

Memorandum of Understanding
between the Institute for Astronomy
and the NASA Space Science Data Coordinated Archive

18 July 2024



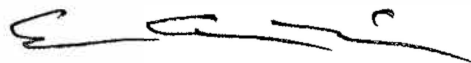
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1 INTRODUCTION

This is a Memorandum of Understanding (MOU) between the NASA Space Science Data Coordinated Archive (NSSDCA) and Institute for Astronomy (IfA) at the University of Hawaii. It documents the roles of those organizations in the acquisition, management, dissemination, and preservation of raw observational data from the Panoramic Survey Telescope and Rapid Response System (Pan-STARRS). This MOU may be amended as a result of further agreements between the NSSDCA and IfA.

Pan-STARRS is located at Haleakala Observatory in Hawaii, where two 1.8-m Ritchey-Chrétien telescopes (PS1 and PS2) with astronomical CCDs search the sky for moving and variable objects. With a very large field of view and using short exposure times, Pan-STARRS images the entire sky in 40 hours. Raw observational FITS images from the CCDs are received at a computing facility on the University of Hawaii at Manoa campus on Oahu, which cleans and calibrates the images before creating science data products such as difference images, stacked images, and derived astrometry and photometry data. Pan-STARRS intends to add ~0.5 PB/year to the 3 PB of compressed, raw FITS images it has collected since first light in June 2009. The Pan-STARRS home page is at <https://neo.ifa.hawaii.edu/>.

The final science data products from PS1 for the period January 2010 - end of 2014 are archived at the Space Telescope Science Institute (STScI) and made available to the public via the Mikulski Archive for Space Telescopes (MAST) at <https://archive.stsci.edu/missions-and-data/pan-starrs/>. No raw FITS images, and none of the data collected since the end of 2014 are provided by MAST. Additionally, MAST does not have any of the broad “w”-band data acquired to search for Near Earth Objects (NEOs). The NSSDCA has consented to accept the compressed, raw FITS image data from IfA into its permanent, deep archive in order to guarantee an off-site backup.

The NSSDCA was created in 1966 as NASA's exclusive repository for space and Earth science data. With the emergence of a series of active archives in both space and Earth science, the NSSDCA's data management role has evolved. It currently has permanent archiving responsibility for NASA space science mission data and active archiving responsibilities in certain space science discipline areas. The NSSDCA has additional roles not germane to this MOU. The NSSDCA home page is at <https://nssdc.gsfc.nasa.gov/>.

The IfA and NSSDCA shall review this MOU as needed. Future changes to this memorandum or inconsistencies between the MOU declarations and actual practices will be addressed and, if necessary, resolved by the Director of the NSSDCA, Pan-STARRS management at IfA, and the relevant program executives of the NASA Science Mission Directorate.

2 RESPONSIBILITIES

2.1 IfA

- IfA shall deliver compressed raw FITS image files. Note: IfA maintains MD5 checksums for those files.
- IfA shall package the compressed raw FITS images in separate chunks (transfer objects or TOs) with sizes to be defined, but in the range of roughly 30 GB to 1 TB. Each TO shall be a separate delivery to the NSSDCA.
- IfA shall generate a manifest for each delivery. This requires IfA to:
 - Internally stage the associated directory tree.
 - Run [NSSDCA-provided xman software](#) in generic mode on the directory tree to generate the required manifest.
 - After the manifest is generated, zip the directory tree, compute the checksum, and post on a password protected server, setup by IfA, for NSSDCA to pull.
 - Alert NSSDCA when a zip file is posted and provide its checksum and the manifest.
 - IfA shall make intermittent deliveries instead of everything at the same time.
- IfA shall provide samples for the NSSDCA to test its xman software.
- IfA should prepare a detailed description document for these data.
- IfA may assign a DOI to these data.
- IfA may request the NSSDCA return one or more deliveries, e.g., if IfA needs to restore data to an identical directory structure in the case of a device/machine failure.

2.2 NSSDCA

- NSSDCA shall open a data collection in the NSSDCA [Master Catalog](#) and provide the ID to IfA.
- NSSDCA shall test its xman software on samples provided by IfA before production deliveries begin.
- NSSDCA shall provide any special qualifiers or other guidance to IfA personnel as to how to execute the xman software.
- For each delivery, NSSDCA shall:
 - Pull each delivery zip file from IfA's designated server.
 - Unzip and confirm checksums against the manifest.
 - Transform the delivery into Archival Information Packets (AIPs) and notify IfA that NSSDCA accepts archival responsibility.

- Write the AIPs to archival tape for permanent preservation.
 - When completed, notify IfA that NSSDCA has archived the delivery to tape.
- If requested, NSSDCA shall electronically return the data to IfA in the format and directory structure as delivered.
- NSSDCA shall distribute limited quantities of these data to interested science users, if requested to do so by the IfA. Quantities so requested shall not generally exceed 5 TB.
- NSSDCA shall negotiate with the IfA any amendments to this MOU, as needed.