



**Reminder
to turn on
recording!**



U.S. National
Science Foundation



Office of Science

Rubin Science Assembly

Looking Forward to Data Preview 1 (DP1)



**Thu Feb 6, 2025
Melissa Graham**

Today's Agenda

9:00 am : Announcements

9:10 am ~ 9:40 am: Looking forward to Data Preview 1 (DP1)

Open time for sharing comments and questions.

Announcements

Save the date: Rubin Community Workshop 2025

- July 28 - August 1st 2025 @ Marriott University Park in Tucson, AZ
- Fully hybrid: virtual + in-person (250 limit); registration is not open yet.

Upcoming Rubin Science Assemblies

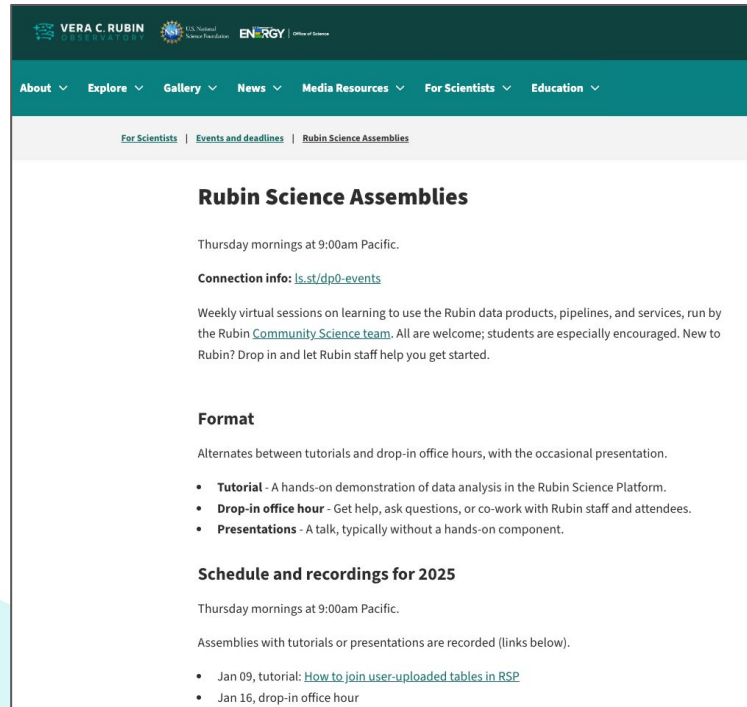
- Thu Feb 13: drop-in “office hours” for virtual Q&A
- Thu Feb 20: How to use the Portal Aspect of the RSP

Announcements

The Rubin Science Assemblies schedule has moved to rubinobservatory.org.

Assemblies will still be announced in the Community Forum and in the Discovery Alliance Slack space.

March - May will feature a special series of science preparation seminars.



The screenshot shows the Rubin Science Assemblies webpage. The header includes the VERA C. RUBIN OBSERVATORY logo, the U.S. National Science Foundation logo, and the U.S. DEPARTMENT OF ENERGY | Office of Science logo. The navigation menu includes About, Explore, Gallery, News, Media Resources, For Scientists, and Education. The main content area is titled "Rubin Science Assemblies" and includes the following text:

Thursday mornings at 9:00am Pacific.

Connection info: ls.st/dp0-events

Weekly virtual sessions on learning to use the Rubin data products, pipelines, and services, run by the Rubin [Community Science team](#). All are welcome; students are especially encouraged. New to Rubin? Drop in and let Rubin staff help you get started.

Format

Alternates between tutorials and drop-in office hours, with the occasional presentation.

- **Tutorial** - A hands-on demonstration of data analysis in the Rubin Science Platform.
- **Drop-in office hour** - Get help, ask questions, or co-work with Rubin staff and attendees.
- **Presentations** - A talk, typically without a hands-on component.

Schedule and recordings for 2025

Thursday mornings at 9:00am Pacific.

Assemblies with tutorials or presentations are recorded (links below).

- Jan 09, tutorial: [How to join user-uploaded tables in RSP](#)
- Jan 16, drop-in office hour

Special series of science preparation seminars. Each seminar will start with a brief overview of the LSST goals and planned data products that are relevant to the science topic, and include a hands-on demonstration of how to access and analyze simulated data products via the Rubin Science Platform. There will be time for questions.

- Mar 20, tutorial: Dark Energy
- Mar 27, tutorial: Strong Lensing
- Apr 03, tutorial: Galaxies
- Apr 10, tutorial: Time Domain
- Apr 17, tutorial: Active Galactic Nuclei
- Apr 24, tutorial: Solar System
- May 01, tutorial: Stars & Milky Way



LINCC Frameworks Office Hours

LINCC Frameworks mission is to **enable scientists** by developing scalable and productionised **software/algorithms** in **collaboration** with broader community.

Office Hours provides users an opportunity to learn about or get support for LINCC Frameworks software.

When: Most Thursdays 1pm ET / 10am PT / 7pm CET (see [LF Calendar](#))

Where: Zoom ([zoom link](#))



Website

You can also submit questions via the [#lincc-frameworks-qa](#) slack channel and sign up for the LINCC mailing list for more updates ([instructions](#)).

LINCC Frameworks Projects

- Catalog storage and analysis ([HATS](#), [LSDB](#))
- Structured data / time series ([nested-pandas](#))
- Photo-Z (supporting DESC's [RAIL](#))
- Shift and stack moving object detection ([KBMOD](#))
- Time series simulation ([TDAstro](#))
- Machine learning support ([FIBAD](#))
- General purpose tools ([python project template](#))

Introduction to the Users Committee

The Rubin Users Committee is charged with:

1. Soliciting feedback from the community about the Rubin data products and Science Platform.
2. Recommending improvements in their twice-yearly reports to the Rubin Operations director.

Charge: rdo-051.lsst.io

Website: lsst.org/scientists/users-committee

Reports: available in the Rubin Community Forum (community.lsst.org/tag/users-committee)

Meetings: two formal meetings per year, which always start with an open community listening session

Contact: via email to RubinObs-Users-Committee@lists.lsst.org or via the Rubin Community Forum (go to Community.lsst.org and send a direct message to the @Users-Committee group)

Feedback: use the Google form at forms.gle/km4VS2r2uYrvJ2w58

The Rubin Users Committee looks forward to hearing from the Rubin science community.

Igor Andreoni

Dominique Boutigny

Alejandra Muñoz Arancibia

Alessandra Corsi

Anupreeta More

Vincenzo Petrecca

Vicki Sarajedini

Matthew Holman

Darryl Seligman

Anja von der Linden

Matthew P. Wiesner

Michael Wood-Vasey

New here? Welcome!

Get an RSP account: rsp.lsst.io

User resources for DP0: dp0.lsst.io

Data Products Definitions Documentation (and tutorials):

- DP0.2 (extragalactic & galactic objects): dp0-2.lsst.io
- DP0.3 (Solar System objects): dp0-3.lsst.io

General information for scientists: rubinobservatory.org/for-scientists



Questions?

- please stay for the Q&A, questions from people new-to-Rubin are always welcome

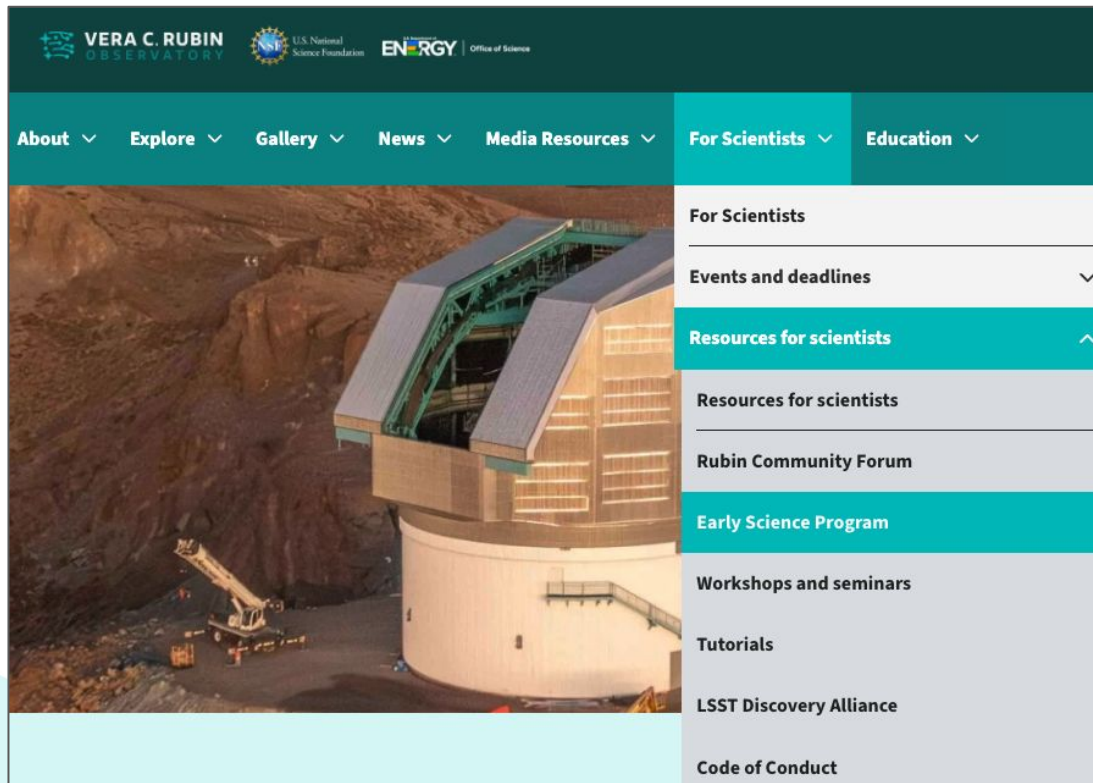
Rubin's Early Science Program

Goal: provide early access to the **data products** and **services** necessary to produce high-impact science during the time through commissioning, up to and including the first data release.

Data products and services

- Data Previews (DPs) and Releases (DRs)
 - DP0: simulated data (available now)
 - DP1: ComCam data (expected June/July)
 - DP2: LSST Science Camera (LSSTCam) data (anticipated by May 2026)
 - DR1: Data Release 1 (anticipated by Jan 2027)
- Alert Stream
 - supported with incremental template generation
 - scaled up continuously during commissioning and LSST year 1
 - anticipated to start in late 2025
- Rubin Science Platform (RSP)
 - data access and analysis tools, computational resources
 - set up an account now by following the instructions at rsp.lsst.io

Rubin's Early Science Program



The screenshot shows the top navigation bar of the Vera C. Rubin Observatory website. The header includes the logos for the Vera C. Rubin Observatory, the U.S. National Science Foundation, and the Department of Energy Office of Science. The navigation menu is displayed in a teal color with white text and dropdown arrows. The 'For Scientists' menu is open, showing a list of options: 'For Scientists', 'Events and deadlines', 'Resources for scientists' (highlighted in teal), 'Resources for scientists', 'Rubin Community Forum', 'Early Science Program' (highlighted in teal), 'Workshops and seminars', 'Tutorials', 'LSST Discovery Alliance', and 'Code of Conduct'. The background of the website shows a large, cylindrical concrete structure under construction in a desert landscape.

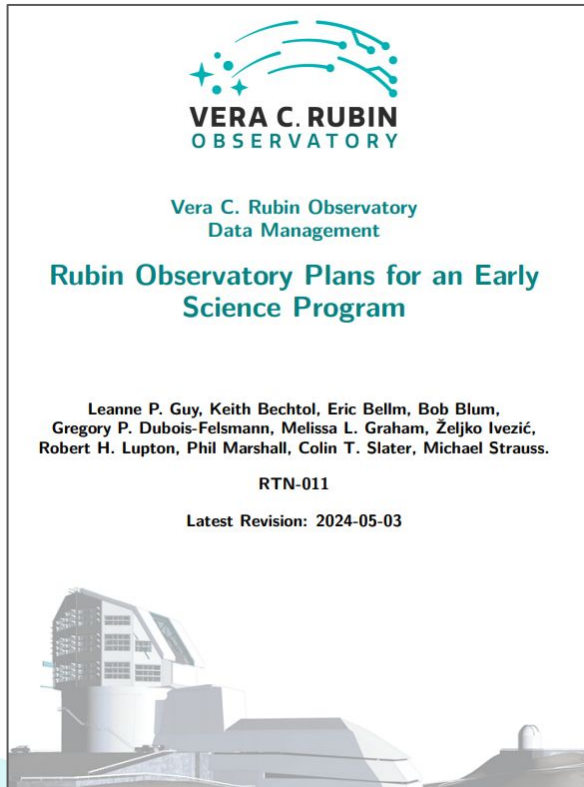
Discover early science at rubinobservatory.org

For Scientists

- ↳ Resources for scientists
 - ↳ Early Science Program

This page is updated when new versions of Rubin Tech Note 11 are released.

Rubin's Early Science Program



Rubin Tech Note 11

rtn-011.lsst.io or ls.st/rtn-011

Source of truth regarding early science.

v.5.1 – 2024-05-03

v.6.0 – coming soon

The following slides are based on v.6.0 (in prep).

Early Science Timeline (RTN-011, Fig 1)

ComCam on-sky late 2024.

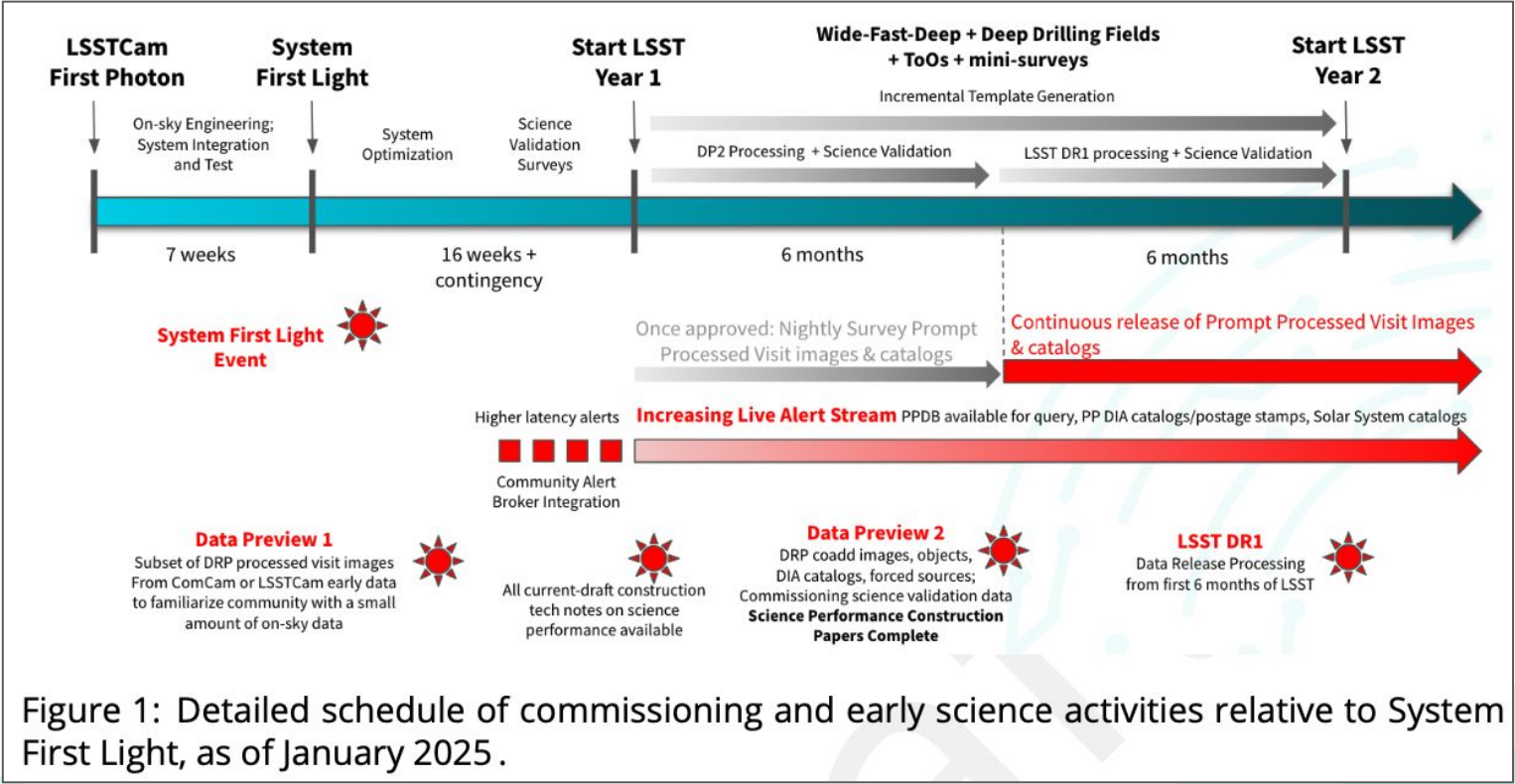


Figure 1: Detailed schedule of commissioning and early science activities relative to System First Light, as of January 2025.

Early Science Timeline (RTN-011, Fig 1)

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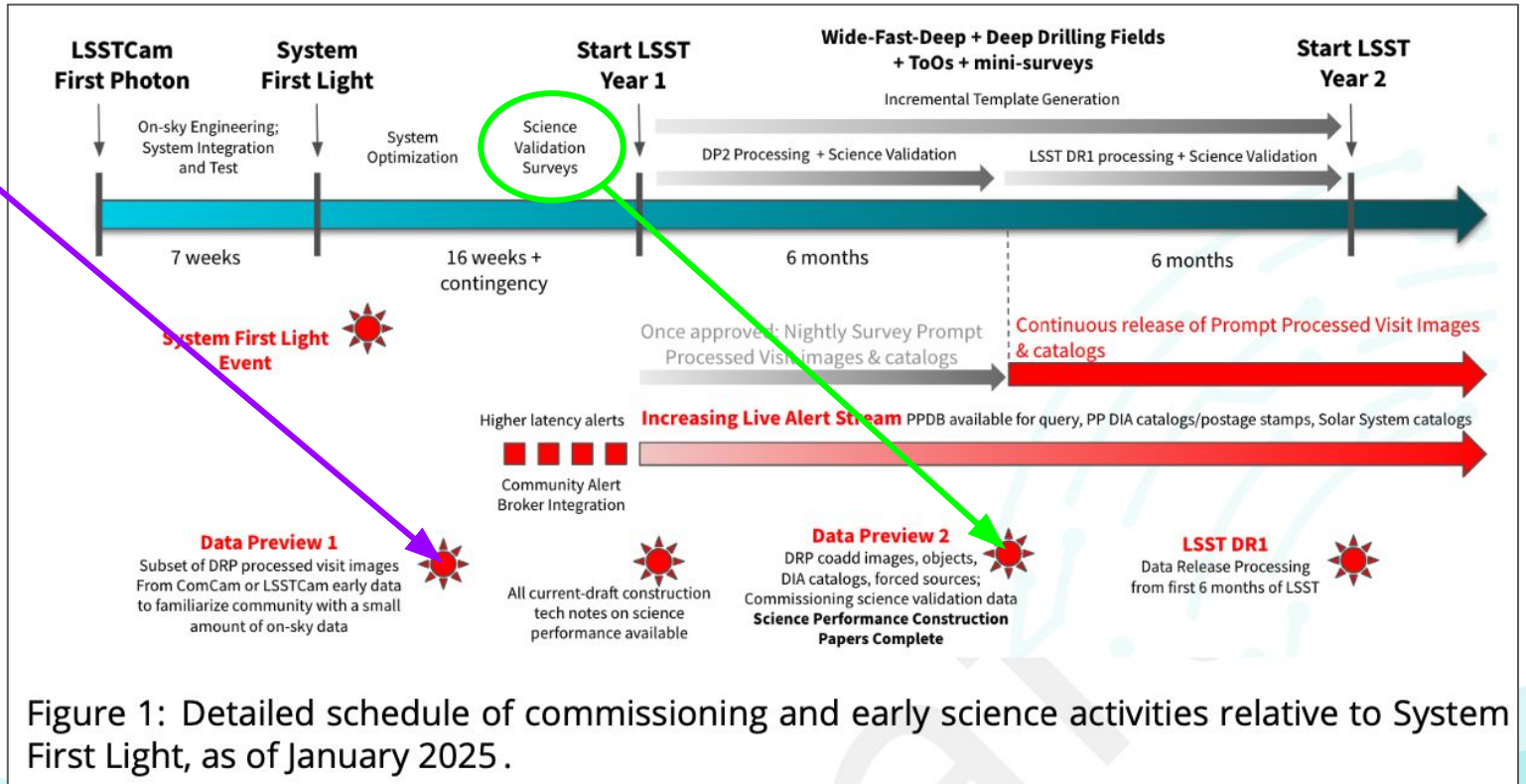


Figure 1: Detailed schedule of commissioning and early science activities relative to System First Light, as of January 2025.

Science Validation Surveys and DP2 (RTN-011, Fig 2)

These data obtained with the LSST Science Camera (LSSTCam) will be used for Data Preview 2.

Electro-optical Testing at Level 3	In-dome Engineering	On-sky Engineering	System Optimization	Science Validation Survey(s)
biases, darks, flats	suite of in-dome calibration	Initial alignment, pointing re-verification, AOS testing star flats, dithering around bright stars, airmass scans	20-year LSST WFD equivalent depth in fields for extragalactic, Galactic, and Solar System science, ~100 deg ² in multiple bands with dense temporal sampling	Menu includes pilot LSST WFD survey, ~1000 deg ² in multiple bands to 1-2 year LSST equivalent depth Increase coverage of LSST DDFs Astrophysical targets / ToO
Complete August 2024				
	Rubin First Photon	Rubin First Light	Start Science Validation Surveys	Start 10-year LSST

Figure 2: Outline plan for the collection of commissioning data, as of January 2025 .

Early Science Data Products (RTN-011, Table 1)

Rubin Early Science - Data Release Scenario								
	Jun 2021	Jun 2022	Jun 2023	Jun 2025 - Jul 2025	Mar 2026 - May 2026	Sep 2026 - Jan 2027	Sep 2027 - Jan 2028	Sep 2028 - Nov 2028
	DP0.1	DP0.2	DP0.3	DP1	DP2	DR1	DR2	DR3
Data Product	DC2 Simulated Sky Survey	Reprocessed DC2 Survey	Solar System PPDB Simulation	ComCam Data	LSSTCam Science Validation Data	LSST First 6 Months Data	LSST Year 1 Data	LSST Year 2 Data
Raw Images	●	●	-	●	●	●	●	●
DRP Processed Visit Images and Source Catalogs	●	●	-	●	●	●	●	●
DRP Coadded Images and Object Catalogs	●	●	-	●	●	●	●	●
DRP ForcedSource Catalogs	●	●	-	●	●	●	●	●
DRP Difference Images and DIA Catalogs	-	●	-	●	●	●	●	●
DRP SSP Catalogs	-	-	●	-	●	●	●	●

Table 1: Summary of Data Release data products expected in each data preview and early LSST data release. A dark teal dot denotes confirmed data products whereas a gray dot denotes data products that currently remain a stretch goal.

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	DP0.1	DP0.2	DP0.3	DP1	DP2	DR1	DR2	DR3
	DC2 Simulated Sky Survey	Reprocessed DC2 Survey	Solar System PPDB Simulation	ComCam Data	LSSTCam Science Validation Data	LSST First 6 Months Data	LSST Year 1 Data	LSST Year 2 Data
Raw Images	●	●	-	●	●	●	●	●
DRP Processed Visit Images and Source Catalogs	●	●	-	●	●	●	●	●
DRP Coadded Images and Object Catalogs	●	●	-	●	●	●	●	●
DRP ForcedSource Catalogs	●	●	-	●	●	●	●	●
DRP Difference Images and DIA Catalogs	-	●	-	●	●	●	●	●
DRP SSP Catalogs	-	-	●	-	●	●	●	●

Table 1: Summary of Data Release data products expected in each data preview and early LSST data release. A dark teal dot denotes confirmed data products whereas a gray dot denotes data products that currently remain a stretch goal.

Early Science Data Products (RTN-011, Table 1)

The Data Preview 1 data products will be based on ComCam images only.

Images:

- raw images
- processed visit images (PVI; “calexp”)
- coadded images

Catalogs:

- Source
 - measurements for sources detected in PVIs
- Object
 - forced photometry on coadded images at the locations of all sources detected in PVIs or coadded images

“Detection” means signal-to-noise ratio > 5 .

Stretch goals.

Images:

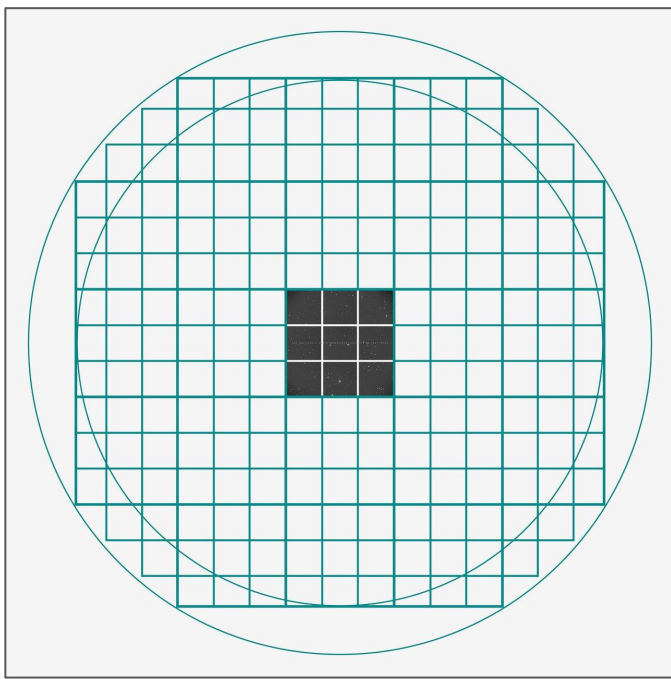
- difference images

Catalogs:

- ForcedSource
 - forced photometry on PVIs for Objects detected in coadds
- Difference Image Analysis (DIA)
 - measurements for sources detected in difference images

rtn-011.lsst.io

What is ComCam?



ComCam

Commissioning Camera

A single “raft” of 9 CCDs.
(CCD = sensor = chip)

Also referred to as the engineering test camera. The CCDs are from one of the same vendors (ITL), and ComCam uses the same filters as LSSTCam.

The **LSST Science Camera** has 21 rafts and 189 CCDs.

This is a shareable ComCam image:

<https://rubinobservatory.org/news/rubin-completes-comcam-tests>

ComCam on-sky observations, 10/24 - 12/11 2024

An on-sky observational campaign with ComCam was executed in late 2024.

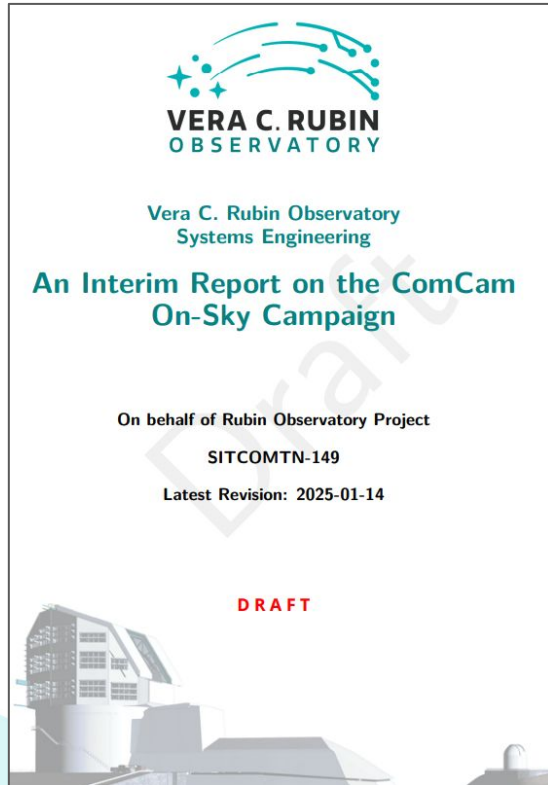
- The primary purpose was to carry out early on-sky engineering and demonstrate the end-to-end functionality of the Simonyi Survey Telescope's hardware and software systems prior to installing LSSTCam.
- The fields observed during the science pipelines commissioning phase were based on community input* and chosen to span the range of LSST Science pillars.
- A sufficient number of science-grade, astronomically useful images were obtained, and it is from this dataset that DP1 is derived.

Motivations for ComCam observations included:

- optically align the telescope
- verify capability to deliver acceptable image quality within the ComCam field of view
- test the end-to-end functionality of Rubin's hardware, software, and procedures
- learn how to more efficiently commission the LSST Science Camera

*Commissioning notes community.lsst.org/t/4406

ComCam on-sky observations, 10/24 - 12/11 2024



SITCom Tech Note 149

sitcomtn-149.lsst.io or ls.st/sitcomtn-149

This report summarizes the accomplishments of the ComCam on-sky campaign, and includes analyses of:

- telescope slew times
- throughputs and zeropoints
- active optics system and image quality
- camera artifacts and instrument signature removal
- photometry and astrometry
- difference image analysis

Many individuals' work is represented in SITCOMTN-149!

This talk is NOT covering the details of this report.

ComCam observations included in DP1

The next few slides talk about the ComCam observations that are *expected* to be included in Data Preview 1.

Keep in mind that this is “expected” in a general sense. Exact image counts and coadd depths may change.

For example, it is conceivable that a few individual exposures might not, in the end, meet the quality control standard of being “science-grade, astronomically useful” images.

ComCam observations included in DP1

Table 2: ComCam target fields and pointing centers that are to be included in the DP1 dataset. ICRS coordinates are shared in units of decimal degrees.

Field Code	Field Name	Right Ascension	Declination
		<i>deg</i>	<i>deg</i>
47 Tuc	47 Tuc Globular Cluster	6.02	-72.08
Rubin SV 38 7	Low Ecliptic Latitude Field	37.86	6.98
Fornax dSph	Fornax Dwarf Spheroidal Galaxy	40.00	-34.45
ECDFS	Extended Chandra Deep Field South	53.13	-28.10
EDFS	Euclid Deep Field South	59.10	-48.73
Rubin SV 95 -25	Low Galactic Latitude Field	95.00	-25.00
Seagull	Seagull Nebula	106.23	-10.51

ComCam observations included in DP1

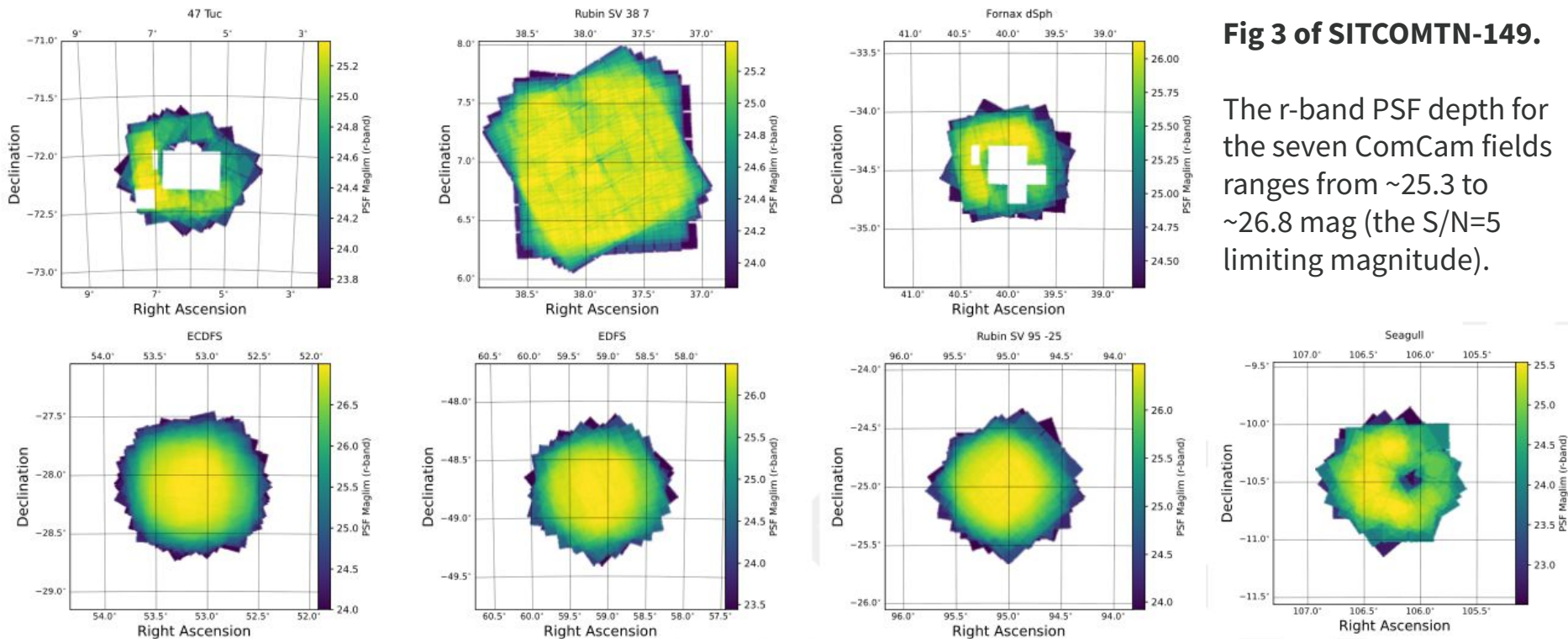
Table 3: Band coverage for seven fields observed during the ComCam on-sky observing campaign that are to be included in the DP1 dataset.

Target	u	g	r	i	z	y
47 Tuc	6	10	33	19	0	5
Rubin SV 38 7	0	44	55	57	27	0
Fornax dSph	0	5	26	13	0	0
ECDFS	53	230	257	177	177	30
EDFS ComCam	20	61	90	42	42	20
Rubin SV 95 -25	33	86	97	29	60	11
Seagull	10	37	49	3	13	0

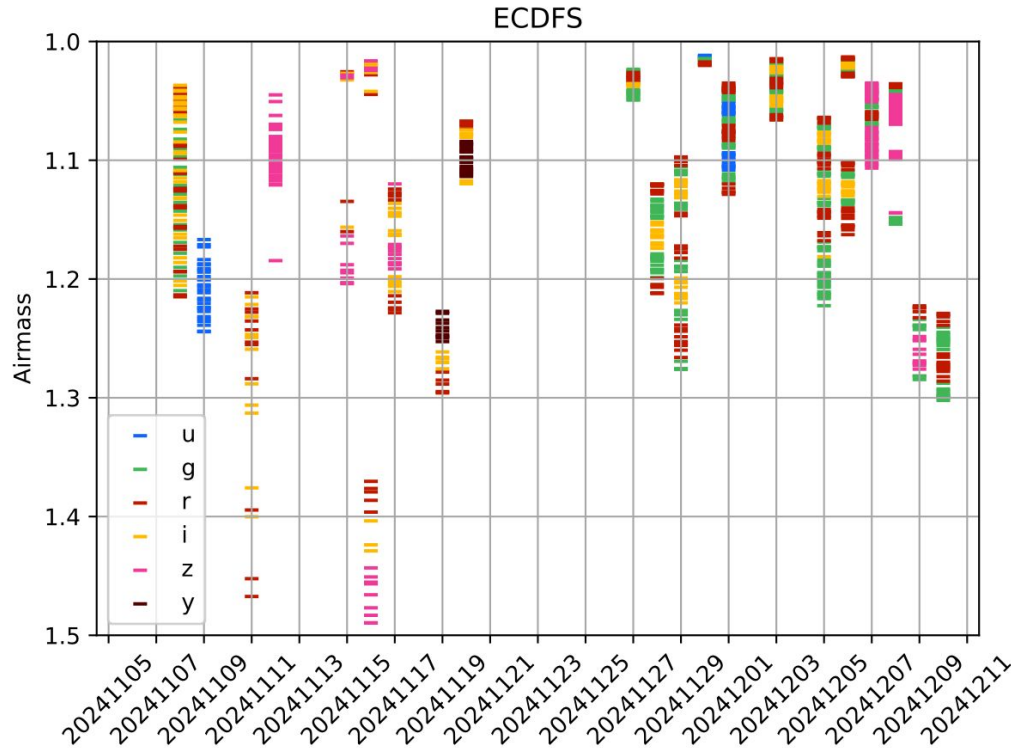
ComCam observations included in DP1

Fig 3 of SITCOMTN-149.

The r-band PSF depth for the seven ComCam fields ranges from ~25.3 to ~26.8 mag (the S/N=5 limiting magnitude).



ComCam observations included in DP1



← Fig 5 of SITCOMTN-149.

Extended Chandra Deep Field South (ECDFS) is the most well-observed field.

ECDFS was observed on 21 nights over a span of 33 nights, from Nov 6 to Dec 8 2024.

Notice that u- and y-band images are particularly limited. But this demonstrates that at least some time-domain science will be possible with the DP1 Source catalog (e.g., variable stars detected in PVI).

ComCam observations included in DP1

Band	Number of Visits	Mean PSF FWHM	STD. DEV. PSF FWHM
		<i>arcsec</i>	<i>arcsec</i>
All	775	1.12	0.23
u	28	1.49	0.08
g	86	1.07	0.14
r	307	1.18	0.22
i	203	1.09	0.24
z	85	1.01	0.21
y	66	1.04	0.18

Table 4: Summary of PSF FWHM performance. Data are from DRP from 2024-11-01 to 2024-11-28.

This table represents – approximately – what to expect for DP1.

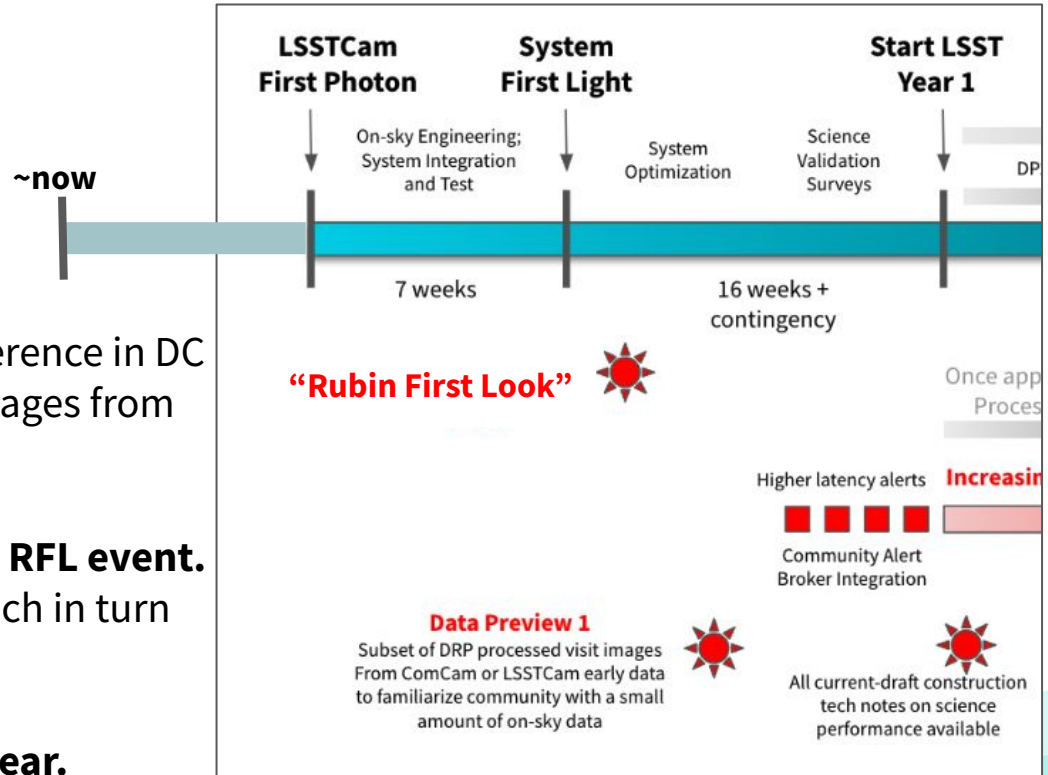
When will DP1 be released?

The plan for the coming months is for the LSST Science Camera to be mounted.

“Rubin First Look” (RFL) is the big press conference in DC and the worldwide media event based on images from the LSST Science Camera.

No Rubin data will be released prior to the RFL event. Thus, the timing of DP1 depends on RFL, which in turn depends on LSSTCam.

DP1 is expected in June or July of this year.



Access to Data Preview 1

When Data Preview 1 is released it will be available:

- to all Rubin data rights holders
- via the Rubin Science Platform (RSP) at data.lsst.cloud

Who has Rubin data rights?

- scientists and students in the US and Chile
- named members of international in-kind teams
- rubinobservatory.org/for-scientists/data-products/data-policy

For those of you familiar with the “DP0 Delegates” program:

- the term “delegate” has been retired in favor of “user”
- there will be no advance applications for RSP accounts
- but there will be similar onboarding sessions, tutorials, and support for DP1

What is the Rubin Science Platform (RSP)?

The **Rubin Science Platform (RSP)** is a set of integrated web-based applications and services running at the Rubin Observatory Data Access Centers (DACs).

The RSP allows users to bring their analysis *to the data*.



Portal Aspect

exploratory analysis and visualization of the Rubin archive



Notebook Aspect

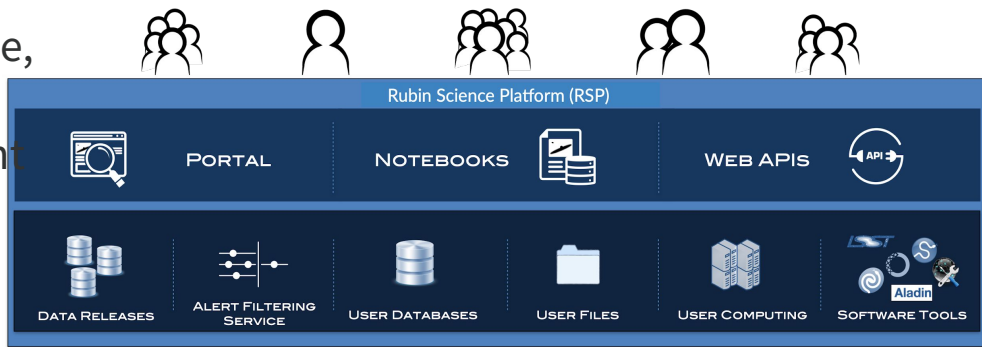
in-depth 'next-to-data' analysis and creation of added-value data products



API Aspect

remote access to the Rubin archive via industry-standard APIs

The RSP provides tools to query, visualize, subset, and analyze the LSST data archives in a stable software environment located next to the data, along with storage space, compute resources, and remote access options.



The DP1-era Rubin Science Platform

The RSP is still in “preview” mode with much development still to come

The same capabilities to query, subset, and analyze the DP0 data sets will be available for the DP1 data (i.e., TAP and butler access to catalogs and images). Much effort has been going into scaling up the services for thousands of users.

User-visible features planned for DP1 include:

- IVOA-compatible SIA image service
- Qserv query temporary uploads
- User query history capabilities
- Context-aware documentation
- More notebook-portal integration

Learning to use the RSP with DP0 remains the best way to prepare for DP1.

However, no major computational expansion (bulk cutouts, parallel computing, batch processing) is available at this time. More on RSP user accounts (e.g., quotas and API limits which were not previously applied in early testing) will be documented at rsp.lsst.io prior to DP1.

Prepare for Data Preview 1

General information for scientists: rubinobservatory.org/for-scientists

Get an RSP account: rsp.lsst.io

**Access the simulated Data Preview 0 data sets as preparation.
Work at your own pace through step-by-step tutorials.**

User resources for DP0: dp0.lsst.io

DP0 documentation and tutorials

- DP0.2 (extragalactic & galactic objects): dp0-2.lsst.io
- DP0.3 (Solar System objects): dp0-3.lsst.io

Prepare for Data Preview 1

Weekly “Rubin Science Assemblies” on Thursdays, 9am Pacific.

- rubinobservatory.org/for-scientists/events-deadlines/events-rsa
- alternates between hands-on tutorials and drop-in office hours
- everyone is welcome to attend, especially students and those new-to-Rubin

Special series of science preparation seminars. Each seminar will start with a brief overview of the LSST goals and planned data products that are relevant to the science topic, and include a hands-on demonstration of how to access and analyze simulated data products via the Rubin Science Platform. There will be time for questions.

- Mar 20, tutorial: Dark Energy
- Mar 27, tutorial: Strong Lensing
- Apr 03, tutorial: Galaxies
- Apr 10, tutorial: Time Domain
- Apr 17, tutorial: Active Galactic Nuclei
- Apr 24, tutorial: Solar System
- May 01, tutorial: Stars & Milky Way

At the time of DP1 release we will have a series of virtual onboarding sessions at a range of times for a global audience.

The virtual, week-long intensive **Rubin Data Academy** will be the week of June 16 or 23, TBD. It will be based on DP0 or DP1, if the latter has been released.

Collected links

Rubin Observatory “For Scientists”:

- rubinobservatory.org/for-scientists
- includes events, assemblies, etc.

Early Science Program

- rtn-011.lsst.io

ComCam On-Sky Campaign

- sitcomtn-149.lsst.io

Rubin Science Platform

- access: data.lsst.cloud
- documentation: rsp.lsst.io

Data Preview 0

- user resources: dp0.lsst.io
- DP0.2, extragalactic & galactic objects: dp0-2.lsst.io
- DP0.3, Solar System objects: dp0-3.lsst.io

Ask questions and get support:

- Rubin Community Forum, community.lsst.org

Scientist participation in the Rubin First Look event

- see slides and talk at community.lsst.org/t/9458

Comments and questions

In Zoom, raise your hand for a turn to speak, or type in the chat window.

- Questions about early science, data previews, data access via RSP, etc.
- Then we'll turn off recording and have more time for questions.