Vera C. Rubin Observatory
Data Management

Rubin Observatory Plans for an Early Science Program

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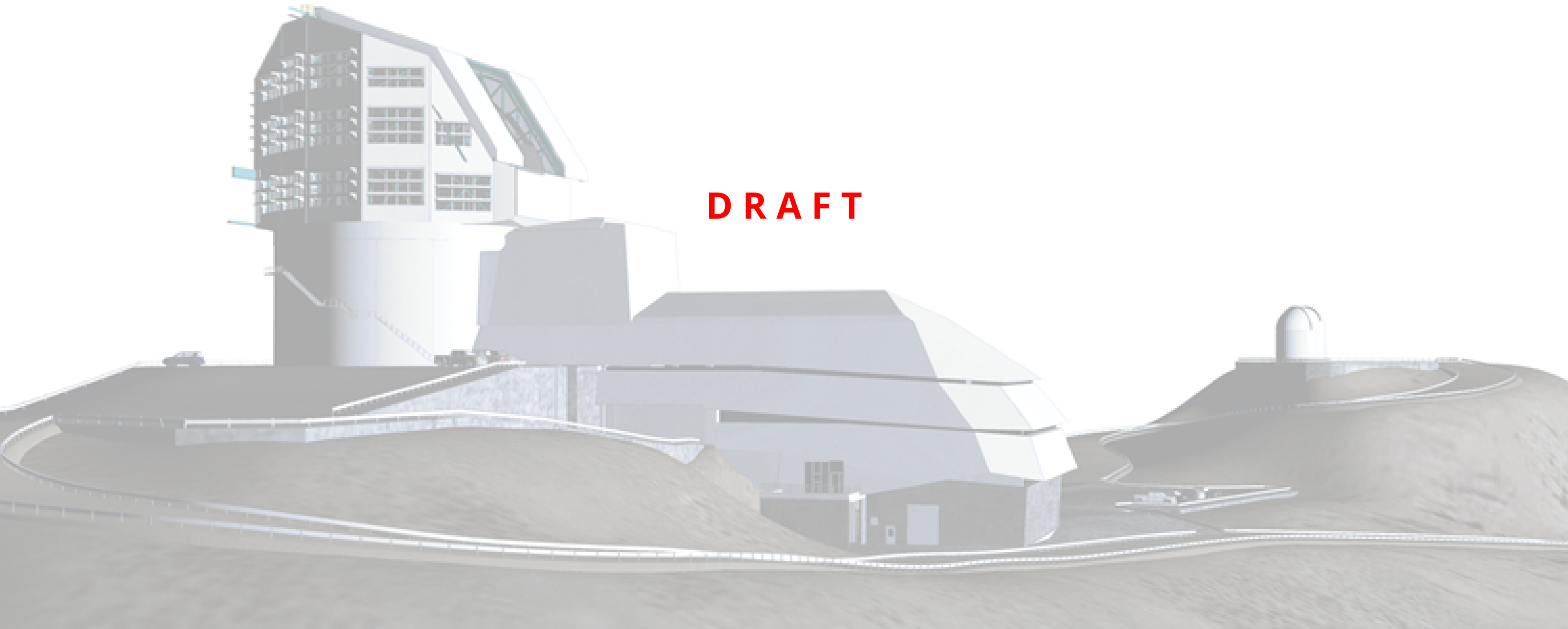

Abstract

This document presents Rubin Observatory's plan for an *Early Science Program* designed to enable high-impact science prior to the first annual data release of the Legacy Survey of Space and Time (LSST). The program includes the release of data products based on a reprocessing of science-grade commissioning data through a series of Data Previews, a progressive ramp-up of the transient alert stream beginning in the late commissioning phase, and an incremental template-generation strategy to support early alert production. Additional components include the release of nightly Processed Visit Images (PVIs) and associated Source catalogs during the first 2 years of the survey, leading up to Data Release 1 (DR1), which will be based on the first year of LSST observations. A detailed schedule of expected data products and milestones is provided. Developed in close collaboration with the science community, this living plan will continue to evolve through the start of LSST operations and DR1 in response to early system performance and community feedback.

Change Record

Version	Date	Description	Owner name
1	2020-10-30	First draft	Leanne Guy
2	2020-12-16	Draft 1.1	Bob Blum
3	2021-10-08	Rework structure	Leanne Guy
4	2021-10-21	Add timeline	Leanne Guy
5	2021-11-05	Edits throughout	Eric Bellm
6	2021-11-09	Global edits and consolidation	Leanne Guy
7	2022-10-14	Data Preview content, and incremental templates, revision of Early Science scenarios, address feedback from PCW 2022	Phil Marshall & Leanne Guy
8	2022-10-21	Release version 2.0	Leanne Guy
9	2022-10-24	Changes to SCOC and survey text. Release version 2.1	Leanne Guy
10	2022-11-16	Clarifications on alert production during commissioning. Release version 2.2	Leanne Guy
11	2023-01-10	Updates following the construction project replan, refactoring of document to remove duplication. Release version 3.	Leanne Guy
12	2023-01-12	Correct Table 1 DP1 data products, Release version 3.1	Leanne Guy, Phil Marshall
13	2023-06-01	Updates following April schedule workshop; revision of early science scenarios; additional details on the data access environment	Leanne Guy
14	2023-06-21	Release version 4.0	Leanne Guy
15	2023-10-31	Updates following October schedule workshop	Leanne Guy
16	2023-10-31	Release version 5.0	Leanne Guy
17	2024-05-02	Added statement on non-sidereal tracking.	Leanne Guy
18	2024-05-03	Release version 5.1	Leanne Guy
19	2025-02-10	Major updates to the plans and data products for DP1. Revision of the Alert Production section. Release version 6.0	Leanne Guy
20	2025-02-24	Minor updates to add more information on DP1 data products. Release version 6.1	Leanne Guy
21	2025-05-30	Updates to DP1 data products, release timeline and moving object alert packet, Release version 6.2	Melissa Graham, Leanne Guy, Eric Bellm

Continued on next page

Version	Date	Description	Owner name
22	2025-08-19	Create Rubin DOI	T. Jenness
23	2025-11-07	Updates to LSSTCam commissioning release timeline.	Leanne Guy, Eric Bellm, Lynne Jones.
24	2025-11-10	Release V7.0	Leanne Guy
25	2025-11-11	Fix minor typos, Release v7.1	Leanne Guy
26	2026-01-07	Revise and update projected release dates, Release v7.2	Leanne Guy
27	2026-01-21	Update start of alerts date, Release v7.3	Leanne Guy
27	2026-02-02	Update start of alerts date, Release v7.4	Leanne Guy

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Contents

Rubin Observatory Plans for an Early Science Program

1 Rubin Early Science Program

Community expectations for early science with Rubin are high due to the transformative nature of the LSST data and the densely-sampled observations obtained during the commissioning period. Rubin Observatory's *Early Science Program* was established to provide Rubin data rights holders with early access to the data products and services needed to produce high-impact science during the period spanning commissioning through Data Release 1 (DR1).

1.1 Early Science Definitions

The following terms and their definitions are used in this document:

- **Commissioning:** The Rubin Construction Commissioning period, from LSSTComCam First Photon on 2024-10-24 through the end of Construction, 2025-10-24.
- **Early Operations:** The period from the start of Rubin Operations, 2025-10-25, through the first Data Release, DR1.
- **Rubin Operations Early Optimization Phase:** The period from the start of Rubin Operations, 2025-10-25, through the start of the LSST.
- **Early Science:** Any science enabled by Rubin for its community during the period from the beginning of Commissioning through the first Data Release, DR1.

1.2 Motivation for an Early Science Program

The Early Science program is motivated by the desire to:

- enable high-impact science with Rubin Observatory data as early as possible;
- provide early access to both static-sky and time-domain science-ready data products to support the community to prepare for science with the LSST;
- enable early time-domain astronomy via early Alert Production; and

- help drive the development of Rubin operations capabilities prior to survey start and prepare the team to be operations-ready.

1.3 Elements of the Early Science Program

The Early Science Program consists of the following elements:

- A series of three **Data Previews (DP)**, DP0, DP1 and DP2, based on either simulated LSST-like data or data taken during the Rubin Observatory Commissioning period.
- A world-public **Stream of Alerts** from transient, variable, and moving sources, which will be scaled up continuously starting during Commissioning phase and continuing into the first year of the survey.
- **Template generation**, beginning before regular survey operations based on data collected during the Commissioning period with LSSTCam, and continuing as needed until DRP templates are available for the entire sky. The aim is to maximize the number of templates available for Alert Production in year 1 of the LSST.
- **Nightly Processed Visit Images (PVIs)** and associated direct-image `Source` catalogs of detections up until Data Release 1.
- **LSST Data Release 1 (DR1)**, which will be derived from the Data Release Processing (DRP) of the first year of LSST data, following the baseline survey strategy.

1.4 Transition to Operations and Early Science

The Rubin Construction Project was declared substantially complete on 2025-10-24, marking the delivery of an integrated system capable of capturing, transferring, and processing science-grade images consistent with the Rubin/LSST Science Requirements Document (SRD; Ivezić & The LSST Science Collaboration LPM-17). The following night, the observatory began on-sky operations and entered the Rubin Operations Early Optimization Phase. Commissioning demonstrated that the as-built system can meet the LSST science requirements, and the Operations team is now focused on achieving stable, repeatable nightly performance while coordinating remaining activities with the Construction team in preparation for full survey operations.

Data collected during Commissioning (§ 2) and Early Operations provide the foundation for many Early Science data products, offering the community an exceptional early dataset as the survey begins systematic sky coverage leading up to Data Release 1 (DR1). While the Operations team aims to deliver the broadest feasible range of early data products and services, the contents and timelines for Data Previews, the early Alert Stream, and supporting services remain subject to change and reflect the best available estimates at the time of publication.

1.5 Factors Impacting the Early Science Program

Factors affecting the schedule and contents of the Early Science program can be broadly grouped into technical considerations and policy considerations. Technical considerations include:

- The operational status of the observatory and progress of system integration and test activities during Commissioning;
- The nature and quality of the data collected during Commissioning;
- The readiness of the data processing pipelines, and data distribution and access services.

Policy factors include:

- The 30-day embargo on all pixel data during Commissioning (concluded);
- The 80-hour embargo on all pixel data throughout the full duration of the LSST (current);
- The construction security review, which must be successfully completed prior to the release of any Prompt data products (successfully completed);
- The Rubin First Look (RFL) media event (Aguirre et al., RTN-083), before which no Rubin image data could be released (concluded).

Of the above policy factors, only the 80-hour embargo on all pixel data remains active, and will continue to be, for the duration of Rubin Operations.

In this document, the term “stretch goal” will be used to describe cases where any uncertainty is due to a technical or scientific consideration and “TBD” (To Be Decided) will be used when the influencing factor is of a policy nature.

2 Rubin Construction Commissioning and Early System Optimization

Rubin Construction Commissioning was completed on 2025-10-24, and the Observatory is now in the Rubin Operations Early Optimization Phase. Figure 1 presents the detailed schedule of completed commissioning and ongoing Early Science activities relative to the start of Operations.

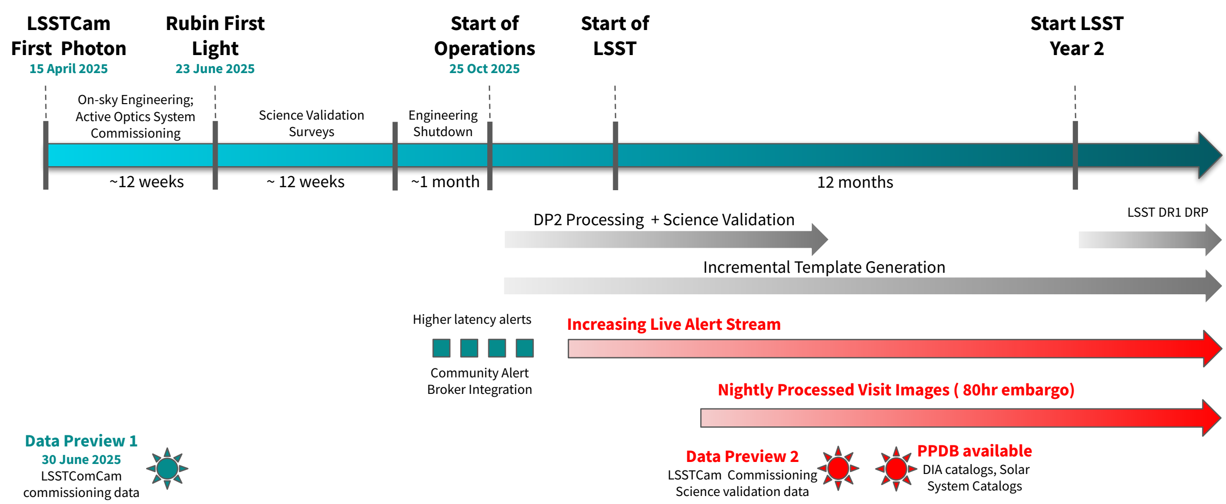


Figure 1: Schematic showing the completed commissioning and ongoing Early Operations activities relative to the start of Operations, 2025-10-25.

2.1 Summary of Commissioning Activities

The completion of Rubin Construction was marked by a series of key milestones, which are included here for completeness.

LSSTComCam First Photon: The first image of the night sky produced by photons passing through the Rubin optical system and detected by the Commissioning Camera (LSSTComCam). This milestone was achieved on 2025-10-24.

LSSTCam First Photon: The first image of the night sky produced by photons passing through the Rubin optical system and detected by the LSST Science Camera (LSSTCam). This milestone was achieved on 2025-04-15.

Rubin First Light: The point at which Rubin routinely began to acquire science-grade imaging across the LSSTCam full focal plane. This milestone was achieved on 2025-06-23.

Rubin Construction Complete: The point at which Rubin Observatory was deemed sufficiently complete and functional to be handed over from Construction to Operations for early system optimization and preparation for the start of the LSST survey. This milestone was achieved on 2025-10-24.

Commissioning data collection was carried out in a sequence of planned phases, shown in Figure 2, beginning with on-sky engineering using LSSTComCam and concluding with LSSTCam. The System Optimization and Science Validation (SV) phases, both conducted with LSSTCam, focused on refining system performance and verifying scientific readiness through targeted observations. These observations adopted many of the design elements of the standard LSST cadence, with modifications to increase the likelihood of delivering a stand-alone high-impact dataset to enhance opportunities for Early Science. Field selection was guided by commissioning priorities and community input, balancing technical constraints with scientific opportunity. Collectively, these efforts validated the end-to-end performance of the as-built system, confirmed its ability to deliver seeing-limited image quality, and demonstrated substantial construction completeness

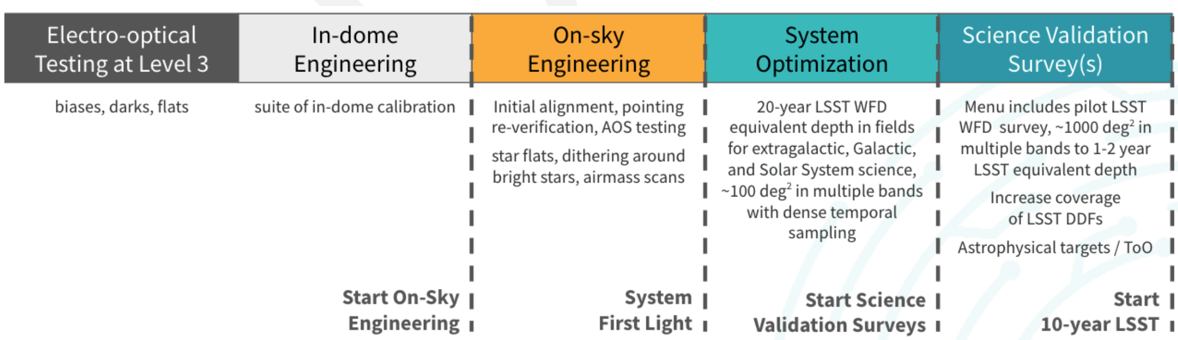


Figure 2: High-level plan that guided the collection of commissioning data.

2.2 LSSTComCam Commissioning

LSSTComCam is Rubin's engineering camera that was used for testing and validating the observatory's systems and processes prior to the installation of the LSST Science Camera. The LSSTComCam focal plane has single raft with a 3×3 mosaic of 4K×4K ITL science sensors, giving a total of 144Mpix, LSSTComCam has the same plate scale as LSSTCam (0.2 arcsec / pixel), with a field of view of 40 × 40 arcmin. The LSSTComCam filter exchanger holds only three physical filters at a time.

The Rubin on-sky commissioning campaign using LSSTComCam began on 24 October 2024 and ended on 11 December 2024, lasting a total of 7 weeks, and included observations to support both engineering and science pipelines commissioning. This highly successful campaign included a first series of on-sky engineering tests demonstrating the end-to-end functionality of the Simonyi Survey Telescope's hardware and software systems. The median delivered image quality for commanded in-focus images collected during the campaign, quantified in terms of the PSF FWHM, was ≈ 1.1 arcseconds. The best images have delivered PSF FWHM of ≈ 0.7 arcseconds. A full report on the LSSTComCam on-sky commissioning campaign is available at SITCOMTN-149.

2.3 LSSTCam Commissioning

LSSTCam was installed on the Simonyi Survey Telescope on 2025-03-05. Following initial engineering and integration work and the achievement of the LSSTCam First Photon milestone, on-sky commissioning campaign using the LSSTCam began on 2025-04-15 and ran through 2025-09-21.

The acquisition of science images[1] with LSSTCam began on 2025-04-17. Early observations consisted of observations to support the Rubin First Look milestone followed by small-field survey visits dithered over small areas around a central boresight. The small-field survey visits were typically acquired in sequences of at least 10 visits per bandpass, cycling through the available filters, in a manner similar to the small-field survey science visits acquired during LSSTComCam commissioning and included in DP1.

The Science Validation (SV) surveys began on 2025-06-20, acquiring visits in a manner consistent with the planned LSST operations cadence. While based on the baseline LSST survey design, the SV surveys incorporated several modifications to maximize the likelihood of producing a stand-alone, high-impact dataset that would enhance opportunities for Early Science. They covered a more limited sky area to achieve greater depth within the SV time frame, resulting in a temporal sampling distribution that differs from the LSST baseline.

[1] As opposed to images taken for engineering or Active Optics System (AOS) testing.

The SV surveys were executed using the Feature based Scheduler (FBS) and comprised two primary components, interleaved within a single FBS configuration.

- **Wide Survey:** Designed to test template generation and Prompt Processing with difference image analysis at data rates representative of the first year of the LSST. This provided a sustained full-scale test of the Data Facility;
- **Deep Survey:** Designed to test the production of deep coadds with integrated exposures equivalent to or exceeding those of the LSST 10-year survey. These observations achieved a rapid temporal sampling in the selected deep fields and validated the observing strategy for the LSST Deep Drilling Fields (DDFs).

The Wide Survey traced the ecliptic plane from dense regions of the Galactic Bulge through low-dust regions within the planned LSST Wide-Fast-Deep (WFD) footprint. Four of the planned LSST Deep Drilling Fields (DDFs) were observed as part of the Deep Survey. A secondary area within the low-dust WFD footprint was included to provide alternate targets when the primary or DDF fields were unavailable, supporting early template generation in higher-declination areas.

A total of 21,647 science visits were acquired during the SV surveys. This total excludes known bad visits (as of 2025-09-30) but includes exposures spanning a broad range of data quality, reflecting variations in cloud extinction, delivered image quality, and engineering issues. Of these, 7,194 were obtained in small-field survey mode, 908 were targeted at the Deep Drilling Fields (DDFs), and 13,240 covered the primary wide SV area. Additionally, 194 visits acquired for Target of Opportunity (ToO) testing purposes Most of the visits were acquired between 2025-04-17 and 2025-07-24, with interruptions due to weather and engineering activities required to improve delivered image quality. Figure 3 shows the temporal distribution LSSTCam SV survey visit acquisition.

Image quality proved challenging throughout the SV period This is evidenced in part as a point-spread function (PSF) larger than expected given estimates of the atmospheric contribution, and partly as spatial variations in the PSF across the field of view. While the median-per-visit PSF width at FWHM reported for the SV images is not substantially larger than typical seasonal values, the shape and variability of the PSF do not meet the performance requirements expected for full survey operations.

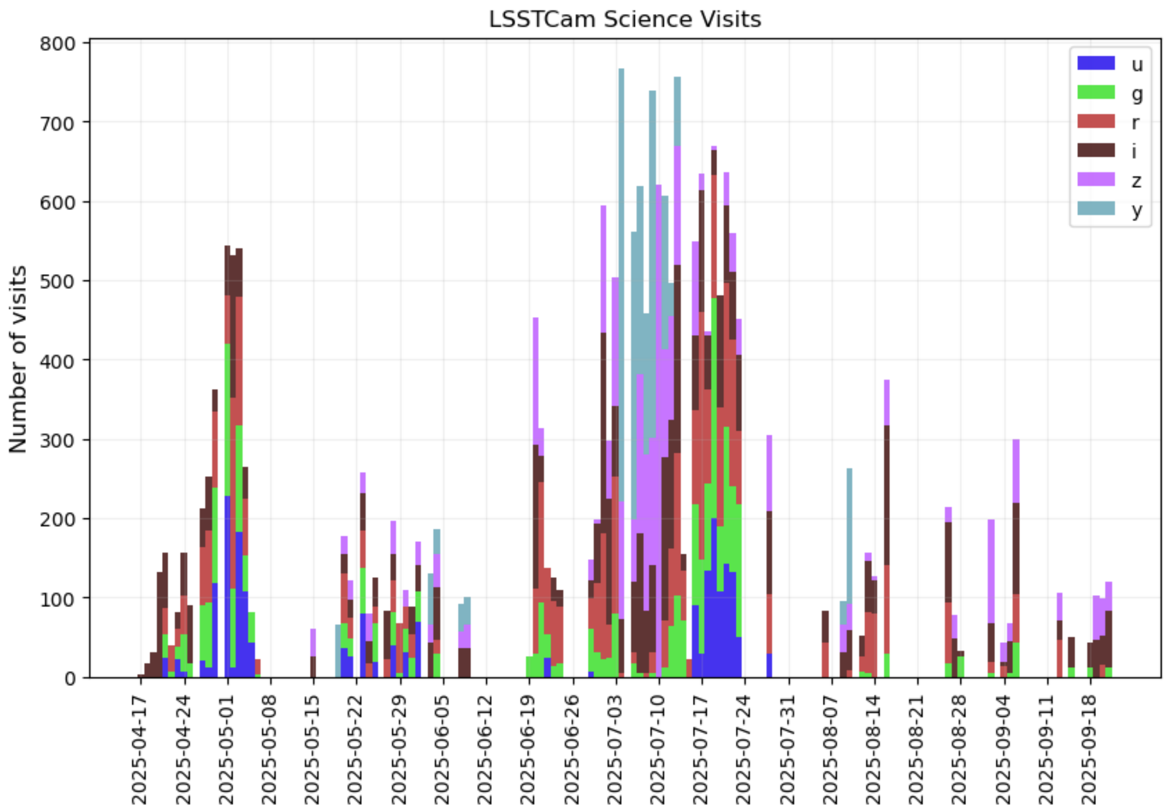


Figure 3: Timeline of LSSTCam commissioning science visit acquisition.

Figure 4 shows a sky map of all the science visits acquired during LSSTCam commissioning. As full summary of the SV data obtained during LSSTCam commissioning can be found at `https://survey-strategy.lsst.io/progress/sv_status/sv_20250930.html`. A full report on the LSSTCam on-sky commissioning campaign is in preparation at SITCOMTN-170.

2.3.1 Small Field Surveys

Several small fields were observed prior to the start of the SV surveys, with some overlapping the early portion of the SV survey period. A subset of these observations formed part of the Rubin First Look campaign. A summary of the data collected during the small-field surveys is provided in Table 1. The median Image Quality (IQ) is expressed in terms of the width of the PSF at FWHM.

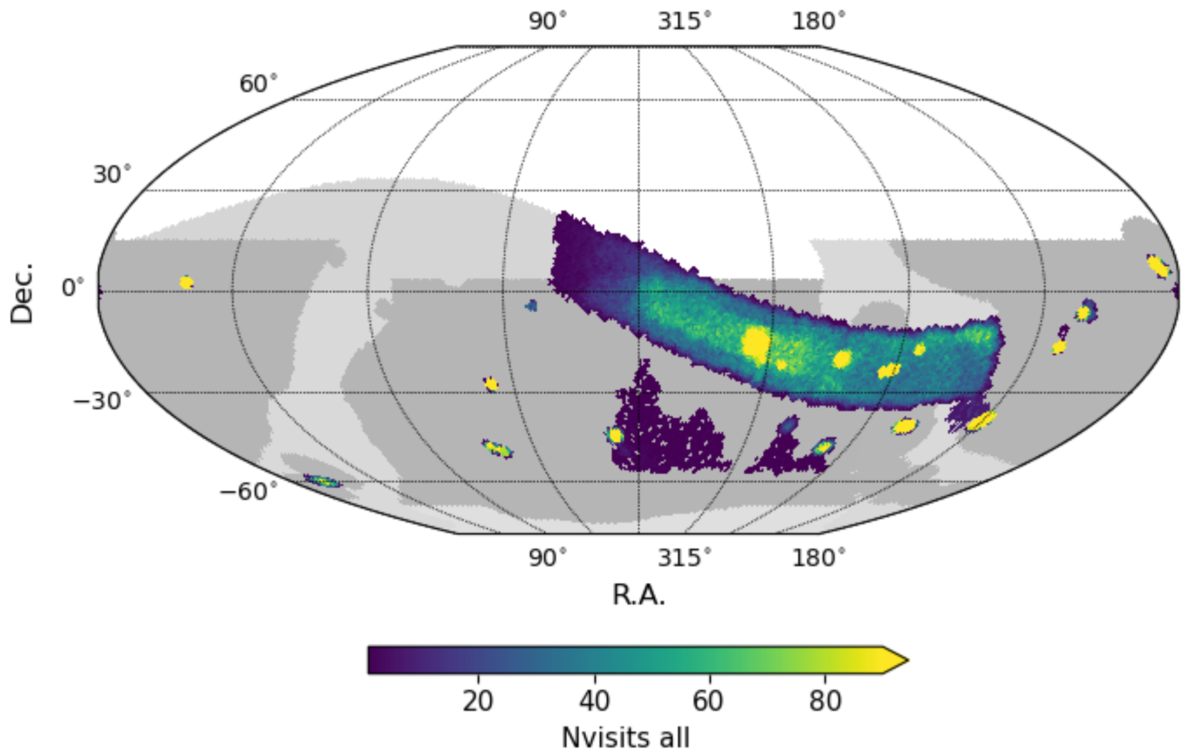


Figure 4: All science visits acquired during LSSTCam commissioning.

2.3.2 SV Wide Area

The initial SV wide area was approximately 3000 deg^2; this was reduced to 750 deg^2 approximately halfway through the SV survey period. This was further reduced to approximately 300 deg^2 during the last week or so of the SV period to concentrate observing cadence and better enable image differencing tests. Table 2 provides the median numbers of visits and estimated m5 coadded depths within each of the subsets of the Wide SV area. The median image quality expressed in terms of the width of the PSF at FWHM is also provided per band across all subset areas in the SV Wide Area survey.

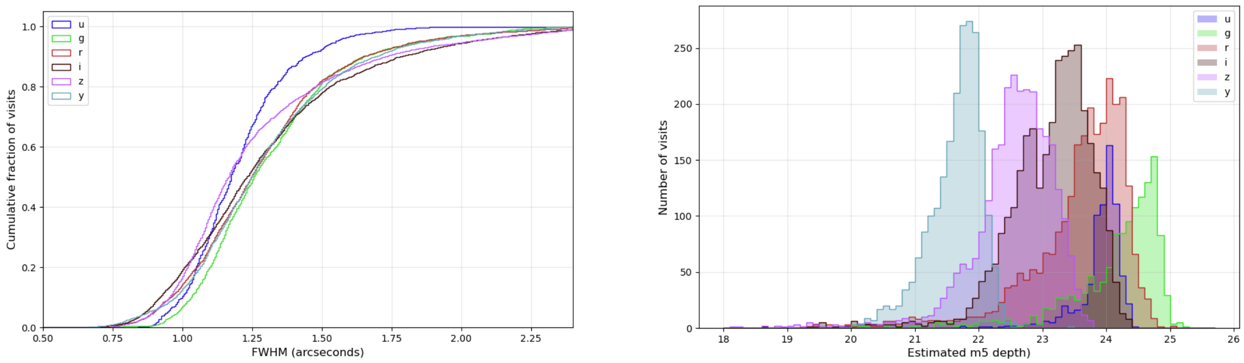
Figure 5 shows distributions of the image quality and depth for the SV Wide Area Survey data The individual image depth across the SV wide-area survey is slightly shallower than predicted by baseline survey simulations, which model the full LSST footprint over the 10 years of operations. This difference can be attributed to poorer delivered image quality and slightly higher mean cloud extinction during the SV surveys. Under favorable conditions, the measured median zeropoints for individual images were consistent with predicted values, indicating that

Field	N Visits	Median IQ (arcsec)	Timespan (days)
Carina (NGC 3372)	124	—	4
Rubin_SV_280_48	148	1.52	1
ELAIS_S1	166	1.38	17
Rubin_SV_320_15	273	1.22	6
New_Horizons	360	1.05	62
Rubin_SV_216_17	386	1.29	8
Rubin_SV_212_7	498	1.21	7
Prawn	632	1.37	79
COSMOS	664	1.22	15
Triffid (M20) & Lagoon (M8)	668	1.14	10
M49	1173	1.29	13
Rubin_SV_225_40	2052	1.36	97

Table 1: Summary of selected small-field observations showing the number of visits, median delivered image quality (PSF FWHM), and total timespan of observations.

Field	Band						Total
	u	g	r	i	z	y	N visits
3k deg^2	2	4	7	8	7	5	38
	24.2	25.0	24.9	24.5	23.8	22.6	
750 deg^2	2	4	12	16	11	9	56
	24.4	25.2	25.2	24.8	24.0	23.0	
300 deg^2	2	5	11	18	15	10	64
	24.5	25.2	25.0	24.9	24.1	23.0	
Median FWHM (arcsec)	1.18	1.26	1.26	1.24	1.17	1.25	

Table 2: Median number of visits per pointing and estimated m_5 coadded depths per band within each subset of the wide-area SV survey. The final row gives the median FWHM of the point spread function in arcseconds.



(a) Delivered image quality.

(b) Estimated individual image depth.

Figure 5: Summary of the delivered image quality per visit and estimated individual image depth per visit for visits in the SV Wide Area survey.

the overall system sensitivity was generally as expected.

2.3.3 Deep Drilling Fields

Each of the LSST Deep Drilling Fields were observed during commissioning, although the depth and completeness varied between fields. Table 3 lists the number of visits obtained during LSSTCam commissioning, including observations acquired during the small-field and SV surveys, within each Deep Drilling Field (DDF). For each field, the first row gives the number of visits per band, while the second row reports the corresponding estimated coadded 5σ depths (m_5). The total number of visits, the timespan over which observations were collected, and the median image quality, expressed in terms of the PSF at FWHM are also provided.

The SV surveys occurred relatively early in the observing season for all Deep Drilling Fields, and COSMOS was entirely unavailable for inclusion. The COSMOS data in Table 3 therefore originate exclusively from the Small Fields Surveys (§ 2.3.1). The remaining DDFs became observable toward the end of the night beginning in July, with ELAISS1 rising first. Consequently, ELAISS1 received the largest number of visits, while the other DDFs were observed less extensively due to limited SV on-sky time. ELAISS1 was the only field observed in all six bands, $ugrizy$, during the SV survey; COSMOS also received observations in all bands as part of the Small Fields Surveys. Most of the others were observed only in $griz$, as these were the only available filters after 2025-08-10 due to hardware issues with the filter exchanger. The XMM-LSS field received visits only in u, owing to a combination of factors including the compressed observing cadence, competition for observing time between the DDFs, azimuth constraints at

Field	Timespan (days)	Median FWHM (arcsec)	Band u	g	r	i	z	y	Total N visits
XMM_LSS	10	1.47	30	—	—	—	—	—	30
			25.3	—	—	—	—	—	
EDFS_A	55	1.32	—	20	21	28	18	—	87
			—	25.3	25.2	25.0	24.1	—	
EDFS_B	55	1.37	—	23	21	29	18	—	91
			—	25.4	25.1	25.0	24.1	—	
ECDFS	57	1.51	—	36	39	41	43	—	159
			—	25.8	25.5	25.3	24.7	—	
ELAISS1	84	1.40	39	101	103	168	112	16	539
			25.6	26.6	26.1	26.2	25.1	22.7	
COSMOS	15	1.22	100	82	166	139	111	66	664
			26.0	26.8	26.3	26.1	25.3	23.9	

Table 3: Summary of Deep Drilling Field observations from LSSTCam on-sky commissioning data, including SV and small-field campaigns. For each field, the first row lists the number of visits per band and total, and the second row lists the corresponding coadded 5σ depths (m_5). The observation timespan and median image FWHM are also indicated.

the end of the night, patchiness of SV observing time, and periodic unavailability caused by moon avoidance.

The dither pattern used for the DDFs evolved over the course of the SV Surveys. Initially, only small dithers were used, and no intra-night dithering was used. This configuration led to challenges with scattered light and the absence of intra-night dithers limited the ability to construct high-quality template images. Later in the campaign, both translational and rotational dithers were introduced within a night, while inter-night dithering was maintained. The optimal dither pattern for LSST DDF observations is the subject of ongoing investigations, but will likely include both intra-night and inter-night dithering components.

3 Data Previews and Data Release 1

A series of three Data Previews (DP) and one Data Release (DR) are planned:

- Data Preview 0 (DP0): Based on simulated LSST-like data.
- Data Preview 1 (DP1): Based on a subset of early science-grade commissioning data taken with LSSTComCam during commissioning.
- Data Preview 2 (DP2): Based on a full reprocessing of all science-grade data taken with LSSTCam during commissioning.
- Data Release 1 (DR1): Based on the first year of LSST data.

Each successive Data Preview will demonstrate increasing levels of functionality and product maturity, progressively building toward the first full Data Release (DR1). Because the commissioning observation period is relatively short (§ 1.4), the Data Previews will necessarily cover smaller areas and shorter timescales than a standard Data Release.

Successive data previews will exercise more and more functionality and products building up towards Data Release 1. Due to the relatively short time periods available for commissioning observations (§ 1.4), the Data Previews will necessarily be limited in their area and temporal coverage relative to a full Data Release.

The data products that comprise the Data Previews and Data Releases are produced by the LSST Science Pipelines (Bosch et al., 2019, 2018). For an introduction to the LSST data products, see Graham (2022) and for a detailed description, see the LSST Data Products Definition Document (DPDD), [LSE-163]. Each Data Preview and LSST Data Release will be accompanied by its own release-specific documentation[2], giving e.g. the database schema for the catalogs included in that dataset. Table 4 provides a summary of the expected early science data products available in DP0, DP1, DP2 and the LSST Data Release 1. Prior to DR1, not all columns described in the DPDD may be produced, depending on the quality and volume of the data from commissioning, and the maturity of the science pipelines. All LSST data products will be subject to the embargo periods described in DMTN-199; 30 days during commissioning and 80 hours during operations for pixel data.

The following sections outline which data products can be expected in each planned Data Preview and Data Release, and on what timescale. Table 7 in § 7 provides a combined view of the expected data preview schedule and associated uncertainties.

[2] For an example, see the online DP0.2 documentation `https://dp0-2.lsst.io/data-products-dp0-2/`.

Rubin Early Science – Data Release Scenario

Data Product	Jun 2021 **DP0.1** DC2 Simulated Sky Survey	Jun 2022 **DP0.2** Reprocessed DC2 Survey	Jun 2023 **DP0.3** Solar System PPDB Simulation	June 2025 **DP1** ComCam Data	Jun 2026 – Sep 2026 **DP2** LSSTCam Science Validation Data	LSST start + 1 year **DR1** LSST Year 1 Data	LSST start + 2 years **DR2** LSST Year 2 Data
Raw Images	●	●	–	●	●	●	●
DRP Processed Visit Images and Source Catalogs	●	●	–	●	●	●	●
DRP Coadded Images and Object Catalogs	●	●	–	●	●	●	●
DRP Cell-based Coadded Images and ShearObject Catalog	–	–	–	–	● (gray)	●	●
DRP ForcedSource Catalogs	●	●	–	●	●	●	●
DRP Difference Images and DIA Catalogs	–	●	–	●	●	●	●
DRP SSP Catalogs	–	–	●	●	●	●	●

Table 4: Summary of the main data products expected in each data preview and early LSST data releases. A dark teal dot denotes confirmed data products whereas a gray dot denotes data products that currently remain a stretch goal.

3.1 Data Preview 0

Data Preview 0 (DP0) was the first of three Data Previews to be released during the period leading up to the start of Rubin Observatory Operations. Data Preview 0 contained three stages, all based on simulated LSST-like data products. DP0 was intended to serve as an early integration test of the LSST Science Pipelines and the Rubin Science Platform (RSP), and to enable a limited number of astronomers and students to begin early preparations for science with the LSST.

3.1.1 Data Preview 0.1

Data Preview 0.1 (DP0.1) was released to a group, approximately 300, of early adopters from the community in June 2021. It is based on simulated LSST-like images generated by the Dark Energy Science Collaboration (DESC) for their Data Challenge 2 (DC2), (LSST Dark Energy Science Collaboration (LSST DESC) et al., 2021). DP0.1 used the 300 deg^2 of DC2 images that were simulated for five years of the LSST's wide-fast-deep component (WFD) using a baseline cadence, [PSTN-055]. The DESC processed the simulated DC2 images with Version 19 of the LSST Science Pipelines, producing calibrated images and catalogs. DP0.1 made the DESC's DC2 images and catalogs available to users through an early version of the Rubin Science Platform (RSP) running at the US DAC. DP0.1 has now been retired from the publicly available RSP instance.

For full details on DP0.1 including an exact description of the data products that were served, see the documentation at https://dp0-1.lsst.io/.

3.1.2 Data Preview 0.2

Data Preview 0.2 (DP0.2) was released to approximately 600 early adopters from the community in June 2022, exactly 1 year after DP0.1. The input simulated image dataset, DESC's "DC2," used for DP0.2 was the same as that used for DP0.1. In this case, the Rubin team itself processed the simulated DC2 images with Version 23 of the LSST Science Pipelines. DP0.2 makes the Rubin reprocessed DESC DC2 images and catalogs available to users through an early version the Rubin Science Platform (RSP) running at the US DAC.

For full details on DP0.2 including an exact description of the data products served, see the documentation at https://dp0-2.lsst.io/ .

3.1.3 Data Preview 0.3

Delivered in June 2023, DP0.3 is the last in the DP0 series of Data Previews based on simulated LSST-like data. DP0.3 supports the Solar System Science Collaboration by hosting their simulated 1-year and 10-year Prompt Products Database (PPDB) catalog to enable moving object analysis development in the RSP at the US DAC. DP0.3 is based on an entirely independent simulation and has no data in common with DP0.2.

For full details on DP0.3 including an exact description of the data products served, see the documentation at https://dp0-3.lsst.io/

3.2 Data Preview 1

Delivered in June 2025, Data Preview 1 (DP1) serves data products generated from a subset of science-grade astronomically useful images taken during the ComCam on-sky commissioning campaign (§ 2.2), to enable the community to prepare to work with LSST data.

Seven target fields observed as part of the ComCam on-sky observing campaign have been selected as the basis for DP1 due to their quality and scientific usefulness. These seven fields, listed in Table 5 together with their central pointing coordinates, span a range of stellar den-

Table 5: 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
		deg	*deg*
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 Seagull	106.23	-10.51

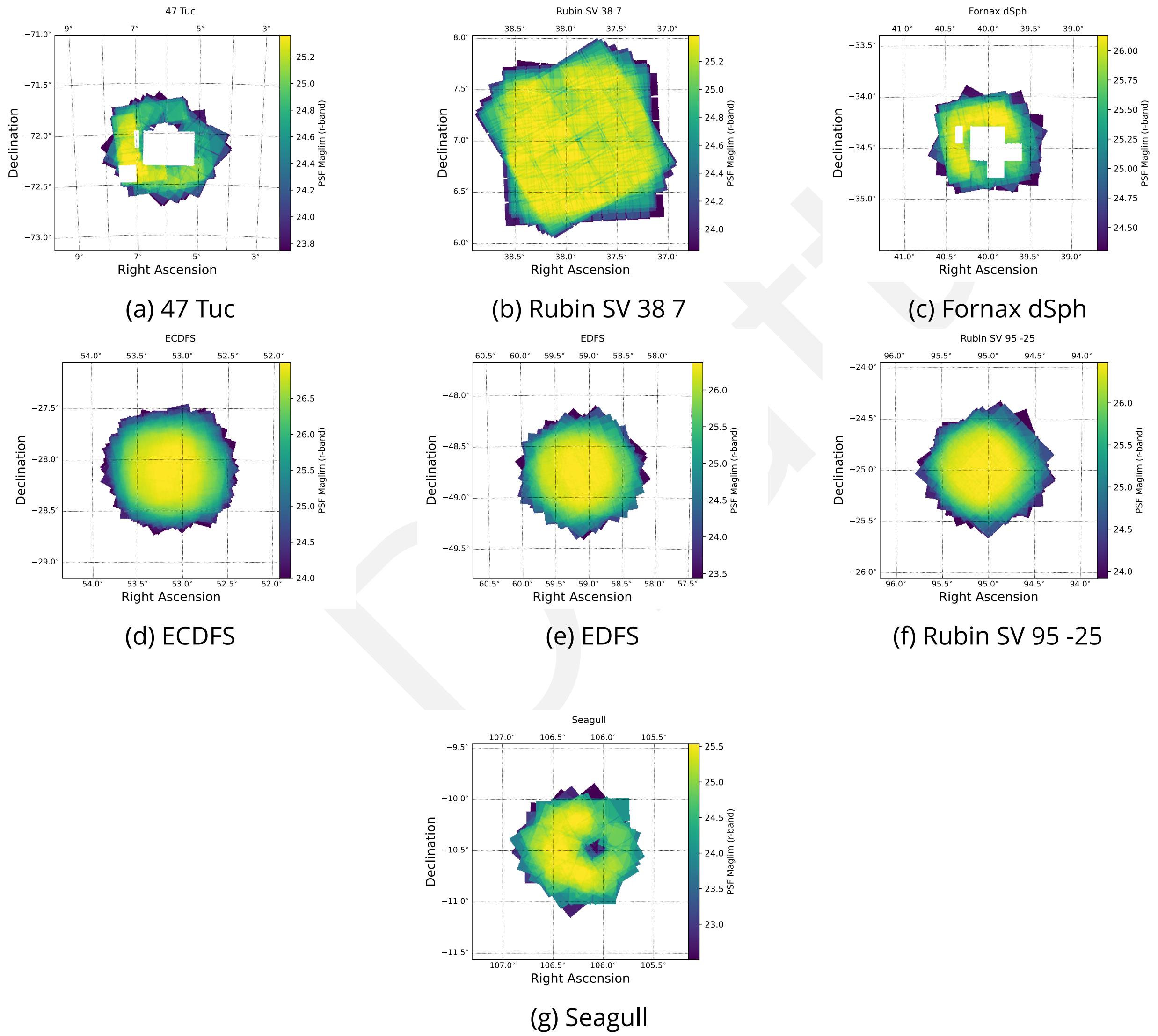
Table 6: Band coverage for seven fields observed during the ComCam on-sky observing campaign that are to be included in the DP1 dataset.

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

sities, have good overlap with external reference datasets, and span the breadth of the four primary LSST science themes.

Table 6 provides a summary of the band coverage for the fields used as a basis for DP1. Figure 6 shows the resulting integrated depth, expressed in terms of the flux of an unresolved source that would be measured with signal-to-noise ratio $S/N = 5$, using the r band as an example. 47 Tuc and Fornax dSph are both dense star fields, and the core of 47 Tuc is saturated in the LSSTComCam commissioning images. No coadds were produced for these regions during the on-sky commissioning campaign, hence the holes in the center of the figures. A typical observing epoch on a given target field consisted of 5-20 visits in each of the three loaded filters. Nearly all the visits were taken with one single 1x30 second exposure time and not 2x15 second snaps[3]. Only 1x30 second exposure images are included in DP1.

[3] At this time, studies as to whether the LSST will use a 1x30 single exposure or 2x15 snaps as the default standard visit are ongoing with LSSTCam data, and a decision will be made prior to starting the LSST.



(a) 47 Tuc

(b) Rubin SV 38 7

(c) Fornax dSph

(d) ECDFS

(e) EDFS

(f) Rubin SV 95 -25

(g) Seagull

Figure 6: Cumulative imaging depth expressed in terms of the $S/N = 5$ limiting magnitude for unresolved sources for seven LSSTComCam Fields.

The processing and preparation of LSSTComCam data for DP1 took place during the first half of 2025. The delivered data products for DP1 are presented in Table 4. DP1 included approximately 2000 exposures. The processing of crowded fields in the centers of 47 Tuc and Fornax was on a best-effort basis. The center of 47 Tuc is saturated and so no coadd images were produced for this region. Solar System catalogs contained observations of known objects from the MPC Orbit Catalog (MPCORB) tables as well as any new discoveries. The snapshot of the MPCORB Catalog tables included in DP1 was taken from around the time of DRP processing for DP1.

Individual exposures taken during the commissioning campaign that did not meet the quality control standard of being "science-grade, astronomically useful" images, were not be included in the DP1 release, and consequently, the exact number of exposures and coadd depths in DP1 was different to what was seen during the commissioning campaign. Additionally, some columns were missing from some catalogs due to the small data sets involved in DP1. There were no cell-based coadds in DP1, nor `ShearObject` catalog. Both of these are currently stretch goals for DP2.

3.3 Data Preview 2

Data Preview 2 (DP2) will provide the first large-area, multi-band dataset generated from a subset of science-grade astronomically useful images taken during the LSSTCam on-sky commissioning campaign, (§ 2.3), offering early access to LSST-like data products across approximately 3 000 deg^2 of sky in all six LSST bands ($ugrizy$).

The full definition and production plan for DP2 is described in RTN-111.

3.3.1 Sky Coverage and Depth

DP2 is derived from LSSTCam observations acquired during the commissioning campaign between 2025-04-17 and 2025-09-21, supplemented by observations taken between 2025-10-25and 2026-01-09 that overlap the existing survey footprint. Observations obtained between these dates that extend beyond the commissioning footprint are expected to have very low visit counts. To avoid processing such sparsely sampled regions, only supplemental observations that increase depth within the established commissioning footprint will be included.

The dataset encompasses the Science Validation wide-area survey, Deep Drilling Fields (ECDFS, EDFS_a, EDFS_b, and ELAISS1, COSMOS), and a number of targeted small-field regions including the Trifid–Lagoon, Prawn, M49, and New Horizons fields that were part of the Rubin First Light campaign.

Approximately 16,900 visits meet the quality thresholds for inclusion in the deep coadds. The wide-area survey regions reach median coadded depths broadly comparable to those reported for the Science Validation surveys in § 2.3. The Deep Drilling Fields achieve substantially greater depth; ELAISS1 and COSMOS are the most extensively observed, with coverage in all six bands. An additional ~4000 visits that do not meet the coadd quality criteria will be available as single-visit data products only.

3.3.2 Data Products

During late 2025 and early 2026, the LSSTCam commissioning data (§ 2.3) will be reprocessed to produce DP2. Table 4 presents a summary of the data products expected in DP2.

All data products delivered with DP1 will also be produced and included in DP2. The DRP Solar System Processing (SSP) is designed to be a Rubin-only product, meaning that it does not begin with the Minor Planet Center (MPC) catalog to identify objects discovered by other observatories, as is done in the Prompt Processing. Instead, it constructs a self-contained "Rubin-only Solar System orbit catalog," which, although less complete, can be more rigorously debiased than the catalog produced in Prompt mode. For DP2, as in DP1, the available data are insufficient to produce a meaningful Rubin-only catalog from orbit associations. Therefore, Solar System products in DP2 will be generated by positional cross-matching of Rubin difference-image detections (`DiaSources`) with predicted ephemerides of known objects from the MPCORB catalog. Cell-based coadds and the ShearObject catalog remain stretch goals for DP2.

3.3.3 Limitations

DP2 is based on commissioning data and users should be aware of certain limitations relative to future Data Releases. The temporal baseline is short (approximately five months for the primary dataset) and the sky coverage, while substantial, does not span the full LSST footprint. Image quality during the Science Validation surveys was variable, and the PSF exhibits spatial structure that does not yet meet full survey-operations requirements. Some catalog columns described in the DPDD may not be populated depending on the quality and volume of the input data and the maturity of the relevant pipeline algorithms. DP2-specific documentation, including the catalog schema and known issues, will accompany the release.

The planned release time range for DP2 is July – September 2026.

3.4 Data Release 1

LSST Data Release 1 will be based on the first year of data taken as part of the 10-year survey. Data Release Processing of this dataset is estimated to take approximately one full year, making the expected delivery date approximately two years following the start of the 10-year survey. DR1 will be the first Data Release in which all data products, as described in the DPDD (Jurić et al., LSE-163) will be provided. Table 4 presents a summary of the data products expected in DR1.

4 Prompt Data Products

Prompt Data Products are generated by the Prompt Processing pipelines on timescales ranging from 120 seconds to 80 hours after each observation. Their primary purpose is to enable the rapid discovery and characterization of transient, variable, and moving objects, supporting timely community follow-up of time-domain events. They complement the annually produced Data Release Products by providing near real-time access to time-domain information during nightly operations.

These products include single-visit images, difference images, and catalogs of detections in difference images (`DiaSources`), their associated astrophysical objects (`DiaObjects`), and Solar System objects (`SSObjects`). Alerts for newly detected `DiaSources` are issued within 120 seconds of observation using community-standard formats and distributed to Community Brokers to facilitate rapid follow-up.

The DPDD summarizes the pipelines used to generate the Prompt Data Products. Rubin plans to progressively scale up access to these products during Early Operations.

4.1 Alert Production in Early Operations

Alert Production depends on the existence of template images. During steady-state operations, these templates will be constructed during the annual Data Releases and will be built from the best available subset of images. To enable alert production to proceed during Early Operations, prior to DR1, it will be necessary to build templates incrementally as data become available, as recommended by the study described in DMTN-107. Because we have a smaller set of input images to choose from and uncertain knowledge about future observations, incremental template generation necessarily must balance the trade-off of earlier template availability against template quality and spatial completeness. Validation will be required to determine when to build incremental templates to maximize the net throughput of Early Science.

Scientifically it is important that once a template is constructed for a given region of sky, it is used exclusively until it can be updated in the next Data Release. Repeated changes to the template make it extremely difficult to construct usable lightcurves for objects from individual difference image sources: transient objects such as supernovae will be contaminated by changing flux levels from the evolving template, and variable objects such as variable stars and AGN will require repeated corrections for different template flux levels as well.

During commissioning, templates were generated incrementally based on the available observations. Due to a slower-than-expected rate of data taking, this yielded usable templates for several Deep Drilling fields and several hundred square degrees of the wide SV survey.

The first Rubin alerts are currently expected to begin in early 2026, and will only use templates from the DDFs (which were observable through the end of 2025). During 2026, Rubin will scale up alert production over a progressively increasing fraction of the sky as more incremental templates become available. Expansion of the template area from DDF-only is not expected before the end of March 2026, at the earliest. Alerts generated during Early Operations may be produced with higher latency. Access to images (§ 4.2) and the PPDB (§ 4.3) will not initially be available when the alert stream first appears, but will be phased in during 2026 as discussed below.

During the Commissioning and Early Operations periods, alert packets for moving objects might not include the associated historical source records, and parameters such as phase curve slope (G) would be empty until sufficient detections exist to derive them. Solar System discoveries will be reported to the Minor Planet Center on an ad-hoc basis during Early Operations, with a goal of increased automation as alert production becomes routine.

4.1.1 Specifics of template generation in year 1

In Year 1 (Y1), Rubin LSST will adopt an incremental and opportunistic approach to template generation. Templates will be constructed once sufficient high-quality visits have been accumulated at a given sky position and will be deployed for image differencing upon validation. However, the production and scientific use of these templates must be understood within the broader operational realities of early survey execution.

The guiding principle for Y1 is that system calibration and survey integrity take precedence over alert production. Following the guidance of the SCOC in Section 3.8 of PSTN-056, stating that releasing some alerts in Y1 is an important goal, but that this objective must not override the priority of delivering a fully calibrated and stable system by the end of Y1.

Templates will be generated once a field has accumulated a sufficient number of visits of adequate image quality with stable and validated calibration and passing defined quality thresholds.

Once these conditions are met, templates will be built and activated without waiting for full annual data reprocessing. In principle, this allows templates to be used within the same observing season in which they are created.

In practice, however, incremental template generation is effectively a race between data acquisition, processing, and seasonal visibility. If sufficient visits are not accumulated and processed before a field sets, alerts for that field will not be issued until the next seasonal revisit. Given realistic Y1 conditions, this outcome is expected to be common.

Operational Constraints in Year 1 include several factors that limit the likelihood of widespread same-season template use, including

- Survey speed and observing efficiency. Template construction requires reaching a minimum density of high-quality visits. Reduced observing efficiency—whether due to commissioning constraints or operational overhead—directly slows template readiness.

- Planned and unplanned downtime. Instrumental issues, maintenance periods, and commissioning activities reduce usable observing time and may delay the accumulation of template-quality data.
- Image quality performance. Deviations from expected image quality affect template depth, subtraction fidelity, and the reliability of early alert streams.
- Survey strategy and calibration integrity. Altering the survey cadence or footprint to accelerate template formation risks compromising photometric calibration, survey uniformity, and Data Release 1 (DR1) quality. Y1 strategy will not be significantly distorted solely to increase early alert production.

These factors collectively make it unlikely that Y1 will achieve uniform, full-footprint template coverage suitable for steady-state alert production.

Alert generation in Y1 should therefore be viewed as opportunistic and demonstrative, not representative of steady-state LSST operations. Limited regions may produce alerts once templates are available, potentially resulting in early bursts of alerts in specific areas. As coverage evolves, alert rates may fluctuate significantly.

The objective of Y1 alert release is to:

- Exercise the end-to-end alert system under realistic conditions,
- Enable community preparation and pipeline testing,
- Demonstrate operational capability ahead of full survey scale.

Full-volume, uniform alert streams remain a goal for subsequent years.

In summary, LSST will actively pursue incremental template generation during Year 1 and will deploy templates as soon as they meet defined quality standards. However, realistic operational constraints make widespread same-season template use unlikely. Alert production in Y1 will be limited and opportunistic, with calibration stability and survey quality remaining the overriding priorities.

4.1.2 Using external templates

Some new external drivers including the upcoming six-month LVK run ("IR1") provides motivation to consider deploying DECam-based templates into in Alert Production. These would allow the alert system to build operational history, validate performance, and demonstrate readiness ahead of full LSST alert volumes. This approach is under investigation; deployment depends on demonstrating an acceptably low rate of false positives.

4.2 Prompt Images

Starting in Early Operations and continuing through Data Release 1 (DR1), Rubin plans to begin nightly releases of single-epoch Processed Visit Images (PVIs) and difference images. These images will be subject to the standard 80-hour embargo period (§ 1.5), and will be released shortly after the embargo expires. The exact cadence and latency are still being determined in the light of operational and performance constraints; more details will be provided closer to the start of the image releases. During the first six months of the LSST, prompt PVIs and difference images may be released with somewhat higher latency as Rubin continues to assess data quality and scale up data services.

4.2.1 Prompt Direct-Image Source Catalogs

During the pre-DR1 Early Operations period, because of the lack of Data Release catalog coverage of the sky, Rubin will release per-epoch direct-image `Source` catalogs for each single-epoch PVI (see § 4.2). Similar to the `Source` catalogs that will be part of future Data Releases, these catalogs are based on detections in the PVIs themselves, rather than on difference images, and are distinct from the difference-image `DiaSource` catalogs produced by Alert Production. This is a temporary measure that will end with the release of DR1. Although not formally subject to the embargo, these catalogs will be released together with their corresponding PVIs after the 80-hour embargo period for convenience and consistency. They will be distributed only as per-image Butler datasets and will not be accessible via database queries.

Prompt image publication is under active development. Nightly PVIs and per-epoch direct-image `Source` catalogs are not expected to begin before July 2026.

4.3 Prompt Products Database

The Prompt Products Database (PPDB) serves as Rubin's real-time catalog of transient, variable, and moving-object detections, supporting community use of alerts. It stores the Catalog Prompt Data Products (`DiaSource`, `DiaObject`, `SSObject`, and `SSSource`), as well as observation metadata tables, and is designed to provide efficient access for scientific analysis and querying. As noted in § 4.2.1, it will not contain the Early-Operations prompt `Source` catalog data, which will be distributed only as per-image Butler datasets.

Note that the contents of the PPDB are very similar to the cumulative content of all released Alerts, with the principal exception of some precovery data that will only appear in the PPDB. The project understands that several brokers are planning to aggregate the Alert stream and provide query services on the results, which we hope will cover some of the use cases of the PPDB during the period before it becomes available to users.

Due to ongoing technical development, the PPDB is not expected to become publicly available before June 2026. Further details will be provided in future versions of this document.

5 Data Access Environment

The Rubin data access environment provides data rights holders with access to all Rubin data products and services. The Rubin data rights policy is described in RDO-013. Prior to the first full LSST Data Release, DR1, all services for data access are under active development and are provided on a shared-risk basis.

5.1 Data Access Centers

Rubin data products will be served to the community from the US Data Access Center (US DAC) hosted in the Google Cloud.[4]. A number of Rubin Independent Data Access Centers (IDAC) are also under construction to provide additional user computing resources to LSST users around the globe [RTN-003].

[4] `data.lsst.cloud`

5.2 Rubin Science Platform

The Rubin Science Platform (RSP), described in LSE-319, is a set of integrated web-based applications, services, and tools that provides access to the Rubin data products and enables next-to-the-data analysis. The RSP comprises three different "Aspects": a *Portal* Aspect designed to provide an environment for data discovery, query, filtering, and visualization; a *Notebook* Aspect to enable next-to-the-data analysis; and an *API* Aspect for programmatic access to the Rubin data products via Virtual Observatory (VO) interfaces. The Portal and Notebook Aspects of the RSP make use of the same APIs as the API Aspect to internally access the LSST datasets.

The RSP is currently under active development and a fully functional RSP is not expected to be available until DR1. The current version of the RSP is deployed at the US DAC and will be used to host the Early Science datasets. New functionality will be deployed incrementally, as it becomes available.

RSP functionality already deployed and operational:

- TAP and Butler access to catalogs and images;
- DataLink annotations in TAP query results for access to light curves and other related information;
- ObsCore data model for image metadata;
- IVOA-compatible SIAv2 and ObsTAP image metadata query services;
- IVOA SODA service for cutouts from individual single-epoch images and coadded image tiles[5];
- DataLink annotations to the ObsTAP and SIAv2 services for access to the full images as well as the SODA service;
- Authenticated HiPS data service for seamless pan-and-zoom access to coadded data;
- Some Portal-Notebook integration features such as seeding a notebook with a query that was executed in the Portal, and retrieving results in the Portal from a query executed from a notebook;

[5] At this time, the cutout service can only process requests for one cutout at a time, meaning to create and retrieve 10 cutouts will require 10 independent synchronous calls to the cutout service. A bulk cutout service is under development and expected to be available by DR1

- Initial user query-history capabilities; and
- Temporary-table uploads for TAP queries, providing multi-object query capabilities, supported for both Qserv (DP1) and Postgres (DP0.3).

RSP functionality not yet available but that is expected by DP2:

- Expanded user query-history and query-status capabilities;
- Context-aware documentation, e.g., pop-ups in the portal, documentation in-context such as "click on the column name and go to the page that explains it in detail;"
- Support for the ADQL spatial INTERSECTS() operation.

Most of the functionality that is expected by DP2 will be rolled out incrementally between DP1 and DP2.

Initial functionality for prompt-products data access in the RSP will be similar to that provided for DP1, but with Google BigQuery as the back end for the catalog data.

RSP functionality not yet available but that is expected by DR1:

- Bulk cutout services, both for individual targets across a range of epochs, and for lists of multiple targets;
- PSF retrieval service;
- Forced photometry on-demand service;
- Data product recreation services;
- Parallel computing;
- Batch processing;
- Support for persistent user-created databases, and their federation with the project-provided databases;
- Support for collaborative work;

- WebDAV service to edit files on their RSP from their preferred device;
- Dask for parallel computing;
- Full LSSTCam focal-plane visualizations.

Again, it is likely that a number of these features will be rolled out incrementally before DR1.

RSP functionality that is under consideration for post-DR1:

- Access to GPUs;
- Bringing individual resources to the RSP, e.g., additional compute paid for by individuals.

5.3 Community Brokers

Alerts are fully world-public and will be accessible via one or more of the nine Rubin-endorsed Community Brokers[6]. During the commissioning period, Rubin will work with the Community Brokers to integrate them [RTN-010]. Community access to early alerts will depend on the readiness of the Community Brokers.

6 Science Considerations for Optimizing Early Science

It will not be possible to survey the whole sky in all filters and generate templates by the end of the commissioning period. A strategy for template generation in the early phases of the survey, which will require balancing a tradeoff between various factors such as smaller area with multiple filters vs a single filter over a large area, must be devised.

There is no non-sidereal observing in the Rubin baseline survey plan and consequently there will be no non-sidereal tracking available during the early science era.

Different science drivers naturally lead to different prioritization strategies, e.g., Milky Way science would prefer templates that cover the Galactic Plane, time domain science would prefer templates in multiple bands rather than a single band for a larger area. Supernova, transient

[6] See https://www.lsst.org/scientists/alert-brokers

and variable science strongly advocate for templates for all bands in the Deep Drilling Fields to be prioritized. Rubin Operations will work closely with the science community to develop a science-driven approach to template generation in the early phases of the survey that will benefit the maximum number of science cases.

6.1 Time Domain

The Transients and Variable Stars Science Collaboration (TVSSC) reviewed the opportunities for Early Science for non time-critical and time-critical science cases in Hambleton et al. (2020) and Street et al. (2020) respectively. In both cases, they recommend the prioritization of template acquisition in multiple bands as the preferred strategy rather than single-band coverage over a larger area of sky.

6.2 Solar System

The Solar System Science Collaboration (SSSC) reviewed opportunities for Early Science in Schwamb et al. (2021) for several high impact solar system science opportunities that would be enabled by accelerated template generation and alert production in year 1. They find that template generation options that maximize the sky coverage in year 1 where LSST Solar System Processing can run daily are strongly preferred, even if the templates result in noisier image subtraction compared to later years.

6.3 Static Science

Datasets for static science will flow from the SV Surveys carried out during commissioning and released as Data Preview 2 (DP2). The commissioning team are planning to acquire on-sky observations that would enable science validation studies for the four LSST science drivers. Guidance is being sought from the community to enhance opportunities for science validation and early science based on commissioning data. Rubin Obs SIT-Com collected "Commissioning Notes" from the community in 2020–2021 that are being considered as part of the planning for the on-sky observing strategy during commissioning. [7]

[7] See https://community.lsst.org/t/community-input-to-the-on-sky-observing-strategy-during-commissioning/4406

Rubin Operations Survey and Data Release Timeline

Event	Date Range
Data Preview 0.1/2/3 (DP0)	30 Jun 2023
Rubin First Light (RFL)	23 June 2025
Data Preview 1 (DP1)	30 Jun 2025
Start of Operations (OPS)	25 Oct 2025
Rubin First Alerts (RFA)	Jan – Feb 2026
PPDB Release (PPDB)	Not before Jun 2026
Data Preview 2 (DP2)	Jul – Sep 2026
Nightly PVIs & Direct-Image Catalogs (NPC)	Not before July 2026
Start of LSST (SVY)	Undefined
Data Release 1 (DR1)	LSST start + 1 year

Table 7: Rubin Operations Key Milestones for Early Science

6.4 Target of Opportunity

Rubin Observatory will be prepared to take advantage of Targets of Opportunities (TOO) in the first year of operations (and hopefully SIT-Com). RTN-008 describes potential data processing scenarios for TOO observations in the early operations era.

7 Roadmap and Timeline

Table 7 presents the Operations timeline, including nominal date ranges for the various elements of the Early Science Program. For completed milestones, the actual delivery dates are listed. Milestone dates are expressed as minimum–maximum ranges to reflect the associated uncertainty or "not before" dates The early date typically corresponds to the early forecast, including any additional operational uncertainty, while the late date approximately reflects the current late date plus any additional operational uncertainty. As the release date approaches, we expect these ranges to narrow as our understanding of the remaining uncertainties improves. Nevertheless, there remains the possibility that the assumptions underlying these estimates are incorrect; the dates presented therefore represent our best current assessment.

The next key milestone is the release of Data Preview 2 in July–September 2026. The observatory is currently in the Early Optimization Phase, and the start date for the LSST will be defined once the system is achieving stable, repeatable performance consistent with survey requirements. Table 7 will continue to be refined and updated in future version of this document as the Early Science Program progresses.

8 Community

Rubin Observatory will work closely with the Survey Cadence Optimization Committee (SCOC) and Community on the detailed design of the Early Science Program.

8.1 Survey Cadence Optimization Committee

The Rubin Survey Cadence Optimization Committee (SCOC)[8] is an advisory committee to the Rubin Observatory Operations Director consisting of 10 members drawn almost entirely from the science community. Convened in 2020, the SCOC will be a standing committee throughout the lifetime of Rubin Observatory operations and will be involved in all aspects of the development of the Early Science Program.

The SCOC will work with the Rubin Operations team and the Community to establish the best strategy for Early Science, including making specific recommendations in terms of, for example, the prioritization of sky coverage, filters, and other specific choices. Recommendations will take into account the plans for commissioning and the realized performance of the telescope and software, and should align as closely as possible with those of the main survey and ultimate long-term science goals. Optimizing the LSST Year 1 observing schedule for early science may mean that the time sampling looks somewhat different to that in subsequent years.

The SCOC has published its Phase 1, 2 and 3 survey cadence recommendations in PSTN-053, PSTN-055 and PSTN-056 respectively. The SCOC will solicit input from the community on the specific observing strategy in year 1 to optimize early science. Several science collaborations have already been proactive in providing input, both the community forum and as research notes (Schwamb et al., 2021; Hambleton et al., 2020; Street et al., 2020).

[8] See https://www.lsst.org/content/charge-survey-cadence-optimization-committee-scoc

8.2 Community Forum

The Rubin Observatory Community Platform has a dedicated category for Early Science[9], where community members are encouraged to open discussions on the topic of early science. Community feedback on the Early Science data products is welcomed and will help the Rubin to improve its data products and services.

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[9] See `https://community.lsst.org/t/about-the-early-science-category/5775`

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B Acronyms

Acronym	Description
ADQL	Astronomical Data Query Language (IVOA standard)
AGN	Active Galactic Nuclei
AOS	Active Optics System
API	Application Programming Interface
COSMOS	Cosmic Evolution Survey
DAC	Data Access Center
DC2	Data Challenge 2 (DESC)
DDF	Deep Drilling Field
DECam	Dark Energy Camera
DESC	Dark Energy Science Collaboration
DMTN	DM Technical Note
DOE	Department of Energy
DOI	Digital Object Identifier

DP0	Data Preview 0
DP1	Data Preview 1
DP2	Data Preview 2
DPDD	Data Product Definition Document
DR	Data Release
DR1	Data Release 1
DRP	Data Release Processing
ECDFS	Extended Chandra Deep Field-South Survey
EDFS	Euclid Deep Field South
FBS	Feature-Based Scheduler
FWHM	Full Width at Half-Maximum
HiPS	Hierarchical Progressive Survey (IVOA standard)
IDAC	Independent Data Access Center
ITL	Imaging Technology Laboratory (UA)
IVOA	International Virtual Observatory Alliance
LPM	LSST Project Management (Document Handle)
LSE	LSST Systems Engineering (Document Handle)
LSS	Large Scale Structure
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
LSSTCam	LSST Science Camera
LSSTComCam	Rubin Commissioning Camera
LVK	LIGO-Virgo-KAGRA
MAF	Metrics Analysis Framework
MPC	Minor Planet Center
MPCORB	Minor Planet Center Orbit database
NGC	New General Catalogue
NSF	National Science Foundation
ObsCore	Observation Data Model Core Components (IVOA standard)
ObsTAP	Observation (metadata) Table Access Protocol (part of IVOA ObsCore standard)
PCW	Project Community Workshop
PPDB	Prompt Products DataBase
PSF	Point Spread Function

PSTN	Project Science Technical Note
PVI	Processed Visit Image
RDO	Rubin Directors Office
RSP	Rubin Science Platform
RTN	Rubin Technical Note
SCOC	Survey Cadence Optimization Committee
SIT	System Integration, Test
SODA	Server-side Operations for Data Access (IVOA standard)
SRD	LSST Science Requirements; LPM-17
SSP	Solar System Processing
SV	Science Validation
TAP	Table Access Protocol (IVOA standard)
TBD	To Be Defined (Determined)
TOO	Target of Opportunity
ToO	Target of Opportunity
US	United States
VO	Virtual Observatory
WFD	Wide-Fast-Deep
XMM	ESA X-ray Multi-mirror Mission