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Guide for finding images

The Annie Maunder Prize
for Image Innovation

Insight Investment
Astronomy ✨
Photographer
of the Year

Guide for finding images

The Annie Maunder Prize for Image Innovation is your chance to get involved in the Insight Investment Astronomy Photographer of the Year Competition 2020, whether or not you have access to a telescope or even a camera. This prize focuses on innovative ways of processing images, and makes use of any astronomical images not taken by yourself, including those taken by professional observatories from around the world.

In this guide, we will discuss some of the basics of using astronomical archives of publicly accessible data to provide you with a wide array of possible images to choose from. We'll explain key jargon and terminology used by these archives and help you avoid some of the pitfalls.

Watch out for tips throughout the guide

Beginners

Advanced

We'll highlight help for beginners and point out some areas that are perfect for the more advanced astrophotographer.

General tips for using data archives

Many of the archives contain a large amount of images. A simple browse through the archive may not always be the easiest way to find your favourite starting image. Instead choose a particular astronomical target like a planet or nebula and search the archive for that.

Scientific archives often come with lots of options, but much of this will be either useless or unhelpful early on. Instead, try a simple search to find out if any information for your target exists, narrowing the search later to provide specific observations.

Beginners

Astronomical objects often go by many names. Before searching for it in an image archive, try searching Google for its Messier or NGC number or other identifier, which is more likely to be recognised by the archive.

Target name: Often data archives will have a target name field. This can be used to search for the common name or other identifier of your chosen target. Typically if it can be understood by the websites [SIMBAD](#) or [NED](#), it will work fine in most cases. If unsure, try entering your query into SIMBAD as a test. Or if SIMBAD works, but the archive doesn't recognise it, use SIMBAD to get the coordinates of your target. You can then use this information to search instead (see next paragraph).

Coordinates: In astronomy, the most commonly used form of coordinate is right ascension and declination (RA and Dec). Just as cities have unique latitudes and longitudes on the Earth's surface, stars, nebulae and galaxies have unique RA and Dec coordinates in the sky (note that the Sun, Moon and planets change RA and Dec over time and so this does not apply to them). Each archive will have its

own preferred form for inputting RA and Dec coordinates, though a few are fairly universal:

- hh:mm:ss +/-dd:mm:ss (for sexagesimal input)
- hh.hhhhh +/-dd.dddd (for decimal input)

A guide to the required format will always be included with the archive (like those seen above), often accessed by clicking on the name of the coordinates field.

Do not use both the target name and coordinates in the same query unless there is a good reason for doing so. The archive will either tell you it can't complete the search, or, more likely, will decide on one of the inputs without necessarily telling you which it used. Don't get caught out!

Search radius: Each observation is centered on a very specific part of the sky. This property is called the pointing. Your chosen target might not be in the centre of every image or if it's a wide object like a nebula, you may only be seeing part of it in one image. The search radius will tell the archive how far around the coordinates of your target it should look for completed observations. Take care with what you put in here. Too small and you'll miss out on that perfect observation. Too big and the archive will return vast numbers of observations or even max out the return form, meaning you miss observations again. If in doubt, use the default search radius first and expand from there.

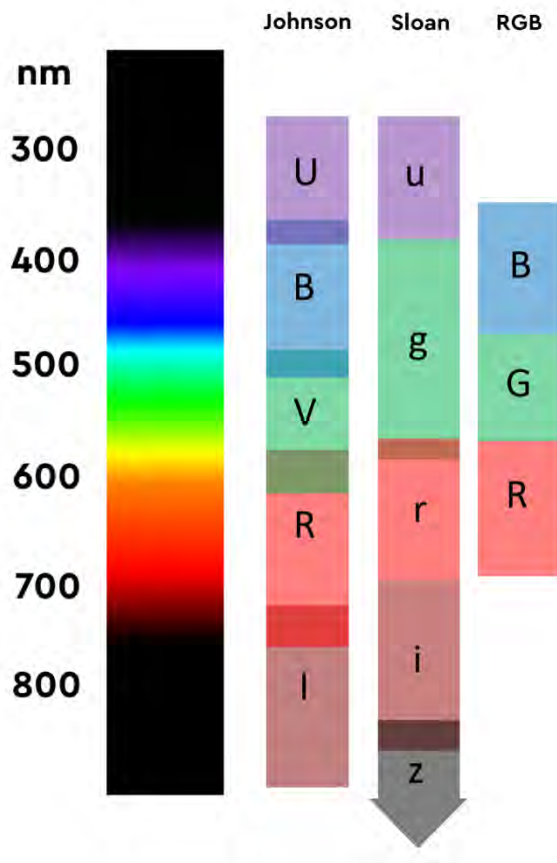
Filters/wavelengths/bandpasses

Many scientific telescopes have the ability to select specific colours of light to observe in, by filtering light through a material that blocks out light outside of the required range or by adjusting some mechanism within the telescope that makes it sensitive over different ranges. Whether you want to produce an accurate representation of what a human eye might see, or something more abstract, knowing what filters your observations are using will be important.

The most common filters you will probably be using cover the entire visible spectrum and into the near-infrared and near-ultraviolet. Below is a quick guide to the filters you are most likely to see. Some common filter systems used are the Johnson system (UBVRI), the Sloan Digital Sky Survey system (ugriz) and the less commonly used astrophotography system (RGB). We'll include some notes on the Hubble Space Telescope system in the relevant section below.

Advanced

For those looking to go beyond these, telescopes in radio, microwave, infrared, X-ray and gamma-ray wavelengths have other methods for defining the bandpasses they use. Check the individual telescope documentation for more information.



The first column on the left shows part of the light spectrum. The different numbers are different wavelengths of light. The three columns to the right show three common filter systems used with telescopes. Most correspond to a particular visible colour which can be helpful choosing what images you want to download through various archives.

Archive access

The following section will outline some of the archives available to you and the ways of accessing the public data found on them. This list is far from exhaustive and there are many more archives out there available for use. These are some of the more popular sources and are representative of how many scientific archives work.

We have focused mostly on archives that contain cleaned up images, i.e. images that have already undergone calibrations to remove some artifacts and flaws it may have. While many images from unprocessed archives may suit an astrophotographer's purposes, these archives are likely to have fewer issues with the data that may need to be cleared up later.

Beginners

Telescope archives often contain newly taken data. This is often proprietary, a period where only the person who took the data has access to it. Not only will this data not be available for download, proprietary data would not be usable in this category of the competition.

Hubble Space Telescope (HST)

Launched in 1990, the Hubble Space Telescope has arguably been one of the most successful telescopes ever built. While far from the largest, or, 29 years on, the most advanced, its position high above the atmosphere grants it an unparalleled view of the Universe.

The Hubble Space Telescope uses its own set of filters which differ from instrument to instrument. While this can get very complicated, with dozens of filters on offer, the general naming system helps identify them. For example, the filter F606W is a (W)ide filter centred roughly on a wavelength of 606nm (yellow-orange). In general, the larger the number of the filter, the redder it is.

For more information on each instrument's filters, check the [instrument manual page](#).

Access to the Hubble Space Telescope Archive can be achieved through a number of separate archives. The one we will focus on here is the [Hubble Legacy Archive](#), an archive of pre-reduced images with easily accessible previews of the images included, meaning you don't have to download the data to see what it will look like.



2019 September 24: Hubble Catalog of Variables released. [Close x](#)
Find out what's new in the [Hubble Source Catalog](#).

Hubble Legacy Archive

eagle nebula [hide advanced search](#)

Examples: M101, 14 03 12.6 +54 20 56.7 r=0.2d, more...
[Requires Firefox, Safari, IE, or compatible browser](#)

Position list file upload: No file chosen
List delimiter: List format:

Position: RA: Dec: Radius: degrees

Selection: Instruments: All

Enhanced Products
 ACS ACSGrism WFC3 WFC2
 NICMOS NICGrism COS WFC2-PC

Standard Products
 STIS FOS GHRS

Data Product:

Proposal ID: Spectral elements: Moving targets only:

Release status: Proprietary Non-Proprietary Both

Display: Previews Cutouts Size: pixels

[Inventory](#) [Images](#) [Footprints](#) [Cart, 0 kB](#) [Grism Spectra \(ST-ECF\)](#) [Help Center](#)

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The HLA's main interface is very simple, including only a search bar, avoiding many of the more complicated options that scientific archives have. Even its advanced version, shown above, is relatively simple. As Hubble is capable of taking both spectra and images, it may be useful to only select imaging cameras, like ACS, WFC2 and WFC3.

Beginners

A spectrum (plural – spectra) is where a device splits out light into its constituent colours, allowing astronomers to study the intensity of each. While powerful tools for science, it is rare to see astrophotography make use of them – though it could make for a particularly abstract composition!

Display	PlotCat	Retrieve	RA	DEC	Level	Target	Detector	Aperture	Spectral_Elt	NExposures	ExpTime	StartTime	Dataset	PropID	VisiNum	PI_Name	DAOCat	SEXCat
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	5	LBN67-RR	WFC3/RR	IR-FIX	F110W	8	4423.5	2014-09-01 23:52:32	hst_ Heritage_hst_wfc3-rr_m10_f110w_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	5	LBN67-RR	WFC3/RR	IR-FIX	F160W	8	5623.51	2014-09-02 00:02:16	hst_ Heritage_hst_wfc3-rr_m10_f160w_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	4	LBN67-RR	WFC3/RR	IR-FIX	F160W/F110W	16	10047	2014-09-01 23:52:32	hst_ Heritage_hst_wfc3-rr_m10_f160w_f110w_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	5	LBN67-UVIS	WFC3/UVIS	UVIS1-FIX	F502N	32	16000	2014-09-02 04:41:03	hst_ Heritage_hst_wfc3-uvis_m10_f502n_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	5	LBN67-UVIS	WFC3/UVIS	UVIS1-FIX	F457N	32	9600	2014-09-02 05:00:11	hst_ Heritage_hst_wfc3-uvis_m10_f457n_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	5	LBN67-UVIS	WFC3/UVIS	UVIS1-FIX	F673N	32	14400	2014-09-02 05:12:42	hst_ Heritage_hst_wfc3-uvis_m10_f673n_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 53.28	-13 50 29.4	4	LBN67-UVIS	WFC3/UVIS	UVIS1-FIX	F473N/F502N	96	40000	2014-09-02 04:41:03	hst_ Heritage_hst_wfc3-uvis_m10_f473n_f502n_v1_dz	13026	m10	Levey		
Display	PlotCat	Retrieve	18 18 52.17	-13 49 51.8	2	MNS-A	WFPC2	PC1-FIX	F502N	2	2200	1995-04-01 20:24:17	hst_05773_05_wpc2_502n_wf	5773	05	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 52.17	-13 49 51.8	2	MNS-A	WFPC2	PC1-FIX	F547M	2	260	1995-04-01 19:23:17	hst_05773_05_wpc2_547m_wf	5773	05	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 52.17	-13 49 51.8	2	MNS-A	WFPC2	PC1-FIX	F656N	2	2200	1995-04-01 17:15:17	hst_05773_05_wpc2_656n_wf	5773	05	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 52.17	-13 49 51.8	2	MNS-A	WFPC2	PC1-FIX	F873N	2	2200	1995-04-01 18:42:17	hst_05773_05_wpc2_873n_wf	5773	05	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 52.17	-13 49 51.8	2	MNS-A	WFPC2	PC1-FIX	detection	8	8800	1995-04-01 17:15:17	hst_05773_05_wpc2_308a_wf	5773	05	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 52.17	-13 49 51.8	4	MNS-A	WFPC2	PC1-FIX	F673N/F547M/F502N	8	8800	1995-04-01 17:15:17	hst_05773_05_wpc2_873n_547m_502n_wf	5773	05	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.27	-13 47 58.6	2	NGC6611-P1	WFPC2	WFALL-FIX	F547M	2	1000	2002-08-08 08:33:15	hst_00091_31_wpc2_547m_wf	6091	31	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.27	-13 47 58.6	2	NGC6611-P1	WFPC2	WFALL-FIX	F656N	2	2600	2002-08-08 10:08:15	hst_00091_31_wpc2_656n_wf	6091	31	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.27	-13 47 58.6	2	NGC6611-P1	WFPC2	WFALL-FIX	F673N	2	2600	2002-08-08 11:42:15	hst_00091_31_wpc2_673n_wf	6091	31	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.27	-13 47 58.6	2	NGC6611-P1	WFPC2	WFALL-FIX	F814W	2	1000	2002-08-08 08:38:15	hst_00091_31_wpc2_814w_wf	6091	31	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.27	-13 47 58.6	2	NGC6611-P1	WFPC2	WFALL-FIX	detection	8	7200	2002-08-08 08:33:15	hst_00091_31_wpc2_308a_wf	6091	31	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.27	-13 47 58.6	4	NGC6611-P1	WFPC2	WFALL-FIX	F164W/F656N/F547M	8	7200	2002-08-08 08:33:15	hst_00091_31_wpc2_814w_656n_547m_wf	6091	31	HESTER	VFDAOphot	VFSEXphot
Display	PlotCat	Retrieve	18 18 40.6	-13 47 59.9	2	NGC6611-P2	WFPC2	WFALL-FIX	F547M	2	1000	2002-08-11 10:17:15	hst_00091_32_wpc2_547m_wf	6091	32	HESTER	VFDAOphot	VFSEXphot

The results page includes various information about the retrieved data. The combination of the Detector and Spectral_Elt columns gives information on the specific filters used. To view the image preview, click 'Display' in the first column. This will bring up a preview window that can be zoomed and panned to check the images. Finally, the 'Footprints' tab can be used to see which images overlap each other, which can help you find complimentary data for your composition.

Data can be downloaded either by adding each image to a trolley (similar to online shopping) or by right clicking (alternate clicking) the image in the 'Retrieve' column and saving directly.

Hubble Space Telescope data can be accessed in many ways. Alternative archives include:

- [The Mikulski Archive for Space Telescopes \(MAST\) portal](#) – this archive includes data from multiple space telescopes, including Hubble, Swift and Spitzer. This archive also includes the ability to preview images and potentially compare different telescopes to combine data.

Advanced

The science MAST archive is a common place for professional astronomers to download. This archive potentially has more observations available. However, the data it provides has not been calibrated and there are no previews of the data available before download. As such we recommend this only for more advanced astrophotographers.

National Schools Observatory (NSO)

The National Schools Observatory is one of the largest astronomy education projects in the world, working to bring astronomy into the classroom. Through use of the world's largest robotic telescope, the Liverpool Telescope (LT), students are given the opportunity to benefit from access to a real world class professional telescope located in one of the best observing sites in the world, La Palma in the Canary Islands. For astrophotographers, the sizeable back catalogue of previous observations makes for a very useful source for new and interesting compositions.

The screenshot shows the NSO website interface. At the top, there is a navigation bar with the NSO logo, the text 'NATIONAL SCHOOLS' OBSERVATORY', and links for 'Login', 'Register', and 'New Password'. A search bar is located in the top right corner. Below the navigation bar is a menu with links: 'ABOUT', 'NEWS', 'GO OBSERVING', 'DISCOVER', 'LEARN', 'GALLERY', 'VIDEOS', 'FORUM', and 'HELP'. The main content area is titled 'Archive of Observations' and includes a breadcrumb trail 'Home » Archive of Observations'. Below the title, there is a brief explanation of the search form and a note that more filters lead to fewer results. The search form itself is a large box with the following fields and options:

- Only search for Observations...
- ...Of Objects with names like this: [text input] [Help]
- ...Taken for this Observing Programme: --Select-- [Help]
- ...Requested by this User: [text input]
- ...That were taken after: [text input] ... [Help]
- ...That were taken before: [text input] ... [Help]
- ...That were observed by the Liverpool Telescope [Help]
- ...That were observed by one of these instruments: RATCam, IO:O
- ...That used one of these filters: U B V G R I HA [Help]
- ...That had an exposure time of at least: [text input] seconds [Help]
- ...That had an exposure time of no more than: [text input] seconds [Help]
- ...That were taken:
 - During Twilight.
 - When the Moon was up.
 - When the Moon was down.

At the bottom right of the search form is a 'Search the Archive' button. Below the search form, there is a link to 'Switch to the Simple Search Form.'

Almost unique in this list as being an archive specifically designed for the non-expert, the NSO's interface is very simple. Even the more complicated advanced search form pictured above includes only a handful of options, making its use comparatively easy. A standard assortment of filters is provided to search through and the 'Observing Programme' option will help you see the capabilities of the telescope in observing certain phenomena, such as galaxies and star clusters, before narrowing your search to a specific object.

SkyView

NASA's SkyView service combines observations from a wide range of telescope archives. These have been turned into searchable sky maps that can be cut into custom images. Because the images are entirely customisable, this represents one of the simplest ways to obtain images. Note that not all of the available telescope archives will cover the same regions of the sky.

At first glance, SkyView's query form may look daunting. However the vast majority of options are merely for choosing the telescopes/surveys you would like to query. You can select as many or as few surveys as you like as any that don't contain data at the selected coordinates will merely return a blank image.

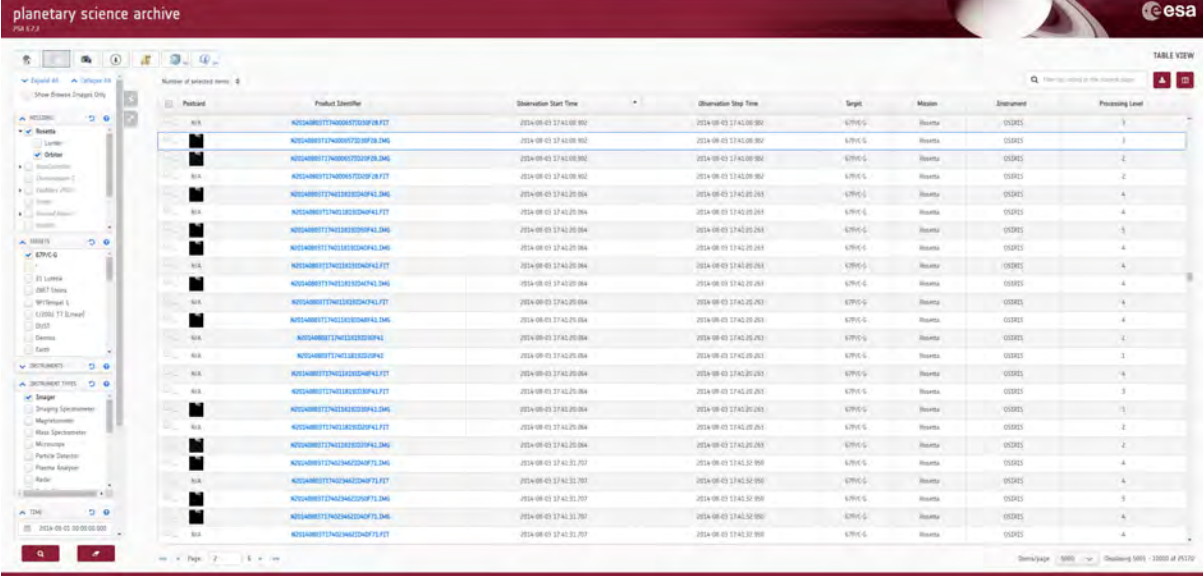
The 'Common Options' tab at the bottom of the form gives you the options to customise your image through image size in pixels (resolution) and in degrees (field of view). Both inputs can be either one or two numbers, e.g. 1000,1500 in the pixel box would be an image 1000 pixels by 1500 pixels. Be aware that if the ratio of the image sizes are not equal (e.g. 1000x1000 pixels but 2°x1°) then the image will be produced with non-square pixels.

The output images can be downloaded in FITS format straight from the results page.

7

European Space Agency's (ESA) Planetary Science Archive

Not all image archives are from telescopes. For a real challenge, consider trying a new take on an image taken by one of the many space probes, landers and rovers that have been launched to destinations around our solar system. Here we will highlight one such archive, [ESA's Planetary Science Archive](#).



The screenshot displays the ESA Planetary Science Archive interface. At the top left, it says 'planetary science archive' and 'PSA 6.2.1'. The interface includes a search bar and a 'TABLE VIEW' button. A left sidebar contains a navigation menu with categories like 'Results', 'Observation Types', and 'Target'. The main area shows a table with the following columns: 'Product', 'Product Identifier', 'Observation Start Time', 'Observation Stop Time', 'Target', 'Mission', 'Observation', and 'Processing Level'. The table lists numerous observations, many with a '67P-C' target and 'Rosetta' mission. The bottom right corner shows 'Items/page: 5000' and 'Showing 985 / 1000 of 9510'.

Product	Product Identifier	Observation Start Time	Observation Stop Time	Target	Mission	Observation	Processing Level
67P-C	N02040801770403020401P01	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	1
67P-C	N02040801770403020401P02	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	2
67P-C	N02040801770403020401P03	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	3
67P-C	N02040801770403020401P04	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	4
67P-C	N02040801770403020401P05	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	5
67P-C	N02040801770403020401P06	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	6
67P-C	N02040801770403020401P07	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	7
67P-C	N02040801770403020401P08	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	8
67P-C	N02040801770403020401P09	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	9
67P-C	N02040801770403020401P10	2014-08-03 17:42:08.960	2014-08-03 17:42:08.960	67P-C	Rosetta	OS0415	10

Unlike the night sky which has coordinate systems that define the position each telescope is looking at, close-in images of planetary objects, asteroids, comets or the Sun rarely come with such mapping systems. As such finding specific observations can be difficult. However, for those willing to put in the effort, some impressive gems can be found.

The Planetary Science Archive at ESA is searchable by mission or target, for example Rosetta's mission to Comet 67P/Churyumov-Gerasimenko. By narrowing down by date and type of observation (specifically using the observation type Image), you can find the images taken by both the orbiter and lander during said mission. With images from Huygens, Venus Express, Bepi-Colombo and ExoMars, amongst others, there are plenty of opportunities for an interesting composition.

European Southern Observatory (ESO)

The European Southern Observatory's sites in northern Chile are some of the very best places for astronomy in the world. From the famous Very Large Telescope through to the yet-to-be-built Extremely Large Telescope, it is home to some of the most advanced telescopes ever built. The images and data taken by these telescopes are as usual available for use in astrophotography.

However, use of this archive is not without its difficulties. Designed primarily for professional astronomers, it has no ability to preview images ahead of downloading, and with the exception of the [Phase 3 archive](#) which contains a subset of the [full archive](#), the images have not been reduced.

Beginners

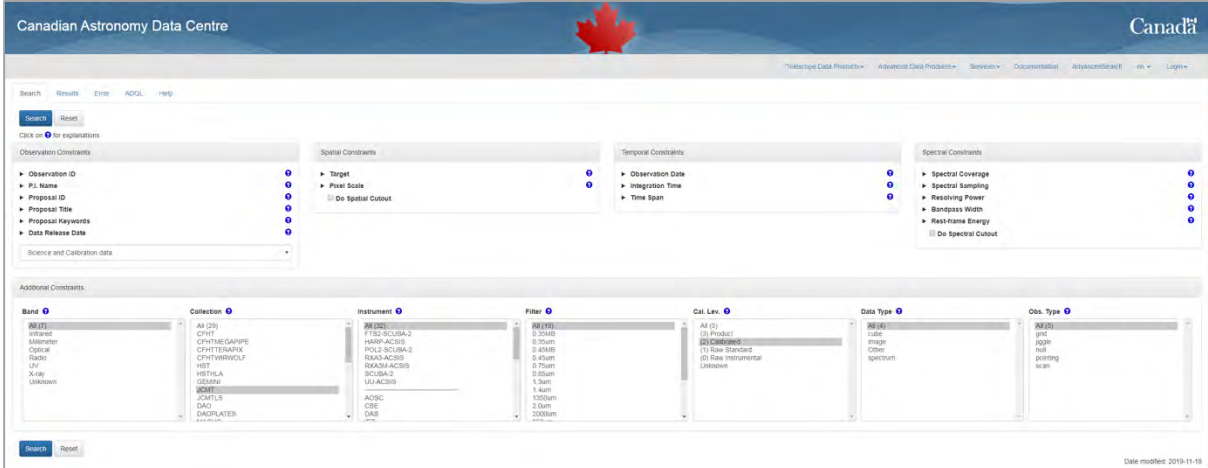
Reduction is the process through which astronomical data is converted into a usable form. It includes removing defects in images and spectra.

The screenshot shows the ESO data archive search interface. At the top, there are tabs for 'GENERIC', 'SPECTRAL', 'IMAGING', and 'VISTA'. Below these are navigation links: 'HOME', 'LINKS', 'FAQ', 'HOW TO QUERY', and 'CONTACT US'. A brief description states: 'This form provides access to reduced or fully calibrated data sets and derived catalogs that were contributed by PIs of ESO programmes or produced by ESO (using ESO calibration pipelines with the best available calibration: APEX (millimetre, submillimetre) data products. Each available data set is fully described, please see the list of contributed data releases and pipeline-processed data streams including their corresponding descriptions. This form allows you to search for data products.' Below this is a search bar with a 'Search' button and a 'Reset' button. To the right of the search bar are 'Output preferences: html table', 'Return max: 200 rows', and 'All Fields'. The main search area is divided into several sections: 'Target/Position Information' with fields for 'Target name' (eagle nebula), 'Input Coord. Sys.' (Equatorial (FK5)), 'Position' (RA: 02 09 00, DEC: [blank]), and 'Search Box' (02 09 00). 'Bandpass/Wavelength and Product Category' section includes 'Filter' (u_SDSS, U, B, g_SDSS), 'Wavelength' (Any [nm]), and 'Product category' (Any, catalog, cube, image, source table, spectrum, viability). 'Observation/Temporal Parameters' section includes 'Telescope' (APEX-12m, ESO-3.6, ESO-MTT, ESO-VISTA), 'Instrument' (APEXBOL, APEXHET, EPOSC, FEROS), 'OBSTECH' (EHELLE, ECHELLE ABSORPTION-CELL, ECHELLE ABSORPTION-CELL SLIC#3), 'Date Obs' (Modified Julian Date), 'MJD Obs', 'Exptime' (Total integration time per pixel [s]), and 'Multi OB'. 'Collections and Observing Programmes' section includes 'Collection' (Select options), 'Raw Program ID' (eg 179.B-2003(B)), 'PI Name', and 'Certified by' (Any). 'Submission, Proprietary Period & Bibliographic Information' section includes 'ORIGFILE', 'Release Date', 'Batch Id', 'ARCFILE', 'REFERENC', and 'Publication Date'. At the bottom, there is a 'Query by raw data' section with a 'Raw Data File List' button.

The interface for the archive has a number of useful options to help narrow down your search. It is recommended to set the 'Product Category' and 'OBSTECH' options both to Image to avoid useless products being included in the search results. Sorting by filter can also help identify images for a three colour channel image. If you have a specific telescope in mind, like the Very Large Telescope, or instruments like FORS2, that information can also help in acquiring the perfect image.

Canadian Astronomy Data Centre (CADC)

The CADC is a repository for multiple telescopes and facilities around the world, including the Gemini telescopes, the United Kingdom Infrared Telescope (UKIRT) and the James Clarke Maxwell Telescope (JCMT). Many are potentially useful for those looking to make compositions including images taken in light beyond the visible spectrum. Some of the telescopes with individual interfaces have only a simple coordinate search.



Most, however, are part of a multi-instrument archive. Here you can search not only by your target's coordinates and name, but also by the telescope, instrument, even by the type of light the detector is sensitive to. Combining sources from multiple wavelengths of light could produce a particularly interesting image, showcasing the range of tools astronomers have at their disposal.

Las Cumbres Observatory Global Telescope (LCOGT)

This array of robotic telescopes, ranging from large 2m telescopes, to mid-sized 0.4m telescopes based in observatories around the world, has an archive of publicly accessible data. In some cases, this archive also allows you to view previews of the available data.

The screenshot shows the Las Cumbres Observatory Science Archive interface. At the top, there is a navigation bar with the LCO logo, 'Las Cumbres Observatory Science Archive', 'Documentation', 'Api', and 'lco.global'. Below this, there is a search bar and a 'Show Me' button. The main content area is divided into a left sidebar with filters and a main results area. The filters include 'Proposed' (set to 'All'), 'Baseline', 'Reduction Level' (set to 'All'), 'Site', 'Telescope', 'Instrument', and 'Filter'. The main results area shows a table of observation records with columns for Basename, Time, Proposal, Object, Filter, Type, Exp. Time, and RLevel. Below the table, there is a section for 'Calibration and Catalog Frames' with a sub-table and a preview image of a star field.

Basename	Time	Proposal	Object	Filter	Type	Exp. Time	RLevel	
+	coj0m045-k856-20191022-0077-e00	2019-10-22 09:39:13	LCOEP020148-007	M6a	rp	EXPOSE	180.290000	Raw
-	coj0m045-k856-20191022-0077-e91	2019-10-22 09:39:13	LCOEP020148-007	M6a	rp	EXPOSE	180.290000	Reduced [BAZDA]

Showing 1 to 10 of 1500 rows | 10 records per page | 1 2 3 4 5 ... 150

Be aware that the archive defaults to looking only at observations made recently so be certain to change the date of observation in the top left hand corner to cover whatever range is suitable (here we have chosen 'All Time'). It is recommended to use reduced data as indicated in the far right hand column of the results unless comfortable with the extra level of processing that might be necessary in unreduced data. Previews are given automatically when opening an entry in the results table with the + symbol in the left hand column.

Further archives

The archives we have suggested here are just the tip of the iceberg. With astronomy being a particularly collaborative and open field, many professional telescopes offer publicly accessible archives. If there is a telescope or mission in particular that you would like to look into, try searching for it online and seeing if an archive exists.

With the guides given above, and a little bit of ingenuity to deal with the various quirks of any new system, you'll likely find plenty of images to include in your own work. If looking to submit to the Insight Investment Astronomy Photographer of the Year Competition, be sure to record where and how you obtained the raw images for your submission. For help on how to process your images, consider the '[Introduction to image processing](#)' guide that accompanies this guide.

We look forward to seeing the incredible images you produce. Until then, happy hunting!

