AllWISE1 the Sequel: AllWISE2

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IPAC Visiting Graduate Fellowship

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AllWISE Proper Motion Study

Uses all of the WISE prime mission data to calculate sky motions

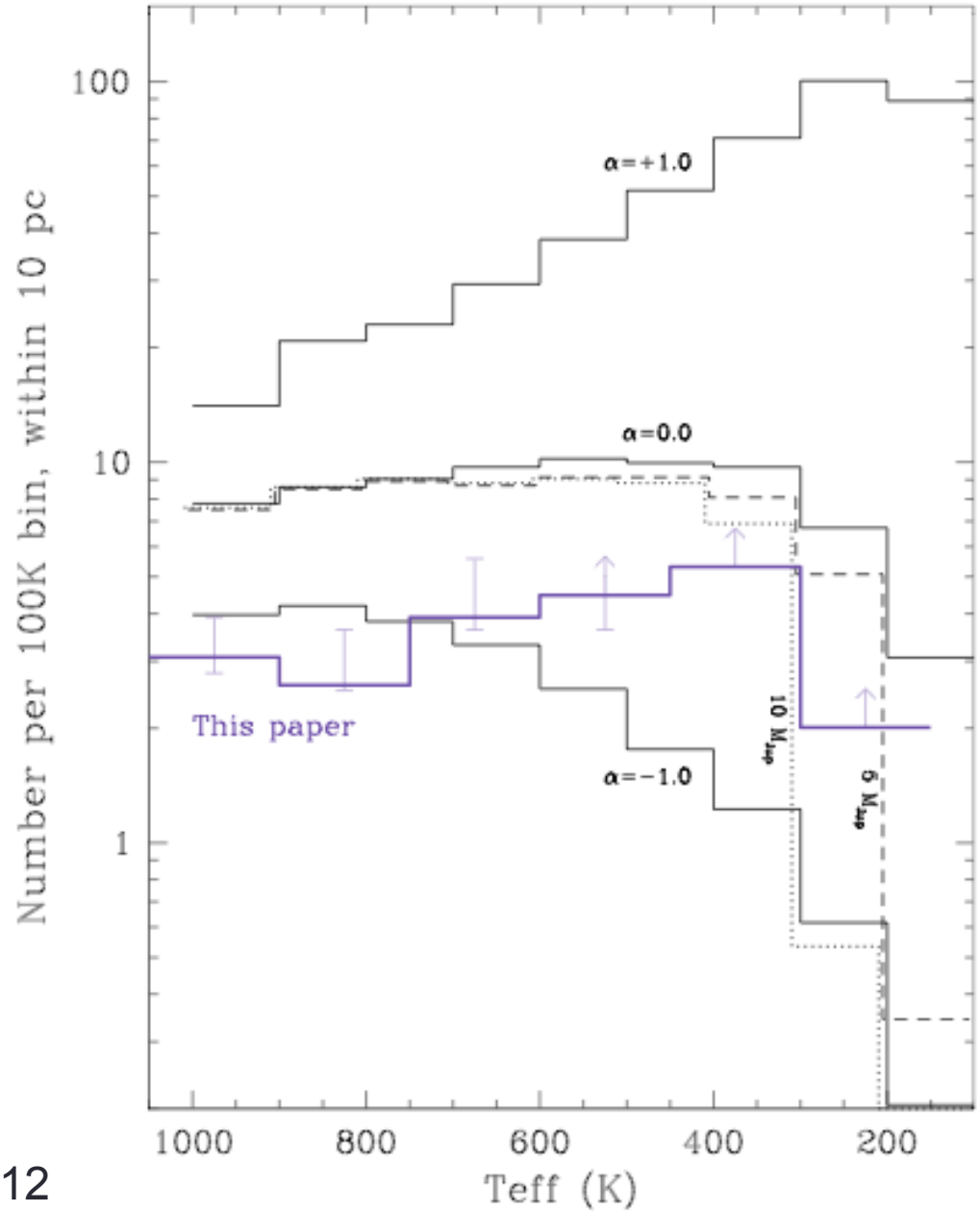
Most of the sky has 2 epochs separated by ~6 months and ~20% with 3 epochs spanning 1 year

Kirkpatrick et al. 2014, ApJ, 783, 122

http://wise2.ipac.caltech.edu/docs/release/allwise/expsup/

Why do it?

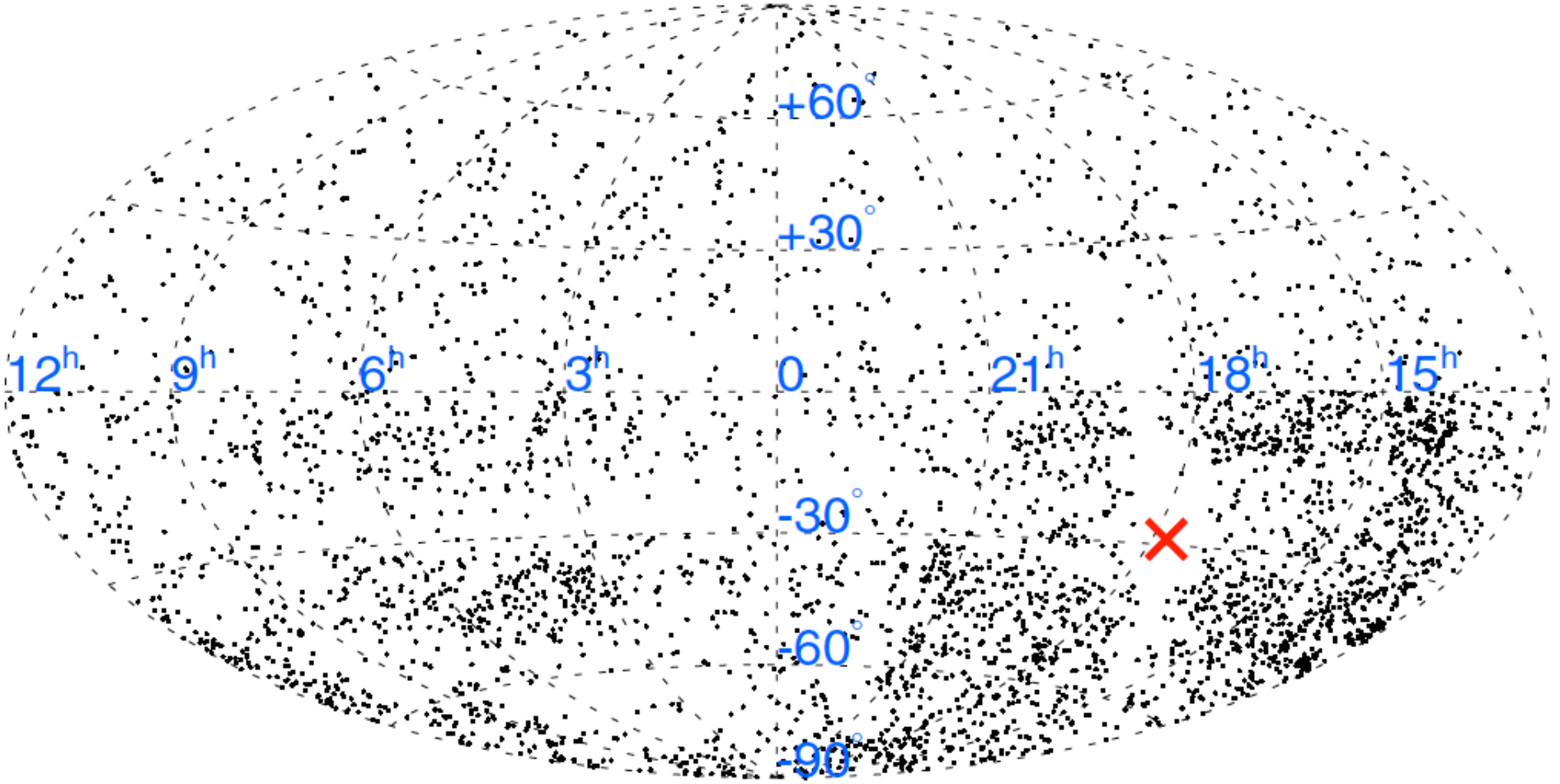
- Map the solar neighborhood in these wavelengths – especially brown dwarfs
- Highlight: subdwarfs



Kirkpatrick et al. 2012

AllWISE1: Summary

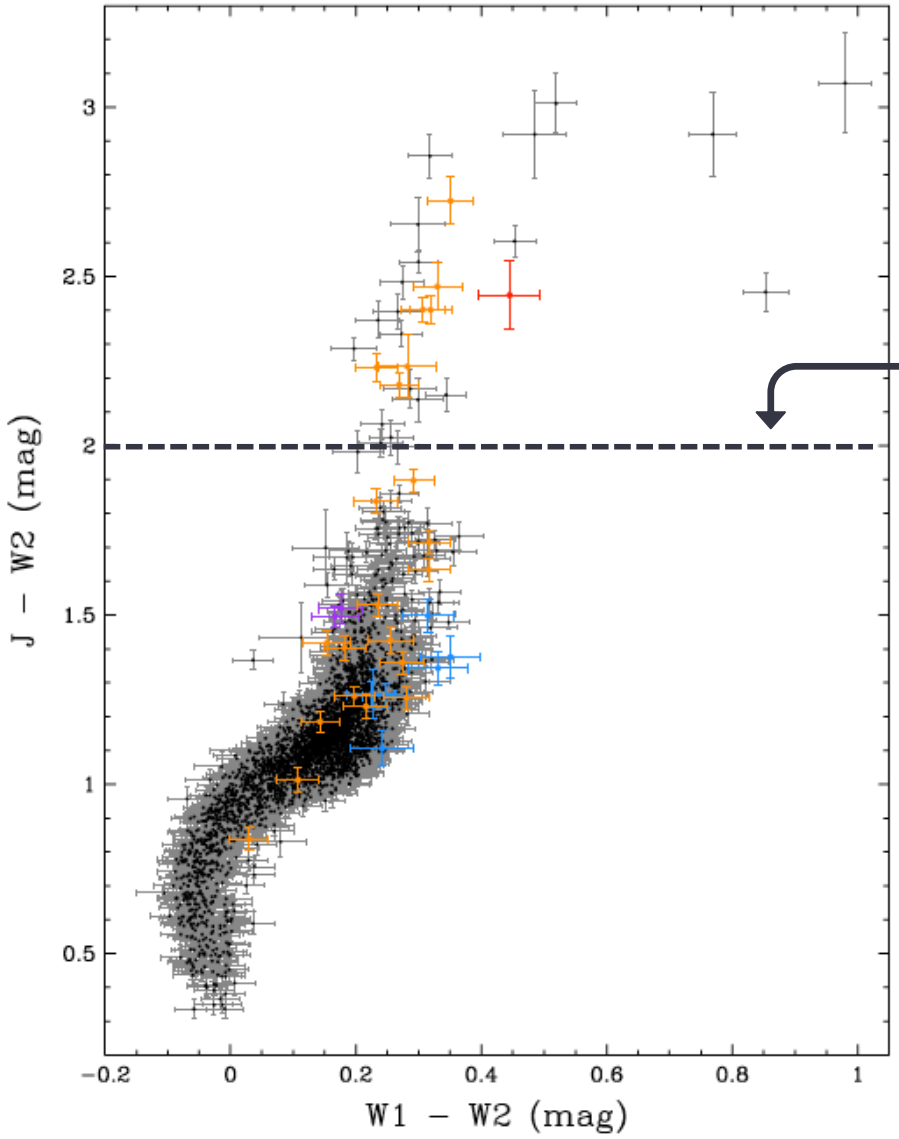
- 3525 motion discoveries
  - 22,387 confirmed motion objects, 18,862 known



Kirkpatrick et al. 2014

AllWISE1: Summary

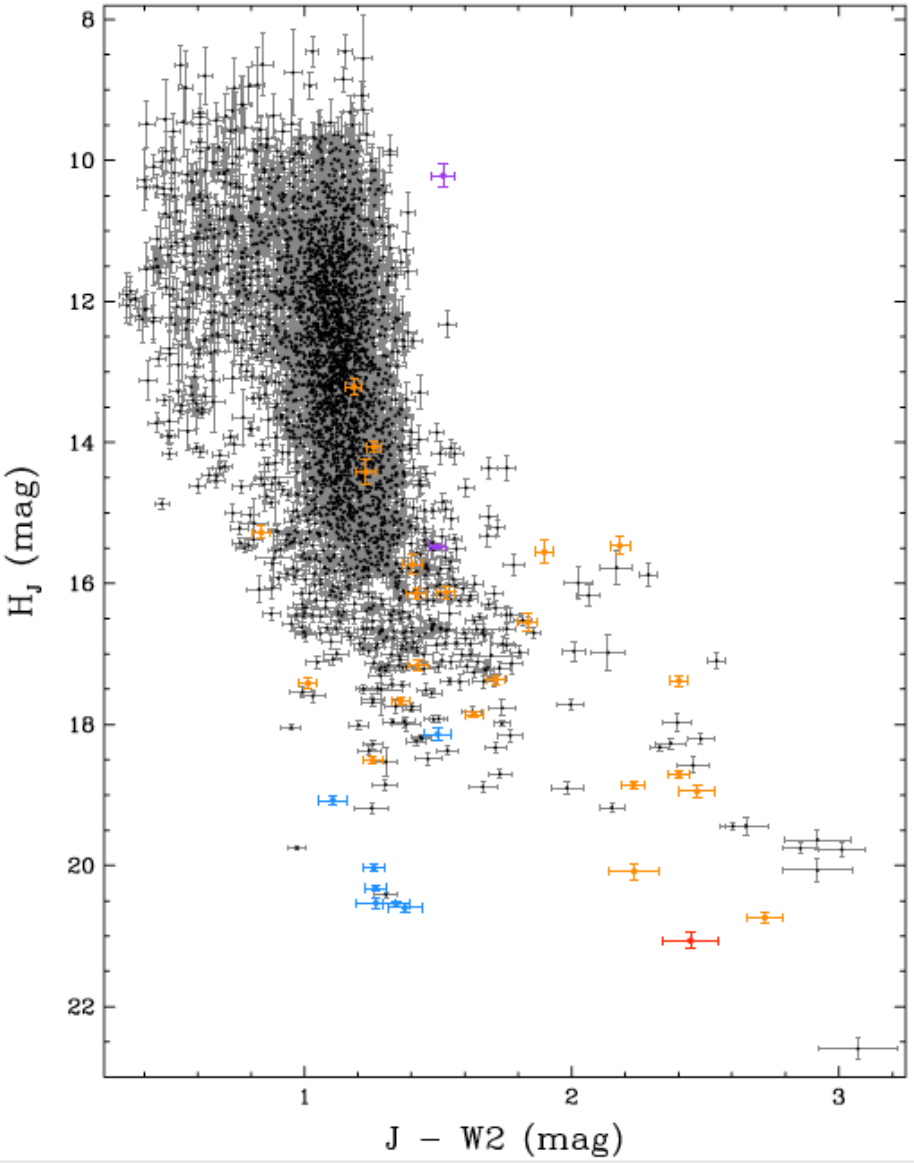
~ 30 new L and T dwarfs



Kirkpatrick et al. 2014

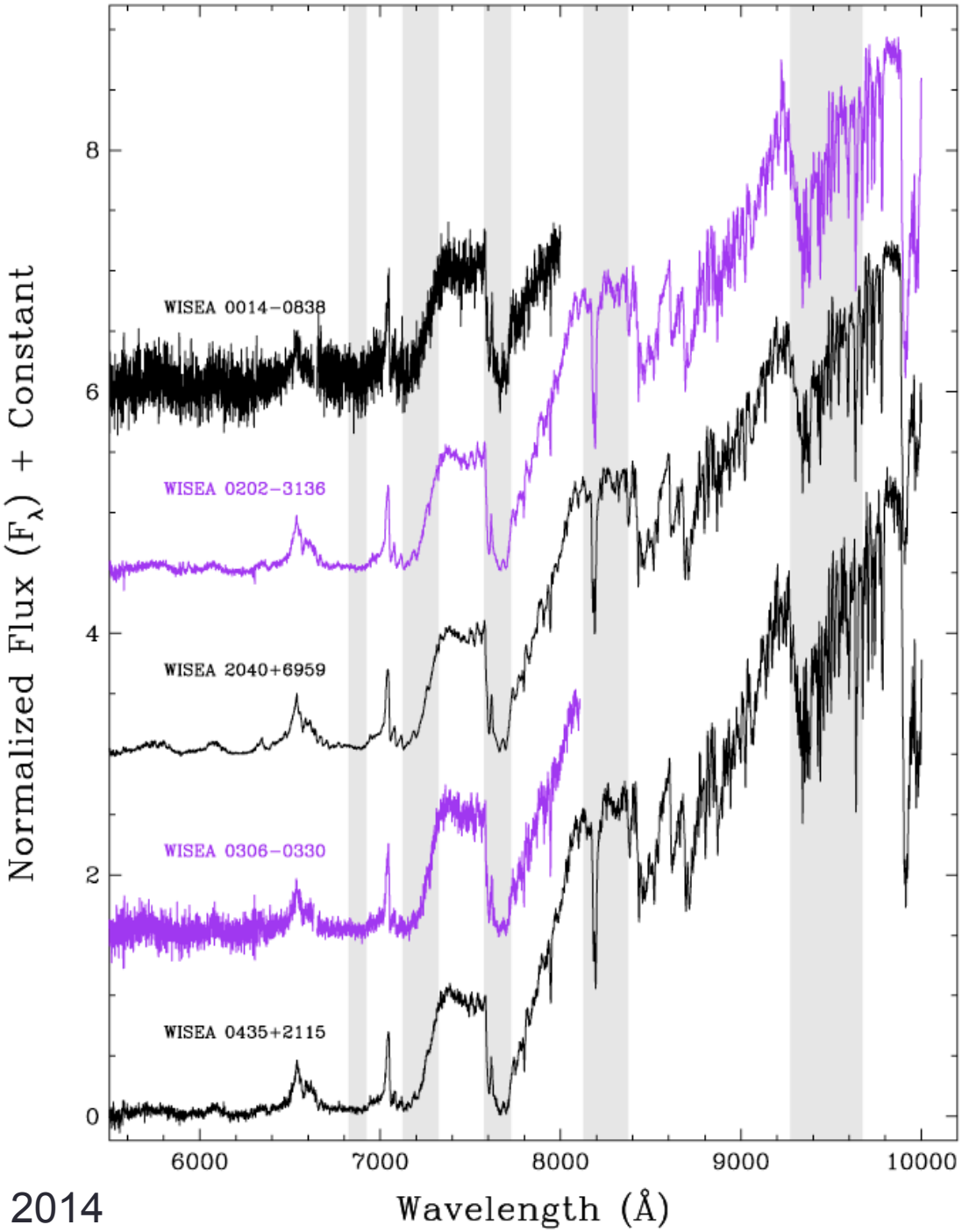
AllWISE1: Summary

8 new late-M and L subdwarfs

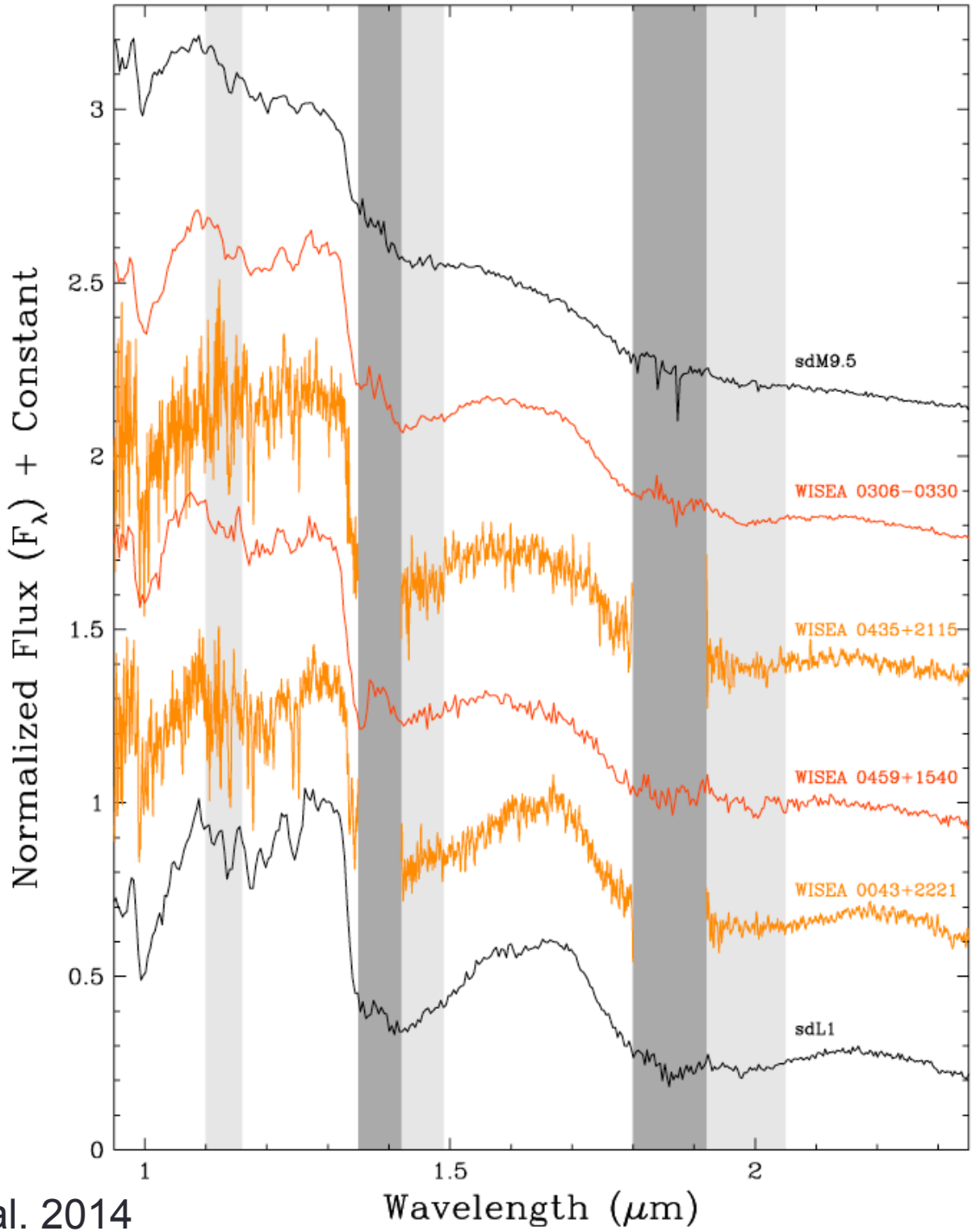


Kirkpatrick et al. 2014

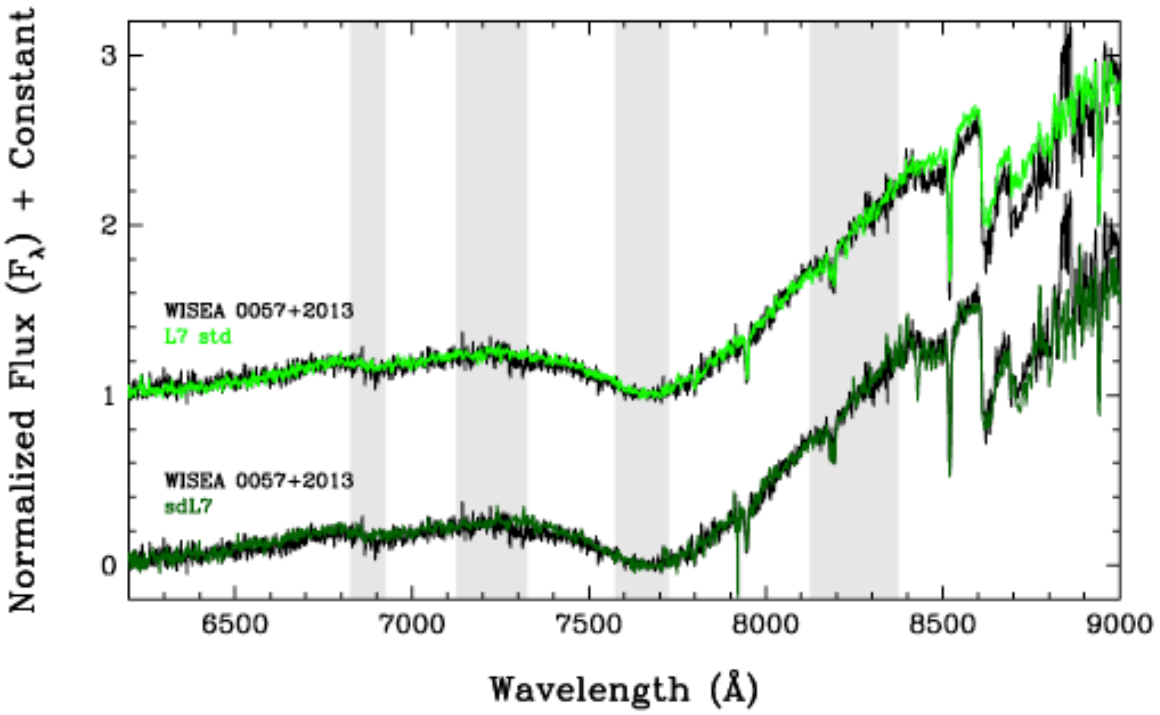
sdL0s

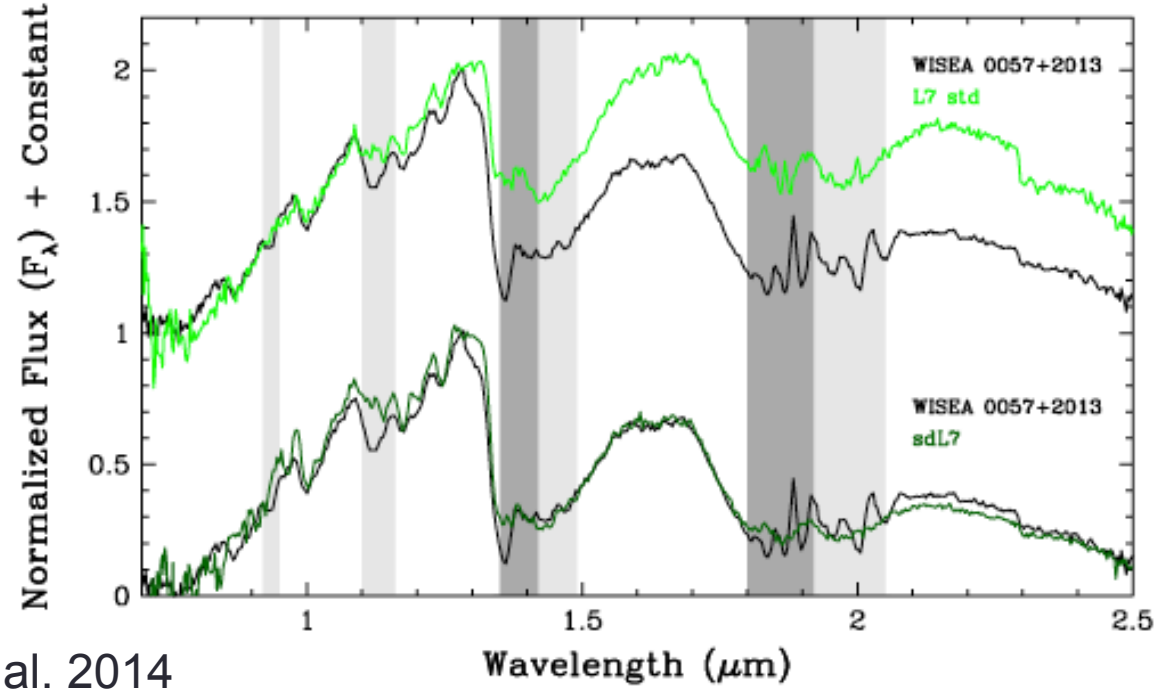


Kirkpatrick et al. 2014

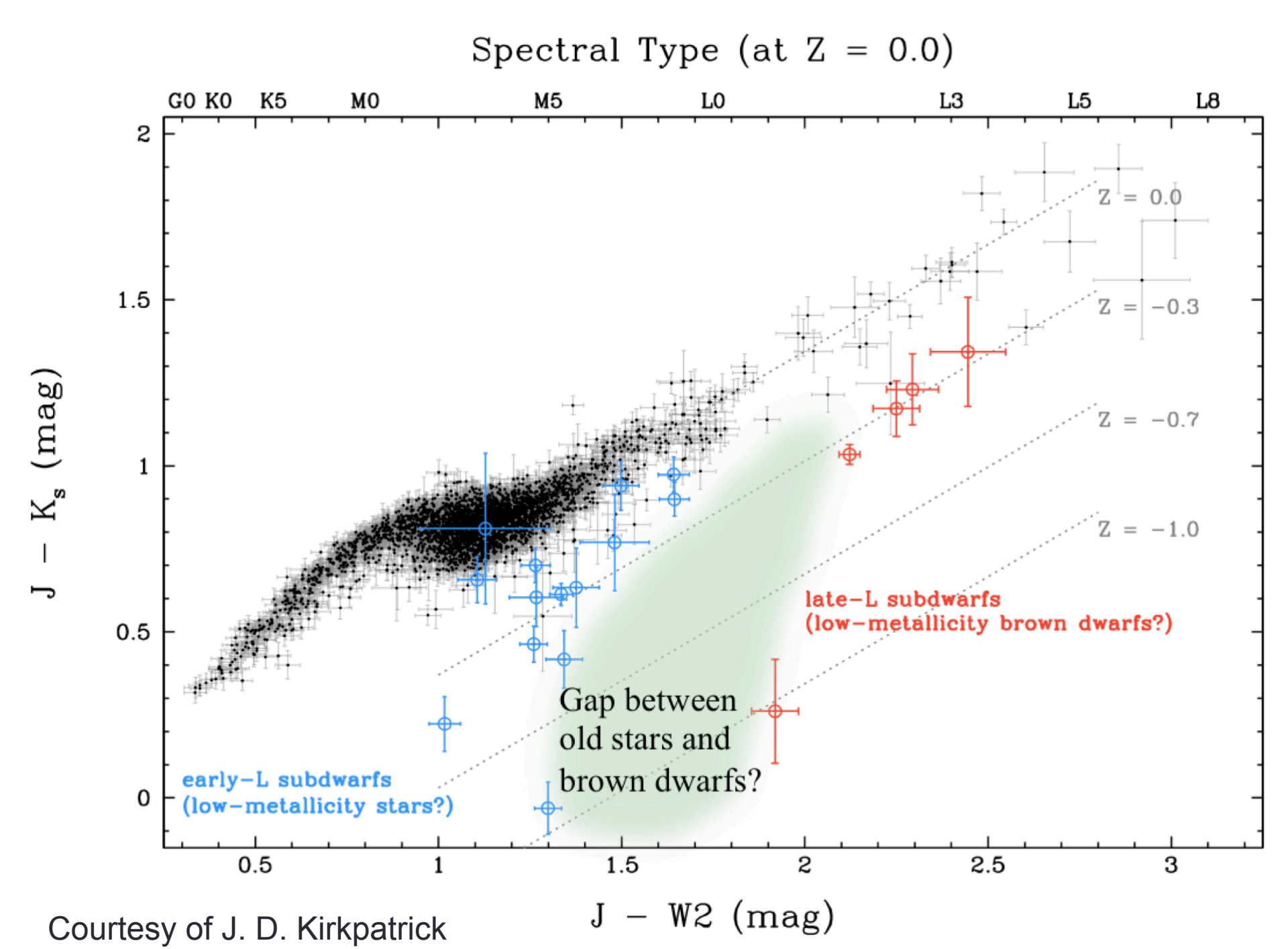


Kirkpatrick et al. 2014





Kirkpatrick et al. 2014

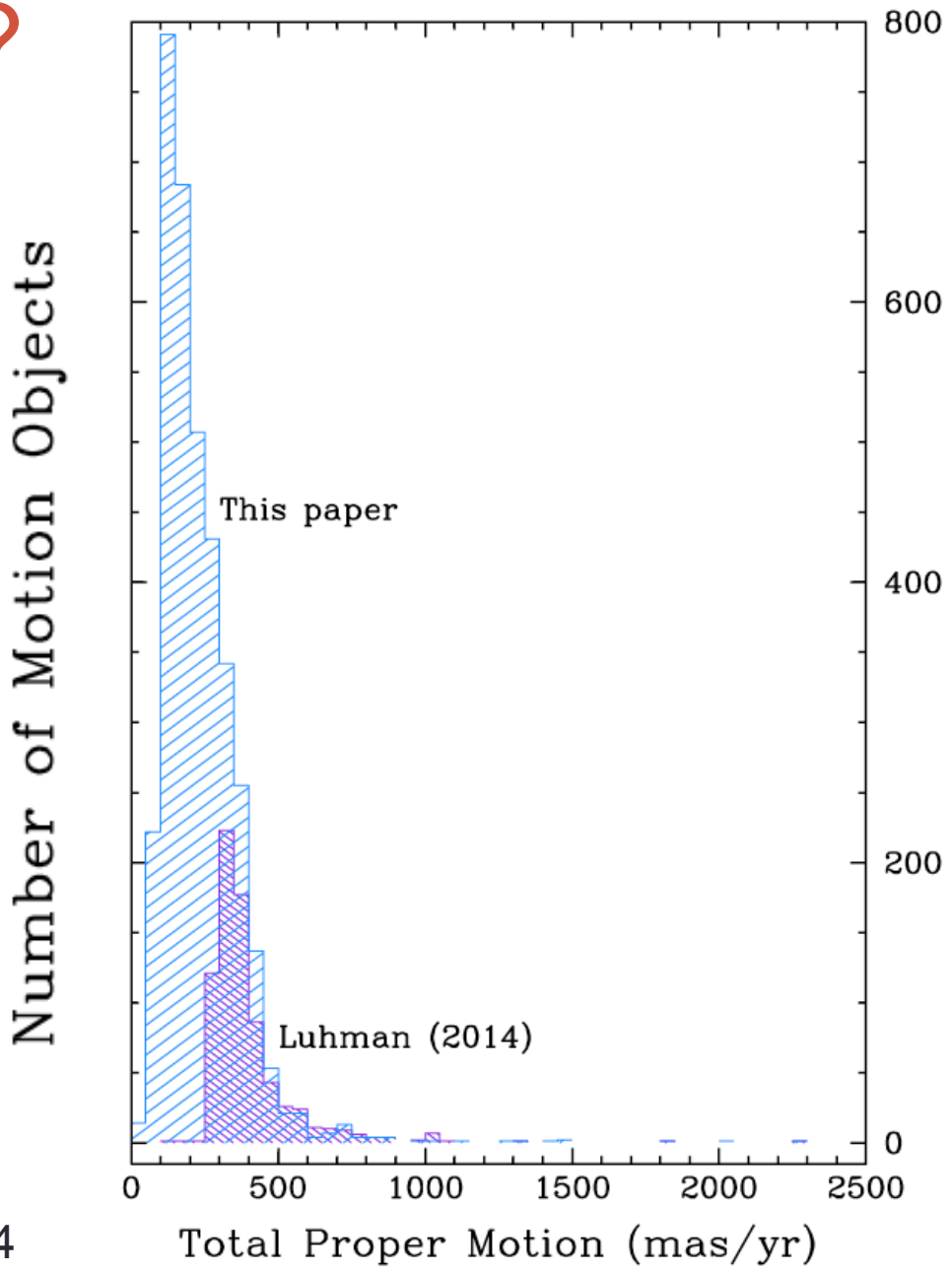


Courtesy of J. D. Kirkpatrick

Can we do better?

AllWISE1 missed 439 of the 762 objects discovered in Luhman (2014a)

~80% (351) failed to pass the rchi2/ rchi2_pm > 1.03 threshold

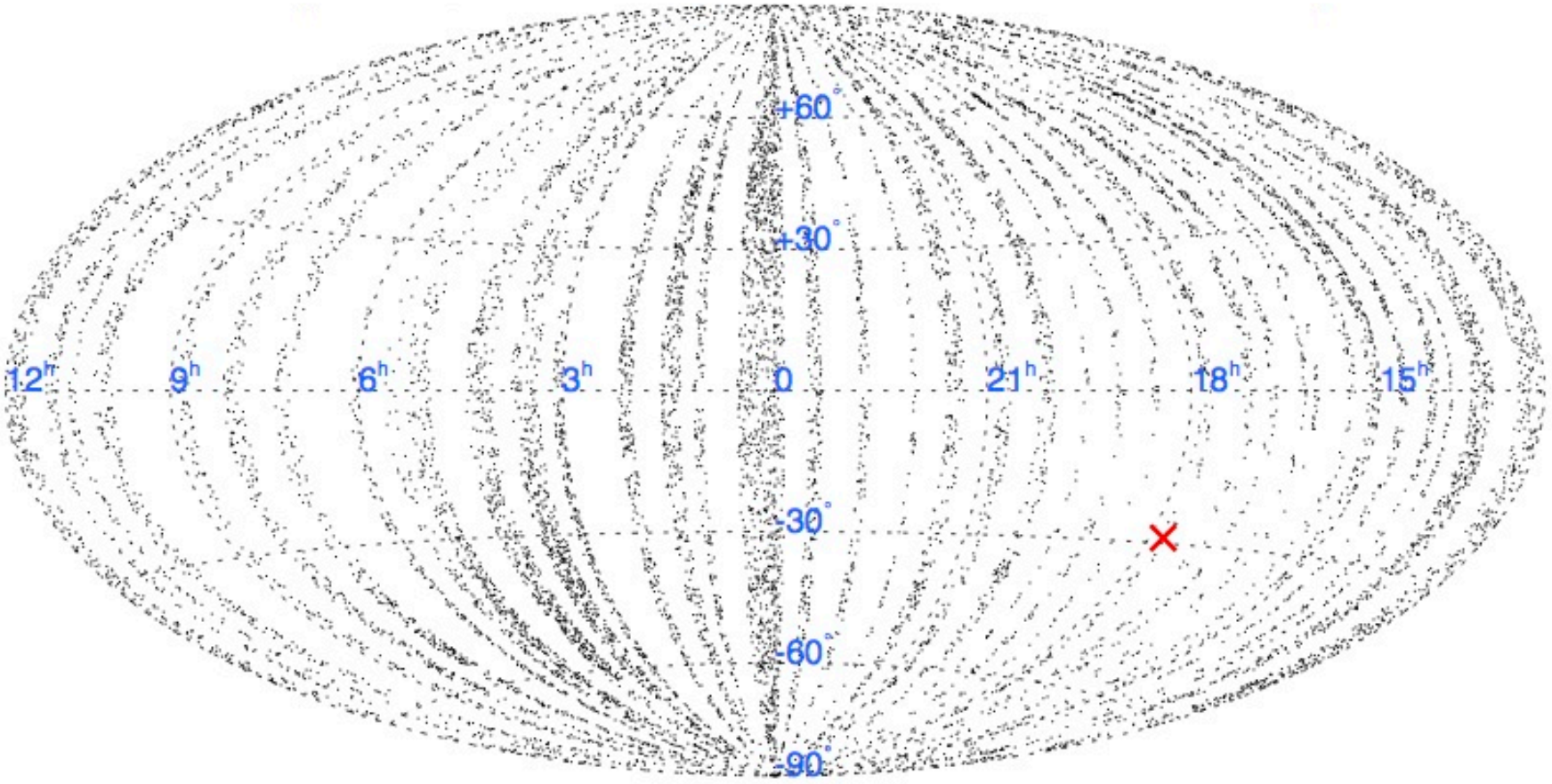


Kirkpatrick et al. 2014

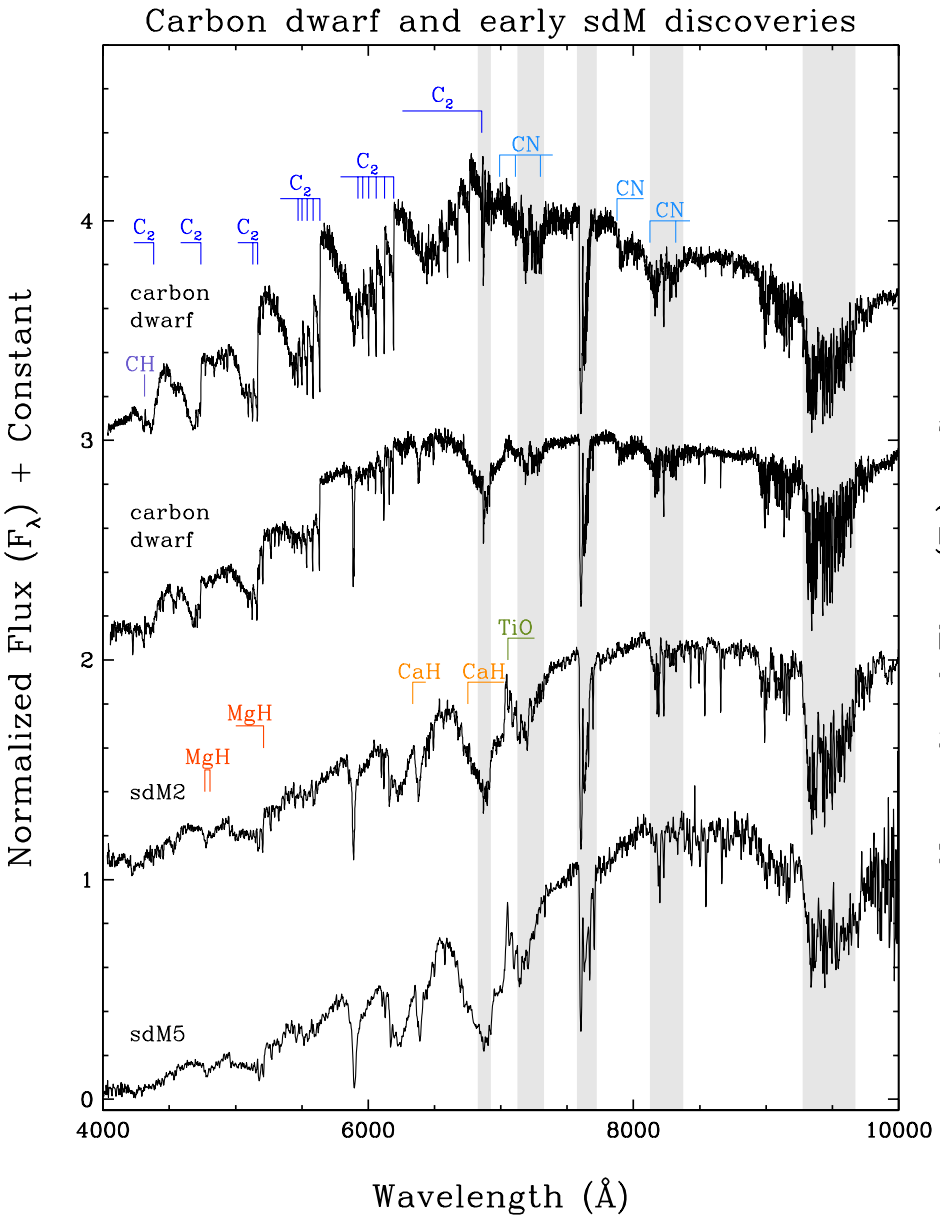
AllWISE2: What's New

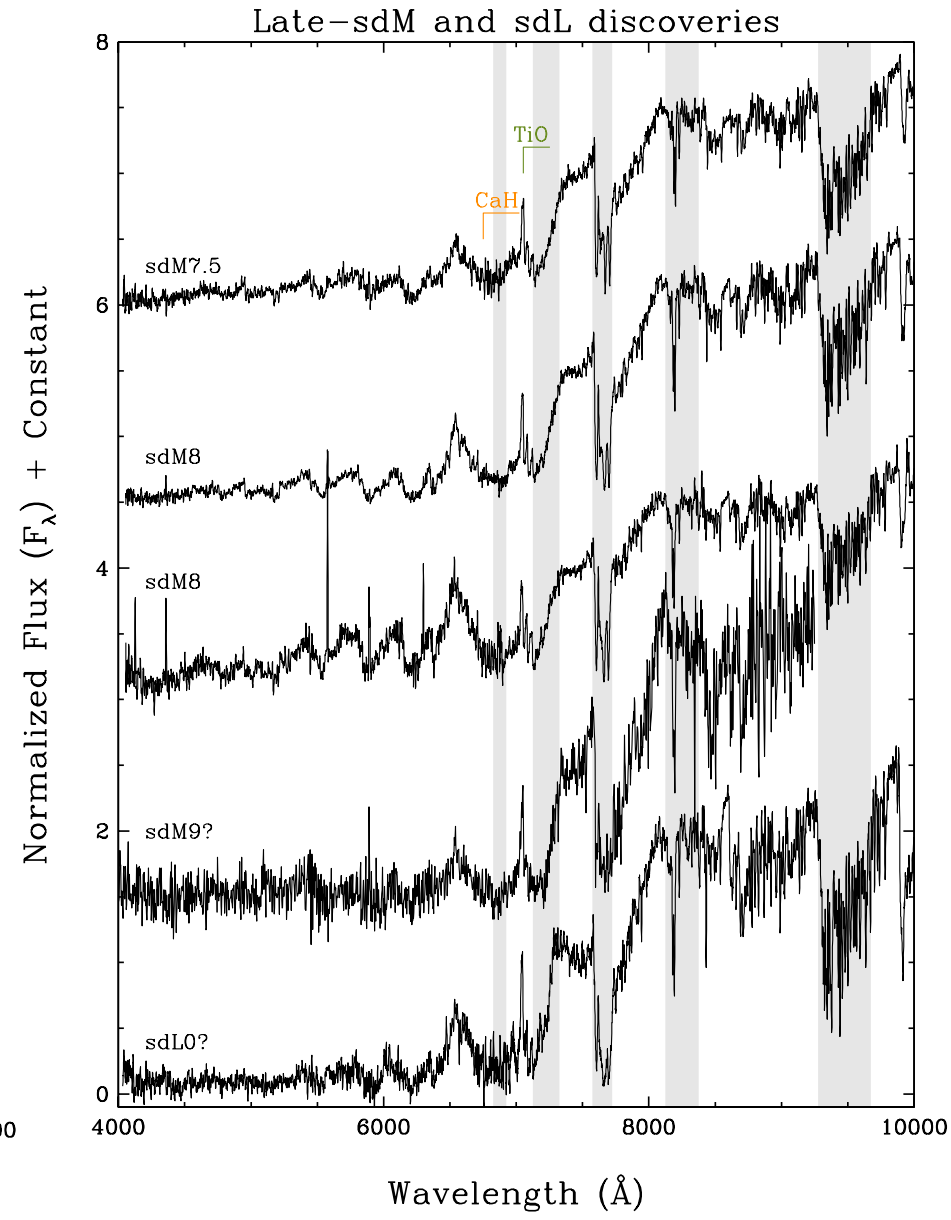
- Smaller motions – removed rchi2/rchi2_pm > 1.03 criteria – smallest motion ~0".05 yr^{-1}
- Total of ~1.4 million motion candidates
- Expect to uncover ~40,000 motion objects

AllWISE2 so far:
13,354 confirmed motion objects – 35.3% of sky done

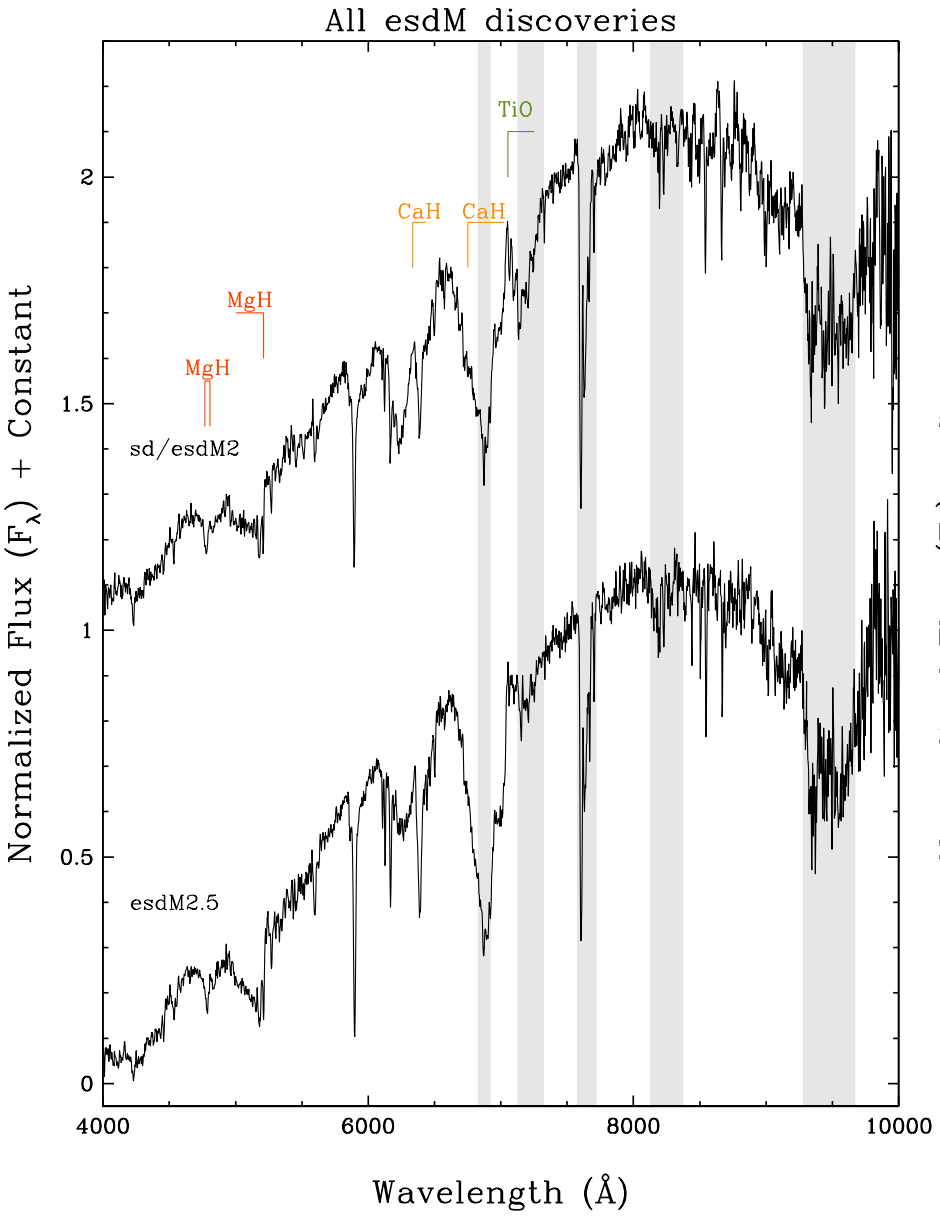


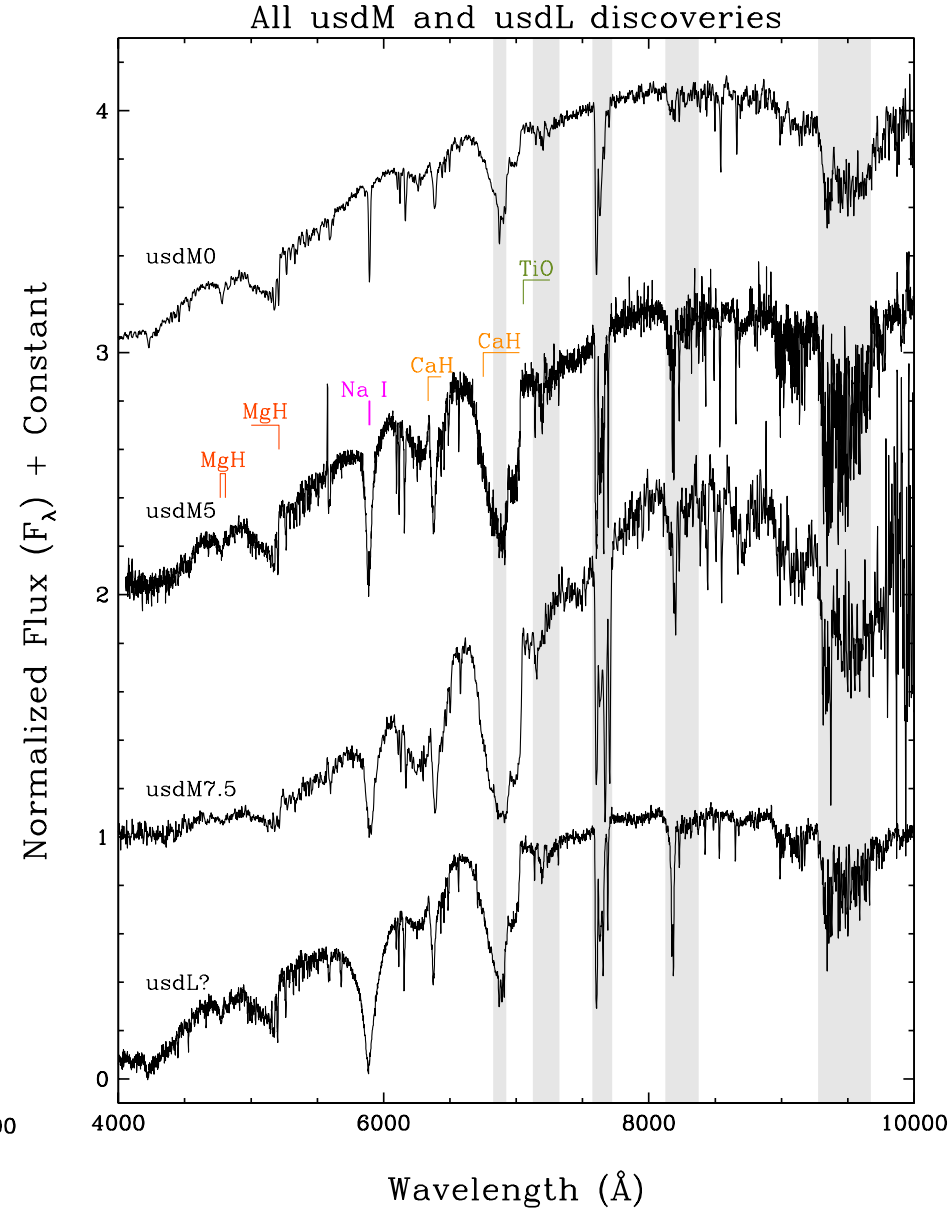
Courtesy of J. D. Kirkpatrick



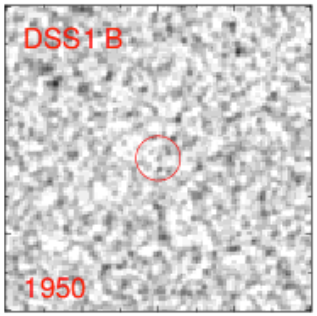


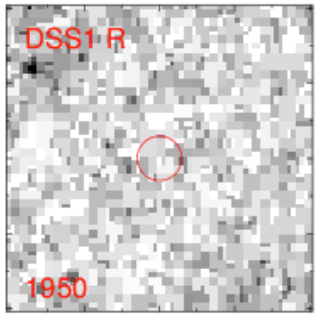
Courtesy of J. D. Kirkpatrick

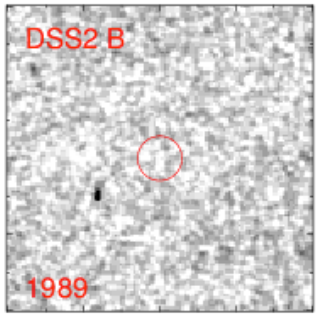


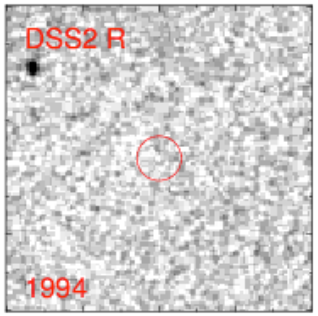


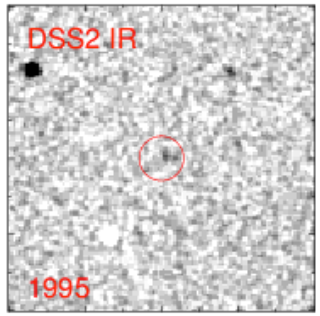
Courtesy of J. D. Kirkpatrick



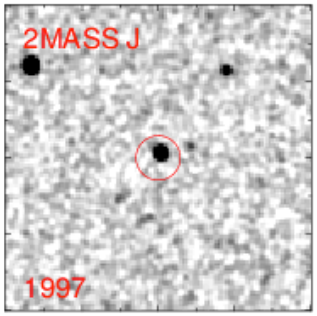


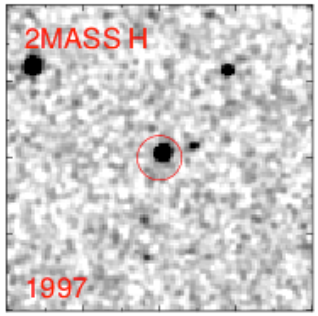


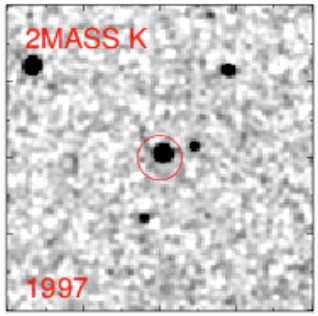




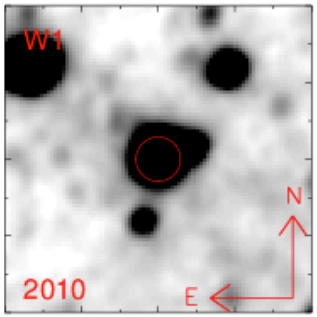
$J\text{-}K_s = 3.02$
J-W2 = 3.67
2MASS-AllWISE motion:
RA: 111.8 +/- 5.7 mas/yr
Dec: -75.1 +/- 5.6 mas/yr

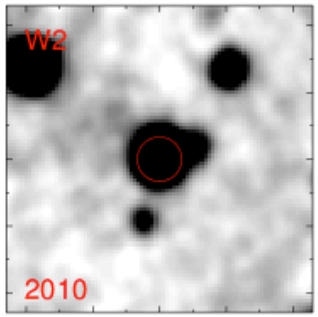


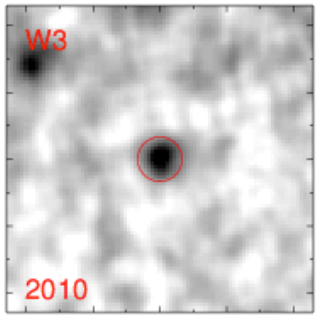


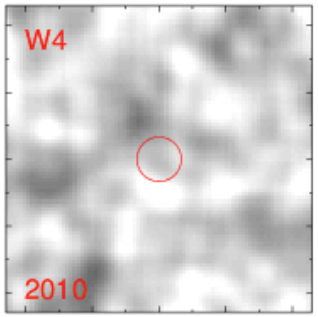


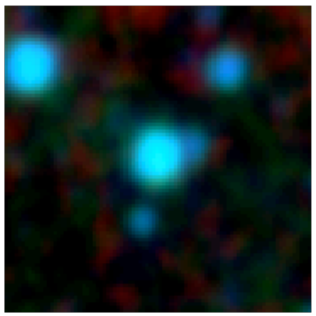
α = 04:18:47.955 (64.69981)
δ = +25:20:01.83 (+25.33384)
l = 171.13
b = –17.57

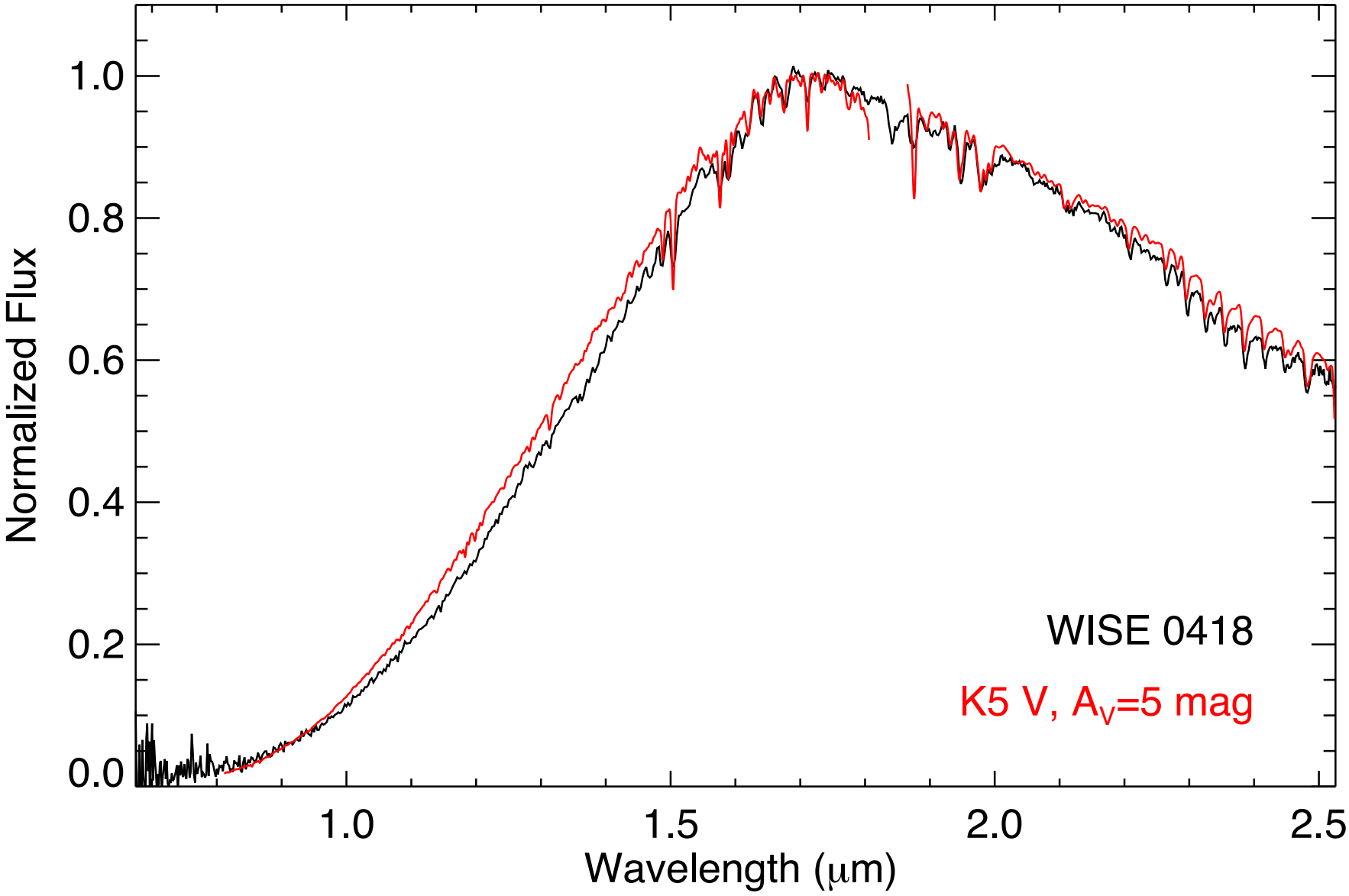












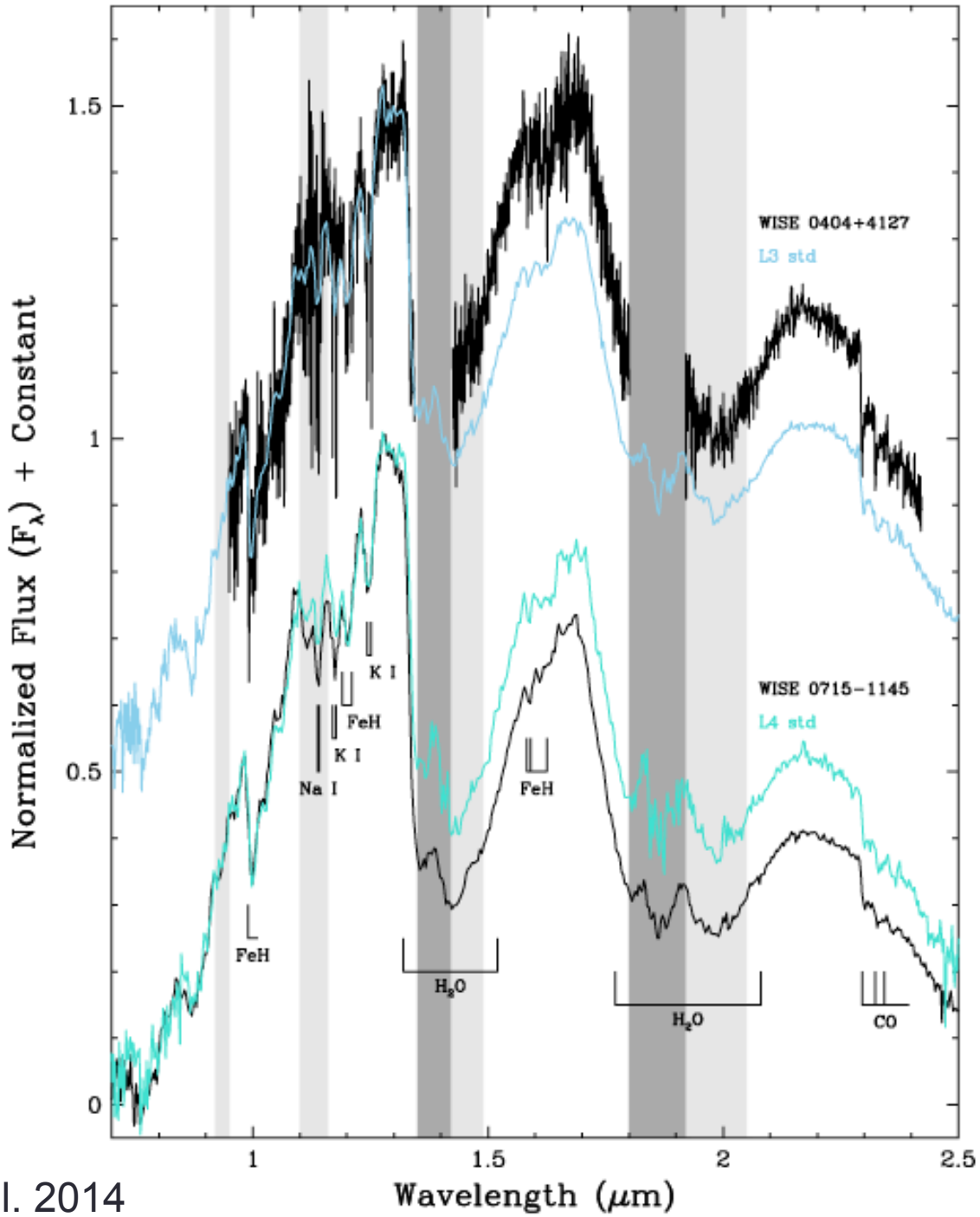
Courtesy of M. Cushing and A. Schneider

Still serendipitously finding strange, interesting objects

See poster #9 by Sergio Fajardo-Acosta

Prospects

- Create complete map of solar neighborhood
- Map out subdwarf gap – if it exists
- Find unusually red and blue brown dwarfs and young objects



Kirkpatrick et al. 2014

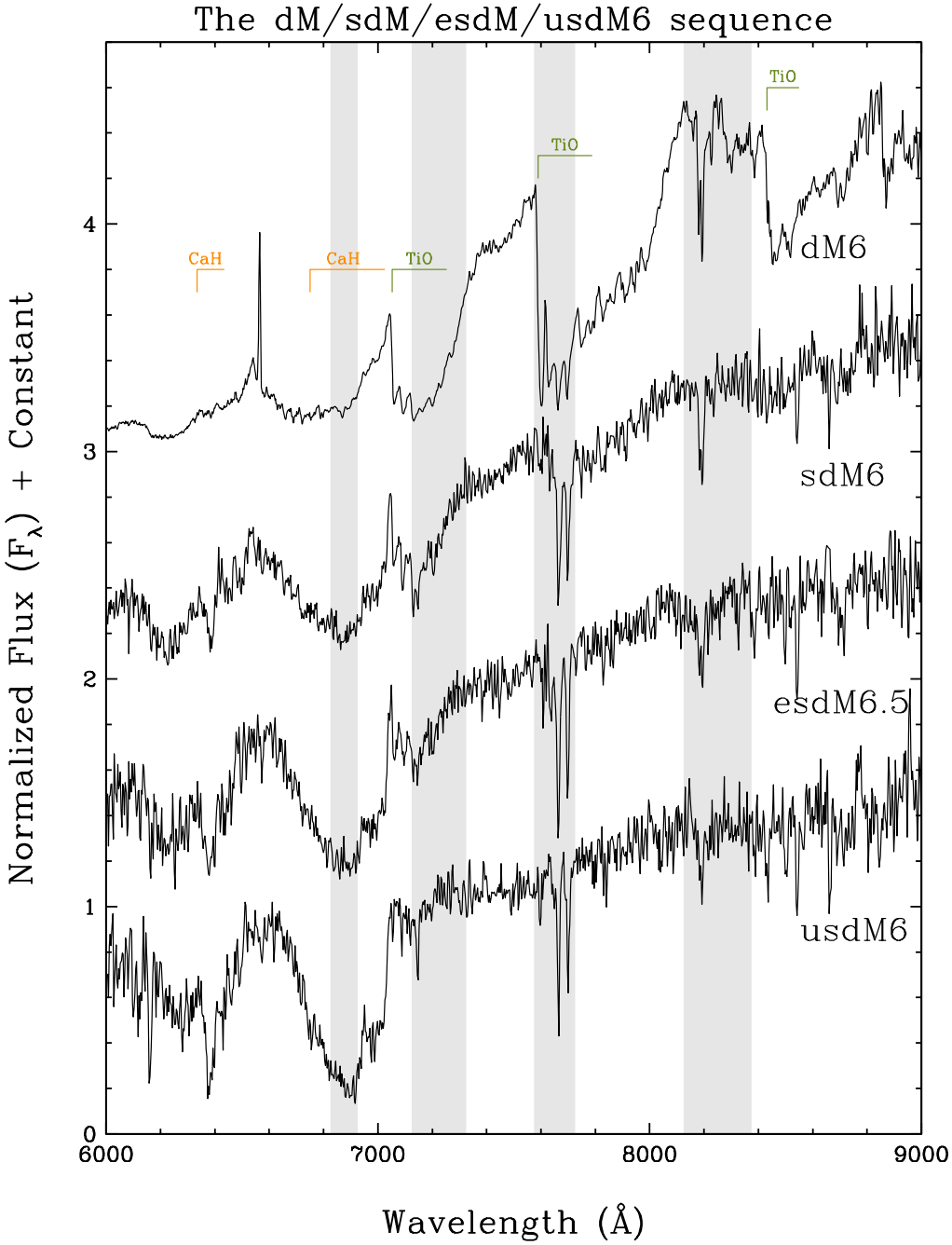
Summary

AllWISE1 has already had a number of interesting discoveries

- Potential subdwarf gap
- Red and blue brown dwarfs
- Interesting binaries

AllWISE2: Hope to find many, many more

Thank you!


The dM/sdM/esdM/usdM6 sequence
Normalized Flux (F_λ) + Constant
Wavelength (Å)
CaH
CaH
TiO
TiO
TiO
dM6
sdM6
esdM6.5
usdM6
0
1
2
3
4
6000
7000
8000
9000