



# ESO Public Surveys

## Status and forward look

Magda Arnaboldi, Nausicaa Delmotte, Dimitri Gadotti, Michael Hilker, Gaitee Hussain, Laura Mascetti, Alberto Micol, Monika Petr-Gotzens, Marina Rejkuba, Jörg Retzlaff, and Rob Ivison, Bruno Leibundgut, Martino Romaniello



# Motivation & Policies

- Since 2010, ESO operates dedicated telescopes for surveys: VST and VISTA. Also FLAMES@UT2, UVES@UT2, VIMOS@UT3, EFOSC/SOFI@NTT spectrographs were supporting survey projects
- ESO public surveys: such scheme implements a partnership between ESO and its community:
  - ESO organize calls, support telescope operations, deliver raw data to teams, acts as data standard authority, facilitate the publication of products through the archive, and organize peer reviews – **activities coordinated by the ESO Survey Team**
  - Community define the science projects, the observing strategy & observations, final scientific QC and delivery of science data products
- The ESO Science Archive Facility (SAF; <http://archive.eso.org/cms.html> ) is the primary point of publication/availability of the survey products (as per ESO Council Meeting 104, 17–18 December 2004).



# Outline

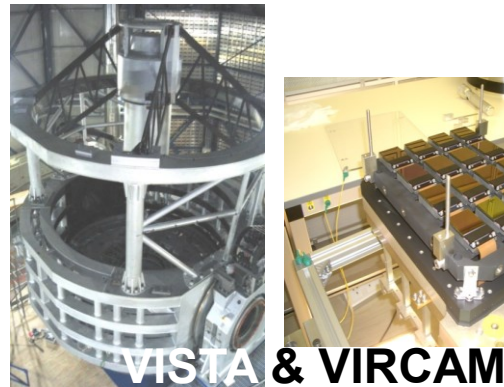
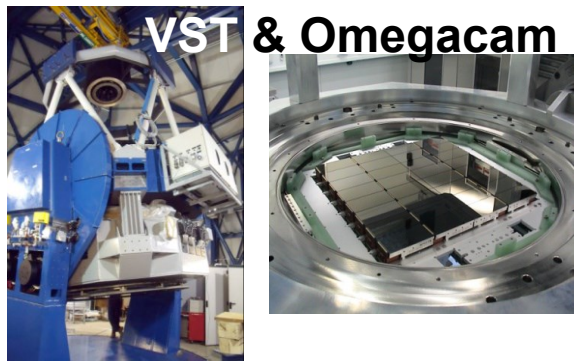
- Motivation & Policies – Public Surveys @ ESO
- On-going ESO Public Surveys
  - VST surveys
  - VISTA first & second cycle
  - Spectroscopic Surveys
- Scientific impact & returns for the community
- Forward look
- Conclusions
- Acknowledgments

# On-going Public Surveys

<http://www.eso.org/sci/observing/PublicSurveys/sciencePublicSurveys.html>

## Public Surveys in a nut-shell

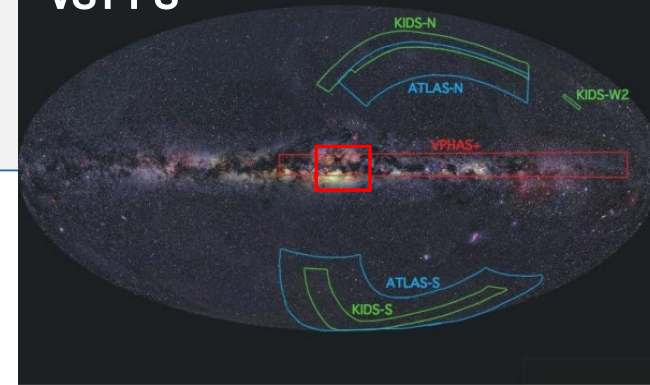
- Legacy value for astronomical community at large
- Very large programmes (>2 years); very diversified observing strategies
- Synergy between optical and NIR imaging, from 0.33 to 2.15 micron
- Spectroscopic follow-up of sources; multiplexing capabilities (FoV ~ 10 arcmin) to single slit; Spec\_res  $10^4$  to ~1000.
- All raw observations are immediately public
- Survey teams commit to deliver reduced images/spectra and catalogues within ~yearly releases



FLAMES@UT2  
VIMOS@UT3

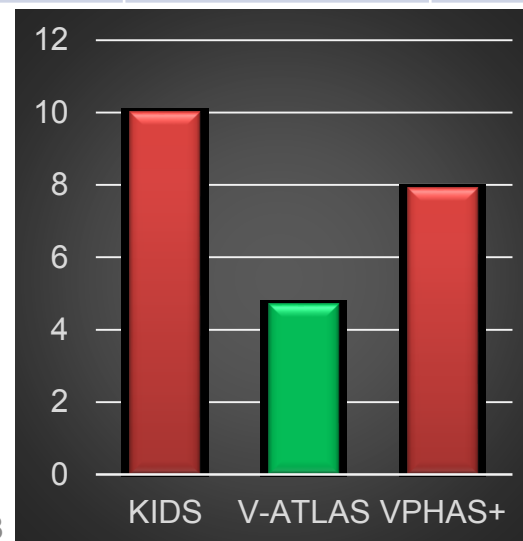
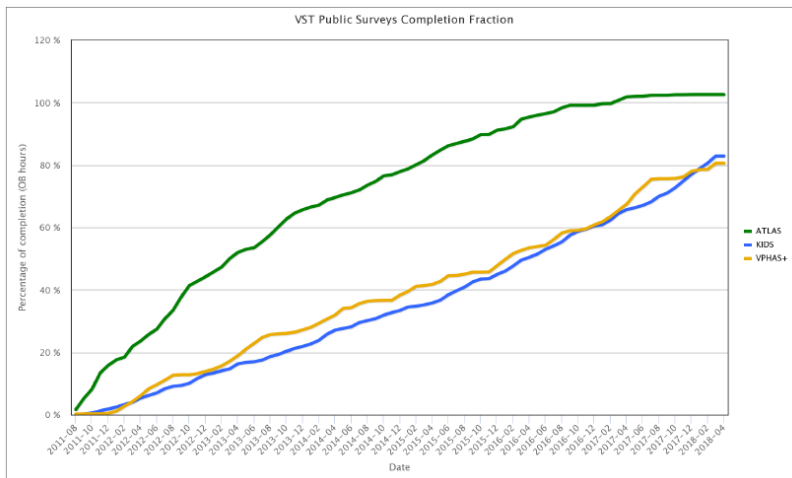


EFOSC&SOFI  
@NTT

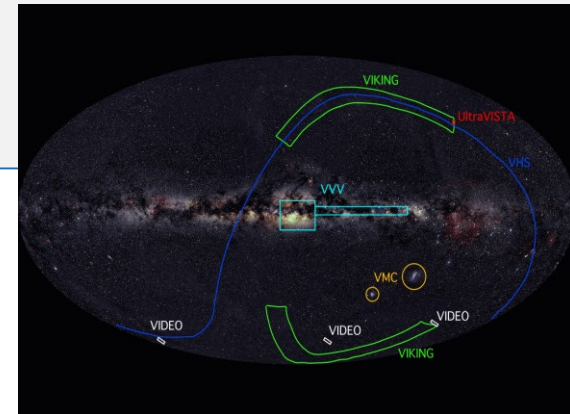


## The VST surveys started operations on October 2011

Survey ID and home page	Science topic	Area deg <sup>2</sup>	Filters	Magnitude limits	Observing time completed (hrs) to Oct 1 <sup>st</sup> 2017
KIDS <a href="http://kids.strw.leidenuniv.nl/">http://kids.strw.leidenuniv.nl/</a>	Extragalactic	1500	u' g' r' I'	24.1 24.6 24.4 23.4	2297
ATLAS <a href="http://astro.dur.ac.uk/Cosmology/vstatlas/">http://astro.dur.ac.uk/Cosmology/vstatlas/</a>	Wide area/BAO	4000	u' g' r' I' z	22.0 22.2 22.2 21.3 20.5	1422
VPHAS+ <a href="http://www.vphas.eu">http://www.vphas.eu</a>	Stellar astrophysics	2000	U' g' H $\alpha$ r' I'	21.8 22.5 21.6 22.5 21.8	985



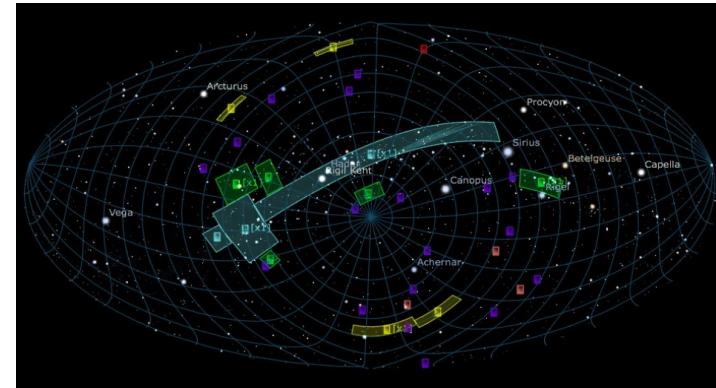
- ATLAS extended 700 sqdeg in u'
- VPHAS+ reprioritization
- KIDS may be completed in 2019



- First cycle of VISTA surveys started operations on April 2010.
- Current assessment is that they will all be completed in P101!

Survey ID and home page	Science topic	Area (deg <sup>2</sup> )	Filters	Magnitude limits	Observing time completed (hrs) to Oct. 1 <sup>st</sup> 2017
Ultra-VISTA <a href="http://home.strw.leidenuniv.nl/~ultravista/">http://home.strw.leidenuniv.nl/~ultravista/</a>	<b>Completed</b>	7 deep 3 ultra deep	Y J H Ks NB118	25.7 25.5 25.1 24.5 26.7 26.6 26.1 25.6 26.0	1809
VHS <a href="http://www.ast.cam.ac.uk/~rgm/vhs/">http://www.ast.cam.ac.uk/~rgm/vhs/</a>	Whole sky	17800	Y J H Ks	21.2 21.1 20.6 20.0	4519
VIDEO <a href="http://www-astro.physics.ox.ac.uk/~video">http://www-astro.physics.ox.ac.uk/~video</a>	Deep high-z	12	Z Y J H Ks	25.7 24.6 24.5 24.0 23.5	1876
VVV <a href="http://vvvsurvey.org/">http://vvvsurvey.org/</a>	<b>Completed</b>	0	Z Y J H Ks	21.9 21.1 20.2 18.2 18.1	2157
VIKING <a href="http://www.astro.wise.org/projects/VIKING/">http://www.astro.wise.org/projects/VIKING/</a>	<b>Completed</b>	00	Z Y J H Ks	23.1 22.3 22.1 21.5 21.2	2410
VMC <a href="http://star.herts.ac.uk/~mcioni/vmc/">http://star.herts.ac.uk/~mcioni/vmc/</a>	Resolved SFH	180	Y J Ks	21.9 21.4 20.3	1779

- **Second cycle of VISTA surveys, ESO call in 2015**
- **13 Loi submitted by the community, oversubscription > 2**
- **7 proposals selected; started operations in April 2017**

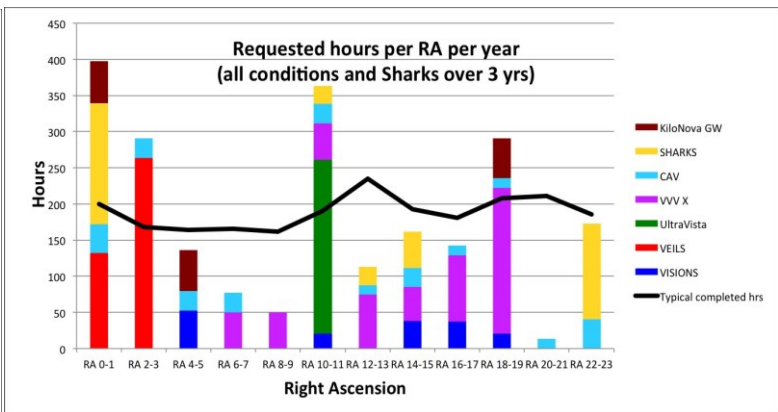
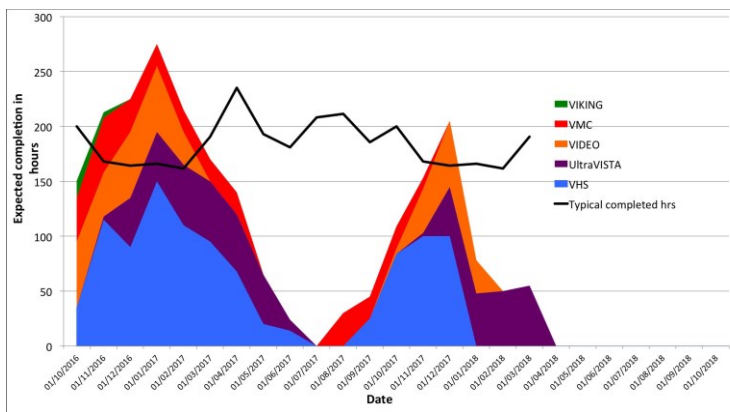


Name P.I.	Short Title	Filters	Tot. Time (hrs)	Area (deg <sup>2</sup> )
GW; N. Tanvir	Kilonova counterparts to Gravitational wave sources	Y J Ks	420	300
UltraVISTA; J. Dunlop	Completing the legacy of UltraVISTA	J H Ks	756	0.75
VVVX; D. Minniti	Extending VVV to higher Gal lat.	J H Ks	1900	1700
VEILS; M. Banerji	VISTA Extragalactic Infrared Survey	J Ks	1180	9
CAV; M. Nonino	Clusters at VIRCAM	Y J Ks	560	30
VISIONS; J. Alves	VISTA star formation atlas	J H Ks	553	550
SHARKS; I. Oteo	Southern Herschel-Atlas Regions K-band survey	Ks	1200	300

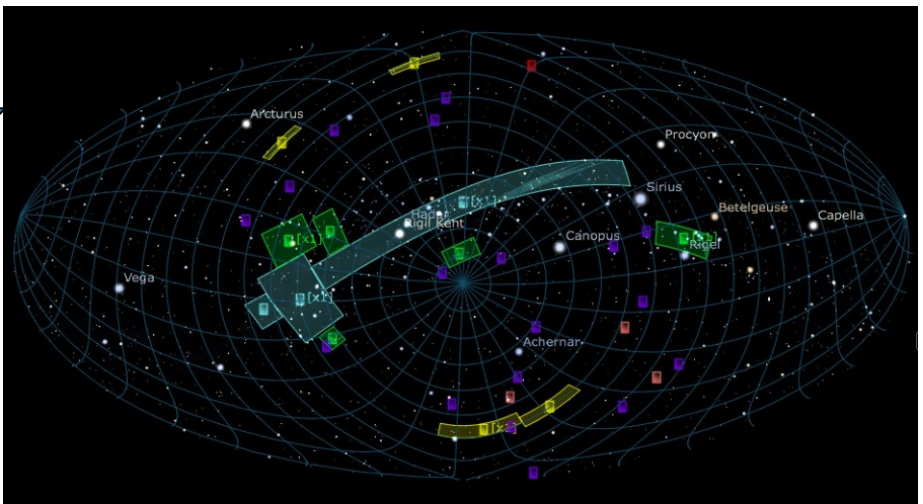
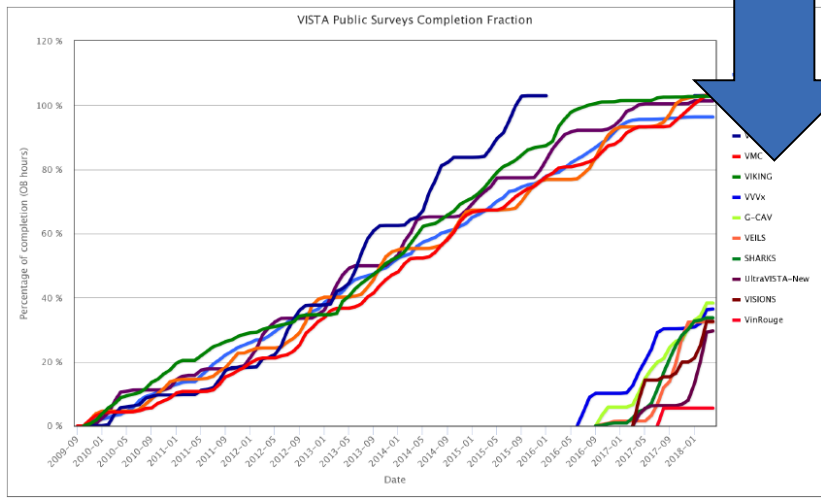


# Lessons learnt and time domain

VISTA 1<sup>st</sup> cycle surveys reaching completion in P101!



- **Compreh. science program;**
- **complementing obs. constraints**
- **Exploitation of the time domain universe**



Arnaboldi et al. [2017Msngr.168...15A](#)







# Spectroscopic Surveys

- Gaia ESO:** this survey targets  $10^5$  stars distributed around the Milky Way (MW) and in 100 open clusters. It provides the photometry and abundances for the stellar populations in the MW. It is synergistic with the Gaia satellite survey. It provides the photometry and abundances for the stellar populations in the MW. It is synergistic with the Gaia satellite survey. It provides the photometry and abundances for the stellar populations in the MW. It is synergistic with the Gaia satellite survey. ( <http://www.eso.eu/> )
 

*Galactic MW, stellar evolution*
- PESSTO:** spectroscopic follow-up of absorption lines in an unbiased sample of nearby galaxies to understand supernovae explosion. Started in 01/2012 on EFOOSC/SOI. ( <http://www.pessto.org/> )
 

*SuperNovae physics*
- VANDELS:** study of the star forming galaxies in the redshift range  $2.5 < z < 7.0$  and passive galaxies in the redshift range  $1.5 < z < 2.5$ , in the two COSMOS fields, CDF South and UDS. Goal is to measure metallicities and ionized gas in these systems. 914 hours allocated on VIMOS. ( [vandel.inaf.it](http://vandel.inaf.it) )
 

*Galaxy evolution, Cosmology*
- LEGA-C:** study of 3000 galaxies in the COSMOS field in the redshift range  $0.6 < z < 1.0$ . Understand how galaxies grow in mass through measurements of their dynamical masses, ages and metallicities. 1010 hours allocated on VIMOS@UT3. ( <http://www.mpia.de/home/legac/index.html> )
 

*Galaxy evolution, Cosmology*





# Spectroscopic Surveys

- **Gaia ESO:** this survey targets  $10^5$  stars distributed among the major components of the Milky Way (MW) and in 100 open clusters in a strong synergy with the Gaia satellite survey. It provides the photometry, radial velocities and abundances for the stellar populations in the MW. Started in 2010 on FLAMES/UVES@UT2, current 5<sup>th</sup> year of operations. Target selection comes from the imaging surveys VHS and VVV, among others. (<http://www.gaia-eso.eu/>)
- **PESSTO:** spectroscopic follow-up of about 1000 candidates in an unbiased sample of nearby galaxies to understand the evolution of galaxies and supernovae explosion. Started in 01/2012 on EFOSC/SOFU@NTT, current 5<sup>th</sup> year of operations. (<http://www.pessto.org/>)
- **VANDELS:** study of the star forming galaxies in the redshift range  $2.5 < z < 7.0$  and passive galaxies in the redshift range  $1.5 < z < 2.5$ , in the two COSMOS LS fields, CDF South and UDS. Goal is to measure metallicities and the ionized gas in these systems. 914 hours allocated on VIMOS. (<http://www.vandels.inaf.it>)
- **LEGA-C:** study of 3000 galaxies in the COSMOS field in the redshift range  $0.6 < z < 1.0$ . Understand how galaxies grow in mass through measurements of their dynamical masses, stellar ages and metallicities. 1010 hours allocated on VIMOS@UT3. (<http://www.mpia.de/home/legac/index.html>)





# SCIENTIFIC IMPACT & RETURNS FOR THE COMMUNITY





# Impact of ESO PS



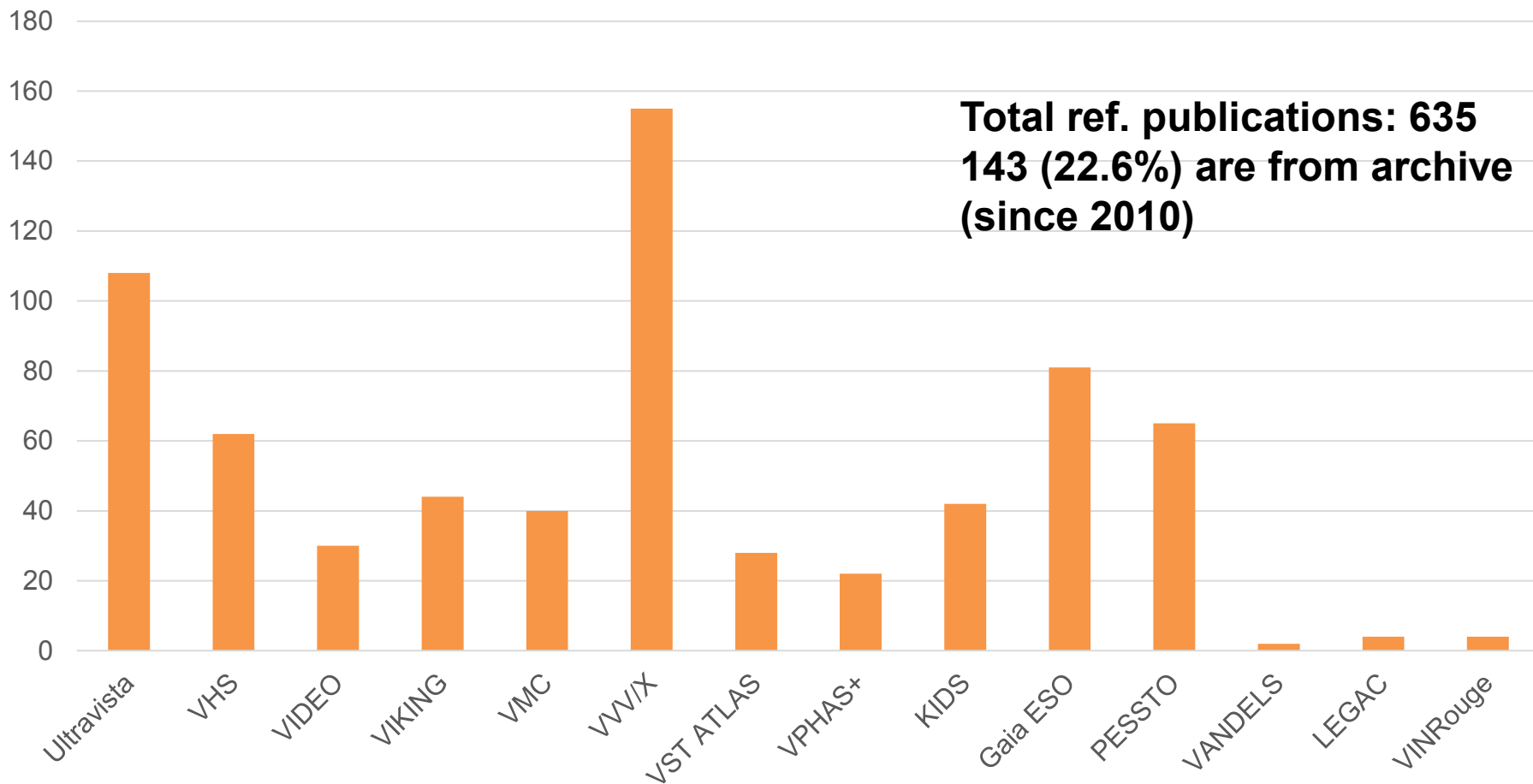
**Ref. Publications: 635 total,  
22% from archive papers**

<http://telbib.eso.org>



# Impact of ESO PS

Cumulative number refereed publications for ESO PS



**Total ref. publications: 635**  
**143 (22.6%) are from archive**  
**(since 2010)**

From <http://telbib.eso.org>

■ N. ref. pubs



# Impact of ESO PS

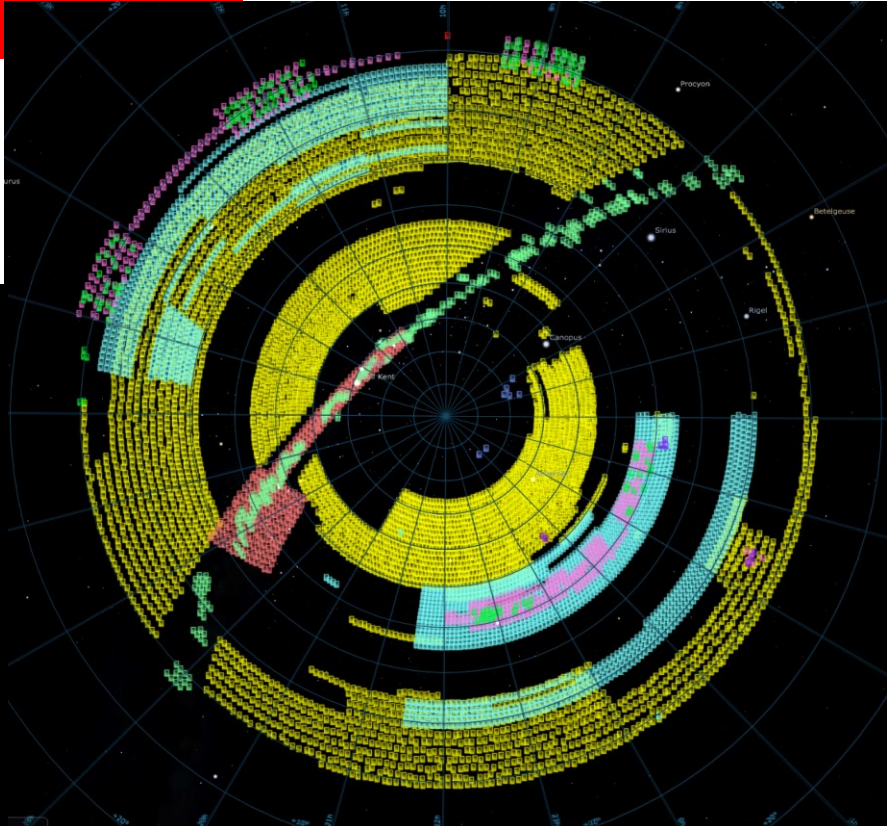


Ref. Publications: ( )  
22% from archive

<http://telbib.eso.org>

All PS have published data product releases through ESO  
SAF : >40 TB, 270k+ files, > 30k spectra; Opt./NIR: 4336/9445 deg<sup>2</sup>

- VPHAS+
- VIDEO
- VVV
- VHS
- KiDS
- VIKING,
- VMC
- UltraVISTA
- ATLAS



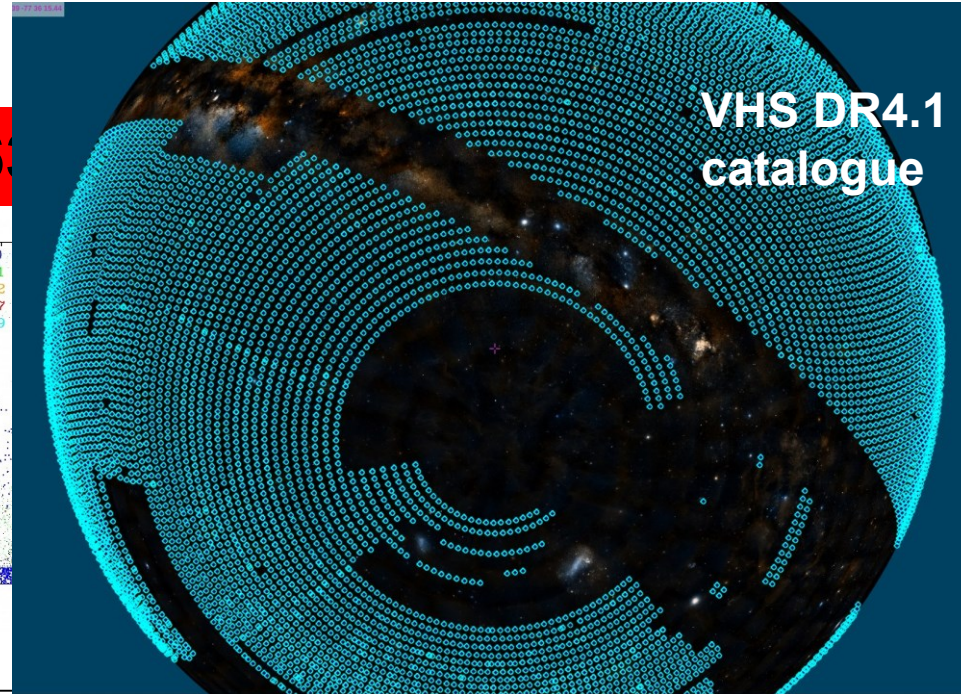
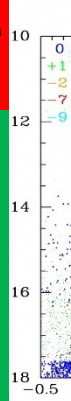
# Impact of ESO PS

The Messenger

**Ref. Publications: 6000**  
**22% from archive**

**Catalogues with aperture matched magnitudes in all relevant bands, light curves, spectral time series**

<http://www.eso.org/qi>



## Building a community

>2600 unique users of science ready data...and counting!

> 10 requests per user; ~30% of these users are new to ESO, having not applied for time

Welcome to the ESO Science Archive Facility  
 The ESO Science Archive Facility provides data from ESO instruments and the historical observatory records to ESO applications developed in Chile or elsewhere. It is the UK's national facility for the ESO Science Archive. The Physical Properties of Asteroidal Objects (PPOAO) project is the first of a series of projects to be funded by the UK Space Agency. The PPOAO project is the first of a series of projects to be funded by the UK Space Agency. The PPOAO project is the first of a series of projects to be funded by the UK Space Agency.

### Latest News and Updates

- The release of PPOAO data is scheduled for 2018.
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To browse the archive

Currently, our data and archive pages are hosted on different machines.

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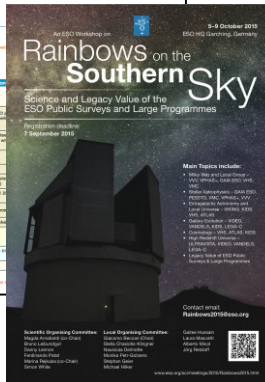
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To browse the archive



**Two ESO workshops dedicated to Public surveys in 2012 & 2015**



From VISTA 1<sup>st</sup> Cycle

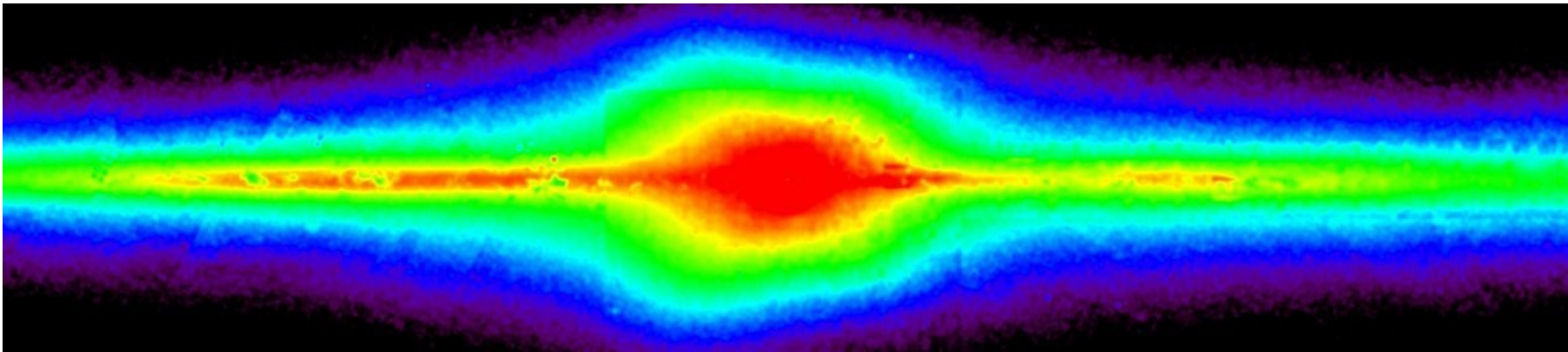
# MILKY WAY AND LOCAL UNIVERSE





# Impact of ESO PS

The structure of the Milky Way outside the Bulge(\*)



This image shows the surface density of stars in the Milky Way as seen from the Sun, taken from four different surveys (UKIDSS, VVV, 2MASS, and GLIMPSE) and corrected for extinction. The bulge is the thicker region near the center; it is asymmetric because it is barred. The asymmetry in the disk towards the left of the image is due to the thinner long bar outside the bulge. Wegg, Gerhard & Portail 2015, MNRAS, 450, 4050

\* MPE PR [http://www.mpe.mpg.de/6333402/News\\_20150521](http://www.mpe.mpg.de/6333402/News_20150521)

From the VISTA 2<sup>nd</sup> cycle & Public Spectroscopic Surveys

# GRAVITATIONAL WAVE ALERTS AND EM COUNTERPARTS

# IMPACT of ESO PS

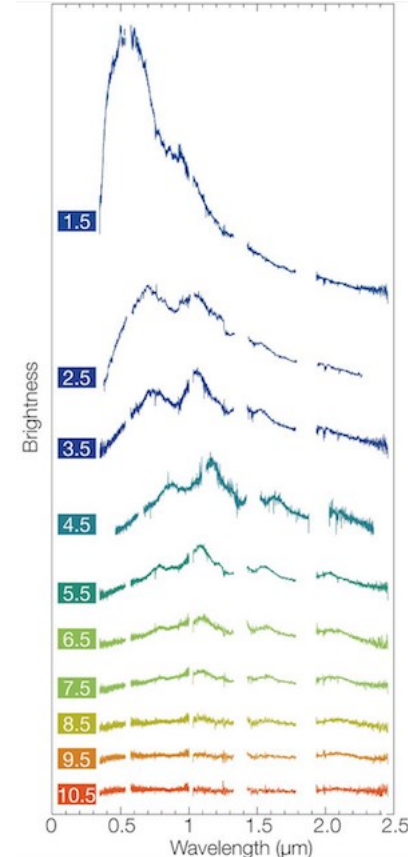
ESO PR 1733 - ESO Telescopes Observe First Light from Gravitational Wave Source

Mosaic of VISTA images of NGC 4993 showing changing kilonova



Montage of X-shooter spectra showing changes in the kilonova in NGC 4993 over 12 days.

*ESO/Pian et al./Smartt & ePESSTO*





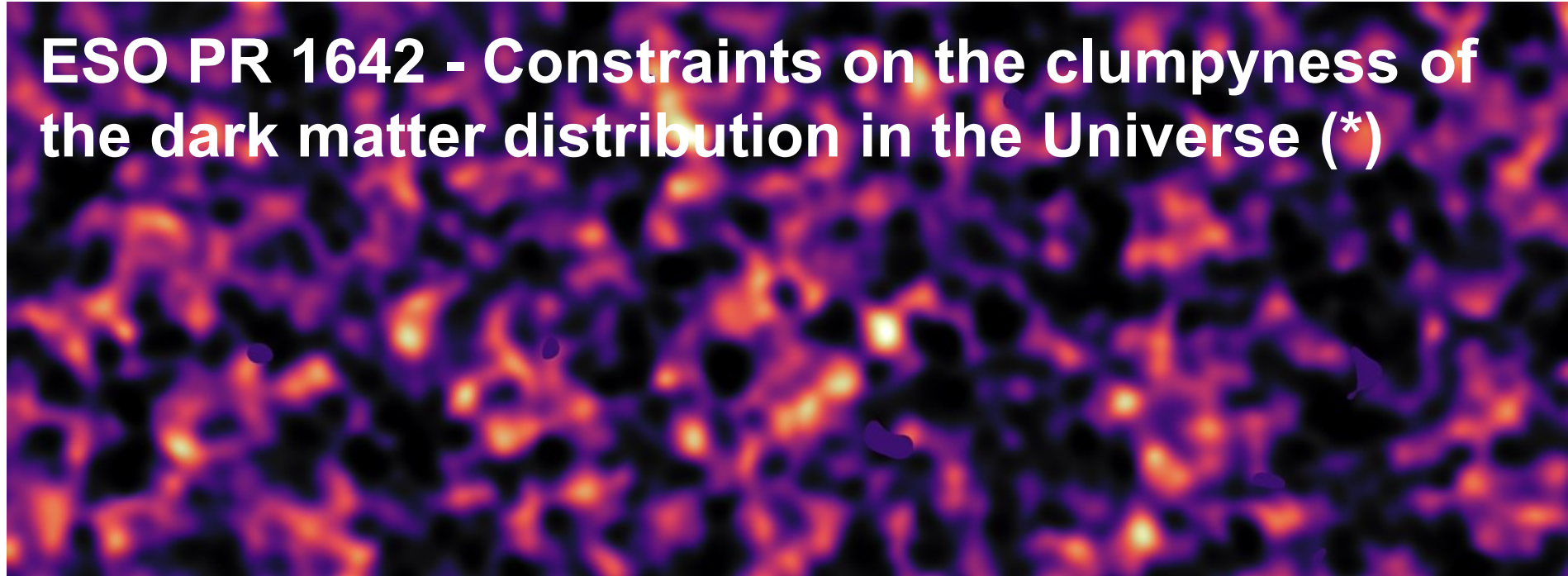
From the VST Public Surveys

# COSMOLOGY



# Impact of ESO PS

## ESO PR 1642 - Constraints on the clumpyness of the dark matter distribution in the Universe (\*)



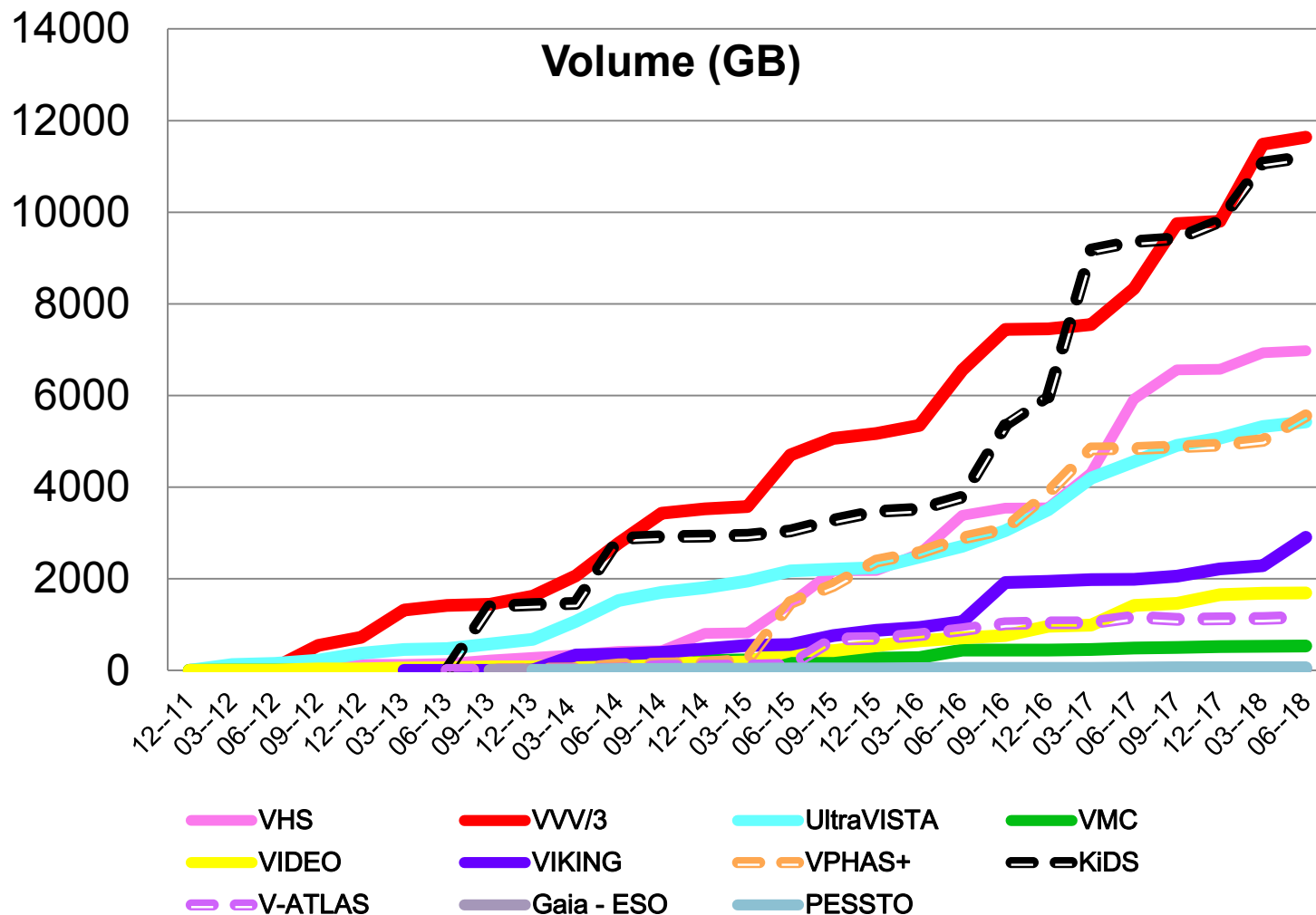
Dark matter may be less dense and more smoothly distributed throughout space than previously thought. An international team used data from the Kilo Degree Survey (KiDS, PI Kujken) to study how the light from about 15 million distant galaxies was affected by the gravitational influence of matter on the largest scales in the Universe. The results appear to be in disagreement with earlier results from the Planck satellite. (\*) Hildebrandt et al. 2017, MNRAS,465,1454



# Returns for the community

<http://archive.eso.org/scienceportal>

Archive users are accessing science data products for their independent science



VST in the era of the large surveys, OAC, June 2018



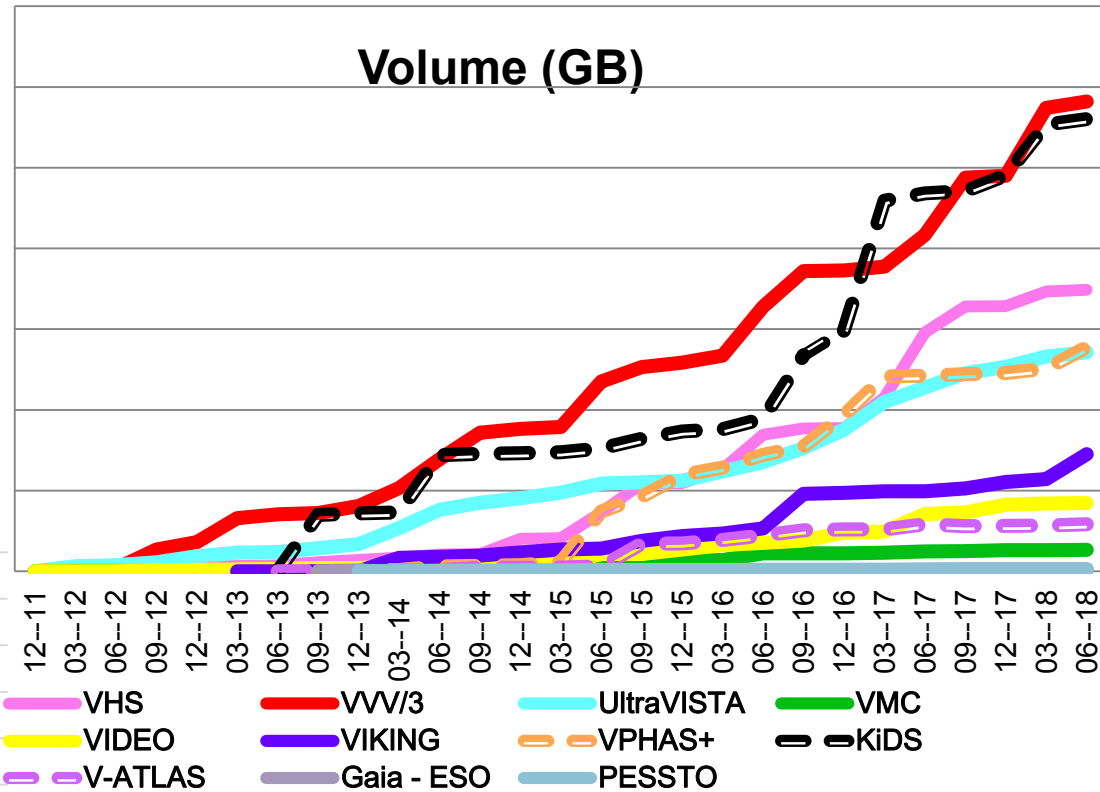


# Returns for the community

<http://archive.eso.org/scienceportal>

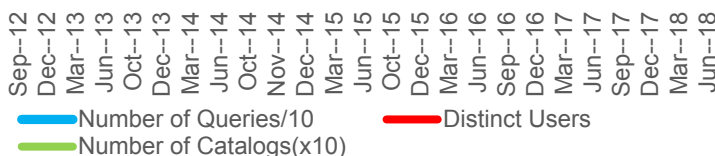
Archive users are accessing science data products for their independent science

14000  
12000  
10000  
8000  
6000  
4000  
2000  
0

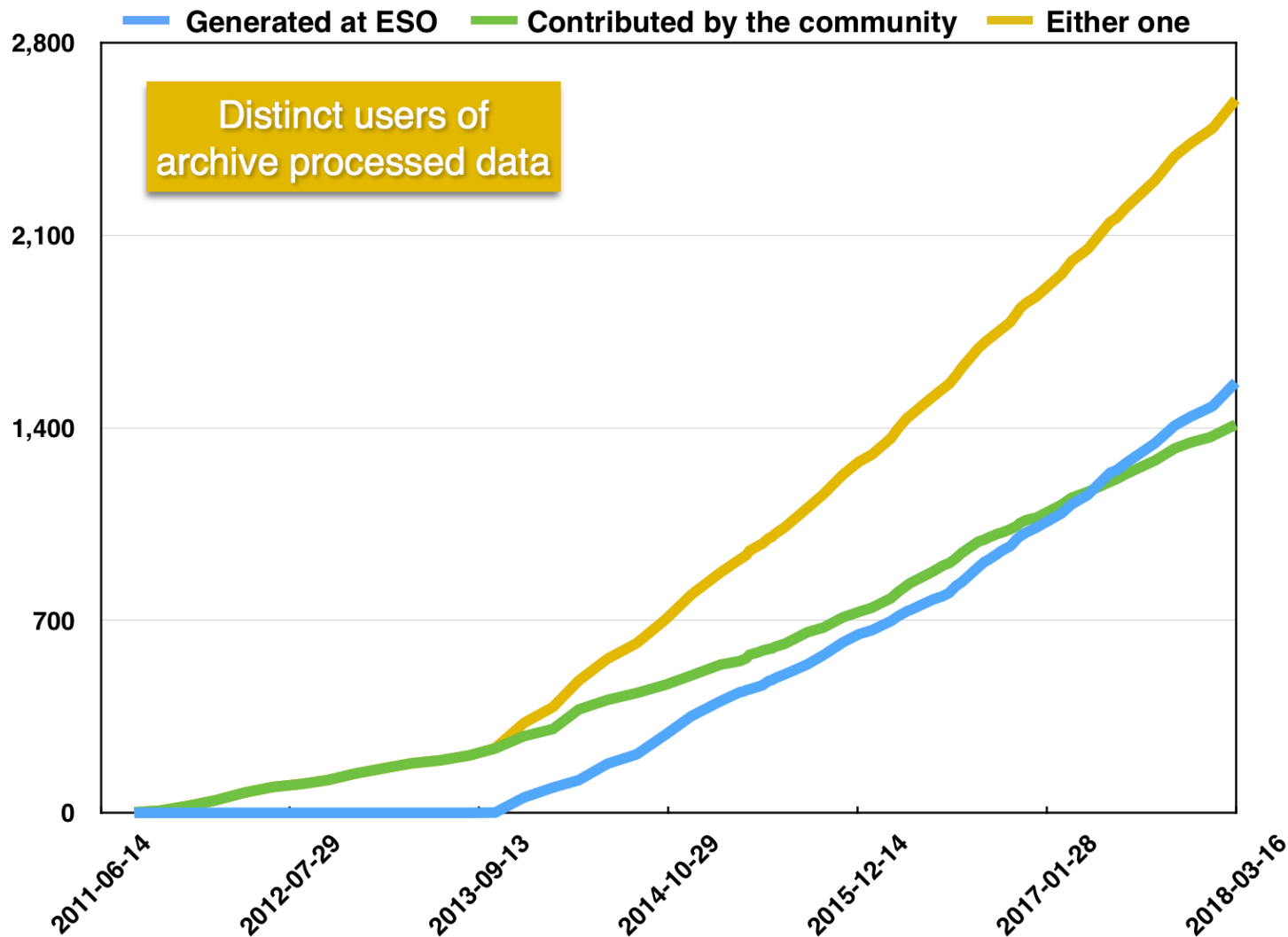


On average users carry out **\*\*21\*\*** independent queries for catalog records via the ESO catalog query

VST in the era of the large surveys, OAG, June 2018



# Science data products





# FORWARD LOOK

# Forward look (I)

- Next Generation Transit Surveys (NGTS) started operations in 01.04.2016 & data products delivery ongoing (Pub. 07.2018)
- Construction and deployment in operations of two wide field spectrographs – the Multi Object Optical and Near Infrared Spectrograph (MOONS) – and the 4 meter Multi Object Spectroscopic Telescope (4MOST) in 2020- 2022
- These spectrographs on VLT/VISTA have large multiplexing (1000, ~2400 fibers), wide-field (500 sq. arcmin, 4.1 sq. deg), extended wavelength coverage (0.6-1.8 micron; 0.37-0.95 micron)
- Effective follow-up of the interesting candidates identified via their colors or morphological properties provided by the public imaging surveys and/or space missions, like Gaia and eROSITA among others



# Forward look (II)

The screenshot displays the ESO Archive Science Portal interface. At the top, it shows search parameters: '04 23 40.002 -29 25 41.20' and 'FoV: 175.91°'. The main search results area shows '2651862 RESULTS'. On the left, there are several filter panels: 'Data Type' with counts for SPECTRUM (2052888), CATALOG (300801), IMAGE (22940), CUBE (628), and VISIBILITY (1543); 'Spectral Range' with a horizontal bar chart; 'Filter/Band' with counts for Ks (221604), J (171331), Y (57191), H (46579), and LSDBS (22625); and 'Spectral Resolution' with another horizontal bar chart. At the bottom, a table of search results is visible, with columns for Actions, Data Type, Spec.Range, Spec.Res., SNR, Sensitivity, Obs.Date, FoV, Sky Res., Collection, Instrum., T.Exp.T., #OBs, Pl., Program Id, Object, and Pub.Date. One row is highlighted in blue.

Actions	Data Type	Spec.Range	Spec.Res.	SNR	Sensitivity	Obs.Date	FoV	Sky Res.	Collection	Instrum.	T.Exp.T.	#OBs	Pl.	Program Id	Object	Pub.Date
<input type="checkbox"/>	SPECTRUM	373.2-491.3 nm	115000	0		2018-05-23 17:03			HARPS	HARPS	1 s	single	OBSERVATORY, L 60A-9700	Preset-near-Zenith	2018-05-25	
<input type="checkbox"/>	SPECTRUM	378.2-491.3 nm	115000	0		2018-05-20 17:05			HARPS	HARPS	1 s	single	OBSERVATORY, L 60A-9700	Preset-near-Zenith	2018-05-22	
<input type="checkbox"/>	CUBE	460-935.2 nm	2989	25.265		2018-05-20 08:05 1.9°		0.727"	MUSE	MUSE	2900 s	single	FUMAGALLI, MIC 1100A-0528	Q2139-4443	2018-05-28	
<input type="checkbox"/>	CUBE	460-935.2 nm	2989	24.317		2018-05-19 08:19 2.05°		0.927"	MUSE	MUSE	2900 s	single	FUMAGALLI, MIC 1100A-0528	Q2139-4443	2018-05-28	
<input type="checkbox"/>	CUBE	460-935.2 nm	2989	24.659		2018-05-19 07:34 1.74°		0.987"	MUSE	MUSE	2900 s	single	FUMAGALLI, MIC 1100A-0528	Q2139-4443	2018-05-28	
<input type="checkbox"/>	CUBE	460-935.2 nm	2989	24.104		2018-05-13 08:07 2.1°		1.149"	MUSE	MUSE	2900 s	single	FUMAGALLI, MIC 1100A-0528	Q2139-4443	2018-05-29	
<input type="checkbox"/>	CUBE	460-935.2 nm	2989	24.117		2018-05-12 08:04 1.52°		1.03"	MUSE	MUSE	2900 s	single	FUMAGALLI, MIC 1100A-0528	Q2139-4443	2018-05-28	
<input type="checkbox"/>	SPECTRUM	378.2-491.3 nm	115000	97.5		2018-05-07 09:45			HARPS	HARPS	500 s	single	OBSERVATORY, L 60A-9700	HD216770	2018-05-17	
<input type="checkbox"/>	SPECTRUM	378.2-491.3 nm	115000	101.5		2018-05-03 09:37			HARPS	HARPS	500 s	single	OBSERVATORY, L 60A-9700	HD216770	2018-05-17	
<input type="checkbox"/>	SPECTRUM	378.2-491.3 nm	115000	103.3		2018-05-03 09:28			HARPS	HARPS	500 s	single	OBSERVATORY, L 60A-9700	HD216770	2018-05-17	
<input type="checkbox"/>	SPECTRUM	378.2-491.3 nm	115000	126.9		2018-05-03 09:18			HARPS	HARPS	500 s	single	OBSERVATORY, L 60A-9700	HD208487	2018-05-17	





Archive Science Portal BETA

target: NGC253 res... type: IMAGE ins: VIMOS remove all 3

00 47 38.012 -25 23 15.35 FoV: 1.17°

36 RESULTS 16 SELECTED

RESET FOV

Include proprietary data

Filter/Band

- V 13
- B 12
- R 9
- U 2

Spectral Resolution

Signal-to-Noise Ratio

No data to display

Sensitivity

Date of Observation

Search results (36) Sky selection (16)

Actions	Dist.	Data Type	Spec.Range	Spec.Res.	Sensitivity	Obs.Date	FoV	Sky Res.	Collection	Instrum.	T.Exp.T.	#OBs	PI.	Program Id	Object	Pub.Date				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.655"	VIMOS	VIMOS	80 s	1	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	504-591 nm	V	4.2 100 24397	1.665"	VIMOS	VIMOS	690 s	1	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.531578947368421	25.416	2014-07-30	06:46:37	7.66	0.801"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 2368421	25.351	2014-08-20	03:25:51	7.66	0.894"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-08-20	03:25:51	7.66	0.894"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-08-20	03:25:51	7.66	0.894"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-09-29	03:31:17	7.66	0.665"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-08-20	03:33:23	7.66	1.605"	VIMOS	VIMOS	990 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-07-27	06:19:13	7.65	0.874"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-08-21	04:40:18	7.65	0.837"	VIMOS	VIMOS	540 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0	IMAGE	383-478 nm	B	4.5 578 24397	1.665"	2014-09-27	01:38:23	7.65	0.859"	VIMOS	VIMOS	480 s	single	HAKALA, P.	093D-0599	NGC 253	2018-03-27

ADP:2018-03-26T12:59:35.239

# Target-driven search & multi-resolution preview of imaging data



Include proprietary data

Collapse all

Spectral Resolution

Signal-to-Noise Ratio

Undefined for 13 datasets

Sensitivity

Date of Observation

FoV

target: NGC6388 ra... | type: IMAGE | type: SPECTRUM | type: CURE | spec.range: ISO | remove all 5

17.36 15.427 -44.45 48.03 FoV: 15.14'

467 RESULTS 11 SELECTED RESET FOV

Maximize Overlays Download SAMP feedback

Wavelength: 855.746  
Flux: 1.402e+4  
SNR: 153.754

VHS background image

Search results (468) Sky selection (2)

Actions	Dist.	Data Type	Spec.Range	Fit.	Spec.Res.	SNR	Sensitivity	Obs Date	FoV	Sky Res.	Collection	Instrum.	T.Expt.	#Obs	PI.	Program Id	Object	Pub.Date
<input checked="" type="checkbox"/>	7.34'	SPECTRUM	848.1-899.2 nm		18000	217.4		2008-07-29 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	8000048	2015-04-01
<input checked="" type="checkbox"/>	7.42'	SPECTRUM	848.2-899.3 nm		18000	214.1		2009-06-12 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	8000051	2015-03-31
<input checked="" type="checkbox"/>	7.42'	SPECTRUM	848.2-099.3 nm		18000	193.9		2008-06-07 01:...			GIRAFFE	GIRAFFE	1517 s	single	LANZONI, BARE	381D-0329	8000091	2015-03-31
<input checked="" type="checkbox"/>	3.2'	SPECTRUM	848.2-899.3 nm		18000	170		2008-06-12 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000216	2015-03-31
<input checked="" type="checkbox"/>	3.2'	SPECTRUM	848.2-899.3 nm		18000	155.7		2008-06-07 01:...			GIRAFFE	GIRAFFE	1517 s	single	LANZONI, BARE	381D-0329	7000216	2015-03-31
<input checked="" type="checkbox"/>	3.2'	SPECTRUM	848.2-899.3 nm		18000	110.6		2008-06-26 04:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000312	2015-03-31
<input checked="" type="checkbox"/>	4.1'	SPECTRUM	848.1-899.2 nm		18000	94.7		2008-06-07 01:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000312	2015-03-31
<input checked="" type="checkbox"/>	4.1'	SPECTRUM	848.1-899.2 nm		18000	54.7		2008-07-29 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000312	2015-04-01
<input checked="" type="checkbox"/>	3.95'	SPECTRUM	848.2-899.3 nm		18000	52		2008-06-12 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000003	2015-03-31
<input checked="" type="checkbox"/>	3.95'	SPECTRUM	848.2-899.3 nm		18000	52		2008-06-12 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000003	2015-03-31
<input checked="" type="checkbox"/>	0	AGE	17-16-1339		18000	52		2008-06-12 03:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	7000003	2015-03-31
<input checked="" type="checkbox"/>	2.89'	SPECTRUM	848.1-899.2 nm		18000	51.5		2008-07-29 23:...			GIRAFFE	GIRAFFE	2320 s	single	LANZONI, BARE	381D-0329	99	2015-04-01

Zoom, Pan, Rescale



Inspecting spectral data using the integrated previewer



Archive Science Portal **BETA** 04 23 40.002 -29 25 41.20 FoV: 175.91°

Target  Rad. J2000- 2651862 RESULTS

Include proprietary data

# Multi-dimensional faceted (all-sky) search

- Data Type**
  - SPECTRUM: 203389
  - CATALOG: 30081
  - IMAGE: 38940
  - CUBE: 6251
  - VISIBILITY: 1540
- Spectral Range**
  - UV: 100k
  - opt: 1M
  - NIR: 1M
  - MIR: 10k
  - mm: 10k
- Filter/Band**
  - Ks: 22164
  - J: 17133
  - Y: 5719
  - H: 46379
  - LSDDS: 2365
- Spectral Resolution**
  - 100k+: 10k
  - 10k-100k: 1M
  - 1k-10k: 10k
  - 10-1k: 10k
  - 10-100: 10k
  - ~10: 10k
- Signal-to-Noise Ratio** (circled)
  - Undefined for 59774 datasets
  - Y-axis: >0M, >00k, >0k, >000, >00, >0
  - X-axis: 1, 100, 10k, 1M, 100M
- Sensitivity** (circled)
  - Undefined for 2072916 datasets
  - Y-axis: >25, >23, >21, >19, >17, >15, >13, >11
  - X-axis: 100, 1k, 10k, 100k, 1M
- FoV** (Field of View)
  - Undefined for 2055543 datasets
  - Y-axis: 10-30°, 10-30°, 1-30°, 1-30°, 1-30°
  - X-axis: 1, 100, 10k, 1M
- Sky Resolution** (circled)
  - Undefined for 2072451 datasets
  - Y-axis: <-0.3, <-0.5, <-0.7, <-0.9, <-1.25, <-1.75, <-2.5, <-3.0, <-20.
  - X-axis: 100, 1k, 10k, 100k, 1M
- Instrument**
  - HARPS: 1395090
  - VIMOS: 470670
  - HARPS: 255132
  - VIMOS: 153381
  - UVES: 129940
- Total Exposure Time**
  - Undefined for 16970 datasets
  - Y-axis: 10k-s, 1k-10k, 200-1k, 100-200, 10-100, ~10
  - X-axis: 10k, 100k, 1M, 10M
- Number of OBs**
  - Undefined for 10087 datasets
  - Y-axis: single, 2-10, 30-100, 100+
  - X-axis: 1, 100, 10k, 1M, 100M
- Principal Investigator**
  - GILMORE, GERARD: 45155
  - MCAHON, R.: 36723
  - GILMORE, G.F.: 158391
  - GUZZO, LUIGI: 92667
  - MINNITI, DANTE: 48157
- Program Id**
  - 179A-2010: 36759
  - 188B-3002: 22378
  - 193B-0936: 213079
  - 182A-0886: 91756
  - 197B-1074: 62227
- Object**
  - ATLAS survey: 4504
  - HD128621: 19439
  - Str05: 13464
  - Str04: 13376
  - Str06: 12748
- Publication Date**
  - 2018: 10k
  - 2017: 10k
  - 2016: 10k
  - 2015: 10k
  - 2014: 10k
  - 2013: 10k
  - 2012: 10k
  - 2011: 10k
- Data Collection**
  - GIRAFFE: 153342
  - VHS: 36759
  - HARPS: 255132
  - UVES: 121198
  - XSHOOTER: 94458
  - VIPERS: 91509
  - VVV: 60061
  - FEROS: 54430
  - GAIASSO: 49751
  - VST-ATLAS: 49134
  - VPHASplus: 27763
  - HAWKI: 20978
  - ZCOSMOS: 20785
  - VIDEO: 20218





Archive Science Portal

866 RESULTS

# VV Survey Footprint (H band)

Target: Rad. J2000: 15 39 8.873 -66 44 38.65 FoV: 176.02°

Include proprietary data

Collaps all

Data Type: 15

Switch to subtype

CATALOG: 1331

IMAGE: 866

Spectral Range

NIR

866

Filter/Band

Ks: 25971

Y: 923

Z: 896

H: 866

J: 837

Spectral Resolution

~10

866

Signal-to-Noise Ratio

No data to display

Sensitivity

Search results (866)

Actions	Data Type	Spec.Range	Filt.	Spec.Res.	Sensitivity	Obs.Date	FoV	Sky Res.	Collection	Instrum.	T.Exp.T.	#Obs	PI	Program Id	Object	Pub.Date
<input type="checkbox"/>	IMAGE	1499-1791 nm	H	5	19.281	2015-09-26 01:31:19.91*	1.91°	0.891"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b241	2017-01-20
<input type="checkbox"/>	IMAGE	1499-1791 nm	H	5	19.155	2015-09-26 01:21:19.91*	1.91°	0.959"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b240	2017-01-20
<input checked="" type="checkbox"/>	IMAGE	1499-1791 nm	H	5	18.817	2015-09-26 01:01:19.91*	1.91°	1.185"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b255	2017-01-20
<input type="checkbox"/>	IMAGE	1499-1791 nm	H	5	18.861	2015-09-26 00:51:19.91*	1.92°	1.179"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b239	2017-01-20
<input type="checkbox"/>	IMAGE	1499-1791 nm	H	5	18.721	2015-09-26 00:34:19.92*	1.92°	1.112"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b254	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-26 00:21:19.91*	1.91°	1.015"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b253	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-24 01:11:19.92*	1.92°	1.012"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b283	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-24 01:01:19.91*	1.91°	1.183"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b282	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-24 00:51:19.91*	1.91°	1.036"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b325	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-23 01:41:19.92*	1.92°	0.837"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b267	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-23 01:21:19.91*	1.91°	0.821"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b338	2017-01-20
<input type="checkbox"/>	IMAGE	14				2015-09-23 01:14:19.91*	1.91°	0.948"	VV	VIRCAM	48 s	single	MINNITL, DANTE	179.B-2002	b337	2017-01-20

ADP2017-01-18T11:58:39.137





# Dynamic coverage maps

Archive Science Portal

data\_collection: V... type: IMAGE remove all 2

17 03 17.270 -34 39 47.62 FoV: 44.44°

25335 RESULTS

Include proprietary data

Collaps all

Data Type

Switch to subtype

CATALOG 28790

IMAGE 39302

Spectral Range

opt

NIR

1k 2k 4k 10k 20k 40k

Filter/Band

Ks 22445

Y 754

Z 726

H 716

J 694

Spectral Resolution

10-100

\*10

100 1k 10k 100k

Signal-to-Noise Ratio

No data to display

Sensitivity

388 Datasets  
388 Obs. Blocks

Filter	#Data sets	Total ExpTime	Max depth (ABmag)
Ks	263	12624	19.23
H	11	528	19.50
J	9	1296	19.83
Y	6	720	19.79
Z	6	720	20.02

Actions	Data Type	Spec.Range	Flt.	Spec.Res.	Sensitivity	Obs.Date	FoV	Sky Res.	Collection	Instrum.	T.Exp.T.	#Obs	Pl.	Program Id	Object	Pub.Date
	IMAGE	829-927 nm	Z	8	20.599	2015-10-16 00:51:19.1*	0.932"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b210	2017-01-20	
	IMAGE	829-927 nm	Z	8	20.568	2015-10-16 00:44:19.1*	0.931"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b336	2017-01-20	
	IMAGE	829-927 nm	Z	8	20.643	2015-10-16 00:46:19.1*	0.904"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b335	2017-01-20	
	IMAGE	829-927 nm	Z	8	20.659	2015-10-16 00:31:19.1*	0.854"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b209	2017-01-20	
	IMAGE	974-1067 nm	Y	10	20.22	2015-10-16 00:36:19.1*	0.889"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	caly-b208	2017-01-20	
	IMAGE	974-1067 nm	Y	10	20.056	2015-10-16 00:29:19.2*	0.918"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	caly-b334	2017-01-20	
	IMAGE	974-1067 nm	Y	10	20.187	2015-10-16 00:11:19.2*	0.83"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	caly-b333	2017-01-20	
	IMAGE	974-1067 nm	Y	10	20.304	2015-10-16 00:05:19.2*	0.854"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	caly-b207	2017-01-20	
	IMAGE	829-927 nm	Z	8	20.67	2015-10-13 01:11:19.1*	0.868"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b213	2017-01-20	
	IMAGE	829-927 nm	Z	8	20.545	2015-10-13 01:05:19.2*	0.862"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b339	2017-01-20	
	IMAGE	829-927 nm	Z	8	20.563	2015-10-13 01:00:19.1*	0.997"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	calz-b212	2017-01-20	
	IMAGE	974-1067 nm	Y	10	19.984	2015-10-13 00:51:19.2*	0.98"	VVV	VIRCAM	120s	single	MINNITL DANTE	179B-2002	caly-b206	2017-01-20	







# Summary of ASP Features

- Multi-dimensional faceted search
- Zooming and panning the sky view (powered by Aladin light, CDS)
- Aggregations expose the entire archive content
- Iterative queries (adding and dropping constraints)
- Footprints & dynamic coverage maps
- Highlighting of datasets across views
- Previews for all products
- Spectral data viewer
- Color-coding according to data type
- HiPS multi-resolution previews of imaging datasets
- Search by target name or around a position
- Background Imagery from HiPS network
- Autocompletion of text-based fields
- Interval constraints
- Server-side sorting
- One-click download
- Dataset detail view
- Interoperability via SAMP & programmatic access



# Conclusions

- Public surveys are leading the way in observational astronomy
- Projects such as these are characterized by large investments in “survey systems” that include dedicated telescopes and instruments, a large community of astronomers involved in the science projects and large networks for the data distribution.
- The scientific success of survey projects includes the legacy values of the science products that become available through the archives for further scientific analysis by the community
- **ESO Public Surveys are examples of effective implementations** of such systems, and empower the community at large to discover the Universe, in the spirit of the IAU statement “The Universe: yours to discover”



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