HiPS data curation process

IVOA INTEROP
October 2022

Mihaela Buga
on the behalf of the Aladin team

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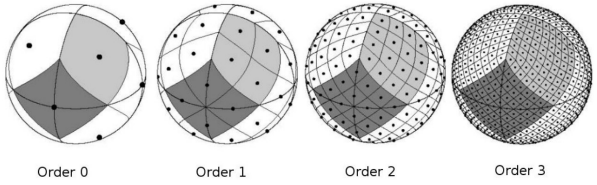
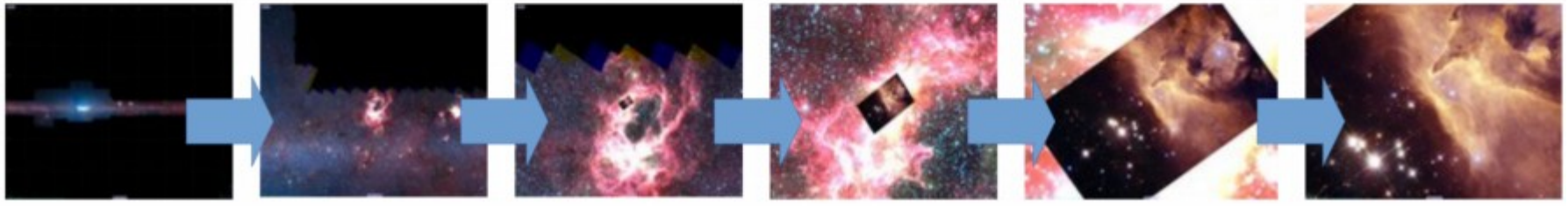
HiPS Hierarchial Progressive Survey

- IVOA standard invented by the CDS in 2009 in order to manage large image surveys

- Hierarchical multi-resolution tessellation of the sky



- HiPS data format : the more I zoom in the progressive hierarchical sky map, the more details show up



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Main steps in data curation process

Establish **priorities**

Choose the **relevant data product**

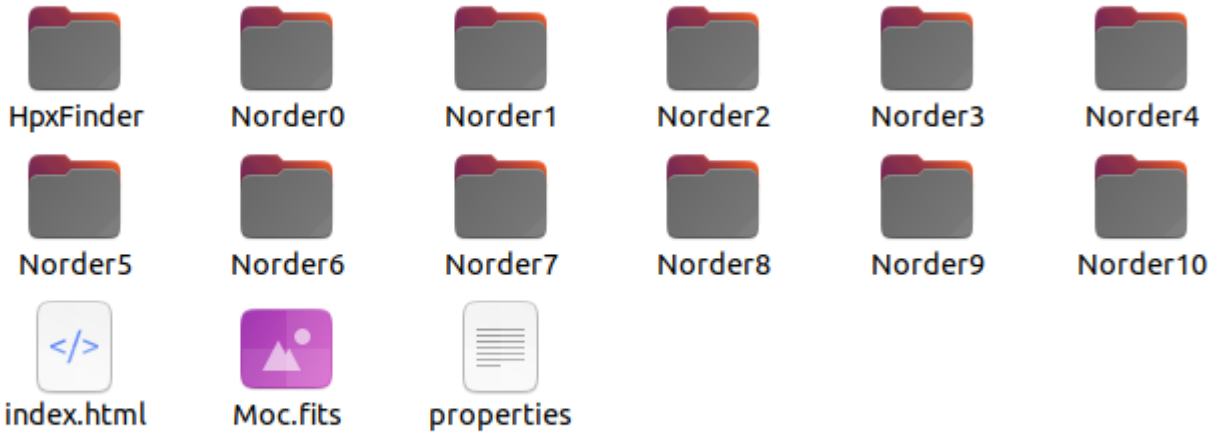
Aladin/Hipsgen

Examine and **process a small data sample**

Process all original data

HiPS structure

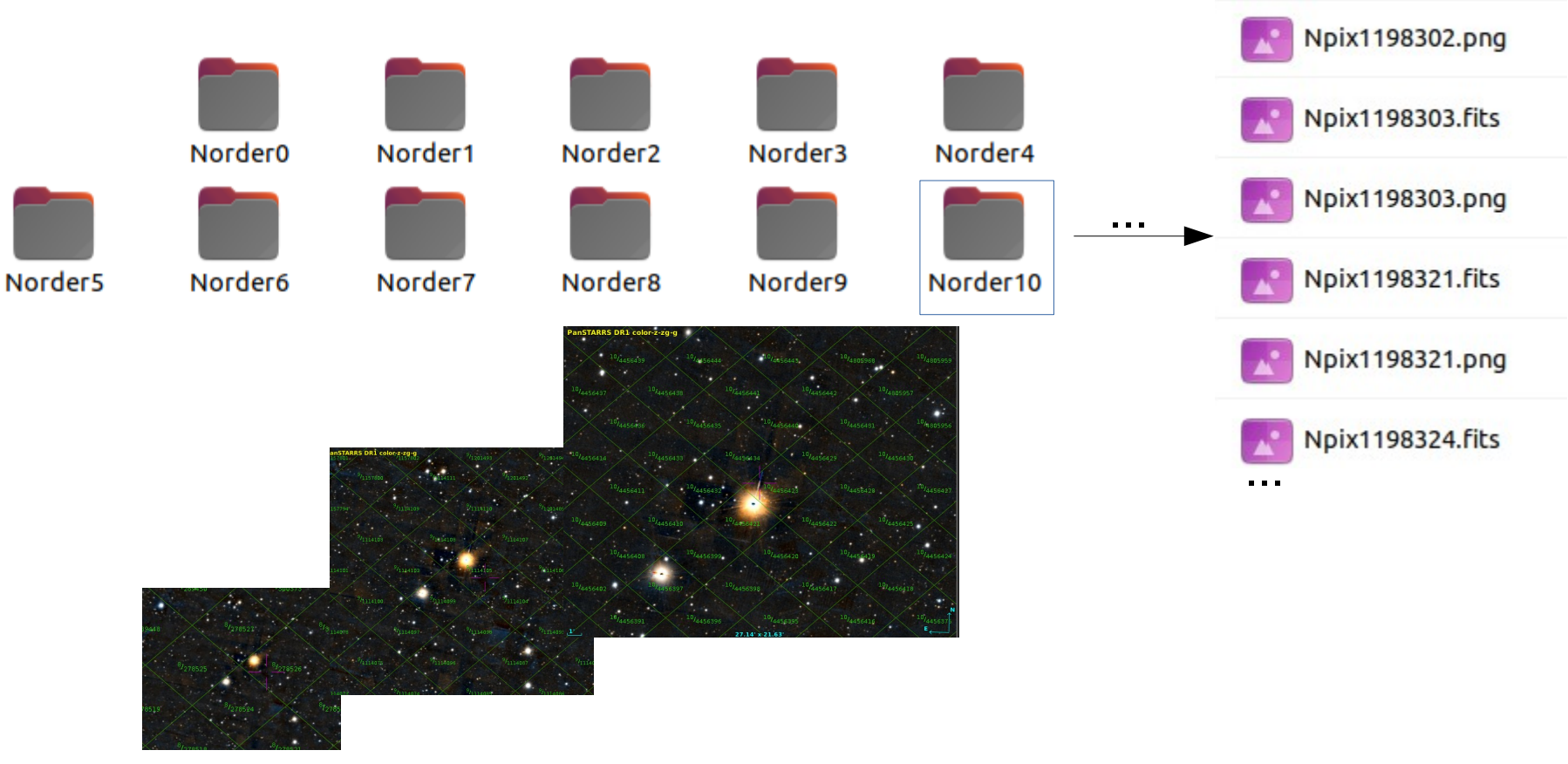
Original survey data



Associated metadata

HiPS structure : original survey data

Original survey data structured as a mosaic of tiles at various resolutions



Main steps in data curation process

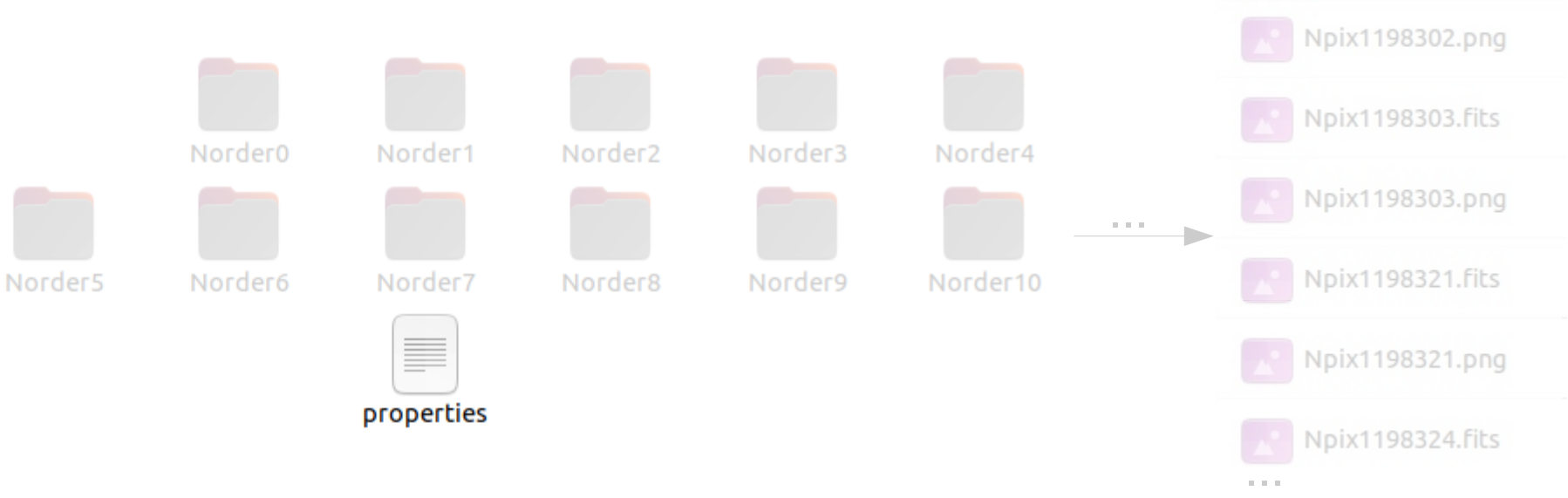
Verify the final HiPS

Add/update the **metadata**

Validate the result together with the team

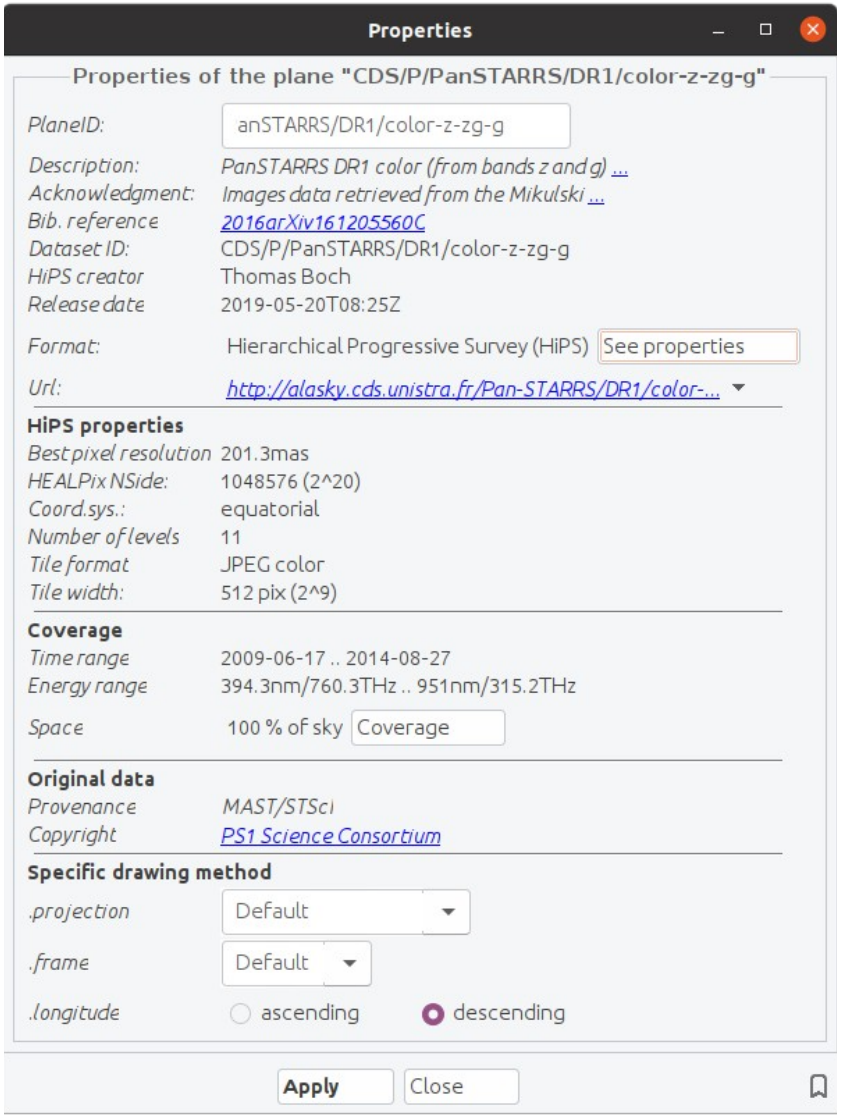
HiPS associated meta data

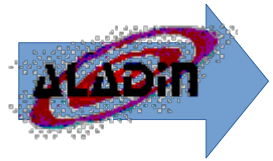
Original survey data structured as a mosaic of tiles at various resolutions



Associated metadata : properties file

Properties





Mandatory* keywords

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obs_description       = Pan-STARRS is a system for wide-field astronomical imaging
developed and operated by the Institute for Astronomy at the University of Hawaii.
Pan-STARRS1 (PS1) is the first part of Pan-STARRS to be completed and is the basis
for Data Release 1 (DR1).  The PS1 survey used a 1.8 meter telescope and its 1.4
Gigapixel camera to image the sky in five broadband  filters (g, r, i, z, y). The
PS1 Science Consortium funded the operation of the Pan-STARRS1 telescope, situated
at Haleakala Observatories near the summit of Haleakala in Hawaii, for the purposes
of astronomical research. The PS1 consortium is made up of astronomers and engineers
from 14 institutions from six countries.\nPan-STARRS1 has carried out a set of
distinct synoptic imaging sky surveys including the 3π Steradian Survey and the
Medium Deep Survey in 5 bands (grizy). The mean 5σ point source limiting
sensitivities in the stacked 3π Steradian Survey in grizy are (23.3, 23.2, 23.1,
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photometric calibration across the sky is 7-12 millimag depending on the bandpass.
The systematic uncertainty of the astrometric calibration using the Gaia frame comes
from a comparison of the results with Gaia: the standard deviation of the mean and
median residuals (Δra, Δdec ) are (2.3, 1.7) milliarcsec, and (3.1, 4.8) milliarcsec
respectively.
obs_ack               = Images data retrieved from the Mikulski Archive for Space
Telescopes (MAST) at STScI. Thanks to Clara Brasseur for her help.
prov_progenitor       = MAST/STScI
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obs_regime            = Optical
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hips_hierarchy        = median
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hips_data_range       = -7.997 15.85



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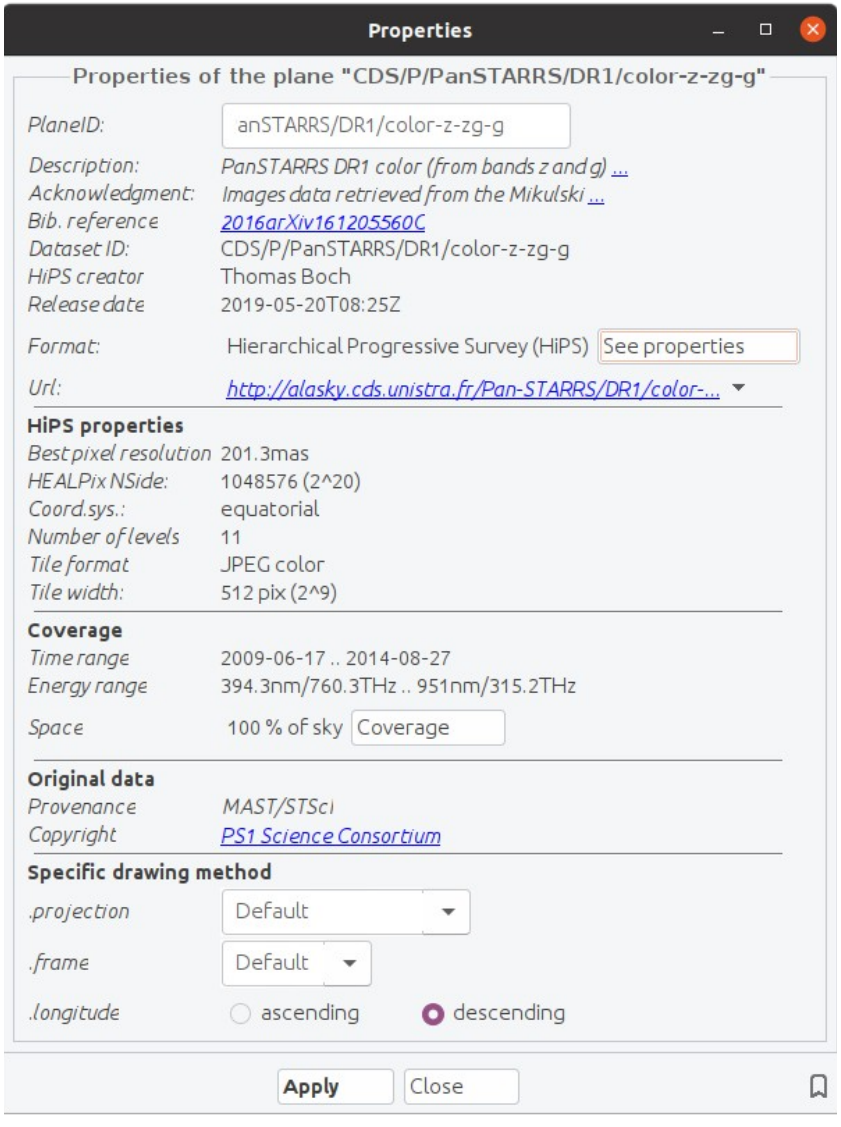
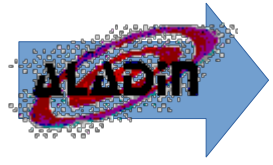
*See https://www.ivoa.net/documents/HiPS/

Properties



Data curation

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hips_tile_format      = jpeg
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obs_title obs_collection obs_description	Description: PanSTARRS DR1 color (from bands z ar	HiPS title and short description
hips_status hips_copyright	hips status = public master clonableOnce hips_copyright = CNRS/Unistra	HiPS rights of use, copyrights
hips_creator hips creation date hips_release_date	HiPS creator Thomas Boch Release date 2019-05-20T08:25Z	The name of the person who generated the HiPS, the date of creation/update(s)
hips_frame hips_order hips_tile_width hips tile format moc_sky_fraction hips_sampling hips_overlay hips_hierarchy hips_data_range hips_order_min hips_pixel_scale dataproduct type dataproduct subtype hips_estsize	**HiPS properties** Best pixel resolution 201.3mas HEALPix NSide: 1048576 (2^20) Coord.sys.: equatorial Number of levels 11 Tile format JPEG color Tile width: 512 pix (2^9)	HiPS technical characteristics
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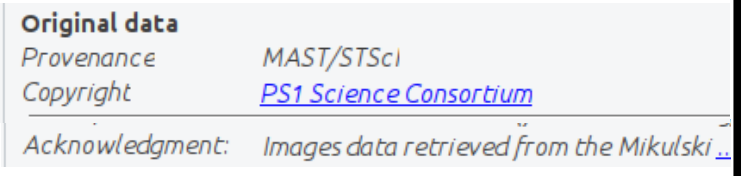
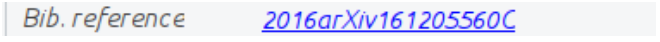
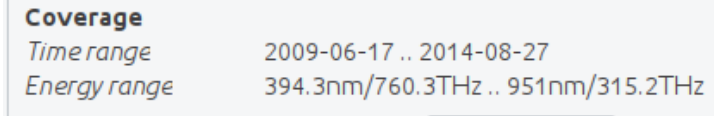
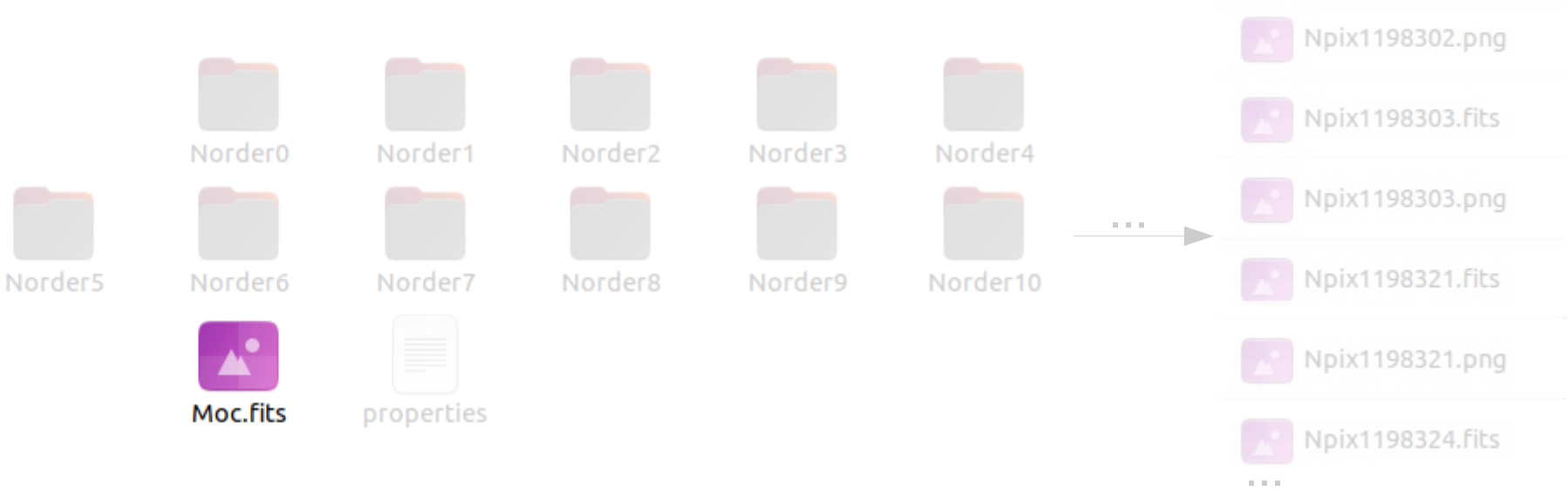
Keyword	Displayed properties	Description
prov_progenitor obs_copyright obs_copyright_url obs_ack		Data provenance, copyright, acknowledgment
bib_reference bib_reference_url		Associated bibliographic reference
t_min t_max obs_regime em_min em_max		Observational parameters : time and energy range, wavelength

Keyword	Displayed properties	Description
prov_progenitor obs_copyright obs_copyright_url obs_ack	**Original data** *Provenance* MAST/STScI *Copyright* PS1 Science Consortium *Acknowledgment:* Images data retrieved from the Mikulski ..	Data provenance, copyright, acknowledgment
bib_reference bib_reference_url	*Bib. reference* 2016arXiv161205560C	Associated bibliographic reference
t_min t_max obs_regime em_min em_max	**Coverage** *Time range* 2009-06-17 .. 2014-08-27 *Energy range* 394.3nm/760.3THz .. 951nm/315.2THz	Observational parameters : time and energy range, wavelength
hips_builder hips_version hipsgen_params	hips_builder = Aladin/HipsGen v10.125 hips_version = 1.4 hipsgen_params = out=/asd-volumes/sc1-asd-volume11/Pan-STARRS/DR1/color-z-zg-g UPDATE	HiPS standard version, Hipsgen version and parameters

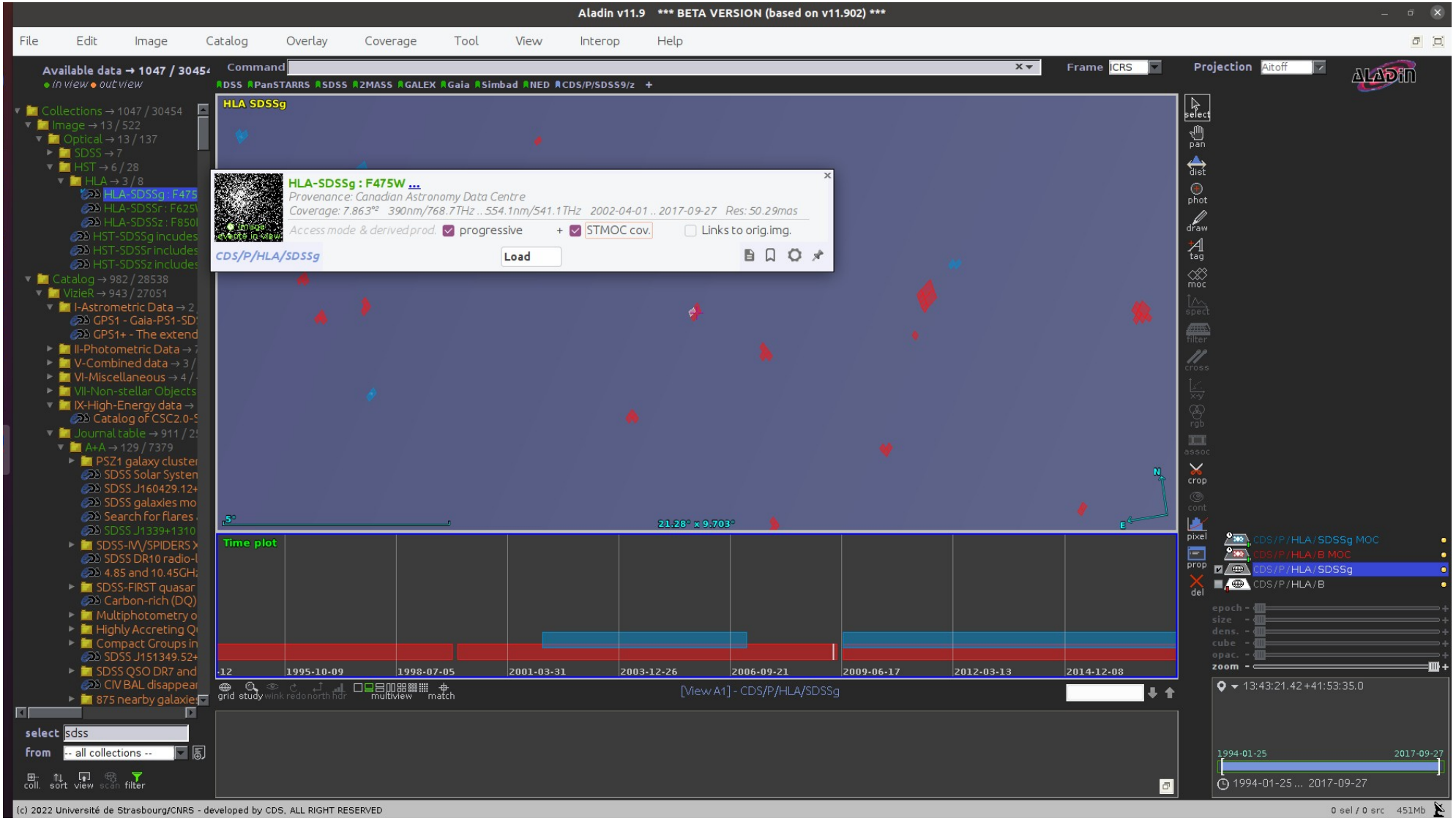
HiPS associated meta data

Original survey data structured as a mosaic of tiles at various resolutions



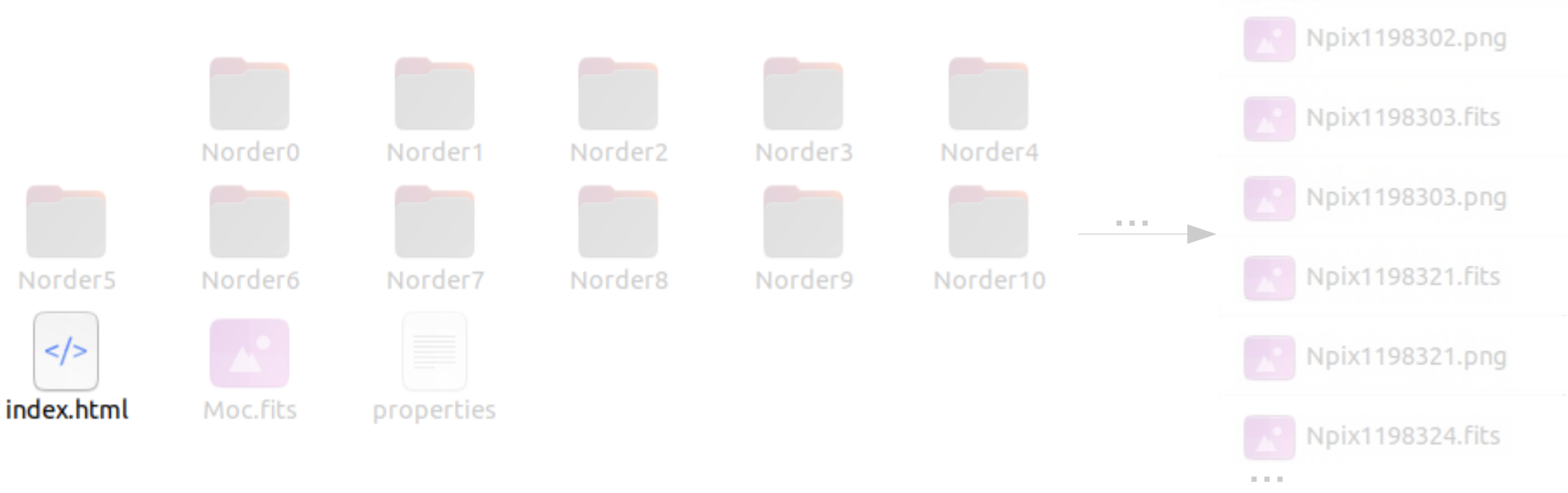
Associated metadata : spatial/time coverage

Map of Coverage



HiPS associated meta data

Original survey data structured as a mosaic of tiles at various resolutions



Associated metadata : HTML presentation of the survey

Landing page

"PanSTARRS DR1 color-z-zg-g" progressive survey

This Web resource contains HiPS(*) components for **PanSTARRS DR1 color-z-zg-g** progressive survey.

This survey can be displayed by Aladin Lite (see above), by Aladin Desktop client (just open the base URL) or any other HiPS aware clients.

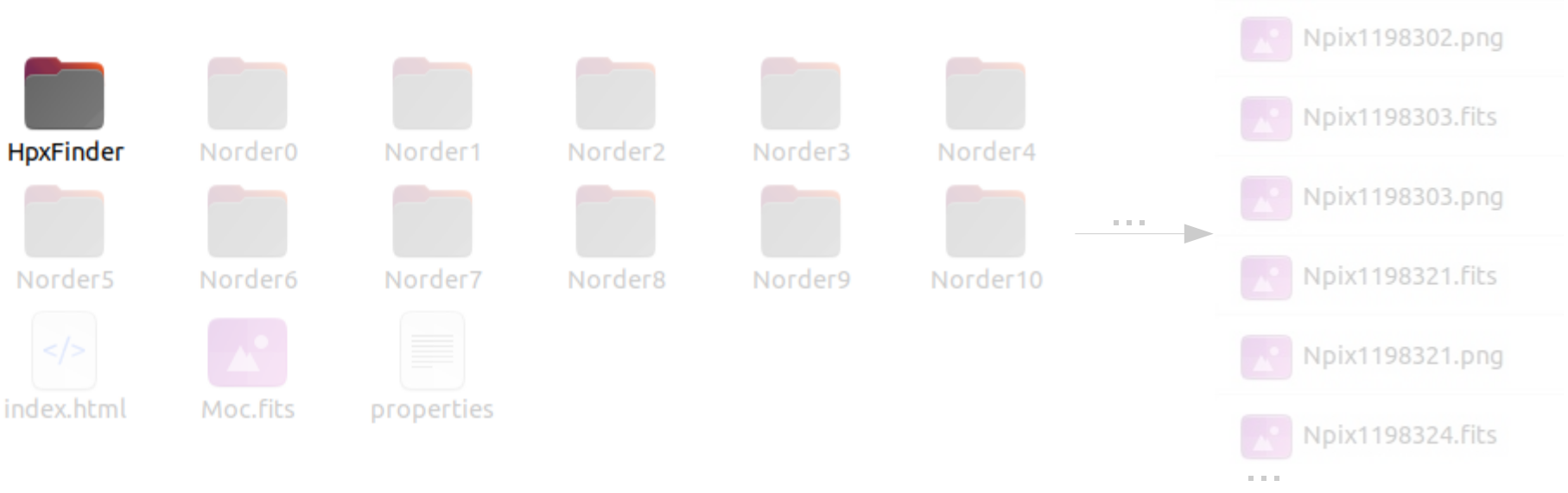
- **Label:** PanSTARRS DR1 color-z-zg-g
- **Type:** colored HiPS image
- **Best pixel angular resolution:** 201.3mas
- **Max tile order:** 11 (NSIDE=2048)
- **Available encoding tiles:** jpeg
- **Tile size:** 512x512
- **Processing date:** 2019-05-20T08:25Z
- **HiPS builder:** Aladin/HipsGen v10.125
- **Coordinate frame:** equatorial
- **Sky area:** 100.0% of sky => 41253Â°^2
- **Associated coverage map:** MOC
- **Property file:** properties
- **Base URL:**

  http://alasky.cds.unistra.fr/Pan-STARRS/DR1/color-z-zg-g

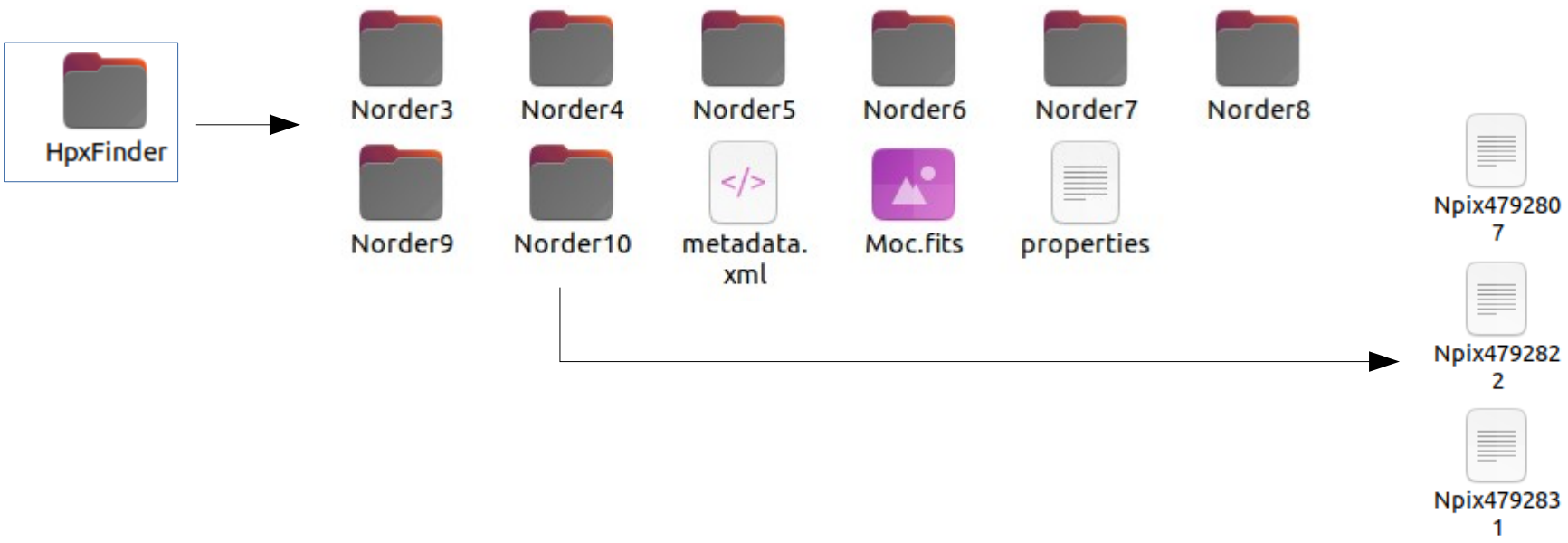
(*) HiPS is a recommended International Virtual Observatory Alliance standard:HiPS REC. The HiPS technology allows a dedicated client to access an astronomical survey at any location and at any scale. HiPS has been invented by CDS-Université de Strasbourg/CNRS (2015A&A...578A.114F). It is based on HEALPix sky

HiPS progenitors

The available meta information about the images allow us to generate **links towards the progenitors**



Link towards the original images

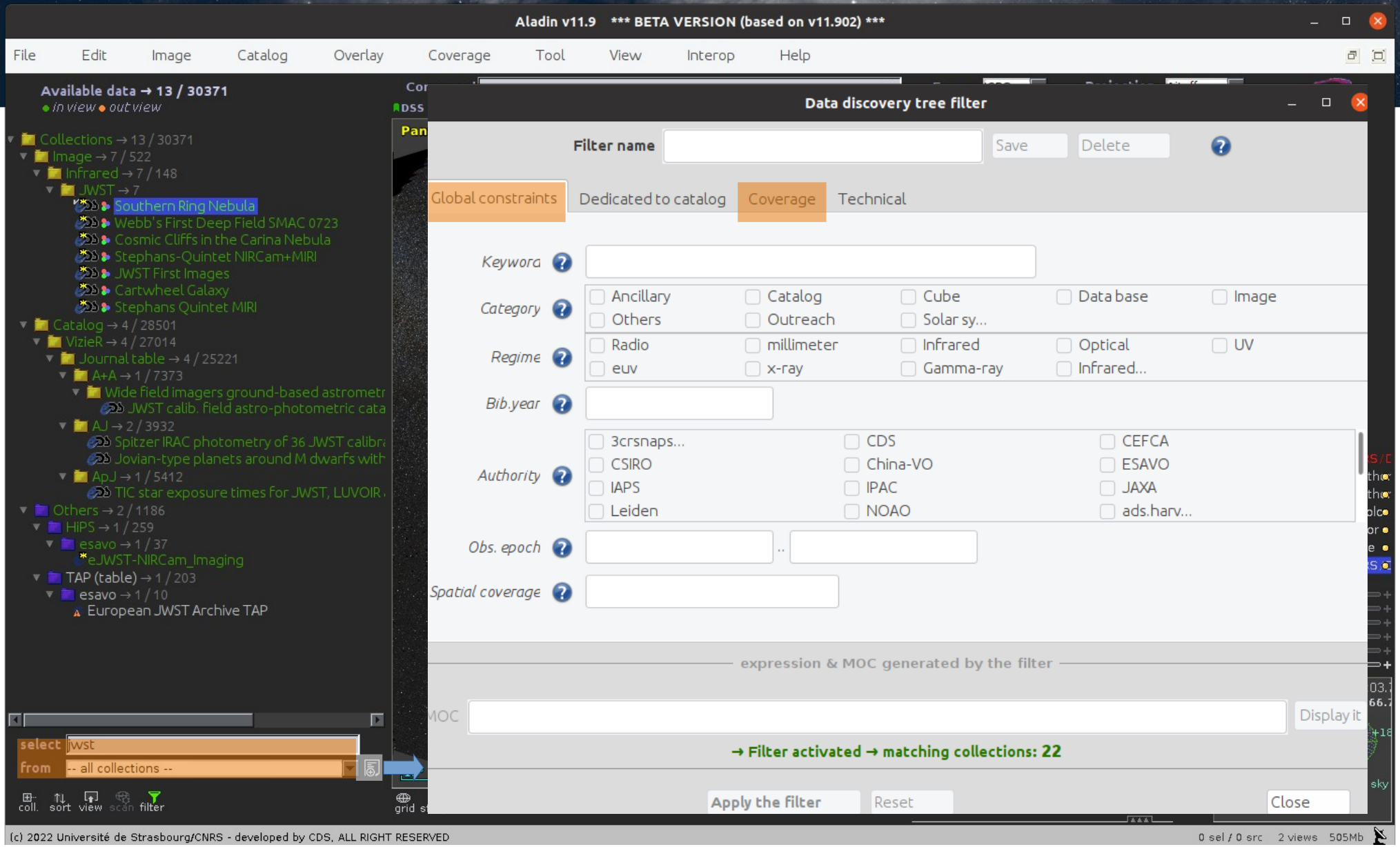


*See https://www.ivoa.net/documents/Notes/HiPSProg/20180525/

Main steps in data curation process

- **HiPS generator tool** evolution:
  - Internal **global verification and updates**
  - **enrich the metadata**, prior or subsequent to new developments
- HiPS **IVOA standard compatibility checks** (Hipsgen LINT action)
- **Properly curated data** → FAIR data
- Maintain contact with :
  - **data** providers
  - **HiPS providers**

Table of content


Aladin v11.9 *** BETA VERSION (based on v11.902) ***
File Edit Image Catalog Overlay Coverage Tool View Interop Help
Available data → 13 / 30371
in view out view
Collections → 13 / 30371
Image → 7 / 522
Infrared → 7 / 148
JWST → 7
Southern Ring Nebula
Webb's First Deep Field SMAC 0723
Cosmic Cliffs in the Carina Nebula
Stephans-Quintet NIRCam+MIRI
JWST First Images
Cartwheel Galaxy
Stephans Quintet MIRI
Catalog → 4 / 28501
VizieR → 4 / 27014
Journal table → 4 / 25221
A+A → 1 / 7373
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AJ → 2 / 3932
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ApJ → 1 / 5412
TIC star exposure times for JWST, LUVOIR
Others → 2 / 1186
HiPS → 1 / 259
esavo → 1 / 37
eJWST-NIRCam_Imaging
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esavo → 1 / 10
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Apply the filter
Reset
Close
(c) 2022 Université de Strasbourg/CNRS - developed by CDS, ALL RIGHT RESERVED
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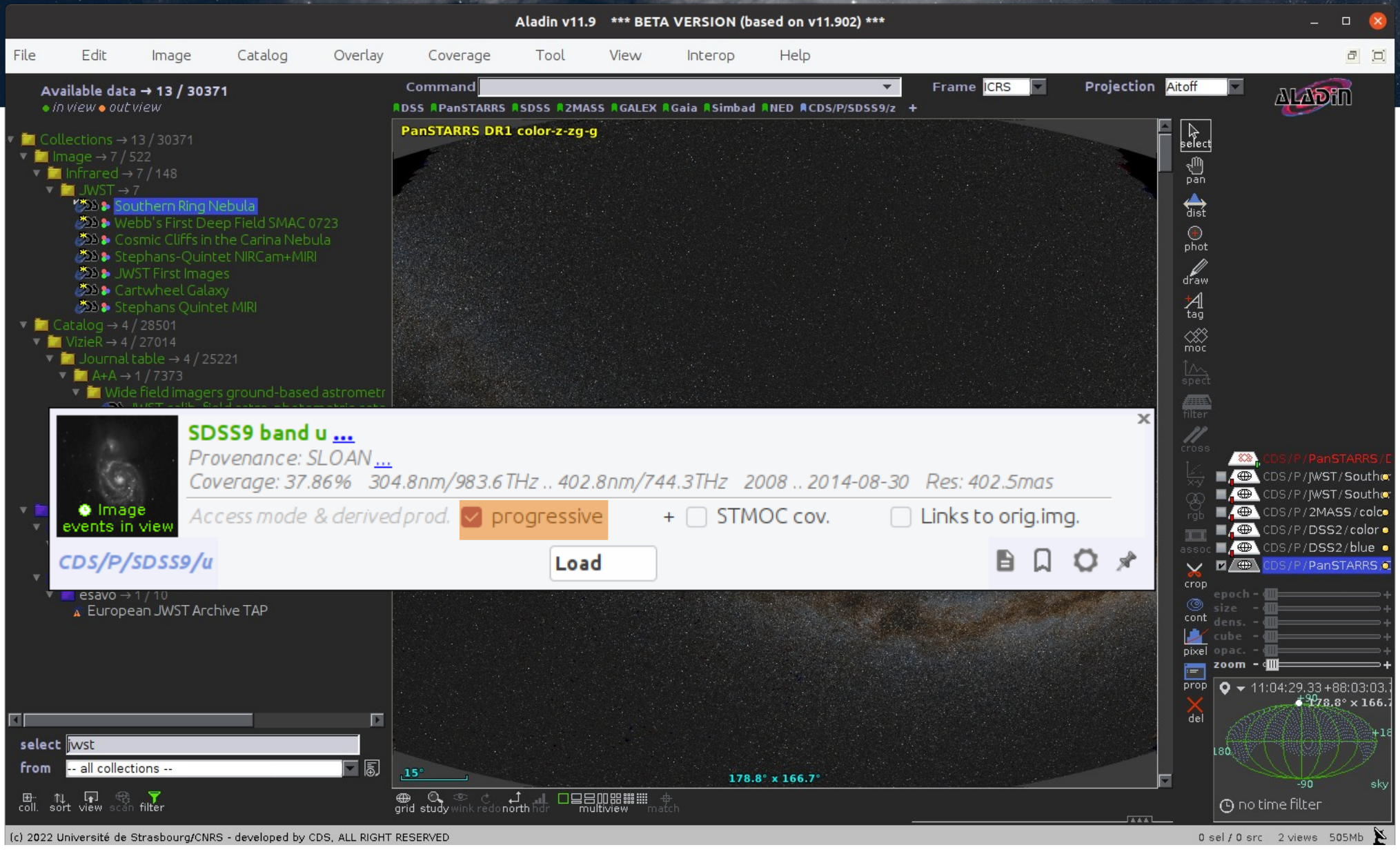
2 views
505Mb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CDS/P/2MASS/colo
CDS/P/DSS2/color
CDS/P/DSS2/blue
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178.8° x 166.
no time filter
(c) 2022 Université de Strasbourg/CNRS - developed by CDS, ALL RIGHT RESERVED
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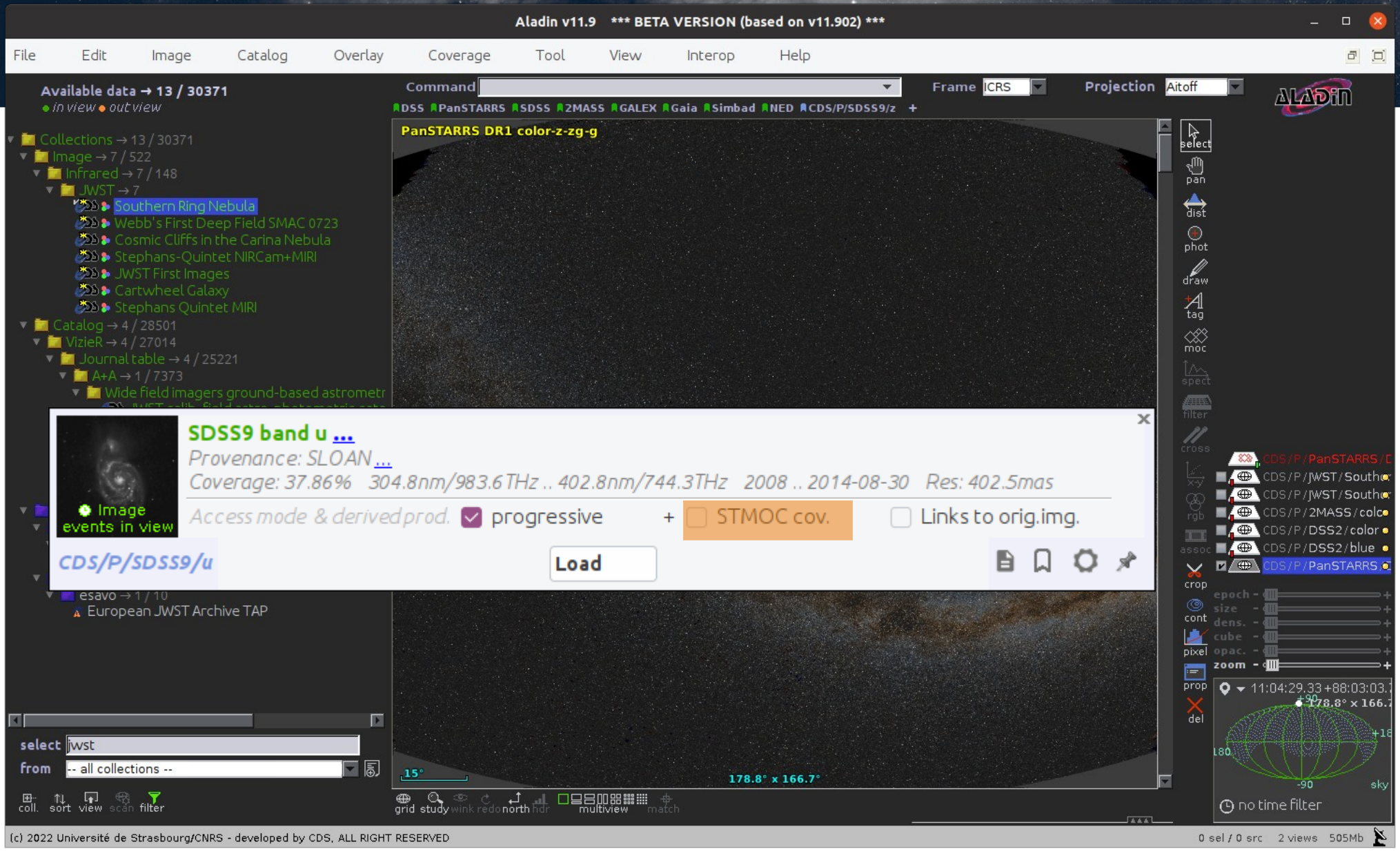
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select pan dist phot draw tag moc spect filter cross xy rgb assoc crop cont pixel prop del
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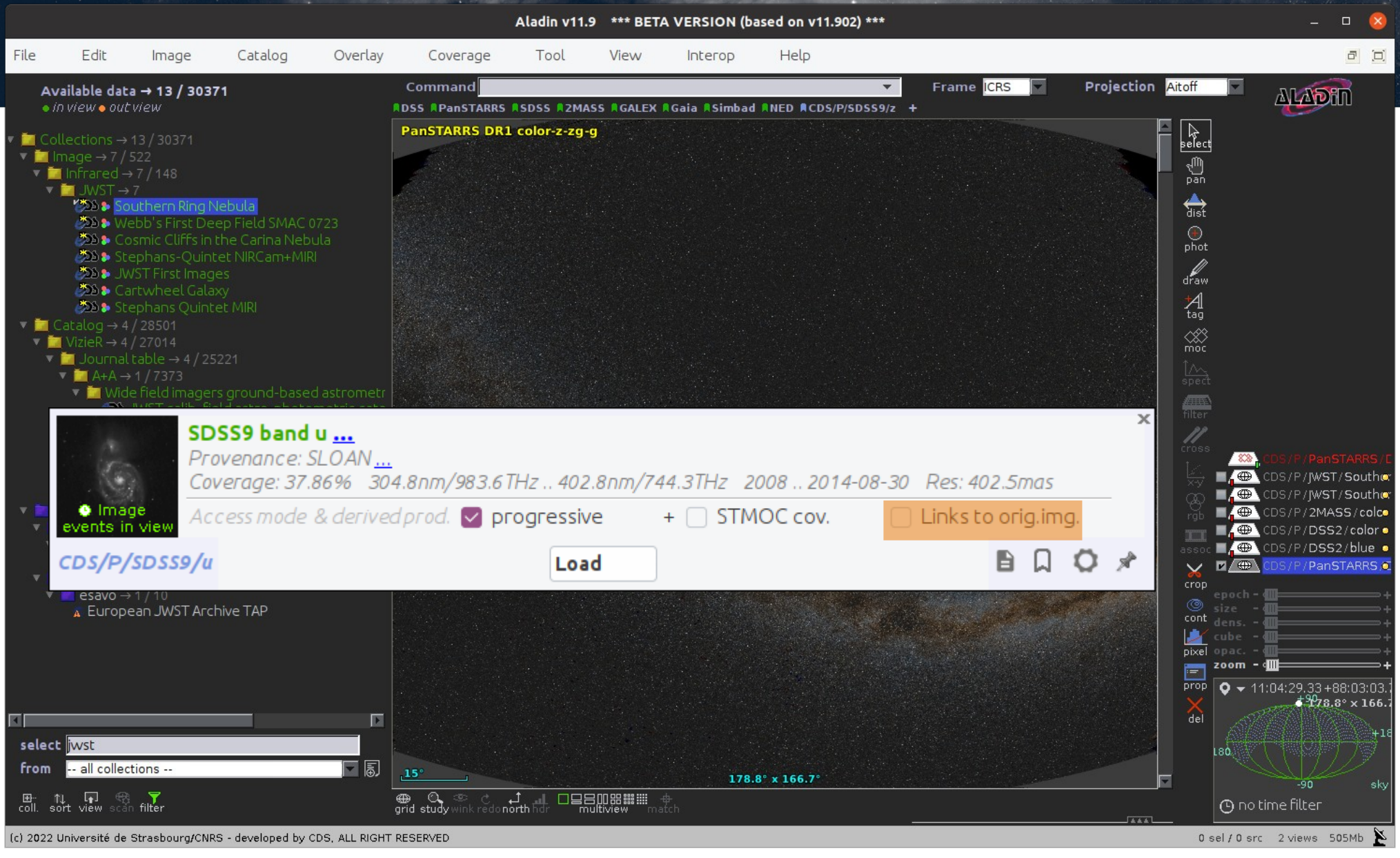
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JWST → 7
Southern Ring Nebula
Webb's First Deep Field SMAC 0723
Cosmic Cliffs in the Carina Nebula
Stephans-Quintet NIRCam+MIRI
JWST First Images
Cartwheel Galaxy
Stephans Quintet MIRI
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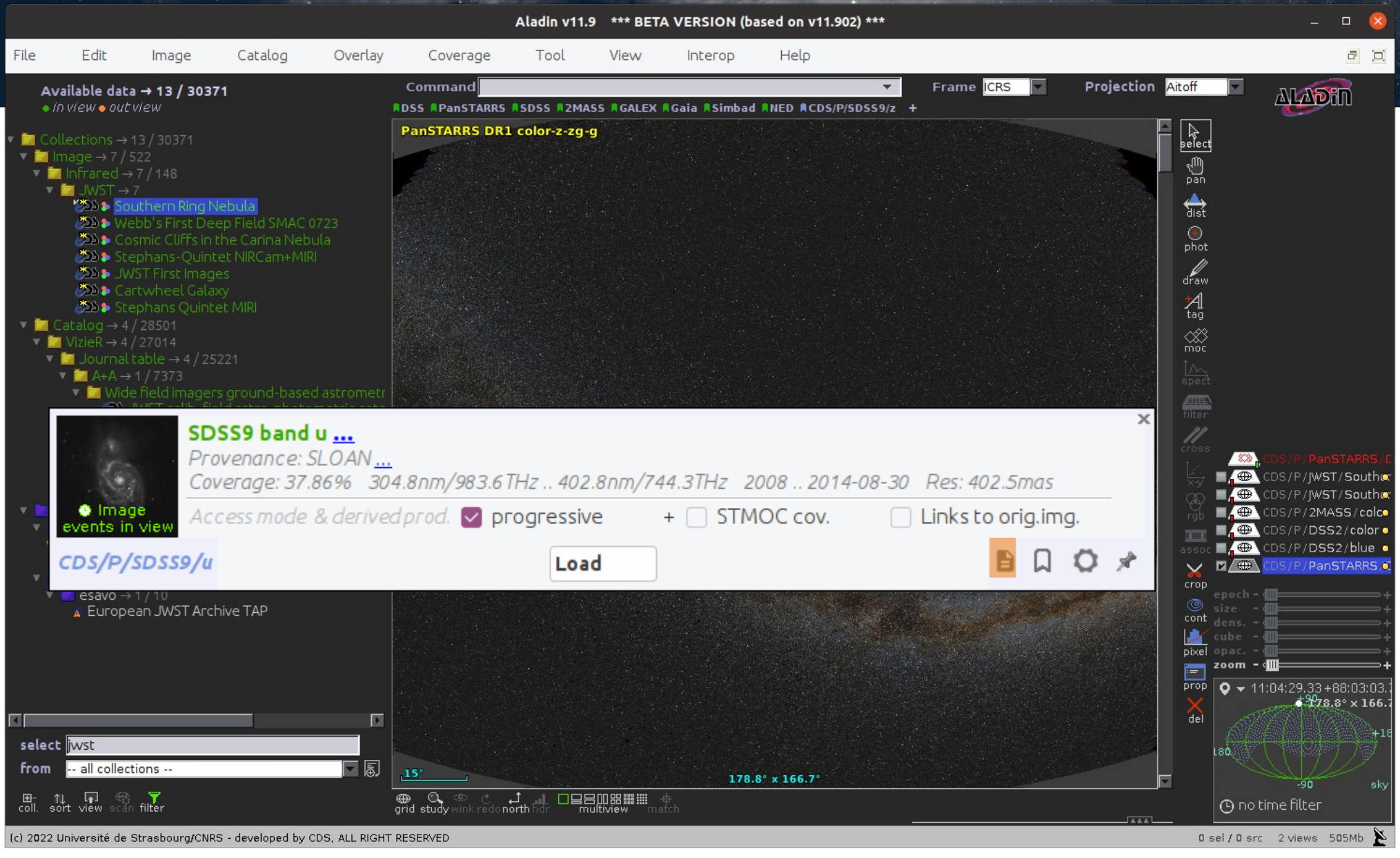
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IVOA registry

- HiPS server registration
- Individual HiPS survey registration : not yet

Thank you!