

VVV Survey

V. D. Ivanov (ESO) and the VVV(X)/VMC teams

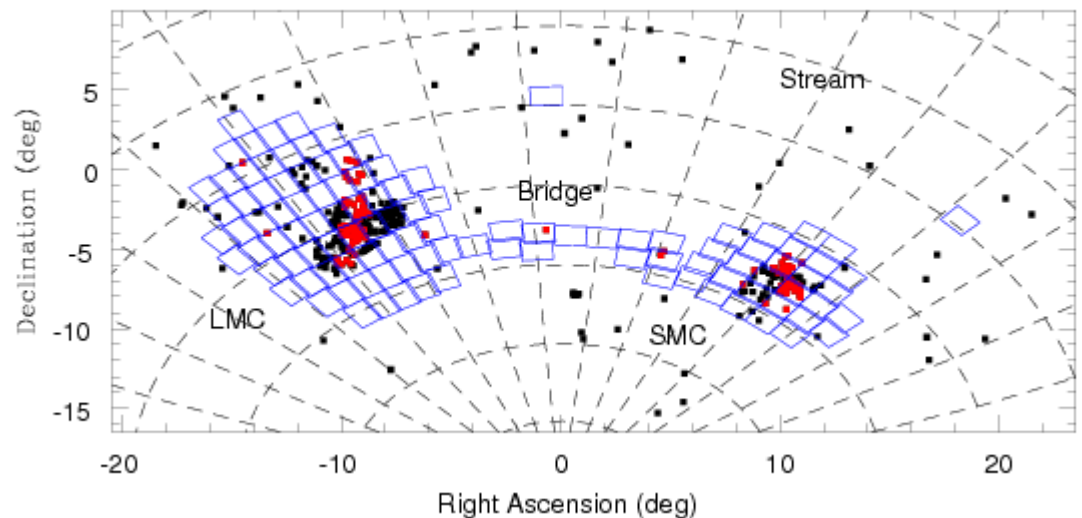
PIs:

VVV: Dante Minniti (Univ. de Catholica)

and Phil Lucas (Univ. of Hertfordshire)

VMC: Maria Rosa Cioni (AIP)

15.02.2018, ESAC



VISTA the telescope

4.1-m

f-ratio 3.25

FOV 1.65 deg,
mean scale 0.34
arcsec/px

Built by an UK
consortium
(QMUL et al.)

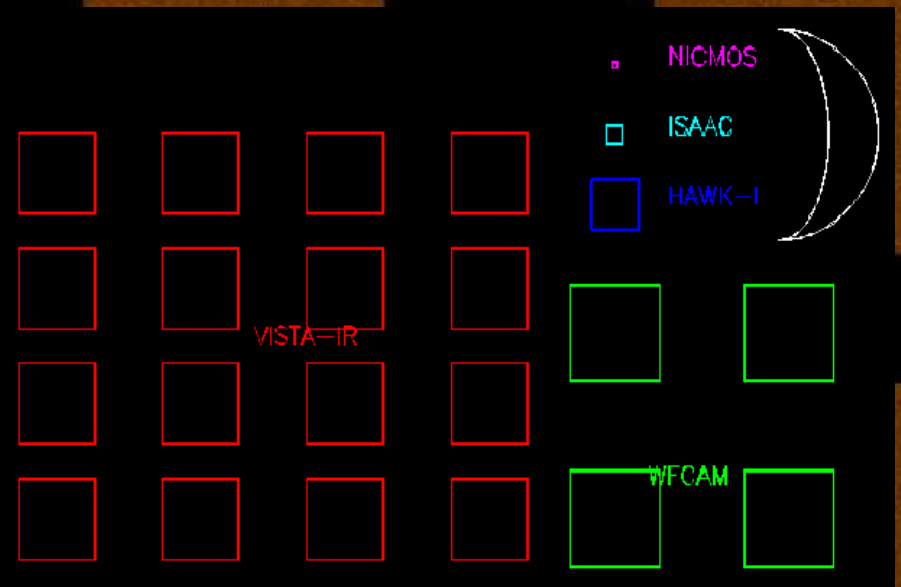
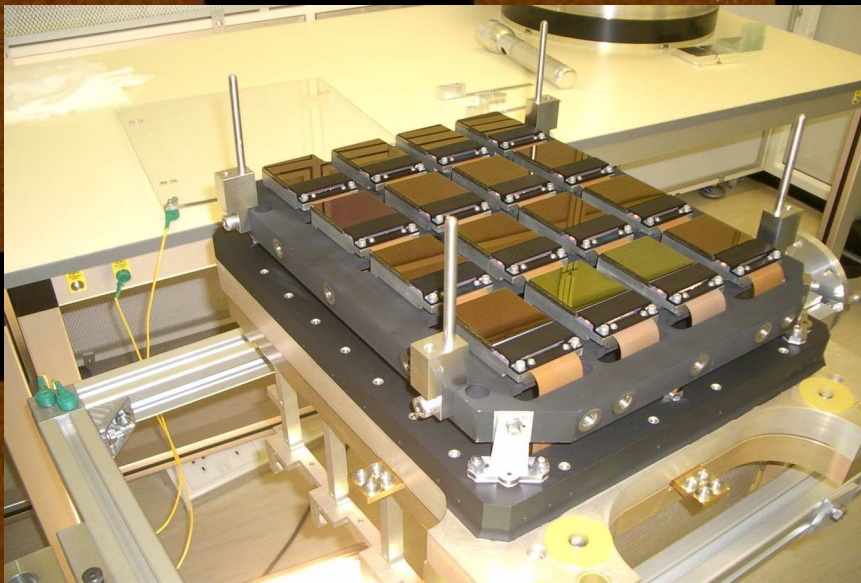
VVV allocation:
193 nights over
5 (7) years

Why IR?

- $A_K \ll A_V$
- different stellar pops

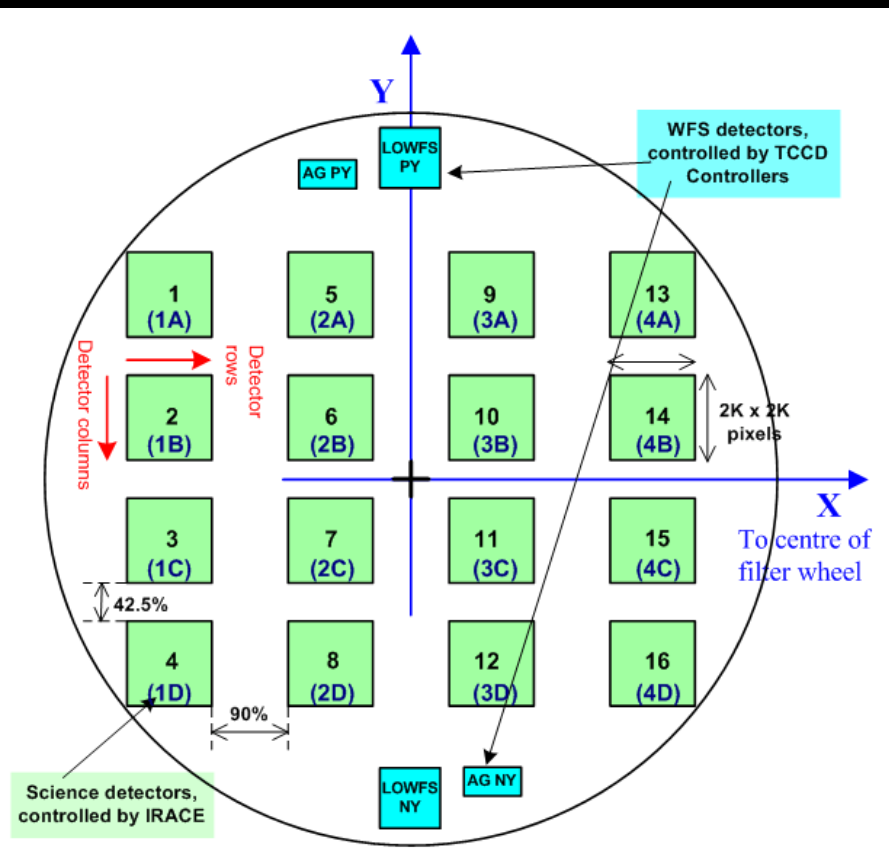
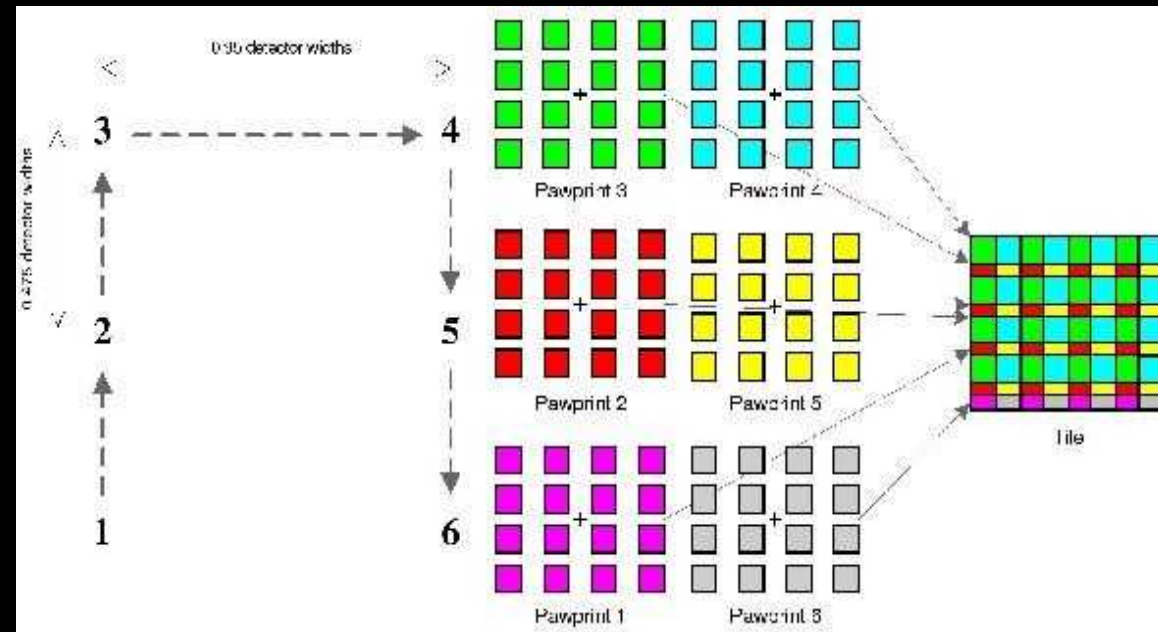


16 VIRGO detectors, 2048x2048 px each,
populating $\sim 1 \times 1.5$ deg of the focal lane



From Pawprints to Tiles

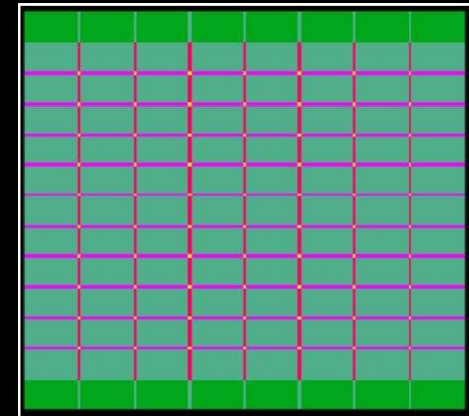
6 pointings (=“paw prints”)
to form a contiguous “tile”



Exposure time coverage (on the right) for a contiguous-coverage tile of 6 pawprints:

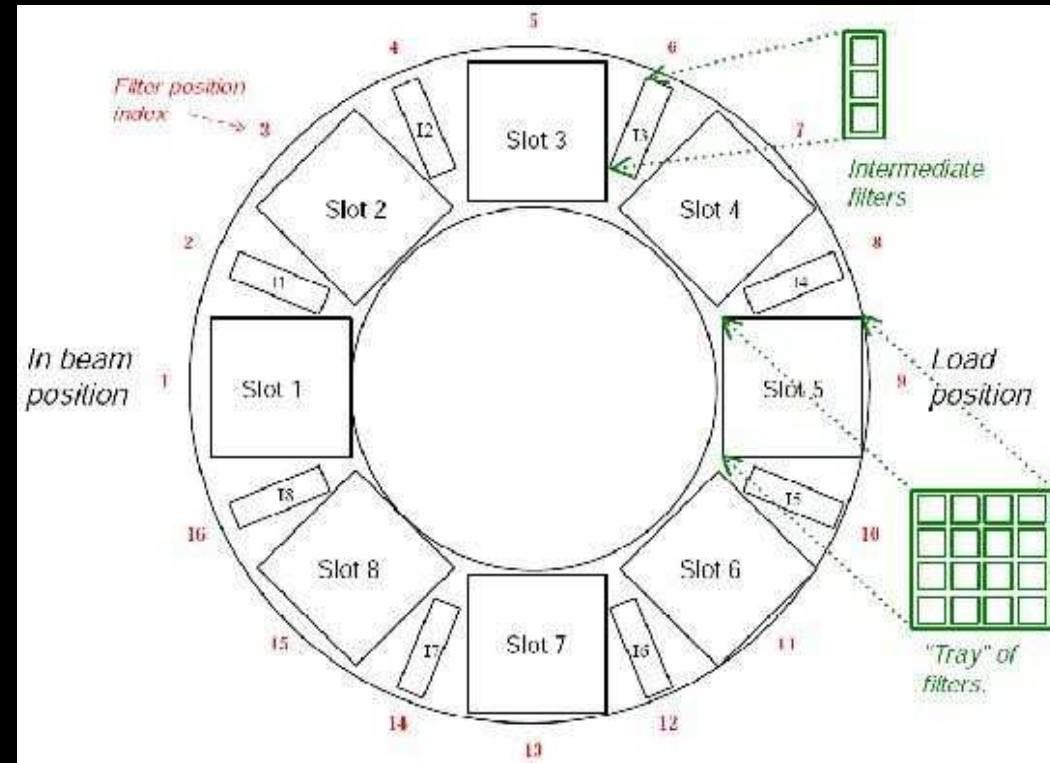
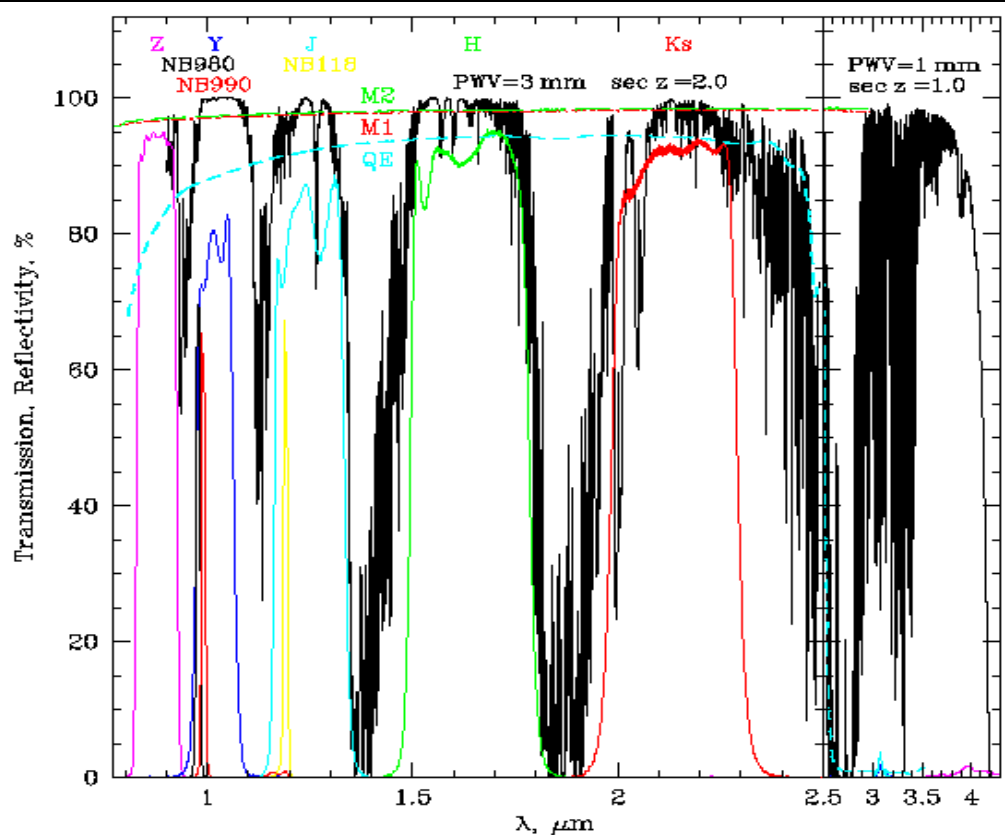
dark green = 1,
light green = 2,
magenta = 3,
red = 4,
yellow = 6.

In units of the single-pawprint exposure time.



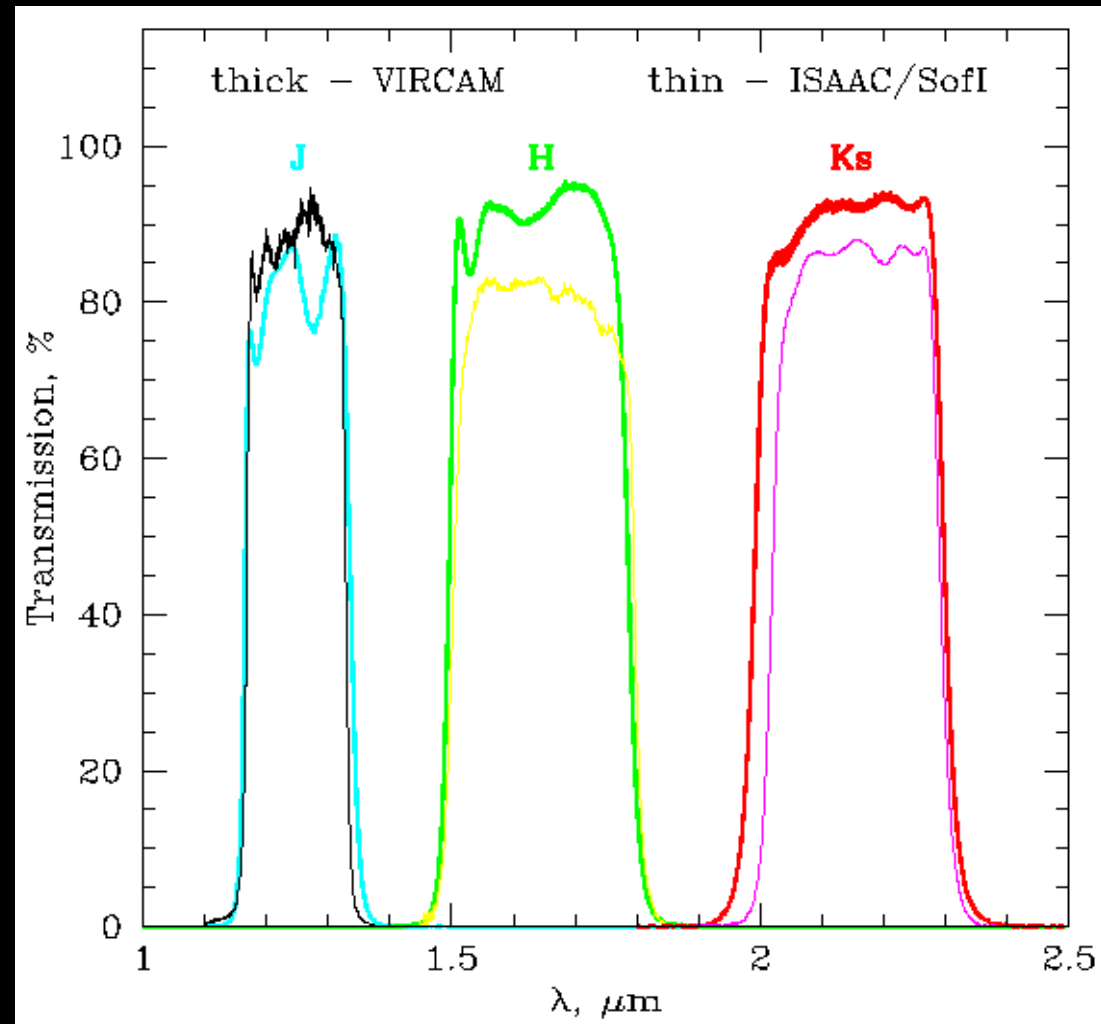
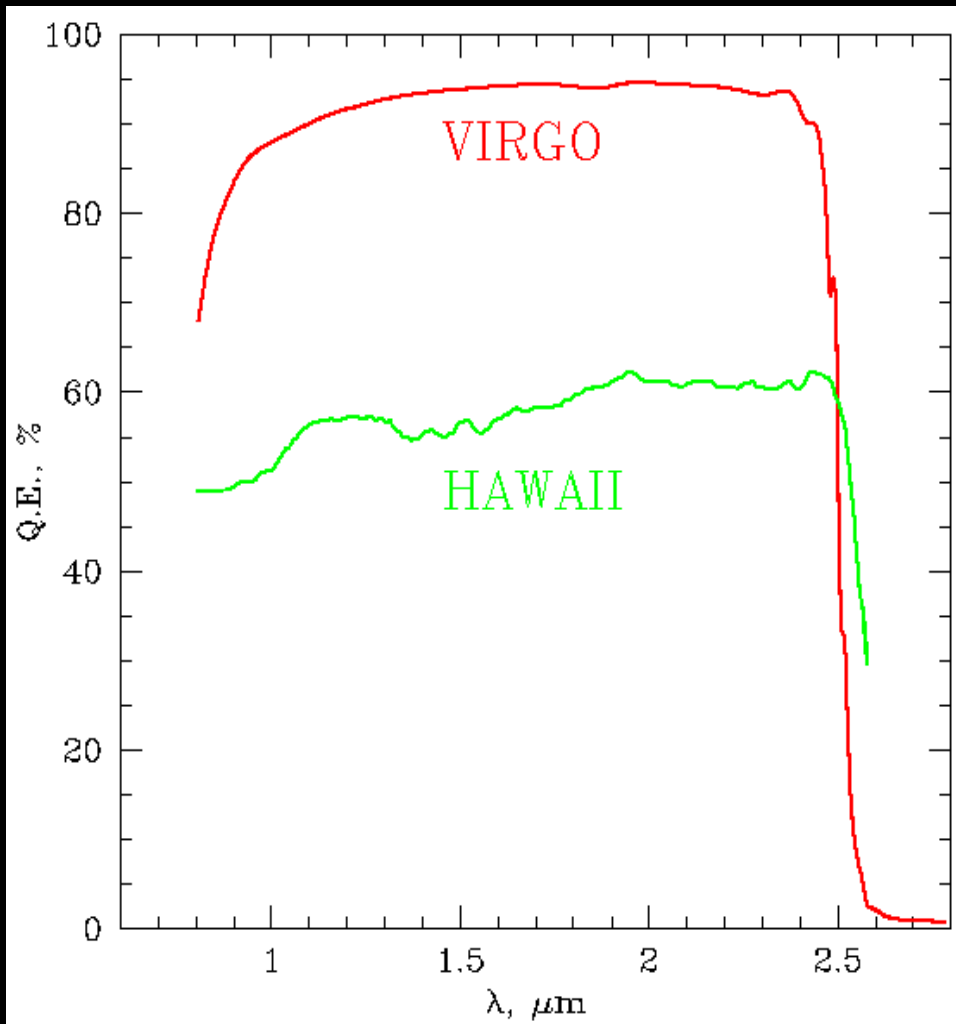
VIRCAM the camera

- Filters: ZYJHKs, NB980+NB990, NB118 + visitor's filters (?)



Advanced Hardware

Product of many years of gradual technological improvement:



OPERATIONAL OPTIMIZATION

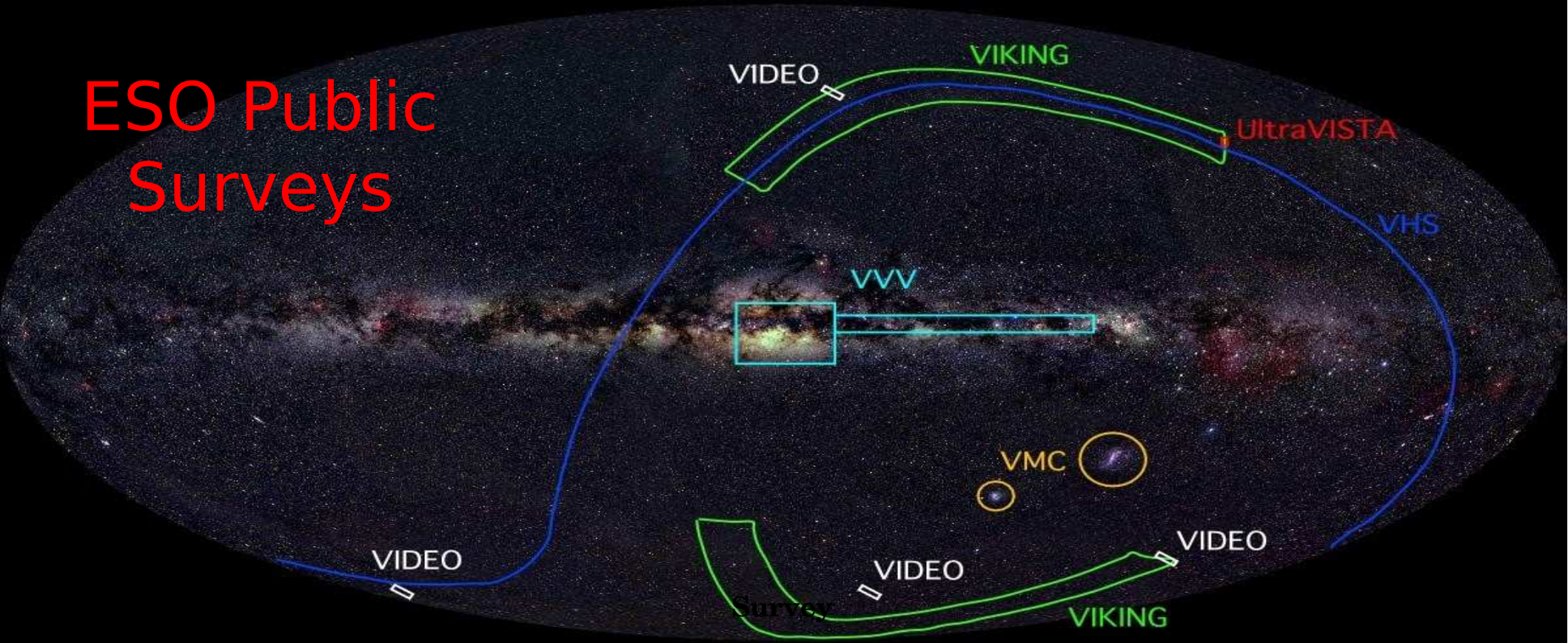
Back to the future of the semi-classical observing or SciOps 2.0 at VISTA:

- no dedicated full night-time support astronomer
- the (super-)TIOs run VISTA (!!!) and do on-the-fly ground-zero QC
- the Shift Coordinator prepares the night (flats, std, 1-2 hrs of science)
- Quality control on the fly (scripts + ftp opslogs + Garching)
- Intelligent tools: SADT, OT3, Calchecker, pipeline+scripts

Why?

- VIRCAM is a simple single-mode instrument
- only 6+ programs (albeit, many OBs), for now
- no visitors

ESO Public Surveys



VMC - VISTA Magellanic Survey : PI Maria-Rosa Cioni (Edinburgh) -- This survey will image 184 sq.degr of the Magellanic System, i.e., the LMS, SMC, the Bridge, and the Magellanic Stream in YJKs. Multi-epoch observations will constrain the mean magnitude of short-period variables. The survey will be used to study resolved stellar populations, the star formation history of the system as well as to trace its 3D structure.

VHS - VISTA Hemisphere Survey : PI Richard McMahon (Cambridge) -- The VHS will image 20 000 sq.degr of the Southern Sky (exception areas covered by the other surveys) in JKs, 4 mag deeper than 2MASS and DENIS. The 5000 square degrees covered by the Dark Energy Survey (DES), another imaging survey scheduled to begin in 2010 at the CTIO 4 metre Blanco telescope, will also be observed in H-band. The area around both of the Galactic Caps will be observed in YH as well to be combined with the data from the VST ATLAS survey. The main science drivers of the VHS include: examining low mass and nearby stars, studying the merger history of the Galaxy, measuring the properties of Dark Energy through the examination of large-scale structure to a redshift of ~ 1 , and searches for high redshift quasars.

VISTA survey observing strategies				
Survey	Area (deg ²)	Filters and Depth Measure(mag (10 σ , AB)	Depth (mag)	
Ultra-VISTA	0.73 (ultra-deep)	5 α , AB	Y=26.7	J=26.6 H=26.1 K _s =25.6 NB=24.1
VIKING	1500	5 α , AB	Z=23.1	Y=22.3 J=22.1 H=21.5 K _s =21.2
VMC	184	10 α , Vega	Y=21.9	J=21.4 K _s =20.3
VVV	520	5 α , Vega	Z=21.9	Y=21.2 J=20.2 H=18.2 K _s =18.1
VHS	20 000	5 α , AB	Y=21.2	Y=21.2 J=21.2 H=20.6 K _s =20.0
VIDEO	15	5 α , AB	Z=25.7	Y=24.6 J=24.5 H=24.0 K _s =23.5

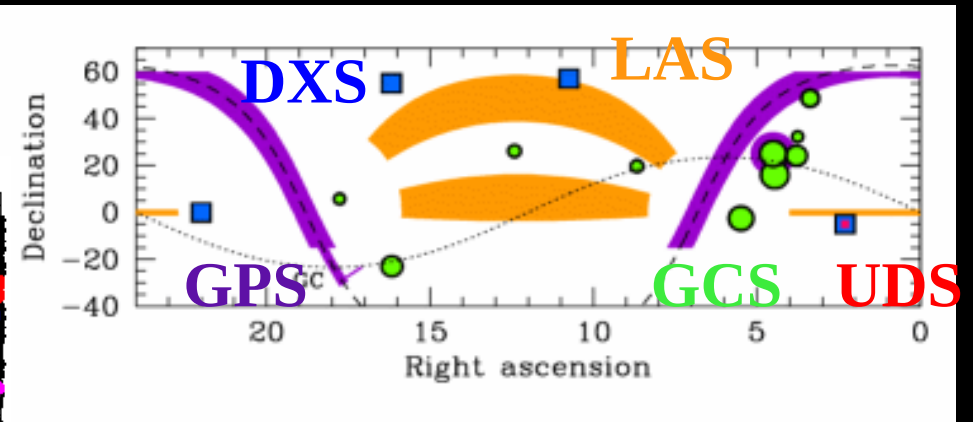
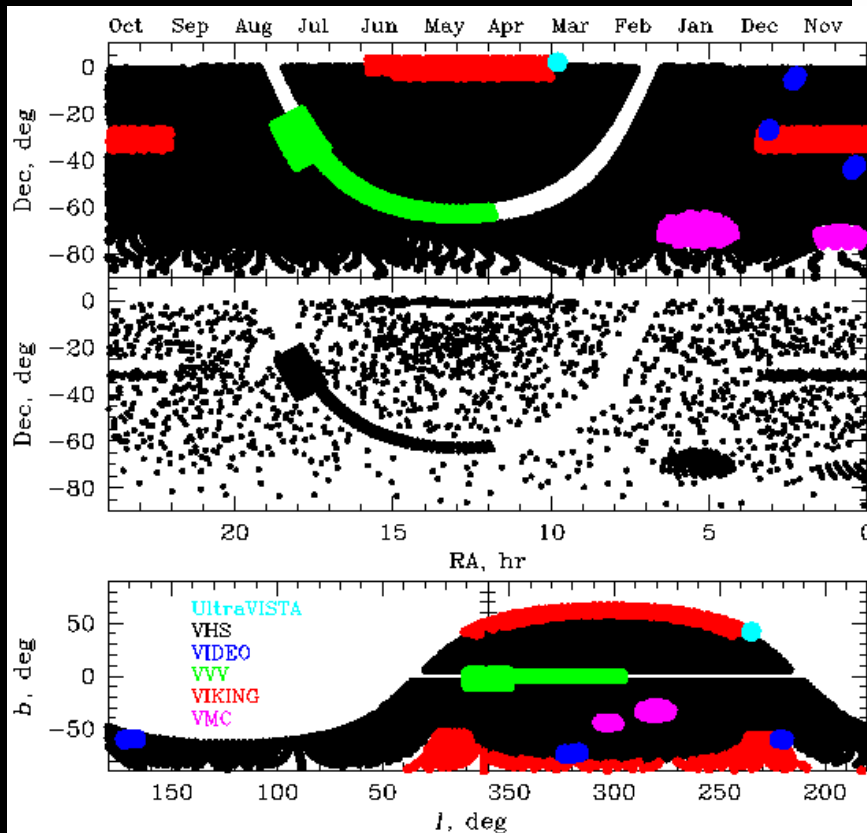
UltraVISTA : PIs Jim Dunlop (Edinburgh), Marijn Franx (Leiden), Johan Fynbo (Copenhagen), Olivier LeFevre (Marseilles) -- Ultra-VISTA aims to image one patch of the sky (the COSMOS field) in YJHKs filters plus one NB at Ly α emitters at $z \sim 8.8$ (~ 30 are expected to be found). The science goals are: first galaxies, the stellar mass build-up during the peak epoch of star formation activity, and dust obscured star formation.

VIDEO - VISTA Deep Extragalactic Observations Survey : PI Matt Jarvis (Hertfordshire) -- VIDEO is a 15 sq.degr ZYJHKs survey to study galaxy evolution as a function of epoch and environment to redshift of ~ 4 using AGNs, galaxy cluster evolution, and very massive galaxies. Four fields: CDFS, XMM-Newton LSSS, ISO field, and a new field. VIDEO is intermediate between the wide/shallow VIKING and the small/deep Ultra-VISTA.

VIKING - VISTA Kilo-Degree Infrared Galaxy Survey : PI Will Sutherland (Cambridge) -- The VIKING survey provides an NIR complement to the optical KIDS project. VIKING will image the same 1500 sq.degr of the sky in ZYJHKs to a limiting magnitude 1.4 mag deeper than the UKIDSS LAS. The main goal is to obtain accurate photometric redshifts, ($z > 1$), important for weak lensing analysis and observation of baryon acoustic oscillations. Other goals: hunt for high redshift quasars, galaxy clusters, and the study of galaxy stellar masses.

Wide Infrared Milky Way Surveys

VISTA Surveys

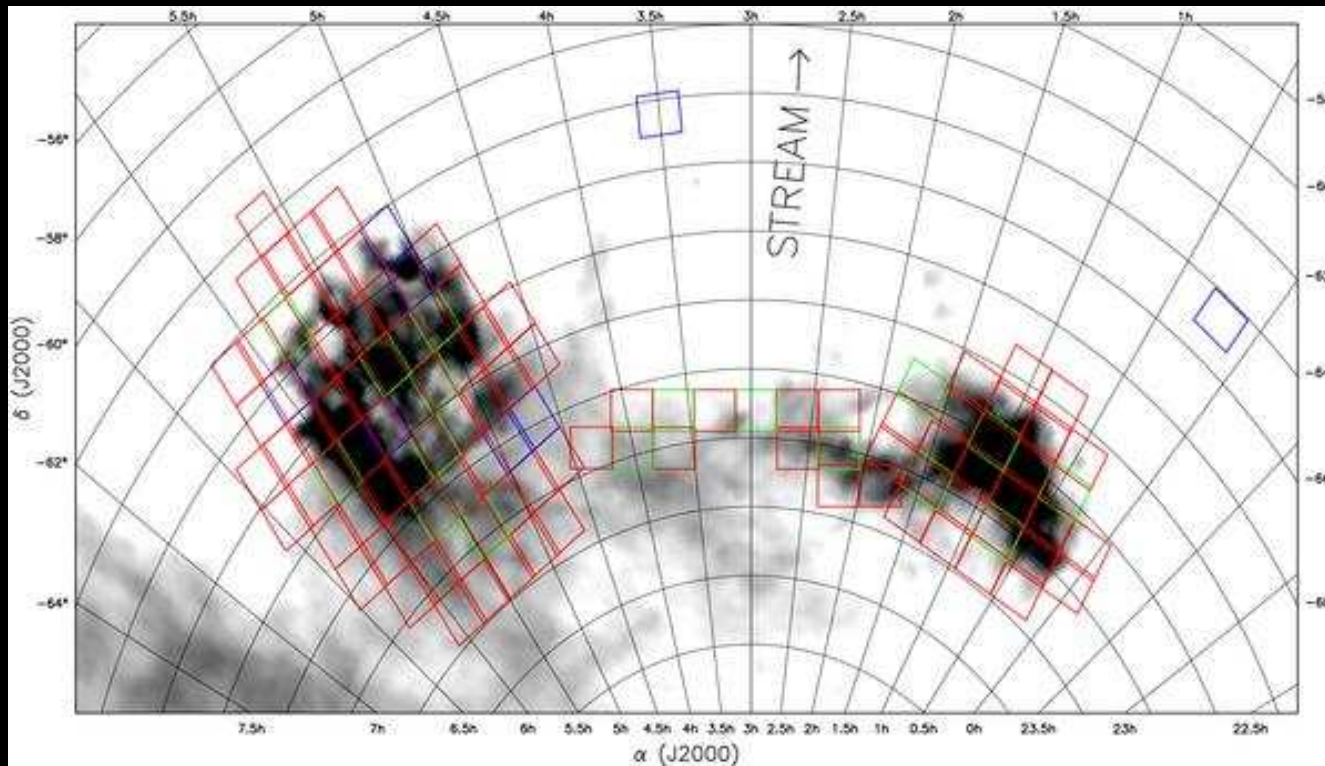


UKIDSS

VISTA Strategy:

- semi-simultaneous YZ and JHKs
- multiple Ks re-visits separated by up to 5 yrs

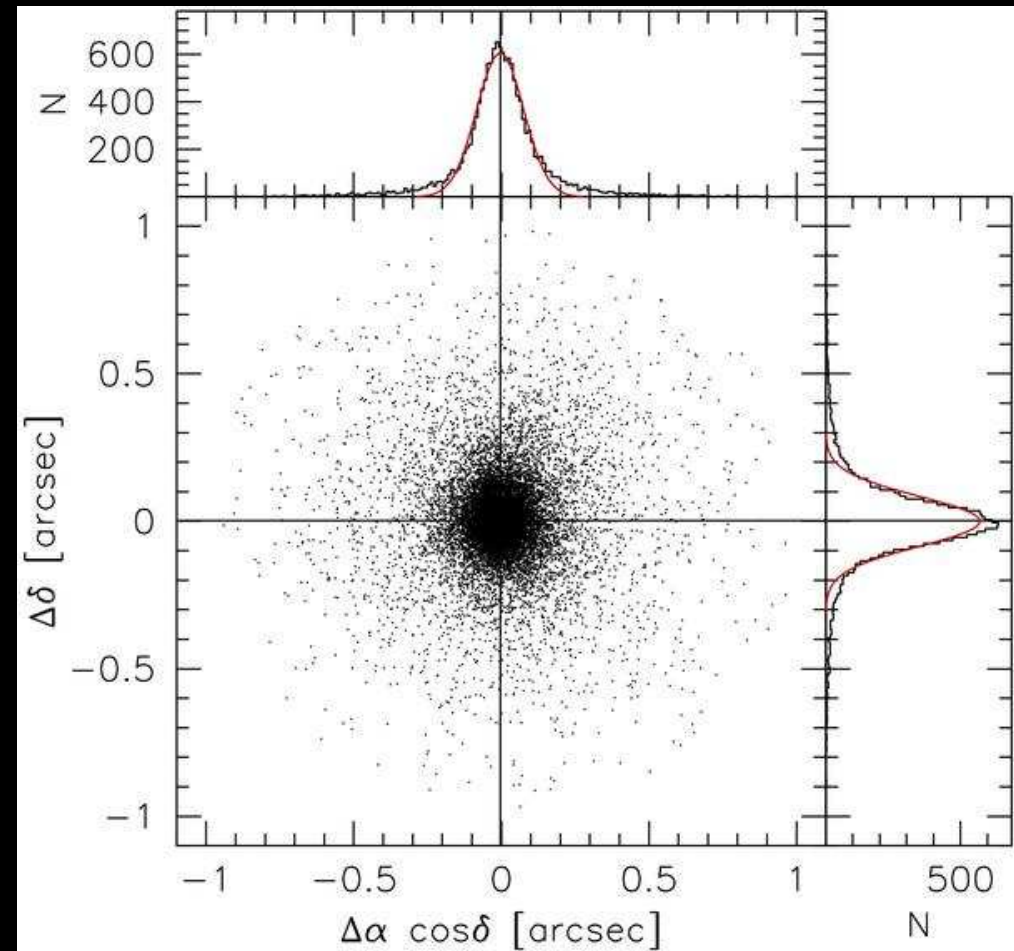
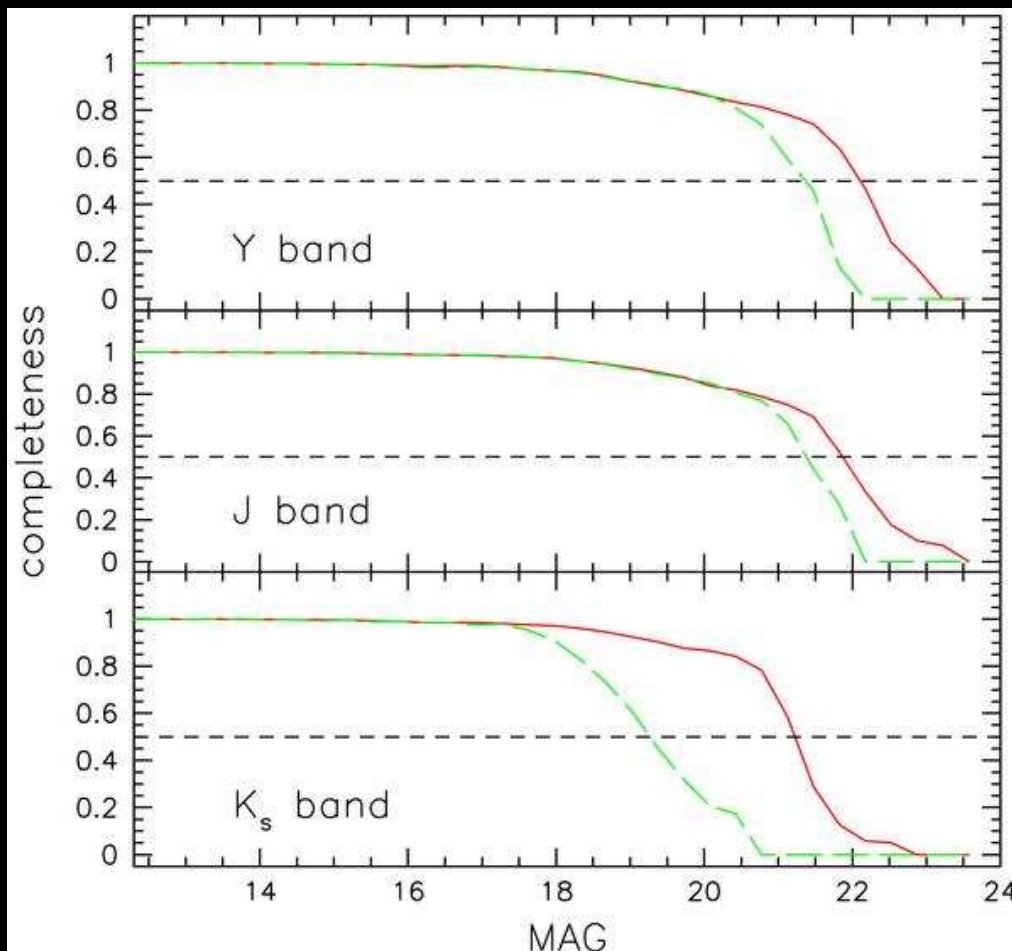
VMC – VISTA Magellanic Clouds ESO public survey



*110 tiles,
184 sq. deg
YJKs
12+ Ks epochs*

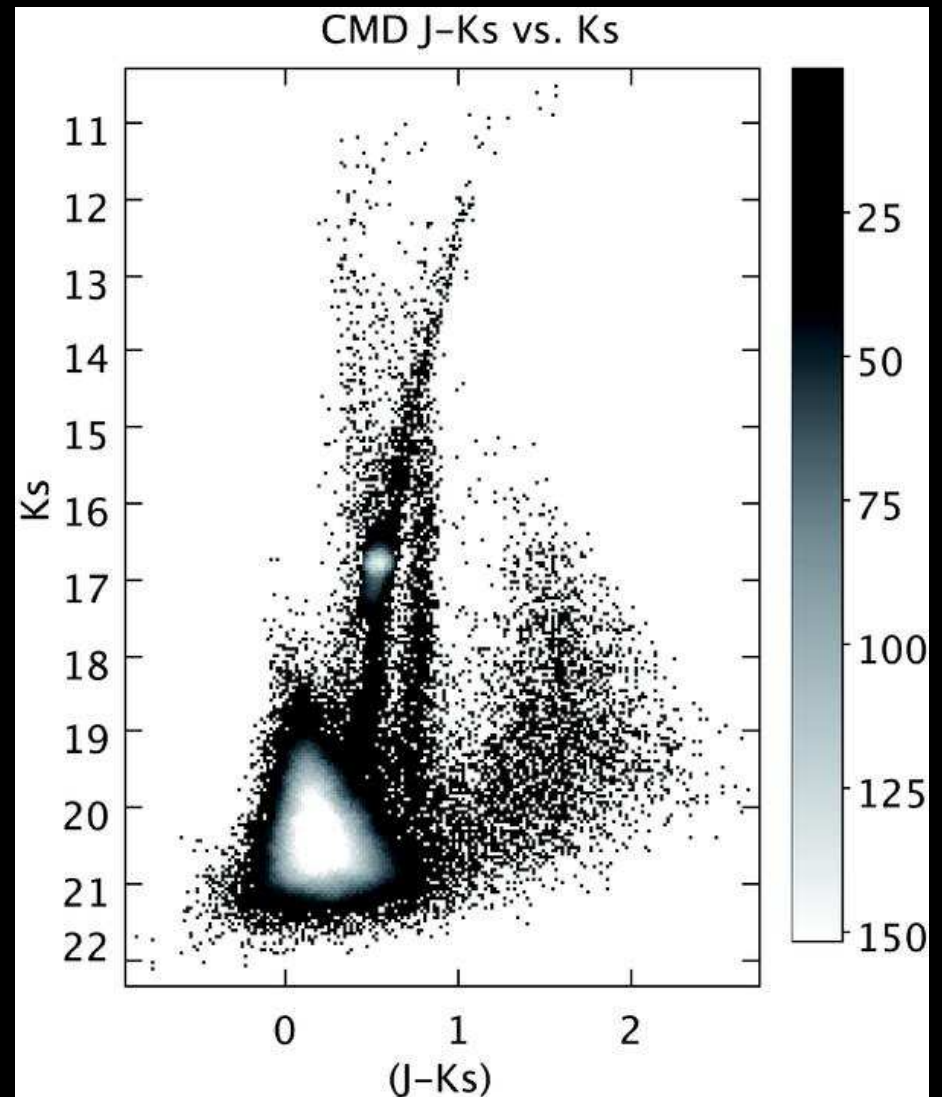
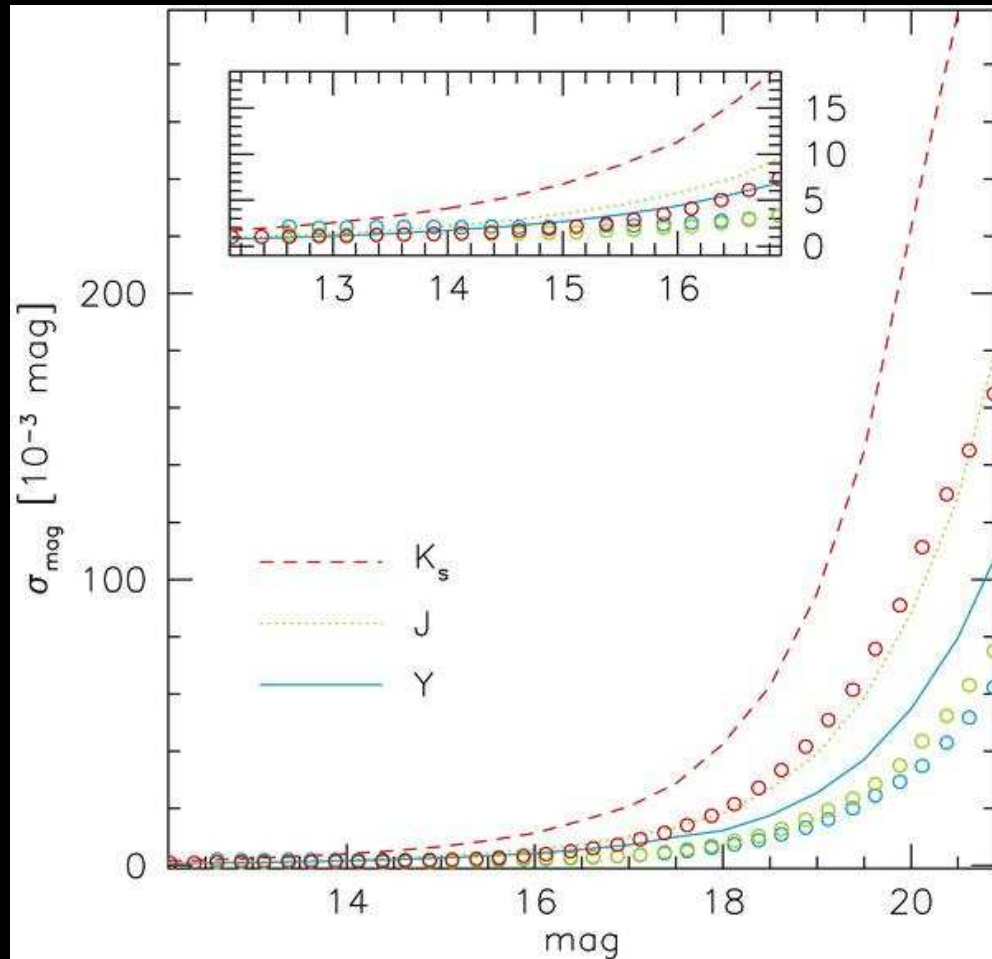
Cioni et al. (2011, A&A, 527, 116)

VMC – VISTA Magellanic Clouds ESO public survey

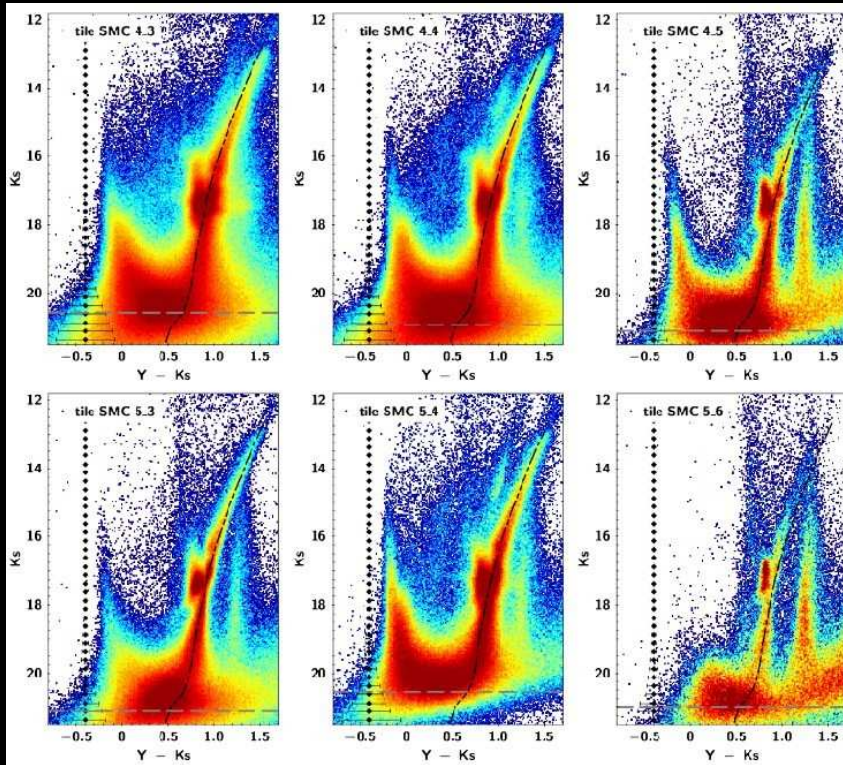


$\sigma=80-85$ mas

VMC – VISTA Magellanic Clouds ESO public survey

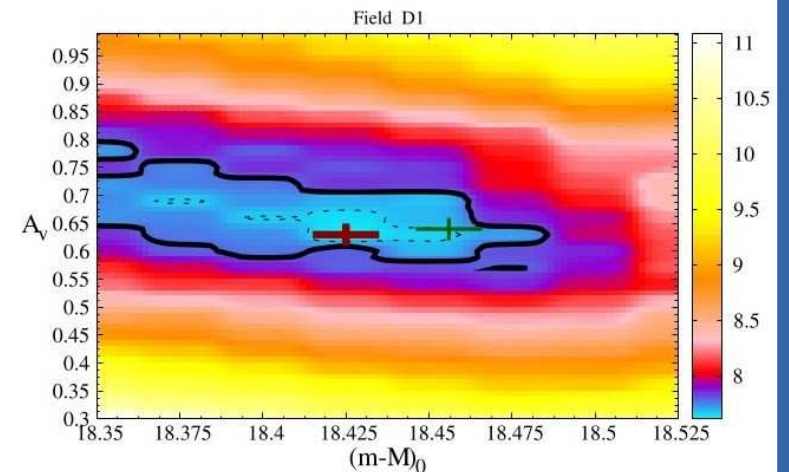
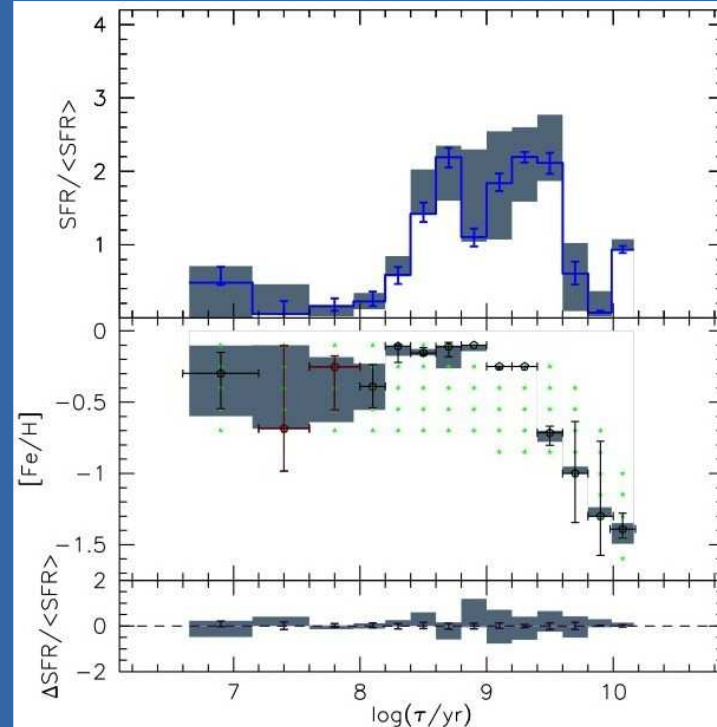
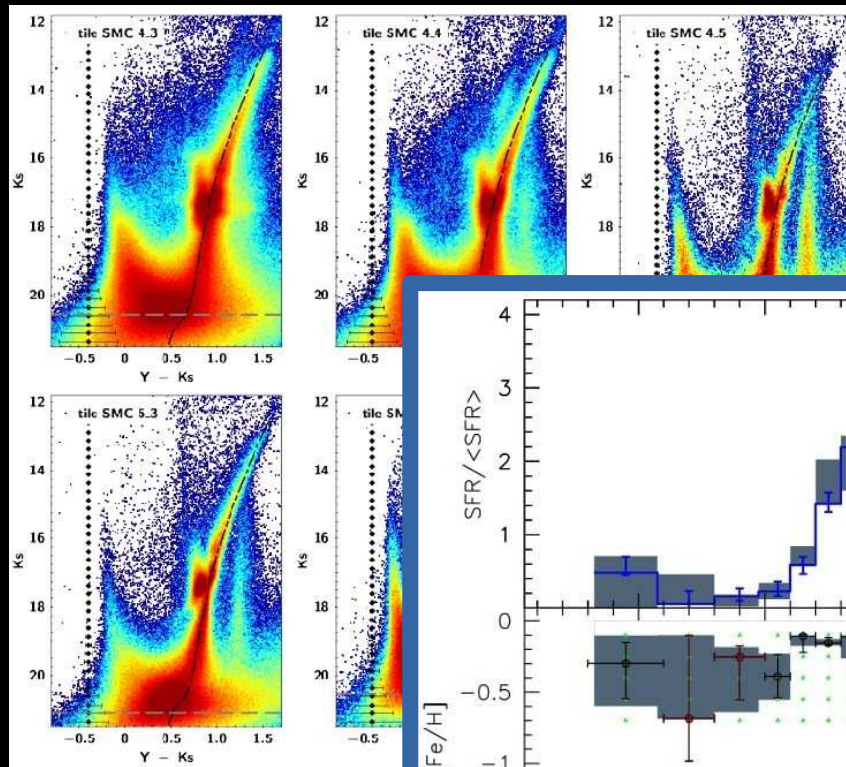


VMC – VISTA Magellanic Clouds ESO public survey



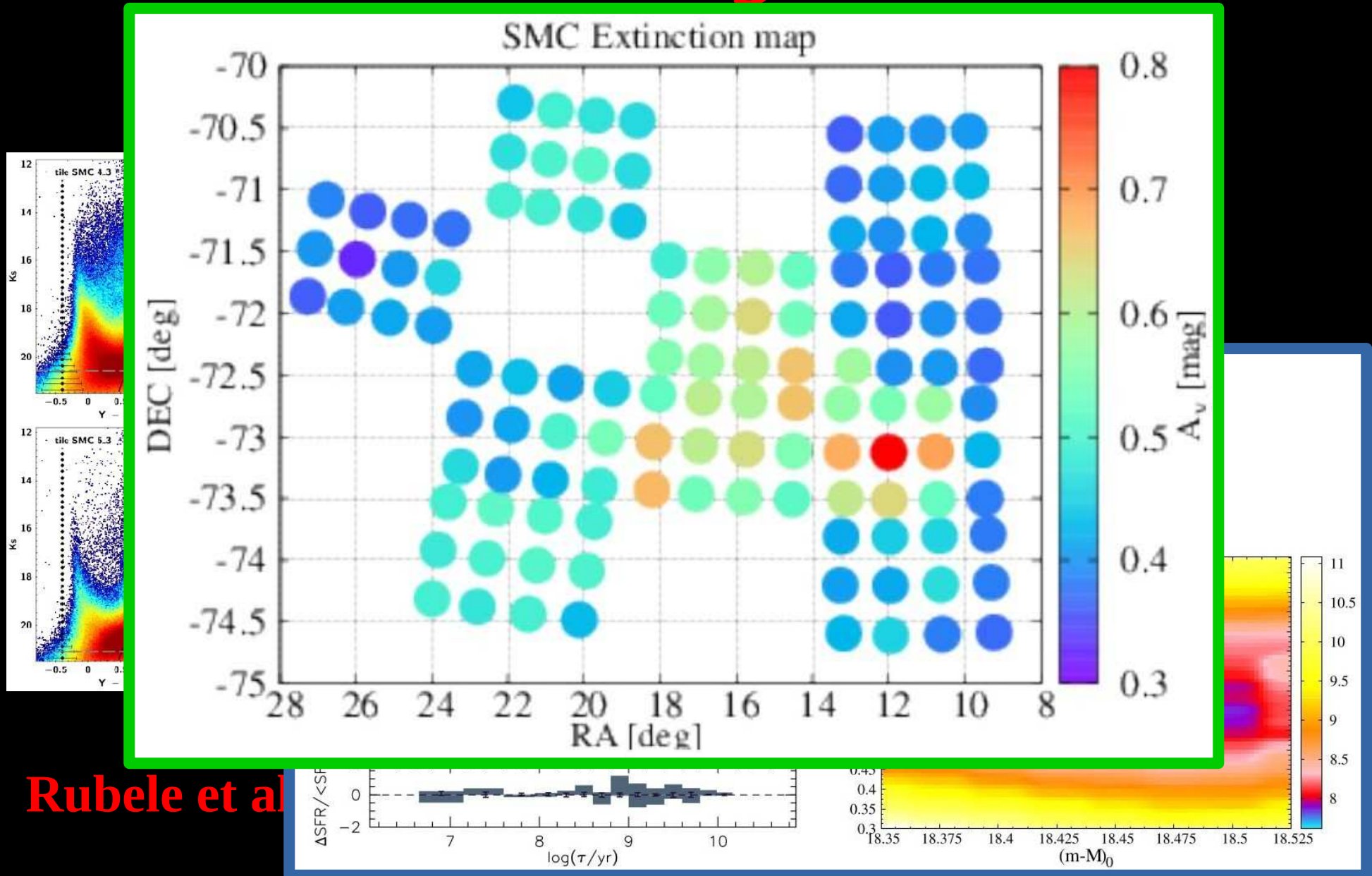
Rubele et al. (2012, 2015, 2018)

VMC – VISTA Magellanic Clouds ESO public survey



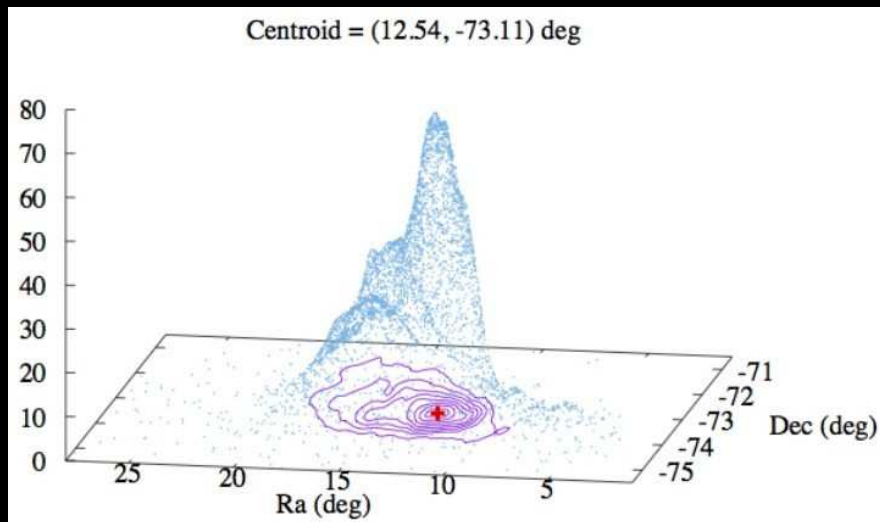
Rubele et al

VMC – VISTA Magellanic Clouds



Rubele et al

VMC – VISTA Magellanic Clouds ESO public survey

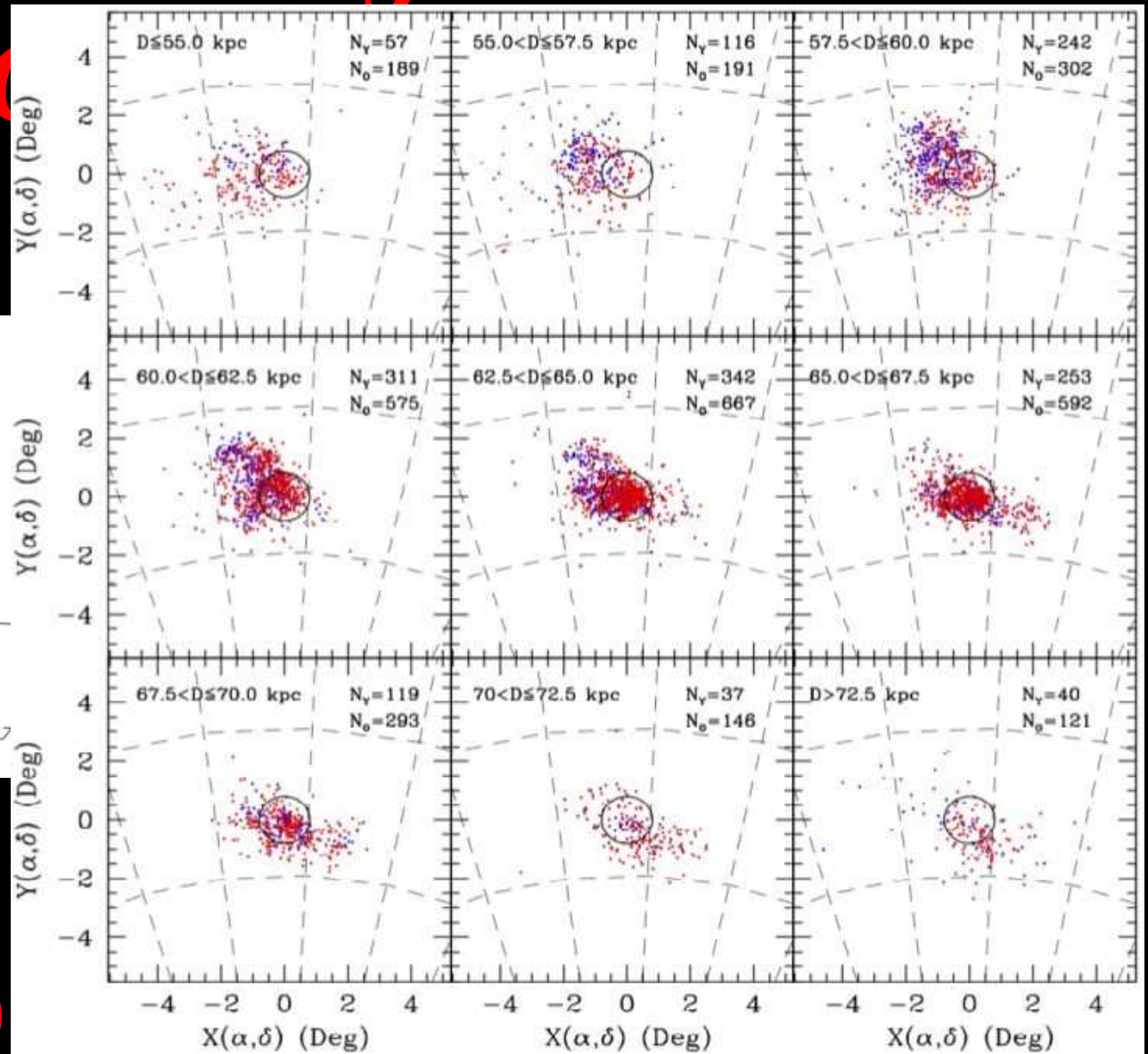
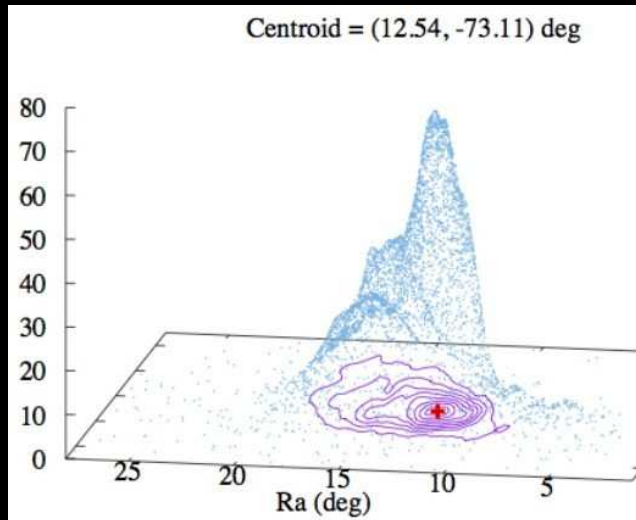


<= Classical Cepheids
(see also Muraveva et al.
2018 for RR Lyr;
Subramanian et al. 2017
for red clump)

Ripepi et al. (2017)

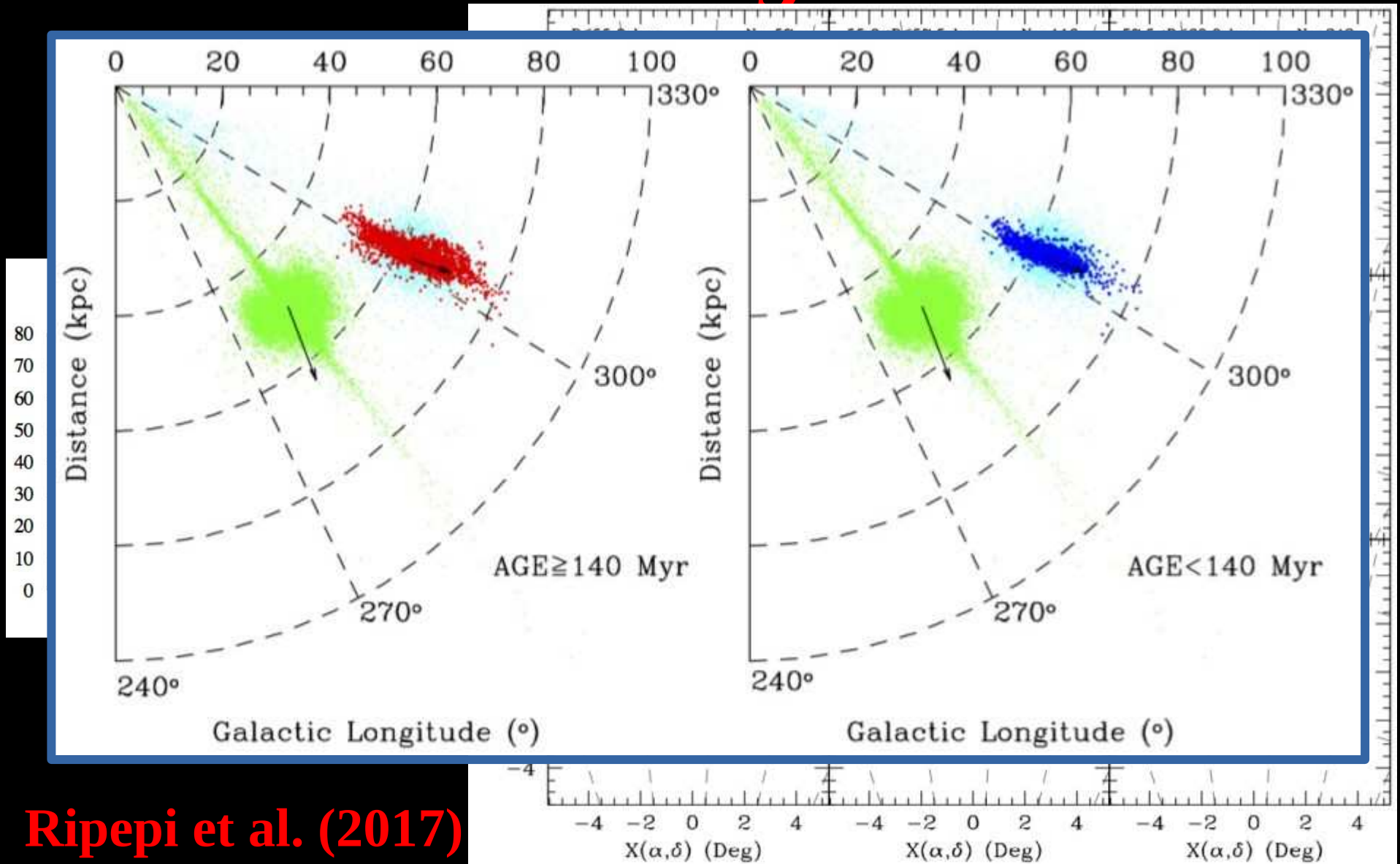
VMC – VISTA Magellanic Clouds

ESO



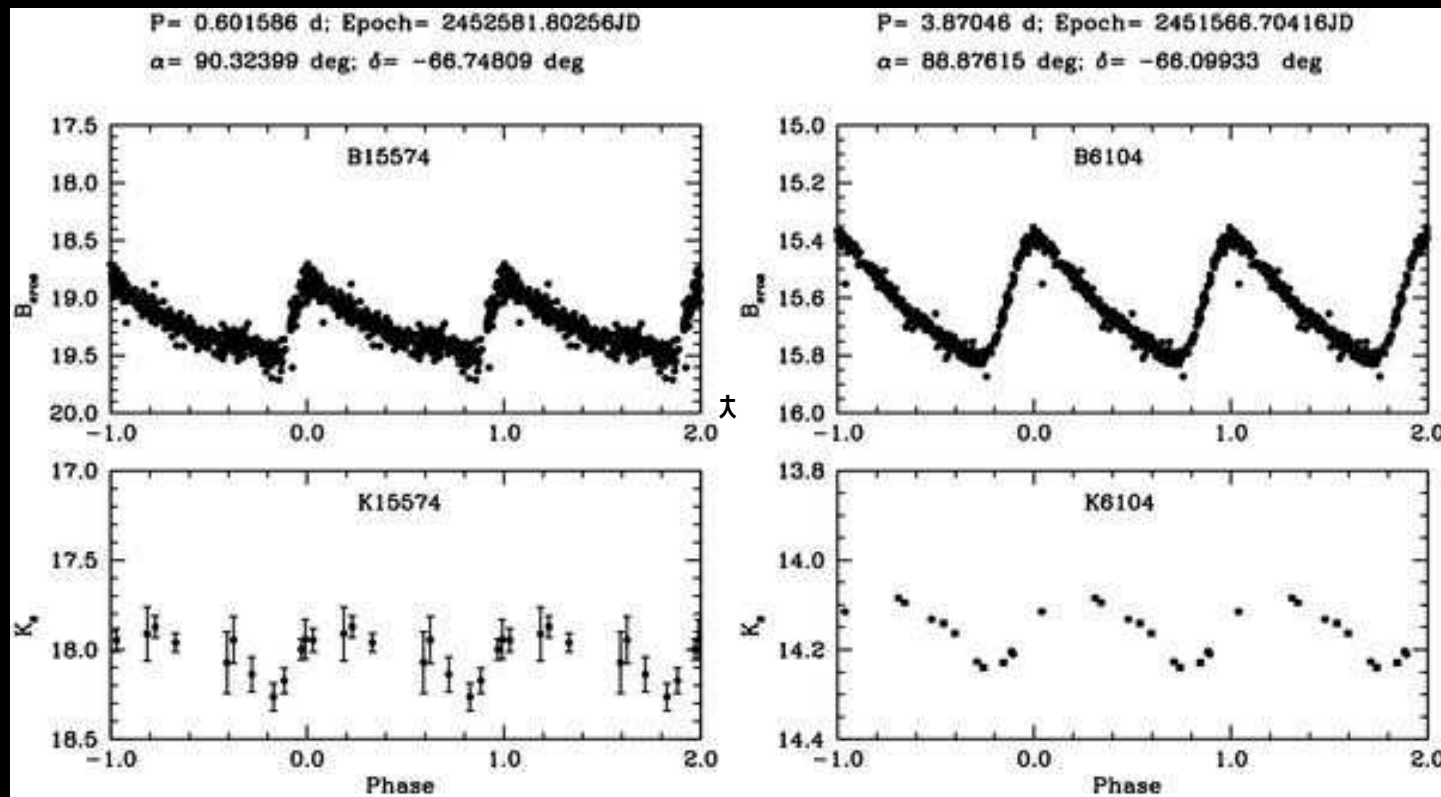
Ripepi et al. (2017)

VMC – VISTA Magellanic Clouds



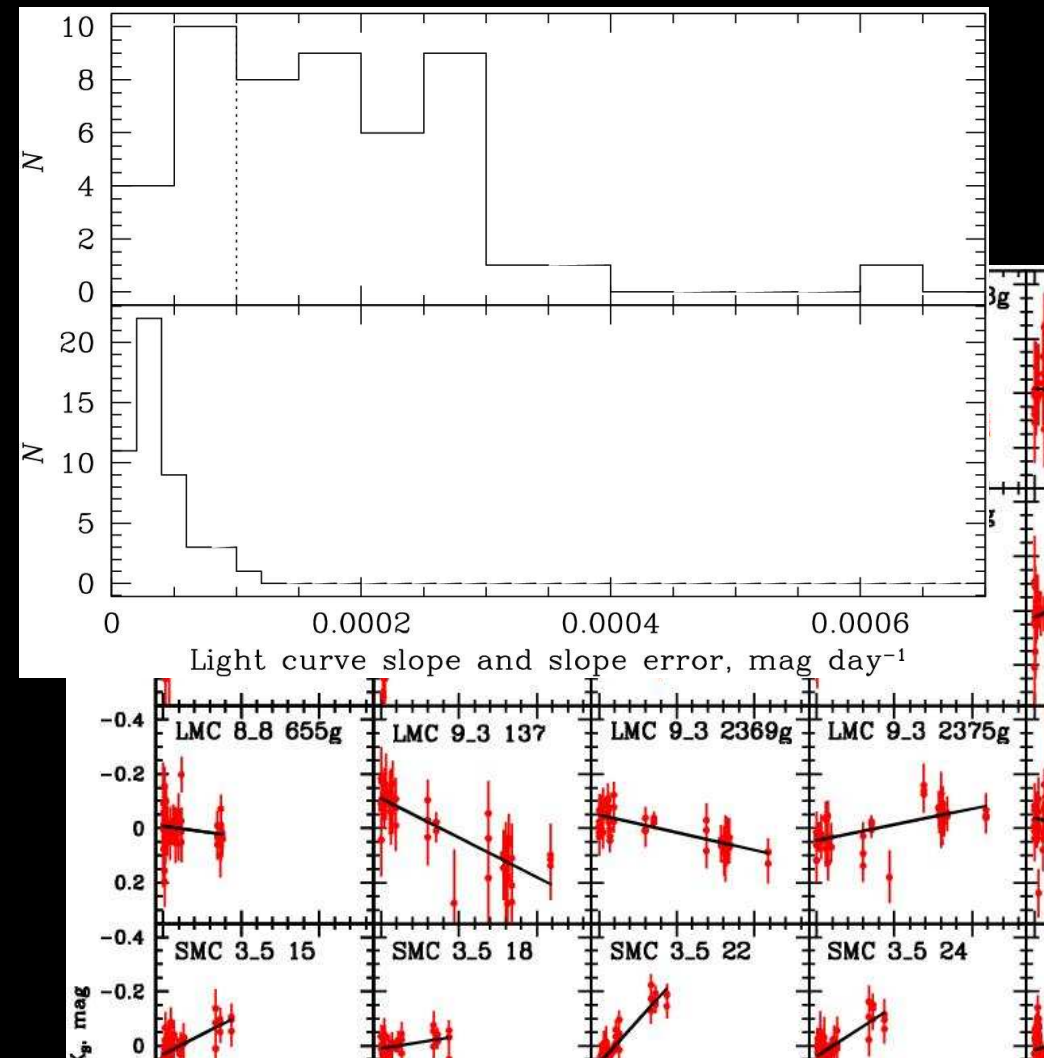
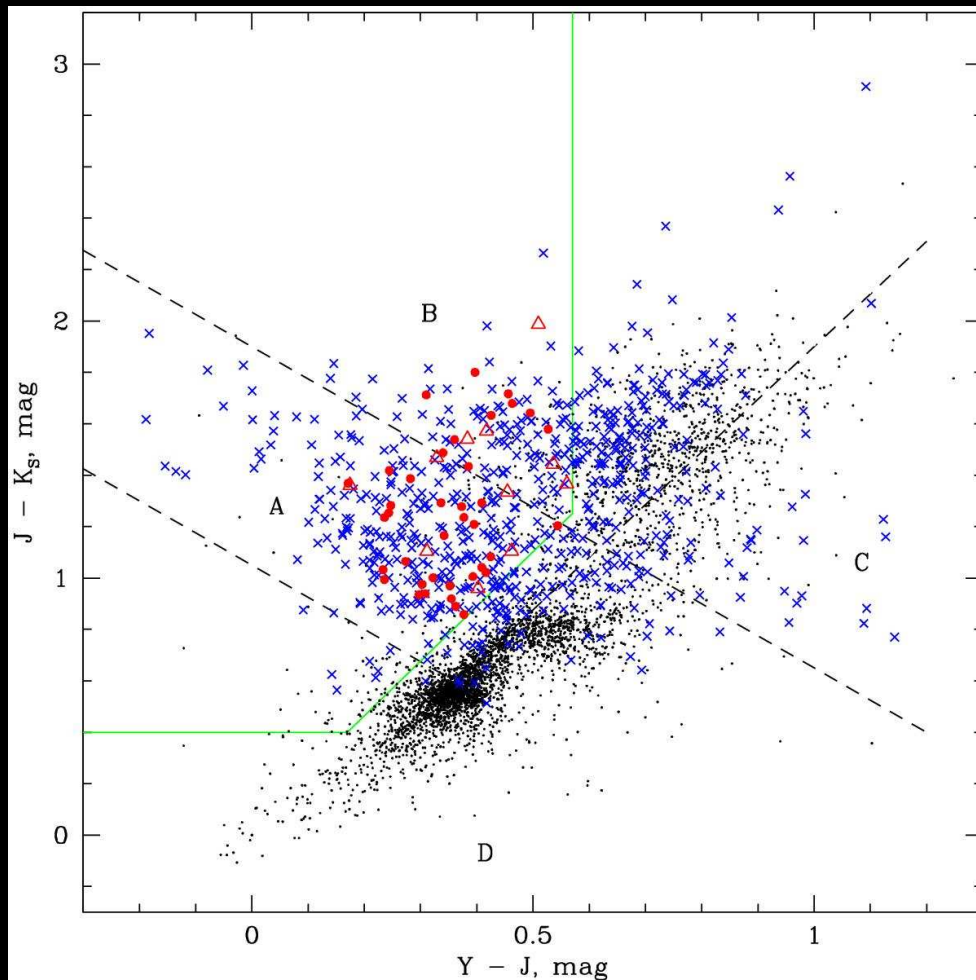
Ripepi et al. (2017)

VMC – VISTA Magellanic Clouds ESO public survey

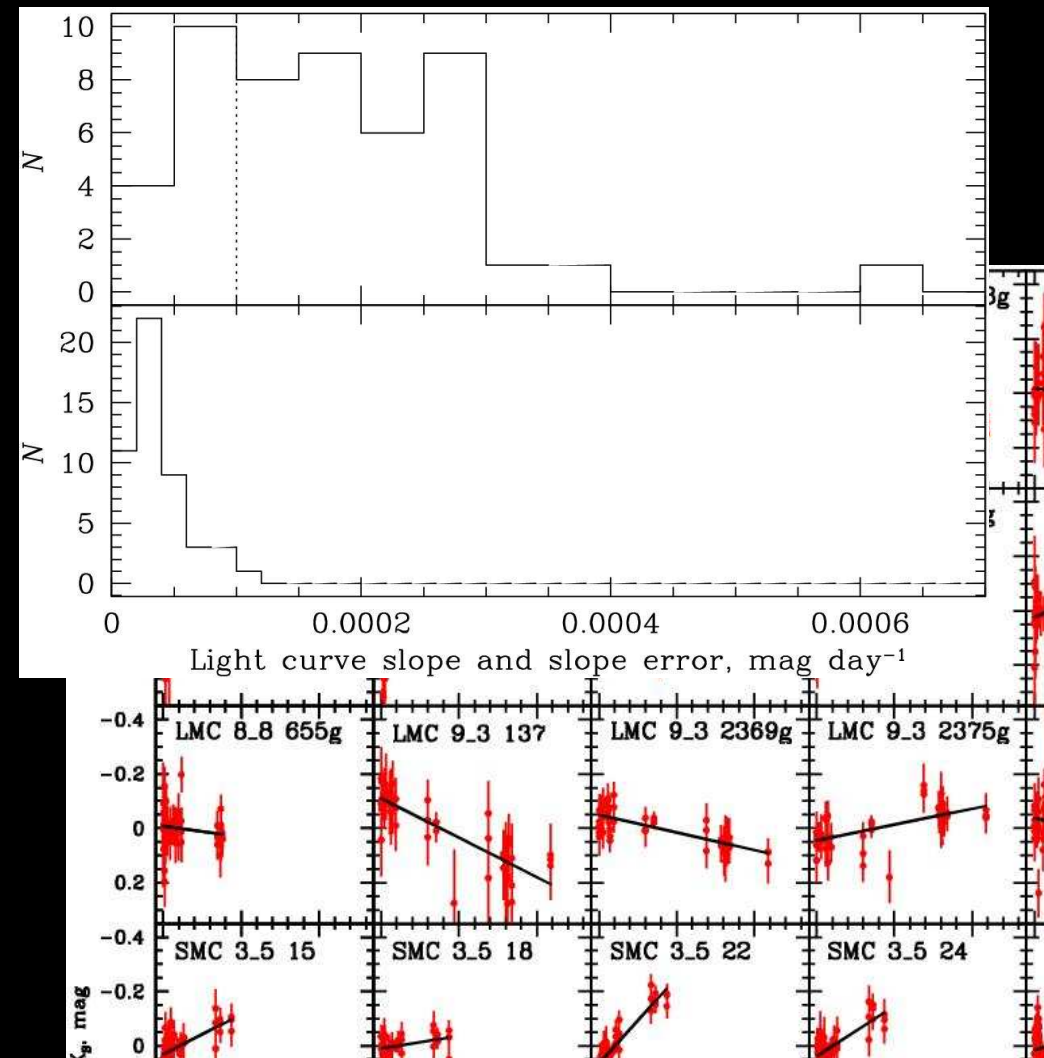
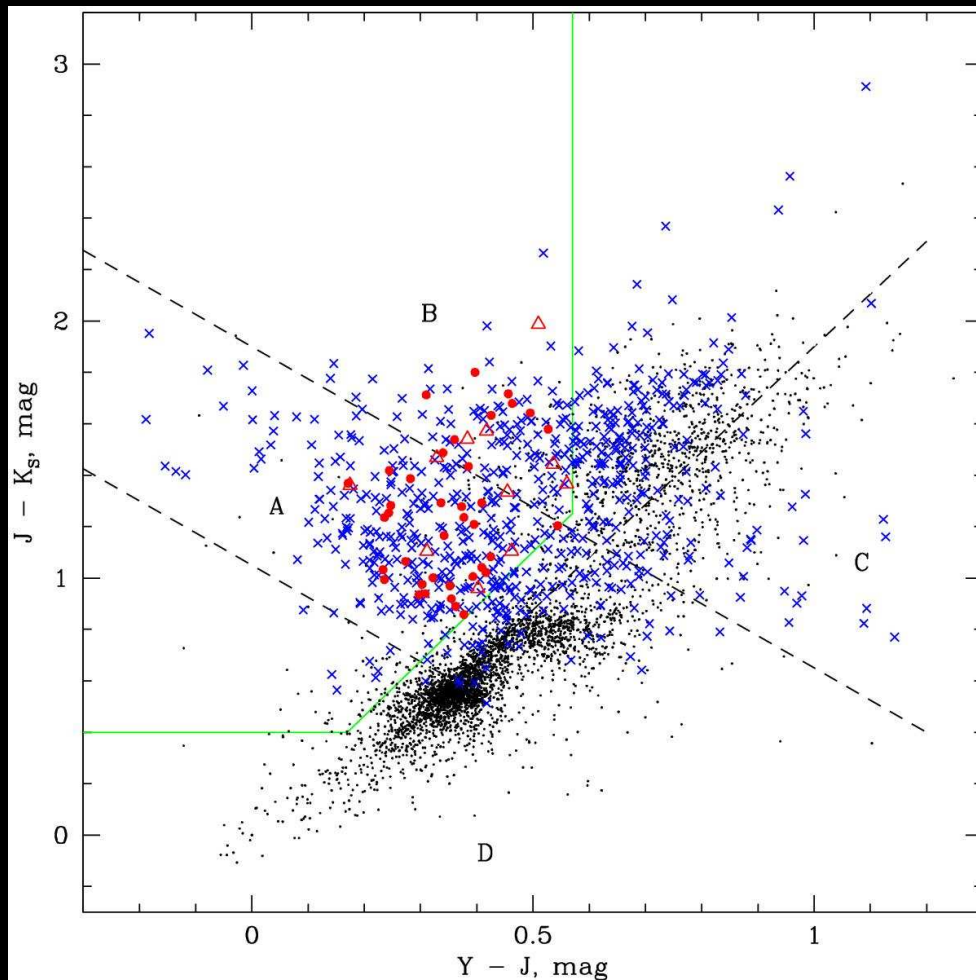


Moretti et al. (2014, 2016), Rippei et al. (2014, 2015, 2016),
Marconi et al. (2017)

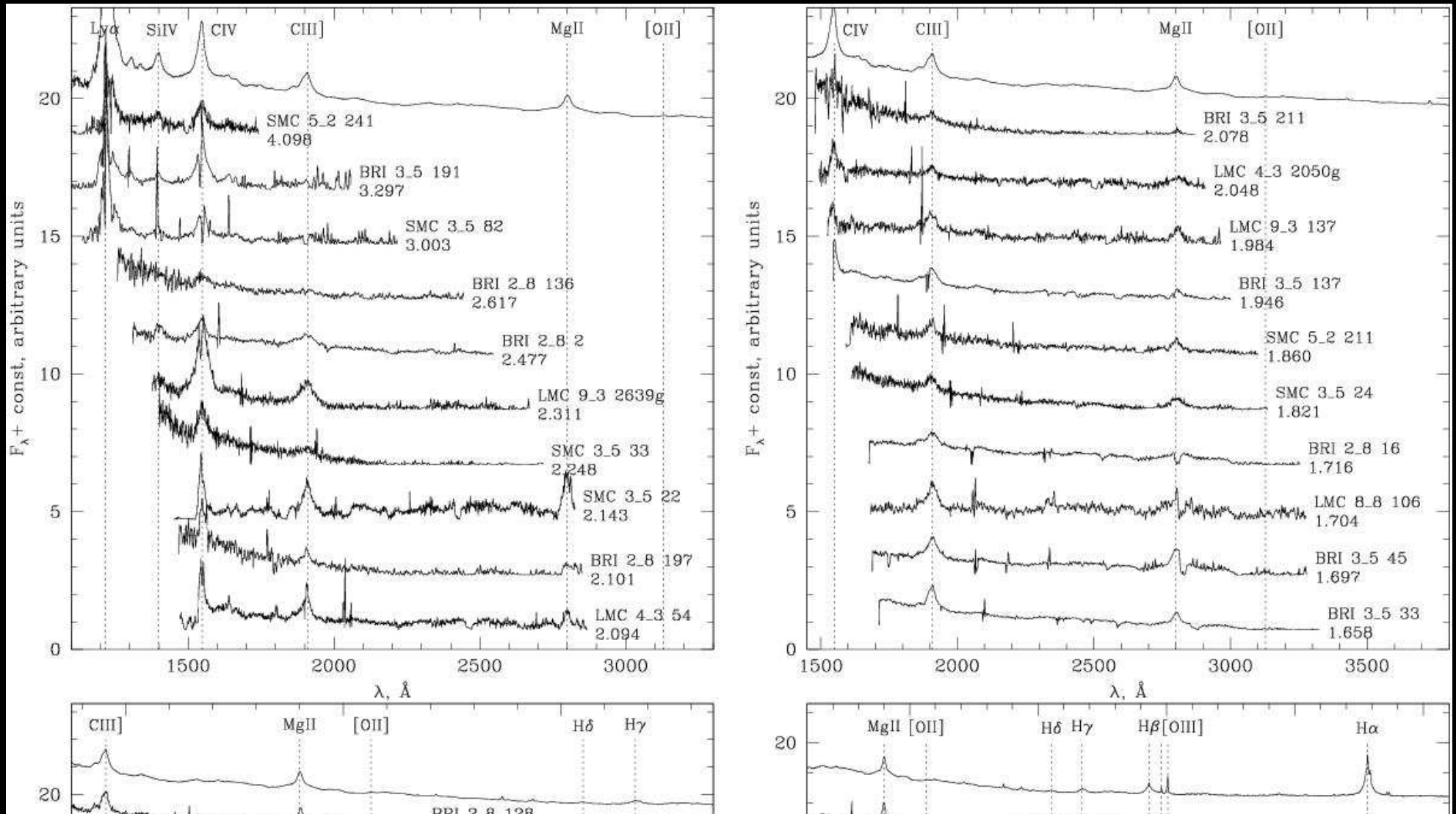
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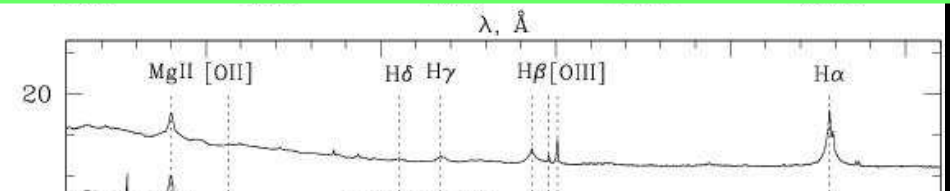
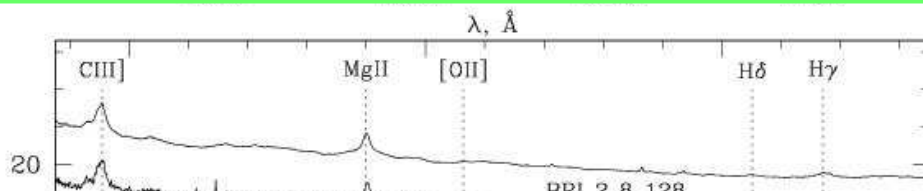
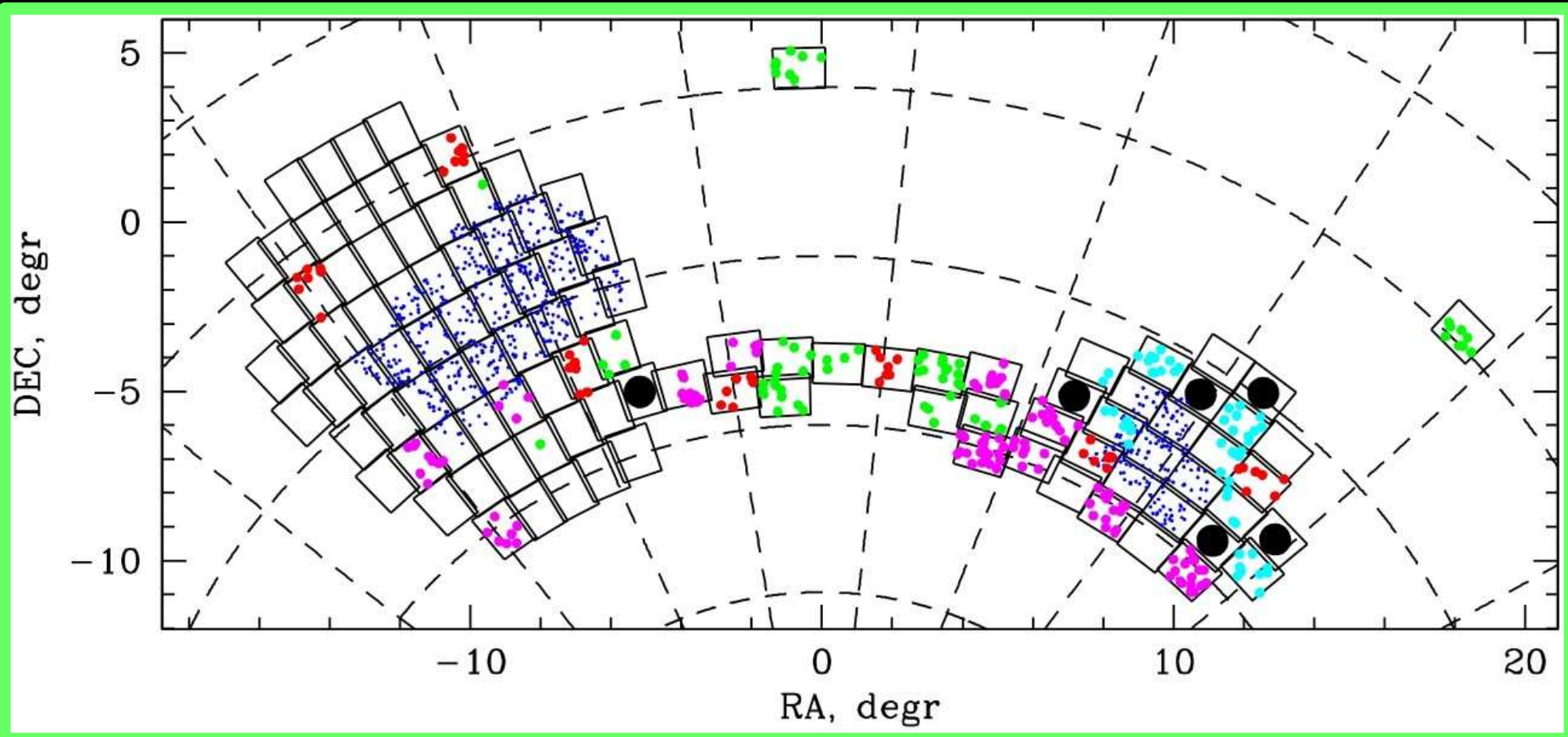
VMC – VISTA Magellanic Clouds ESO public survey



VMC – VISTA Magellanic Clouds ESO public survey



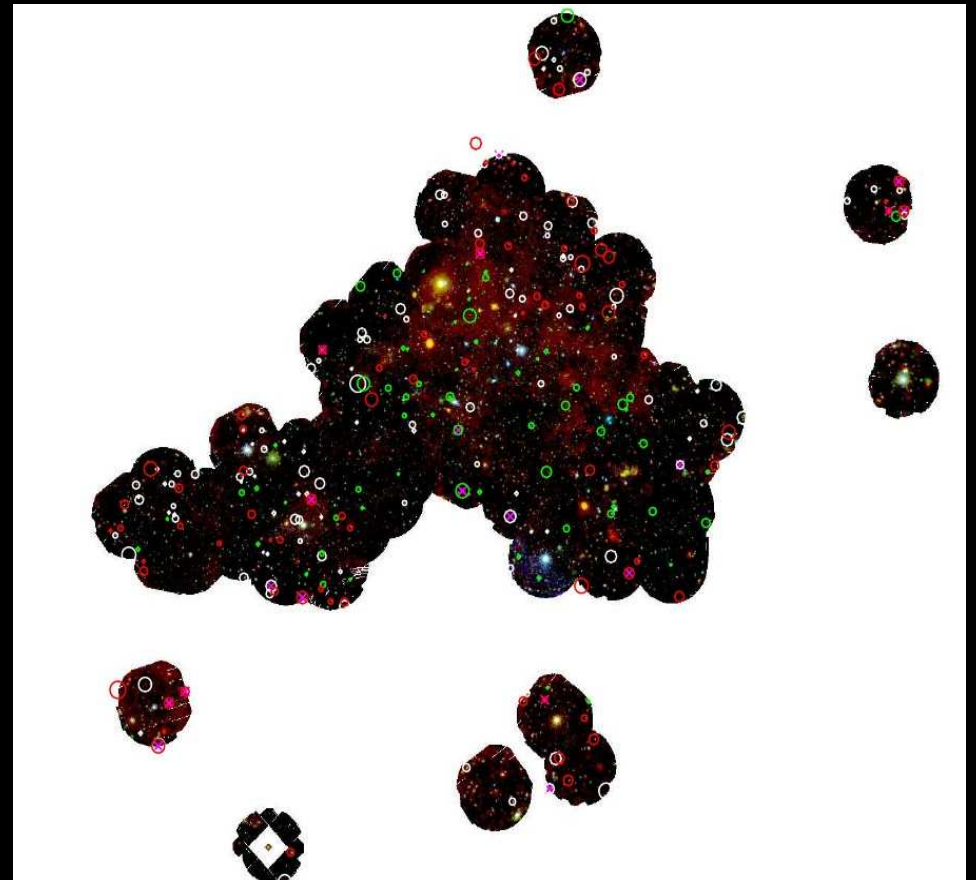
VMC – VISTA Magellanic Clouds ESO public survey



VMC – VISTA Magellanic Clouds

ESO public survey

- AGNs behind the SMC from a XMM-Newton survey of the SMC (0.2-12 keV) in X-rays and mid-IR (ALLWISE)
- Identified 270 sources, 78 are new candidates; 20 candidates for highly obscured AGNs, which are rare objects.

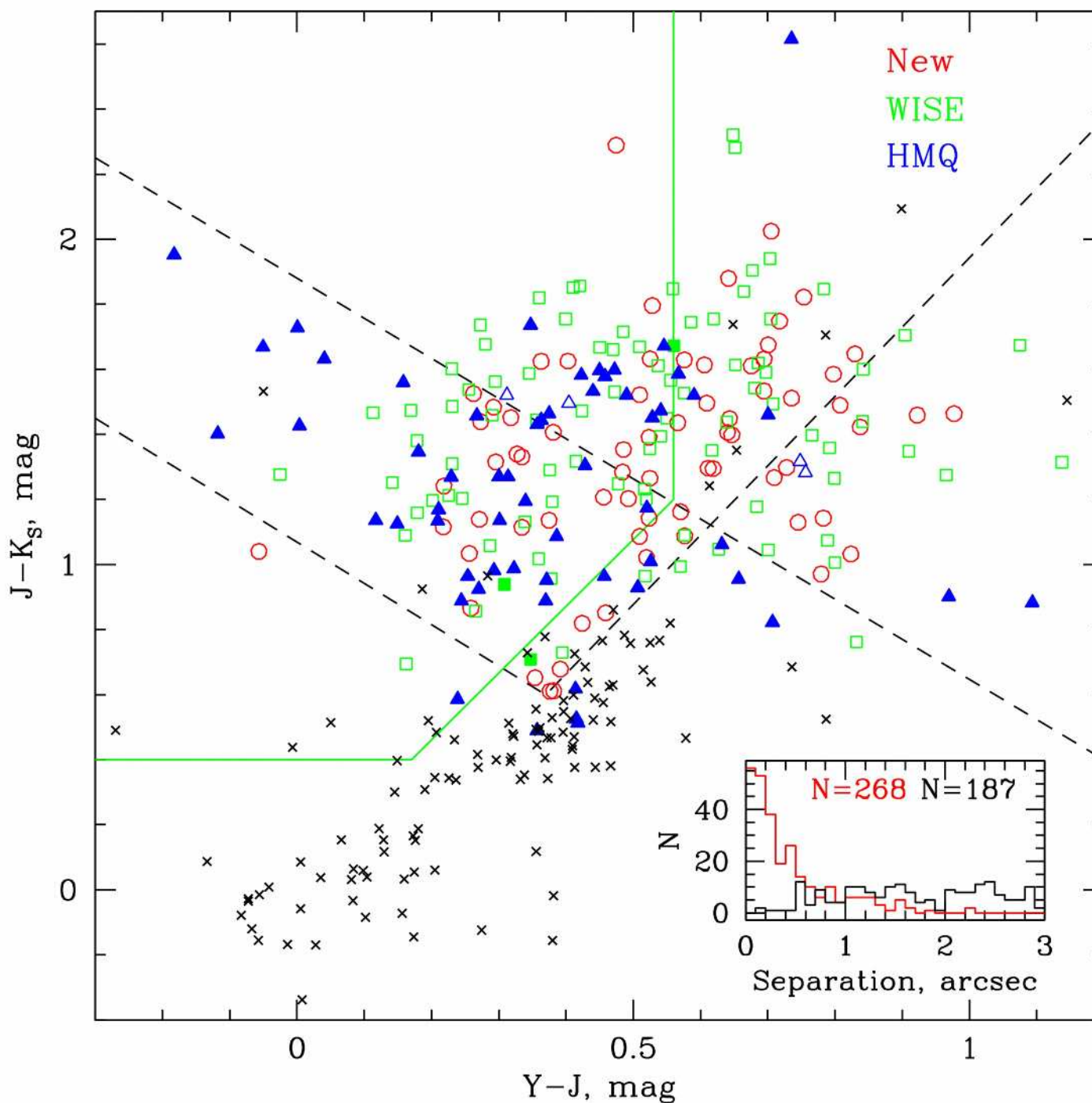


Maitra, Haberl, Ivanov, in prep.

VM

ids

- AGN from a survey (keV) (ALL)
- Ident 78 are candid obscure rare o



Maitra, I

The Milky Way, our Galaxy



Minniti, Lucas et al. 2010, NewA, 15, 433

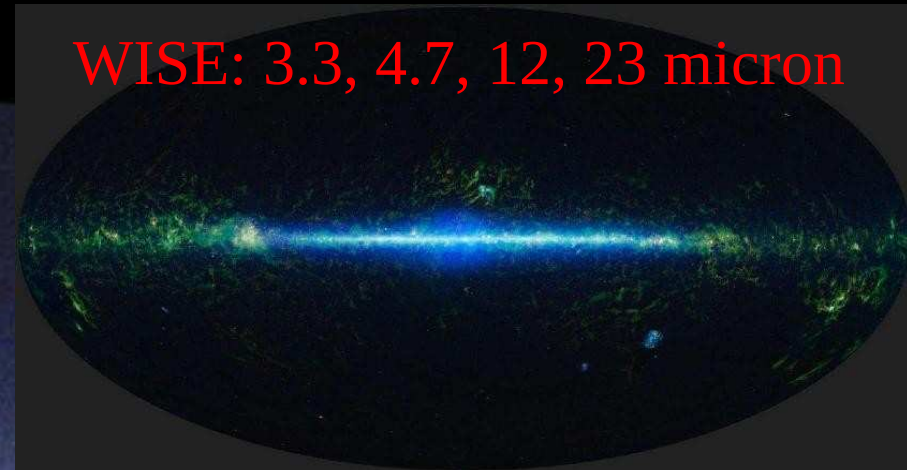
- Dante Minniti, PI (Universidad Católica, Chile)
- Phil Lucas, CoPI (University of Hertsfordshire, UK)
- Maren Hempel (Universidad Católica, Chile)
- Roberto Saito (Universidad Católica, Chile)
- Javier Alonso (Universidad Católica, Chile)
- Istvan Dekany (Universidad Católica, Chile)
- Kris Helminiak (Universidad Católica, Chile)
- Jim Emerson (Queen Mary University of London, UK)
- Andy Adamson (Joint Astronomy Center, USA)
- Andrea Ahumada (Universidad de Cordoba, Argentina)
- Rodolfo Barba (Universidad de La Serena, Chile)
- Beatriz Barbuy (Universidade de Sao Paulo, Brazil)
- Mike Barlow (University College of London, UK)
- Luigi Bedin (European Southern Observatory, Germany)
- Reba Bendyopadhyay (University of Florida, USA)
- Eduardo Bica (Universidade de Porto Alegre, Brazil)
- Jura Borissova (Universidad de Valparaíso, Chile)
- Leonardo Bronfman (Universidad de Chile)
- Giovanni Carraro (Universidad de Chile)
- Simon Cassassus (Universidad de Chile)
- Marcio Catelan (Universidad Católica)
- Mark Cooper (Mullard Space Science Laboratory, UK)
- Richard de Grijs (IoA, Cambridge, UK)
- Janet Drew (Imperial College, London, UK)
- Jochem Eisloffel (Thueringer Landessternwarte, Germany)
- Juan Fabregat (Universidad de Valencia)
- Roberto Gamen (Universidad de La Plata, Argentina)
- Doug Geisler (Universidad de Concepcion, Chile)
- Teresa Gianinni (Rome Observatory, Italy)
- Wolfgang Gieren (Universidad de Concepcion, Chile)
- Bertrand Goldman (MPIA, Heidelberg, Germany)
- Andrew Gosling (Oxford University, UK)
- Paul Groot (Nijmegen University, The Netherlands)
- Nigel Hambly (Royal Observatory, Edinburgh, UK)
- Melvin Hoare (Leeds University, UK)
- Valentin Ivanov (European Southern Observatory, Chile)
- Juan Jose Claria (Universidad de Cordoba, Argentina)
- Leandro Kerber (Universidade de Sao Paulo, Brazil)
- Radostin Kurtev (Universidad de Valparaíso, Chile)
- Andy Longmore (Royal Observatory, Edinburgh, UK)
- Martin Lopez-Correidora (IAC, Spain)
- John Lucey (Durham University, UK)
- Eduardo Martin (IAC, Spain)
- Katherine McGowan (Southampton University, UK)
- Ronald Mennickent (Universidad de Concepcion, Chile)
- Maria Messineo (European Southern Observatory, Germany)
- Felix Mirabel (European Southern Observatory, Chile)
- Lorenzo Morelli (Universidad Católica, Chile)
- Tim Naylor (Exeter University, UK)
- Pawel Pietrukowicz (Copernicus Institute, Poland)
- Grzegorz Pietrzynski (Universidad de Concepcion, Chile)
- Giuliano Pignata (Universidad Católica, Chile)
- Marina Rejkuba (European Southern Observatory, Germany)
- Ivo Saviane (European Southern Observatory, Chile)
- Anja Schroeder (Leicester University, UK)
- Andrew Stephens (Gemini Observatory, USA)
- Claus Tappert (Universidad Católica, Chile)
- Maria Teresa Ruiz (Universidad de Valparaíso)
- Mark Thompson (University of Hertfordshire, UK)
- Leonardo Vanzi (European Southern Observatory, Chile)
- Nic Walton (Cambridge University, UK)
- Glenn White (Open University, UK)
- Albert Zijlstra (Manchester University, UK)
- Manuela Zoccali (Universidad Católica, Chile)

VW Goal

What is the 3-D
structure of the
Milky Way



WISE: 3.3, 4.7, 12, 23 micron

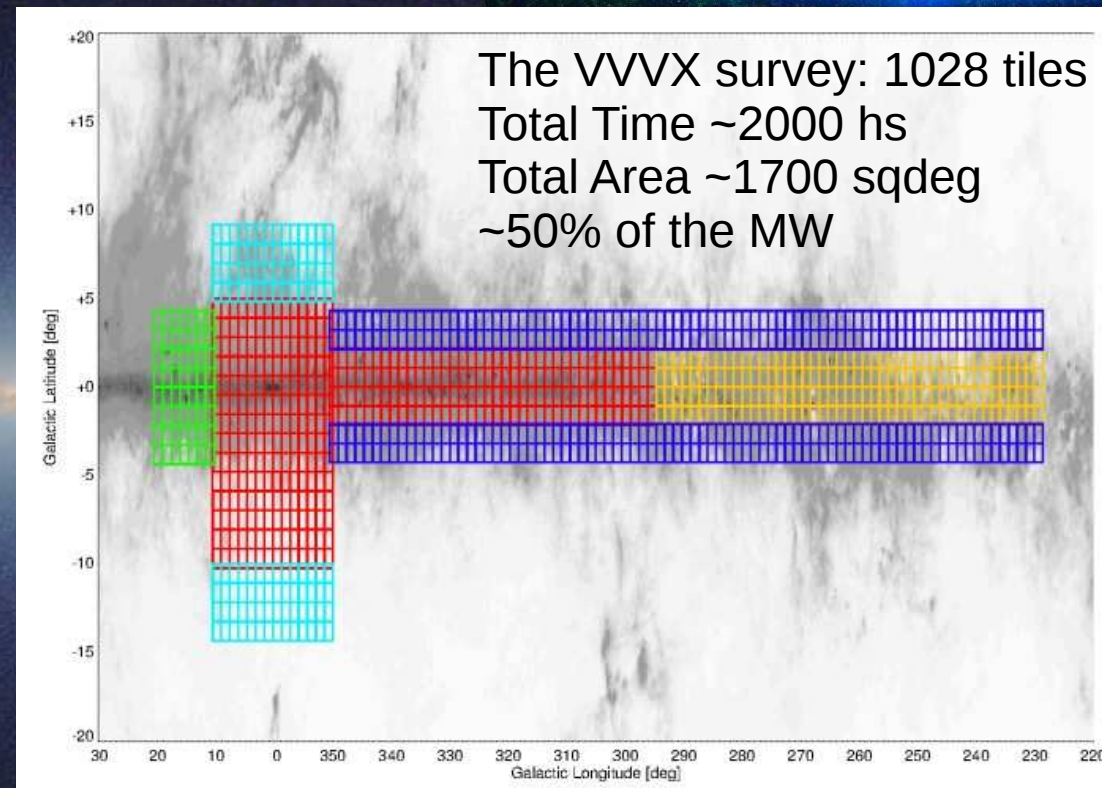


Bulge – 300 sq. deg: $-10 < l < +10$, $-10 < b < +5$

Disk – 220 sq. deg: $-65 < l < -10$, $-2 < b < +2$

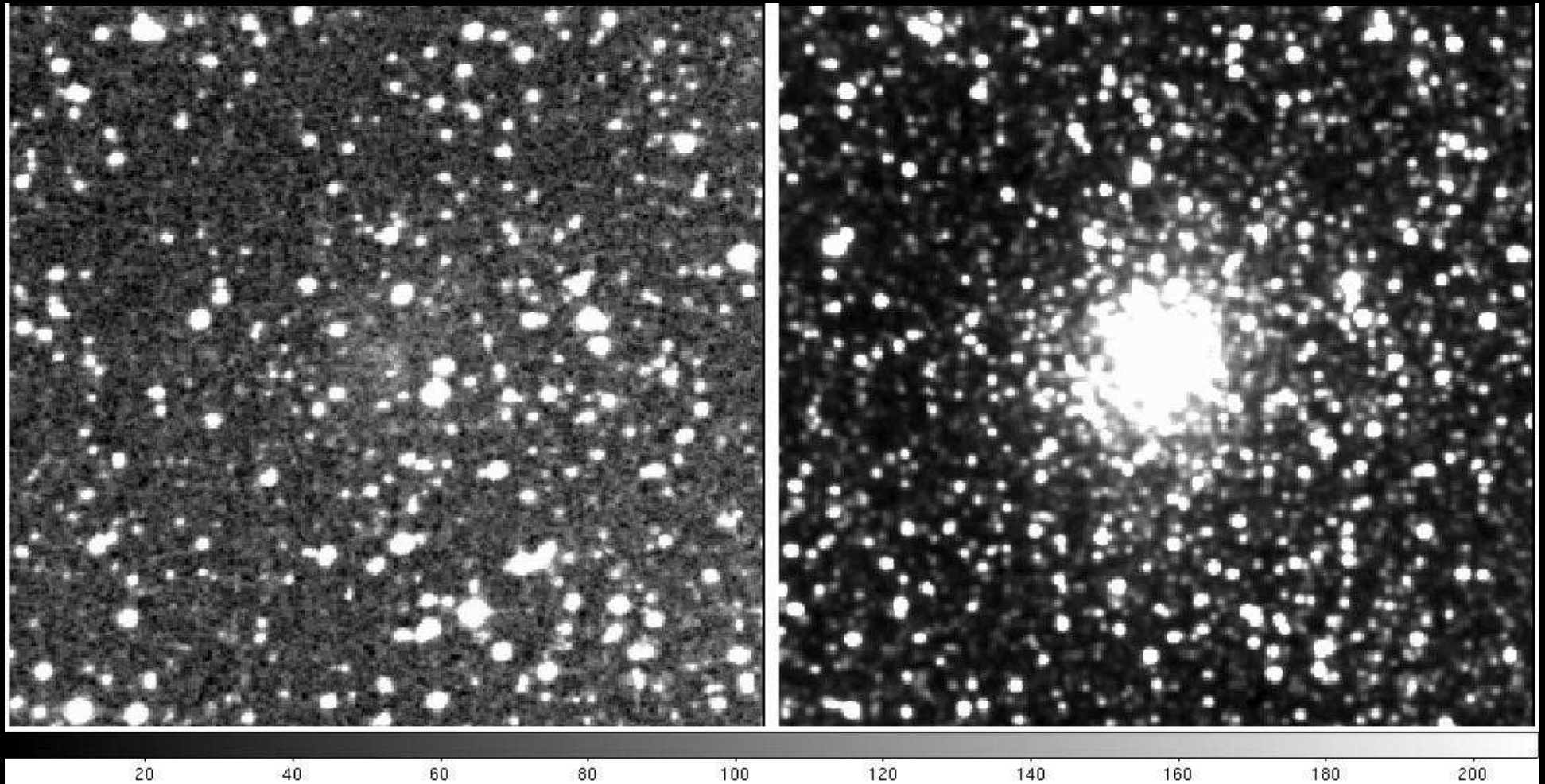
2MASS JHK 2000

WISE: 3.3, 4.7, 12, 23 micron



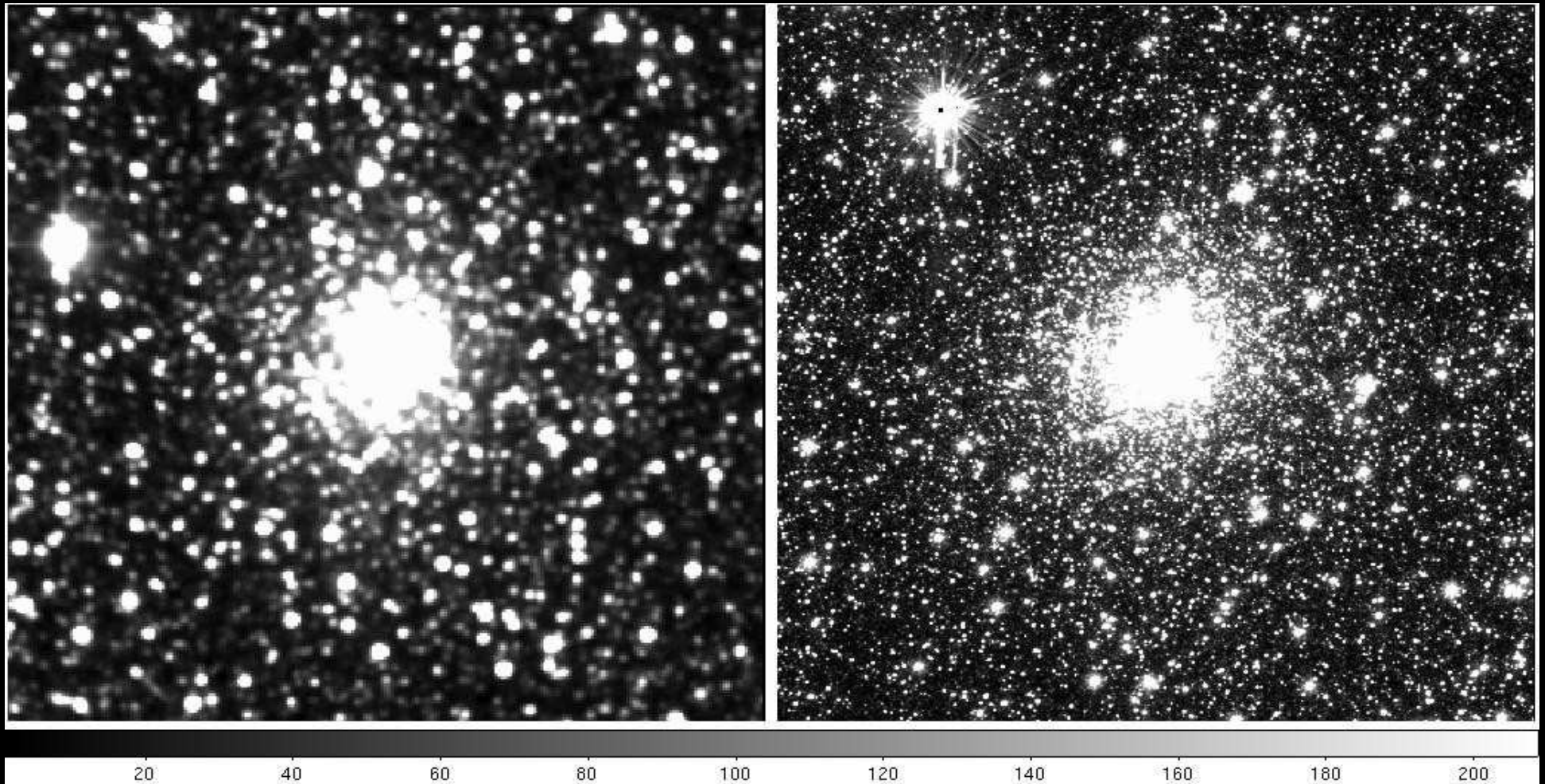
2MASS JHK 2000

Do it in the NIR – to see through!



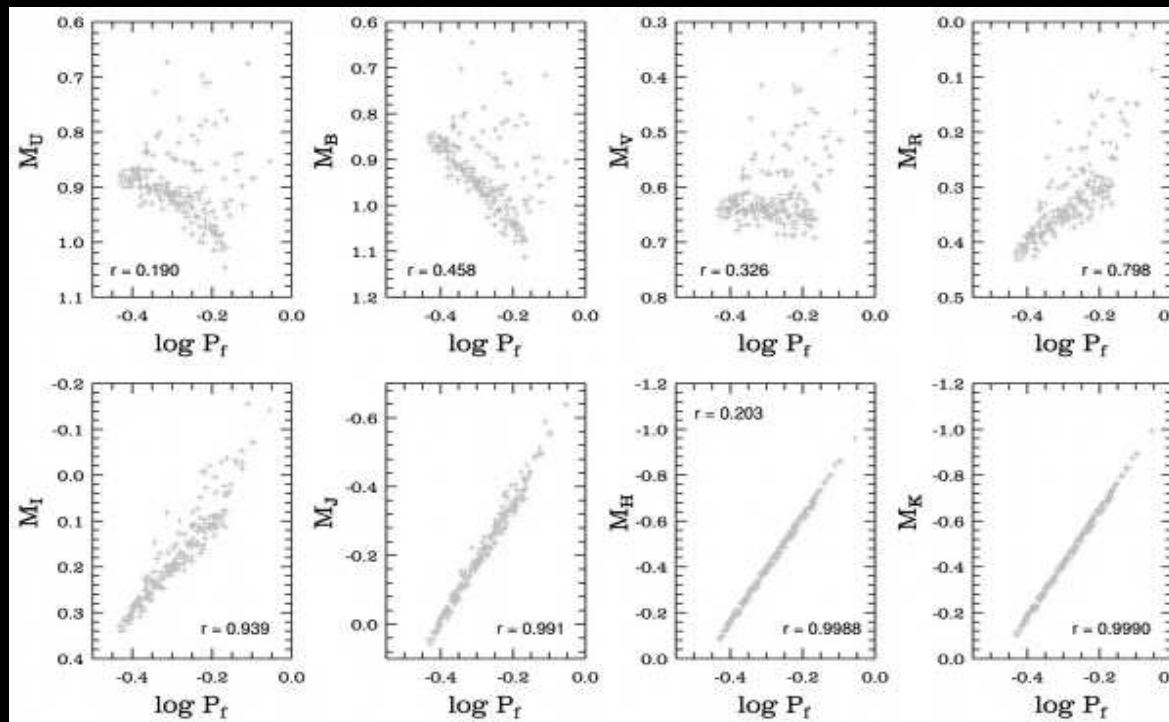
Globular Cluster UKS-1 on DSS2 Red and 2MASS J (5'x5')

Do it with the highest available
angular resolution!

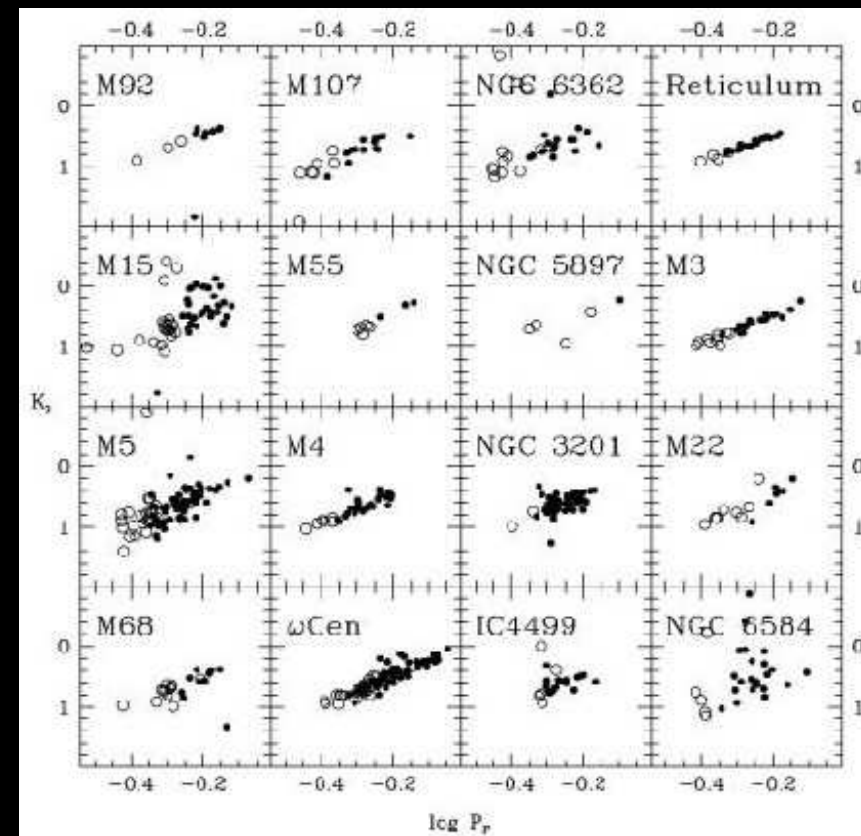


Globular Cluster UKS-1 on 2MASS Ks and VVV Ks (5'x5')

Obtain multiple epochs to do 3D
tomography with RR Lyr and
Cepheids! ==> *60-100 epochs*

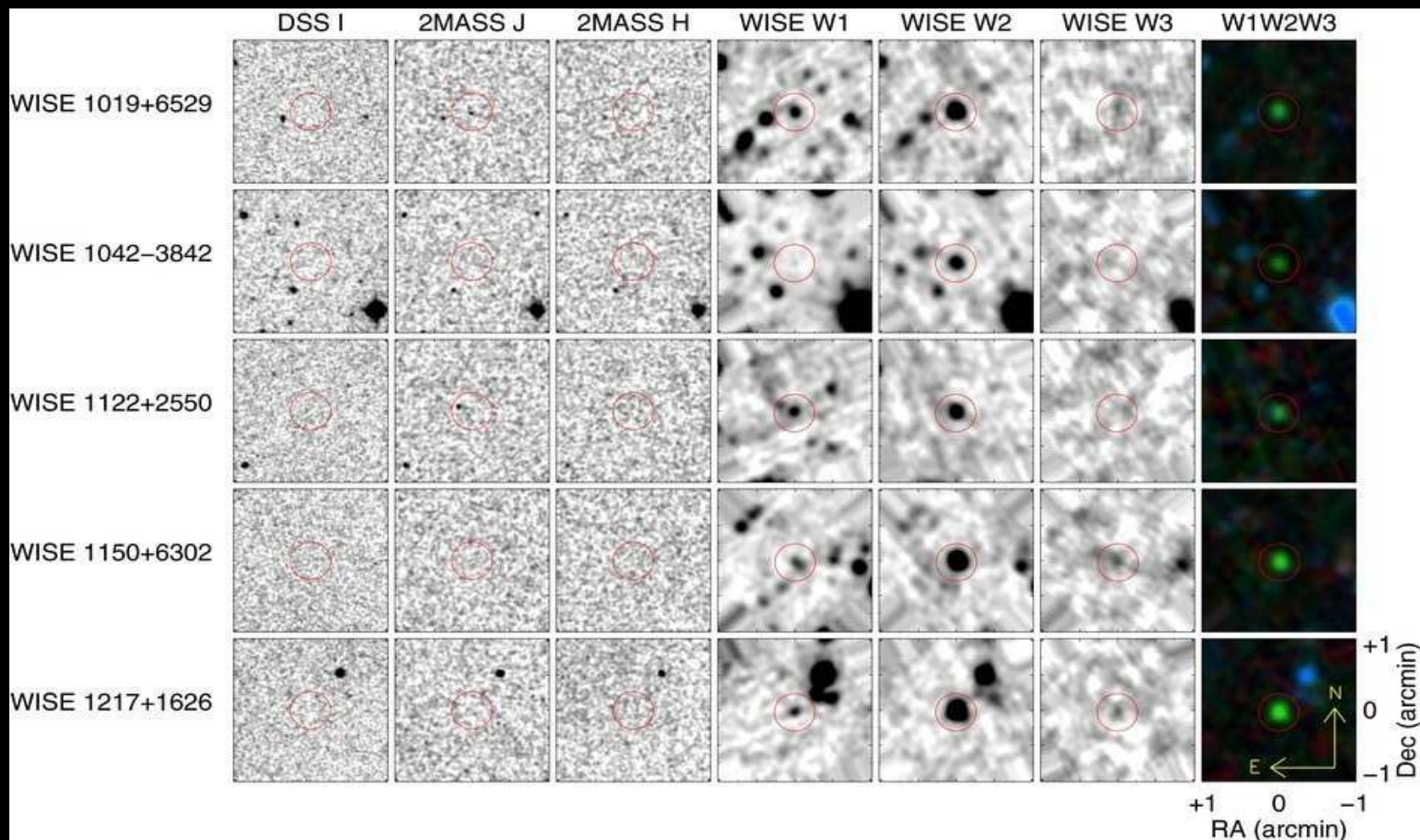


Catalan et al (2006)



Solima et al. (2006)

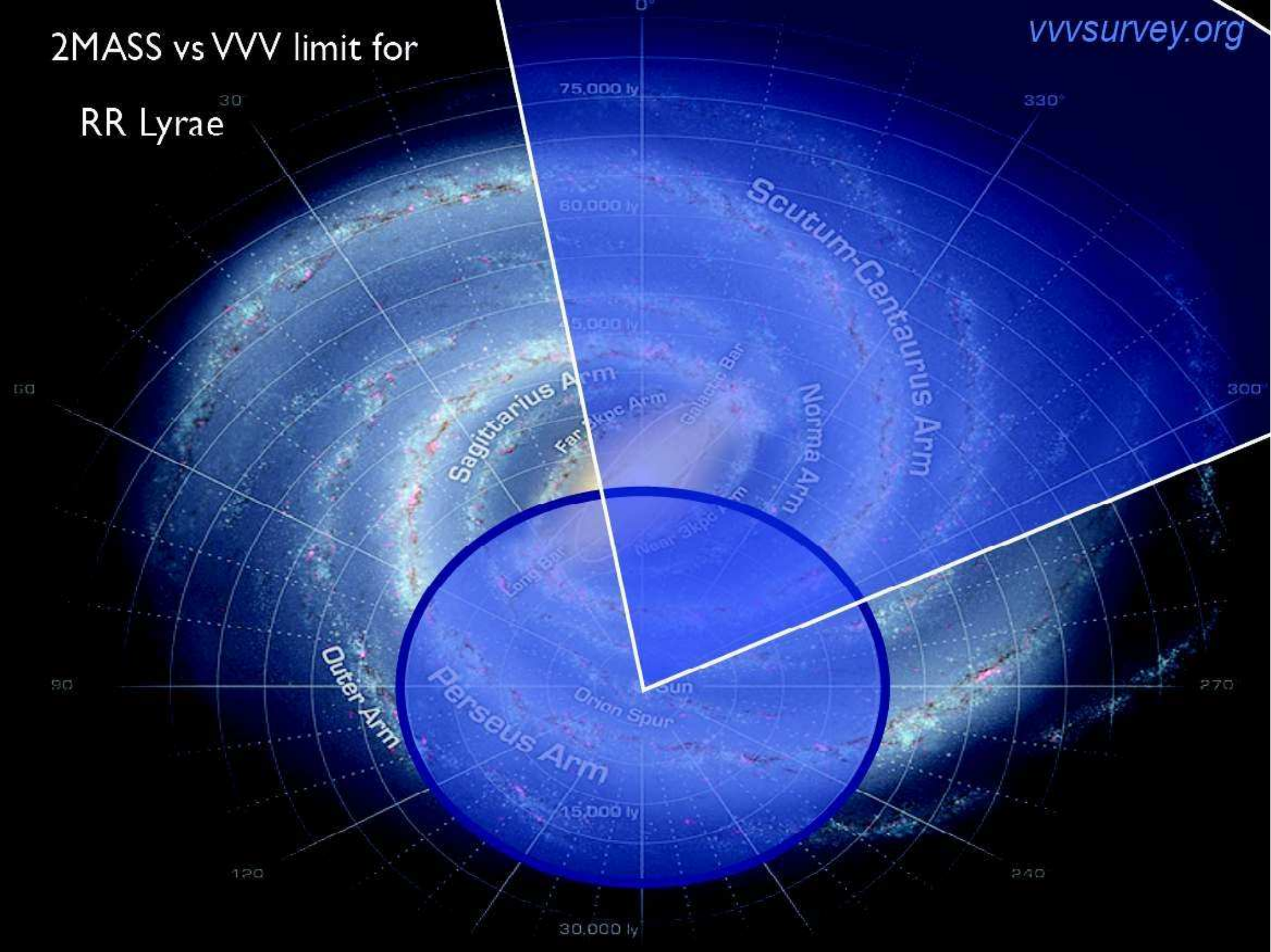
... And do it in multiple bands to
broaden the community interest in
your survey!



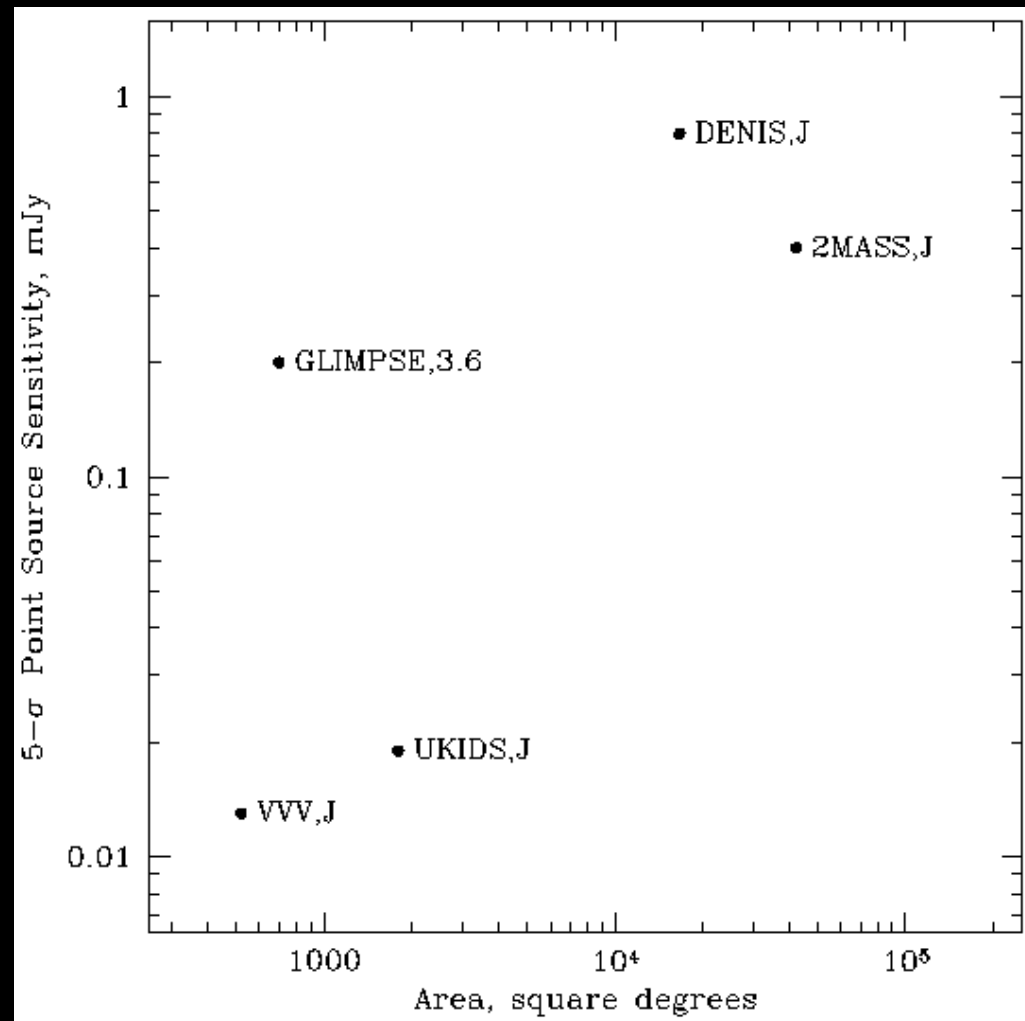
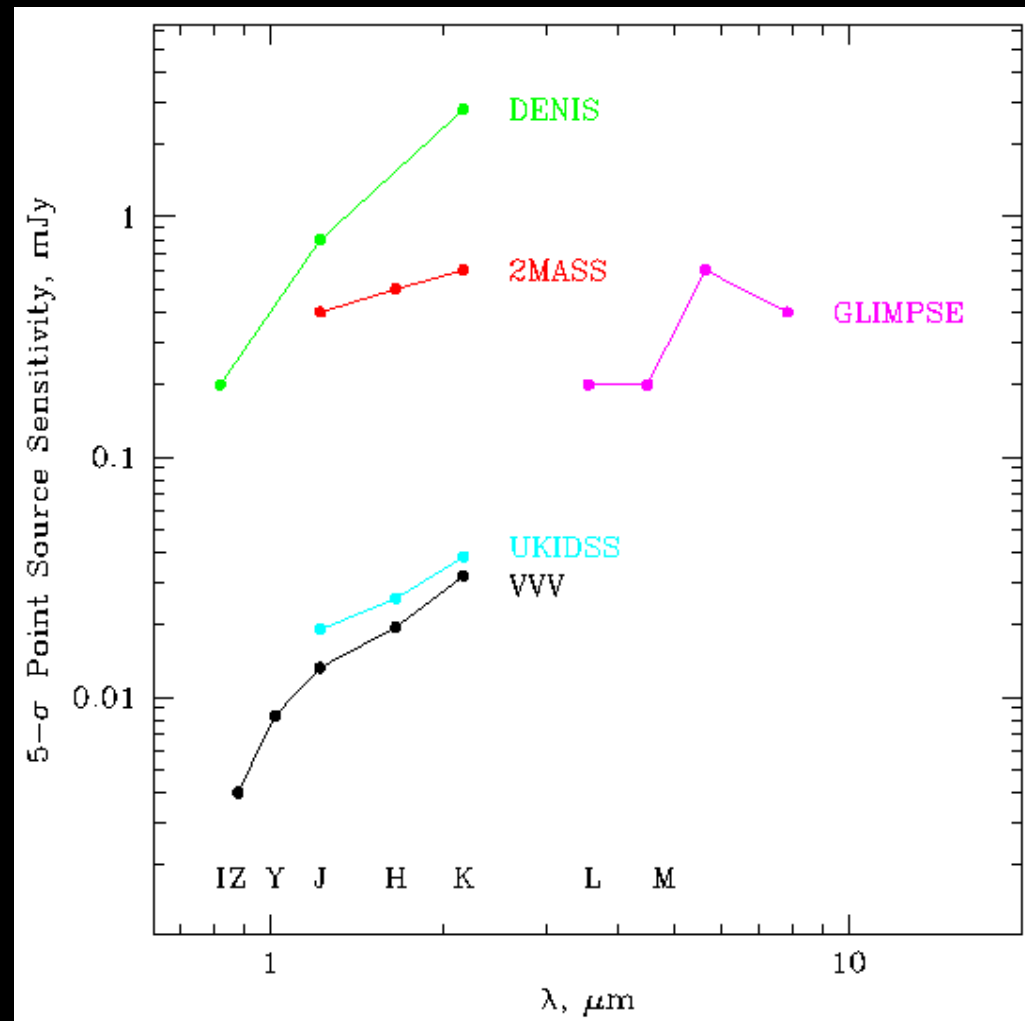
WISE selected brown dwarfs (Kirkpatrick et al. 2011)

2MASS vs VVV limit for RR Lyrae

vvvsurvey.org

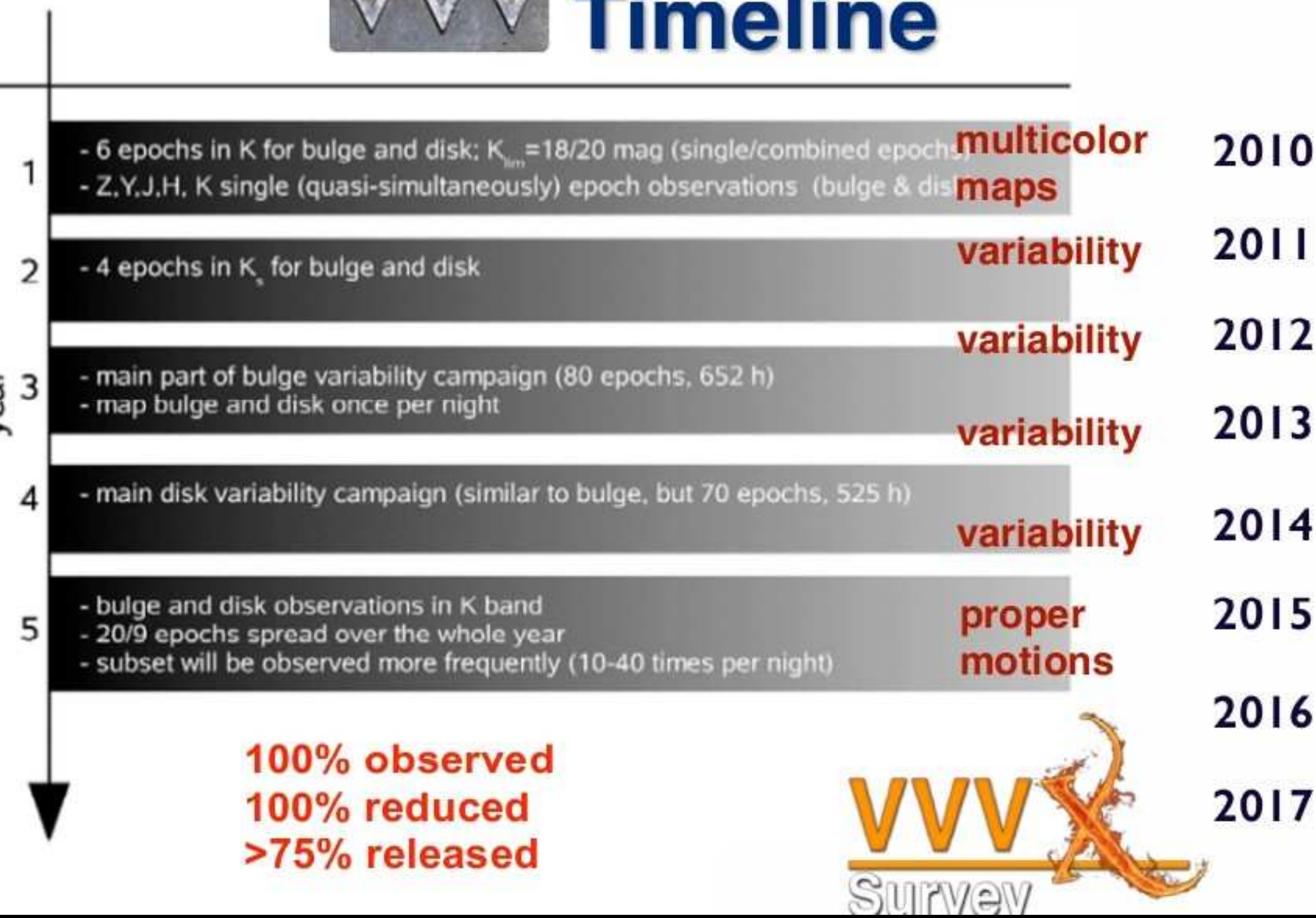


Wide Infrared Milky Way Surveys



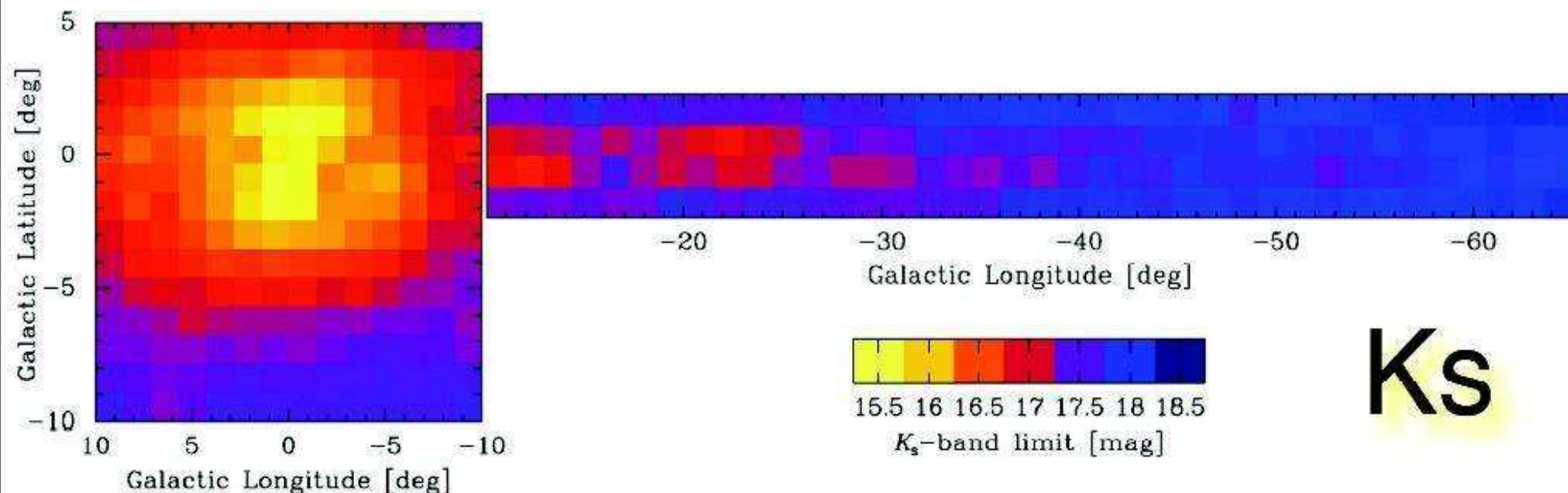


Timeline



VVV limiting magnitudes

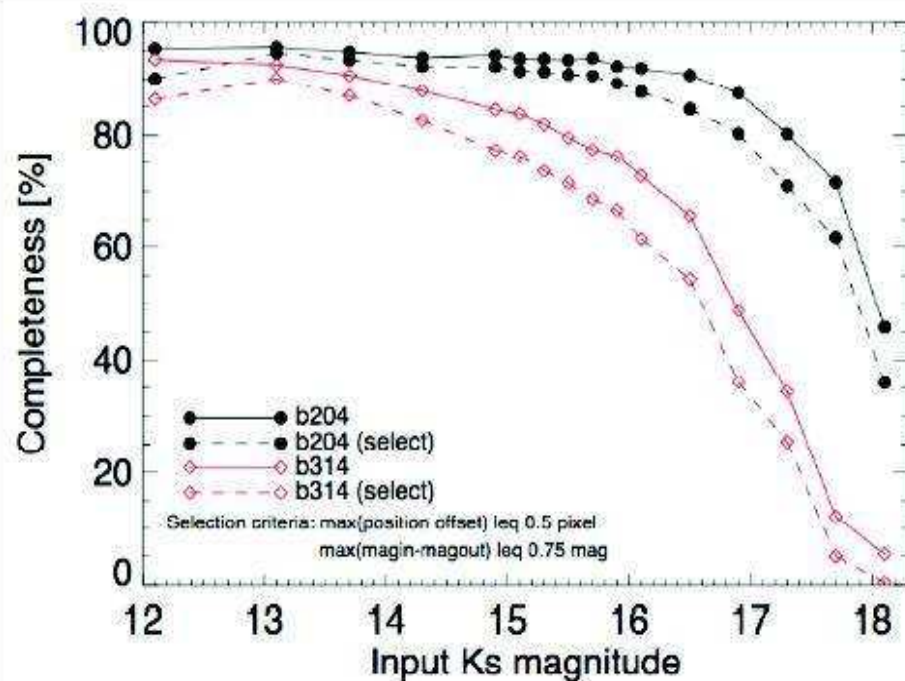
vvvsurvey.org



R. Saito

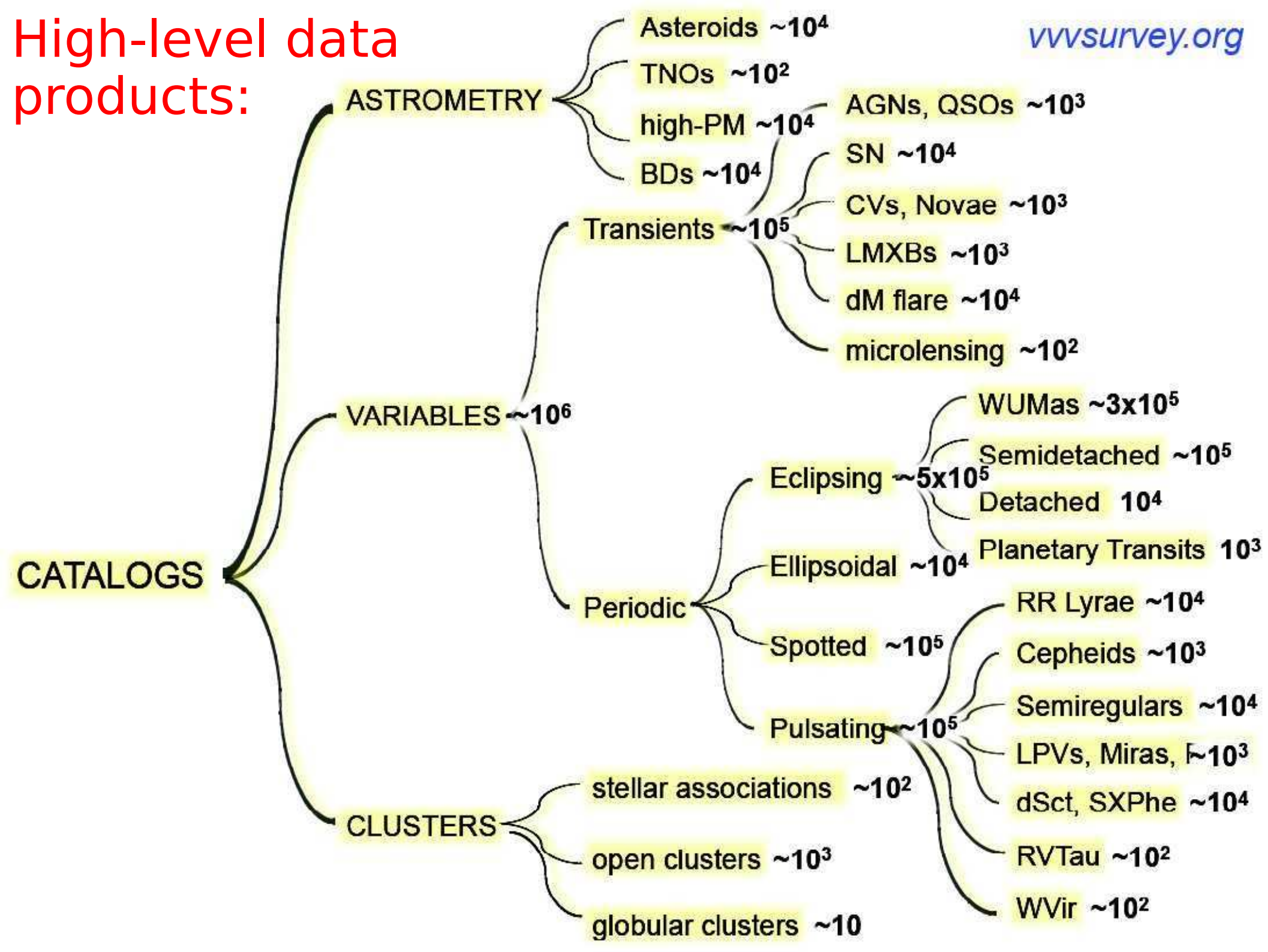
Completeness tests

M. Hempel



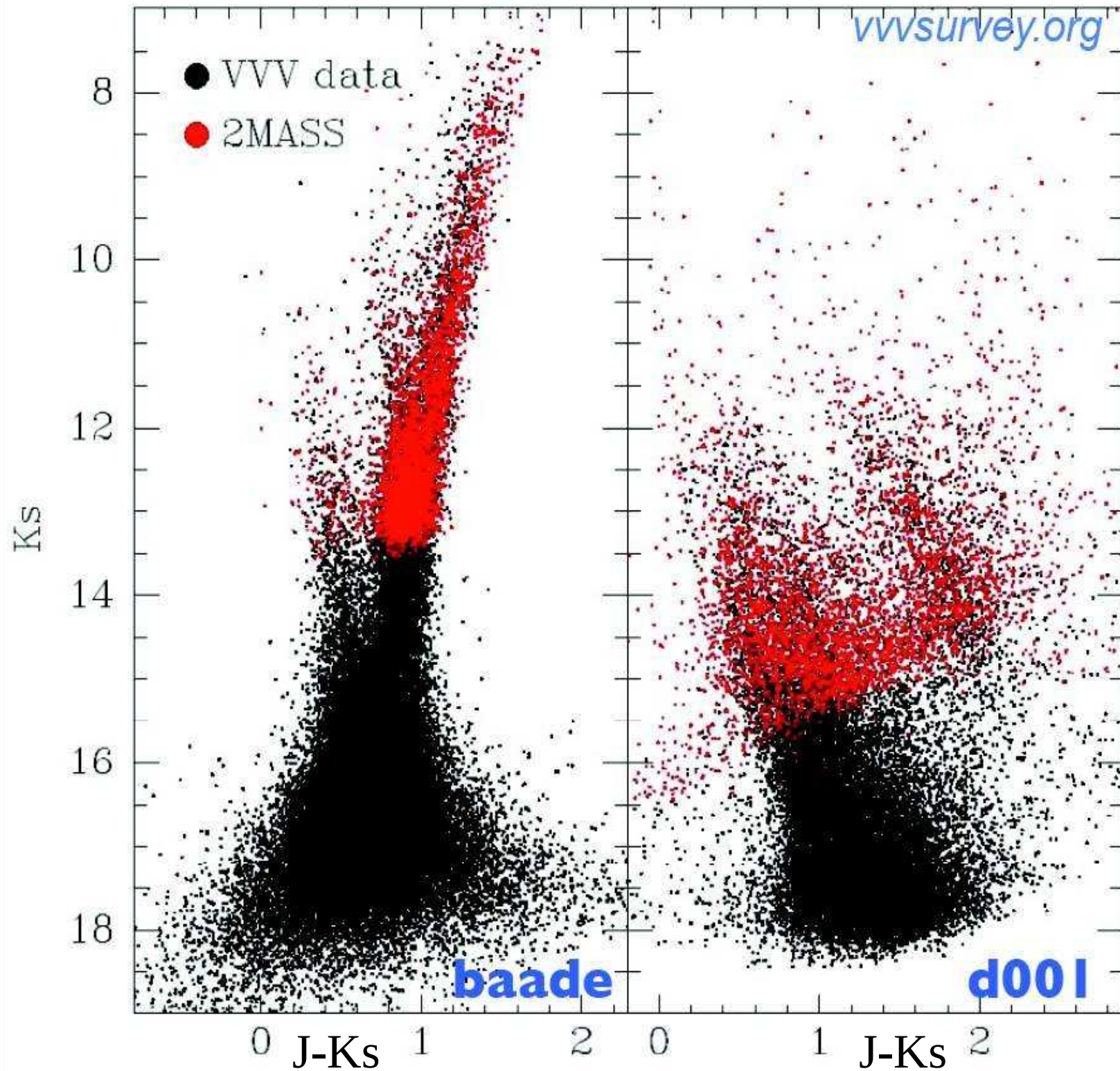
High-level data products:

vvsurvey.org



VVV CMDs

Color-magnitude
diagrams of bulge
and disk fields
compared with
2MASS.




Variability

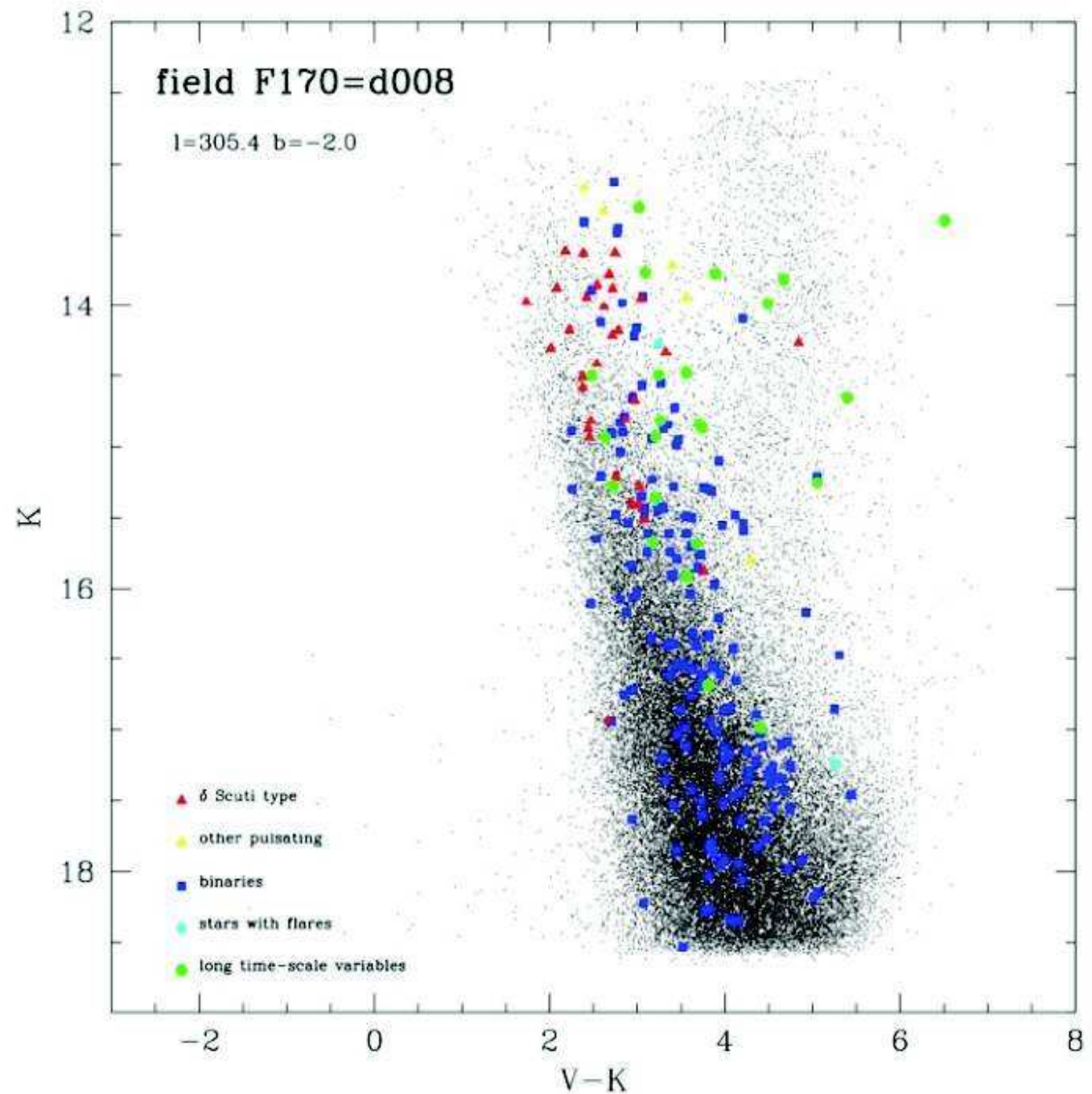
Combined VLT-optical and
VISTA-IR photometry

230 new variables from VLT/
VIMOS observations matched
to VVV IR photometry

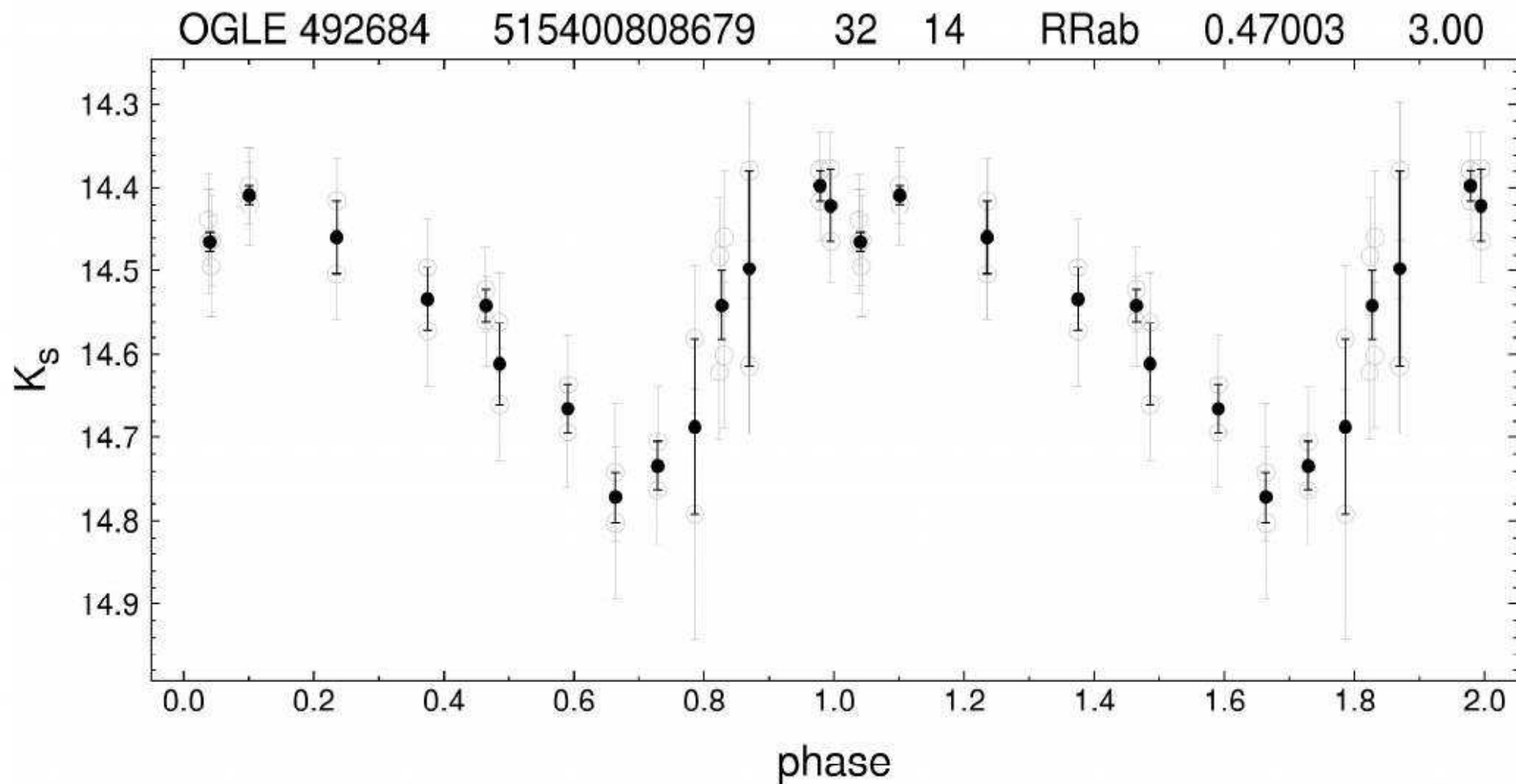
Many more than expected!

1/1000  few/1000

Total in VVV Survey
~1 million variables



A few RR Lyrae light curves



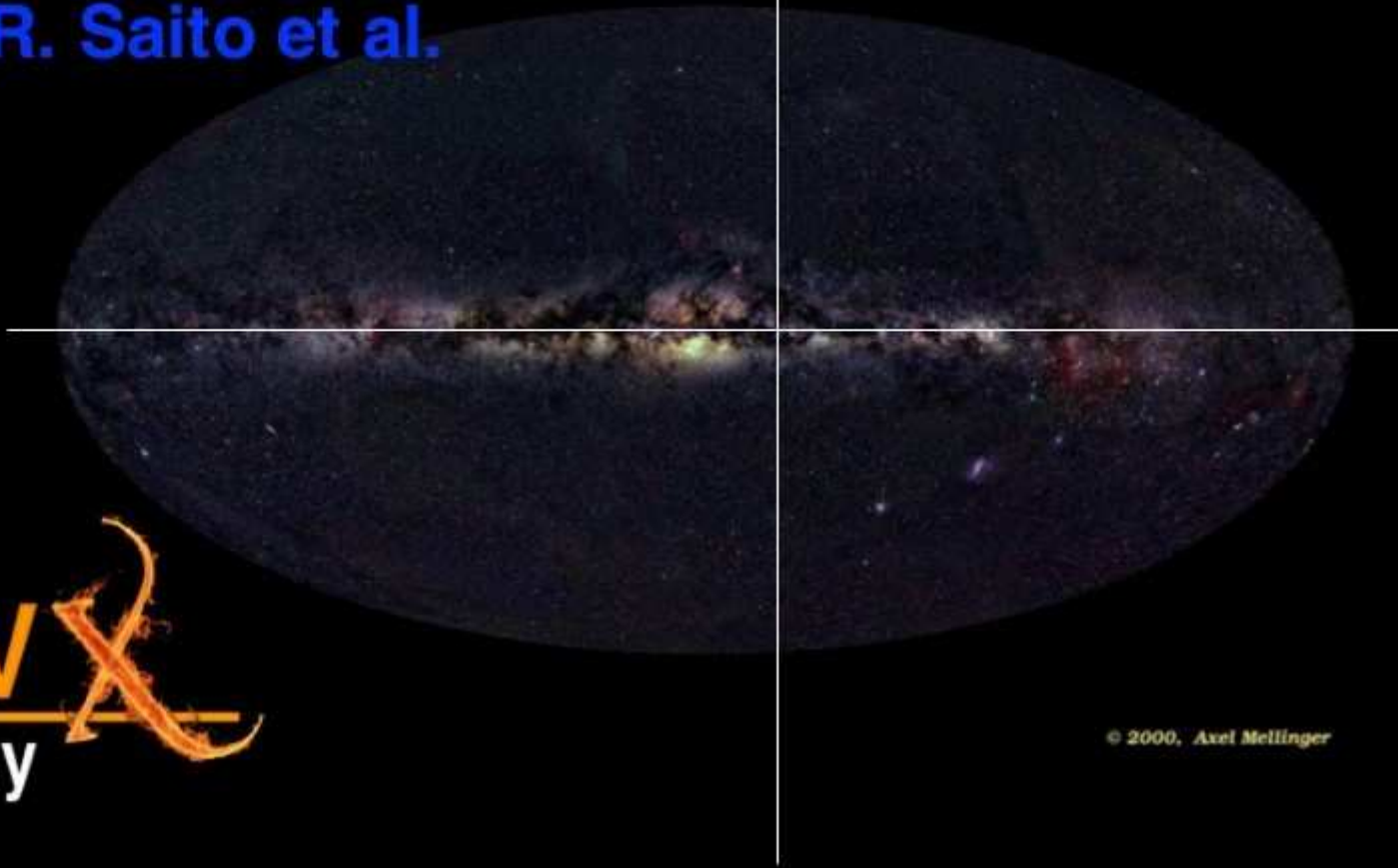
Extreme Variables

VVV-WIT06

with R. Saito et al.

The Deep Sky

VVV
Survey

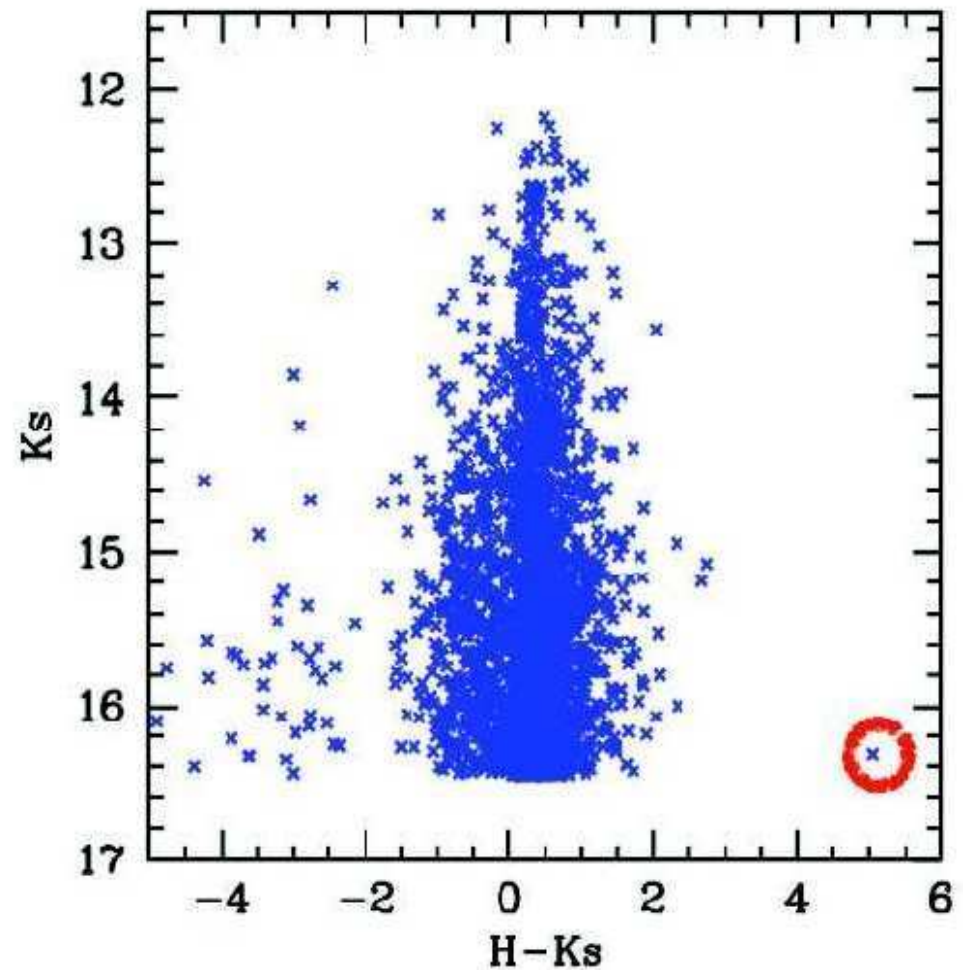
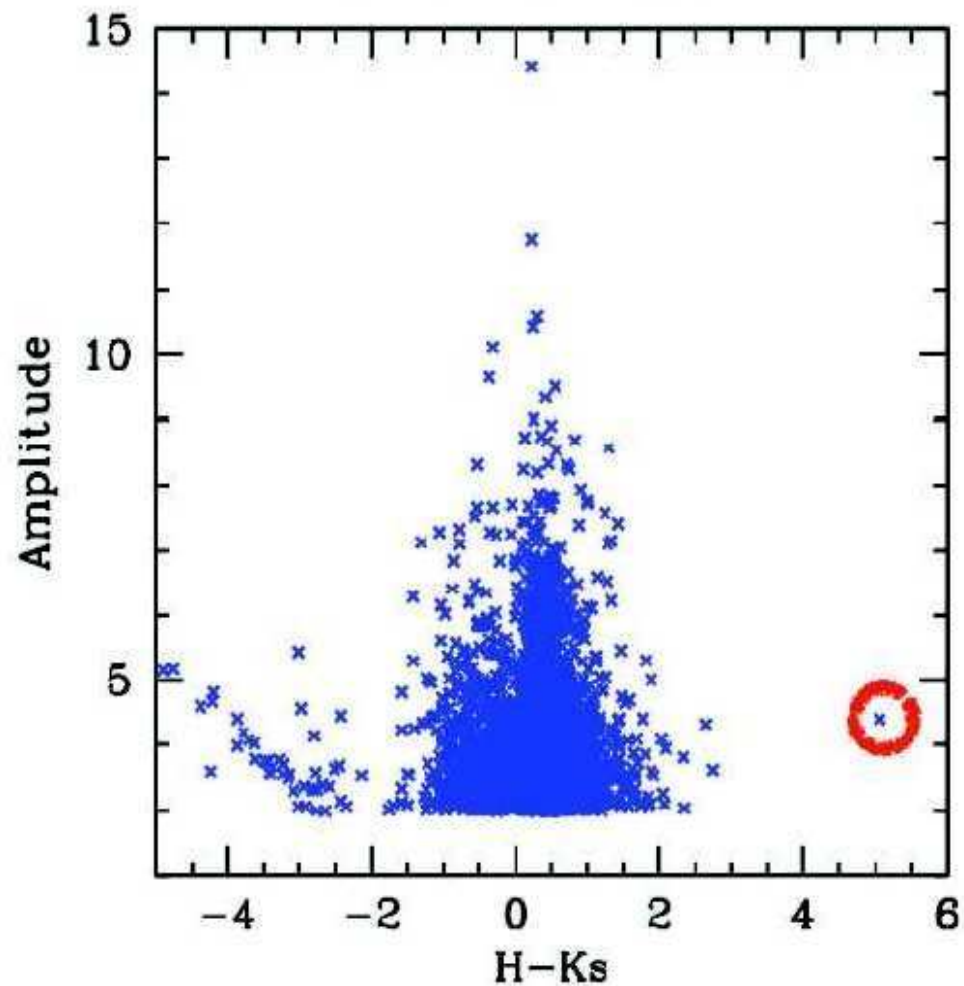


© 2000, Axel Mellinger

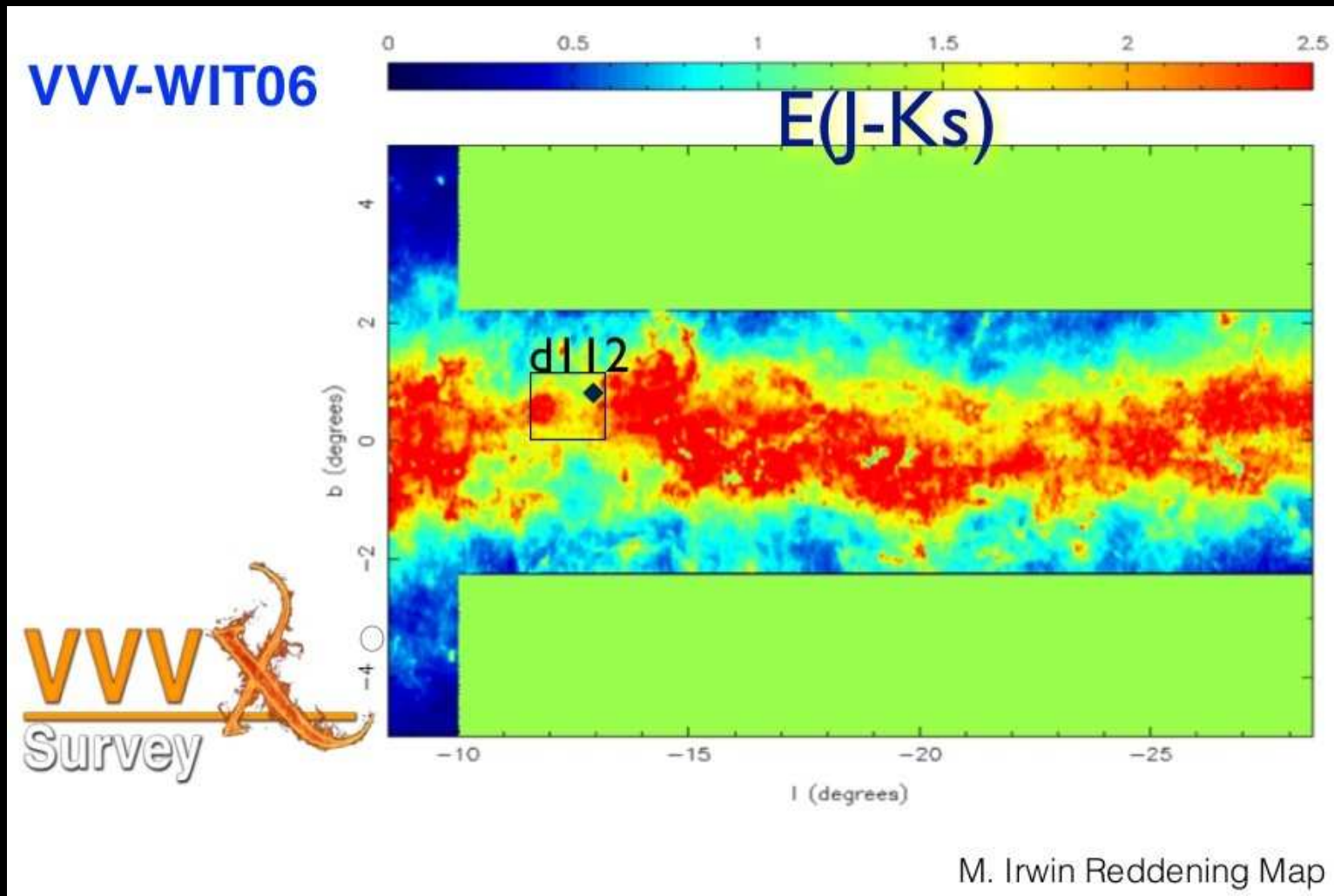
Minniti et al. (2017, ApJ, 849, L23)

Extreme Variables

- very rare ($< 10^{-6}$)
- different types: dN, RCB, FU Ori...

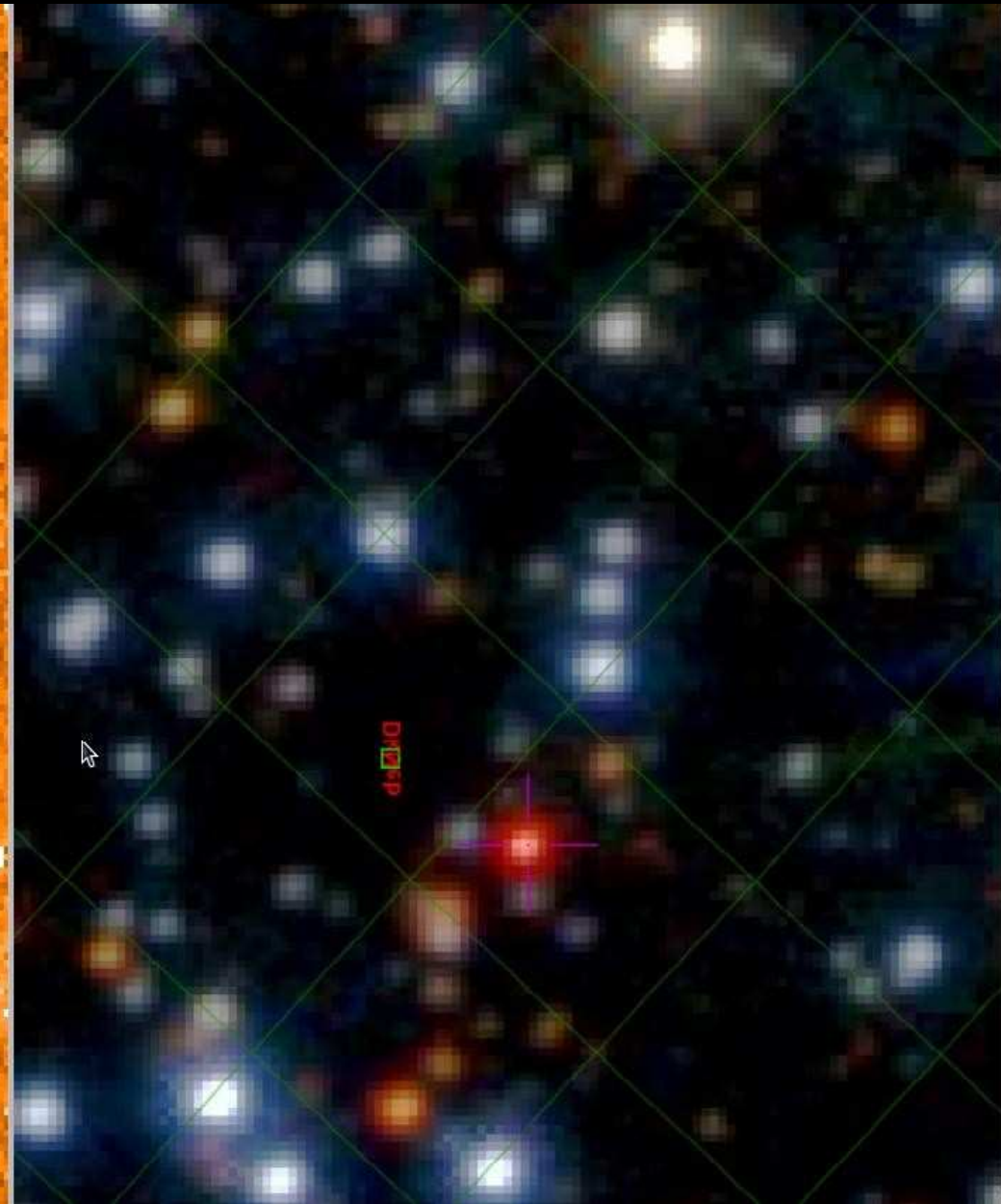
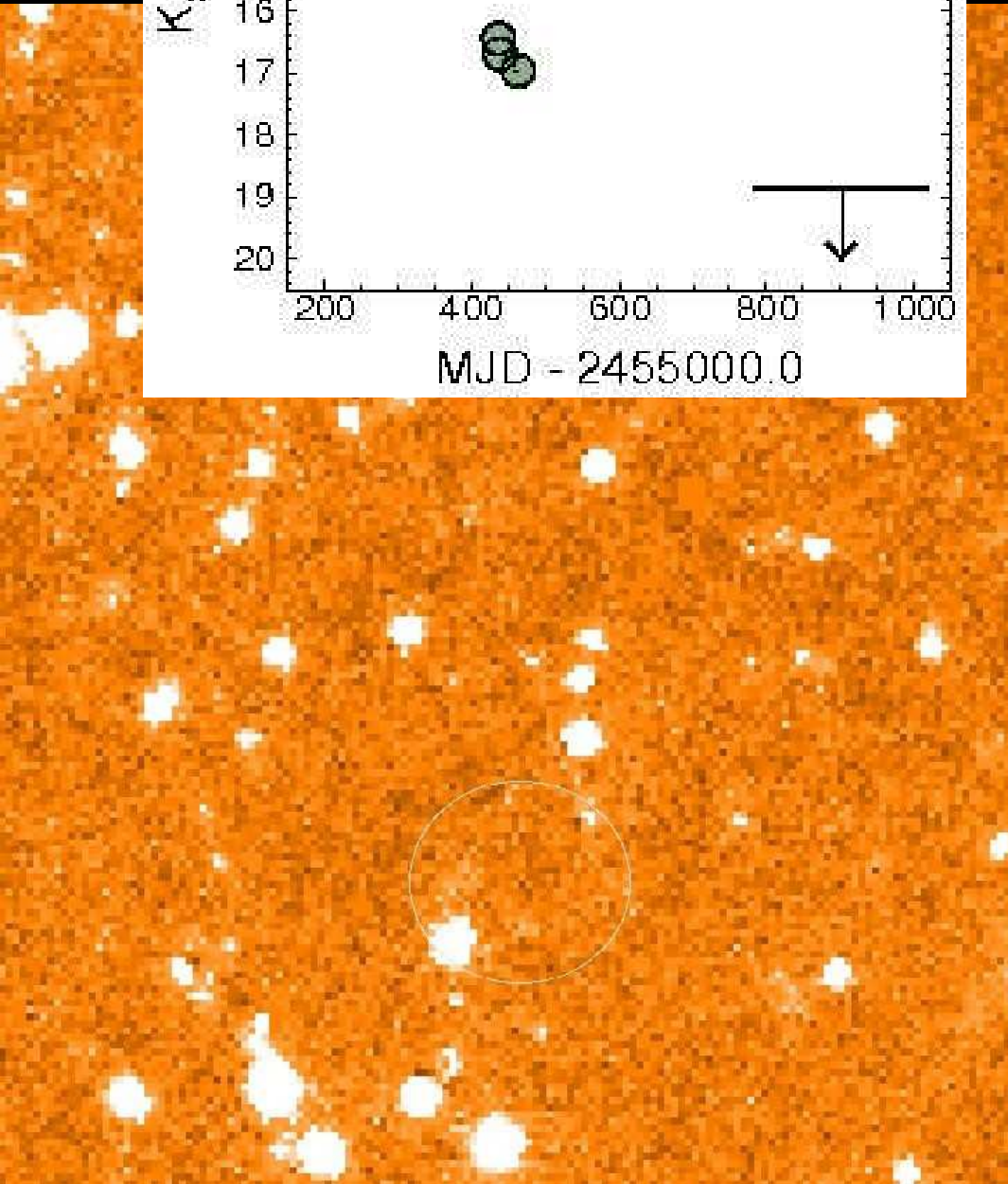
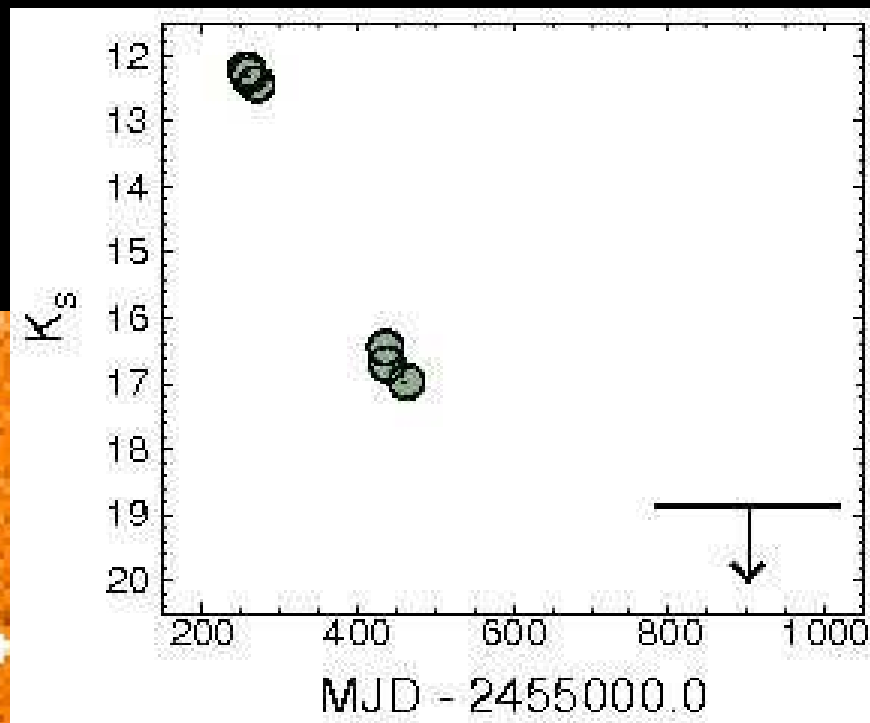


Extreme Variables

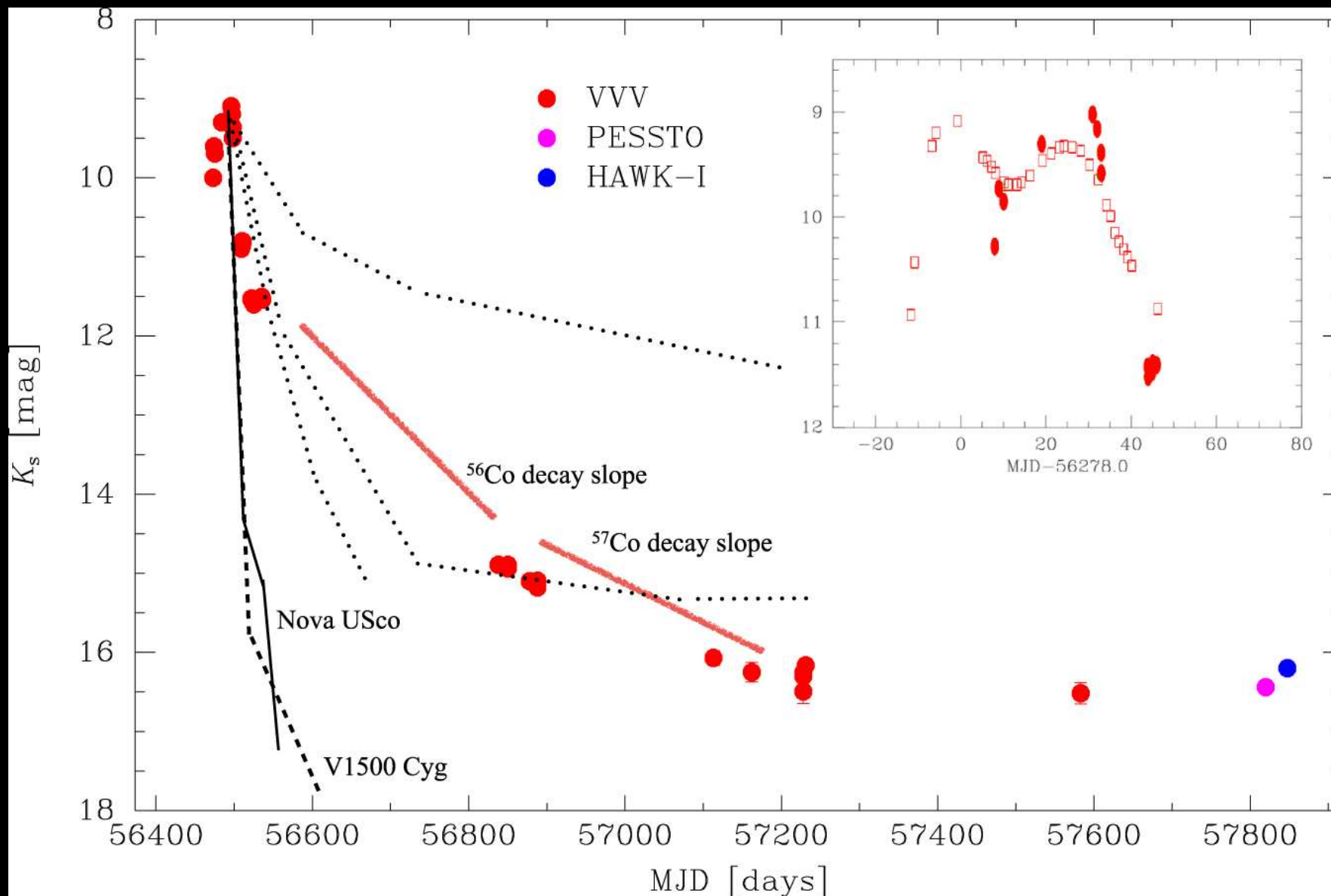


$l=347.14539$, $b=0.88522 \Rightarrow A_v = 10-15$ mag

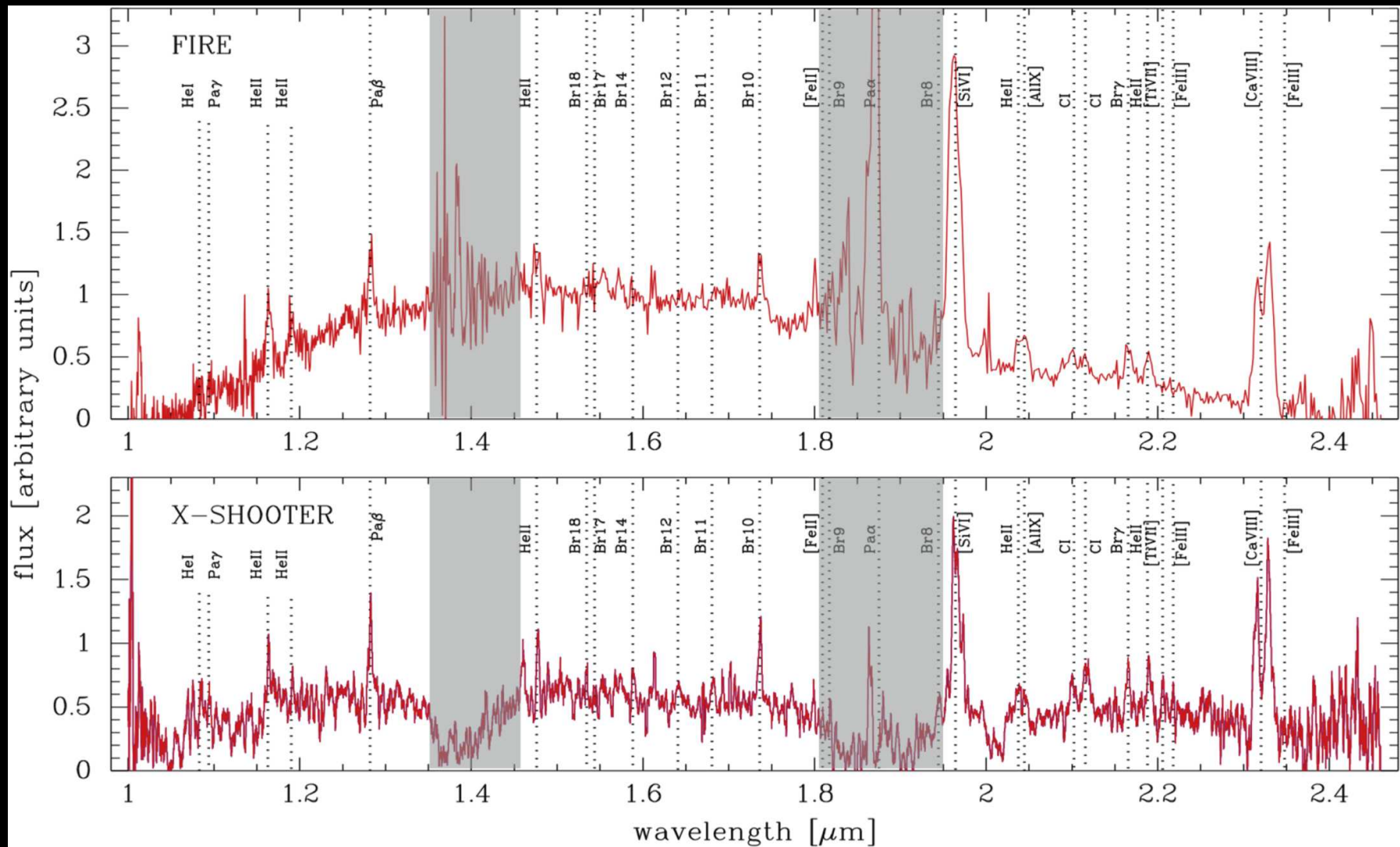
Extreme Variables



Extreme Variables



Extreme Variables



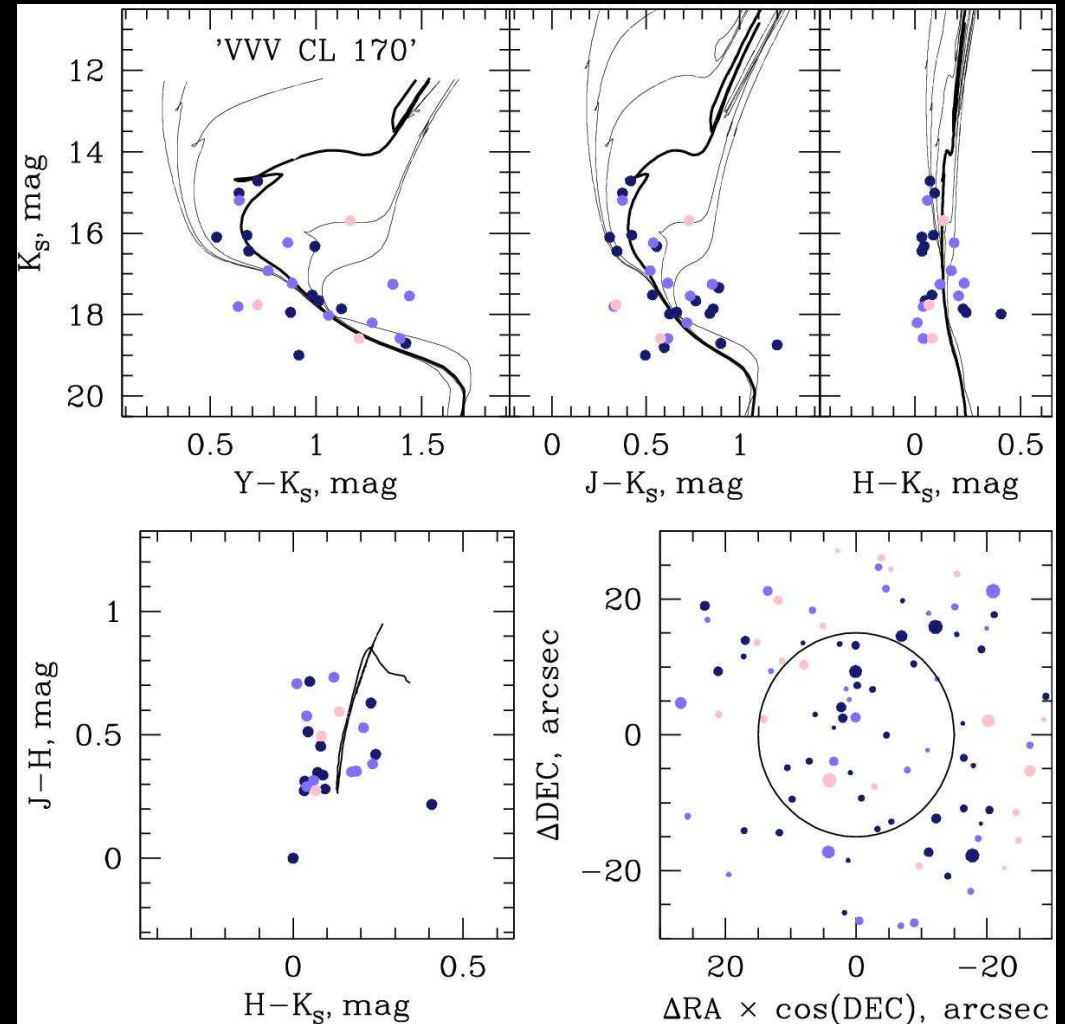
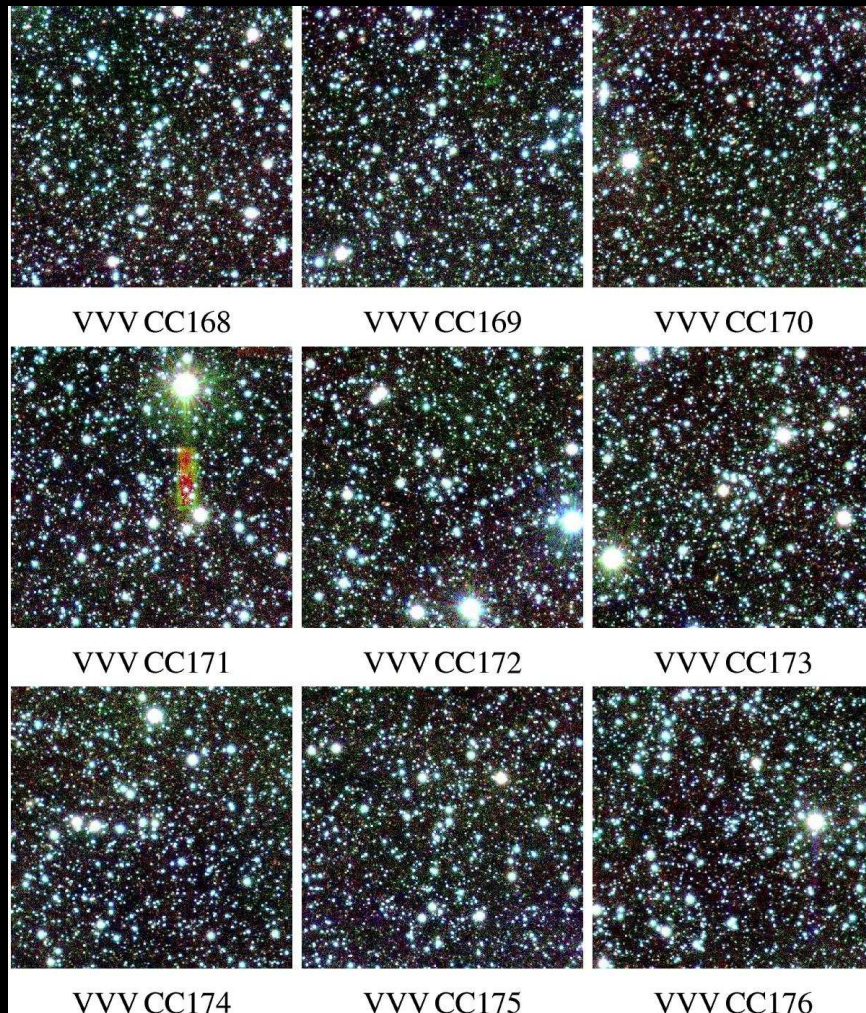
- broad emission lines (upward of 3000 km /s)

Extreme Variables

VVV-WIT06 may be:

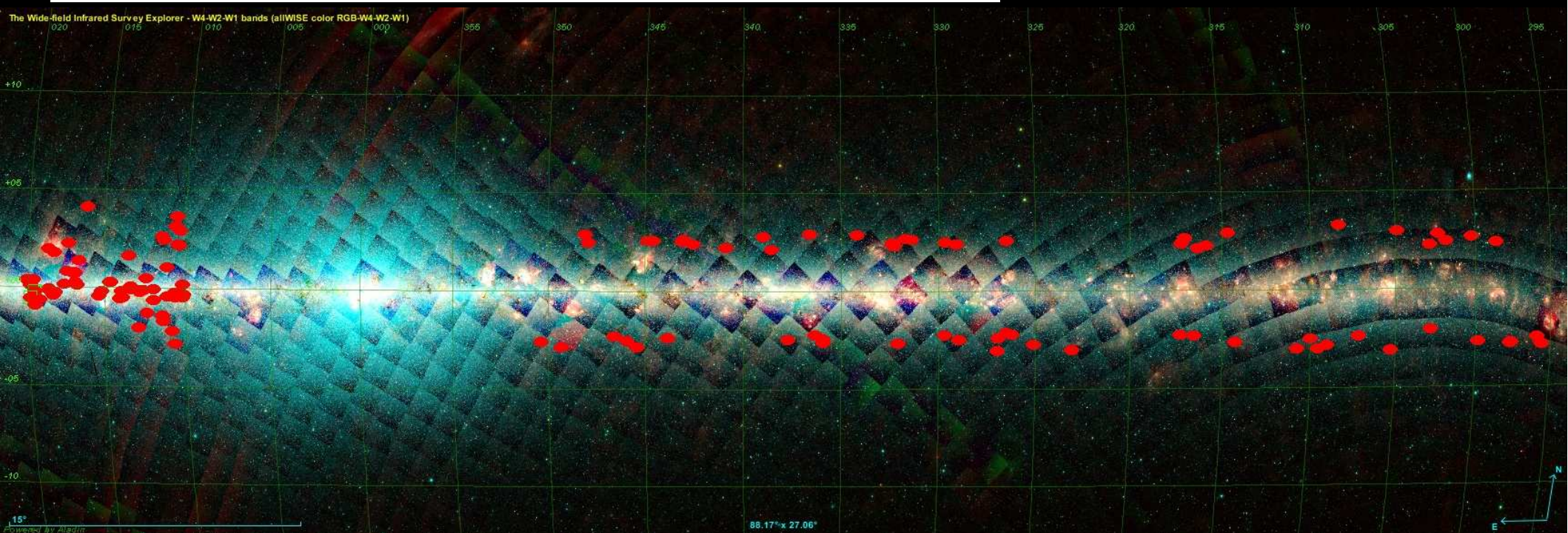
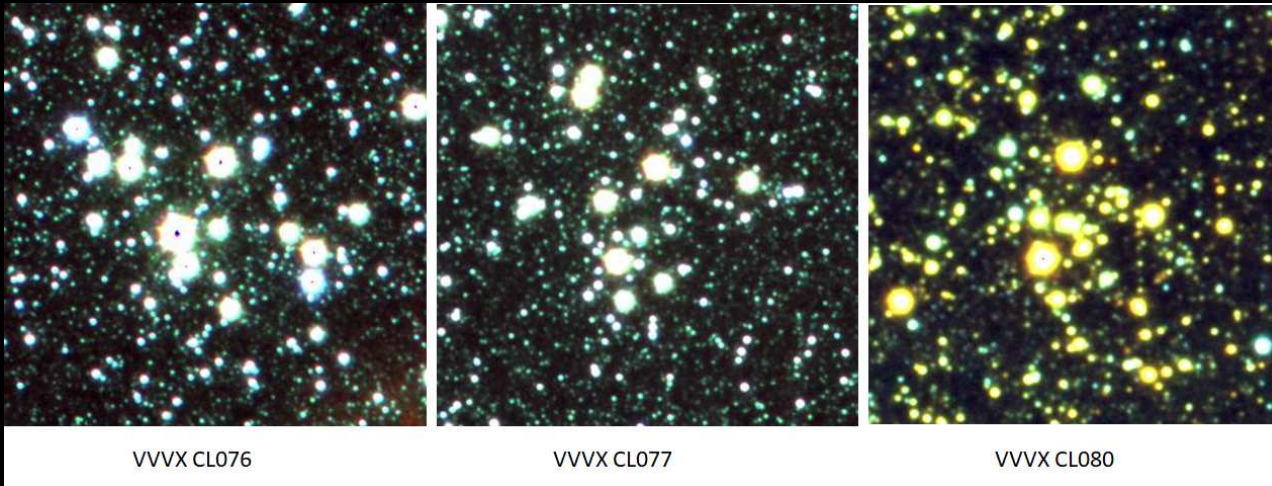
- (i) the closest Type I SN observed in about 400 years (0.7-2.2 Mpc),
- (ii) an exotic high-amplitude nova that would extend the known realm of such objects, or
- (iii) a stellar merger.

Obscured clusters



Borissova (2011, 2014, 2018), Minniti et al. (2011),
Chene et al. (2012) Ivanov et al. (2017)

Obscured clusters



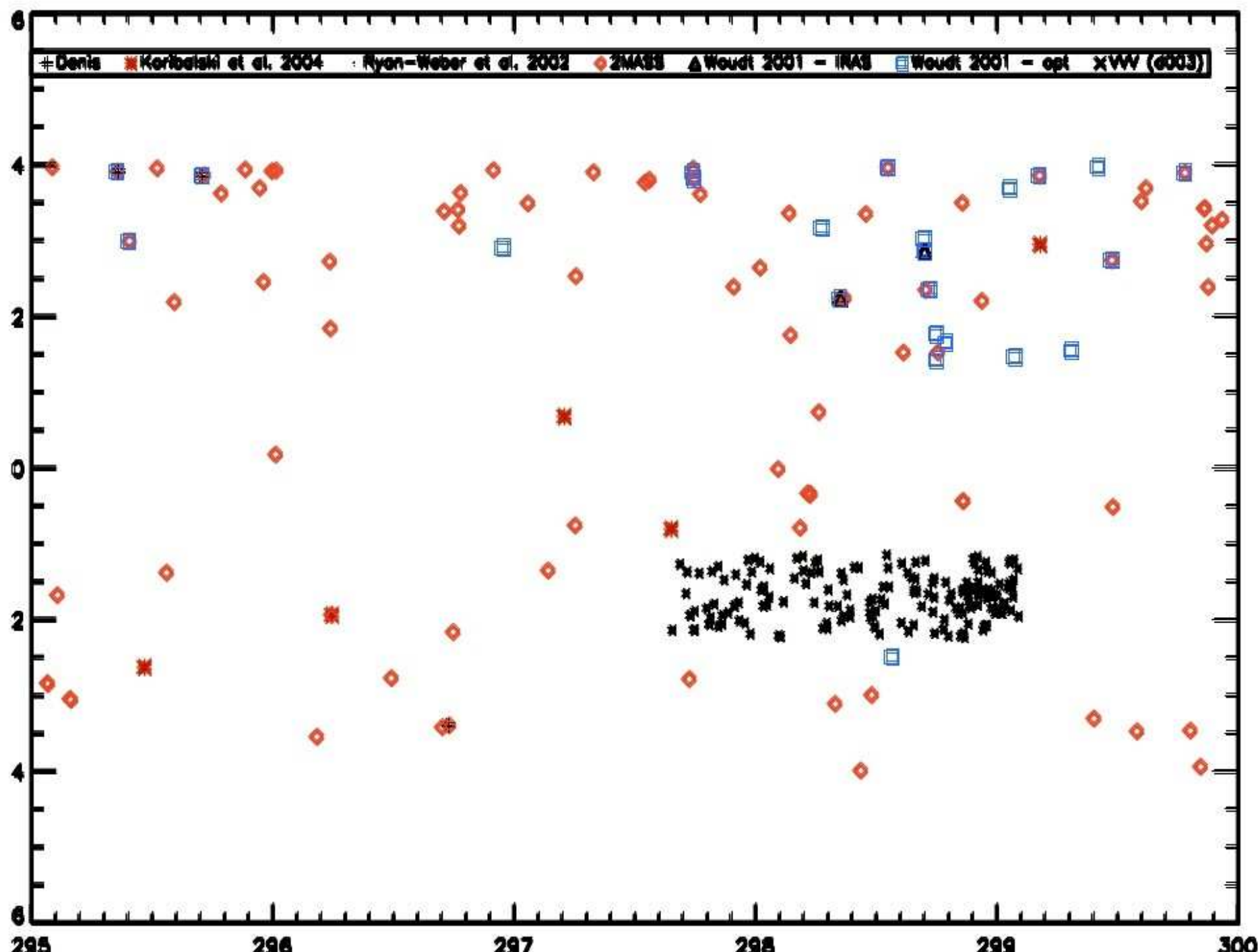
Borissova (2011, 2014, 2018), Minniti et al. (2011),
Chene et al. (2012) Ivanov et al. (2017)

~35,000 GALAXIES



Galaxies in Field d003

Eduardo de Amores





Background Galaxies



VVV field d003

Data Access (= Survey Success)

ESO Science Archive - Data Products - Mozilla Firefox

http://archive.eso.org/wdb/wdb/adp/phase3_vircam/form

ESO Data Products
VISTA Query Form

Other data products query forms

This form provides access to **reduced images** released by the [VISTA public survey projects](#) and integrated into the ESO [Science Archive Facility](#) since April 2011, through the [Phase 3 process](#).
To search for other ESO data products, please use the [Generic Data Products](#) and [Imaging Data Products](#) query forms.

Search ShowAll Default ShowNone Phase3 Data Releases Query Help Status of Requests

Observing programme

Programme: ☐ VVV ☐ VIDEO ☐ VMC ☐ VHS ☒ Collection: ☐ VVV ☐ VIDEO_XMM3 ☐ VMC ☐ VHS ☒ Release version: default: latest

Run/Program ID: PPP.C-NNNN(R) (eg 080.A-0156) ☐ Phase3 user:

Target Information

Target name: SIMBAD name:

Coordinate System: RA: DEC: RA: sexagesimal/hours, decimal/degrees

Search Box: Equatorial Output Format: Sexagesimal

Input Target List: Browse... File contains Object Names

TL RA: Tile RA [deg] ☐ TL DEC: Tile Dec [deg]

TL OFFAN: Tile rotator offset angle [deg]

EPS REG: ESO public survey region name

Observation Parameters

OBSTECH: IMAGEJITTER Filter:

DATE OBS: UT in YYYY-MM-DD HH:MM:SS format

MJD OBS: Modified Julian Date

EXPTIME: Total integration time per pixel [sec]

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ESO - Data Releases - Mozilla Firefox

http://www.eso.org/sci/observing/phase3/data_releases.htm

50 YEARS 1962-2012 European Southern Observatory

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Phase 3 Data Releases

Overview

Data Release	Release Date
VISTA Variables in the Via Lactea Survey (VVV) - Data Release 1	25.07.2011
VISTA Deep Extragalactic Observations Survey (VIDEO) - Data Release 1	25.07.2011
VISTA Magellanic Survey (VMC) - Data Release 1	25.09.2011
VISTA Hemisphere Survey (VHS) - Data Release 1	17.10.2011
Ultra-VISTA: an Ultra Deep Survey with VISTA - Data Release 1	15.02.2012

Last Update: 15.02.12 © ESO

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ESO - VVV Survey Data Release 1 - Mozilla Firefox

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http://www.eso.org/sci/observing/phase3/data_releases/vvv_dr1.html

Science Users Information > Observing with ESO Telescopes > Phase 3 > Data Releases > VVV Survey Data Release 1

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Phase 3
Process Overview
Phase 3 Policies
Release Manager
Release Validator
Phase 3 FTP Upload
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Observing Tools and Services
Visiting Astronomers
Phase 2 Preparation
Science Software
Data Handling and Products
Science Archive Facility
Science Activities
Scientific Meetings
IT Services
ESO Libraries
Publications
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VISTA Variables in the Via Lactea Survey Data Release 1

Provided by: D. Minniti, P. Lucas, and the VVV team

Release Date: 25.07.2011

Summary

The VVV Survey data delivered in this ESO Data Release 1 (DR1) includes the VISTA paw-print and tile images that were acquired until September 30, 2010, and processed by the Cambridge Astronomical Survey Unit (CASU). These CASU v1.1 data files were successfully submitted to the ESO Archive through the Phase 3 system before April 30, 2011.

The Phase 3 release contains observations up to 30 September 2010 with all the approved data from CASU v1.1 pipeline reduction, including images and merged source catalogs. The list for this first Phase 3 DR1 has ~2800 tile images. If we count these plus associated confidence maps and catalogues they are approximately 1.6TB of data.

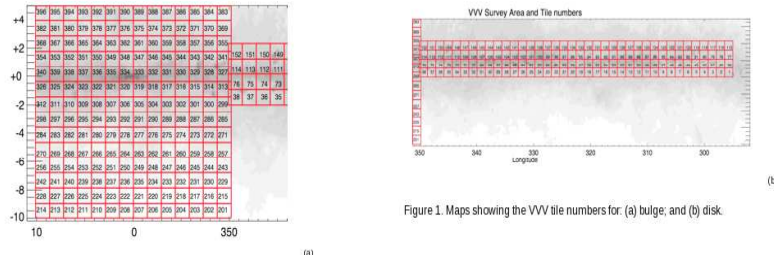


Figure 1. Maps showing the VVV tile numbers for: (a) bulge; and (b) disk.

VVV Tiles

The VVV photometry is divided into different disk and bulge tiles. The tile nomenclature goes from d001 to d152 in the disk, and from b201 to b396 in the bulge. The map with the field IDs is shown in Figures 1a and 1b, overlapped on the extinction map of the inner Milky Way from Schlegel et al. 1997.

The VVV Survey Year 1 data completion is illustrated in Figures 2-4. The files for this VVV Survey DR1 include images and their respective photometric catalogues that have passed the Quality Control (QC). QC is not all the fields shown in Figures 2-4 are being included in DR1, only higher quality data. For the Phase 3 DR1 of Year 1 we defined the list of data files that pass all the quality and calibration checks in order to be released, and at the same time defined a list of deprecated images, or re-reduced/re-calibrated some acceptable files. The final list of tiles available can be found in the attached document vvv_dr1_list.pdf.

Bulge:

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http://www.eso.org/sci/observing/phase3/data_releases/vvv_dr1.html

Science Users Information > Observing with ESO Telescopes > Phase 3 > Data Releases > VVV Survey Data Release 1

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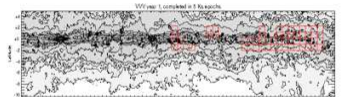


Fig. 4. VVV Survey observations completed in 5 Ks epochs until Oct 26th, 2010. These Ks observations of the first year were intended to test the variability search techniques, and to provide a long term baseline for stellar variability (e.g. microlensing, long term variable sources), as well as for proper motions. We decided to give them lower priority than the multi-color maps, and it is evident that the total coverage is rather poor due to the time lost to telescope intervention and weather.

There are still observations pending from YEAR 1, as shown below in the maps of ZY filter observations and 5 Ks filter observations (credit M. Hempel). These show completed tiles, but there are still pending observations. In addition to the two YZ and Ks variability maps, the map of JHKs is mostly completed, but with 20 tiles still queued for observations. The total completion is 52% in terms of OBs, and 69% in terms of time for the first year observations.

The adopted naming convention for the 3 types of files of this release is the following:

File type	File name pattern
Tile images	*_st_tl.fits.gz
Associated weight map	*_st_tl_conf.fits.gz
Source lists per tile	*_st_tl_cat.fits

Also, the OBJECT keyword identifies the VVV tile ID, as shown in Figures 1a and b.

Quality Control

The data processing pipeline at CASU released in May 2010 the version 0.8, which was very reasonable, and in September 2010 the version 1.0, which was very good, and can be publication quality after proper checks are made. The DR1 is based on the new CASU version v1.1, and the team has worked on the quality control using the v1.1 data, as detailed below. However, the v1.0 and v1.1 tiles are identical as far as the FITS image extensions are concerned. The differences are only in the image headers and the catalogues.

Visual Quality Control was performed in different steps. Initially this was done using the JPEG images of the individual pawprints supplied by CASU before August 2010. The JPEG images are not ideal because they look too small when displaying whole tiles (or too big when zoomed in). Then, visual Quality control of VVV tiles was made on a fraction of the FITS images supplied by CASU version 1.0. Finally, there was inspection of the v1.1 tiles supplied by CASU. A word of caution: this intense activity is continuing, and even though we checked the images for gross defects, we are still identifying images that need to be reprocessed or reacquired.

The Quality Control for the Phase 3 data from v1.1 was performed on the paw-prints with involvement of most of the scientists from the team. We checked image defects, telescope problems, seeing, zero points, magnitude limits, ellipticities, airmass, etc. There are a number of well known image defects intrinsic to VISTA, many of which are illustrated with pictures in the CASU and VVV web pages (see also [vvv_defects.pdf](#)).

Algorithmic quality control cuts to remove images with low zero points (after correcting for the seasonal trend), seeing that was significantly outside specification, or high average ellipticity were also applied. These were based on the v1.0 reduction, but no significant changes are expected in the v1.1 data.

VVV Calibrations

First we explain how to calculate source magnitudes from the fluxes in the catalogues and the zero points and other keywords in the catalogue headers. The main equation is

$$\text{calMag} = \text{instMag} + ZP + \text{atmCor} + \text{tepxCor} - \text{apcor}$$

where the terms on the right hand side are defined below, and there is a choice of many apertures for *instMag* and *apcor*. *apcor1* is a 1 arcsec diameter and consecutive apertures increase in diameter by a factor of $\sqrt{2}$, so that *apcor3* is a 2 arcsec diameter aperture, and we take *tepxCor* from the DIT keyword.

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Data Access (= Survey Success)

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http://horus.roe.ac.uk/vsa/

ES0 Astro Personal

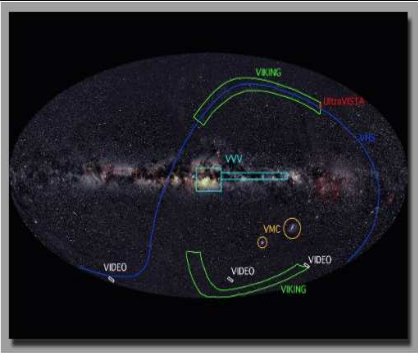
Cambridge A... CASU: Vista... Data Process... VISTA Data Pr... Data Access... VISTA SCIENCE... ESO - Data R... ESO Science...

Home | Overview | Browser | Access | Login | Cookbook **VSA**

VSA - VISTA Science Archive

The VISTA Science Archive (VSA) holds the image and catalogue data products generated by VIRCAM on the Visible and Infrared Survey Telescope for Astronomy (VISTA). The primary contents of the archive originate from the VISTA Public Surveys. Survey science-ready catalogue data will be released in phases, while standard flat-file data products (both images and derived single passband catalogues) become available continually after routine observation and processing operations. Information on the various archive releases can be found on the [surveys page](#).

The history of archive releases, updates and bug fixes is recorded under the [release history](#) page. Users wishing to receive email announcements of such entries should subscribe to the VSA_Announcelist (contact vsa-support@roe.ac.uk).



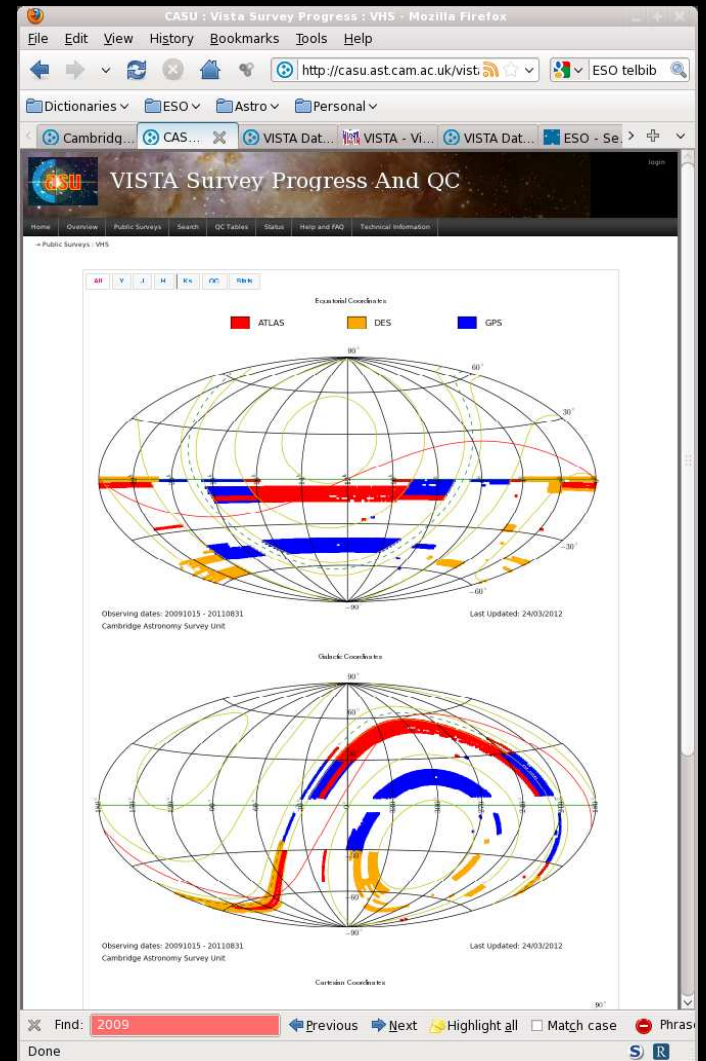
Picture: Sky coverage of VISTA surveys, overlaid on a 2MASS image of the whole sky.
Credit: VISTA

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Summary



Surveys are great!