

# Community Missions Office Update for October 2017

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## Abstract

The Community Missions Office is STScI's home for missions where the Institute provides support for data archives, Calls for Proposals, conducting Peer Review, observation scheduling, calibration, pipeline processing, mission planning, and also for future mission development. Through CMO, the Institute can apply skills and lessons from its long experience operating *Hubble*, and with helping to develop *Webb*, to benefit smaller missions based at other institutions. In this role we organize and manage the work of the engineering branches and act as the scientific interface to the larger project.

Over the last year, CMO's major efforts have been devoted to supporting the PanSTARRS archive and NASA's forthcoming *TESS* mission. CMO has also been involved with the concept study of the "*Large UV/Optical/Infrared Surveyor*," or *LUVOIR*.

## TESS

The launch of NASA's *Transiting Exoplanet Survey Satellite* is currently targeted for March 2018. MAST will host the *TESS* data archive and we look forward to fully integrating this exciting mission into the range of space missions' data currently curated by MAST. All the *TESS* primary data and data products will be archived and available for retrieval. In addition, there are a number of ancillary resources in support of *TESS* that will be of interest to the community. The *TESS Input Catalog* is already available from MAST. Version TIC-5 contains information on ~700 million stars and extended sources. More information about *TESS* and its expected data products is available at [archive.stsci.edu/tess/](http://archive.stsci.edu/tess/).

The development work on the primary archive for *TESS* is progressing well, with full MAST involvement in ongoing ground system testing activities, and the telescope's archive in MAST will be fully operational by the time *TESS* launches. In addition to data products familiar to observers who use *Kepler*, such as light curves and data validation files, *TESS* will return full-frame images of huge swaths of the sky on a 30-minute cadence. MAST anticipates a great deal of interest in this astronomical resource, and is laying the groundwork for observers to access these data effectively and efficiently.

## PanSTARRS

Pan-STARRS (The Panoramic Survey Telescope & Rapid Response System) is an innovative wide-field imaging facility developed at the University of Hawaii's Institute for Astronomy. The Pan-STARRS1 telescope (PS1) scanned the sky from 2010 through 2014 from the summit of Haleakala, Maui, Hawaii. With a 1.4 billion pixel camera and a 7 square degree field of view, PS1 repeatedly surveyed the 75% of the sky ( $3\pi$  steradians) visible from Hawaii in five visible and near-IR passbands: *g* (475 nm), *r* (625 nm), *i* (775 nm), *z* (850 nm) and *y* (980 nm). The reduced images and associated database were released to the public via the Institute's Mikulski Archive for Space Telescopes in December 2016. This first release (DR1) included the deep, combined stacked image

products from the  $3\pi$  survey along with ancillary data including exposure time maps. The primary DR1 component is the static sky  $3\pi$  survey object catalog, which contains photometric information and astrometry for almost 2 billion astronomical objects. Public access to the PS1 public science archive is via the website [panstarrs.stsci.edu/](http://panstarrs.stsci.edu/).

The usage of the public PanSTARRS DR1 archive has been substantial. In the first 3 months alone, user requests from over 10,600 unique IP addresses downloaded over 26 Terabytes of PanSTARRS data, making the PS1 archive one of MAST's most popular data products. In the same time period, over 6.5 million image cutouts were extracted and over 6 million image searches and database rows accessed.

The second data release (DR2) is scheduled to be available to the public sometime before June 2018. DR2 will include all DR1 products plus the single-epoch "warp" images and the full 100 Terabyte PS1 database, including all single-epoch detections and forced photometry.

## **LUVOIR**

In 2016, NASA began studying four prospective flagship missions to be presented to the Astro 2020 Decadal Survey. The Institute's staff is contributing to all four studies, including the *Far-IR Origins Space Telescope*, the X-ray *Lynx* mission, and the exoplanets-focused *HabEx* mission. CMO staff are focused on the *Large UV/Optical/Infrared Surveyor (LUVOIR)* concept as part of that study's Science and Technology Definition Team (STDT). *LUVOIR*'s primary design is a 15-meter deployable telescope, orbiting at Sun-Earth L2, that is optimized for detection and characterization of exoplanets with high-contrast coronagraphy, high-resolution imaging from the UV to the NIR, and high-sensitivity, multi-object UV spectroscopy. *LUVOIR* is envisioned to enable many areas of "signature science" that are simply untouchable even with *Webb* or the forthcoming ground-based extremely large telescopes.

With a 15-m primary mirror, ultrastable structures and optics, the high-performance coronagraph designed for *LUVOIR* (ECLIPS) will be able to detect and characterize dozens of Earth-like planets orbiting nearby stars, looking for signs of habitability in the concentrations of oxygen and water and possible habitation in the form of methane and ozone. *LUVOIR*'s High-Definition Imager (HDI) will be the UV-NIR imaging camera operating from 200 nm–2200 nm and will be Nyquist sampled at wavelengths longer than 400 nm. HDI is capable of resolving structures the size of Manhattan at the orbit of Jupiter, detecting galaxies as small as the Milky Way's faintest dwarfs over 90% of cosmic time, and tracking any stars moving at more  $\sim 1$  m/sec anywhere in our Galaxy. The Large UV Multiobject Spectrograph (LUMOS) will be able to detect the incredibly faint emission from the gas surrounding galaxies (the CGM), to track in the inflows and outflows from nearby galaxies, and examine the chemical composition of protoplanetary disks anywhere in the Galaxy. The GSFC-led *LUVOIR* study is planning to release its interim report describing *LUVOIR*'s science potential in detail in the spring of 2018. More details about *LUVOIR* are available at [asd.gsfc.nasa.gov/luvoir/](http://asd.gsfc.nasa.gov/luvoir/), and simulation tools and exposure time calculators are available at [luvoir.stsci.edu](http://luvoir.stsci.edu).