

1st Annual
CITIZEN ENGAGEMENT

Hubble for the people!

JAMBOREE!

Monday, July 16
11 AM - 1 PM

EXPLORING THE SYNERGY BETWEEN THE:
OFFICE OF PUBLIC OUTREACH
HUBBLE HERITAGE
CITIZEN SCIENCE
& THE HUBBLE ARCHIVE

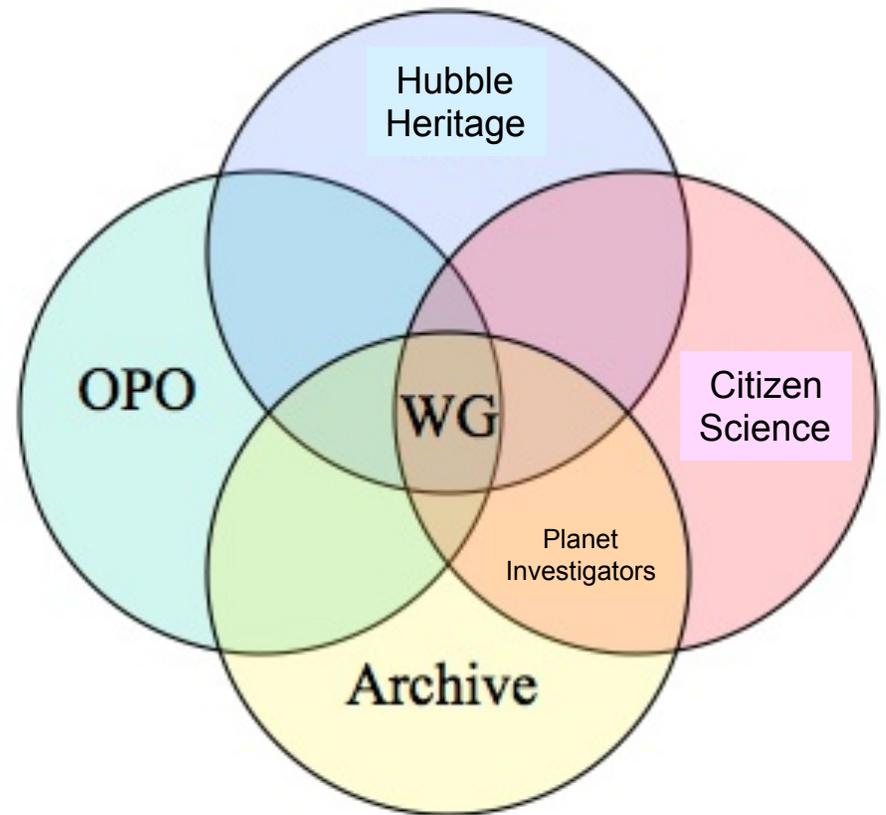


- Watch the creation of a Hubble Heritage image!
- Make your own color image using the Hubble Legacy Archive!
- Watch the creation of a 3-D image!
- Try your hand at one of the Citizen Science Projects!
- Consider submitting an EPO grant associated with your cycle 20 Hubble proposal!

LIGHT REFRESHMENTS WILL BE SERVED!
starting at 10:30

http://hla.stsci.edu/citizen_science/Citizen_Science.html

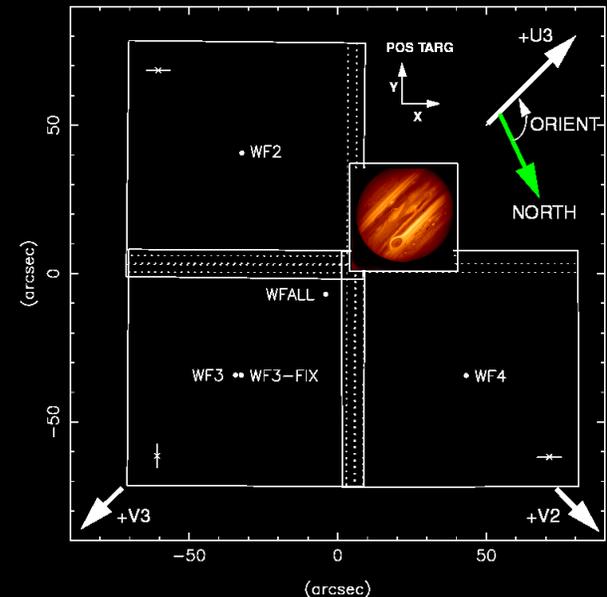
citizen science = crowd-sourced data mining



"It should be possible to combine the strong public response to the Hubble Heritage images, the extensive educational expertise of OPO, and the potential for citizen science embodied by the new generation of archival tools (e.g. Galaxy Zoo), to engender a new level of interaction between Hubble and the community." – Matt Mountain

The Planet Pipeline (and Citizen Science)

Data curation and mining of
Solar System images from WFPC2



ORIENT is defined as the Position Angle of the +U3 Axis on the Sky.

Hubble Cycle 18 Legacy Archival Research proposal 12142
Max Mutchler, Mike Wong, Alberto Conti, Susana Deustua, Alex Viana,
Pamela Gay, Corey Lehan, Justin Higgins, Sean McKenna

Jamboree 16 July 2012

Overview

- “Planet Pipeline” is an AR project to produce High Level Science Products (HLSP) for a tough case: moving targets in a weird camera
- **Visual inspections** are needed to verify rejections and catalog secondary objects (moons, surface features, *and hopefully some discoveries*)
- “Planet Investigators” is funded by a Supplementary Cycle E/PO proposal (3 combined): with over 10,000 Solar System images, we need a brute force neural network: citizen scientists. We start with Neptune soon!
- See Confluence wiki for links, to post comments, or to get involved



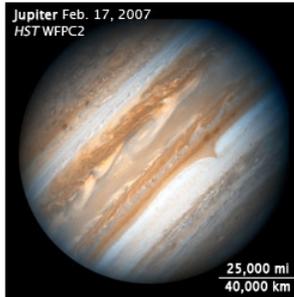
Please take the 2010 [MAST User Survey](#).

Jupiter

[Heritage HLSP Home](#) | [README](#)

Hubble Heritage

The [New Horizons spacecraft](#) was launched on January 19, 2006, and on February 28, 2007, encountered the planet Jupiter. The spacecraft conducted observations and got a gravity boost en route to Pluto, which it will encounter in July 2015. In support of this flyby, two Hubble Space Telescope (HST) General Observer (GO) proposals were approved and prepared: [10862](#) (PI John Clarke) and [10871](#) (PI John Spencer). Following the failure of the ACS side 2 (backup) electronics on January 27, 2007, STScI Director Matt Mountain granted 20 orbits of his discretionary time to the Hubble Heritage Team to conduct additional Jupiter observations with WFPC2 ([program 11096](#)). Working closely with the New Horizons science team to design complementary observations, the Heritage Team conducted a sequence of multiwavelength observations over a full Jupiter "day" (~10 hours), to globally map the Jovian cloud structure at the time of the flyby, and then repeat this sequence again 3 weeks later. Other observations include a transit of Io (with an active Tvashtar volcanic plume), and some sequential observations of the Great Red Spot and Little Red Spot. Some observations were lost as a result of guide star failures, but the main goals of the program were accomplished.



[Heritage Press Release](#)

Each filename indicates that it is an HLSP (h_jupiter), the filter wavelength in nanometers (F255W, F343N, F410M, F673N, F953N), and the observation date (YYMMDD) followed by a letter code which indicates membership in an observation sequence. The filter and observation date/time are also visible when these images are displayed (in the object title). The observations sequence letter codes are as follows:

code	observation sequence
a-g	Full Jupiter rotation (one 10-hour Jupiter "day")
x-z	Consecutive Great Red Spot observations (about 10 hours apart)
j	Little Red Spot (a.k.a Red Spot Jr.) observations
i	Io transit

The data reduction steps are found in the associated [readme file](#). The data listed below are grouped by filter for each observation date. Click on the link to download a fits file; click on thumbnail image to see a larger version of the preview. Click on one of the dates below to see the data and previews for that date. You may also download the data via anonymous ftp from [archive.stsci.edu \(cd /pub/hlsp/heritage/jupiter\)](ftp://archive.stsci.edu/cd/pub/hlsp/heritage/jupiter).

[17 feb 2007](#) | [26 feb 2007](#) | [27 feb 2007](#) | [28 feb 2007](#) | [01/02 mar 2007](#) | [25/26 mar 2007](#)
 (Red Spot Jr.) (Io transit) (Red Spot)

Observations made 17 Feb 2007	
F255W	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>070217a h_jupiter_255_070217a_drz_sci.fits h_jupiter_255_070217a_drz_weight.fits</p> </div> <div style="text-align: center;">  <p>070217b h_jupiter_255_070217b_drz_sci.fits h_jupiter_255_070217b_drz_weight.fits</p> </div> </div>

Our goal is to optimally re-process all WFPC2 Solar System images.

Our processed images and object catalogs will be ingested into MAST as High Level Science Products (similar to the Jupiter HLSP at left).

Our "Planet Pipeline" search interface will be optimized for mining Solar System data.



Archive Status

Planet Pipeline HLSP

[\(Help\)](#)[Field Descriptions](#)

Name or Description

(insert commas for multiple targets)

Start Date

End Date

Observation Time (MJD)

Proposal ID

P.I.

Dataset

Exposure Time

Filters

WFPC2 Detector

 ALL NONE PC1 WF2 WF3 WF4

Advanced Search Options [+]

Output Columns

- Mark
- Dataset
- Original Target
- Target Description
- Observed Date-Time
- Main Detector
- Filter #1
- Exposure Time
- A/D Gain

Sort By:

 Reverse Reverse Reverse**Output Coords :** Sexagesimal Degrees Hours

Output Format



PLANETPIPELINE Search Results

Edit Query

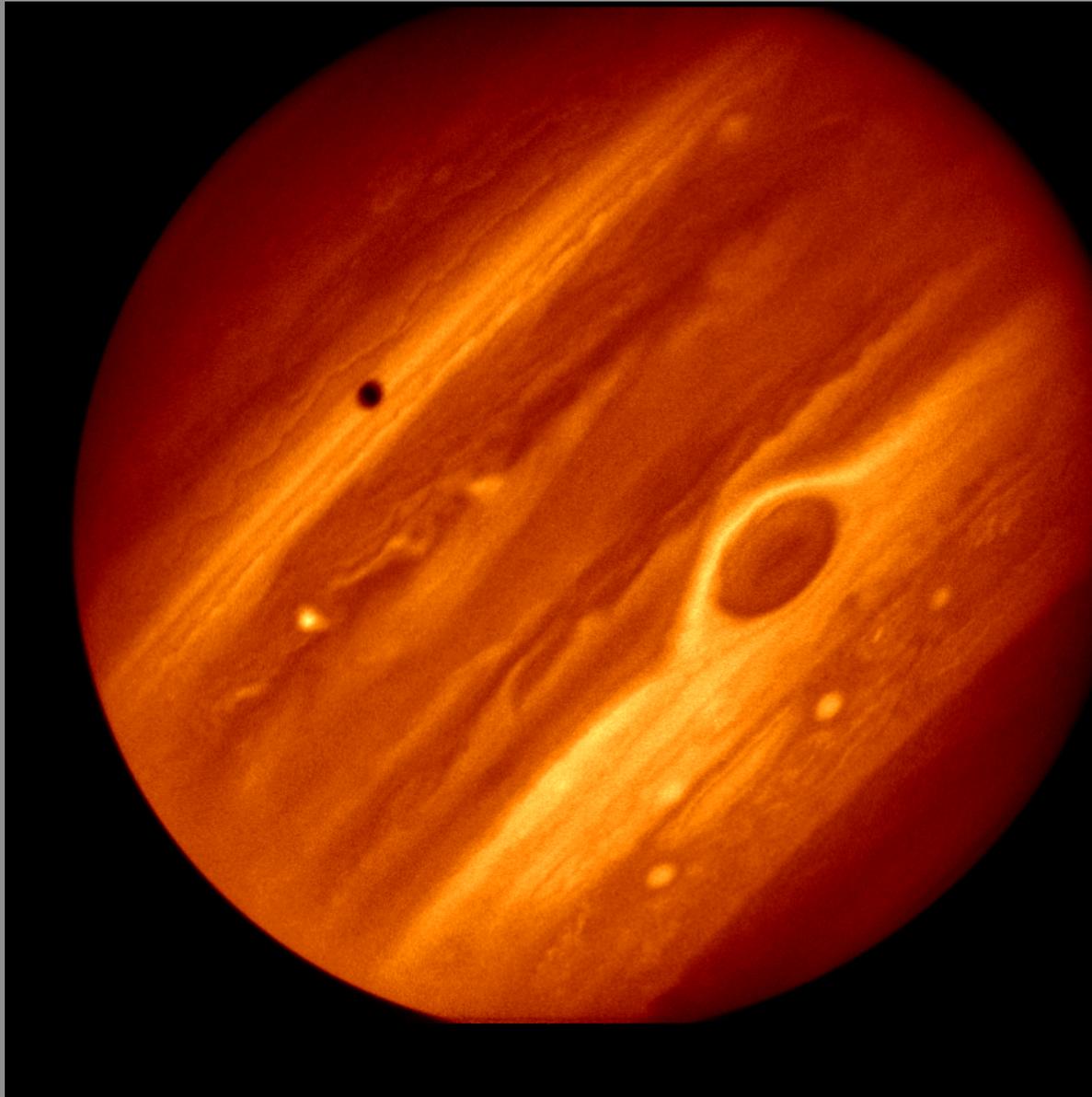
[Display numeric columns graphically using VOPlot](#)

number of rows returned - 756

◀ Previous 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 Next ▶ Page 1 of 16

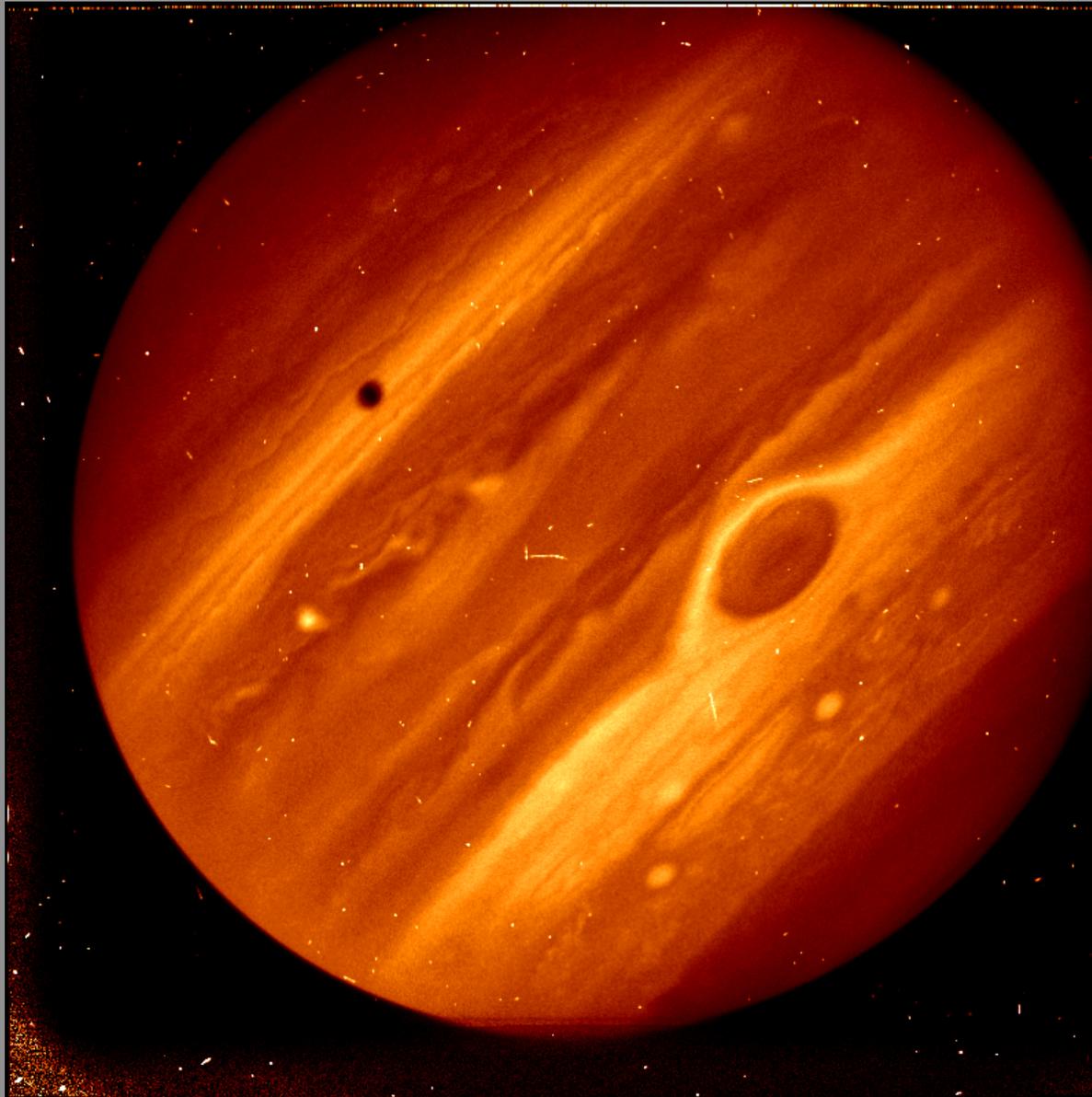
Mark	Dataset	Original Target	Target Description	Observed Date-Time	Main Detector	Filter #1	Exposure Time	A/D Gain	Detector Orientation	Target RA	Target DEC	Angular Diameter	Phase Angle	Heliocentric Range	Sub-Observer Longitude	P.I.	Proposal ID	Line Number
<input type="checkbox"/>	u2iq0101t	SAT-N-AUR1	planet saturn	1994-10-09 11:06:16	1	F673N	2.000	15	85.306	22 36 07.67	-10 56 21.3	18.646	3.747	9.705	41.770	trauger	5219	1.100
<input type="checkbox"/>	u2iq0102t	SAT-N-AUR1	planet saturn	1994-10-09 11:13:16	1	F160BN15	1500.000	7	85.289	22 36 07.44	-10 56 21.6	18.646	3.749	9.705	52.740	trauger	5219	1.200
<input type="checkbox"/>	u2iq0103t	SAT-N-AUR1	planet saturn	1994-10-09 12:29:16	1	F160BN15	1000.000	7	85.289	22 36 06.98	-10 56 25.2	18.645	3.752	9.705	93.180	trauger	5219	1.300
<input type="checkbox"/>	u2kr0104t	SATURN	planet saturn	1994-12-01 05:14:16	1	F410M	6.000	15	113.019	22 34 31.78	-10 58 39.9	17.158	5.832	9.690	332.440	beebe	5776	1.040
<input type="checkbox"/>	u2kr0109t	SATURN	planet saturn	1994-12-01 05:34:16	1	FQCH4P15	100.000	15	113.175	22 34 31.84	-10 58 38.5	17.158	5.833	9.690	344.140	beebe	5776	1.090
<input type="checkbox"/>	u2iq0104t	SAT-N-AUR1	planet saturn	1994-10-09 12:52:16	1	F160BN15	1000.000	7	85.289	22 36 06.70	-10 56 25.7	18.644	3.754	9.705	106.130	trauger	5219	1.300
<input type="checkbox"/>	u2iq0107t	SAT-N-AUR1	planet saturn	1994-10-09 14:46:16	1	F673N	2.000	15	85.307	22 36 05.86	-10 56 29.8	18.643	3.761	9.705	165.630	trauger	5219	1.400
<input type="checkbox"/>	u2iq0105t	SAT-N-AUR1	planet saturn	1994-10-09 14:05:16	1	F160BN15	1000.000	7	85.289	22 36 06.23	-10 56 29.3	18.643	3.757	9.705	147.230	trauger	5219	1.300
<input type="checkbox"/>	u2iq0106t	SAT-N-AUR1	planet saturn	1994-10-09 14:29:16	1	F160BN15	800.000	7	85.289	22 36 05.96	-10 56 29.8	18.643	3.760	9.705	159.810	trauger	5219	1.310
<input type="checkbox"/>	u2on0104t	SATURN	planet saturn	1995-05-22 02:04:17	1	FQCH4N	400.000	7	-69.297	23 37 58.16	-04 29 47.1	16.645	5.564	9.642	347.370	bosh	5782	1.020
<input type="checkbox"/>	u2on0106t	SATURN	planet saturn	1995-05-22 03:10:16	1	FQCH4N	7.000	7	-69.297	23 37 58.95	-04 29 43.7	16.646	5.566	9.642	22.680	bosh	5782	1.040

The standard calibration pipelines are not optimized for moving targets



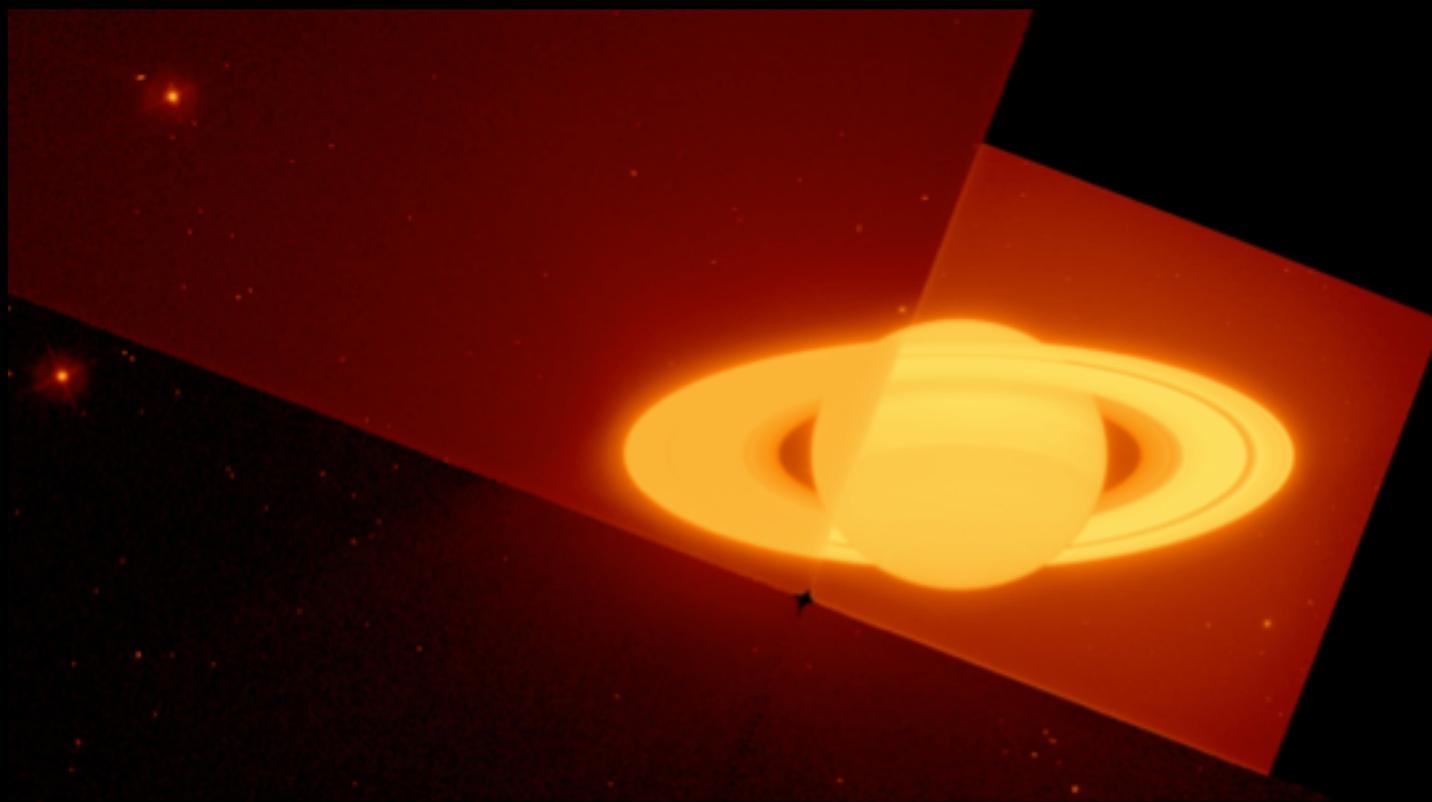
Single-image
cosmic ray rejection
requires visual verification,
iteration, and masking

The standard calibration pipelines are not optimized for moving targets

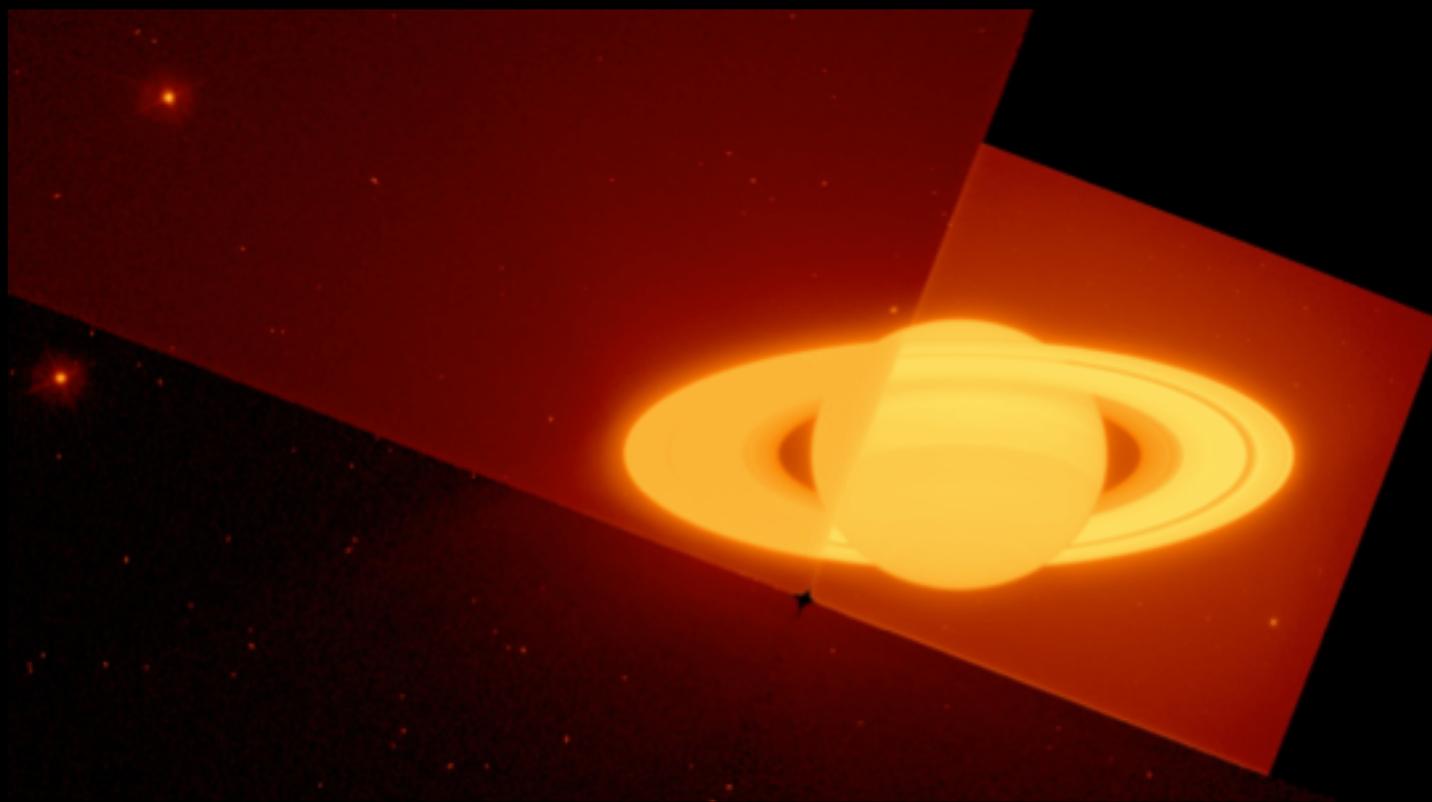


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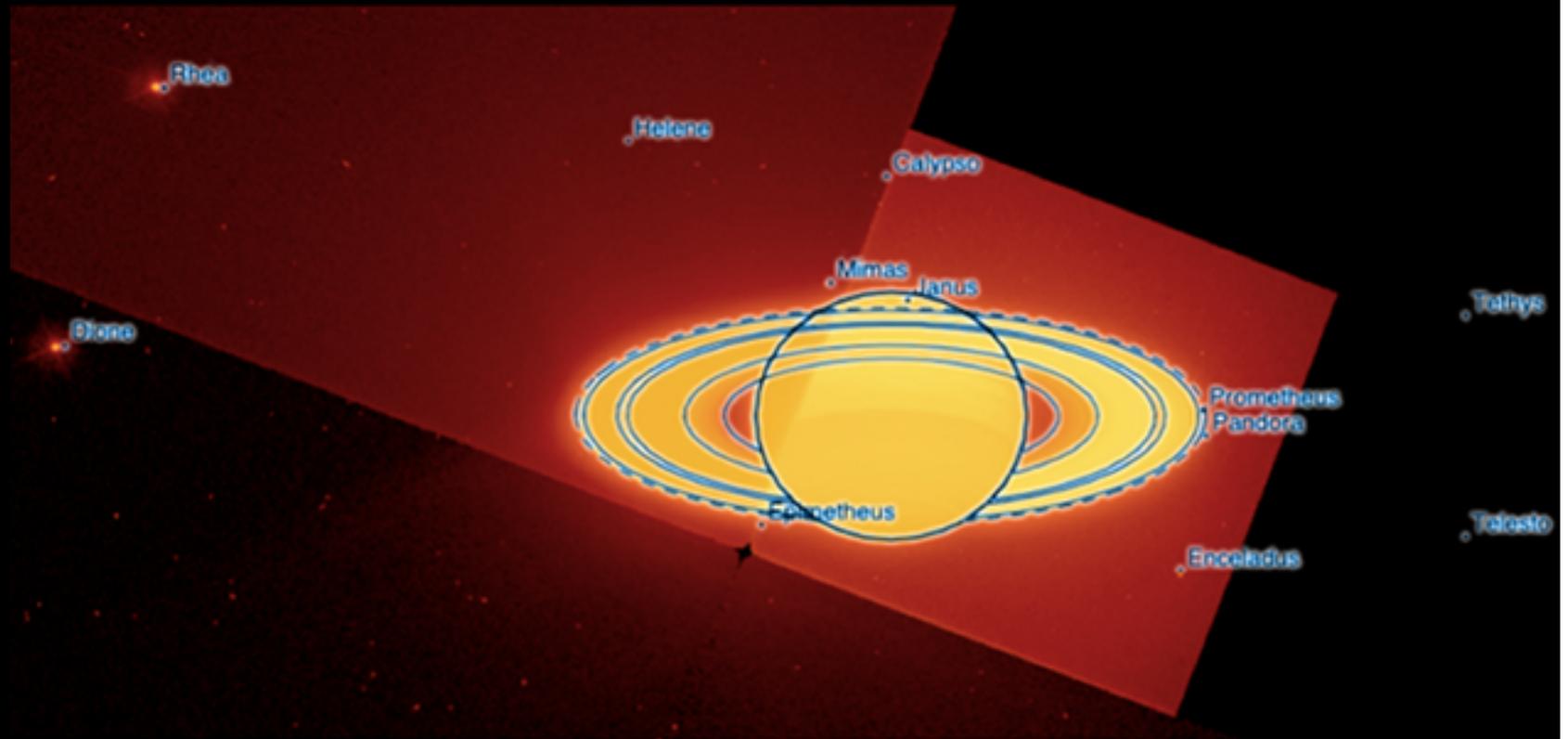
Chronological blinking helps distinguish artifacts from real objects



Chronological blinking helps distinguish artifacts from real objects



We'll catalog the entire contents of each image





The place where you map other worlds, explore our universe, & contribute to science.

User Name

Log in

Help

Register

Remember Me?



@CosmoQuestX
#CQX

Weekly Space Hangout with Host Fraser Cain for July 12 2012 archival edition <http://t.co/HCyddIzX> posted about 18 hours ago

Welcome home! *Where would you like to explore today?*

Newest Science Project: **Ice Investigators**

Moon Mappers



Help us get to know our moon better! Identify craters and other interesting phenomena in actual images of the moon.

[▶ Let's explore!](#)

Ice Investigators

Look for asteroids and transient space objects! Your observations will help to direct the New Horizons spacecraft!

[▶ Let's investigate!](#)



Planet Investigators

Jupiter Edition



2011-09-20: This is a message designed to completely fill a twitter box. In the future, this box will be connected to the project specific twitter feed.

English

The Science

The Data

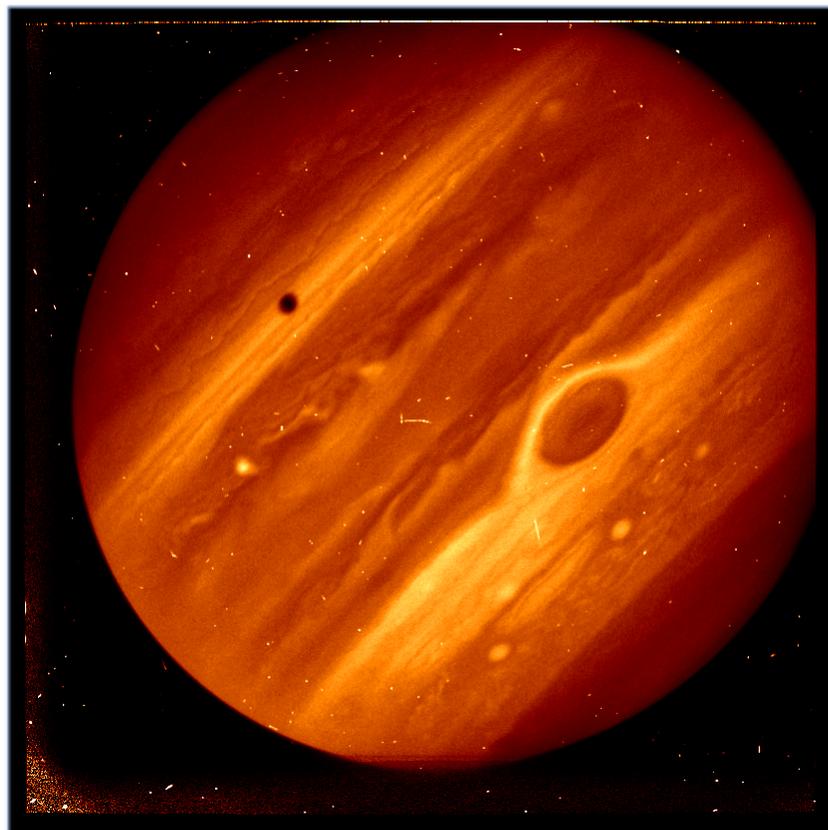
Discuss Images

Gallery

Help

My Results

Help scientists with the Hubble Space Telescope track storms, identify which moons are bright enough to appear in which images, flag image defects like cosmic rays, and discover storms, and random travelers like asteroids and Kuiper Belt Objects that wander through the field of view.



Please mark both image 1 and 2.

- cosmic ray
- appearing object
- moving object
- mark feature
- flag oddity
- erase marking

Contrast:

high low

Finding Chart:

on off

Show Image:

1 2 or blink

Done Working

Tool Tip click any tool to see tips

Cosmic Rays: Pellentesque ultrices commodo facilisis. Morbi lacinia, elit nec facilisis dictum, purus tellus tempus mauris, et bibendum libero massa ut sapien. Phasellus lorem eros, accumsan eu pharetra vitae, molestie ac sapien. Suspendisse massa ante, iaculis eget varius quis, consectetur non risus. Suspendisse luctus mollis massa, eu consectetur lacus posuere et. Morbi iaculis massa eget metus adipiscing vel elementum quam venenatis.

Markers & Flags

- A impact
- B white storm
- C dark storm
- D Europa

	Days Since Launch:	297
	Total Contributors:	1,234,566
	Images Analyzed (everyone):	123,456,789
	Images Analyzed (by you):	9



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Jupiter Edition



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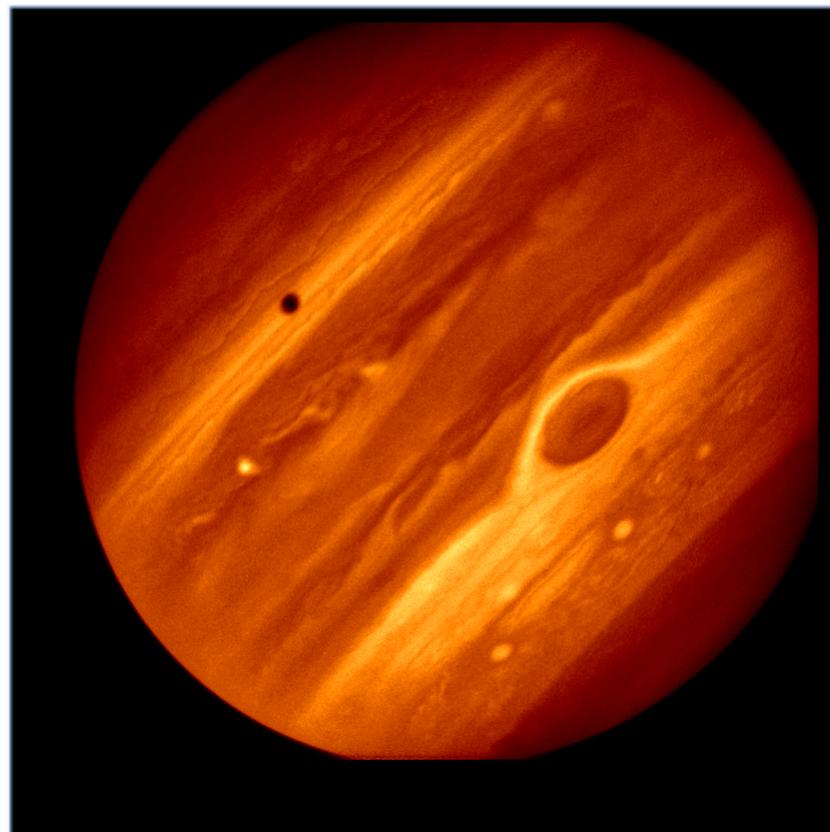
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Cosmic Rays: Pellentesque ultrices commodo facilisis. Morbi lacinia, elit nec facilisis dictum, purus tellus tempus mauris, et bibendum libero massa ut sapien. Phasellus lorem eros, accumsan eu pharetra vitae, molestie ac sapien. Suspendisse massa ante, iaculis eget varius quis, consectetur non risus. Suspendisse luctus mollis massa, eu consectetur lacus posuere et. Morbi iaculis massa eget metus adipiscing vel elementum quam venenatis.

Markers & Flags

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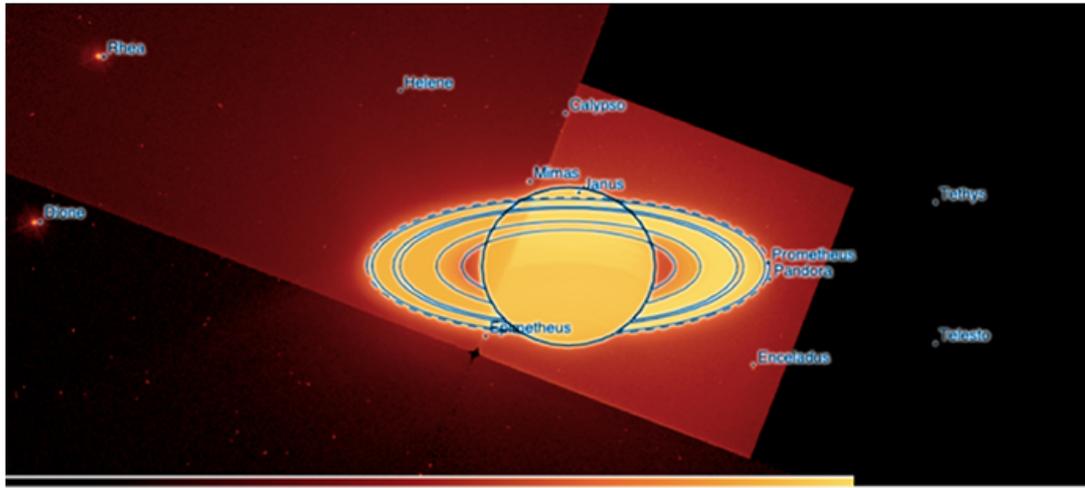
	Days Since Launch:	297
	Total Contributors:	1,234,566
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	Images Analyzed (by you):	9



Planet Investigators

Edit Share Add Tools

2 Added by [Max Mutchler](#), last edited by [Max Mutchler](#) on Jun 02, 2012 ([view change](#))



[The Planet Pipeline: enabling data mining and citizen science with Hubble images of the Solar System](#) (click title for full article)

Max Mutchler, Alberto Conti, Susana Deustua, Alex Viana, Mike Wong (University of California, Berkeley), Pamela Gay (Southern Illinois University, Edwardsville)

In 15 years of service, the Wide Field Planetary Camera 2 (WFPC2) onboard the Hubble Space Telescope (HST) obtained over 10,000 frames of Solar System data. Since standard data reduction pipelines are typically not optimized for moving target data, our "planet pipeline" will uniformly reprocess and catalog this WFPC2 image collection to make it more immediately science-ready. Some of our processing steps will [utilize citizen scientists](#) to perform visual inspections. Our corresponding database will enable [robust queries](#) which are more specific to planetary science, helping archival researchers quickly find and utilize the prepared images within our collection for a wide range of scientific analyses. We welcome suggestions (especially from veteran WFPC2 users) on the optimal treatment and organization of this data collection, and also to identify a broad range of analyses that might only be possible with visual inspections by citizen scientists. Our processed images and associated catalogs will be made available as High Level Science Products (HLSP) in the Multimission Archive at STScI (MAST): <http://archive.stsci.edu/prepds/planetpipeline>

Like Be the first to like this

Labels None

1 Comment



Max Mutchler

Jun 02, 2012

Watch for a beta release of "Planet Investigators" – the citizen science interface to our "Planet Pipeline" – in July. We will have an official launch in late August or early September. Check out the other citizen science projects being conducted by [CosmoQuest](#) (Pamela Gay) for a sense of how our interface will function: [Moon Mappers](#) and [Ice Investigators](#).

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