

12 Data Management Policy

12.1 Overview

LSSTPO's plans for data production and access are embodied in several project documents, including the Science Requirements Document and the construction proposal submitted to NSF in February, 2011. The key elements of those documents relating to the types of data to be acquired, the data products that will be produced by the data management system, and the policies for when and to whom the data products will be made available are described in Document-13380 and summarized below.

12.1.1 LSST Data

The LSST data products are described in three groups:

- Level 1 data products include science images, difference source and object catalogs, transient alerts, and data quality metrics and statistics. They are generated by pipeline processing of the stream of data from the camera subsystem during normal observing. Level 1 data products are therefore continuously generated and/or updated every observing night.
- Level 2 data products include stacked science images, template and calibration images, deep source and object catalogs, alert statistics, and data quality metrics and statistics. They are generated as part of Data Releases, which are required to be performed at least yearly.
- Level 3 data products are derived at the initiative of scientific users from Level 1 and/or Level 2 data products to support particular science goals. The LSST project is required to facilitate the creation of Level 3 data products, by providing suitable software interfaces and computing infrastructure, but is not itself required to create any Level 3 data product. Instead these data products are created externally to the data management system, using software written by researchers, e.g., science collaborations.

The LSST project will deliver a deep survey that covers 18,000 square degrees in the southern sky and will detect 10 billion stars and a similar number of galaxies. Observations will be made in six filters, with a total of 825 visits to each part of the sky within this area. Special cadences will make ~100 visits to an additional 7,000 square degrees in order to cover the plane of the Milky Way, the South Celestial Pole, and the north ecliptic spur. A small fraction of LSST operational time will be devoted to a "deep-drilling" search of a limited number of 10 square-degree fields. One application of this search to fainter limiting magnitudes will be to extend the discovery of supernovae to the "pre-acceleration" era and improve constraints on the properties of dark energy as a function of redshift. Another is the discovery and characterization of rapid transients.

12.1.2 Standards to be used for Data and Metadata Format and Content

The LSST project will adhere to the most widely used astronomical data and metadata format standards and will support distribution of the data products according to the following standards:

- [Flexible Image Transport System \(FITS\)](#)

- [Virtual Observatory \(SIAP, VOTable, VOEvent, etc.\)](#)

12.1.3 Policies for Access and Sharing

For U.S., Chilean, and other authorized users, Level 1 data products will be available within 24 hours of processing, and Level 2 data products will be issued annually. . Catalogs of Level 2 data products will be made available to other users on a cost-reimbursable basis after a 2-year proprietary period. Alerts of transient objects will be made available world-wide within 60 seconds of observation. The access policies for Level 3 data products will be product- and source-specific, and Level 3 products developed by others may be proprietary. If researchers choose to cache Level 3 products on LSST-managed computing and storage resources, the proprietary status will be enforced via automated access controls.

LSST key science deliverables will be enabled by providing computing resources co-located with the raw data and catalog storage. Researchers will be able to process up to petabyte-sized sections of the Level 1 and Level 2 data on LSST-provided dedicated supercomputer clusters or on local computers, institutional clusters, or across a scientific grid. The workload placed on the LSST-provided clusters by these users will be actively managed to ensure equitable access to all segments of the user community.

12.1.4 Policies and Provisions for Reuse, Re-distribution, and the Production of Derivatives

No restrictions are placed on reuse, re-distribution, and production of derivatives from LSST data. Further, to promote production of derivatives, all LSST data management software is today open and available, and will remain so throughout the construction, commissioning, and operations phases of the project. The software is available in source form from an online repository accessible via the public internet and research and education networks. The software is licensed under the Gnu Public License (GPL) 3.0 and the Limited Gnu Public License (LPGL).

12.1.5 Plans for Archiving Data, Samples, and other Research Products, and for Preservation of Access to Them

All data products will be archived for the entire operational life of the LSST Observatory. During this time they will be accessible via direct query and download or for fusion with other astronomical surveys. The scientific value of providing access beyond the lifetime of the 10-year survey is likely to be high but will be subject to additional review.

Additional Policies and/or References:

The Data Rights and Data Management Policy may be found in Document-13380.

13 Operations Plan

13.1 Operations Concept

The Operations Plan describes the plans for operating the Large Synoptic Survey Telescope (LSST) and providing data products from the resulting survey to the user community.

The **LSST system** consists of: (1) a 8-meter class ground-based optical telescope with a 3.5-degree