

# Status of the European Galactic Plane Surveys: IPHAS, UVEX and VPHAS+

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The EGAPS collaboration

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PI

J.Drew

P.Groot

J.Drew

Hemisphere

North

North

South

Telescope

INT

INT

VST

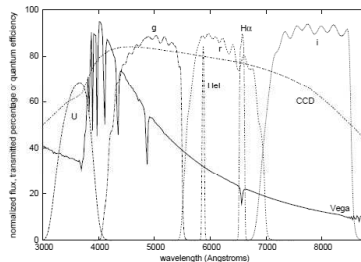
Filters

r, i, H $\alpha$ 

u, g, r

u, g, r, i, H $\alpha$ 

web

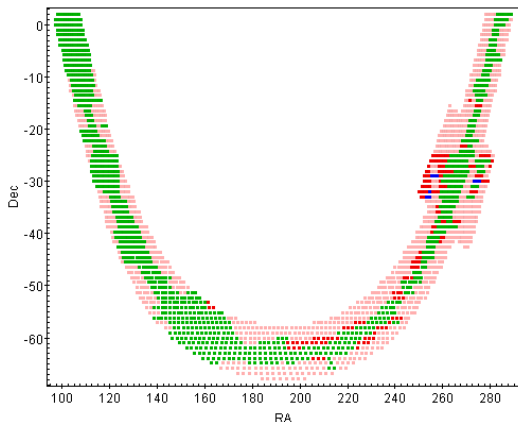
[www.iphas.org](http://www.iphas.org)[astro.ru.nl/uvex/](http://astro.ru.nl/uvex/)[www.vphas.eu](http://www.vphas.eu)

## EGAPS characteristics

- Entire Galactic Plane at  $|b| < 5^\circ$ , plus the bulge at  $|b| < 10^\circ$
- Around 1 arcsec angular resolution
- Reaches to **at least** 20th magnitude ( $5\sigma$ ) in all bands: u,g,r,i, $H\alpha$  (more usually 21–22 in g and r)
- Approximate Saturation limit:  $\sim 12$ -13  
13 (r), 12 (i), 12.5 ( $H\alpha$ )
- Aims:
  - High resolution photometric imaging for nebular astrophysics, throughout the Milky Way disk and bulge
  - Massive update of  $H\alpha$  emission line stars – young and evolved
  - Massive update of the UV-excess population – high-mass and evolved low-mass stars (OB stars, sub-dwarfs, WDs, compact binaries)
  - Map the 3D dust distribution across the Galactic disc, to which u and  $H\alpha$  make valuable contributions
  - Resource for photometric source selection for MOS surveys

- The only optical surveys to target the Galactic Plane at high enough angular resolution to do its dense star fields.
- Other overlapping digital surveys:-
  - PanSTARRS: similar PSF to northern surveys: no u or  $H\alpha$
  - Skymapper: 0.5 arcsec pixels sampling 2 arcsec seeing at best:  $H\alpha$  not part of the main survey
  - Gaia: no u sensitivity, not  $H\alpha$ , no extended objects ( $>0.7$  arcsec), not a wide field imager.

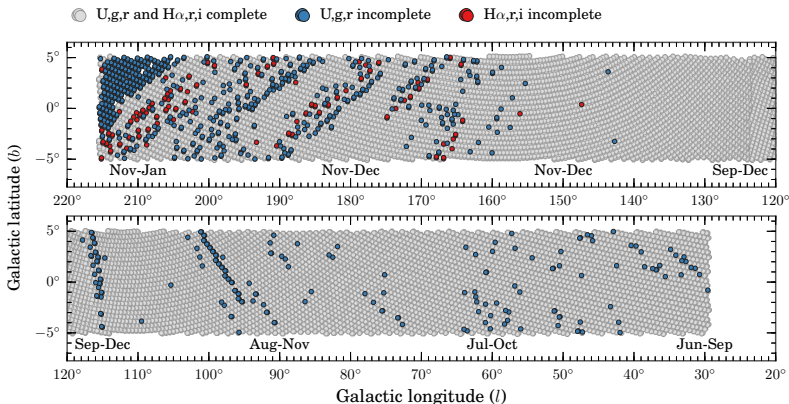
## VPHAS+ status



To end of March 2016:  $\sim 47\%$  in u,g,r  
 $\sim 54\%$  in r,i,H $\alpha$

Next release this summer: 43% of the survey (images and catalogues)

# IPHAS and UVEX status

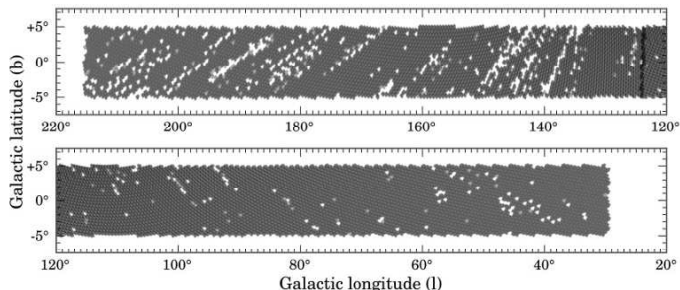


Coloured points need to be observed (applied for)

All went through CASU pipeline

Currently dealing with QC and calibrations

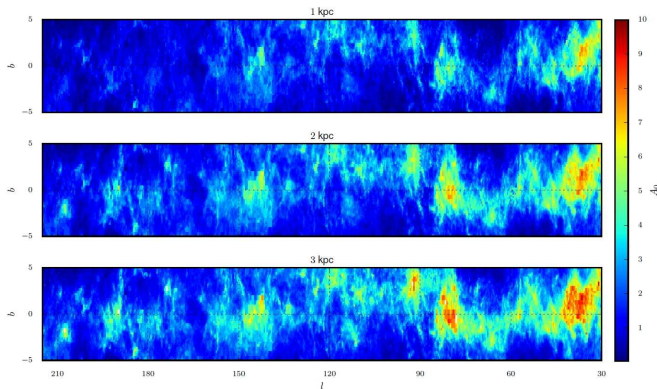
Preparing next data release



- $|b| < 5^\circ$  and  $l = 30-215^\circ$
- Covering 92% of the final footprint
- Median seeing of 1.1 arcsec
- Mean 5-sigma depth of 21.2 (r), 20.0 (i) and 20.3 (H-alpha)
- Vega magnitude system
- External precision of 0.03 mag
- Data available in VizieR and through [www.iphas.org/dr2/](http://www.iphas.org/dr2/)

## DR2 outputs

### 3D extinction map, Sale et al 2014



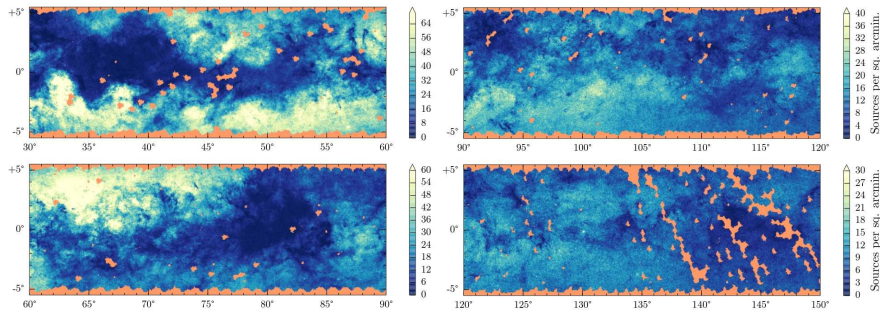
Sensitive to  $1 < D < 5$  kpc typically

Catalogue of stellar parameters for  $\sim 38$  million stars are also available  
(distance,  $A_0$ ,  $T_{eff}$ ,  $\log g$ , Mass)



# DR2 outputs

## Star counts map, Farnhill et al 2016

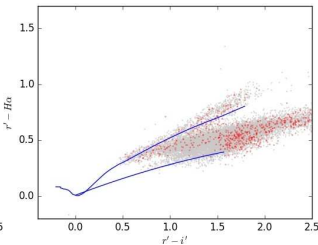
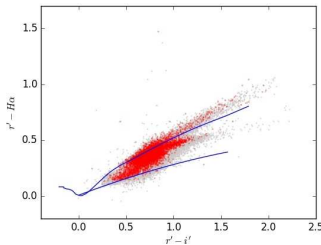
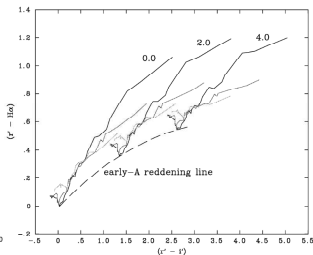
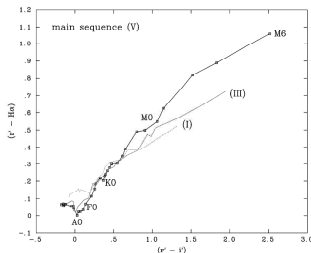


Maps from both r and i bands

Using different magnitude limits: r, i < 17, 18, 19, 20

Using different resolutions: 1', 2', 10', 30', 1°

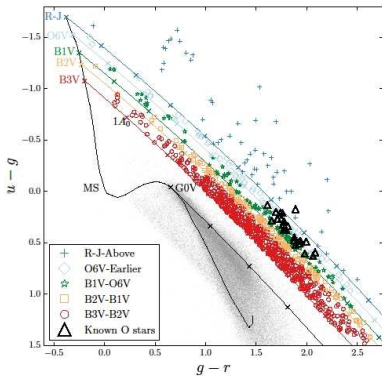
# Characteristic diagrams



- early-A stars (Drew et al 2008, Hales et al 2009)
- M giants (Wright et al 2008, 2009)
- emission-line stars (Witham et al 2008, Raddi et al 2015)

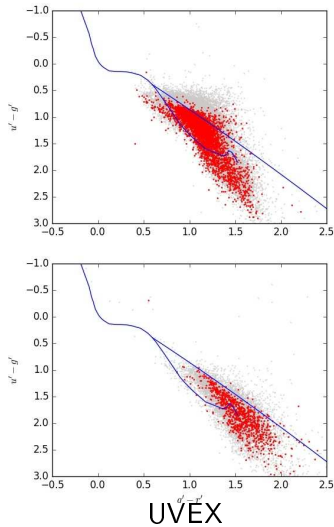
All easily IDed

# Characteristic diagrams



VPHAS+

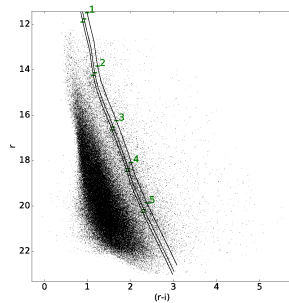
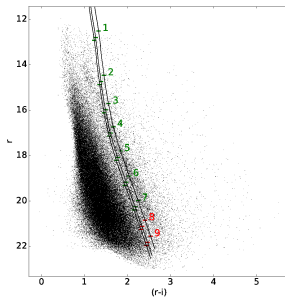
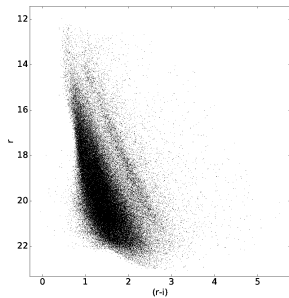
(Mohr-Smith et al 2005)



UVEX

WDs, IBs and OB stars easily selected. Verbeek et al (2013)

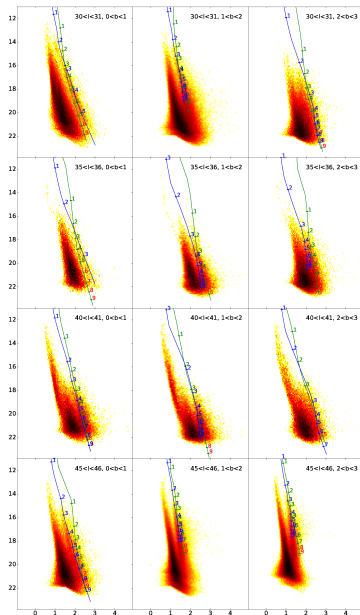
# Tracing Red Clump stars



Expected sequences for G8III, K0III, K2III from Sale and Marshall

$$30 < l < 31, 0 < b < 1$$

# Tracing Red Clump stars



## Concluding remarks

### EGAPS:

- IPHAS and UVEX to be published soon (together?), with uniform calibration.
- VPHAS+ at 50% (DR2 available at ESO, DR3 coming)

### The surveys offer:

- Calibrated multi-band photometry down to 20th magnitude.
- $\sim 1$  arcsec angular resolution imaging,
- A powerful set of resources complementing longer wavelength surveys and Gaia astrometry.

## EGAPS Consortium (non-complete list of names)

IPHAS/VPHAS+ PI: Janet Drew

UVEX PI: Paul Groot

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- Bristol University, UK: Steve Phillipps, Rhys Morris
- Harvard-Smithsonian Center for Astrophysics, USA: Jeremy Drake
- Erlangen University (Germany): Ulrich Heber
- ESO (Chile): Roger Wesson
- ESO (Germany): Jeremy Walsh
- ESTEC, Noordwijk (ESA/The Netherlands): Timo Prusti
- Exeter University (UK): Tim Naylor, Stuart Sale
- Harvard-Smithsonian Center for Astrophysics (USA): Jeremy Drake
- Imperial College London, UK: Yvonne Unruh
- Institute of Astronomy, Cambridge, UK: Mike Irwin, Nic Walton, Eduardo Gonzalez-Solares
- Instituto de Astrofísica de Canarias, Spain: Romano Corradi, Antonio Mampaso, Eduardo Martin, Pablo Rodriguez-Gil
- NASA Ames, California, USA: Geert Barentsen
- Nordic Optical Telescope (Spain): Tom Augusteijn
- SRON, Utrecht (The Netherlands): Peter Jonker
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- University of Hong Kong: Quentin Parker, David Frew
- University of Manchester, UK: Albert Zijlstra
- University of Oxford, UK: Stuart Sale
- Warwick University, UK: Boris Gaensicke, Roberto Raddi, Danny Steeghs