



U.S. National
Science Foundation



U.S. DEPARTMENT
of ENERGY | Office of
Science

Rubin Observatory Update

Early Operations Bob Blum for the Rubin Team

May 19th, 2026

Slide credits, AlSayyad, Bellm,
Bechtol, Blum, Ivezić, Reil



Welcome to Operations! Handover October 25, 2025



Handover started Early Operations

- Substantially Complete, we need to optimize for efficiency (uptime), IQ performance, system reliability (summit and USDF)
- Tune processes, workflows to prepare for (survey) nighttime operations
- Transitions, NOIRLab (people, administrative homes, risk management, safety, travel...), SLAC(people, USDF workflows, processes, onboarding new contributors, nighttime camera support...)
- Continued efforts with Ops partners (UW, Princeton, IPAC, NCSA, Individual contractors, French team, LSST UK) and with the community (CST, DP1 support, SC Chairs engagement, Science Advisory Committee, Users Committee, SCOC ...)
- Reorganization (our Org Chart) and Redirection (Genesis, American Science Cloud)
- Construction Punch List

Camera Cooling Capacity
 CMMS lower fault rate
 blanket condensation mitigations
 Scrub Tools drainage improvement on level 3
 In-Kind Program Coordination
 glycol recirculation 12 Genesis Proposals
 Scheduler Light and Wind Screen Panel 4
 clean facility Top end heat mitigation
 SLAC FWP
 Program Tracking AAS Financial Reports
 transfer and removal of construction items
 Rapid Analysis Data Services
 Five Year Proposal fixed camera leak Change Control
 DP2 processing complete! repaired floors
 Cadence Simulations Citizen Science
 dynalene reliability Admin Support
 On Line Formal Education 12 Louvers! Long Haul Network
 Observatory Software JTM!
 news items and social media engagement
 Nighttime Operations Ultra Fast Rotators
 Data Assemblies First Alerts! Many VIP and Public Visits
 a new elevator mirror

improved DIQ

Risk Management

NSF POP27

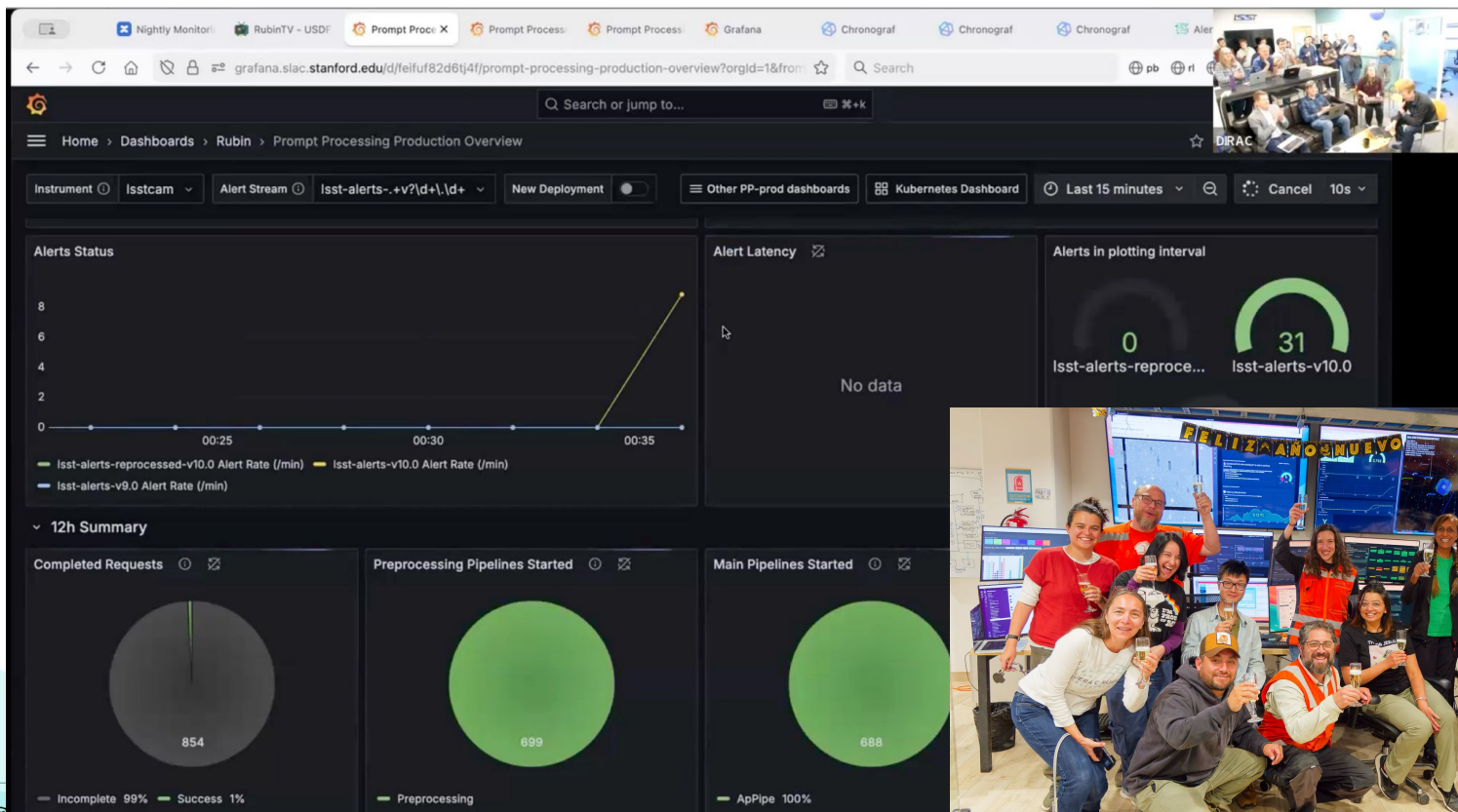
NOIRLab AEON Followup

M1M3 thermal control Agency Reports

11000 new SSO

Rubin Science Platform Support

Rubin alerts are live since February 24th!



Alert-driven science is already happening.

Showing results 1 to 50 out of 231

1 2 3 4 5 > >>

ID [▲]	Name	Reps	Class	RA	DEC	Obj. Type	Redshift
208084	AT 2026lui	1		12:23:54.129	+08:39:10.09		
207850	AT 2026llp	1		10:00:13.680	+03:40:20.55		
207848	AT 2026lln	1		12:21:27.344	+07:15:12.57		
207828	AT 2026lkw	1		10:05:46.584	+03:00:31.79		
207802	AT 2026lka	1		09:57:15.877	+00:40:00.74		

[Previous]

AT 2026epw: Discovery of a possible nova from Vera C. Rubin Observatory

ATel #17703; *Anirudh Salgundi (UNC), Igor Andreoni (UNC), Akash Anumarpudi (UNC), James Freeburn (UNC), Theophile du Laz (Caltech), Michael Coughlin (UMN), V. Ashley Villar (Harvard), Eric Burns (LSU), Jonathan Carney (UNC), Mansi Kasliwal (Caltech).*

on 27 Feb 2026; 21:00 UT

Confirmation: Akash Anumarpudi (akasha@unc.edu)

AstroNote 2026-45 Type: Object/s-Data/Analysis

Spectroscopic Observations of AT 2025agpz, a Long-Rising Hydrogen-Rich Transient in Rubin-LSST Commissioning Data 3
C. R. Angus (QUB), H. Stevance (Oxford), M. Nicholl (QUB), K. W. Smith, S. Smartt (Oxford/QUB), D. R. Young, M. Fulton, ...

AstroNote 2026-46 Type: Object/s-Data/Analysis

AT 2025agpz / ATLAS25pny / LSST-P-DO-313761043604045880: SLSN candidate in the first Rubin / LSST alerts

I. Pérez-Fourmon (IAC and ULL), F. Poidevin (IAC and ULL), D. Cano-Morales, A.E. Hernández-Díaz, I. Correa-Plasencia, E...

AstroNote 2026-50 Type: Object/s-Discovery/Classification

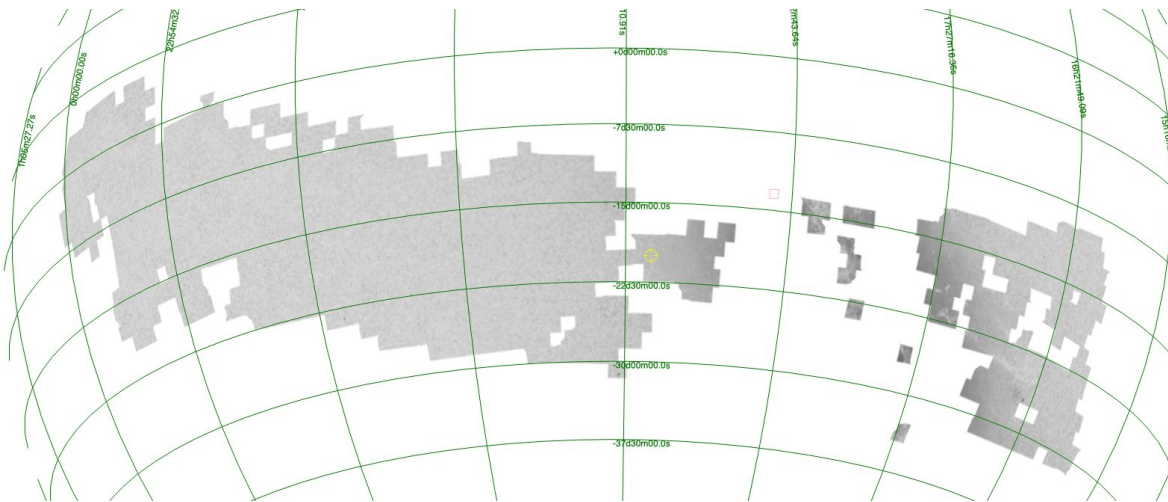
Identification of Rubin Supernova Candidates with Superphot+
Kaylee de Soto (Harvard/CfA), Yize Dong (Harvard/CfA), Anya Nugent (Harvard/CfA), S. Karthik Yadavalli (Harvard/CfA), V...

SDSS J095715.86+004000.9

AstroNote 2026-53 Type: Object/s-Data/Analysis

Late-Time Detection of the Ca-rich SN Ia-pec 2024kce in Early LSST Alerts

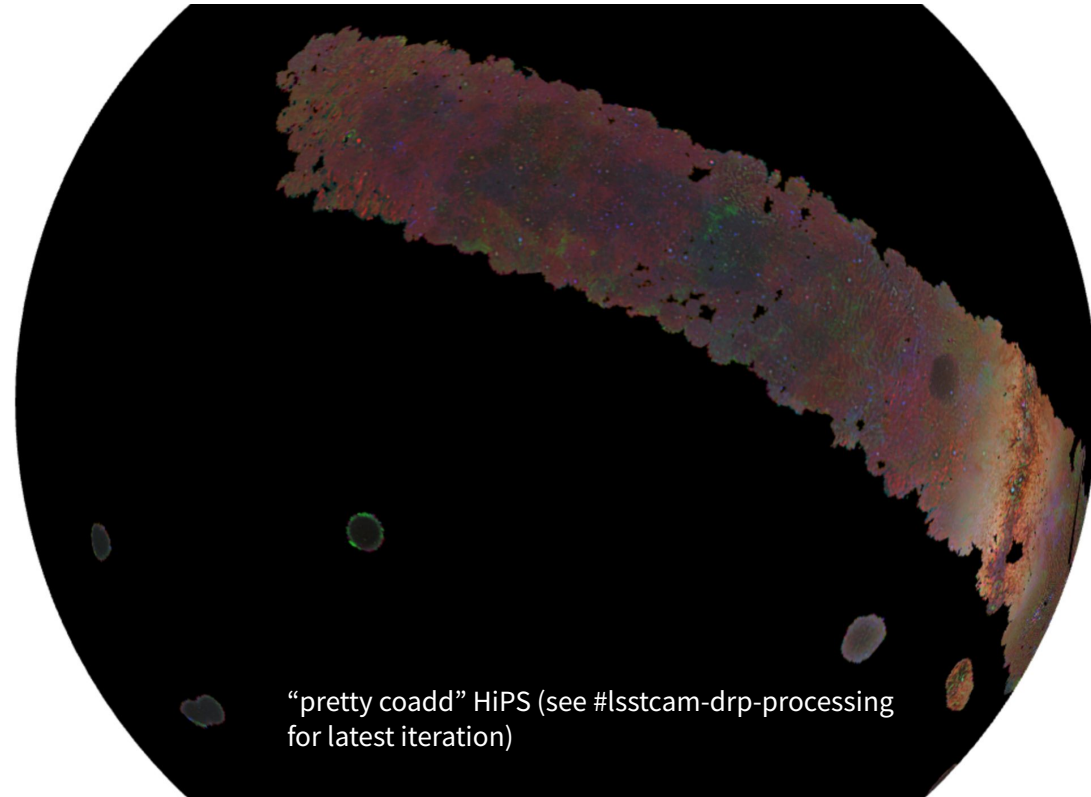
We are preparing to deploy additional templates and ramp up the alert volume by a factor of ~10.



Initial DP2 i-band templates being vetted.

Band	Current tracts	Next deployment
u	9	9
g	24	51
r	28	255
i	37	436
z	27	337
y	4	141

DP2 Processing is Complete



“pretty coadd” HiPS (see #lsstcam-drp-processing for latest iteration)

Mantra has been: DP2 fast, DR1 good

Big thank you to everyone in data management for going above and beyond over the last 18 months.

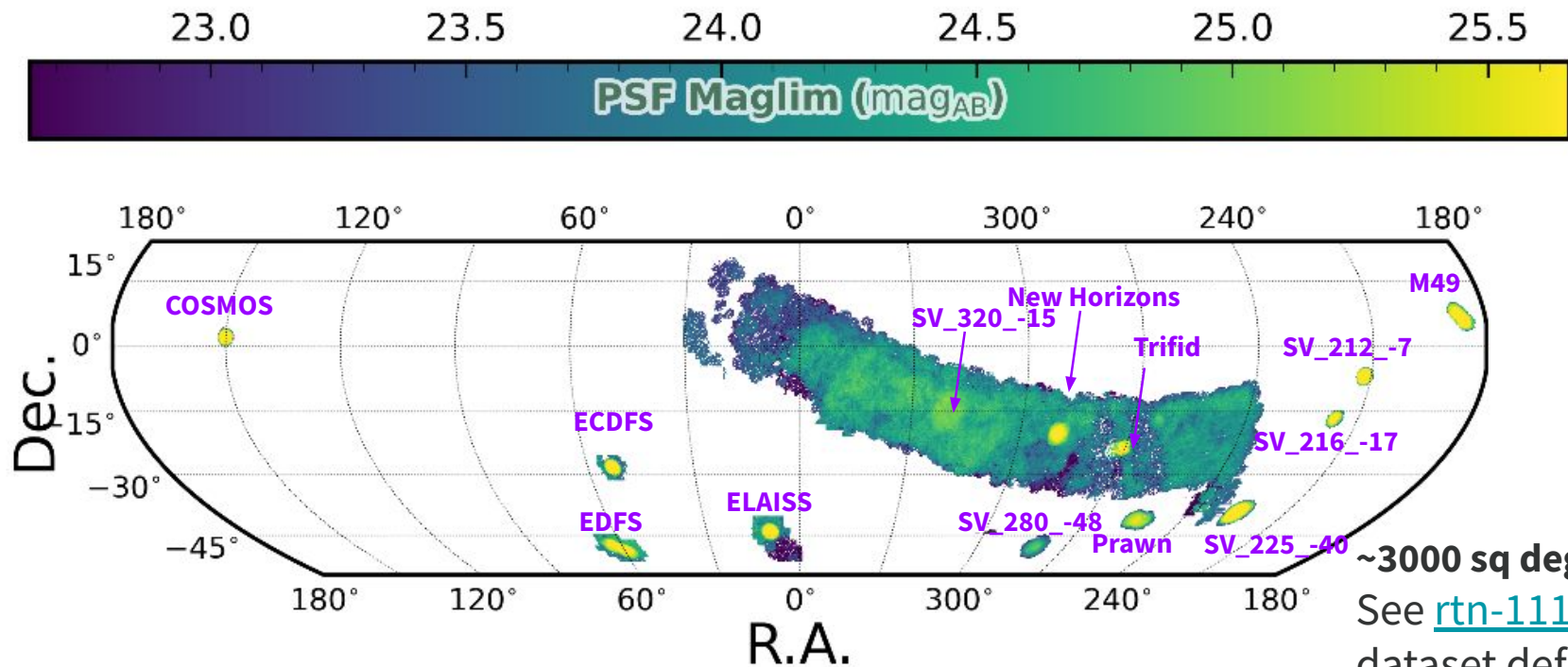
~30,000 ‘science’ visits 20250424 - 20260106

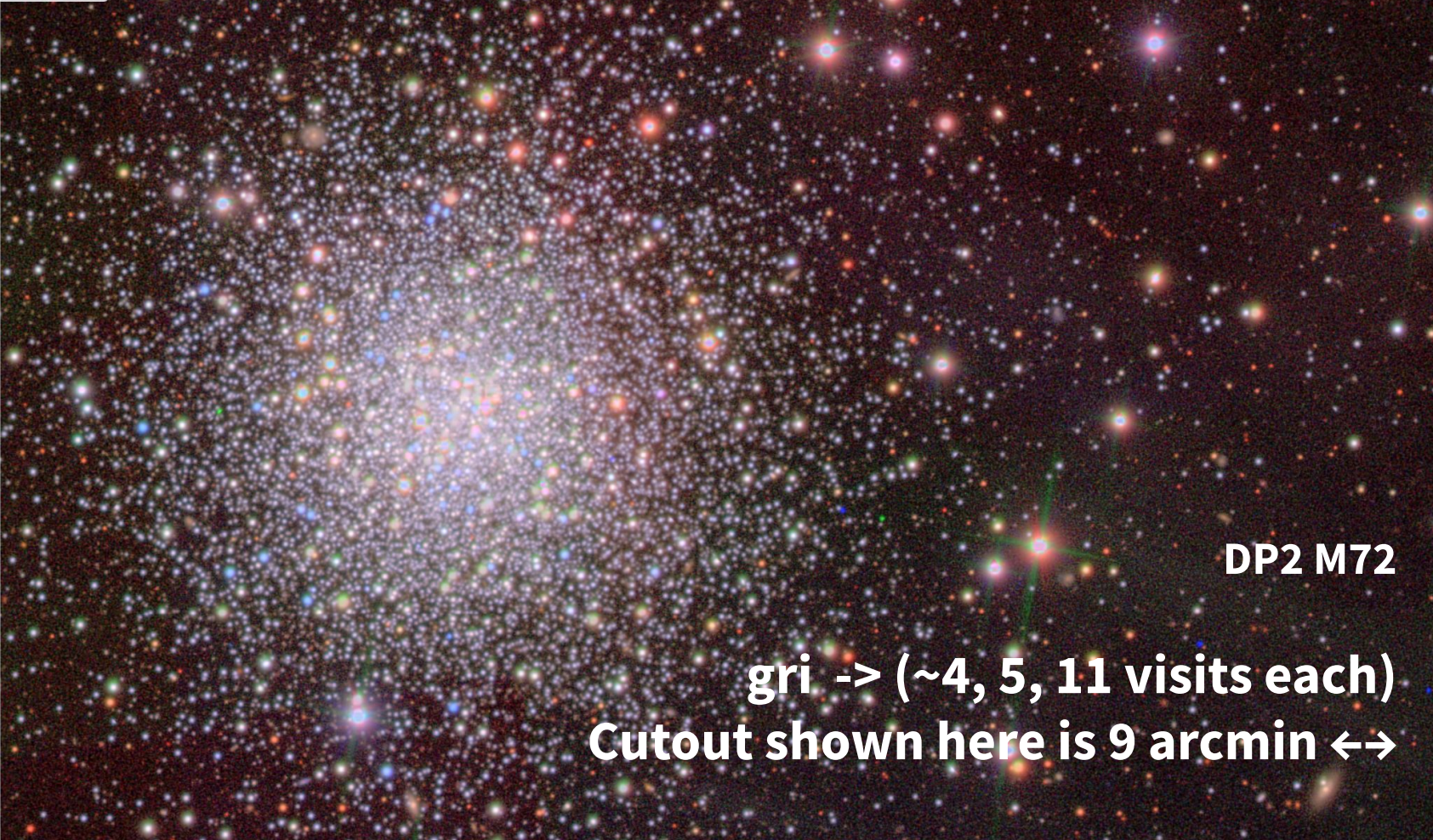
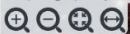
90 day processing campaign

Data Management is now hard at work serving it

... along with prompt visit images and the Prompt Products DB

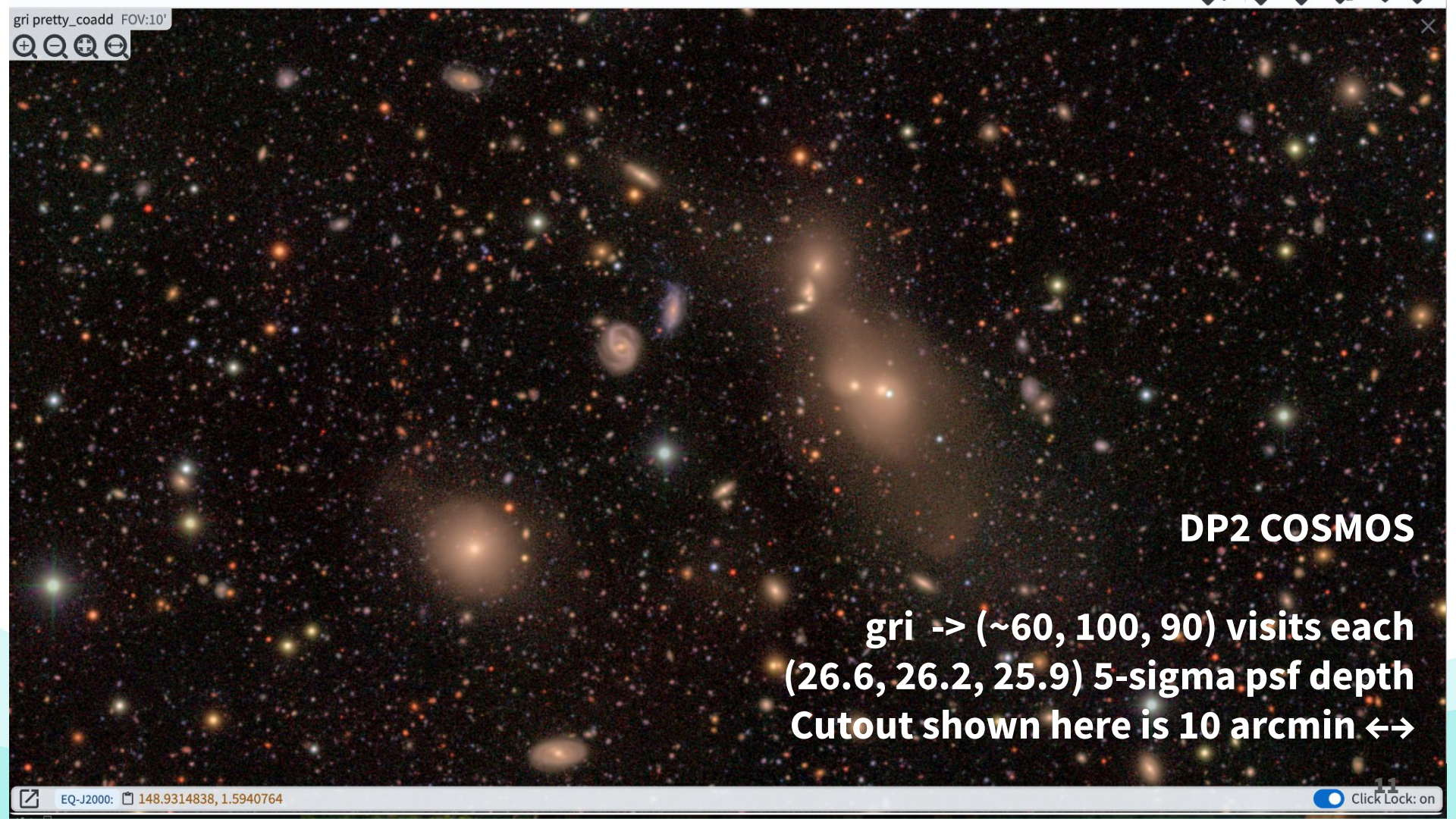
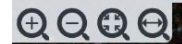
Actual i-band coadd depth of DP2





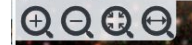
DP2 M72

**gri -> (~4, 5, 11 visits each)
Cutout shown here is 9 arcmin ↔**



DP2 COSMOS

**gri -> (~60, 100, 90) visits each
(26.6, 26.2, 25.9) 5-sigma psf depth
Cutout shown here is 10 arcmin ↔**



DP2 SV225

**gri -> (212, 165, 210) visits each
(27.0, 26.6, 26.1 5-sigma psf depth
Cutout shown here is 10 arcmin ↔**

Science Highlights

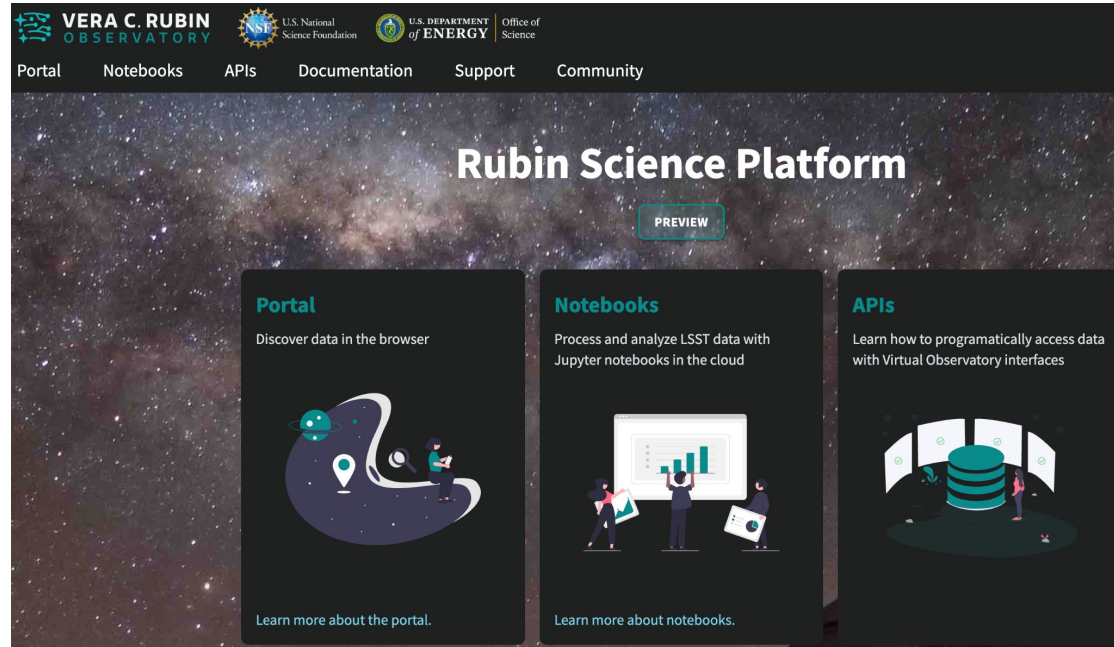
Data Preview 1: ~0.01% of LSST

Data Preview 2: ~1% of LSST

Data Release 1: ~10% of LSST

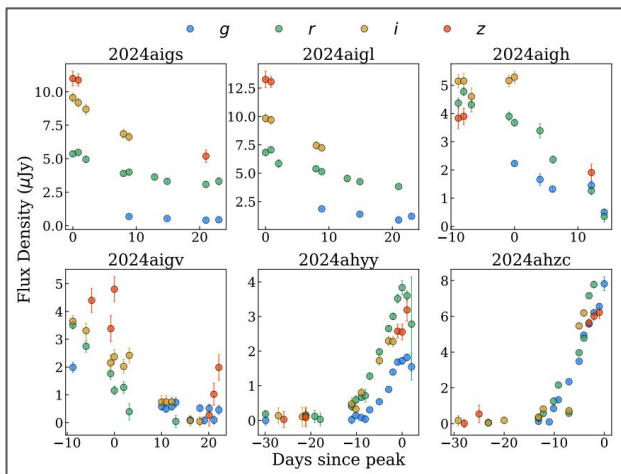
& alert-based science since

Feb 24, 2026 (earlier slides by Bellm)

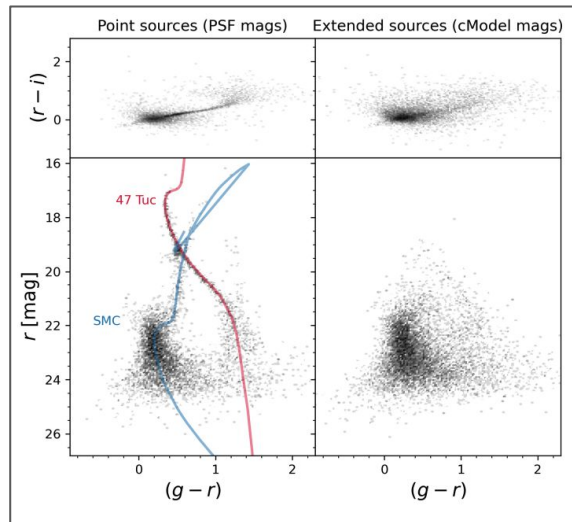


First results from Rubin's Data Preview 1

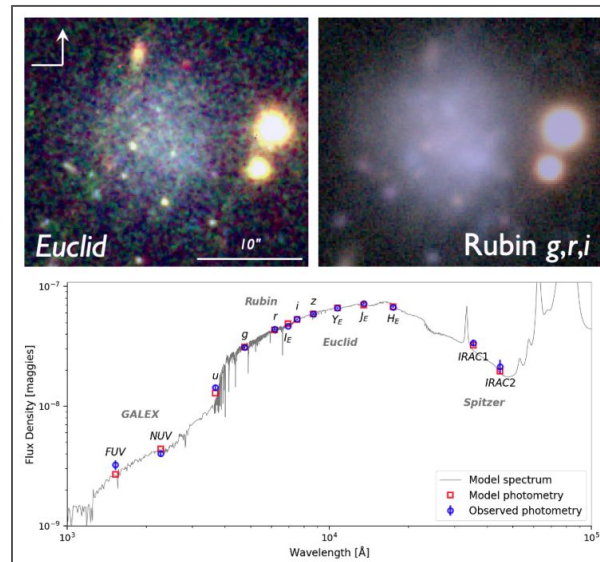
Three example figures from the earliest DP1-based papers.



Extragalactic transients in DP1.
Freeburn et al. 2025



Stellar isochrones for 47 Tuc.
Choi et al. 2025



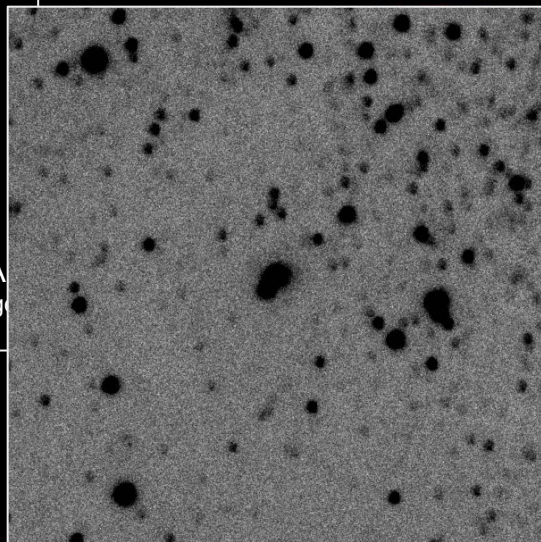
Ultra-diffuse galaxy in Euclid+Rubin.
Romanowsky et al. 2025

The 3rd Interstellar Object Ever Discovered



C/2025 N1 (ATLAS)

High-precision early
astrometry (and
more).



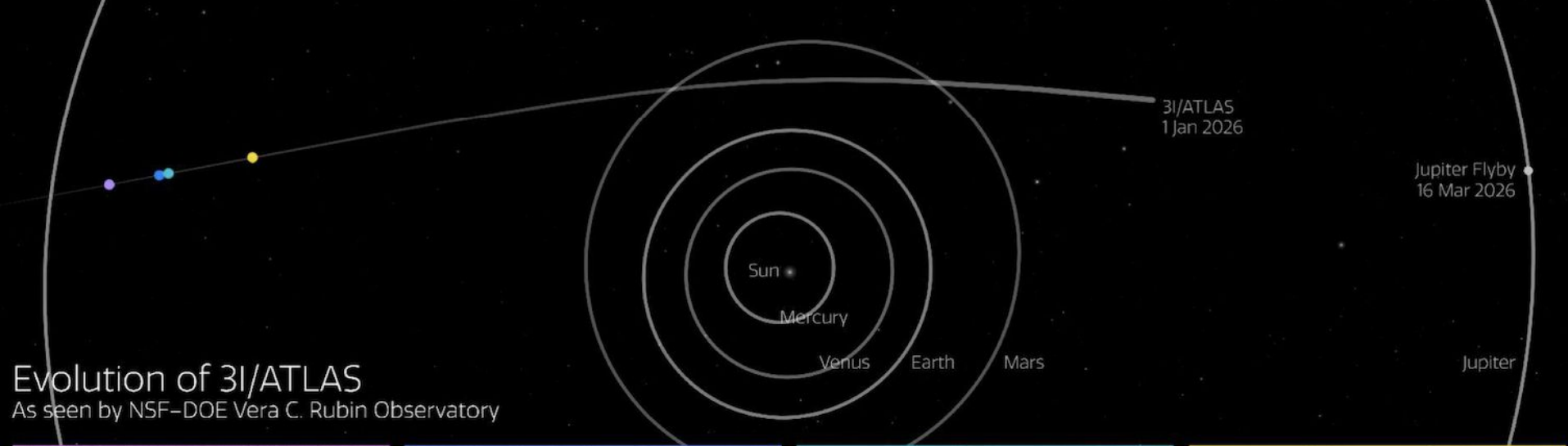
Rubin Image of 3I/ATLAS
(The earliest high-resolution image)

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

- 1 COLIN ORION CHANDLER^{1,2,3} PEDRO H. BERNARDINELLI^{2,*} MARIO JURIC^{2,7} DEVANSHI SINGH^{2,8}
2 HENRY H. HSIEH^{2,4} IAN SULLIVAN^{2,8} R. LYNNE JONES^{2,5,6} JACOB A. KURLANDER^{2,2} DMITRIY VAVILOV^{2,7}
3 SIEGFRIED EGGLE^{7,8} MATTHEW HOLMAN⁹ FEDERICA SPOTO¹⁰ MEGAN E. SCHWAMB¹¹
4 ERIC J. CHRISTENSEN² WILSON BEEBE^{2,1,2} AARON ROODMAN¹² KIAT-TAT LIN¹² TIM JENNESS¹³
5 JAMES BOSCH¹⁴ BRIANNA SMART² ERIC BELLM² SEAN MACBRIDE¹⁵ MEREDITH L. RAWLS^{2,5}
6 SARAH GREENSTREET^{16,2} COLIN SLATER² AREN HEINZE² ŽELJKO IVEZIĆ² BOB BLUM¹⁶
7 ANDREW CONNOLLY² GREGORY DAUES¹⁷ RAHIL MAKADIA² MICHELLE GOWER^{18,8} J. BRYCE KALMBACH¹²
8 MICHELE T. BANNISTER¹⁹ LUKE DONES²⁰ ROSEMARY C. DORSEY²¹ WESLEY C. FRASER^{22,23}
9 JOHN C. FORBES¹⁹ CESAR FUENTES²⁴ CARRIE E. HOLT^{25,1} LAURA INNO^{26,27} GERAIN T. H. JONES²⁸
10 MATTHEW M. KNIGHT²⁹ CHRIS J. LINTOTT³⁰ TIM LISTER²⁵ ROBERT LUPTON¹⁴
11 MARK JESUS MENDOZA MAGBANUA³¹ RENU MALHOTRA³² BEATRICE E. A. MUELLER⁴ JOSEPH MURTAGH¹¹
12 NITYA PANDEY²⁴ WILLIAM T. REACH³³ NALIN H. SAMARASINHA⁴ DARRYL Z. SELIGMAN^{34,1}
13 COLIN SNODGRASS³⁵ MICHAEL SOLONTOI³⁶ GYULA M. SZABÓ^{37,38} ELLIE WHITE³⁹ MARIA WOMACK⁴⁰
14 LESLIE A. YOUNG²⁰ RUSS ALBERY¹³ ROBERTO ARMELLINI⁴¹ ÉRIC AUBOURG⁴² CHRYSA AVELLIDOU⁴³
15 FARRUKH AZFAR⁴⁰ JAMES BAUER⁴⁴ KEITH BECHTOL^{13,45} MATTHEW BELYAKOV⁴⁶ SUSAN D. BENECHCI⁴
16 IVANO BERTINI⁴⁷ BRYCE T. BOLIN⁴⁸ MAITRAYEE BOSE⁴⁹ LAURA E. BUCHANAN²³ ALEXANDRE BOUCAUD⁵⁰
17 RODRIGO C. BOUFLÉUR⁵¹ DOMINIQUE BOUTIGNY⁵² ANDREW BRADSHAW^{12,53} FELIPE BRAGA-RIBAS^{54,51}
18 DANIEL CALABRESE⁵⁵ J. I. B. CAMARGO^{56,51} NEVEN CAPLAR² JEFFREY L. CARLIN^{16,13} BENJOT CARRY⁵⁷
19 JUAN PABLO CARVALAL⁵⁸ ROSS CEBALLO^{16,13} YUMI CHOI¹⁶ LUIZ DA COSTA⁵¹ PREETI COWAN⁵⁹
20 STEVE CROFT^{60,61,62} MATIJA ČUK⁶² PHILIP N. DALY⁶³ FELIPE DARUICH² GUILLAUME DAUBARD⁶⁴
21 JAMES R. A. DAVENPORT² TANSU DAYLAN⁶⁵ JENNIFER DELGADO⁶⁶ HADRIEN A. R. DEVILLEPOIX^{67,68}
22 PETER E. DOHERTY⁹ ABBIE DONALDSON³⁵ HOLGER DRASS⁶⁵ STEPHANIE JH DEPPE^{16,5}
23 GREGORY P. DUBOIS-FELSMANN⁶⁹ PETER S. FERGUSON² FROSSIE ECONOMOU¹³ MARIELLE R. EDUARDO²³
24 IOANA SOTUELA ELORRIAGA⁷ KEVIN FANNING¹² DAVIDE FARNOCCIA⁷⁰ MAXWELL K. FRISSELL^{2,3}
25 GRIGORI FEDORETS^{71,21} MARYANN BENNY FERNANDES⁷² MARCO FULLE⁷³ DAVID W. GERDES⁷⁴
26 ALEX R. GIBBS³² A. FRASER GILLAN⁷⁵ LEANNE P. GUY² MARK HAMMERGREEN⁷⁶ ANDREW HANUSHEVSKY¹²
27 FABIO HERNANDEZ³⁷ DANIEL HESTROFFER⁷⁸ MATTHEW J. HOPKINS^{30,19} MIKAEL GRANVİK^{21,79}
28 SIMONE LEVA⁸⁰ DAVID H. IRVING^{3,16} SÉBASTIEN JACQUES⁵⁵ BUELL T. JANNUZI⁸¹ M. JAMES JEE^{82,83}
29 DAVID JIMÉNEZ¹³ ALTAIR RAMOS GOMES-JÚNIOR^{84,51} CLAIRE JURAMY⁸⁵ STEVEN M. KAHN⁸⁶
30 ARUN KANNAWADI⁸⁷ YIYUNG KANG^{12,53} JJ KAVELAARS^{88,23,89} MICHAEL S. P. KELLEY⁹⁰ KSHITIA KELKAR⁵
31 LEE S. KELVIN¹⁴ AGNIESZKA KRYSZCZYŃSKA⁹¹ IVAN KOTOV⁹² ALEC KOUMJIAN⁹³ K. SION KRUGHOFF^{13,1}
32 CRAIG LAGE⁸³ TRAVIS J. LANGE¹² W. GARRETT LEVINE⁹⁴ ZHUO FU LI⁹⁵ SHUANG LIANG⁹⁶
33 JAVIER LICANDRO⁹⁷ HSING WEN LIN (林育文)^{96,97} CAREY LISSÉ⁹⁸ NATE B. LUST¹⁴ RYAN R. LITTLE¹³
34 ASHISH A. MAHABAL^{98,100} MAX MAHLKE¹⁰¹ ANDRÉS A. PLAZAS MALAGÓN^{12,53} LUIS E. SALAZAR MANZANO¹⁰²
35 MONIEZ MARC¹⁰³ GULIANO MARGOT^{96,51} MORALES MARÍN C.A.L.⁵ DUŠAN MARČETA¹⁰⁴
36 MARIO D. MELTA¹⁰⁵ FELIPE MENANTEAU¹⁸ JOSHUA MEYERS^{53,12} DAVE MILLER¹³ NAOMI MORATO²
37 SURHUD MORE¹⁰⁶ CHRISTOPHER B. MORRISON¹⁰⁷ YOUSSEF MOULANE¹⁰⁸ KARLO MRAKOVIČIĆ¹⁰⁹
38 MARCO A. MUÑOZ-GUTIÉRREZ¹¹⁰ NEWCOMER F. M.¹¹¹ ERFAN NOURBAKHSH¹¹⁴ PAUL O'CONNOR⁹²
39 DREW OLDAG^{1,12} WILLIAM J. OLDROYD³ WILLIAM O'MULLANE⁵ CYRILLE OPTOM³⁵
40 DAGMARA OSZKIEWICZ⁹¹ GARY L. PAGE¹¹² JACK PATTERSON¹⁹ MATTHEW J. PAINNE⁹ JULIEN PELOTON¹⁰³
41 CHRISTIAN LUCIANO PEREIRA^{36,51} JOHN R. PETERSON¹¹³ DANIEL POLIN⁹⁴ HANNAH MARY MARGARET POLLEK¹²
42 REBEKAH POLES⁹⁷ YONGQIANG QIU¹² DARIN RAGOZZINE¹¹⁴ JAYADEV RAJAGOPAL¹⁶ ARIANNA RANABHATHI¹¹⁵
43 WOUTER VAN REEVEN⁵² MALENA RICE¹¹⁶ STEPHEN T. RIDGWAY¹⁹ ANDREW S. RIVKIN¹¹⁷
44 JAMES E. ROBINSON³² AGATA ROZEK¹³⁵ ANDREI SALNIKOV¹² BRUNO O. SÁNCHEZ¹¹⁸ GAL SARID¹¹⁹
45 CHARLES A. SCHAMBEAU^{120,60} GERMAN SCHUMACHER^{5,16} DANIEL SCOLING^{97,72} RAFE H. SCHINDLER¹²⁰
46 ROBERT SEAMAN³² NIMA SEDAGHAT³ RICHARD A. SHAW¹²¹ ALYSHA SHUGART^{5,16} JONATHAN SICK^{122,13}
47 AMIR SHAI¹⁴ MICHAEL C. SITARZ¹²³ SHAHRAM SOBHANI⁵⁵ CHRISTINE SOLDAHL¹²⁴ BRIAN STALDER¹³

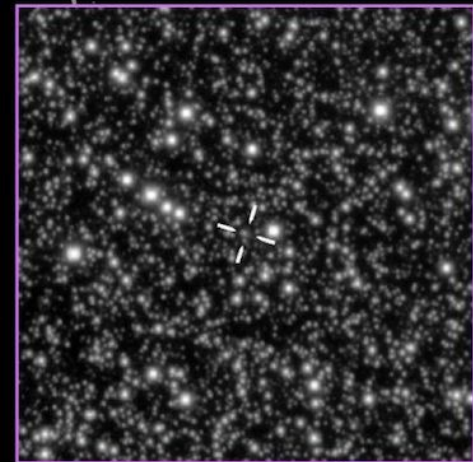
Colin Chandler, Pedro Bernardinelli, M.J., Devanshi Singh
et al (<https://arxiv.org/abs/2507.13499>)





Evolution of 3I/ATLAS

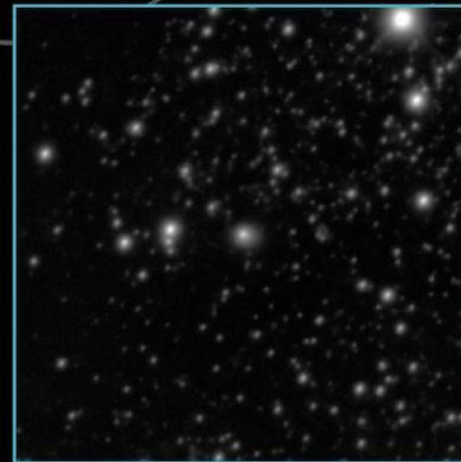
As seen by NSF-DOE Vera C. Rubin Observatory



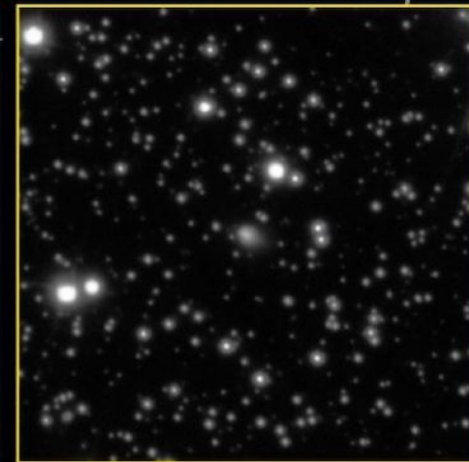
21 Jun 2025 (10 days before discovery)
Rubin/ LSSTCam



2 Jul 2025 (1 day after discovery)
Rubin/ LSSTCam



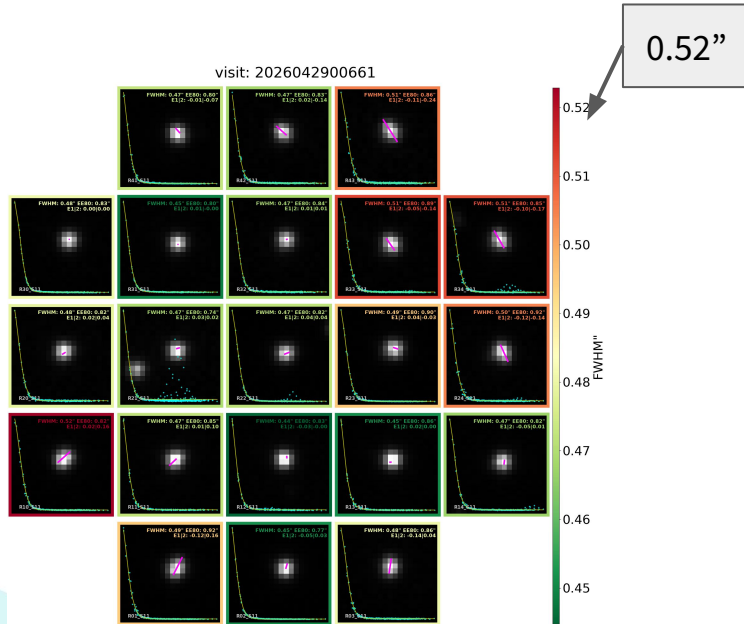
3 Jul 2025 (2 days after discovery)
Rubin/ LSSTCam



19 Jul 2025 (18 days after discovery)
Rubin/ LSSTCam

Moving Forward on Pachón

Reil



US Data Facility



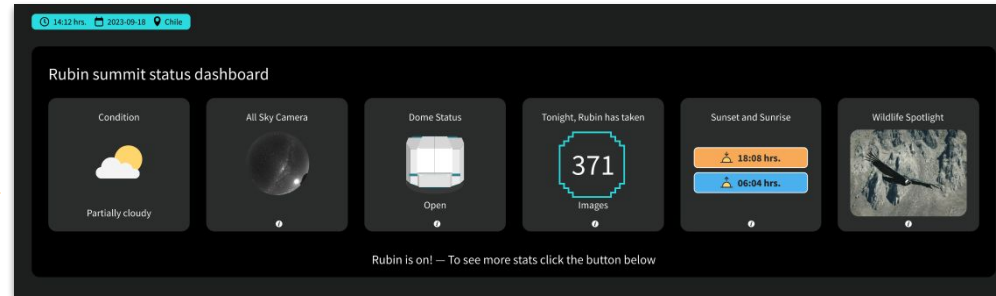
- Highest USDF priorities:
 - DP2 completion and DR1 readiness
 - Alert Production infrastructure monitoring and reliability
 - Hybrid DAC performance upgrades (data transfer SLAC → Google Cloud-based RSP)
 - Managing realized risk of computing hardware price inflation
- See [Request for Comment 1183](#) about plan for lifecycle-based storage at USDF
- SLAC IT-provided access to frontier LLMs at USDF in early roll-out
 - Send Adam Bolton a DM on Slack if you want API access
 - No cost to Rubin through EOFY26; need to budget for ongoing Rubin usage in FY27+
- DOE Genesis Mission engagement: building the Rubin/DESC AI future
 - Multiple USDF-related Genesis Phase I proposals (from AIOps to science found'n models)
 - Leveraging S3DF role as American Science Cloud Infrastructure Partner
 - Multi-lab “AI Universe” collaboration: “intelligent data pilot” for the cosmic frontier

EPO Update

Stay tuned for details about EPO lunchtime sessions at RCW!

Current activities (a sampler):

- Supporting upcoming press releases & preparing resources for Survey Start & DP2
- Preliminary Observatory Dashboard
- Developing exhibit for Planetario Chile/USACH
- Supporting Rubin CitSci projects
- Formal Education work



ls.st/resources
(including grab-n-go slide deck)

Questions? Comments?
#epo-project-questions

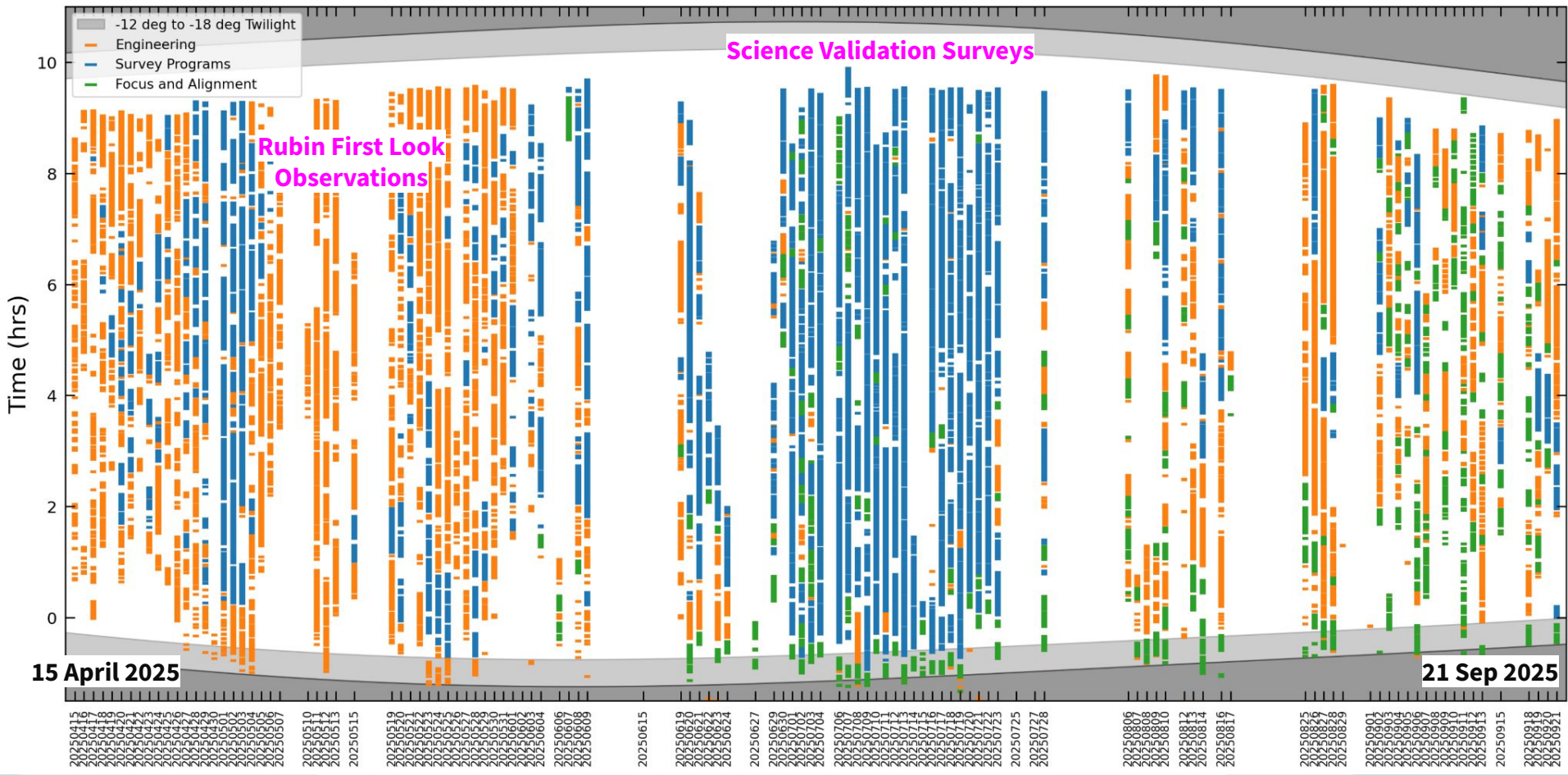
Summit Performance gains and work in progress

Effective survey speed and reliability of delivered image quality have substantially improved during the past year

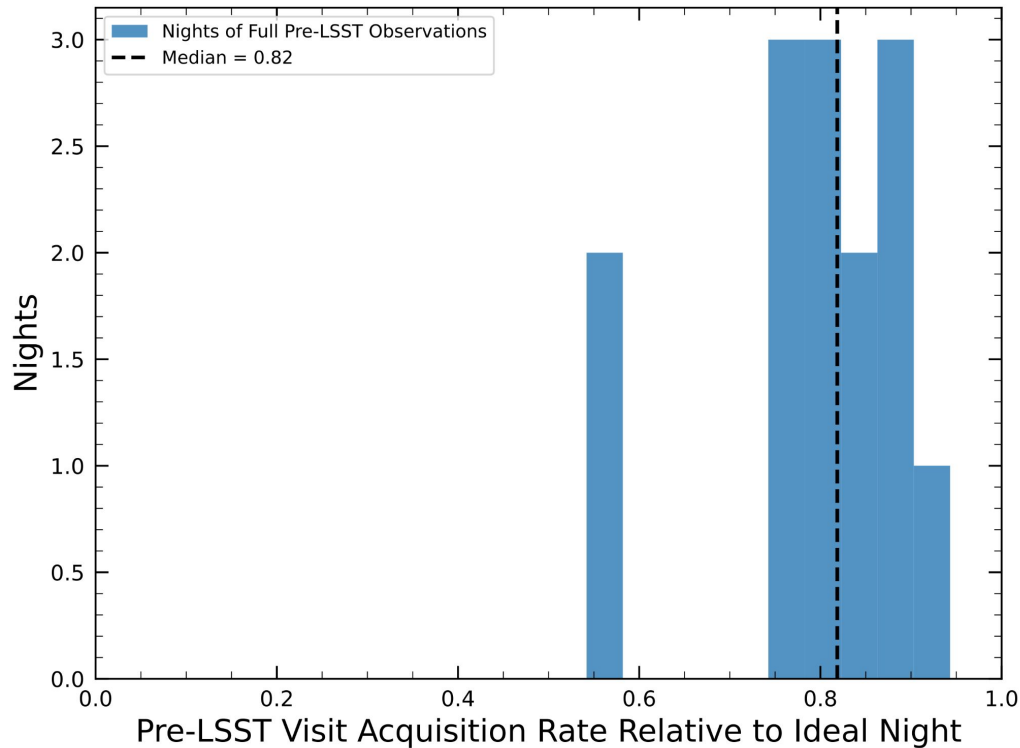
- On most nights, now running continuous on-sky observations during nearly the full night
 - On nights dedicated to sustained pre-LSST observations, now routinely achieving ~80% of expected number of survey visits relative to an ideal night
- Estimated instrument contribution to delivered image quality PSF FWHM is now consistently at the level of 0.4-0.5 arcseconds for pre-LSST observations
 - In-dome thermal control substantially improved during Early Ops (e.g., dome louvers, M1M3 thermal)
 - Majority of images have well behaved PSFs that are well described by their second moments; still some work needed to reduce PSF ellipticity and improve uniformity of PSF across field of view

Even with this progress, as-built Rubin Observatory is not yet meeting its full technical performance potential for summit operations → ongoing efforts to drive performance towards meeting all LSST design specifications

Draft technote [RTN-122](#) in progress

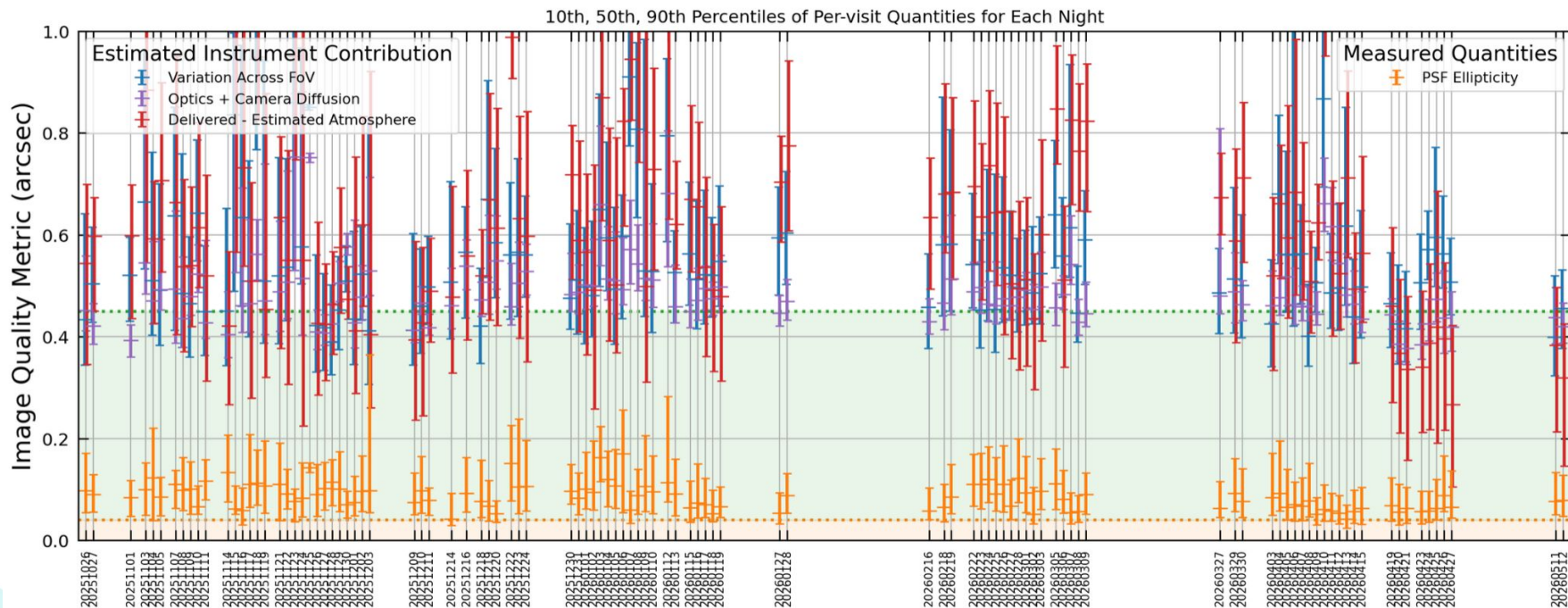


Summit Performance gains and work in progress: Effective Survey Speed



On recent nights dedicated to sustained pre-LSST observations, now routinely achieving ~80% of expected number of survey visits relative to an ideal night

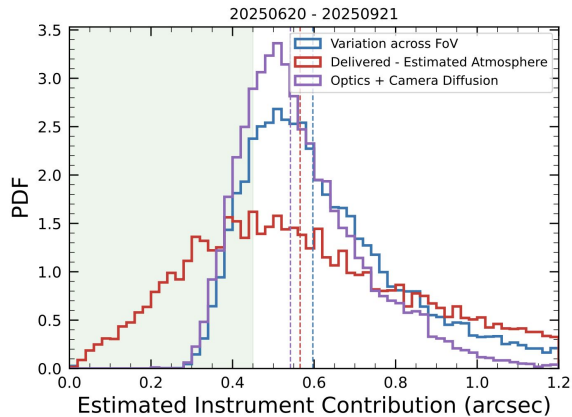
Summit Performance gains and work in progress: Instrument Contribution to Delivered Image Quality



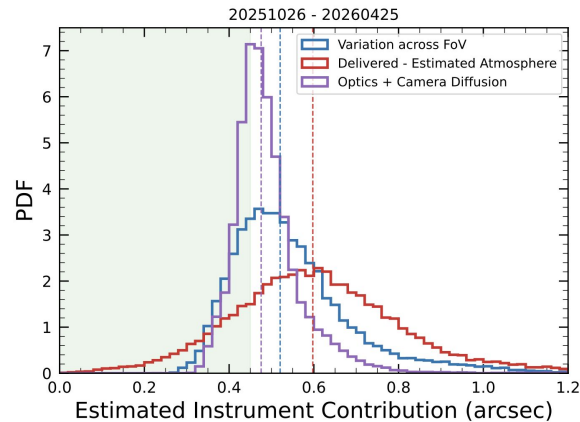
Improvements across summit the hardware, control software, and operational procedures are improving the reliability of the delivered image quality

Summit Performance gains and work in progress: Instrument Contribution to Delivered Image Quality

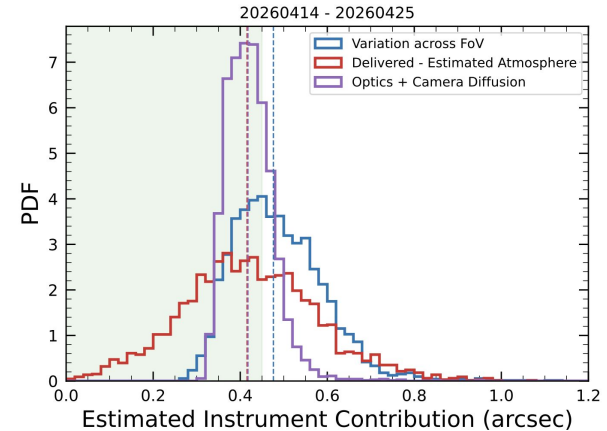
SV Surveys



Full Early Ops



Late April



Improvements across summit the hardware, control software, and operational procedures are improving the reliability of the delivered image quality

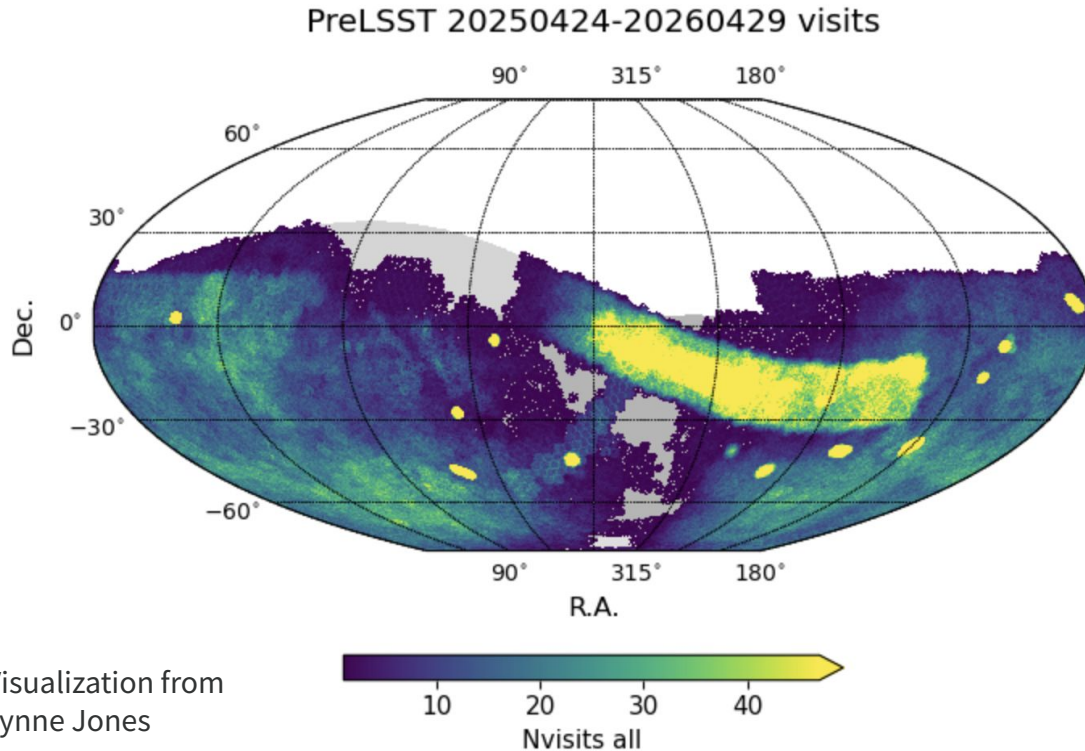
Delivered Image Quality: Areas of Active Development

- Image Quality Assessment and Development of Metrics
- Optical State Retrieval from Corner Wavefront Sensors
- Intrinsic Wavefront, Look-up Tables, Biases and Double Zernike Control
- AOS Control Loop
- Connection between measured wavefront and delivered PSF
- In-dome Environment Control

Resources:

- Image Quality Improvement Plan (draft in progress)
- Report from Recent (April-May) AOS Analyses (advanced draft, RSO-217)
- AOS Progress and Status ([slides](#) presented by Aaron Roodman at 13 May 2026 Image Quality meeting)
- [Image Quality Workshop February 2026](#)

Sky Coverage during First Year



Visualization from
Lynne Jones

Rubin Observatory acquired
>50K science program visits
w/ LSSTCam during the first
year on sky

(caveats: not uniformly distributed by band,
not all visits of sufficient quality to be used for
coadds in data releases, etc.)

Starting the LSST

- Start of LSST Board (Zeljko is chair) will recommend to Director when to begin.
- Engaging Rubin Science Advisory Committee, SC Chairs, and science experts on input.
- Fulfill criteria in RTN-093. In practice we will satisfy some criteria during year 1.
- We are taking a lot of really good data.
- Final RTN-093 perf gains will take a bit longer (detailed shape, thermal control)

