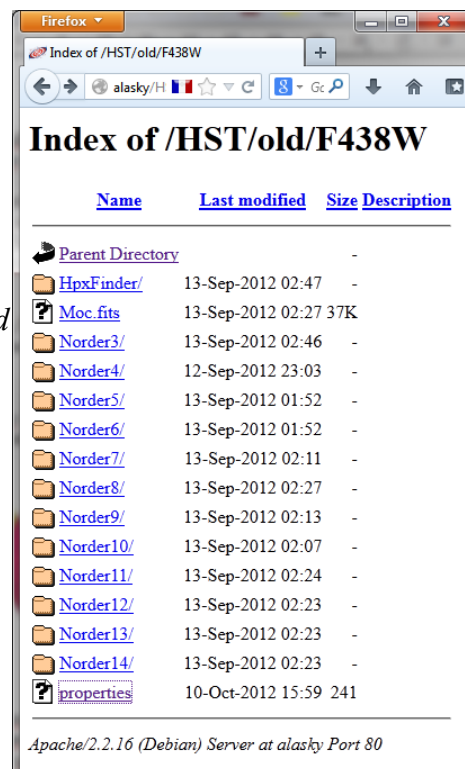


HiPS – Hierarchical Progressive Survey

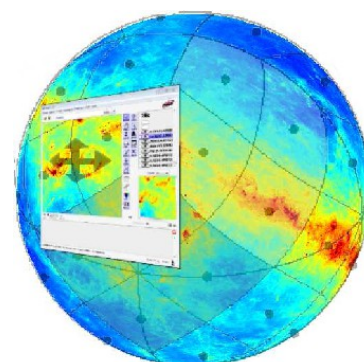
This document describes the method for storing a HiPS (Hierarchical progressive Survey) as a collection of files. This method was developed in the frame of Aladin allsky study based on HEALPix sky tessellation. It is not an IVOA standard and it is still in progress, but it can already help the development of alternative HiPS generators/clients/browsers.

*Author : Pierre Fernique
Date : 22th June 2015 – 18:35
HiPS version : 1.3*

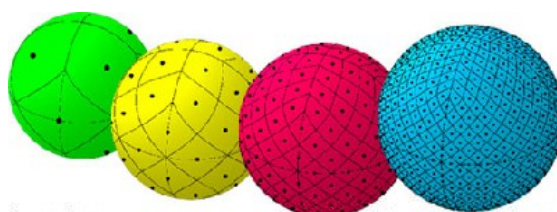


1 Description

the more you zoom in on a particular area the more details show up”



2 HEALPix principle



3 HiPS directory structure

A HiPS follows this directory structure:

```
...
Norder3
  Dir0
    Npix0
...
Norder6
  Dir0
    Npix0
    Npix1
  ...
  Dir10000
    Npix10000
...
```

4 Tile format

4.1 Image tile format:

Example.

Note:

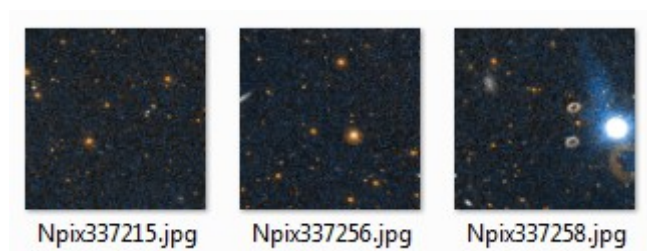


Image tile drawing method:

4.2 Catalog tile format:

```
Npix285.tsv - Notepad2 (Administrator)
File Edit View Settings ?
MAIN_ID OTYPE RA DEC COO_ERR_MAJA COO_ERR_MINA COO_ERR_ANGLE PMRA PMDEC B V R J H K SP_TYPE GALDIM_MAJA
3B 940301 gammaBurst 06 54.0 +64 21 62
V* V470 Cam EB*Algo1 07 10 42.07 +66 55 43.6 100.0 80.0 2 -0.7 -10.0 14.1 14.6 15.103 15.233 15.301
Ln1:10 Col1 Sel0 962 octets ANSI LF INS Default Text
```

Catalog tile drawing method:

4.3 Cube tile format:

5 Allsky packaging

—

“Allsky” file corresponds to the frame 0.

6 Meta data

SHOULD MAY

6.1 Properties

SHOULD

Note :

not

```

obs_publisher_did = P/VTSS/Ha
publisher_id      = ivo://CDS
obs_collection    = VTSS-Ha
obs_title         = VTSS Ha - The Virginia Tech Spectral-Line Survey
obs_description   = he VTSS is a wide-field image survey of the Galaxy's warm ionized interstell
obs_ack          = Lane, W. M., Cotton, W. D., Helmboldt, J. and Kassim, N. E. 2012 "VLSS Redu
data_copyright    = (c) Virginia Tech Physics - HEALPix by CDS
hips_builder      = Aladin/HipsGen v8.141
hips_version      = 1.0
hips_release_date = 2015-03-30T11:27Z
hips_publisher    = CDS [P.Fernique]
hips_frame        = equatorial
hips_order        = 3
hips_tile_width   = 512
hips_tile_format  = fits
hips_pixel_cut    = -4.691 402.8
hips_data_range   = -601.8 1783
hips_initial_ra   = 345.73719
hips_initial_dec  = +37.6812
hips_initial_fov  = 10.3064
hips_pixel_scale  = 0.01431
s_pixel_scale     = 0.02677
dataproduct_type  = image
moc_sky_fraction  = 0.03516
  
```

ObsCore

IVOA

MAY

MAY

publisher_did	Unique ID of the data set - Format : IVORN - Ex : ivo://CDS/P/2MASS/J
publisher_id	Unique ID of the HiPS publisher – Format : IVORN - Ex : ivo://CDS
obs_collection	Short name of original data set – Format : one word – Ex : 2MASS
obs_title	Data set title – Format : free text, one line – Ex : HST F110W observations
obs_description	Data set description – Format : free text, one paragraph
obs_ack	Acknowledgment mention.
prov_progenitor (*)	Provenance of the original data – Format : free text
bib_reference (*)	Bibliographic reference

hips_initial_dec	Default DEC display position – Format : real (ICRS frame) – Unit : degrees
hips_initial_fov	Default display size – Format : real – Unit : degrees
hips_pixel_scale	HiPS pixel angular resolution at the highest order – Format : real – Unit : degrees
s_pixel_scale	Best pixel angular resolution of the original images – Format : real – Unit : degrees
t_min	Start time of the observations – Format : real – Unit: MJD (*)
t_max	Stop time of the observations – Format : real – Unit: MJD (*)
em_min	Start in spectral coordinates – Format: real – Unit: meters
em_max	Stop in spectral coordinates – Format: real – Unit: meters
client_category	'/' separated keywords suggesting a display hierarchy to the client – Ex : Image/InfraRed
client_sort_key	Sort key suggesting a display order to the client inside a « client_category » – Format : free text – Sort : alphanumeric
moc_sky_fraction	Fraction of the sky covers by the MOC associated to the HiPS – Format : real between 0 and 1

id	publisher_did
copyright	obs_copyright
copyrightUrl	obs_copyright_url
HiPSBuilder	hips_builder
publisher	hips_publisher
firstProcessingDate	hips_creation_date
processingDate	hips_release_date
coordsys	hips_frame
maxOrder	hips_order
minOrder	hips_order_min
nside	hips_tile_width
format	hips_tile_format
pixelCut	hips_pixel_cut
pixelRange	hips_data_range
cubeDepth	hips_cube_depth
firstFrame	hips_cube_firstframe
target	See hips_initial_dec , hips_initial_ra
targetRadius	hips_initial_fov
category	client_category
isColored	See dataprodct_subtype
isCatalog	See dataprodct_type
isCube	See dataprodct_type
liveUpdate	See dataprodct_subtype
red	See hips_rgb_red

green	See <code>hips_rgb_green</code>
blue	See <code>hips_rgb_blue</code>

6.2 Metadata

MAY

HiPS image:

HiPS catalog:

HiPS cube:

6.3 MOC

MAY

MUST

6.4 *index.html*

MAY

Firefox

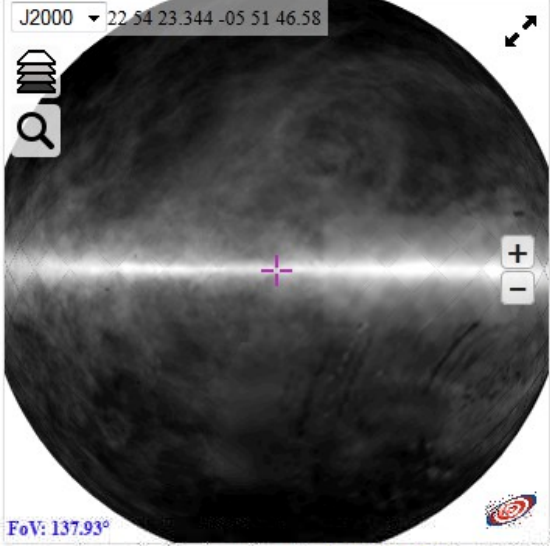
http://alasky.u-strasbg.fr/HI/

alasky.u-strasbg.fr/HI/

"HI" progressive survey

This Web resource contains HiPS(*) components for HI progressive survey.

J2000 22 54 23.344 -05 51 46.58



FoV: 137.93°

- Label: HI
- Type: HiPS image
- Best pixel angular resolution: 51.53"
- Max tile order: 3 (NSIDE=8)
- Available encoding tiles: jpeg fits
- Tile size: 512x512
- FITS tile BITPIX: -32
- Processing date: 19/04/14 17:59:03
- HiPS builder: Aladin/HipsGen v8.103
- Coordinate frame: galactic
- Sky area: 100.0% of sky => 41253?^2
- Associated coverage map: [MOC](#)
- Raw property file: [properties](#)
- Base URL:

<http://alasky.u-strasbg.fr/HI>

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

(*) The HiPS technology allows a dedicated client to access an astronomical survey at any location and at any scale. HiPS is based on HEALPix sky tessellation and it is designed for astronomical scientific usages (low distortion, true pixel values...). HiPS technical documentation is available [here](#)

7 Progenitors & HpxFinder

MAY

Note :

7.1 HpxFinder tile format

one line per image

-
-
-
-
-

Example :

```
{ "ra": "221.040", "dec": "42.60632", "name": "hst_12018_18_wfc3_uvis_f438w_drz", "path": "/staging/sciproc2/1/durand/HSTSKY_FINAL/extraction/F438W/hst_12018_18_wfc3_uvis_f438w_drz.fits[2048,4096-327x44]", "stc": "POLYGON J2000 221.07105 42.60602 221.03554 42.60602 221.03553 42.65159 221.07107 42.65159" }
```

7.2 VOTable progenitor template

prefix $\$[key1]$ suffix $\$[key2:./(w+)]...$*

“metadata.xml” HpxFinder example :

```
<RESOURCE>
<TABLE name="HST">
<DESCRIPTION>HST progenitors</DESCRIPTION>
<FIELD name="RAJ2000" ucd="pos.eq.ra" datatype="double" width="9" precision="5" unit="deg">
<DESCRIPTION>Right ascension</DESCRIPTION>
</FIELD>
<FIELD name="DEJ2000" ucd="pos.eq.dec" datatype="double" width="9" precision="5" unit="deg">
<DESCRIPTION>Declination</DESCRIPTION>
</FIELD>
<FIELD name="id" ucd="meta.id;meta.dataset" datatype="char" arraysize="10*">
<DESCRIPTION>Dataset name, uniquely identifies the data for a given exposure.</DESCRIPTION>
<LINK href="HST.obs  $\${id}$ " />
</FIELD>
<FIELD name="Access" datatype="char" arraysize="9*">
<DESCRIPTION>Load original this original image</DESCRIPTION>
<LINK content-type="image/fits"
href="http://www.cadc.hia.nrc.gc.ca/data/pub/HSTCA/ $\${id}$ _drz.fits" title="Original img"/>
</FIELD>
<FIELD name="Preview" datatype="char" arraysize="9*">
<DESCRIPTION>Load preview image</DESCRIPTION>
<LINK content-type="image/fits"
href="http://www.cadc.hia.nrc.gc.ca/data/pub/HSTCA/ $\${id}$ _prev.jpg" title="Preview"/>
</FIELD>
<FIELD name="Band" datatype="string" arraysize="10*">
<DESCRIPTION>Wavelength band</DESCRIPTION>
</FIELD>
<FIELD name="Instrument" datatype="string" arraysize="10*">
<DESCRIPTION>Instrument</DESCRIPTION>
</FIELD>
<FIELD name="FoV" datatype="char"
utype="stc:ObservationLocation.AstroCoordArea.Region" arraysize="7*">
<DESCRIPTION>Field of View (STC description)</DESCRIPTION>
</FIELD>
</TABLE>
```

```

<DATA><TABLEDATA>
<TR>
<TD>${ra}</TD>
<TD>${dec}</TD>
<TD>${name:(.*)_drz}</TD>
<TD>${name:(.*)_drz}</TD>
<TD>${name:(.*)_drz}</TD>
<TD>${path:.*extraction/(\w+)/\w+.*}</TD>
<TD>${path:.*extraction/\w+/(\w+).*}</TD>
<TD>${stc}</TD>
</TR>
</TABLEDATA></DATA>
</TABLE>
</RESOURCE>

```

Example of corresponding client result:

RAJ2000	DEJ2000	id	A...	Access	Preview	Band	Instrument	FoV
270.79943	-29.86112	066b0108		Original And...	Preview	RF55M	HEPC2	FoV
		066b0108		Original And...	Preview	RF55M	HEPC2	FoV
		066b0108		Original And...	Preview	RF55M	HEPC2	FoV
		066b0108		Original And...	Preview	RF55M	HEPC2	FoV

Note:

Note:

8 Miscellaneous

8.1 Fits tile compression

Note:

8.2 Client cache

8.3 HiPS examples

HiPS site & HiPS mirroring

1 HiPS node, HiPS list

HiPS node

MUST

HiPS list

MUST

**publisher_id,
MAY**

**hips_release_date, hips_service_url, hips_status
hips_order, hips_tile_format, hips_estsize, moc_sky_fraction**

hips_service_url	Base URL of the HiPS
hips_status	Status of the HiPS node – Format: list of keywords: public private : allowed for all clients (public), or only for dedicated authorized clients (private) master mirror partial : original HiPS (master), full copy of HiPS (mirror), partial copy of HiPS (partial) clonable unclonable : HiPS mirroring allowed (clonable) or not (unclonable) Default: public master clonable

```
# Hipslist of http://alasky.unistra.fr HiPS node
# Date: 2015-04-16T13:42Z
# Do not copy any HIPS with unclonable status !

publisher_id      = ivo://CADC/P/HST/F850LP/r3
hips_release_date = 2014-10-14T12:00Z
hips_service_url  = http://alasky.u-strasbg.fr/HST/F850LP
hips_status       = public master clonable

publisher_id      = ivo://CDSP/2MASS/H
hips_release_date = 2014-11-03T12:00Z
hips_service_url  = http://alasky.u-strasbg.fr/2MASS/H
hips_status       = public mirror unclonable
hips_estsize      = 1610612736
hips_order        = 9
hips_tile_format  = fits jpeg
dataprod_type     = image
moc_sky_fraction = 1
...
```

2 *HiPS node registry*

hips_node_id, hips_node_url

hips_node_id = ivo://CDS/hipsnode/one
hips_node_url = http://alasky.u-strasbg.fr/hips

hips_node_id = ivo://ESAC/hipsnode
hips_node_url = <http://skies.esac.esa.int/list.txt>
...

hips_node_id

hips_node_url

3 *HiPS node mirroring policy*

hips_status = ... unclonable ... ”.

MUST hips_status = ... mirror ...”

MUST NOT hips_release_date

hips_order, hips_tile_format hips_status = partial”

4 *HiPS security*

MAY

5 *HiPS statistics*

SHOULD

stat_hips_tile_hits	Number of asked tiles (HTTP code 20X) – Format : integer
stat_t_min	Date of the beginning (include) of the measurement period – Format: real – Unit: MJD
stat_t_max	Date of the end (include) of the measurement period – Format: real – Unit: MJD

```
publisher_id      = ivo://CADC/P/HST/F850LP/r3
stat_hips_tiles_hits = 234569
stat_t_min        = 56444
stat_t_max        = 56475

publisher_id      = ivo://CADC/P/HST/F110W/r3
stat_hips_tiles_hits = 10543
stat_t_min        = 56444
stat_t_max        = 56475
...
```

MAY <http://xxxx/hipsstat>

6 *Global HiPS list*

global HiPS list

hips_service_url _1 _2

hips_order hips_tile_format
