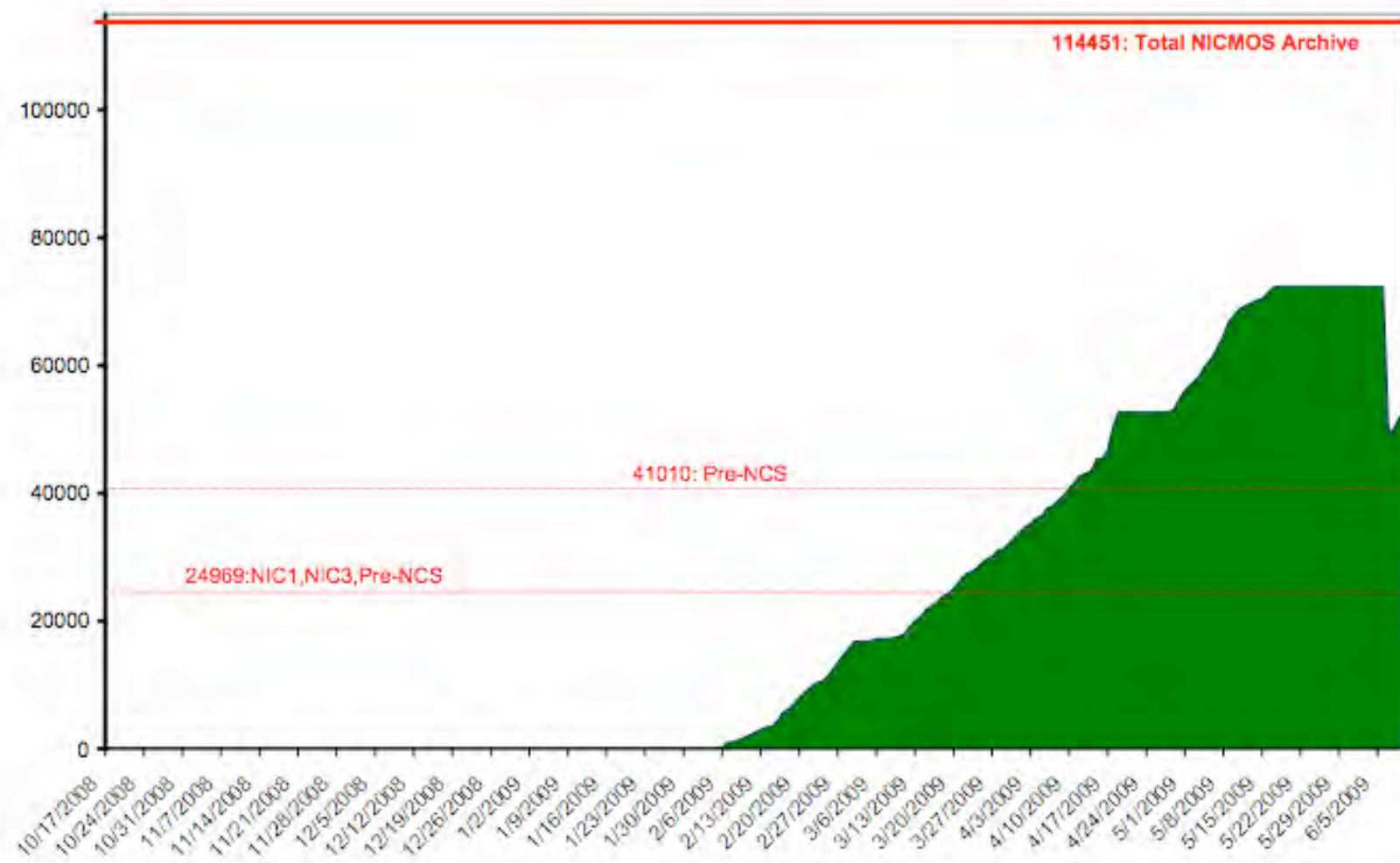
Hubble Legacy Archive (HLA) Update

HLA Status and News

- Two major data releases (DRs):
  - DR 2.5 (December 2008): Contributed High Level Science Products fully integrated in HLA
  - DR 3 (May 2009): NICMOS images, ACS grisms, WFPC2 source lists, prototype mosaics
  - Numerous interface upgrades
  - New development environment and installation procedures:
    - Creation of a Linux Clustered Environment including a separate Development and Test area
    - Setup similar to the OPUS environment
    - New software development progression (Dev -> Test -> Ops) used since DR2.5
- Strong presence at AAS; interactions with possible partners in both scientific and broader community
  - Partnerships with Chandra and Spitzer centers
  - Prototypes of enhanced footprint/overlay features using Google Sky, World Wide Telescope, FLEX (Flash-based) software tools

Data Release 2.5 – Overview

- Data Release 2.5 took place successfully on December 22, 2008
- Focus on the addition of Contributed Products:
  - User-generated image combinations from the MAST High Level Science Products
  - Most delivered by Treasury and Archival Legacy programs
  - Over 4500 images, including ACS, WFPC2, and NICMOS
  - Functional quality verification; limited review of scientific accuracy
- High-quality but heterogeneous products required several changes behind the scenes:
  - Enhancements to footprint, inventory services, default scaling for grayscale and color images
  - Database remains incomplete for some keywords
  - A small fraction of the data excluded from the delivery because of quality issues

Data Release 2.5 – Other Changes

- Some minor changes were made to the HLA interface and procedures at the time of Data Release 2.5:
  - Review and enhancements to help information and FAQ to support new products
  - Improved functionality based on user choices
  - Improved cross-functionality of Inventory and Footprint view
  - Small number of problems detected and corrected
  - New, streamlined deployment process to take advantage of Development and Test environments
  - Pre-computed multi-resolution FITS data for faster loading, zooming, panning of large-format images

Table of Contents Products

Project Name	PI	Instrument(s)[1]	Reference Position	Number of Products
ANGST (ACS Nearby Galaxy Survey)	Dalcanton	ACS	Multiple targets	114
COMA (ACS Treasury Survey of Coma Cluster of Galaxies)	Carter	ACS	12:59:49.45 27:55:21.1 1.2d	69
COSMOS (Cosmic Evolution Survey)	Scoville	ACS, WFPC2, NICMOS	10:00:27.85 02:12:03.5 1.0d	999
GEMS (Galaxy Evolution from Morphologies and SEDs)	Rix	ACS	03:32:30 -27:48:20 0.4d	187
GOODS (Great Observatories Origins Deep Survey)	Giavalisco	ACS	North: 12:36:55 62:14:15 0.3d South: 03:32:30 -27:48:20 0.3d	175
Hubble Heritage	Noll	ACS, WFPC2, NICMOS	Multiple targets	91
STAGES (Space Telescope A901/902 Galaxy Evolution Survey)	Gray	ACS	09:56:02.16 -10:05:20.5 0.4d	80
UDF (Ultra Deep Field)	Beckwith, Stiavelli, Thompson	ACS, WFPC2, NICMOS	03:32:29.45 -27:48:18.4 0.1d	20
APPP (Archive Pure Parallels Program)	Casertano	WFPC2	Multiple targets, all sky	2858
SGAL (Spiral Galaxies)	Holwerda	WFPC2	Multiple targets	96

Notes:
1. Only instruments for which HLSP data are available through the HLA interface are listed.

"Best Available" selection
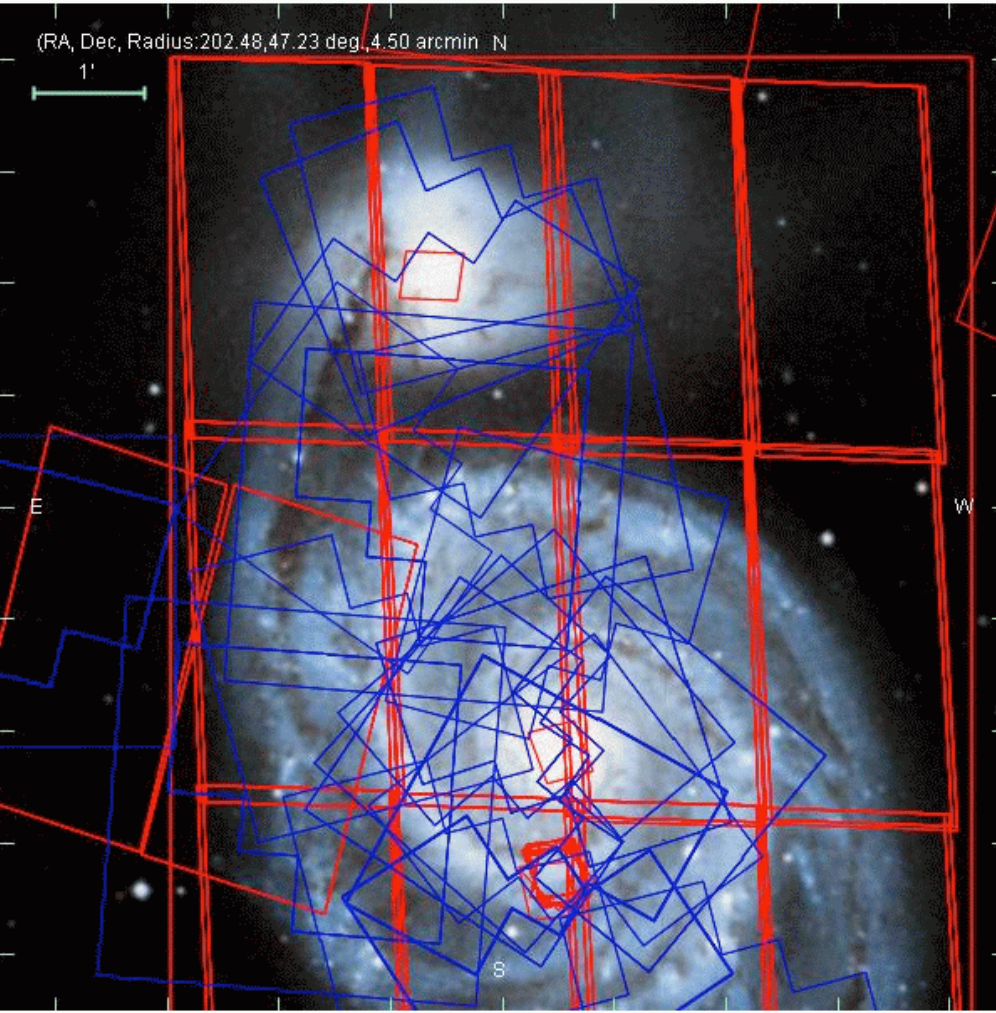
"Contributed Products" selection

Example: Heritage image of M51
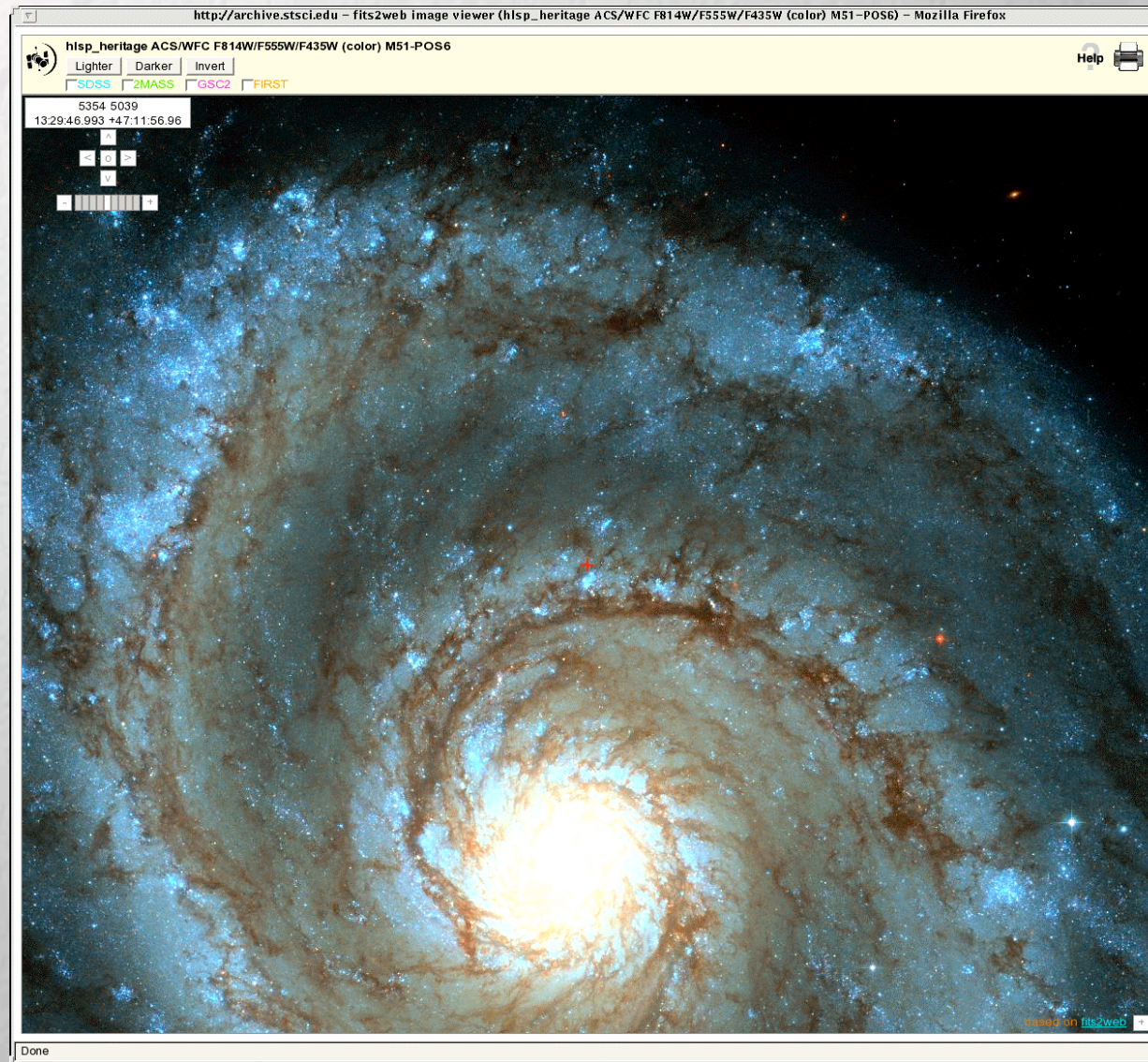
Data Release 3 - Overview

- Data Release 3 took place successfully on May 27, 2009
- New data content:
  - NICMOS reprocessed and visit-combined images
  - ACS Grism data processed by ST-ECF
  - Reprocessed WFPC2 images
  - Prototype ACS mosaics (multi-visit combined images)
- Structural and interface enhancements:
  - Substantially improved options for sorting and filtering of selected data
  - Full consistency between table views (footprint and inventory display)
  - Enhanced "shopping cart" functionality
  - Complete revision of help and FAQ information
  - GALEX catalog added to overlay options
  - Advanced color controls in Interactive Viewer

New NICMOS Images

- New post-pipeline scripts to obtain Multidrizzle combination of NICMOS data after reprocessing
- All combined images reviewed by NICMOS team in order to validate pipeline improvements
    - Review directly on HLA candidate release images
    - Special web tools provided to facilitate review process
- Results very satisfactory; few images rejected
- DR3 included 25% of all NICMOS images (pre-NCS data)
- Benefits user community as well as NICMOS team (by facilitating quality verification)

Image of the Carina nebula included in the DR3 data. This color image is produced from F110W and F160W data obtained with NIC3 with a total depth of one orbit.
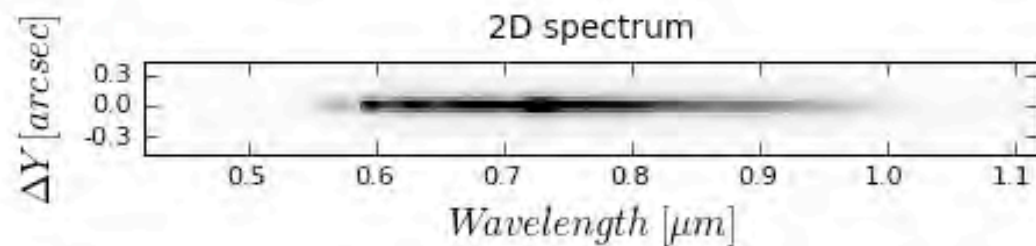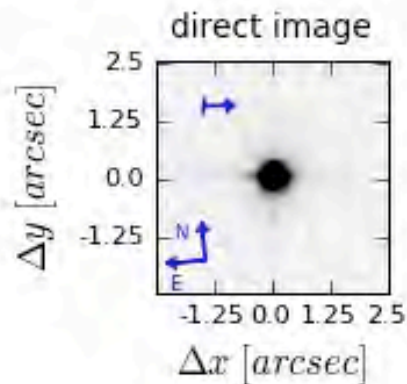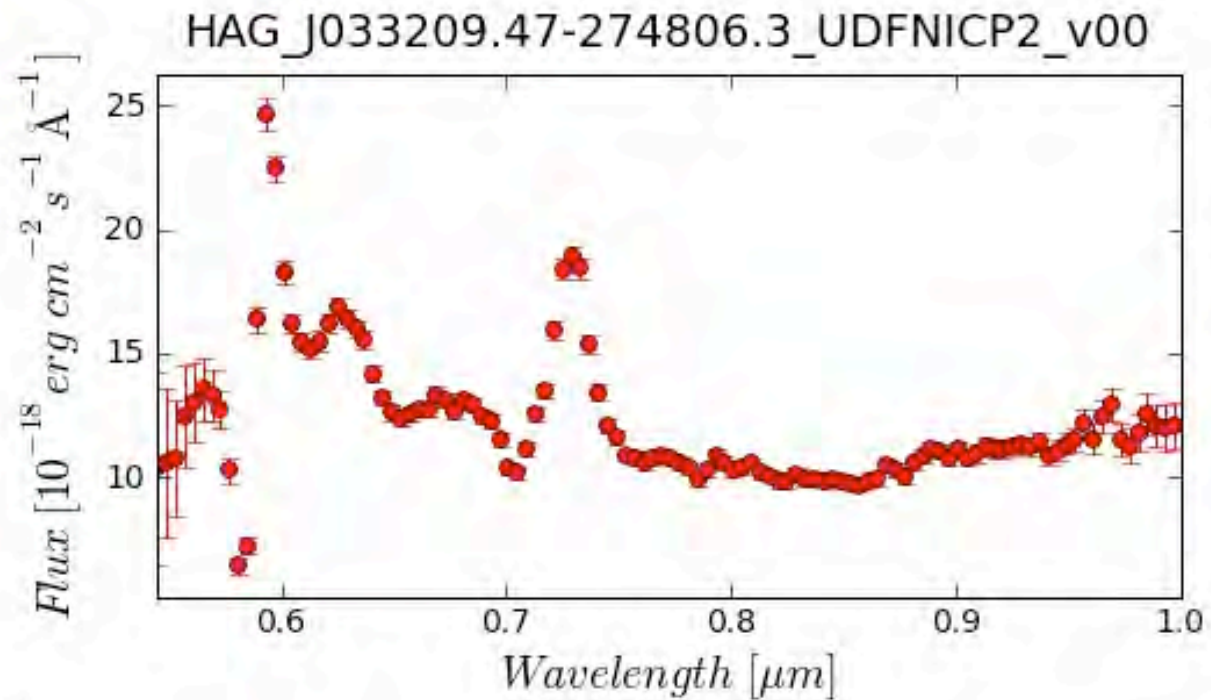
ACS Grism data

- ST-ECF carried out extraction of 1-dimensional spectra from ACS Grism data

- DR3 included 1235 spectra from the UDF region – estimated about 10% of all GRISM data potentially available

- Data are provided with previews – 1-d plot, direct image, and 2-d spectral image

- Data hosted directly by ST-ECF, but fully integrated in footprint database

Preview of the extracted GRISM spectrum of a z=2.82 BAL QSO included in the DR3 data. The preview includes a plot of the spectrum, a direct image, and a cutout of the two-dimensional GRISM data. A similar preview is available for each extracted target.

WFPC2 Source Lists

- Same structure as ACS Source Lists:
  - Both DAOPhot and Source Extractor lists available
  - Obtained for over 95% of reprocessed WFPC2 data
  - Include CTE correction using Dolphin (2008) prescription:
    - CTE correction based on point-source data
    - Extended source correction under development by ACS/WFPC2 team
    - Data used for CTE correction explicitly included in catalog files
- Very good consistency between magnitudes, positions in two sets of sources; match well to independent catalogs in spot checks
- However: Source Extractor lists not deep enough, currently working on improved parameter settings
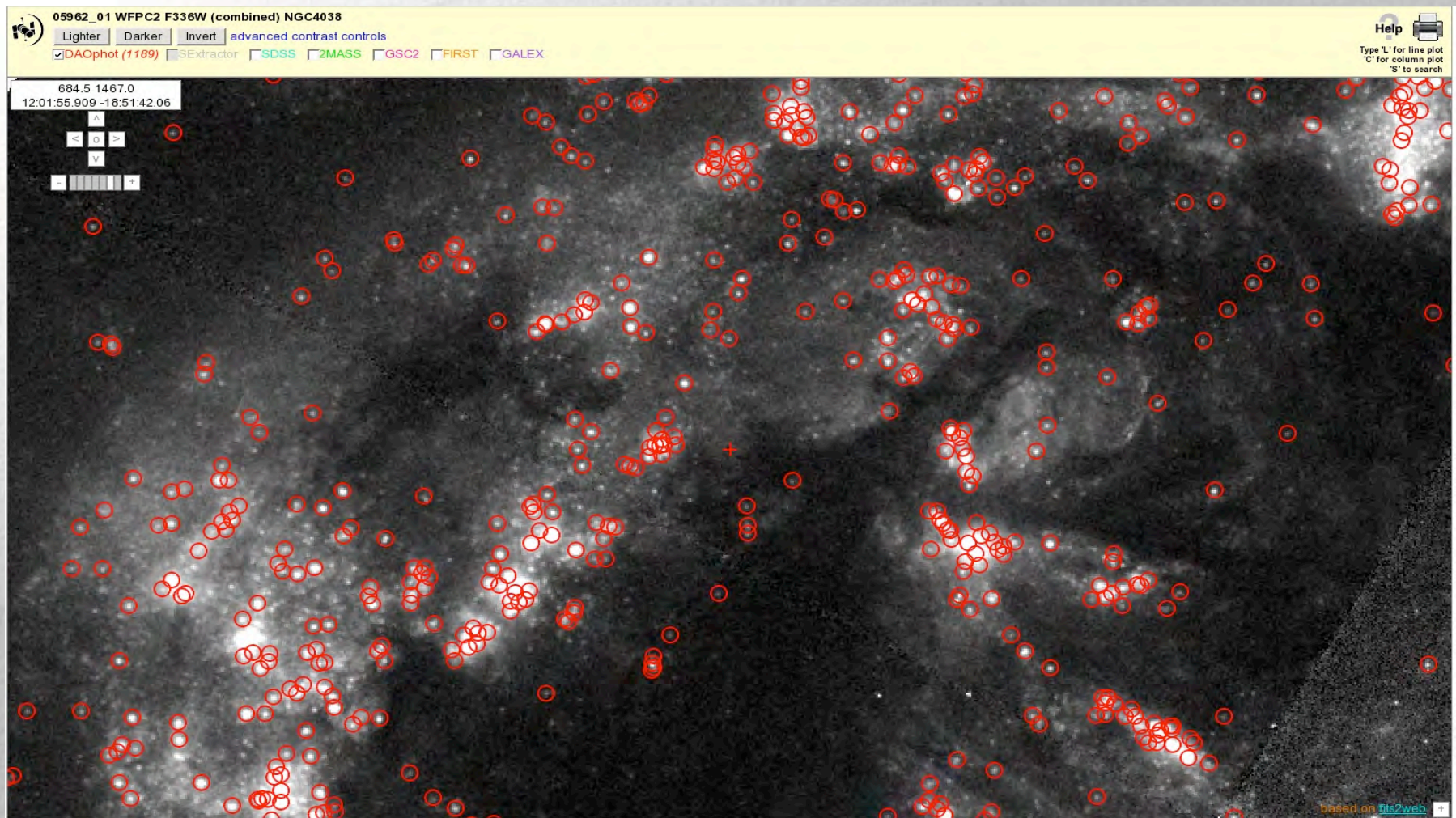
A region of the WFPC2 image of the Antennae with an overlay of the DAOPhot sources included in DR3

Prototype Mosaics

- Combine overlapping multi-visit data:
  - Unlike single-visit data, images cannot be registered from header information
  - New pipeline includes astrometry matching step
  - First batch requires at least 4 exposures per filter per visit and narrow (4-month) time window
    - Ensure CR rejection from single-visit information
    - Not sensitive to long term changes in instrument
  - Future developments will relax such restrictions
- Only 8 mosaics available at release
  - Plan to add ~50 more over next 2 months
  - Interest in feedback on usefulness, formats, ancillary information
- Quality verification successful to date
  - Photometry and pixel-level data consistent with independent combination from ACS Science Team
  - PSF width within 3% of other combinations
  - More quality tests will be possible with a larger data sample (and more time)
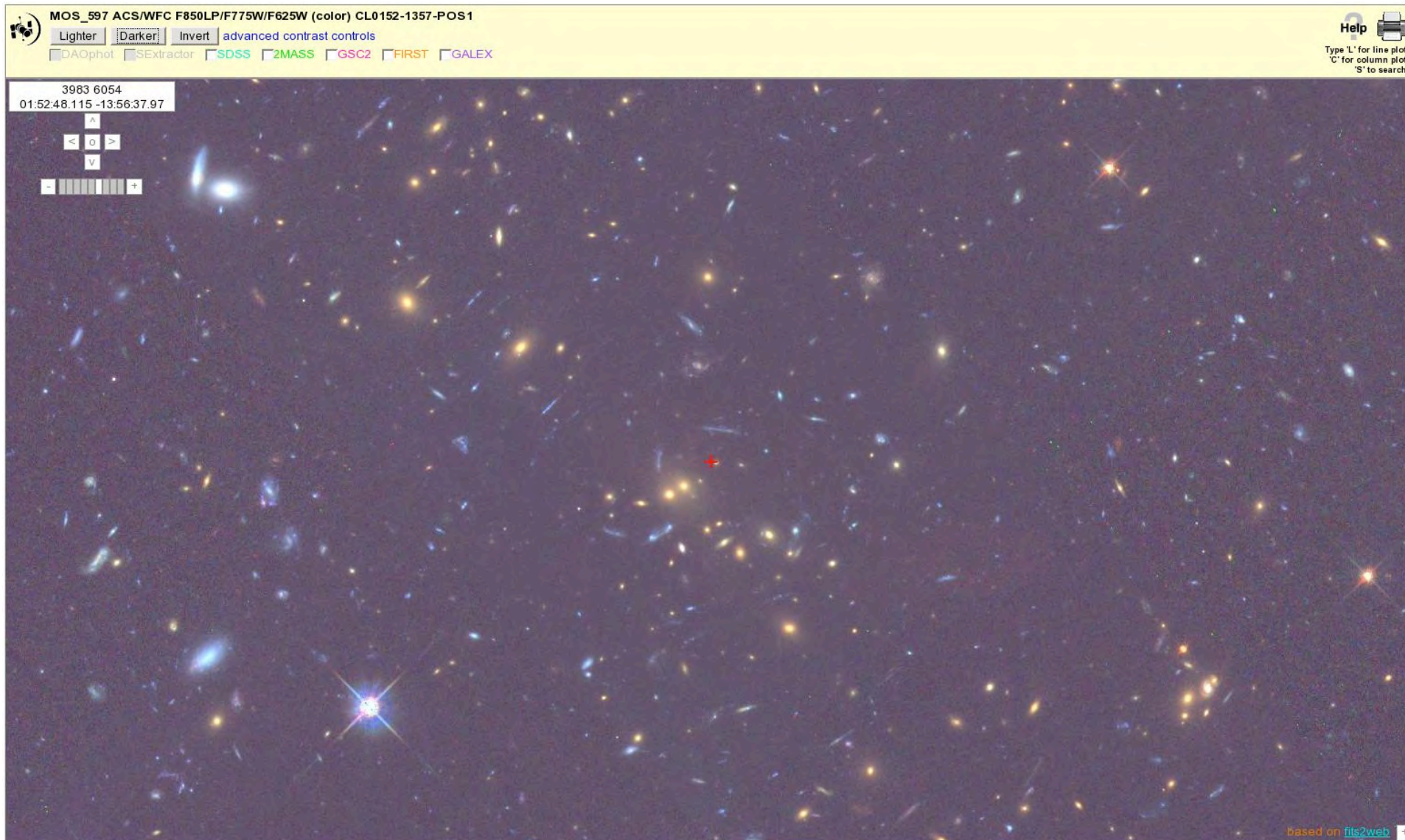
Color image of CL0152-1357 generated automatically by the HLA mosaic pipeline. The color image is generated from F625W, F775W and F850LP, for a total of 57200s in 8 visits laid out in a 2x2 grid. This is one of 8 mosaics released with DR3; processing of these mosaics is fully automated.

Future Plans

- Short term (1-2 months): complete the work started for DR3
  - Improve WFPC2 SExtractor source lists
  - Add more sample mosaics
  - Include more NICMOS data as reprocessing continues
- Medium term (3-6 months): Improve existing data products, prepare for new instruments
  - Extend absolute astrometry enhancement to all HST data
    - Expected worst-case accuracy 0.4"
    - Typical accuracy 0.1-0.2"
  - Work with Instrument Teams to understand best products for WFC3, COS, possibly STIS
  - Define content and timetable for DR4
  - Test enhancements for mosaic pipeline to relax current restrictions
    - Carefully weigh resources needed for more general mosaic generation vs. other developments on the basis of community demand
  - Continue work with Chandra, Spitzer to integrate our footprint data
- Long term (1 year): Evaluate new software tools for enhanced interface
  - Prototypes allow concurrent display of multiple image layers, contextual data through browser
  - Stability, availability, and resource demands of software will be considered