

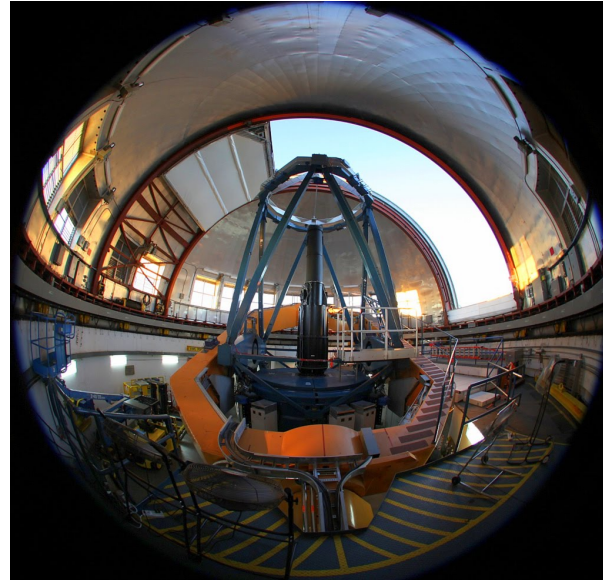


# Astrometry and Photometry from the UKIRT Hemisphere Survey

Adam C. Schneider  
USNO Flagstaff Station  
Rare Gems in Big Data  
23 May 2024



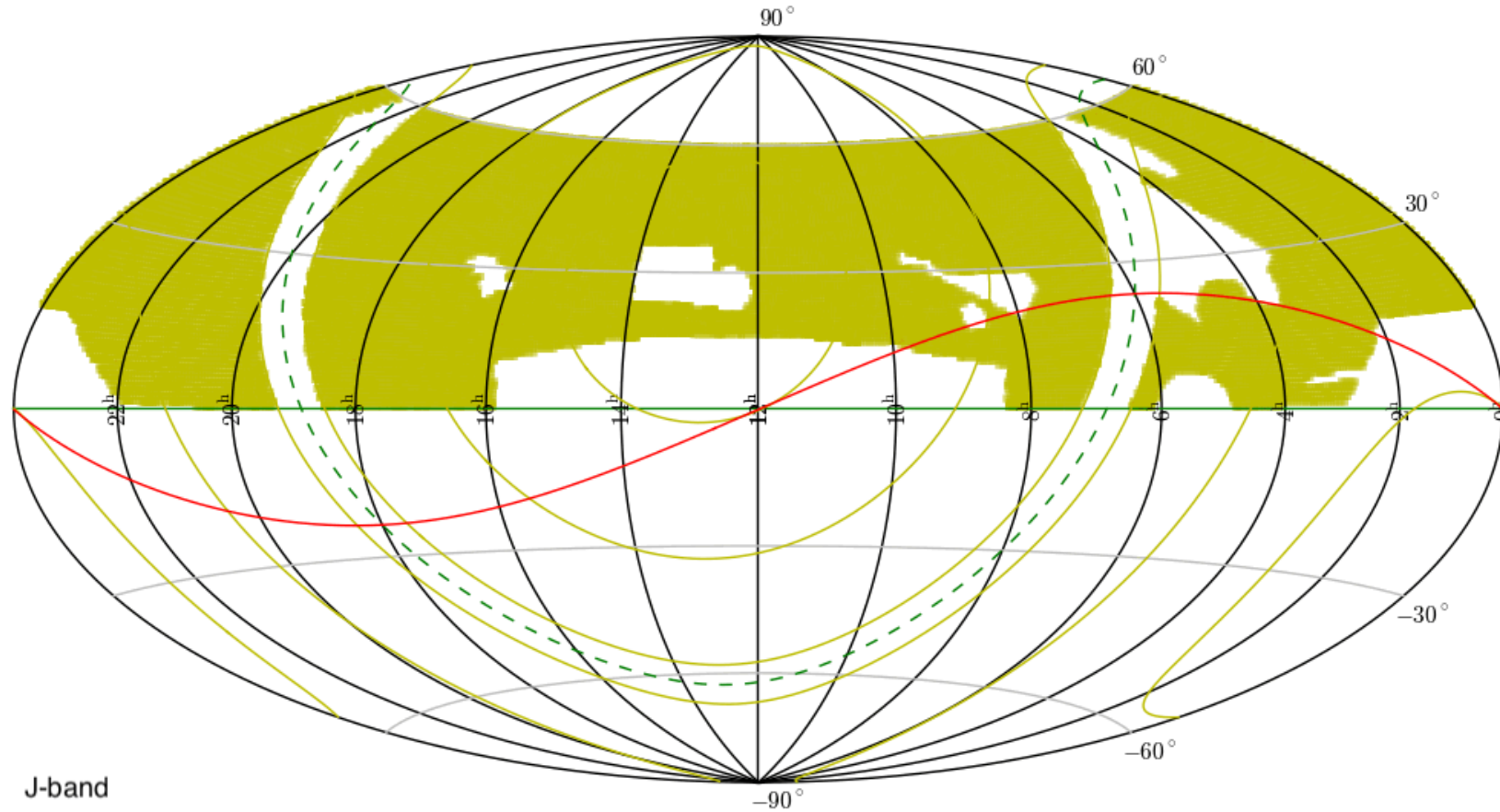
# The UKIRT Hemisphere Survey



- UHS — UKIRT Hemisphere Survey
- UKIRT — United Kingdom InfraRed Telescope
  - IR optimized 3.8-m @ Mauna Kea
- Partners:
  - USNO
  - IfA University of Hawaii
  - Cambridge Astronomy Survey Unit (CASU)
  - Wide Field Astronomy Unit (WFAU) in Edinburgh
- UHS initiated in 2012
- ~12,800 square degrees between 0 and +60



# Status of the UKIRT Hemisphere Survey



J-band

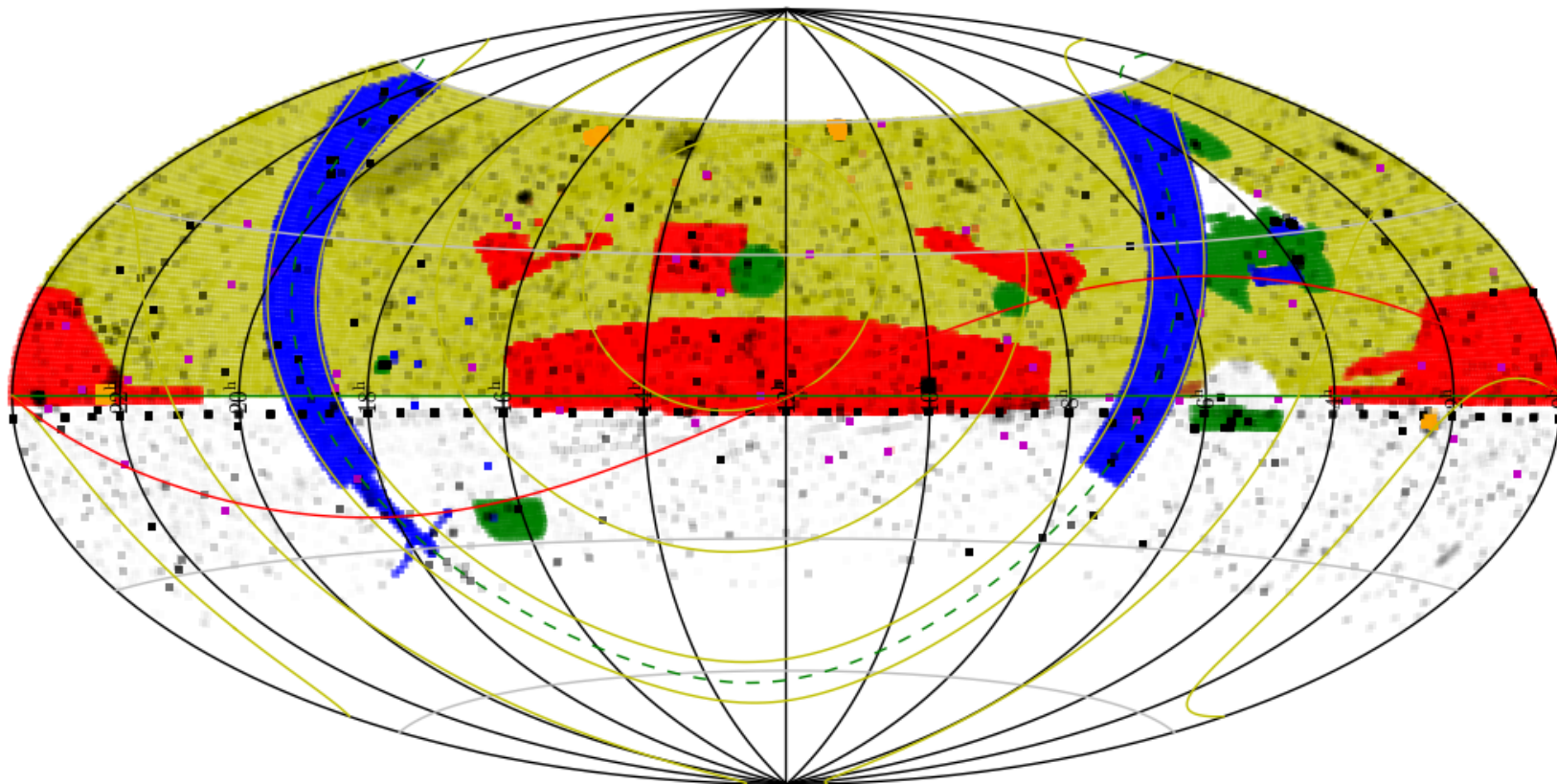
Date Range: 20120519 - 20240422

Last Updated: 20240505

<http://casu.ast.cam.ac.uk/wfcamp/uhs>



# UHS + UKIDSS





# Status of the UKIRT Hemisphere Survey




- *J*-band (UHS DR1):
  - Public release: August 2018
  - Median depth = 19.6 mag
  - 581 million detections
  - [Dye et al. \(2018\)](#)
- *K*-band (UHS DR2):
  - Public release: June 2023
  - Median depth = 18.4 mag
  - 392 million detections
  - Bruursema et al. (in prep)
- *H*-band (UHS DR3):
  - Ongoing (~95% complete)
  - Expected depth = 19.0 mag
  - Public release ~2025
- *Y*-band+second epoch *J* (UHS DR4):
  - Ongoing (~10% complete)



# Where is the UHS?



Home | Overview | Browser | Access | Login | Cookbook | nonSurvey 

**WFCAM**  
Science Archive

- WSA Home
- Start Here
- Data Overview
- Known Issues
- the Surveys
- Coverage Maps
- Schema browser
- Data access
- Login
- Archive Listing
- GetImage
- ColourImage
- MultiGetImage
- Region
- Menu query
- Freeform SQL
- CrossID
- Analysis services
- SQL Cookbook
- Q&A
- Glossary
- Release History
- non-Survey
- Gallery

\*\*\* 2023-06-01 UHS DR2 public release \*\*\* (to use select UHSDR2 in database drop down list)

Status: Not logged in.  
Please reload this page if you have logged in and are not seeing the correct login status.

### Image Extraction

Use this form to extract cut-out images around a given position or object name. For help on using this form see [getImage help](#).

Database release to use:

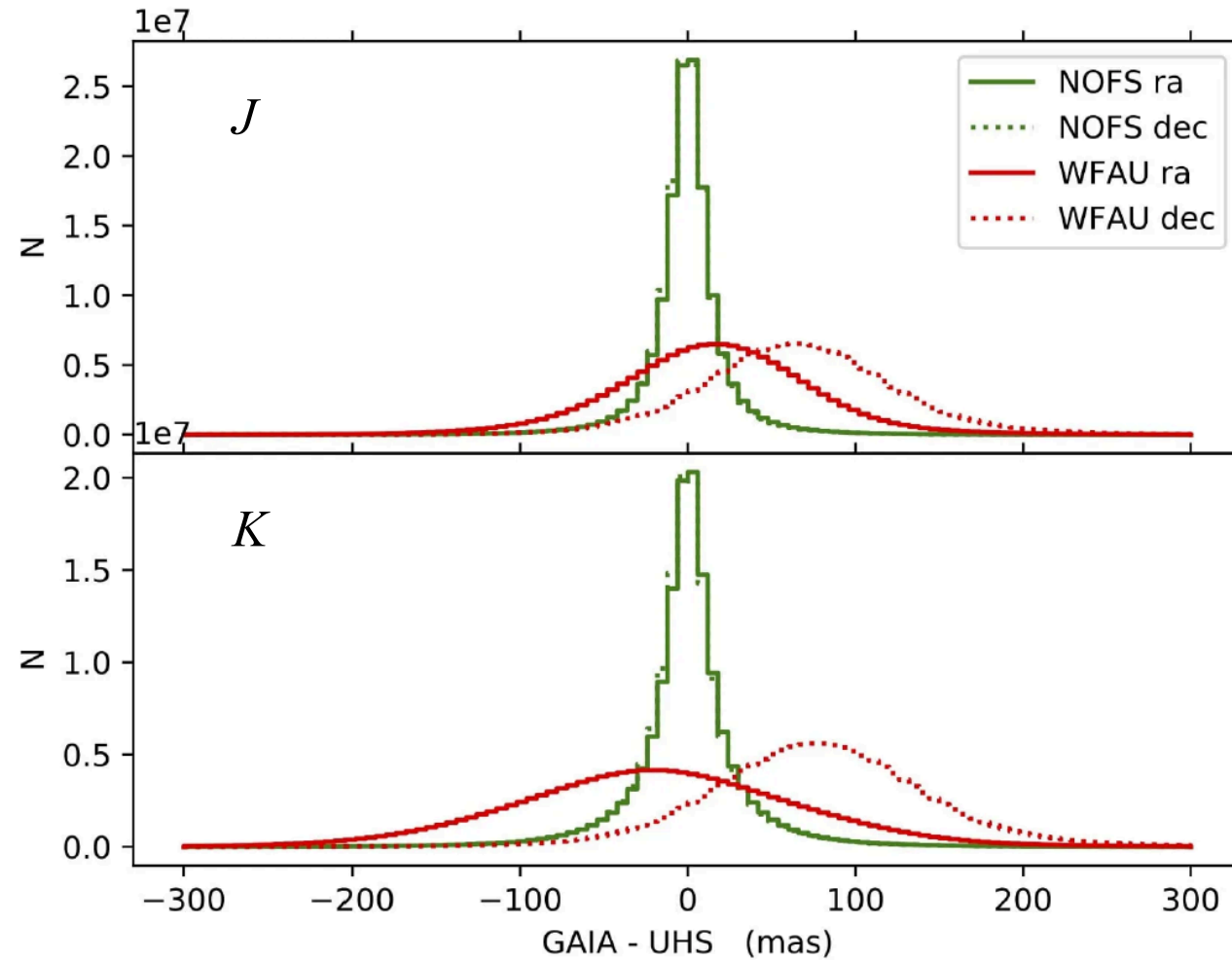
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RA or Galactic Long.:	<input type="text"/>	sexagesimal format or decimal degrees
Dec or Galactic Lat.:	<input type="text"/>	
Coordinate System:	<input type="text" value="J2000"/>	
or Object name:	<input type="text"/>	resolved by Sesame/CDS
Filter/waveband:	<input type="text" value="all"/>	
X-size:	<input type="text" value="1"/>	in arcminutes (maximum 15)
Y-size:	<input type="text" value="1"/>	in arcminutes (maximum 90)
Additional constraints		
Observation type:	<input type="text" value="object"/>	
Frame type:	<input type="text" value="stack"/>	
MultiframeID number:	<input type="text"/>	
FramesetID number:	<input type="text"/>	

<http://wsa.roe.ac.uk/>



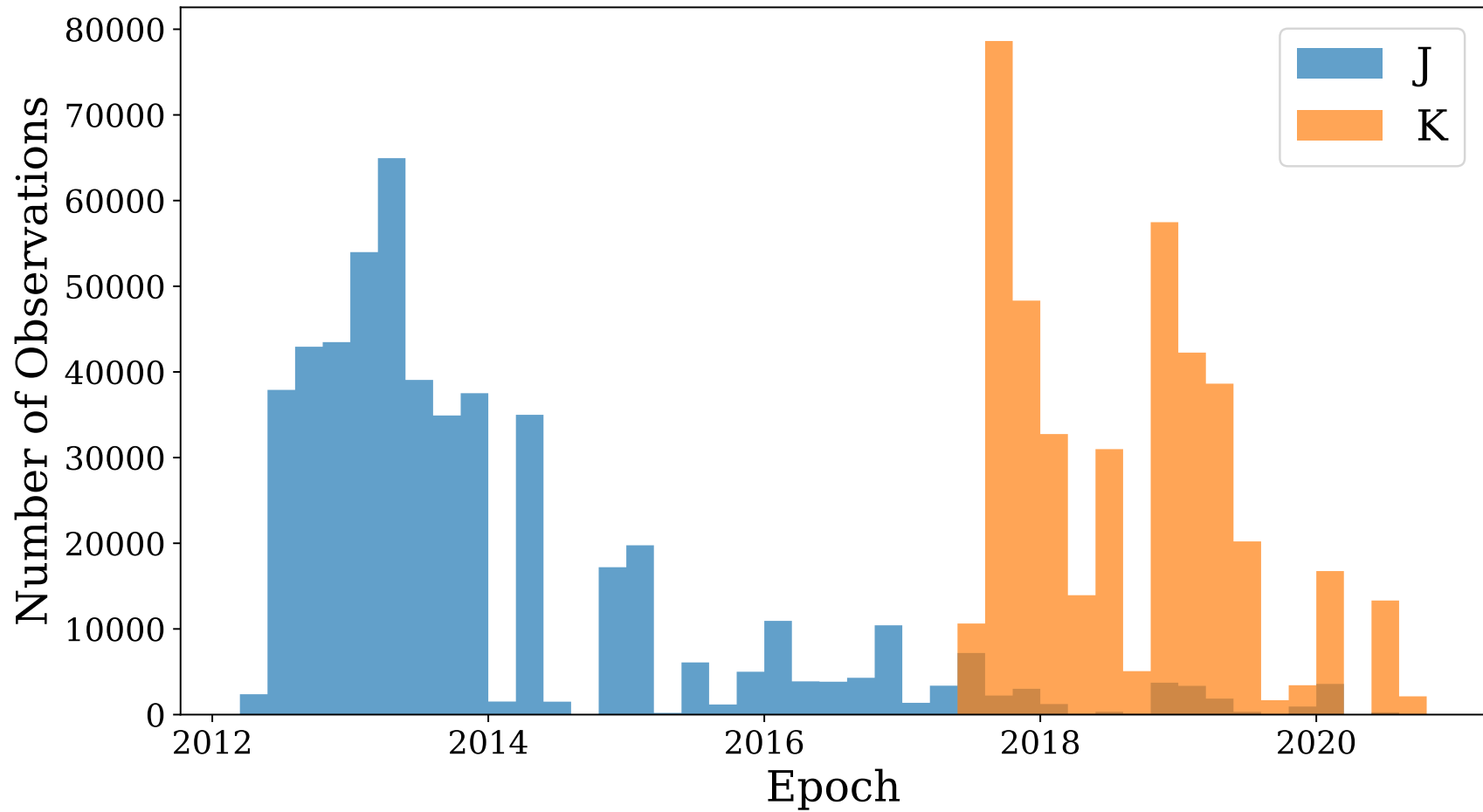
# UHS astrometric recalibration



Credit: Jeff Munn



# UHS proper motions

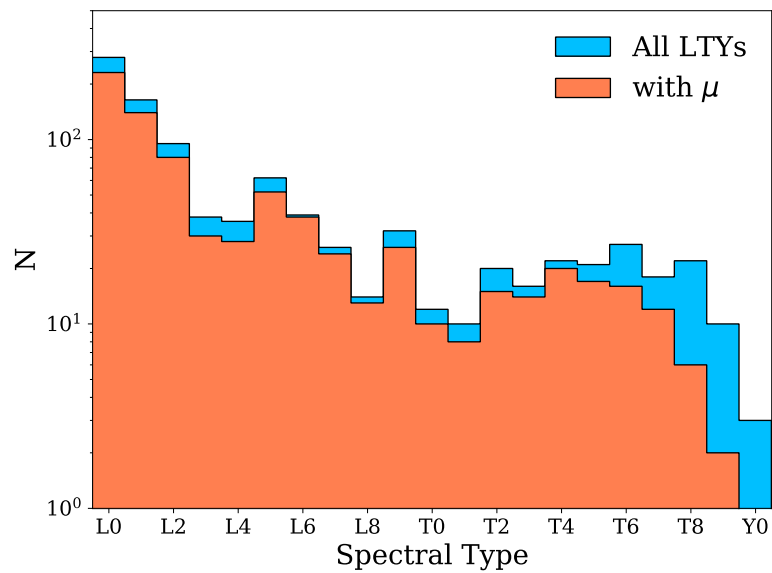
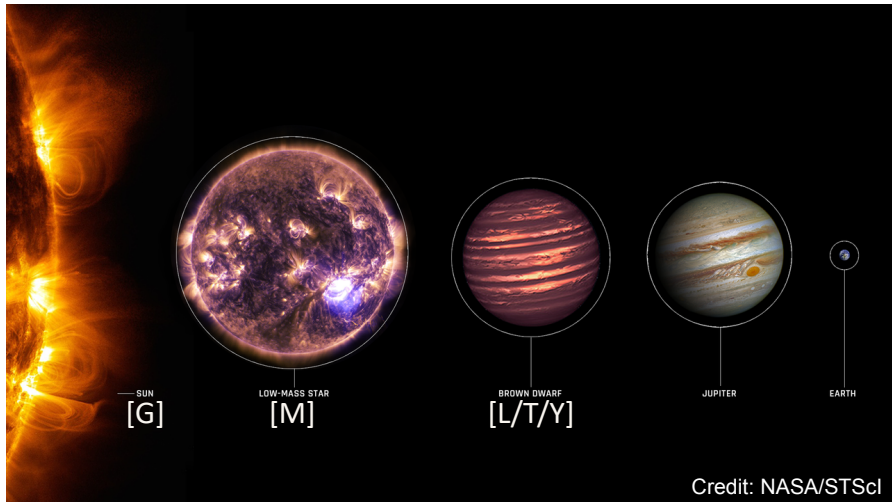


median  $\Delta t = \sim 5$  yrs

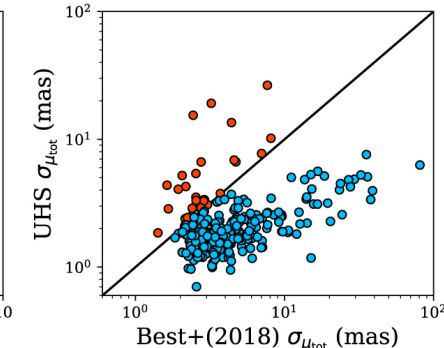
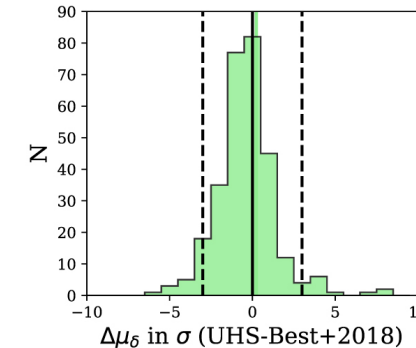
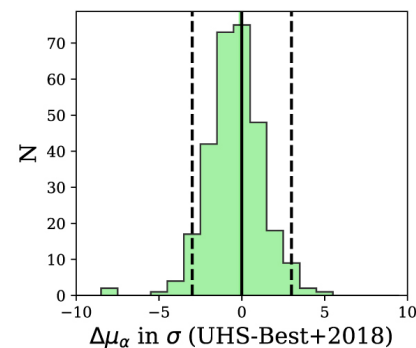
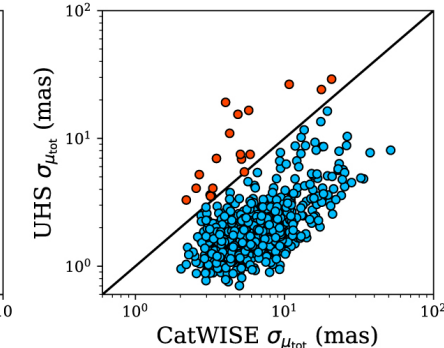
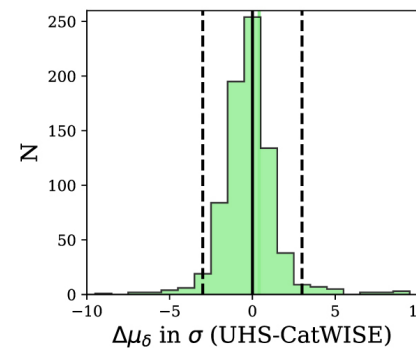
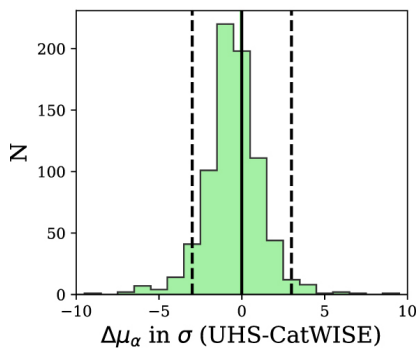
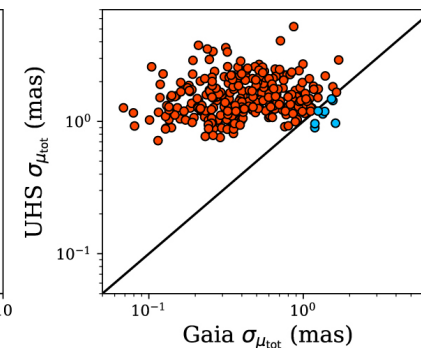
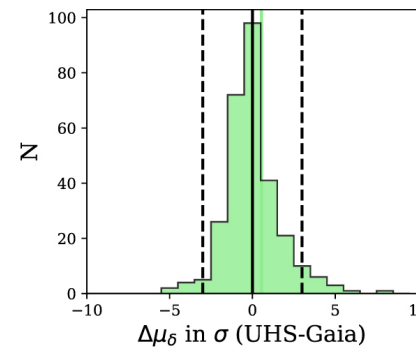
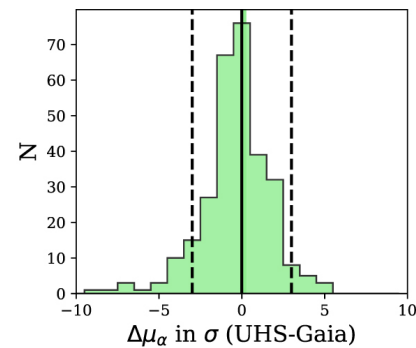


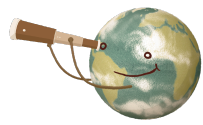


# How good are UHS proper motions?

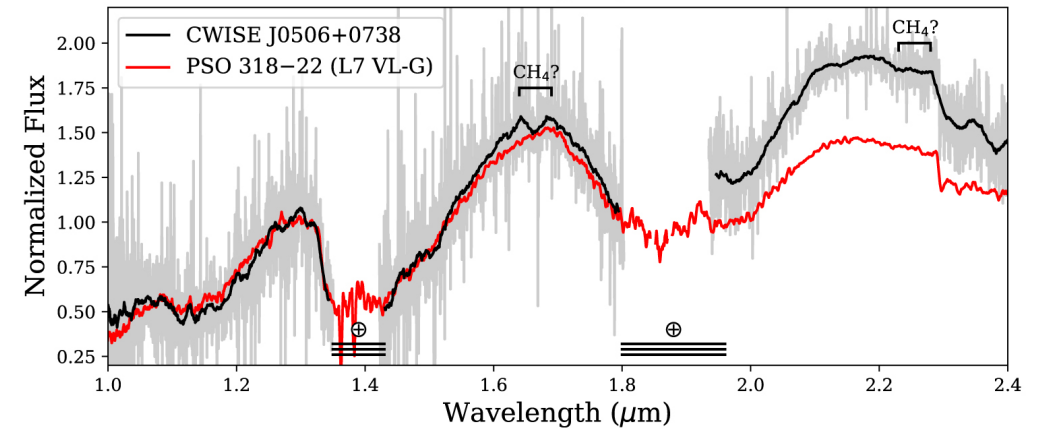
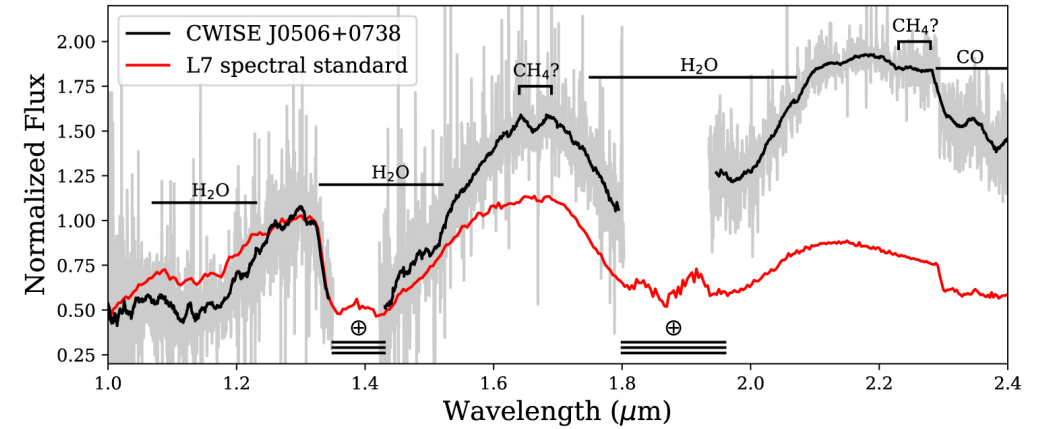
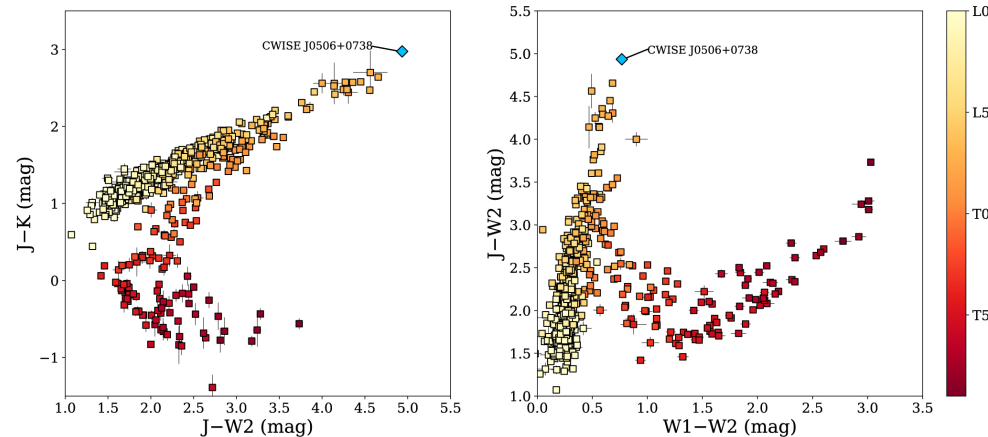
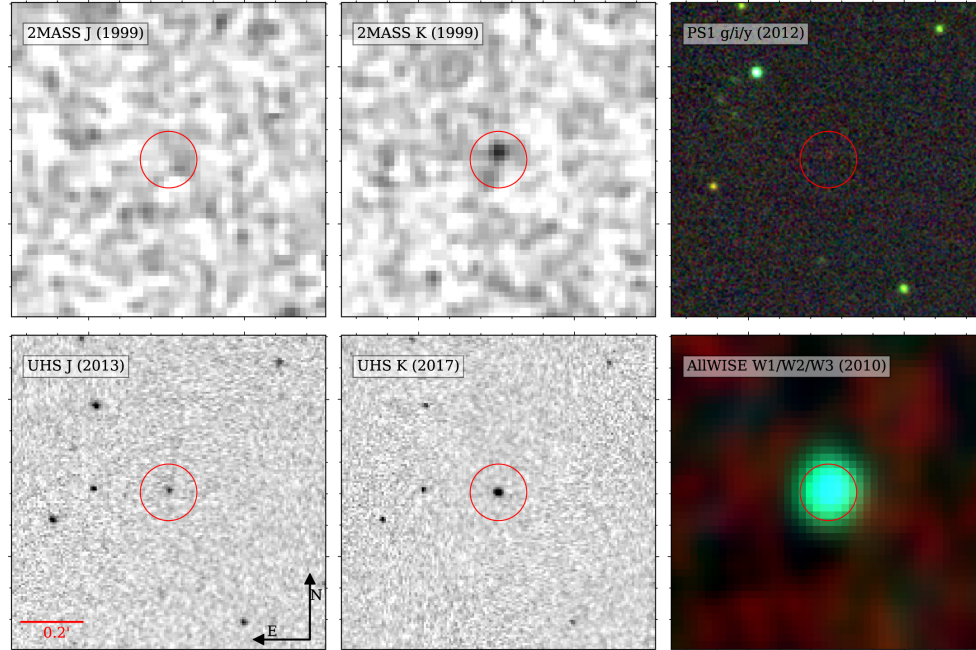


[Schneider et al. \(2023b\)](#)





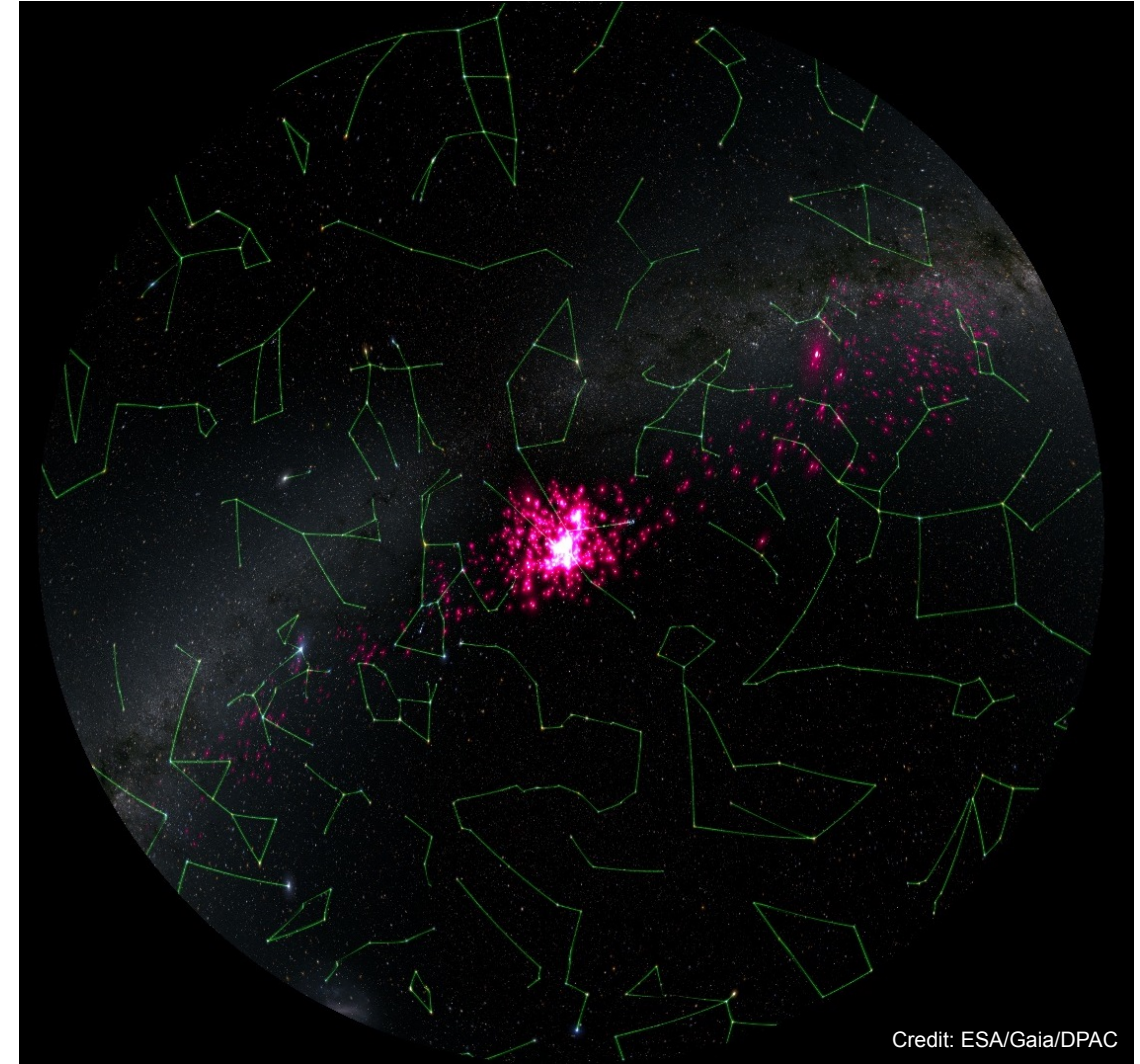
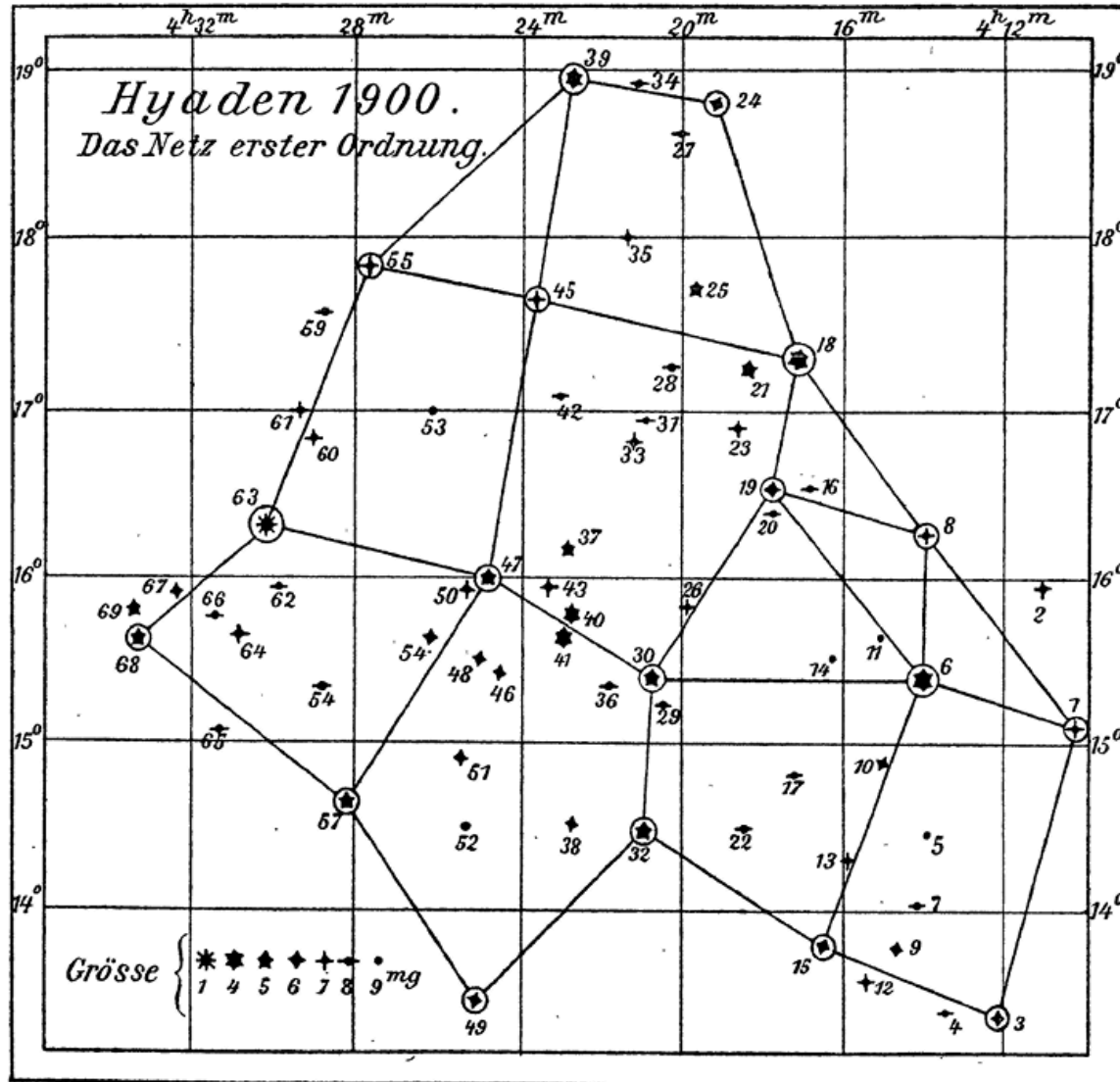
# Backyard Worlds discovery of WISE J050626.96+073842.4



Dan Caselden (USA), Arttu Sainio (FIN),  
Martin Kabatnik (GER) Tom Bickle (UK)

[Schneider et al. \(2023a\)](#)

# UHS and the Hyades

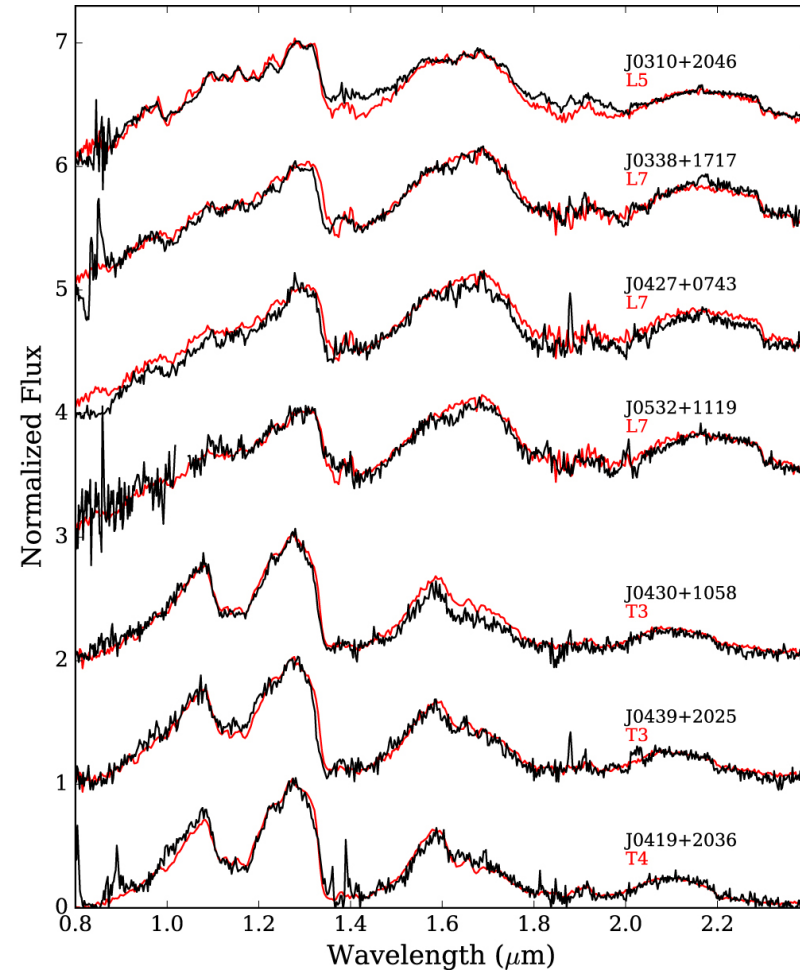
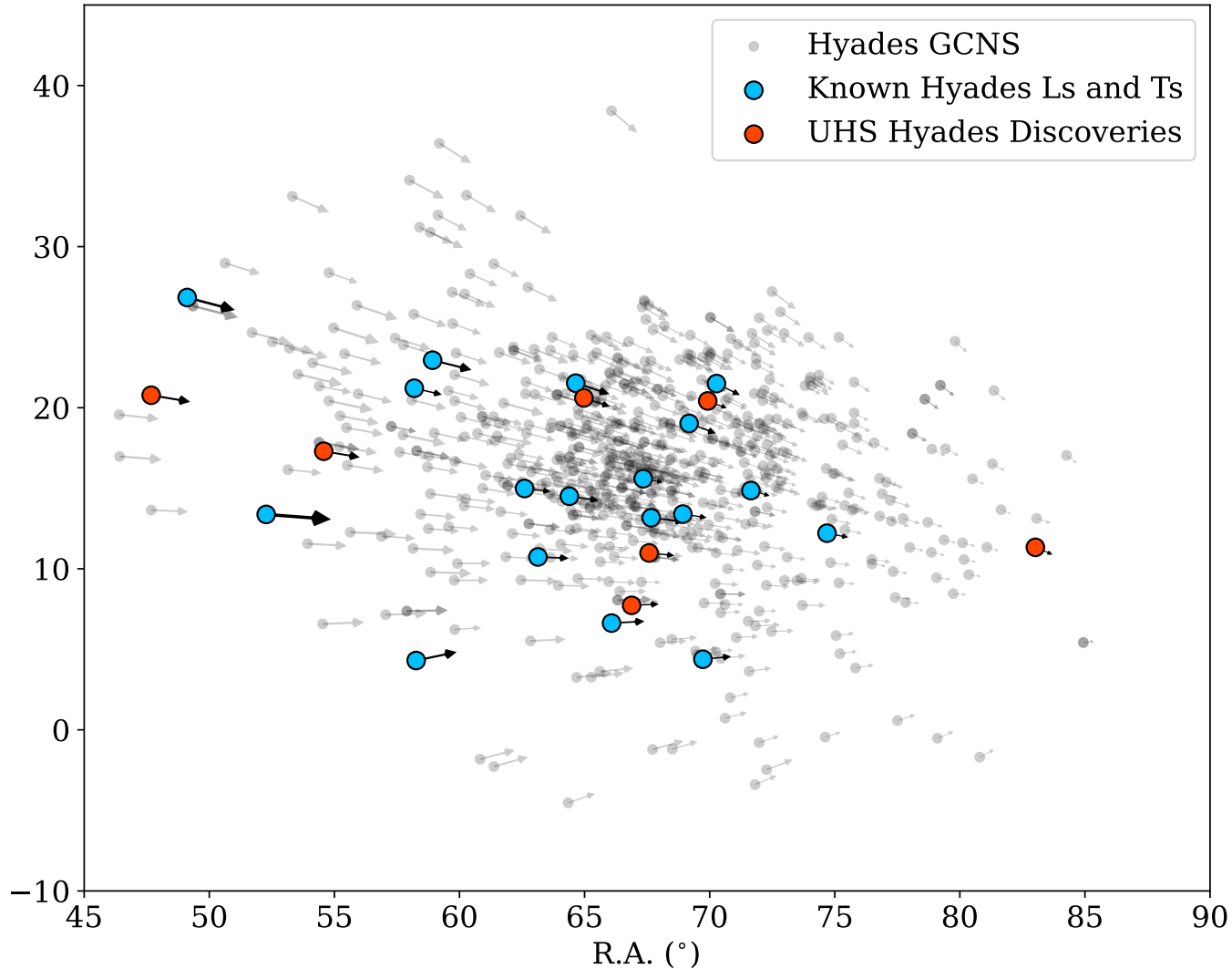


Credit: ESA/Gaia/DPAC

[Wirtz et al. \(1902\)](#)



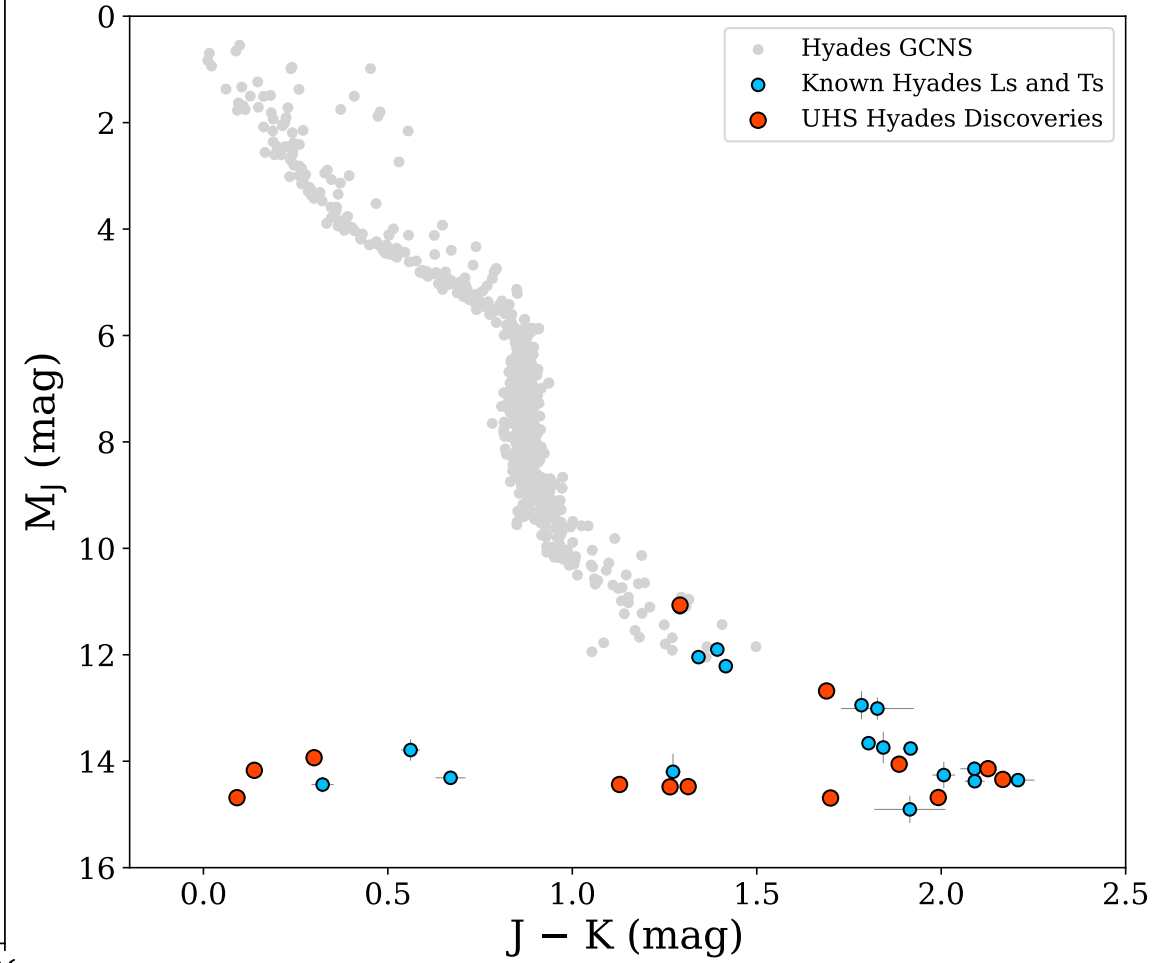
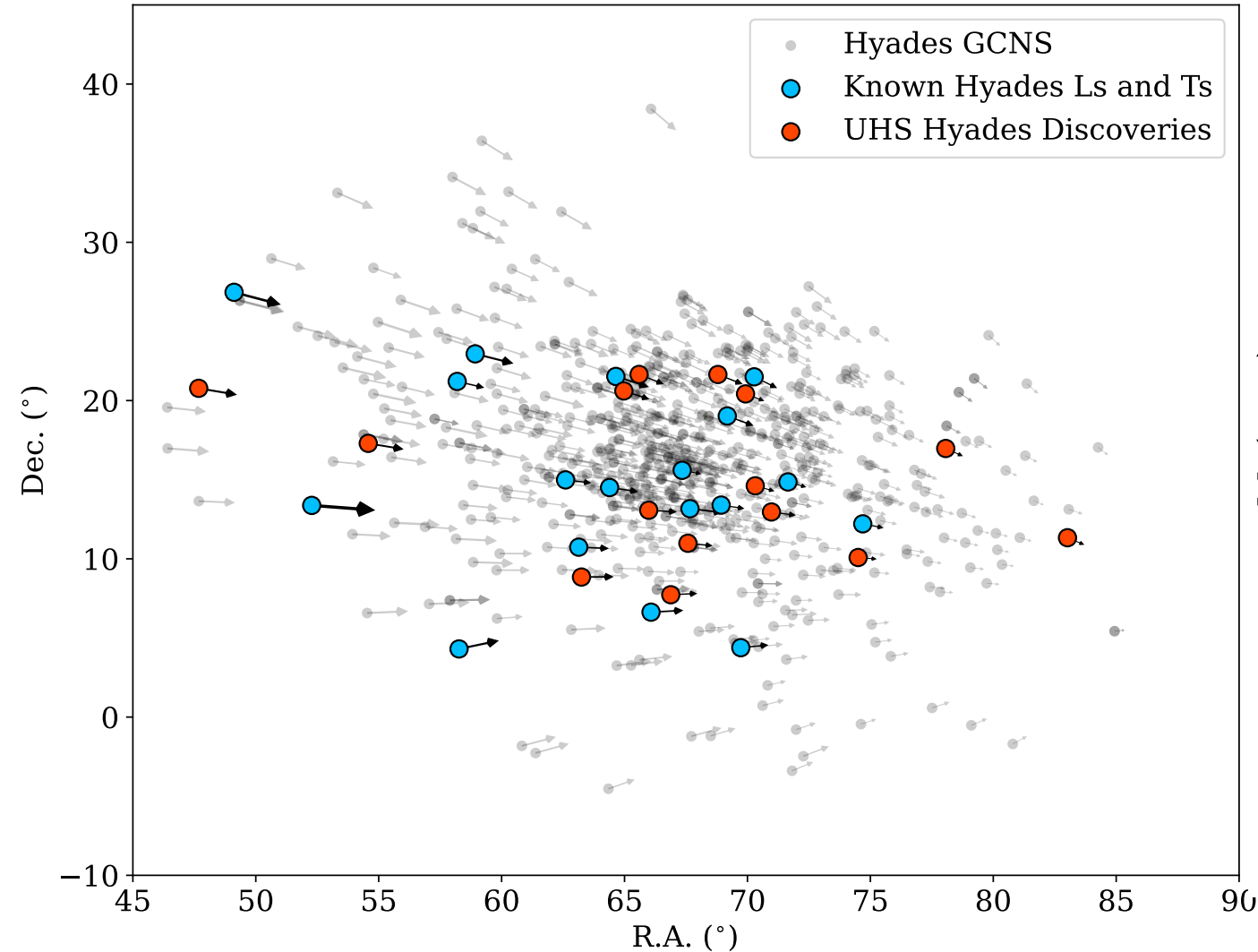
# UHS and the Hyades



[Schneider et al. \(2022\)](#)



# UHS and the Hyades



Schneider et al. (~submitted)



# Summary



1. UHS J- and K-band data released (2018 and 2023, respectively)
2. UHS H-band release expected 2025
3. UHS Y-band and second-epoch J-band ~2027-2028
4. Recalibration of UHS astrometry (positions and proper motions) using Gaia reference frame to be made publicly available
5. Recalibration of previous UKIRT surveys (UKIDSS) is ongoing
6. UHS data has provided improved astrometry for many known substellar objects, and has helped to find and characterize new discoveries
7. Other UHS science cases also fruitful (e.g., quasars, YSOs, white dwarfs, etc.)

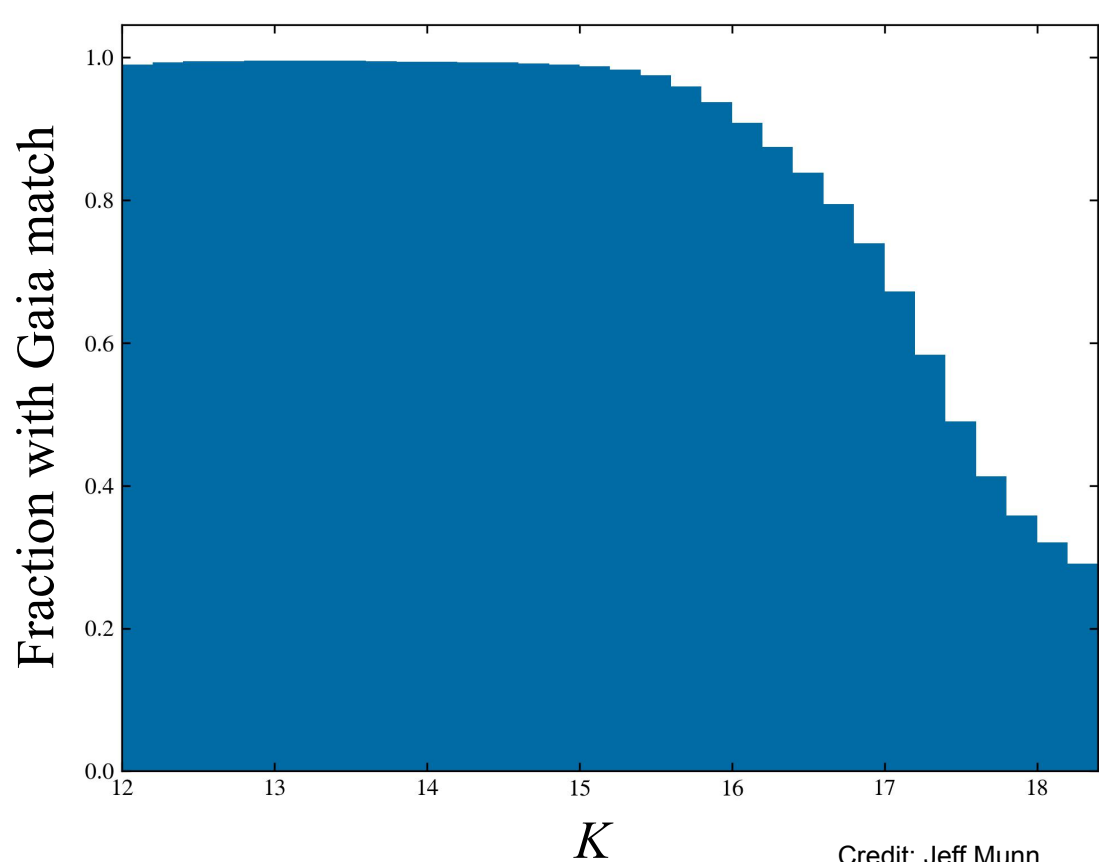


# Backup Slides

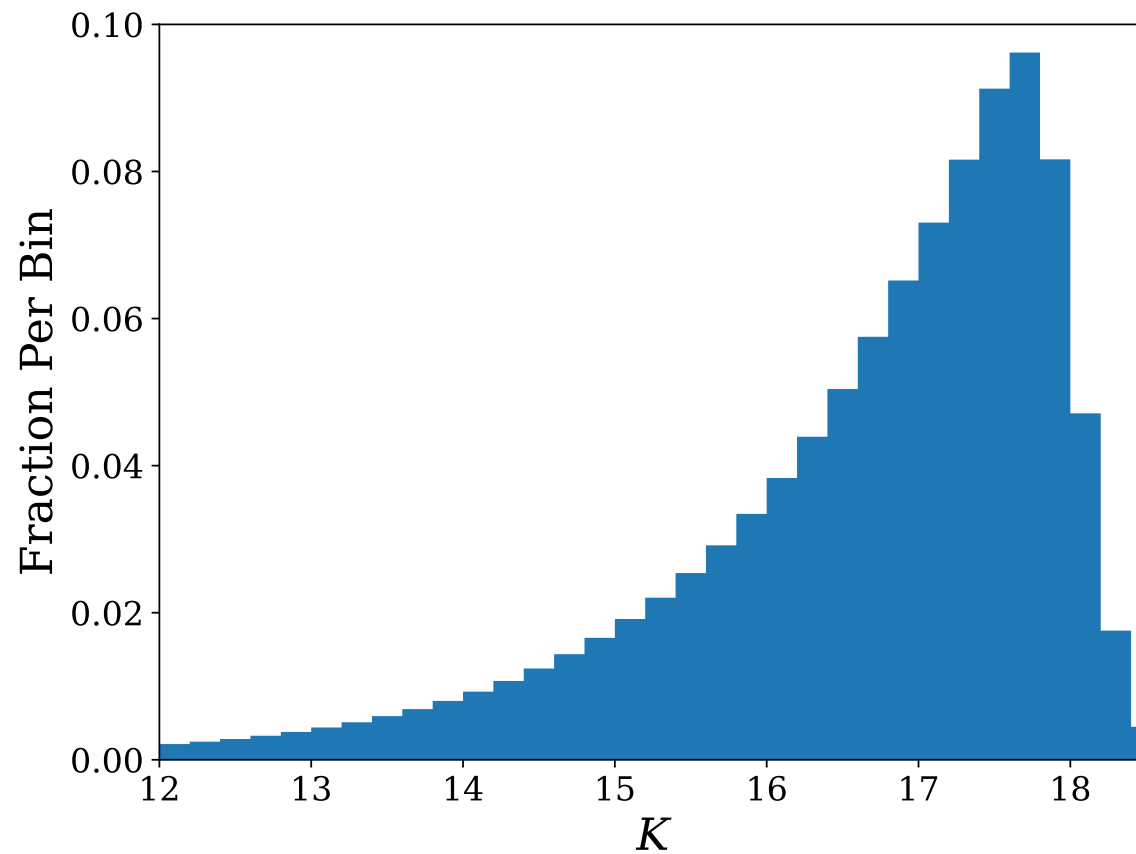




# UHS astrometric recalibration



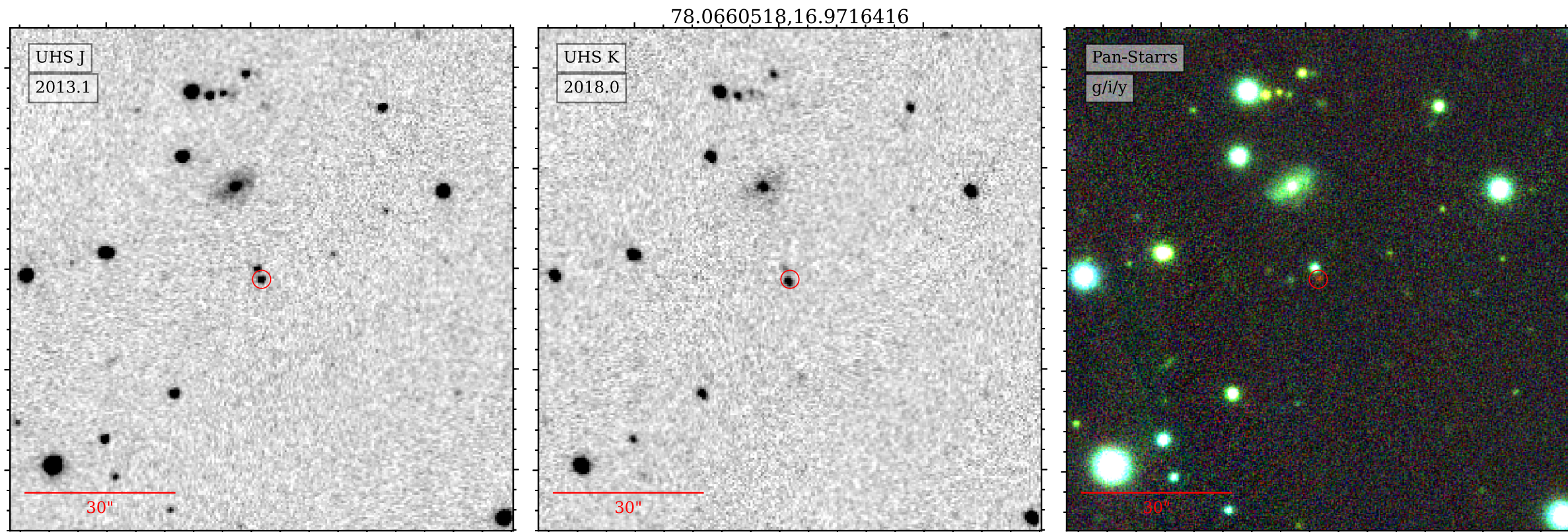
Credit: Jeff Munn







# UHS and the Hyades





# UHS + UKIDSS + VISTA

