VERA C. RUBIN OBSERVATORY

U.S. National Science Foundation

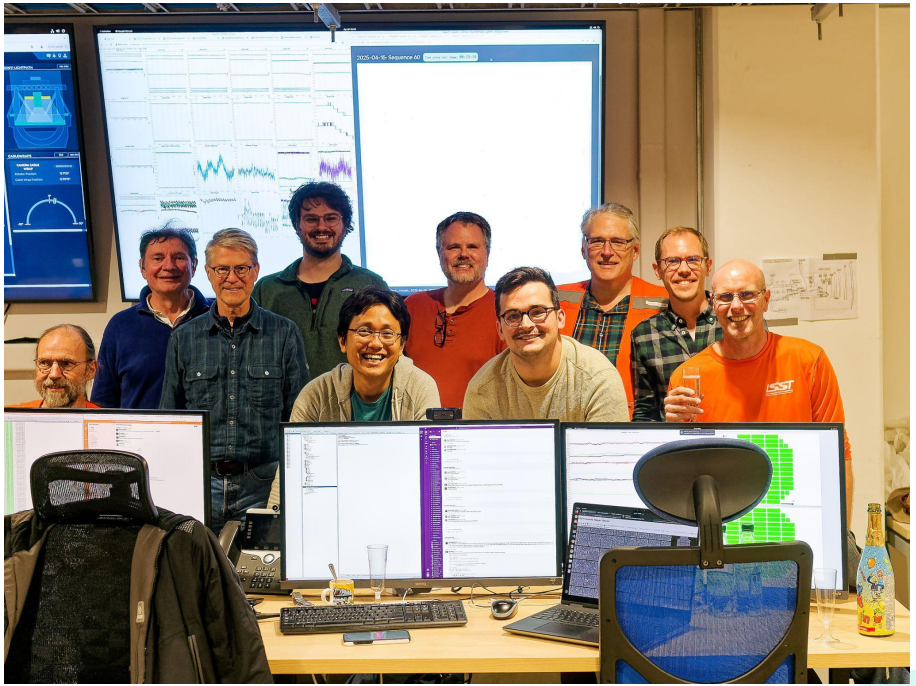
U.S. DEPARTMENT of ENERGY | Office of Science

Operations Update, CAA

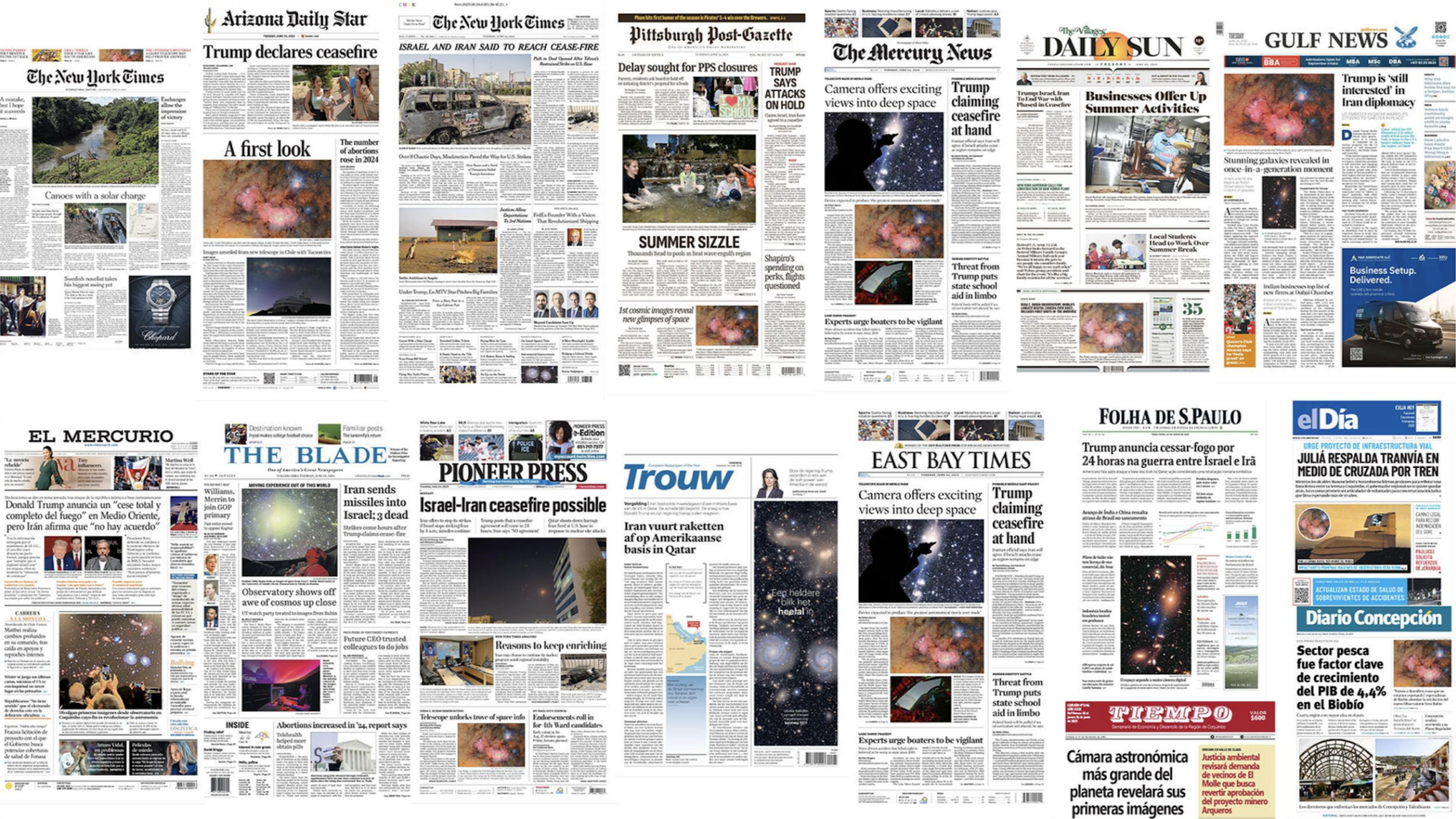
Bob Blum, Phil Marshall

2025 October 07

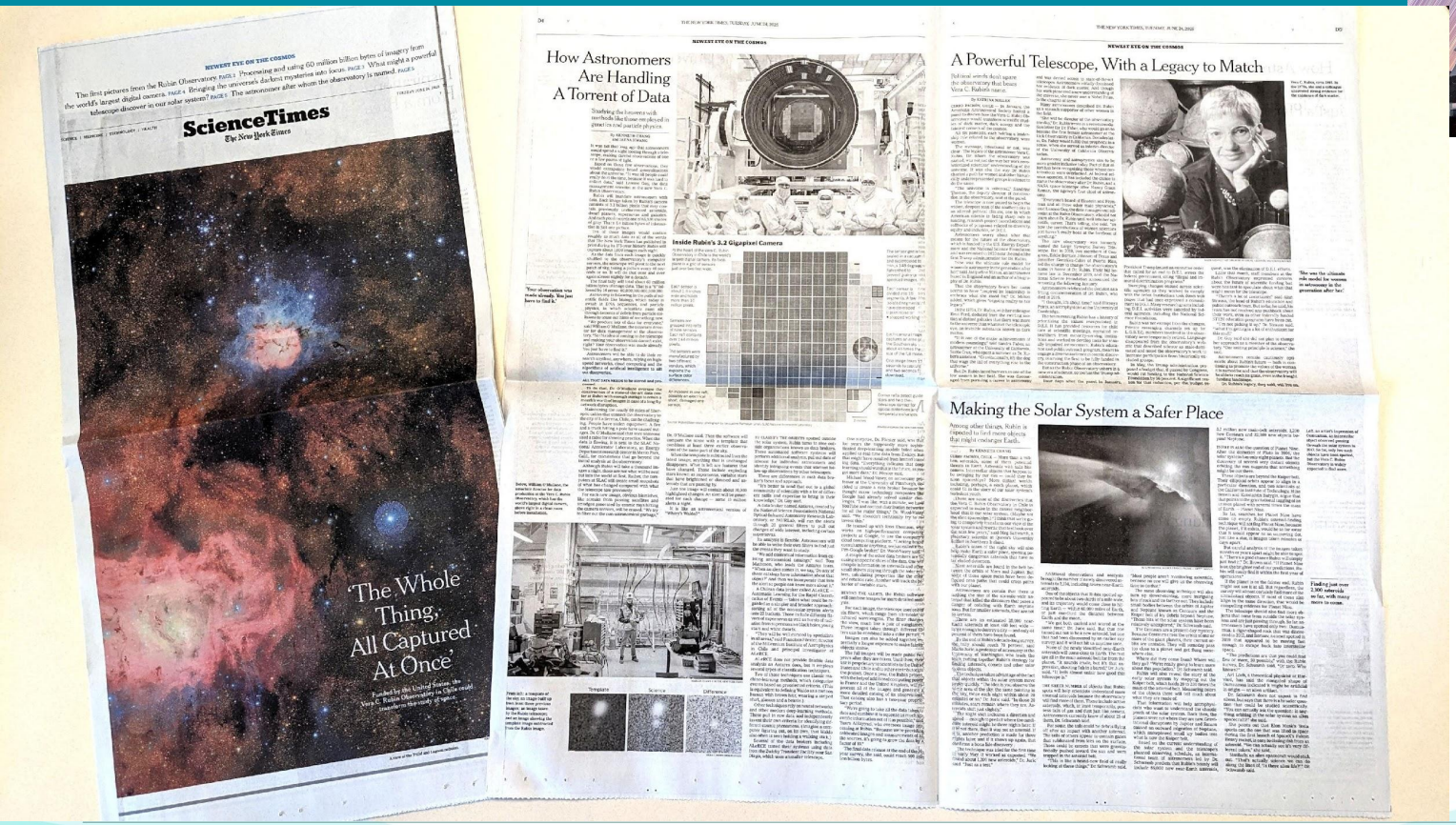
First On-Sky Image April 15th




Rubin First Look!


The New York Times
Canoes with a solar charge
Arizona Daily Star
Trump declares ceasefire
A first look
The number of abortions rose in 2024
The New York Times
ISRAEL AND IRAN SAID TO REACH CEASE-FIRE
Pittsburgh Post-Gazette
Delay sought for PPS closures
TRUMP SAYS ATTACKS ON HOLD
SUMMER SIZZLE
1st cosmic images reveal new glimpses of space
The Mercury News
Camera offers exciting views into deep space
Trump claiming ceasefire at hand
Experts urge boaters to be vigilant
The Villages DAILY SUN
Businesses Offer Up Summer Activities
Local Students Head to Work Over Summer Break
GULF NEWS
Trump is 'still interested' in Iran diplomacy
Stunning galaxies revealed in once-in-a-generation moment
Business Setup. Delivered.
EL MERCURIO
Donald Trump anuncia un "cese total y completo del fuego" en Medio Oriente, pero Irán afirma que "no hay acuerdo"
THE BLADE
Iran sends missiles into Israel; 3 dead
Observatory shows off awe of cosmos up close
PIONEER PRESS
Israel-Iran ceasefire possible
Reasons to keep enriching
Telescope unlocks trove of space info
Trouw
Iran vuurt raketten af op Amerikaanse basis in Qatar
Camera offers exciting views into deep space
Trump claiming ceasefire at hand
Experts urge boaters to be vigilant
EAST BAY TIMES
Threat from Trump puts state school aid in limbo
FOLHA DE S.PAULO
Trump anuncia cessar-fogo por 24 horas na guerra entre Israel e Irã
elDía
JULIÁ RESPALDA TRANVÍA EN MEDIO DE CRUZADA POR TREN
Diario Concepción
Sector pesca fue factor clave de crecimiento del PIB de 4,4% en el Biobío
TIEMPO
Cámara astronómica más grande del planeta revelará sus primeras imágenes
Justicia ambiental revisará demanda de vecinos de El Molle que busca revertir aprobación del proyecto minero Arqueros

NYT Science Section



5 pages!
June 24, 2025

Rubin First Look “watch parties”

Designed and executed by NOIRLab’s CEE (Phoebe Dubisch, Lars Lindberg Christensen...)

Over 360 locations around the world:

Attendance:

150,000 (including 1000 journalists)

Planning for Early Operations

- **Operations begins 25 October** following a engineering (on-sky) shutdown and pre-survey maintenance period that commenced the week of September 21st.
- The LSST will begin when we have obtained the reliable performance needed for the 10 year survey. The system as delivered from the Construction team is capable of meeting our requirements. We need to optimize the system to reliably meet that performance night after night.
- Today, we review data for the community in hand now (DP1) and plans going forward including what data was obtained at the end of Commissioning (Science Validation Surveys) to set the stage for what is to come in the next year and decade.

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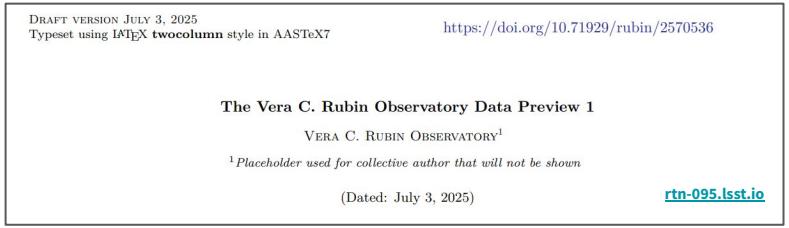
Data for the Community: DP1

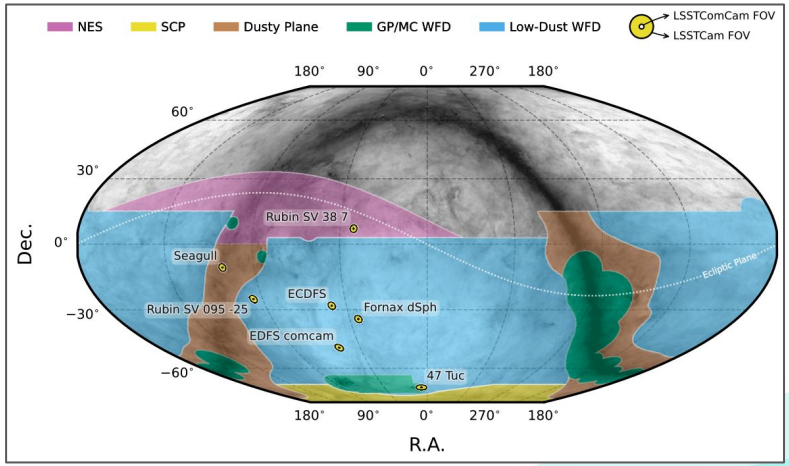
Slides provided by Leanne Guy

Data Preview 1 (DP1) – Delivered 30 June 2025

First data preview from Rubin Observatory based on science-grade data from the Commissioning Camera (LSSTComCam), acquired between 10 Oct – 11 Dec 2024

- 1792 raw exposures in *ugrizy* over distinct 48 nights;
- ~15 sq. deg. total area across 7 ~equal-size non-contiguous fields that span a range of stellar densities, latitudes and overlap with external datasets;
- 2.3 million distinct astrophysical objects;
- 3.5 TB total data volume;
- Access via early version of the Rubin Science Platform for data rights holders.
- data.lsst.cloud





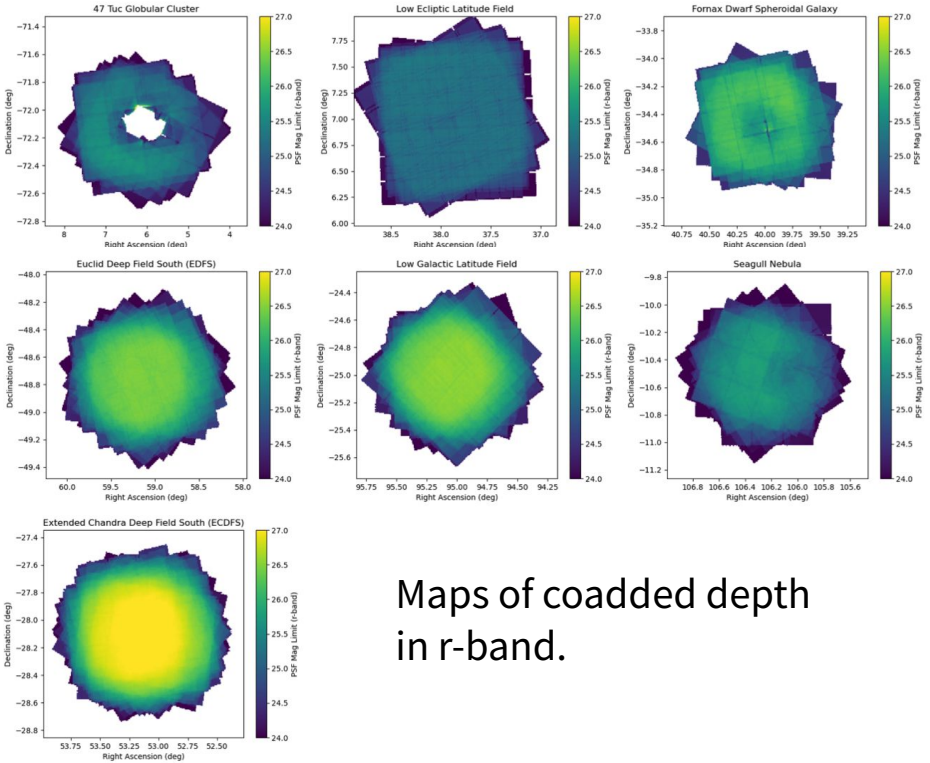
RTN-095: The Vera C. Rubin Observatory Data Preview 1

Show affiliations | Show all authors

NSF-DOE Vera C. Rubin Observatory Team ; Acero-Cuellar, Tatiana ; Acosta, Emily ; Adair, Christina L. ; Adari, Prakruth ; Adelman-McCarthy, Jennifer K. ; Alexov, Anastasia ; Allbery, Russ ; Allsman, Robyn ; AlSayyad, Yusra ; Amado, Jhonatan ; Amouroux, Nathan ; Antilogus, Pierre ; Aracena Alcayaga, Alexis ; Aravena-Rojas, Gonzalo ; Araya Cortes, Claudio H. ; Aubourg, Éric ; Axelrod, Tim S. ; Banovetz, John ; Barría, Carlos ; ...

We present Rubin Data Preview 1 (DP1), the first release of data from the NSF-DOE Vera C. Rubin Observatory, consisting of raw and calibrated single-epoch images, coadds, difference images, detection catalogs, and other derived data products. DP1 is based on 1792 science-grade optical/near-infrared exposures acquired over 48 distinct nights by the Rubin Commissioning Camera, LSSTComCam, on the Simonyi Survey Telescope at the Summit Facility on Cerro Pachón, Chile during the first on-sky commissioning campaign in late 2024. DP1 covers a total of ~15 sq. deg. over seven roughly equally-sized non-contiguous fields, each independently observed in six broad photometric bands, ugrizy, spanning a range of stellar densities and latitudes and overlapping with external reference datasets. The median image quality across all bands, measured by the FWHM of the point-spread function, is approximately 1.13 arcseconds, with the sharpest images reaching about 0.65 arcseconds. DP1 contains approximately 2.3 million distinct astrophysical objects, of which 1.6 million are extended in at least one band, and 431 solar system objects, of which 93 are new discoveries. DP1 is approximately 3.5 TB in size and available to Rubin data rights holders via the Rubin Science Platform, a cloud-based environment for the analysis of petascale astronomical data. While small compared to future LSST releases, its high quality and diversity of data support a broad range of early science investigations across all four LSST themes, providing a valuable opportunity to engage with Rubin data ahead of the start of full operations in late 2025.

DP1 Deep Coadded Images



Maps of coadded depth in r-band.

DP1 deep coadds are built from single visit images with a PSF FWHM smaller than 1.7''.

Table 2. Median 5σ coadd point source detection limits per field and band.

Field Code	Band					
	u	g	r	i	z	y
47_Tuc	-	24.03	24.24	23.90	-	21.79
ECDFS	24.55	26.18	25.96	25.71	25.07	23.10
EDFS_comcam	23.42	25.77	25.72	25.17	24.47	23.14
Fornax_dSph	-	24.53	25.07	24.64	-	-
Rubin_SV_095_-25	24.29	25.46	24.95	24.86	24.32	22.68
Rubin_SV_38_7	-	25.46	25.15	24.86	23.52	-
Seagull	23.51	24.72	24.19	-	23.30	-
LSST 10-year (Bianco et al.)	**25.7**	**26.9**	**26.9**	**26.3**	**25.6**	**24.9**

DP1 fields support a wide range of science

Field	Suggested Science Use	Bands	Stellar Density	Relative Cadence	External Data
47 Tuc	Crowded field photometry	griy	High	Sparse	GAIA
Rubin SV 38 7	Solar System objects	griz	Medium	Low	—
Fornax dSph	Resolved dwarf galaxies	gri	High	Very Sparse	—
ECDFS	Extragalactic, time domain	ugrizy	Low	Highest	HST, DECam, The Monster
EDFS	Extragalactic, weak lensing	ugrizy	Low	High	Euclid
Rubin SV 95 -25	Galactic plane science	ugrizy	Medium	Medium	—
Seagull	Star formation, ISM	ugrz	Medium	Sparse	—

“47 Tuc Globular Cluster”

“Low Ecliptic Latitude Field”

“Fornax Dwarf Spheroidal Galaxy”

“Extended Chandra Deep Field South”

“Euclid Deep Field South”

“Low Galactic Latitude Field”

“Seagull Nebula”

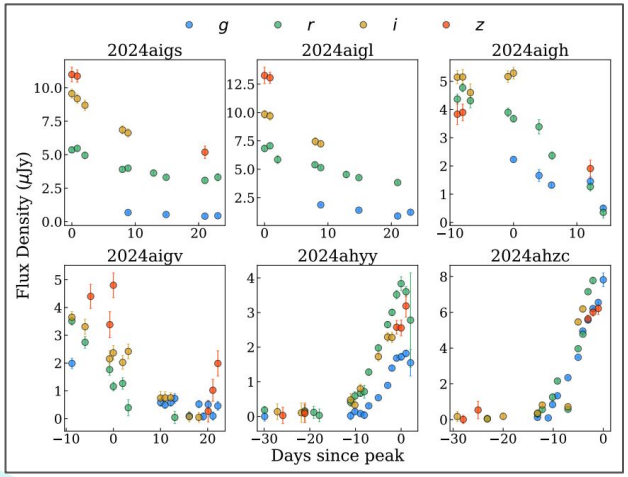
This table summarizes and compares the seven DP1 fields.

It is available in tutorial notebook “301.0 DP1 Overview”.

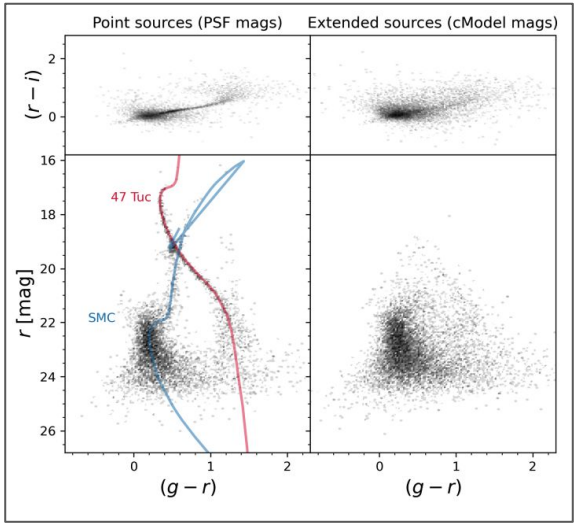
Find it at dp1.lsst.io/tutorials

First results from DP1

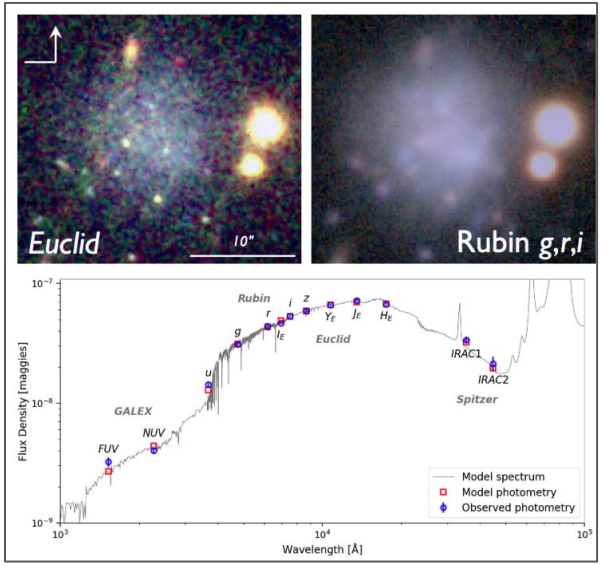
Three example figures from the earliest DP1-based papers.



Extragalactic transients in DP1.
Freeburn et al. 2025



CMDs and Color-Color plots with
Stellar isochrones for 47 Tuc.
Choi et al. 2025



Ultra-diffuse galaxy in Euclid+Rubin.
Romanowsky et al. 2025

Data Preview 1: data from ComCam released on June 30 ’25

First Rubin science papers are appearing on arXiv!!

See ls.st/rtn-095

RUBIN | DP1

Overview | Data products | Data processing | Tutorials | **How to cite Data Preview 1** | More

How to cite Data Preview 1

How to cite Rubin Observatory.

When citing this data release please reference the data release paper: **NSF-DOE Vera C. Rubin Observatory** (2025); The Vera C. Rubin Observatory Data Preview 1 https://doi.org/10.71929/rubin/2570536.

For AAS publications please refer to the facility as “Rubin:Simonyi” and for DP1 use “Rubin:Simonyi (LSSTComCam)”. The Minor Planet Center has allocated the telescope code X05.

arXiv > astro-ph > arXiv:2507.00192

Astrophysics > Astrophysics of Galaxies

[Submitted on 30 Jun 2025]

An outer-disk SX Phe variable star in Rubin Data Preview 1

Jeffrey L. Carlin, Peter S. Ferguson, A. Katherina Vivas, Neven Caplar, Konstantin Malanchev

We report the discovery of an SX Phoenicis-type pulsating variable star via 217 epochs of time-series photometry from the Vera C. Rubin Observatory's Data Preview 1. The star, designated LSST-DP1-O- 614435753623041404 (or LSST-C25_var1 for short), has mean magnitudes of $(\langle g \rangle, \langle r \rangle) = (18.65, 18.63)$, with pulsation amplitudes of (0.60, 0.38)-mag in these bands. Its period is 0.0767 days (1.841 hours), typical of SX Phe pulsators. We derive a distance to the star of 16.6 kpc based on an SX Phe period-luminosity relation. Its position ~ 5 kpc from the Galactic plane, in the outer Milky Way disk at a Galactocentric distance of ~ 22 kpc, and its proper motion suggest that LSST-C25_var1 is part of the Monoceros Ring structure. This star is presented as a small taste of the many thousands of variable stars expected in Rubin/LSST data.

arXiv > astro-ph > arXiv:2506.23955

Astrophysics > Instrumentation and Methods for Astrophysics

[Submitted on 30 Jun 2025]

Variability-finding in Rubin Data Preview 1 with LSDB

Konstantin Malanchev, Melissa DeLucchi, Neven Caplar, Alex I. Malz, Wilson Beebe, Doug Branton, Sandro Campos, Andrew Connolly, Mi Dai, Jeremy Kubica, Olivia Lynn, Rachel Mandelbaum, Sean McGuire, Eric Aubourg, Robert David Blum, Jeffrey L. Carlin, Francisco Delgado, Emmanuel Gangler, Buell T. Jannuzi, Tim Jenness, Yijung Kang, Arun Kannawadi, Marc Moniez, Andrés A. Plazas Malagón, Wouter van Reeven, David Sanmartim, Elana K. Urbach, W. M. Wood-

n advance of the upcoming Legacy Survey of Space and Time (LSST), which will enable boundless ovides an ideal sandbox for validating innovative data analysis approaches for the LSST mission, whose te presents a pair of such pipelines for variability-finding using powerful software infrastructure suited rmat and the LSDB framework, developed by the LSST Interdisciplinary Network for Collaboration and ability-finding pipelines built on LSDB, the HATS catalog of DP1 data, and preliminary results of

arXiv > astro-ph > arXiv:2507.03228

Astrophysics > Astrophysics of Galaxies

[Submitted on 4 Jul 2025]

Crowded Field Photometry with Rubin: Exploring 47 Tucanae with Data Preview 1

Tobin M. Wainer, James R. A. Davenport, Eric C. Bellm, Yuankun (David)Wang, Neven Caplar, Elliott S. Burdett, Nora Shipp, John K. Parejko, Gray Thoron, Eric Butler, Maya Salwa, Erin Leigh Howard, Brianna Marie Smart, Wilson Beebe, Ishan F. Ghosh-Coutinho, Bob Abel, Željko Ivezić

We analyze imaging from Data Preview 1 of the Vera C. Rubin Observatory to explore the performance of early LSST pipelines in the 47 Tucanae field. The coadd-\texttt{object} catalog demonstrates the depth and precision possible with Rubin, recovering well-defined color magnitude diagrams for 47 Tuc Small Magellanic Cloud. Unfortunately, the existing pipelines fail to recover sources within ~28 pc of the cluster center, due to the extreme source density. Using Rubin's forced photometry on stars identified via Difference Imaging, we can recover sources down to ~14 pc from the cluster center, and find 14744 potential cluster members with this extended dataset. While this forced photometry has significant systematics, our analysis showcases the potential for detailed structural studies of crowded fields with the Rubin Observatory.

arXiv > astro-ph > arXiv:2507.01343

Astrophysics > Solar and Stellar Astrophysics

[Submitted on 2 Jul 2025]

47 Tuc in Rubin Data Preview 1: Exploring Early LSST Data and Science Potentia

Yumi Choi, Knut A. G. Olsen, Jeffrey L. Carlin, Yuankun (David)Wang, Fred Moolekamp, Abi Saha, Ian Sullivan, Colin T. Slate Adair, Peter S. Ferguson, Yijung Kang, Karla Peña Ramírez, Markus Rabus

We present analyses of the early data from Rubin Observatory's Data Preview 1 (DP1) for the globular cluster 47 Tuc field. The DP1 dataset for 47 Tuc includes four nights of observations from the Rubin Commissioning Camera (LSSTComCam), covering multiple bands (ugriy). We address challenges of crowding near the cluster core and toward the SMC in DP1, and demonstrate improved star-galaxy separation by fitting fifth-degree polynomials to the stellar loci in color-color diagrams and applying multi-dimensional sigma clipping. We compile a catalog of 3,576 probable 47 Tuc member stars selected via a combination of isochrone, Gaia proper-motion, and color-color space matched filtering. We explore the sources of photometric scatter in the 47 Tuc color-color sequence, evaluating contributions from various potential sources, including differential extinction within the cluster. Finally, we recover five known variable stars, including three RR Lyrae and two eclipsing binaries. Although the DP1 lightcurves have sparse temporal sampling, they appear to follow the patterns of densely-sampled literature lightcurves well. Despite some data limitations for crowded-field stellar analysis, DP1 demonstrates the promising scientific potential for future LSST data releases.

Rubin Comet Catchers

RFL data with LSSTCam: 3I/ATLAS paper on arXiv

Astrophysics > Earth and Planetary Astrophysics

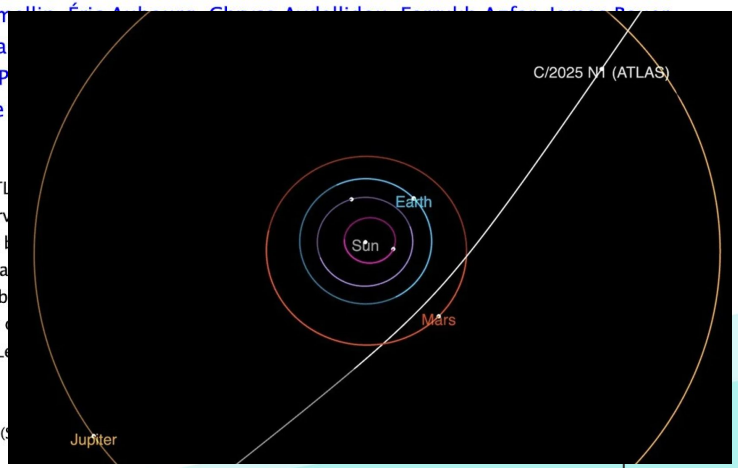
[Submitted on 17 Jul 2025]

NSF-DOE Vera C. Rubin Observatory Observations of Interstellar Comet 3I/ATLAS (C/2025 N1)

Colin Orion Chandler, Pedro H. Bernardinelli, Mario Jurić, Devanshi Singh, Henry H. Hsieh, Ian Sullivan, R. Lynne Jones, Jacob A. Kurlander, Dmitrii Vavilov, Siegfried Eggl, Matthew Holman, Federica Spoto, Megan E. Schwamb, Eric J. Christensen, Wilson Beebe, Aaron Roodman, Kian-Tat Lim, Tim Jenness, James Bosch, Brianna Smart, Eric Bellm, Sean MacBride, Meredith L. Rawls, Sarah Greenstreet, Colin Slater, Aren Heinze, Željko Ivezić, Bob Blum, Andrew Connolly, Gregory Daues, Rahil Makadia, Michelle Gower, J. Bryce Kalmbach, David Monet, Michele T. Bannister, Luke Dones, Rosemary C. Dorsey, Wesley C. Fraser, John C. Forbes, Cesar Fuentes, Carrie E. Holt, Laura Inno, Geraint H. Jones, Matthew M. Knight, Chris J. Lintott, Tim Lister, Robert Lupton, Mark Jesus Mendoza Magbanua, Renu Malhotra, Beatrice E. A. Mueller, Joseph Murtagh, Nitya Pandey, William T. Reach, Nalin H. Samarasinha, Darryl Z. Seligman, Colin Snodgrass, Michael Solontoi, Gyula M. Szabó, Ellie White, Maria Womack, Leslie A. Young, Russ Allbery, Roberto Arm
Keith Bechtol, Matthew Belyakov, Susan D. Benecchi, Ivano Bertini, Bryce T. Bolin, vMaitrayee Bose, Laura E. Buchana
Felipe Braga-Ribas, Daniel Calabrese, J. I. B. Camargo, Neven Caplar, Benoit Carry, Juan Pablo Carvajal, Yumi Choi, P
Daubard, James R. A. Davenport, Tansu Daylan, Jennifer Delgado, Hadrien A. R. Devillepoix, Peter E. Doherty, Abbie
Felsmann, Frossie Economou, Marielle R. Eduardo et al. (112 additional authors not shown)

We report on the observation and measurement of astrometry, photometry, morphology, and activity of the interstellar object 3I/ATL
Observatory. The third interstellar object, comet 3I/ATLAS, was first discovered on UT 2025 July 1. Serendipitously, the Rubin Observ
regular commissioning activities. We successfully recovered object detections from Rubin visits spanning UT 2025 June 21 (10 days b
large aperture, we report on the detection of cometary activity as early as June 21st, and observe it throughout. We measure the loca
with typical precision of about 20 mas (100 mas, systematic) and about 10 mmag, respectively. We use these to derive improved orb
hourly timescales. We derive a V-band absolute magnitude of H_V = (13.7 +/- 0.2) mag, and an equivalent effective nucleus radius
this object by a large (8-meter class) telescope reported to date, and illustrate the type of measurements (and discoveries) Rubin's L
later this year.

Comments: 36 pages, 16 figures, 4 tables; collaboration between the NSF-DOE Vera C. Rubin Observatory and the LSST Solar System Science Collaboration (S



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Data for the Community: SV

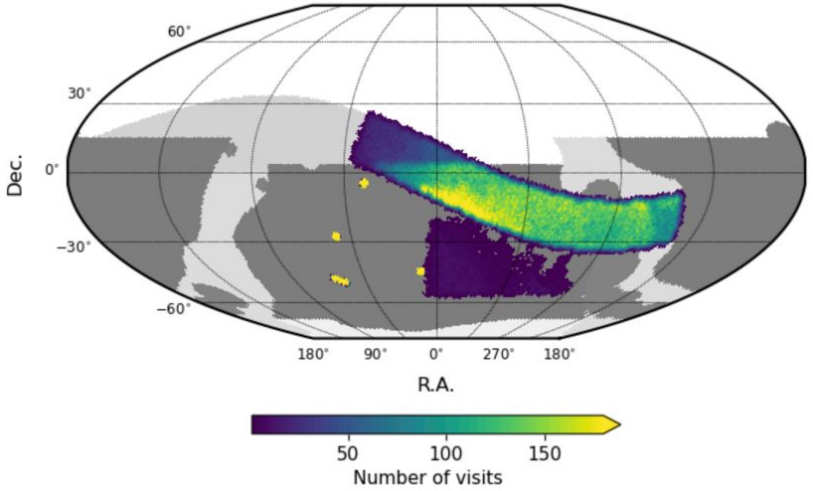
Slides provided by Keith Bechtol

Science Validation (SV) Surveys: Design

See LSST Community Forum post on SV Surveys design

Two main components interleaved as part of a single FBS configuration

- **Deep Survey** – optimized for testing deep coadds at the equivalent integrated exposure of the LSST 10-year survey and beyond, achieving a rapid temporal sampling in those fields, and validating the observing strategy for the LSST Deep Drilling Fields (DDFs);
- **Wide Survey** – optimized for testing template generation and Prompt Processing with difference image analysis at data rates that would be expected during the first year of LSST, thereby providing a sustained full-scale test of the Data Facility

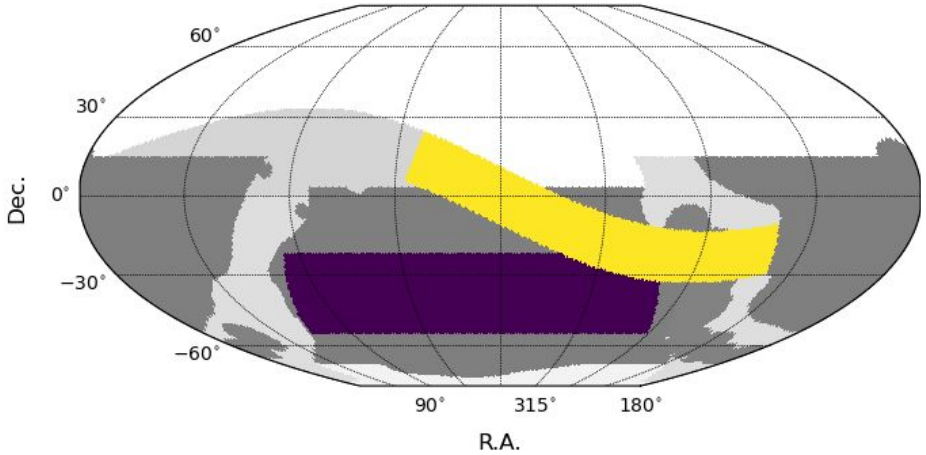


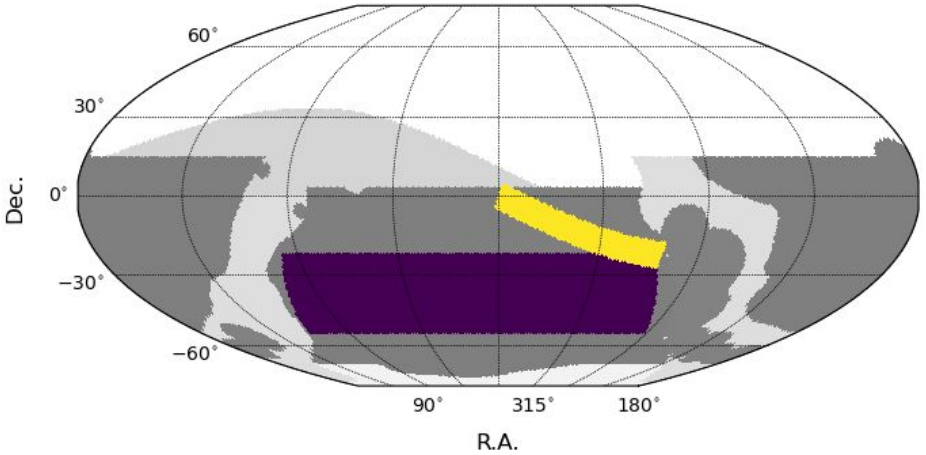
SV surveys adopt many of the design elements of the standard LSST cadence, with modifications to increase the likelihood of delivering a stand-alone high-impact dataset to enhance opportunities for Early Science. Figure shows **design survey simulation**.

Science Validation (SV) Surveys: Timeline

15 Apr	First night sky images w/ LSSTCam
4 May	Rubin First Look observations completed
9 Jun	Start wide-area survey-mode observation engineering
20 Jun	Start of pilot SV Survey observations w/ ~2 hours per night
Early Jul	Multiple consecutive full nights of SV survey operations; System First Light technical milestone
Late Jul-Aug	Multiple winter storms substantially limit opportunities for on-sky observing
24 Jul	One of the five filter sockets on LSSTCam becomes non-operational until engineering downtime
Early Aug	Test priorities shift to emphasize improvements to consistency of delivered image quality
10 Aug	FBS configuration updated to reduce footprint of Wide from 3000 deg^2 → 750 deg^2
12 Aug	Last filter swap during on-sky campaign w/ LSSTCam; remaining observations use *griz* filters only
5 Sep	FBS configuration updated for longer DDF sequences; prioritize ECDFS and ELAIS-S1 DDFs
15 Sep	FBS configuration updated to target only regions with deployed template coverage
21 Sep	Last night of on-sky commissioning campaign w/ LSSTCam
22 Sep	Start final construction downtime and the first operations engineering downtime
Late Oct	Forecast to resume on-sky observations; transition to Early Operations system optimization

SV Surveys Wide Footprint





Left = original plan [~3000 sq deg in primary area]
Right = update (10 Aug) [~750 sq deg in primary area]
Yellow = primary ‘wide’ SV area
Purple = backup (available but not priority) template-generation area (LIGO/Virgo/KAGRA) (useful as late-night area or if moon interfering with primary area)

SV visits dayobs 20250620 to 20250921

These are the visits from the start of the SV survey (20250620) until the end on dayobs 20250921.

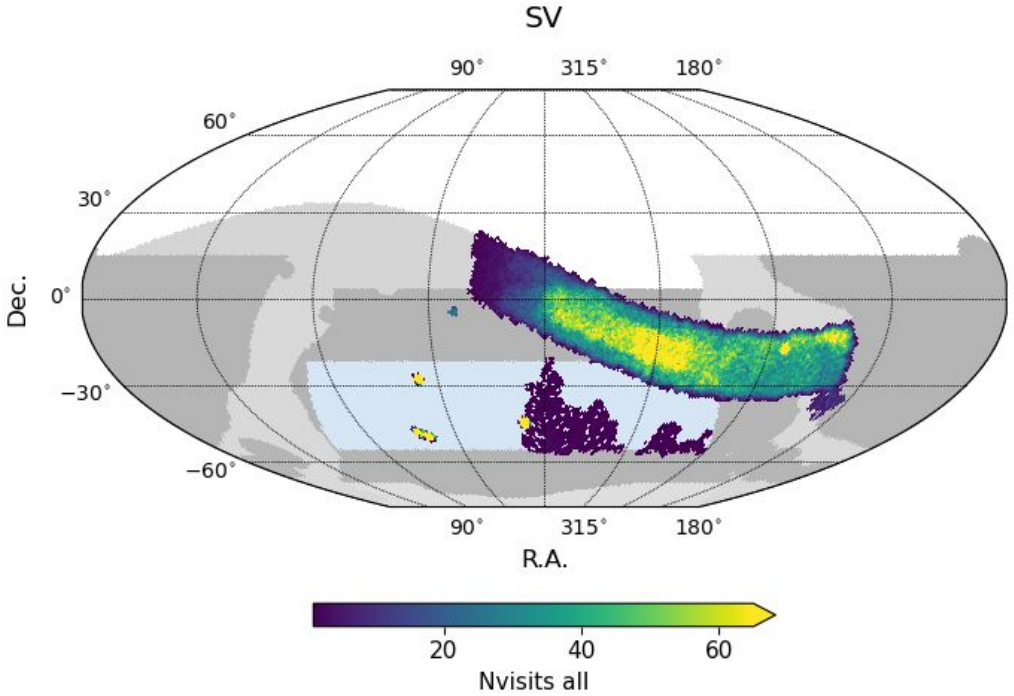
The background gray areas indicate the main survey footprint (dark gray - WFD). The light blue area in the foreground indicates the permitted SV footprint (visible light blue = area included as backup template gathering area in response to community request (LVK area)).

First table below is visits per healpix point within the (750 sq deg) primary wide SV survey area.

Second table is number of visits total.

	u	g	r	i	z	y	all
Nvisits	2.00	4.00	12.00	16.00	11.00	9.00	56.0
CoaddM5	24.38	25.21	25.18	24.82	23.96	22.99	NaN

u	g	r	i	z	y	all
810	1586	2977	3651	3203	2227	14454

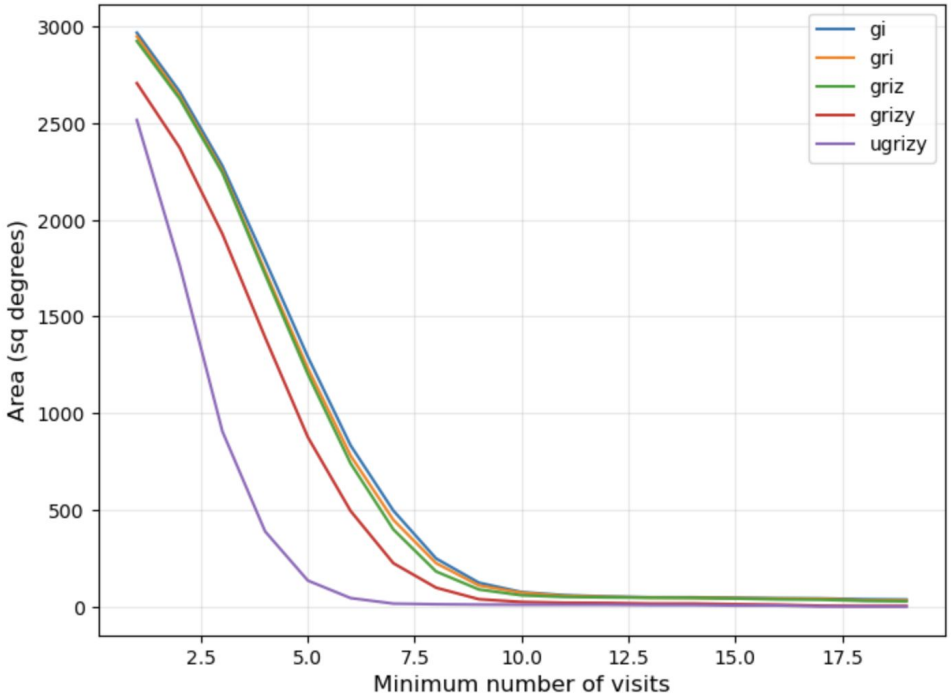


Area covered in multiple bands

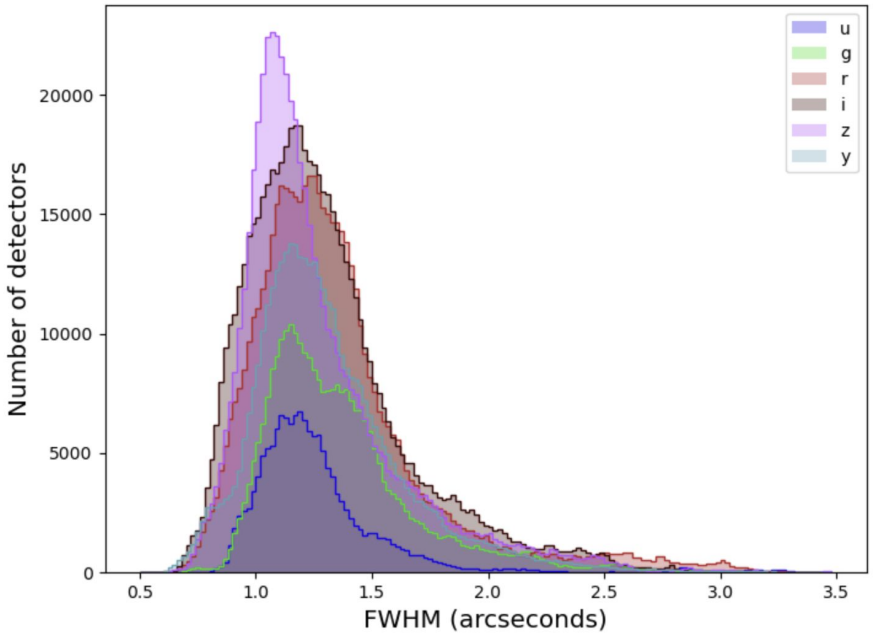
Area covered in SV survey with at least ‘minimum number of visits’ in each band of the various combinations.

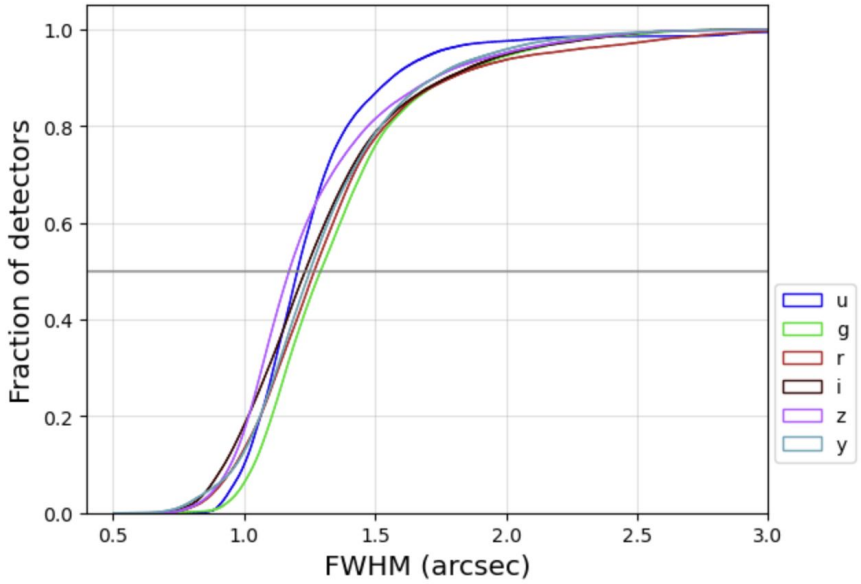
Coverage in griz looks fairly uniform, but requiring y or especially u brings the available area down significantly.

This does not account for image quality or clouds.



Delivered image quality (per detector - quicklook)



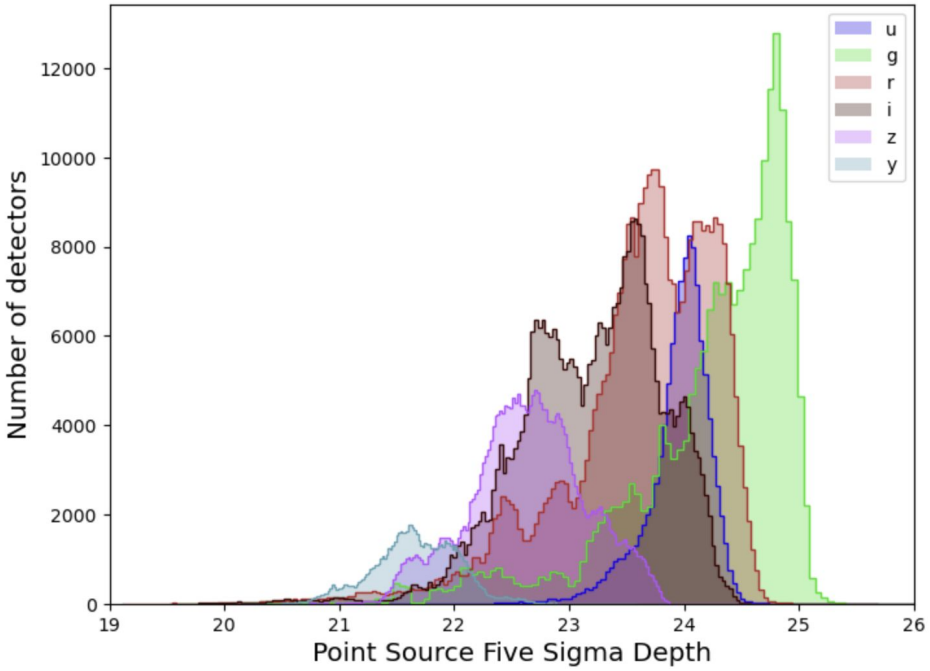


Estimated image depth (per detector - quicklook)

Preliminary per-detector values from quicklook processing currently include zeropoint gradients across the FOV due to flat-field variations (these would be corrected during DRP processing as part of FGCM processing). The strength of variations depends on bandpass (some flatfields are more evenly illuminated than others).

Table below shows median per-visit SNR = 5 depth across all visits (actual and simulated)

	u	g	r	i	z	y
Estimated 5sigma depth	24.0	24.4	23.7	23.2	22.6	21.6
Sim 5sigma v5.0.0	23.4	24.5	24.1	23.5	23.0	22.0



Early Operations

- We have made significant progress in advancing our understanding of the system performance. We will still need to continue optimizing for reliability of performance before starting the LSST. **This is our highest priority in early operations**.
- We will use the data obtained, analysis done and in work, and discussions through the September - October Engineering shutdown/pre-survey maintenance period to plan for what November/December looks like.

Evolving Data Release Schedule following DP1 Experience

- A 6-month data release (“DR1”) was initially conceived (when the Project requirements were defined over 10 years ago) as a way to help the LSST Science Community prepare for analysis at LSST scale.
- Since then, we developed the data previews as a means to release Rubin commissioning data to the community incrementally increasing the dataset at regular intervals.
- The 6-month data release concept has turned out to be over-ambitious – processing and releasing 10,000 square degrees of data within 6 months is not feasible.
- The priority must be to produce a high quality Y1 dataset within ~1 year of Y1 end, and this would not be possible if we attempt a 6 month dataset before that.
- **Data Preview 2 (DP2)**, built from the SV dataset designed to support science analysis development and released during 2026, will give the observatory and the community the time and data we need to optimize and capitalize on the Y1 dataset.

Augmenting SV

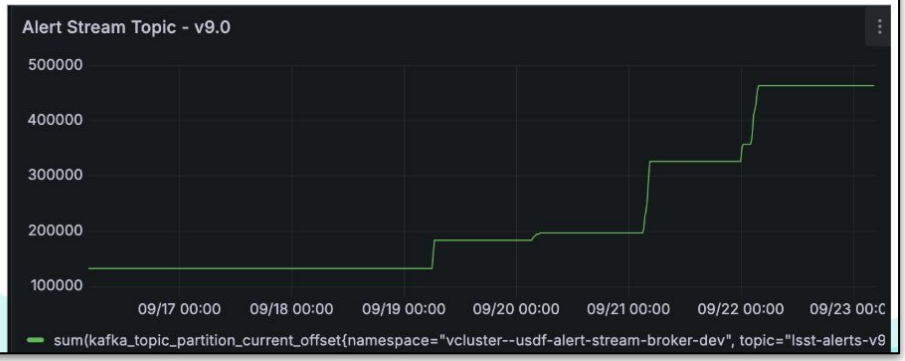
- There is a possibility to augment SV by including some early LSST data in DP2, or even taking more data for 1-2 months before starting the LSST. (We will include “small field” survey data including that taken for First Look.)
- This could push the nominal DP2 release, and potentially the start of LSST and the Y1 release out by approximately the same 1-2 months.
- The Observatory discussed DP2 and the Y1 release (now DR1) with the community at the time of the RCW. **There is clear tension in the competing desires of different SCs and then too the desire to start LSST as soon as possible while still working on performance and optimization of the system**. We work to mitigate these as we chart the course for year 1.
- We will continue to update the community about plans on data releases, timing and content before we start operations. We expect some uncertainty going forward.

Alerts and Prompt Products

- Our goal is to keep alert production and the alert stream on track through 2026. This will provide nightly and prompt data products for the community.
- Community will have an ever improving alert stream as we produce more templates and by mid 2026 we will have PVIs, template images and associated catalogs made available on the RSP regularly (daily with 80 hr latency).

We sent almost half a million alerts to brokers in September.

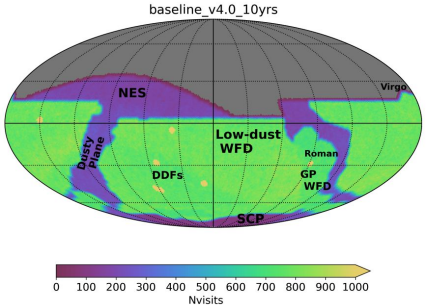
418 visits with alerts. Alerts were filtered on reliability > 0.1.
Average 16 alerts/detector ⇒ 3k alerts/visit



Operations Timeline

Officially starting October 25th, the Operations team takes over responsibility and authority for the Observatory. The Construction Project will continue to work on a "punch list" of items to complete.

- Priority will be performance optimization following end of commissioning to ensure the IQ and survey efficiency are sufficient to start the LSST.



Late 2025
Start LSST
10 Yr cadence begins w/Alerts, incremental templates are generated

Citizen Science data available
Workflows and data available to deploy projects at Zooniverse.

Late 2026 PPDB Ready for users

Early 2027 Start DR Y1 DRP

Release DR1

2026 → 2027 → 2027

Mid 2026 DP2 Released to the community
Includes alert database and single images, incremental template generation continues

Continue to grow alert stream through Y2/2027

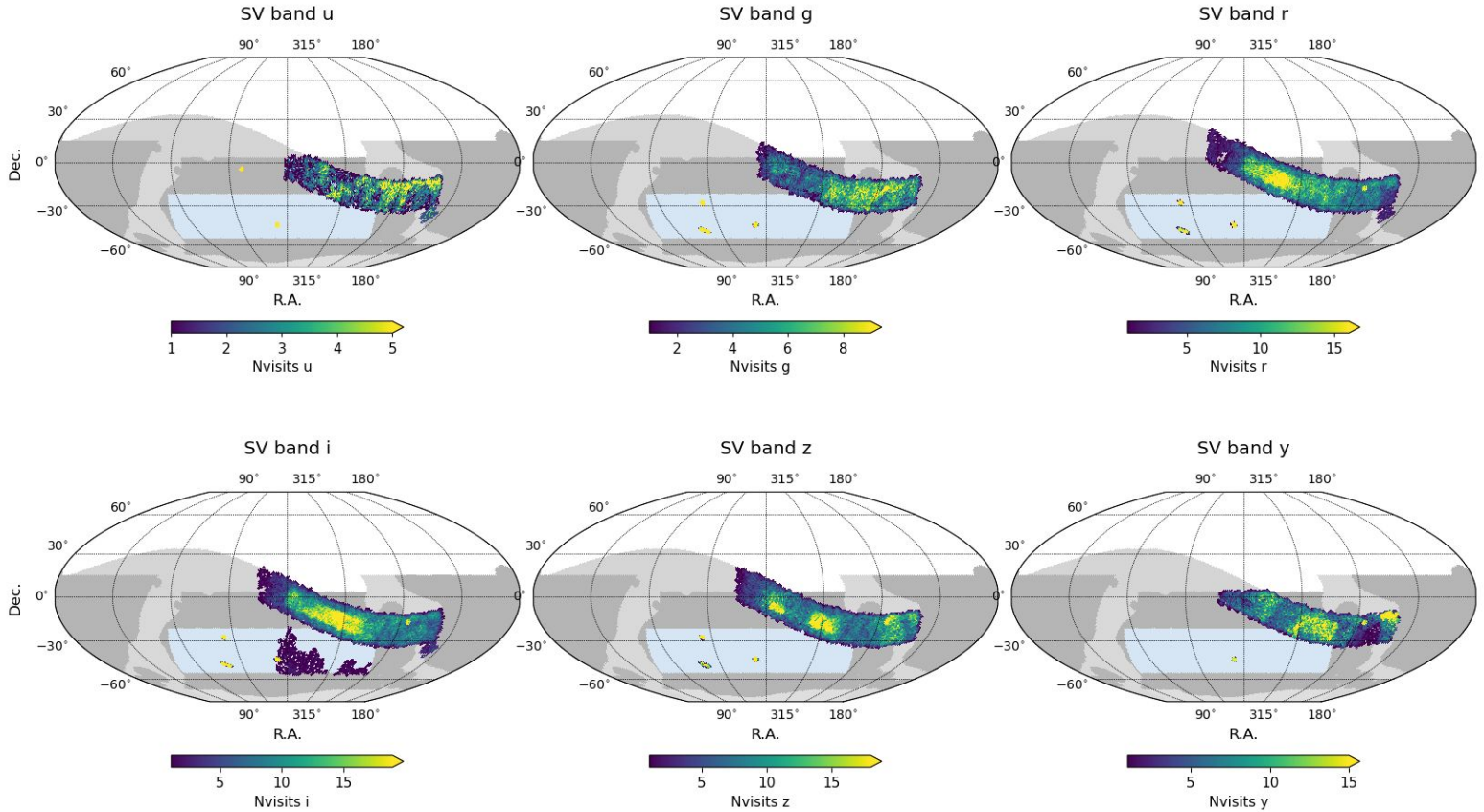
Late 2027 - Early 2028

Final Thoughts

- We are actively working on a set of objective criteria to gate starting the LSST.
- We have shared early draft criteria with the Science Advisory Committee, our community, and our Management Board. We will update everyone soon.
- We are taking stock of the system status now and as it will be coming out of the shutdown while we continue to hone the survey start criteria.
- The highest priority for the team in early operations will be optimizing on-sky performance for the start of LSST.
- Operation is here, and the LSST will soon be.


End of plenary presentation

SV visits dayobs 20250620 to 20250921



Visit Counts by Band in Specific Target Fields

No quality selection criteria applied

Fields observed (mostly) before the start of SV surveys on 20 June

	target	u	g	r	i	z	y	total
0	COSMOS	102	82	166	139	112	66	667
1	M49	261	281	388	255	0	0	1185
2	Trifid-Lagoon	239	199	124	116	0	0	678
3	Rubin_SV_225_-40	315	571	446	390	243	124	2089
4	New_Horizons	36	54	73	108	74	23	368
5	Prawn	196	164	151	93	30	0	634
6	Rubin_SV_212_-7	0	140	238	123	0	0	501
7	Rubin_SV_216_-17	0	64	95	228	0	0	387

LSST DDFs in SV Survey Deep Component

	target	u	g	r	i	z	y	total
0	ECDFS	0	36	39	42	44	0	161
1	ELAISS1	42	107	106	169	117	16	557
2	XMM_LSS	30	0	0	0	0	0	30
3	EDFS_a	0	24	21	28	18	0	91
4	EDFS_b	0	24	21	29	18	0	92

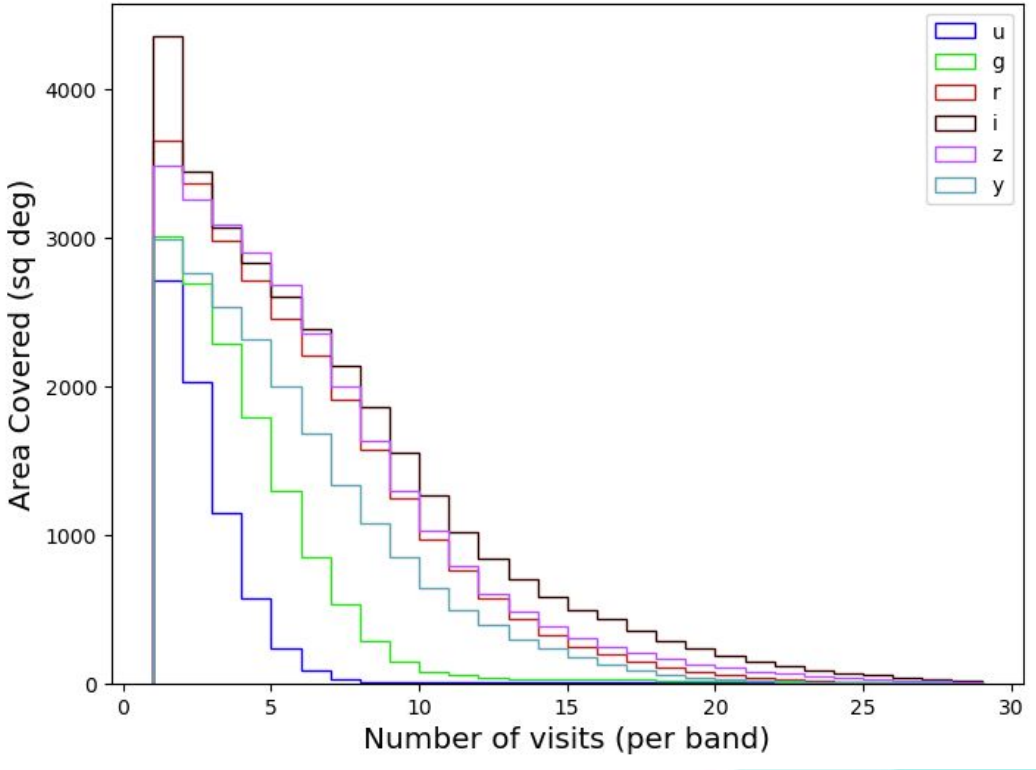
Area covered per band

The area in the original SV footprint was ~3000 sq deg. The updated footprint was ~750 sq deg.

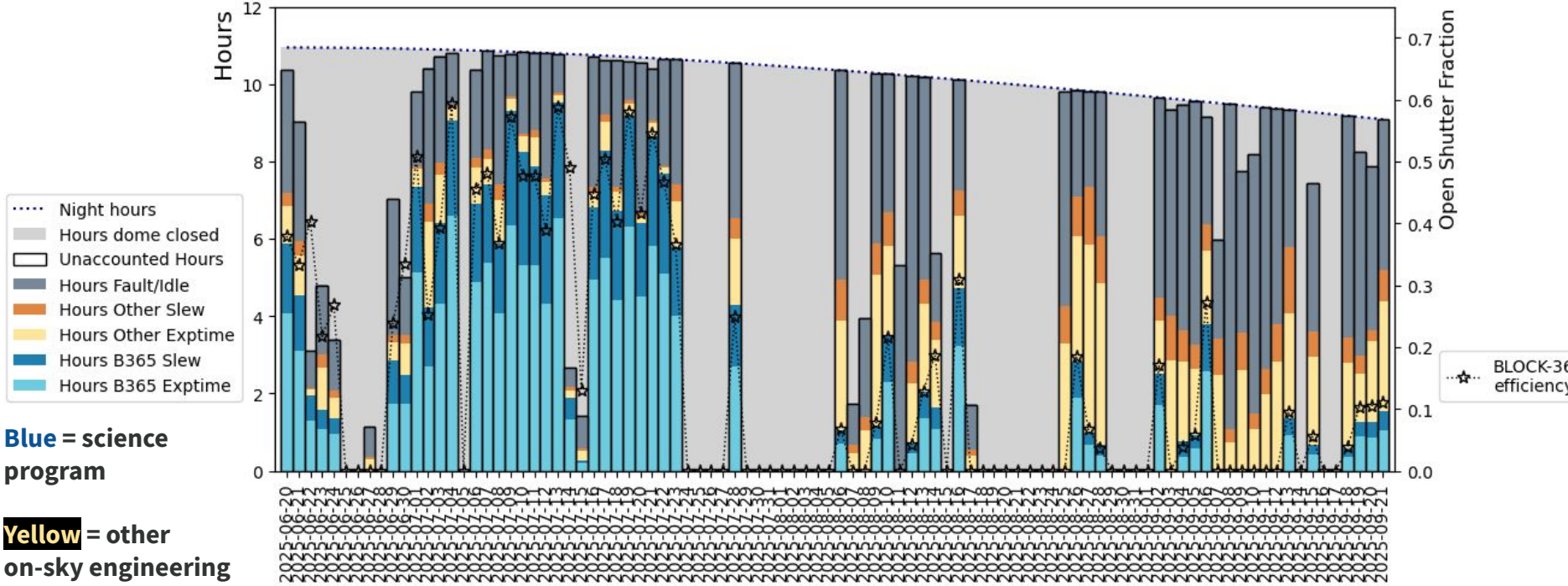
There was a ToO executed outside the footprint that increased the area counted in the SV survey, in uri bands.

The LIGO/Virgo/KAGRA (LVK) template area in the south also increases the coverage in i band, but is extremely sparse.

The four DDFs add on the order of 40 degrees of coverage, but only ELAISS1 and XMM-LSS were observed in u band; XMM-LSS was not observed in other bands.



Time on sky: 20 Jun – 21 September – Full SV Period



Blue = science program

Yellow = other on-sky engineering

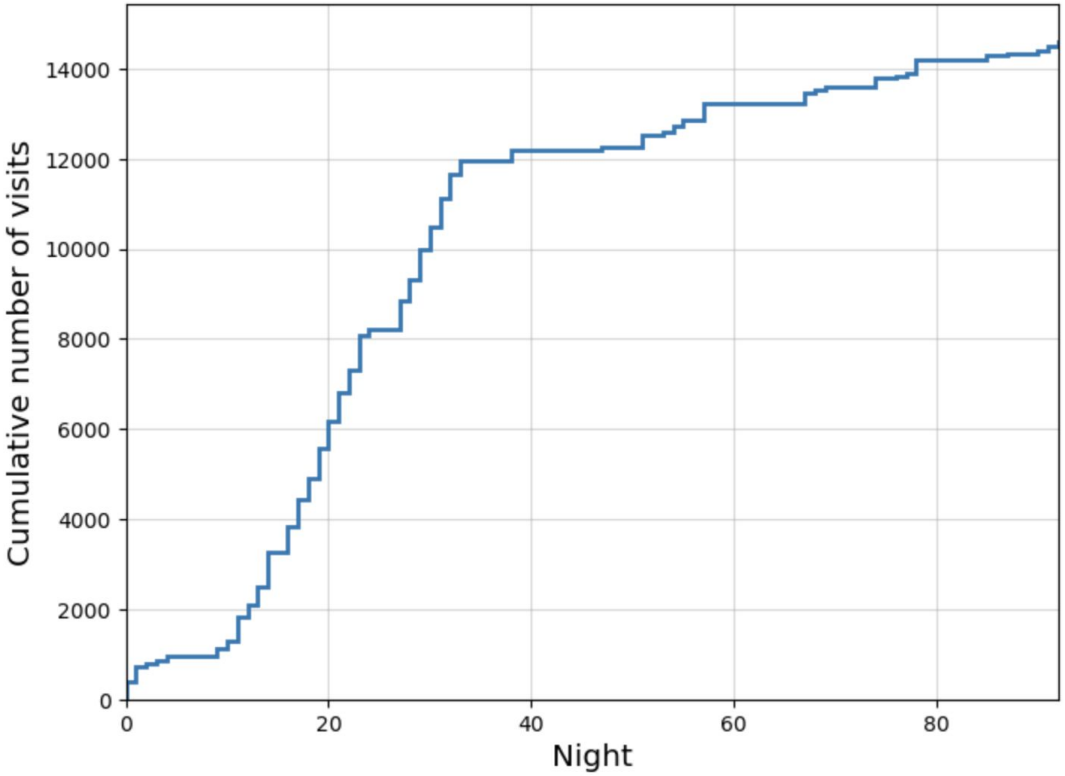
Cumulative SV Survey Visits

First night of survey 2025-06-20

Last night of survey 2025-09-21

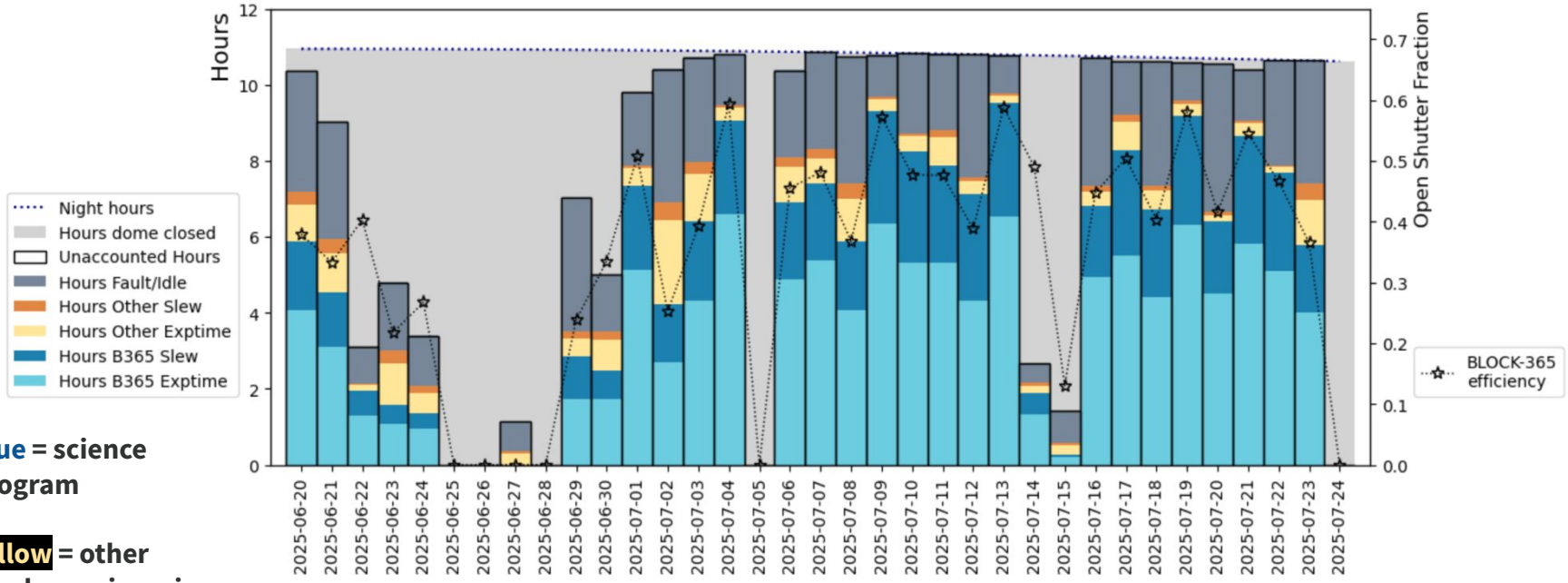
Total of ~14,500 SV survey visits

During early- to mid-July, successfully demonstrated capability to acquire visits at sustained rate matching expectations from survey simulations. However, the overall volume of delivered SV survey visits is substantially lower than our initial goals set out with the design of SV surveys in mid-June (see SITCOMTN-005), due to winter weather and needs to prioritize other on-sky engineering



Time on sky: 20 Jun – 24 Jul

First month (bulk of SV data is from this period) – 11,783 SV visits

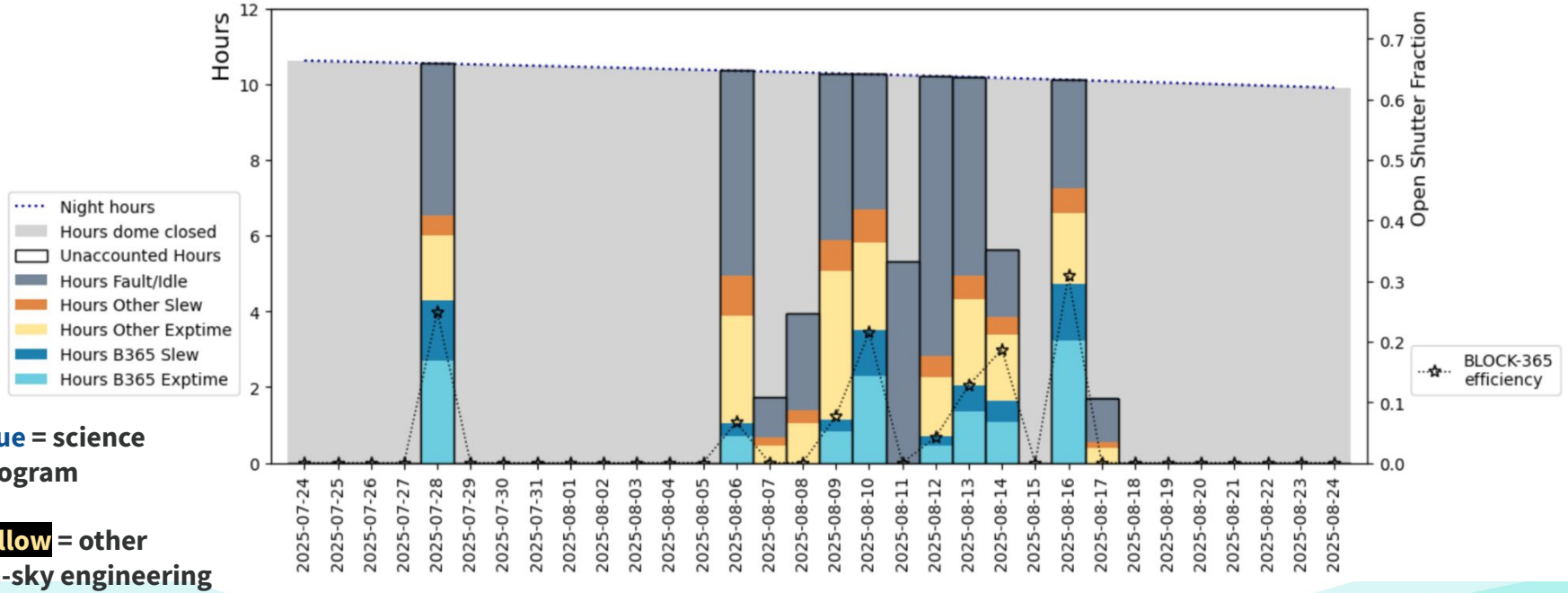


Blue = science program

Yellow = other on-sky engineering

Time on sky: 24 Jul – 25 Aug 🥶

Second month (primarily bad weather) – 1,273 SV visits

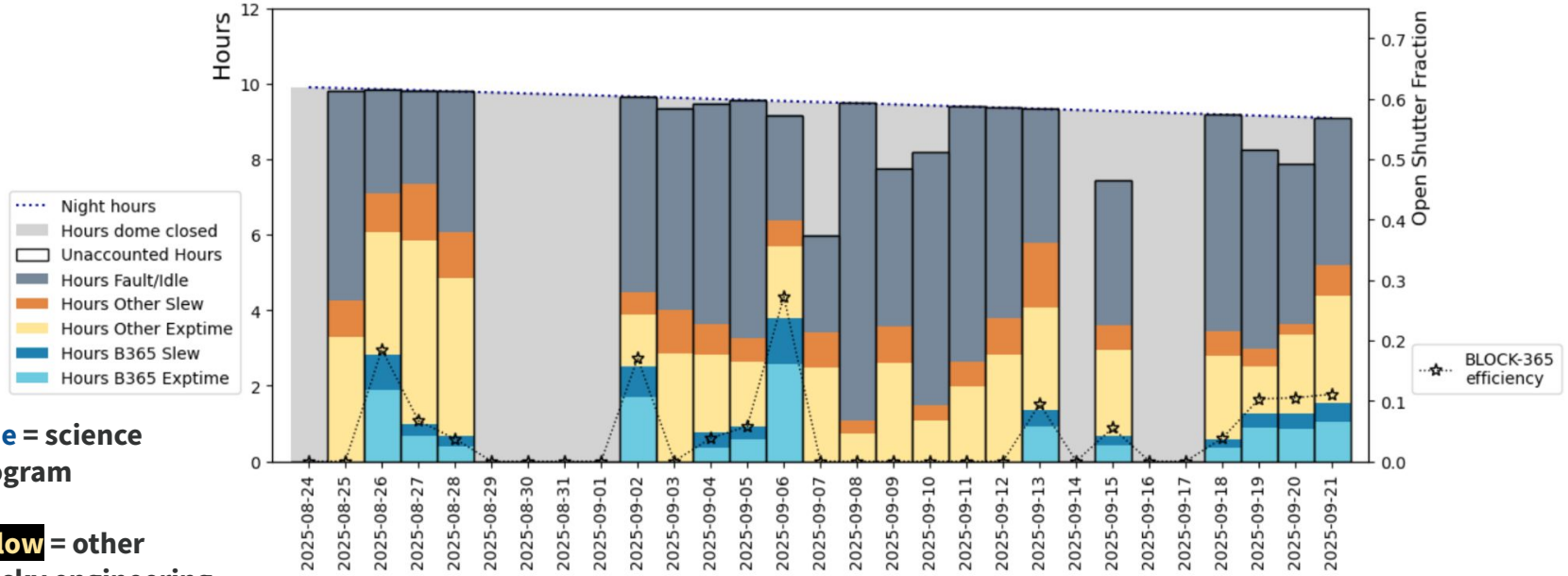


Blue = science program

Yellow = other on-sky engineering

Time on sky: 24 Aug – 21 Sep

Third (last) month (primarily on-sky engineering for AOS commissioning) – 1,468 SV visits

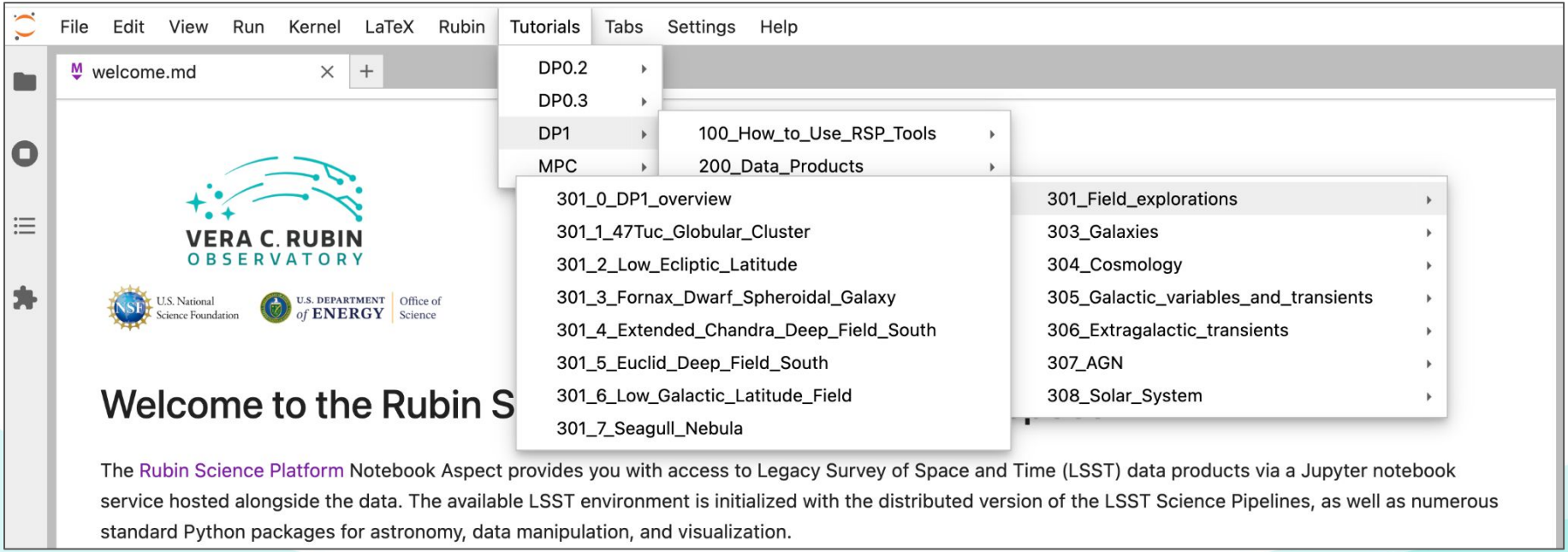


Blue = science program

Yellow = other on-sky engineering

All new tutorials for DP1

To learn more about DP1, start with the “301. Field explorations” series; first “301.0 DP1 Overview” and then your field of interest.

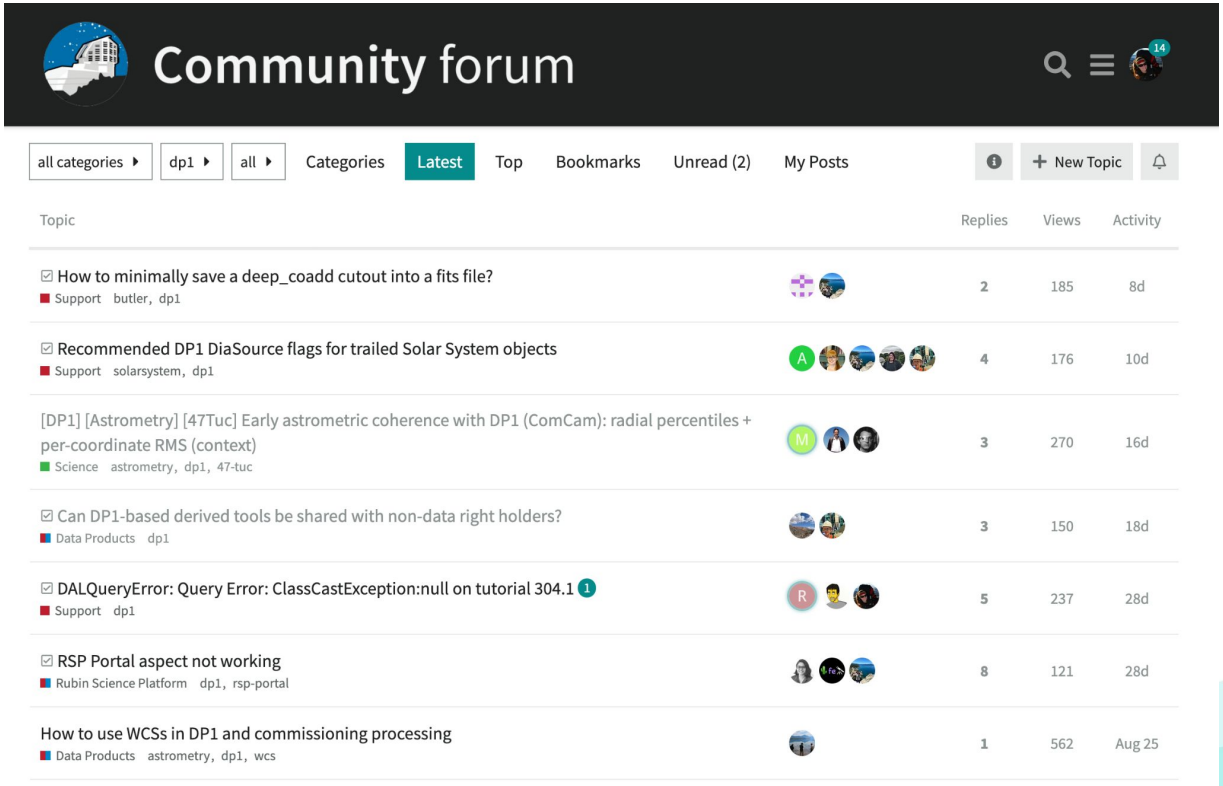


Getting Help with DP1 and the RSP

Support for working with DP1 is provided via the Rubin Community Forum

The Rubin Community Science Team is actively supporting the community to work with DP1 and the RSP.

Create a new topic in the Support category at Community.lsst.org.



DP1 is a small but complete preview.

Science-ready data products in the same format as future LSST data releases…

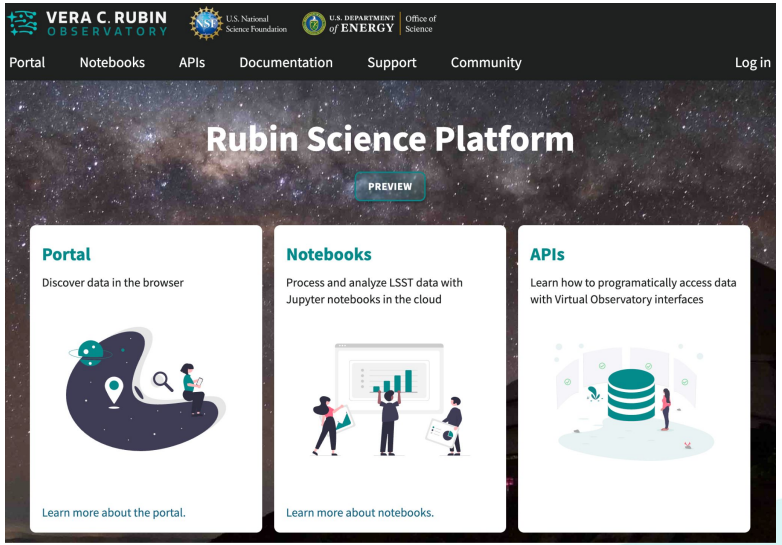
Catalogs:
- object
- source
- forced source
- difference image analysis
- moving objects
- visit metadata

Images:
- deep coadd
- visit
- difference
- template
- raw
- calibration

Maps:
- survey properties
- browsable HiPS

DP1 has a good representation of all the different kinds of data products.

…available for access and analysis with the Rubin Science Platform.



Temporal Distribution of DP1 Observations

Number of epochs (unique nights), and the mean number of visits per epoch, by field.

Table 3: Number of nights, mean visits per night.

Field name	Epochs (nights)	Visits/epoch
47 Tuc Globular Cluster	4	16.5
Low Ecliptic Latitude Field	5	31.8
Fornax Dwarf Spheroidal Galaxy	2	21.0
Extended Chandra Deep Field South (ECDFS)	21	40.7
Euclid Deep Field South (EDFS)	9	30.2
Low Galactic Latitude Field	10	29.2
Seagull Nebula	4	25.0

ECDFS, Rubin SV Low Galactic Latitude Field and EDFS have the largest number of epochs, and will be the best for time-domain studies.

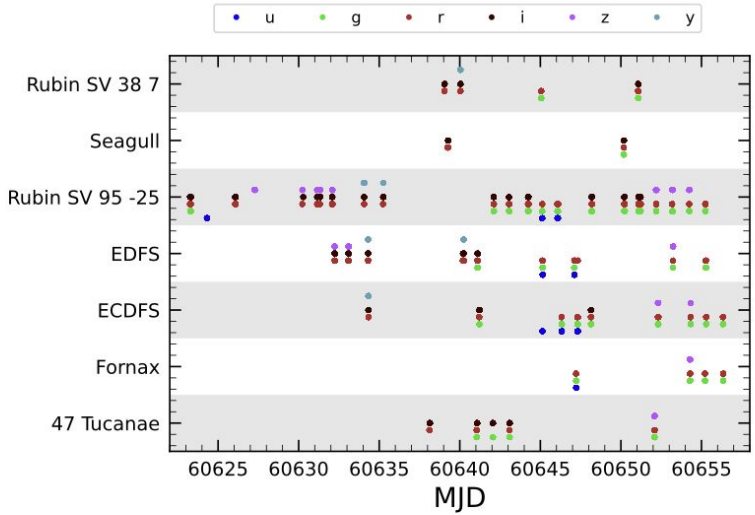


Figure 5. Distribution of DP1 observations by date grouped by field as a function of time over the 48 nights of data taking with LSSTComCam. Each dot represents a single exposure, color-coded by band.

DP1 Processed Visit Images

Fully calibrated single-epoch images that have undergone instrument signature removal, PSF modeling, background subtraction, and astrometric and photometric calibration.

Table 2: Number of visits per band per field.

Field name	u	g	r	i	z	y	Total
47 Tuc Globular Cluster	0	10	32	19	0	5	66
Low Ecliptic Latitude Field	0	44	40	55	20	0	159
Fornax Dwarf Spheroidal Galaxy	0	5	25	12	0	0	42
Extended Chandra Deep Field South (ECDFS)	43	230	237	162	153	30	855
Euclid Deep Field South (EDFS)	20	61	87	42	42	20	272
Low Galactic Latitude Field	33	82	84	23	60	10	292
Seagull Nebula	10	37	43	0	10	0	100

Different coverage per field:

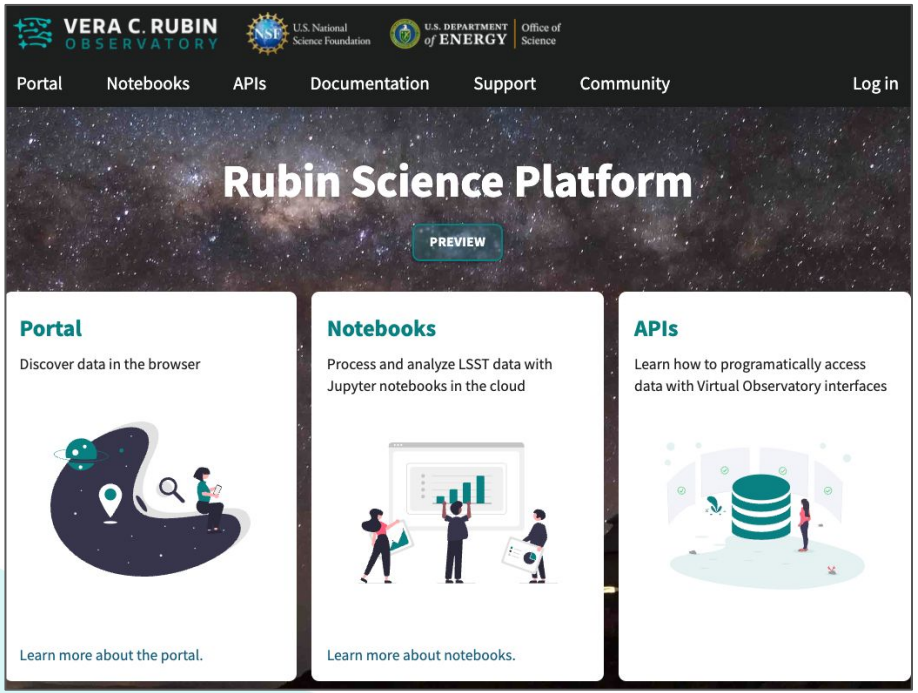
- every field has g & r
- three fields have ugrizy
- ECDFS is the deepest

Key Concept: Visit

- One 30s exposure (38s for u band) in a single filter of all CCDs in the LSSTComCam focal plane
- Synonymous with “exposure” in DP1

The RSP is also in “Preview Mode”

The RSP is the primary interface for scientists to access, explore, and analyze Rubin and LSST data.



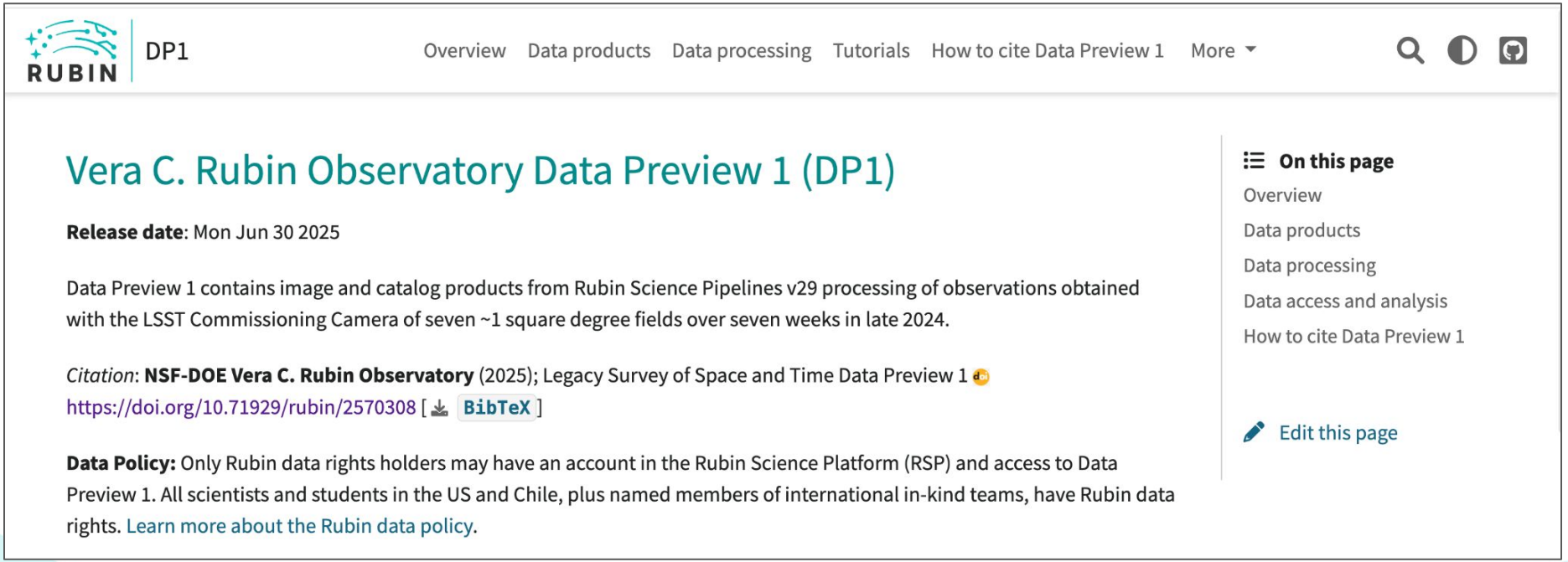
An early preview of the RSP was launched on Google Cloud in 2022, operating under a shared-risk model to support Data Preview 0.

Data Preview 1 brings major updates to RSP services.

Although DP1 is small in size (3.5 TB) to existing survey datasets, future LSST datasets will be larger and more complex, making it crucial to co-locate data and analysis for effective scientific discovery

The RSP remains under active development, with incremental improvements being rolled out as they mature. During Rubin Early Science, the RSP will continue to operate under a shared-risk model.

DP1 Documentation: dp1.lsst.io



All the information in these slides is also found at dp1.lsst.io.

Rubin Early Science Schedule

Rubin Operations Survey and Data Release Timeline

Nominal LSST Start Date: October 2025

Event	Date Range
Data Preview 0.1/2/3 (DP0)	Delivered Jun 2023
Data Preview 1 (DP1)	30 Jun 2025
Rubin First Light (RFL)	Jul 2025
Rubin First Alerts (RFA)	Sep 2025 – Dec 2025
Start of Operations (OPS)	Oct 2025
Start of LSST (SVY)	Nov 2025 – Dec 2025
Start Regular Alert Production (RAP)	Nov 2025 – Dec 2025
Data Preview 2 (DP2)	Jun 2026 – Sep 2026
Data Release 1 (DR1)	Nov 2027 – Mar 2028

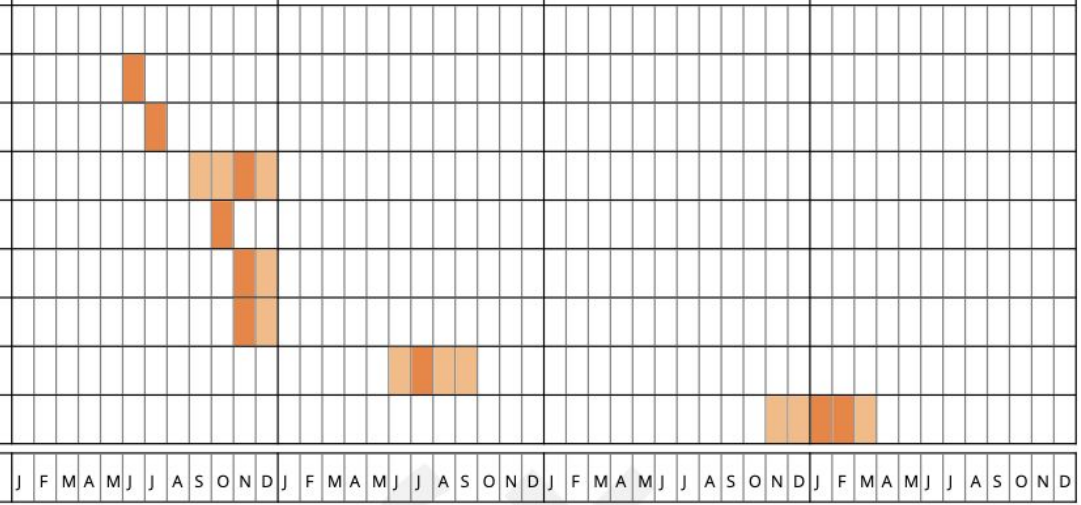


Table 4: Rubin Operations Key Milestones for Early Science

Data Product Delivery Schedule

Rubin Early Science – Data Release Scenario

● – Confirmed
● – Stretch Goal

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	Oct 2027 – Feb 2028 DR1 LSST Year 1 Data	Oct 2028 – Feb 2028 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	–	–	–	–	◉	●	●
DRP ForcedSource Catalogs	●	●	–	●	●	●	●
DRP Difference Images and DIA Catalogs	–	●	–	●	●	●	●
DRP SSP Catalogs	–	–	●	●	●	●	●

Note that unlike for DP1, in future releases difference images will not be included in release due to their size. Instead, they will be generated on demand via dedicated services.