Rubin Data Preview 0

Alert Brokers Workshop
Tue Apr 13 2021

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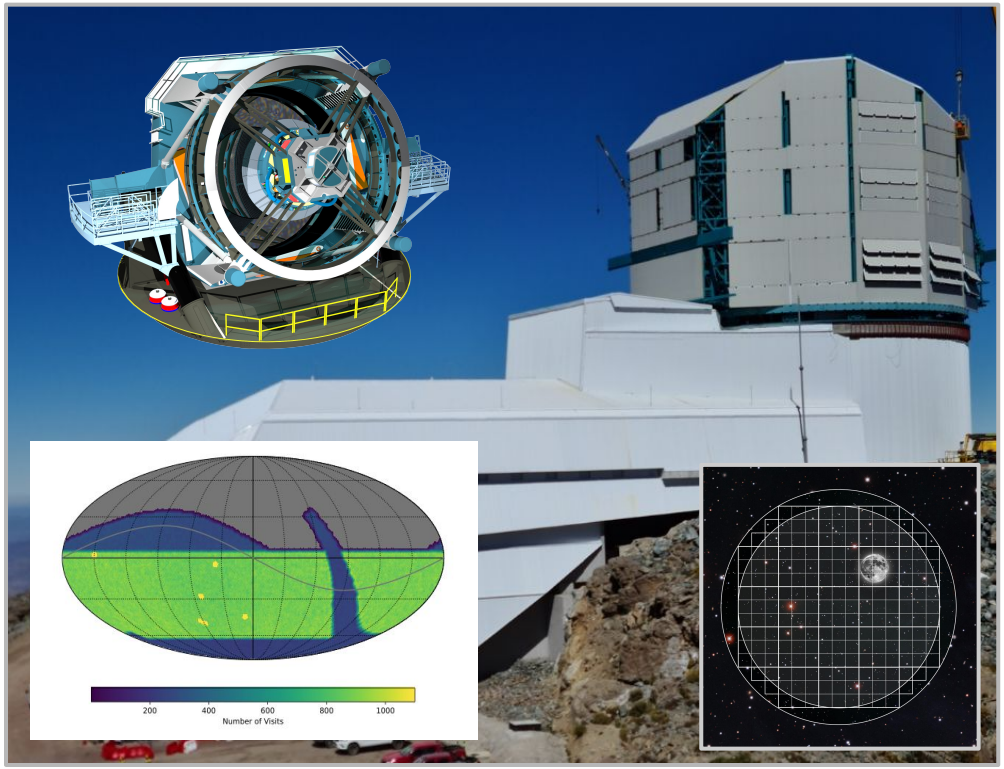
The Vera C. Rubin Observatory



The Rubin Observatory, located in Chile, has an 8.4 meter diameter primary mirror and a 9.6 deg^2 field-of-view camera with six filters, *ugrizy*.

Once complete, Rubin Observatory will execute the **Legacy Survey of Space and Time (LSST)**.

The 10-year southern sky survey will make major advances in four core science areas:

1. Probing dark energy and dark matter
2. Taking an inventory of the solar system
3. Exploring the transient optical sky
4. Mapping the Milky Way

The LSST will cover ~⅓ of the sky each night, detect billions of stars and galaxies, and millions of transients, variables, and moving objects -- a data set of unprecedented volume and complexity.

Rubin Science Platform

It will not be possible to download the entire LSST data set, and scientists will need a venue for **“next-to-the-data analysis”**.

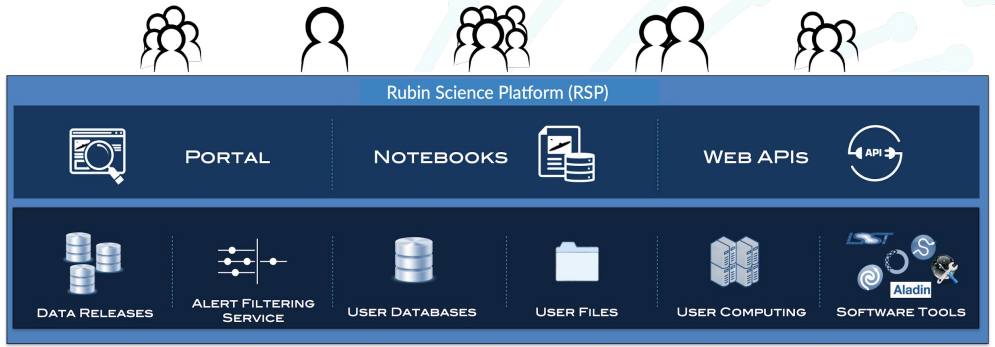
The **Rubin Science Platform (RSP)** is a set of integrated web-based applications and services running at the Rubin Observatory Data Access Centers (DACs).

Portal Aspect
exploratory analysis and visualization of the Rubin archive

Notebook Aspect
in-depth ‘next-to-data’ analysis and creation of added-value data products

API Aspect
remote access to the Rubin archive via industry-standard APIs

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



RSP “Vision Document”: ls.st/lse-319

The path to science with Rubin Observatory

Data Preview 0 (DP0): The first of three planned data previews between now and operations.

DP0 Goals: To enable the community to begin early preparations for LSST science, and to serve as an early integration test of the LSST science pipelines and the Rubin Science Platform.

Who: Up to 300 scientists and students.

What: *Simulated* LSST-like data products.

Where: In the Rubin Science Platform (RSP).

When: Apply by Apr 30 for RSP access by June 30.

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An order of magnitude increase over the current number of scientists using the RSP.

The Rubin pre-operations team has a limited ability to provide support for services that are still in development, and needs to scale-up in a safe and sustainable way.

These “DP0 delegates” will represent the science community and provide feedback.

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Simulated images and catalogs generated by the Dark Energy Science Collaboration (DESC) for their Data Challenge 2 (DC2).

Primarily contains extragalactic and Galactic objects, and some transients and variables, but not Solar System objects.

Full DC2 description in the DESC's paper, arXiv:2010.05926. Catalogs have been released by the DESC (arXiv:2101.04855).

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The DP0 images and catalogs have a format similar to the future LSST data products.

The **RSP is still in development and has limited functionality**. The Portal and API aspects will evolve significantly.

RSP aspects available for DP0 delegates:

- Jupyter Notebooks
- Portal Aspect
- TAP Service (catalogs only)

*Rubin Observatory Data Policy: ls.st/rdo-013

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When: **Apply by Apr 30** for RSP access by June 30.

Register by Apr 30: ls.st/clo4798

Allow 10-15 minutes to complete the form.

If DP0 applications are oversubscribed, we'll use a diversity-based selection process.

There will be a second round of applications in early 2022 (for "DP0.2").

Notifications will come by May 30.

Potential benefits of participating in DP0.

The term "**DP0 Delegate**" has been adopted to reflect how participants will represent the science community as learners, testers, and providers of feedback, and how they will be able to share what they've learned with their communities as teachers and colleagues.

Some benefits of participation would include the following.

- Have an accelerated learning experience in the Rubin Science Platform.
- Access to support from Rubin Community Engagement and Data Production.
- Design and test your early plans for science with LSST-like data products.
- Be able to share what you learn about the RSP with students and colleagues.
- Publish or publicize your DP0-related work (e.g., analysis tools that you develop).
- Advocate for RSP developments that would benefit your scientific field.
- Provide feedback about the RSP and enhance its scientific potential for all.

How participants will be selected for DP0.

The selection process will prioritize diversity in representation from across the broad astronomical community. Applicants will be asked to self-identify with groups such as:

- scientific interest (e.g., cosmology, transients)
- institution type (e.g., small colleges, underserved communities)
- career stage (e.g., graduate students, early-career)
- global location (e.g., Chilean astronomers)
- underrepresented groups (e.g., race, gender)
- novice perspective (e.g., students, people new to science platforms)
- relevant expertise (e.g., experience with science platforms or DC2)

DP0 is not useful for brokers, but DP1/2 may be.

Data Preview 0 is not anticipated to be of interest to brokers because:

- There are few types of simulated transients/variables, and no moving objects.
  - Type Ia supernovae and some variable stars
- There are no Difference Image Analysis (DIA) data products for the DP0 data set.
  - no difference images, no DIA catalogs, and no alerts (neither for DP0.1 nor DP0.2)

The DP0 TAP service *might* be of interest to brokers:

- DP0.1: TAP available for catalog queries but not image retrieval.
- DP0.2: TAP available for both catalog queries and image retrieval.

Future Data Previews 1 and 2 should be more useful for brokers:

- will be based on real data from Rubin (ComCam, science camera)
- will include DIA data products (e.g., alerts with high-latency)
- use a more full-featured & developed Rubin Science Platform
- support for broker interface testing (TBD if DP-related or separate)

DP0.1 vs. DP0.2

DP0.1: Jun 30 2021
> The DC2 images and catalogs from DESC.

DP0.2: Mar 31 2021
> The DC2 images and catalogs reprocessed by Rubin Observatory.

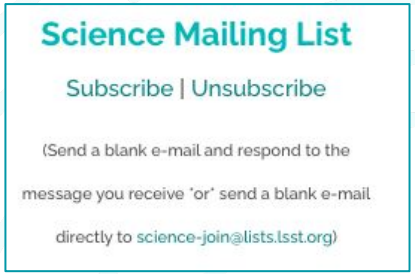
Find more information about DP0.

Visit our Community Forum (Community.lsst.org) and read more about:

- community participation in DP0: ls.st/clo4618
- the DP0 data sets: ls.st/clo4619
- how to register to participate: ls.st/clo4798

Make a user account and enable email notifications to receive news.

Subscribe to the science mailing list described at lsst.org/scientists.



References:

The LSST DESC DC2 Simulated Sky Survey, arXiv:2010.05926
DESC DC2 Data Release Note, arXiv:2101.04855
The Rubin Science Platform Vision Document, https://lse-319.lsst.io
Guidelines for Community Participation in Data Preview 0, ls.st/rtn-004
The Rubin Observatory Data Policy, ls.st/rdo-013