



# Large Synoptic Survey Telescope

[www.lsst.org](http://www.lsst.org)

## LSST Operations Plan

Sidney Wolff<sup>1</sup>, D. Silva<sup>2</sup>, R. Blum<sup>2</sup>, V. Krabbendam<sup>2</sup>, J. Kantor<sup>1</sup>, C. Smith<sup>3</sup>  
<sup>1</sup>LSST, <sup>2</sup>NOAO, <sup>3</sup>CTIO

The LSST will be operated in survey mode only. The primary goals of LSST operations are to: 1) maintain the end-to-end survey throughput at a level consistent with achieving the goals for the number of individual exposures at the level specified in the Science Requirements Document within 10 years; 2) achieve the specifications on image quality, photometric and astrometric accuracy, etc.; and 3) enable effective use of the data by a broad community of users. In order to maintain the cadence required, the observations, data processing, data quality assurance, archiving, and access for the community must all be highly automated. The LSST operations plan describes the operational model, the facilities required and their locations, and the services that will be provided.

### • The LSST will be operated in survey mode only

- Universal cadence: 90 percent of available time
  - 6 filters (u,g,r,i,z,y)
  - ~1000 visits per field (= 2x15 sec exposures in 10 years)
- Mini surveys: 10 percent of available time
  - Very deep observations
  - Short time scales
  - Special regions (Magellanic Clouds, Galactic plane, ecliptic)

### • The LSST project is committed to providing data to the US and Chilean communities of users with no proprietary period.

### • The Data Products:

- Alerts of transients in 60 seconds
- Annual data releases (shapes, positions, fluxes, motions, etc.)
- Annual deep co-added images derived from all data taken to date
- Provision for federating external data sets and/or including externally developed data products

### • Key Specifications

- Field of View: 9.6 deg<sup>2</sup>
- Pixel Count: 3.2 Gigapix
- Wavelength Coverage: 320-1050 nm
- Plate scale: 0.2 arcsec/pixel
- Single visit survey depth: r~24.5
- Co-added depth: r~27.5
- Cadence: sample SN every few days; recover orbits of solar system objects

### • LSST Operations Facilities

#### - Chile

- Telescope and support building on Cerro Pachón
- Supercomputer and Data Access Center in La Serena

#### - US

- Supercomputing-class processing center and archive at NCSA
- Data Access Center
- LSST headquarters (Director and administrative offices, operations center, education and public outreach, user help desk and other services)

#### - Data Access Centers

- Duplicate copies of full data set including raw data
- Primary portals to data products

### • Operations Metrics: Quantities Monitored

- Hours on sky
- Data rates including time to issue alerts
- Data quality
- Completeness of survey relative to plan
- Data usage including papers published

Processing Cadence	Image Category (files)	Catalog Category (database)	Alert Category (database)
Nightly	Raw science image Calibrated science image Subtracted science image Noise image Sky image Data quality analysis	Source catalog (from difference images) Object catalog (from difference images) Orbit catalog Data quality analysis	Transient alert Moving object alert Data quality analysis
Data Release (Annual)	Stacked science image Template image Calibration image RGB JPEG Images Data quality analysis	Source catalog (from calibrated science images) Object catalog (optimally measured properties) Data quality analysis	Alert statistics & summaries Data quality analysis

### EPO is an Integral Part of the LSST Project

- EPO data products are designed to engage multiple audiences
- Science Centers
  - Classrooms
  - Citizen Scientists
  - Lay Public

