NEW ULTRACOOL DWARFS IN *GAIA* DR2

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(Reid&Gizis97， Bochanski+10)

Bonfils+18

(Kirkpatrick+97)

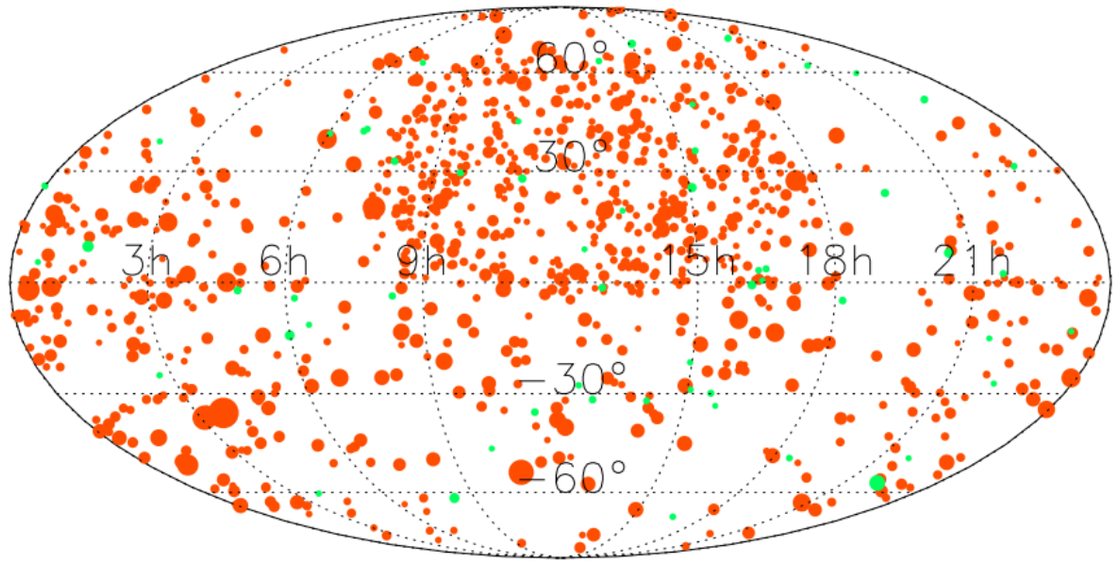
(Baraffe+15)

rather than purely photometric, selection.

Smart+17

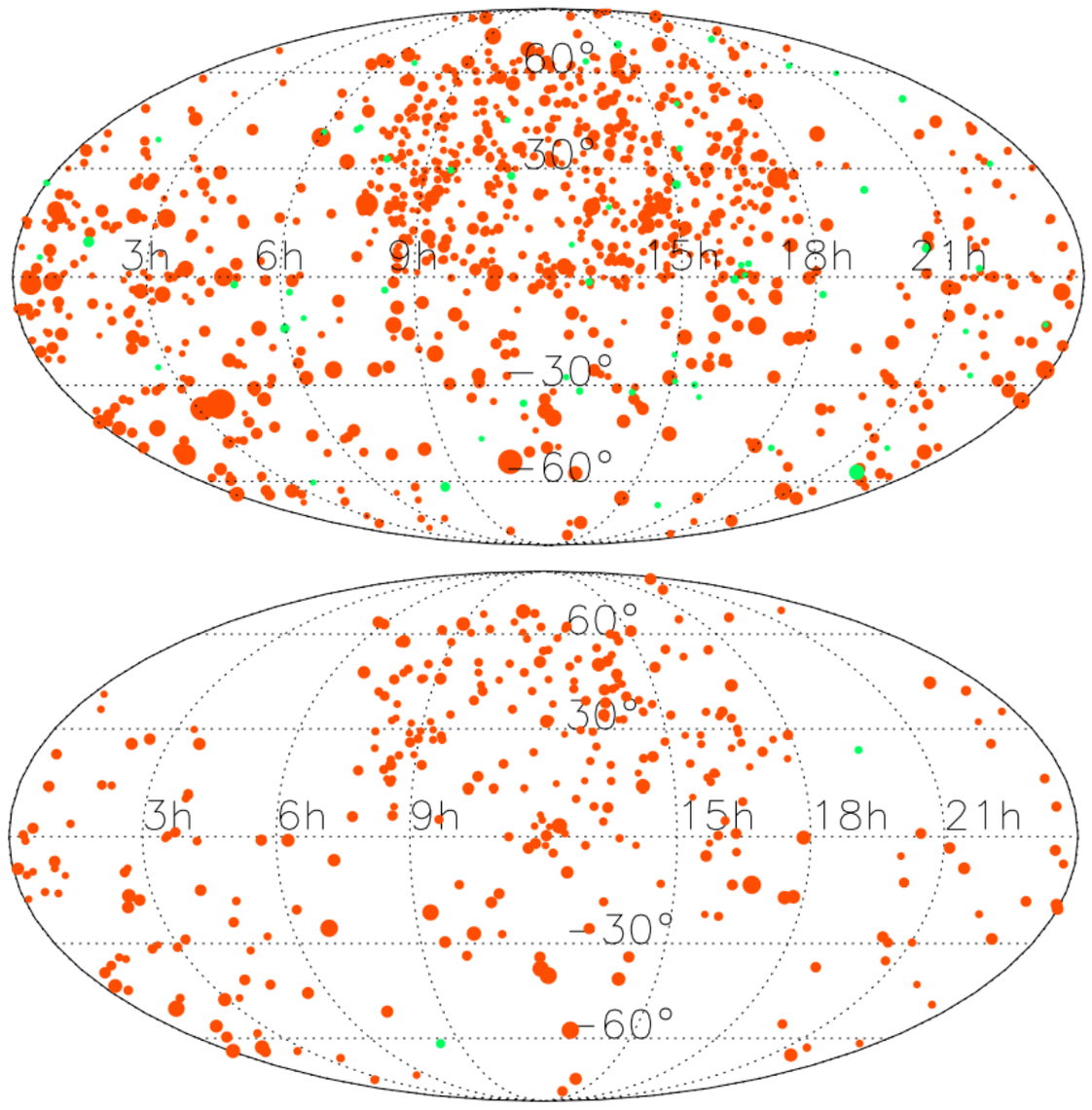
L SpT	$D_{G<20.7}$ (pc)	T SpT	$D_{G<20.7}$ (pc)
L0	82	T0	14
L1	67	T1	14
L2	54	T2	14
L3	44	T3	14
L4	35	T4	14
L5	29	T5	12
L6	23	T6	10
L7	19	T7	7
L8	15	T8	4
L9	12	T9	2

(Smart+17)



(Smart+17)

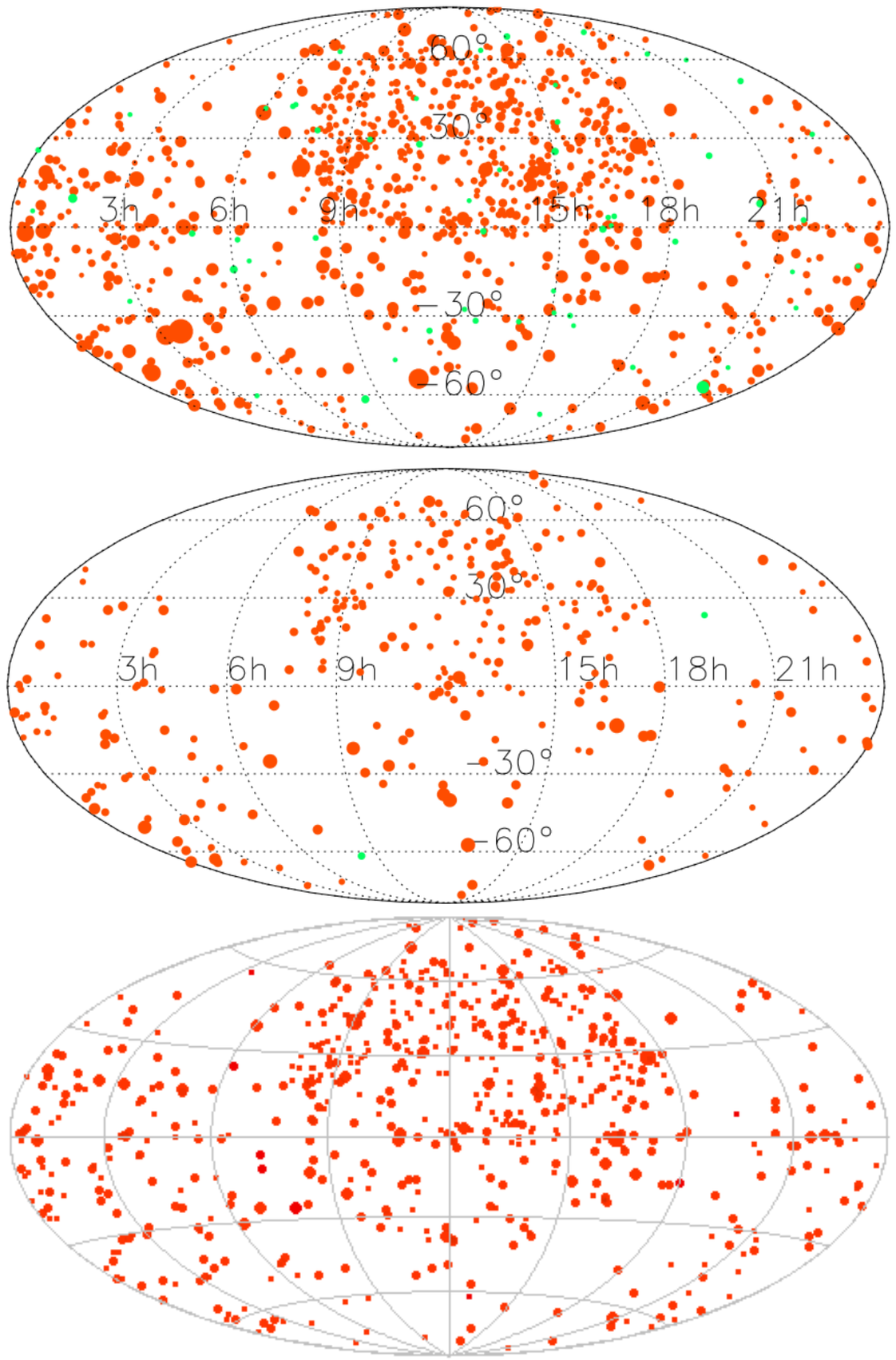
(Smart+17)



(Smart+17)

(Smart+17)

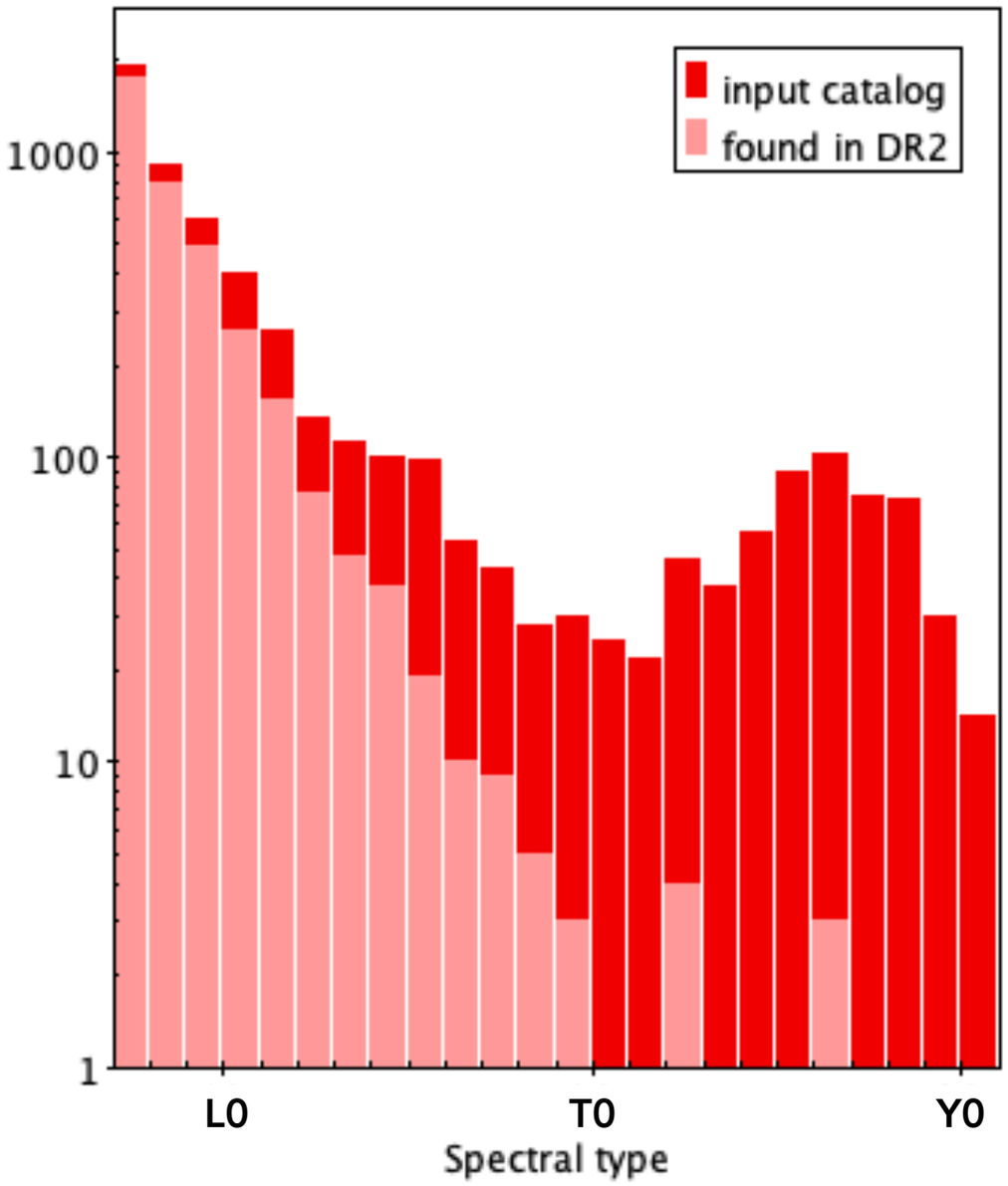
(Reylé18, Smart+19)

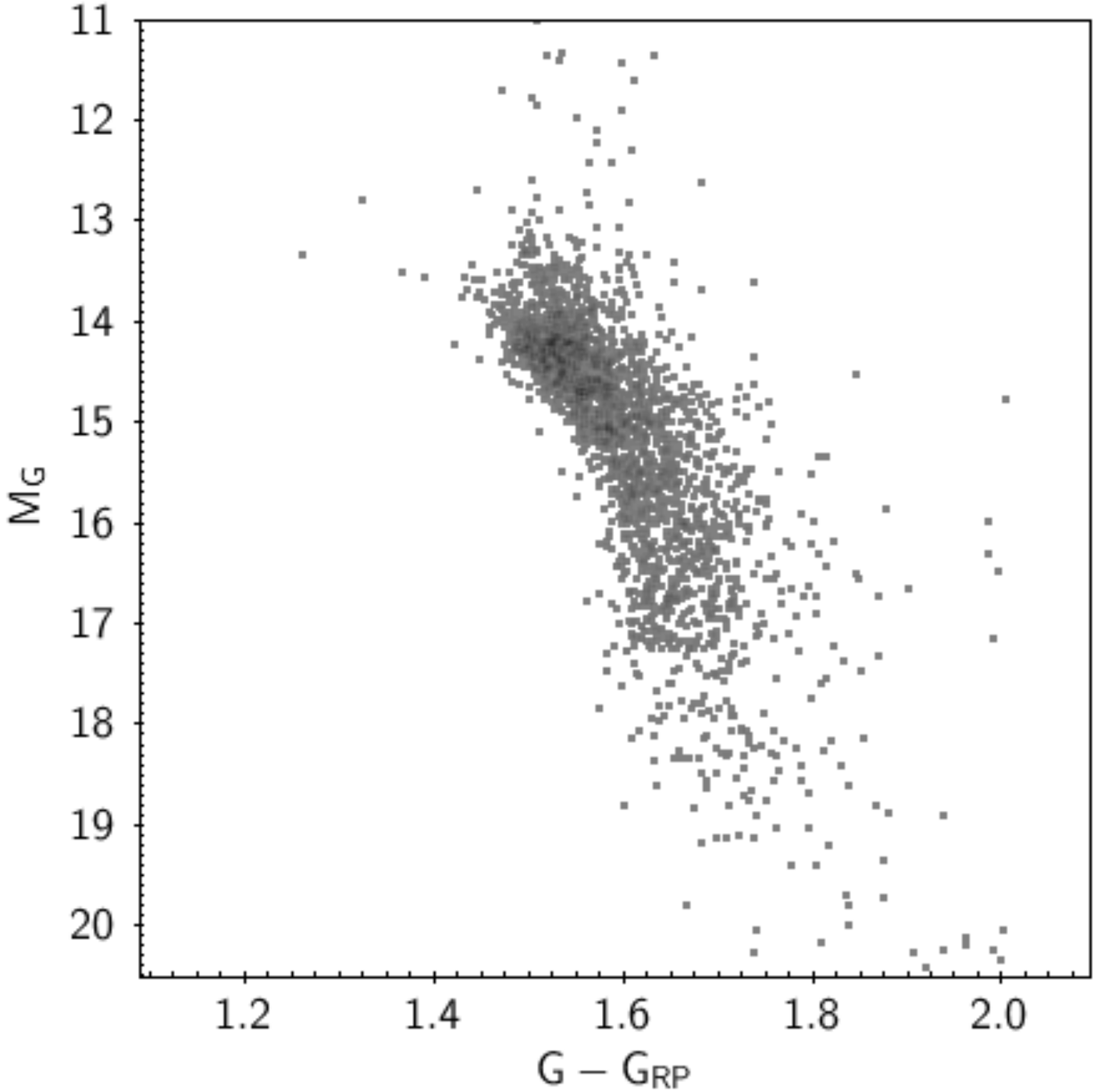


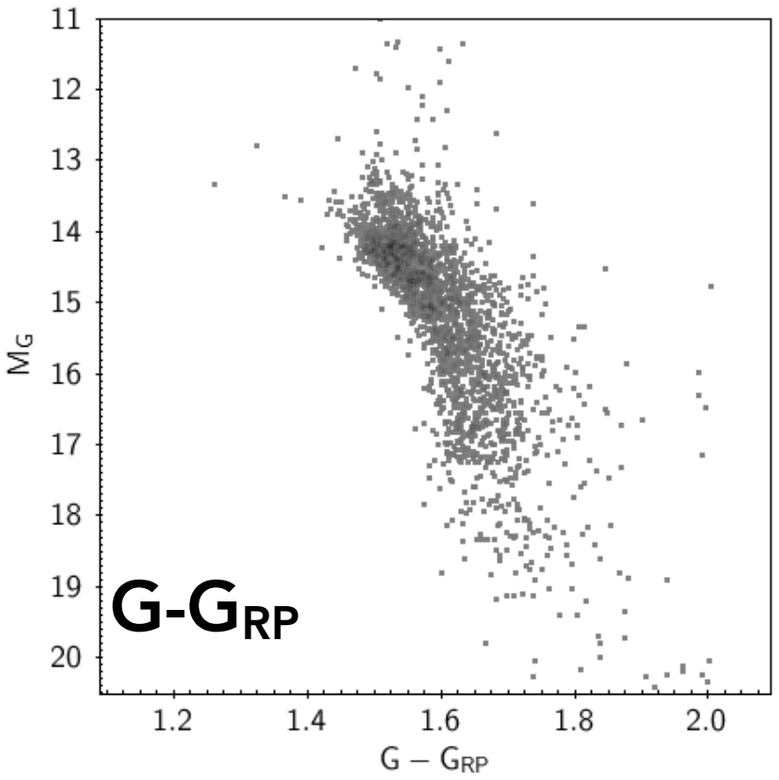
J. Gagné

(Rajpurohit+14, Marocco+15, Robert+16, Faherty+16, Zhang+18, Scholz&Bell18, Faherty+18)

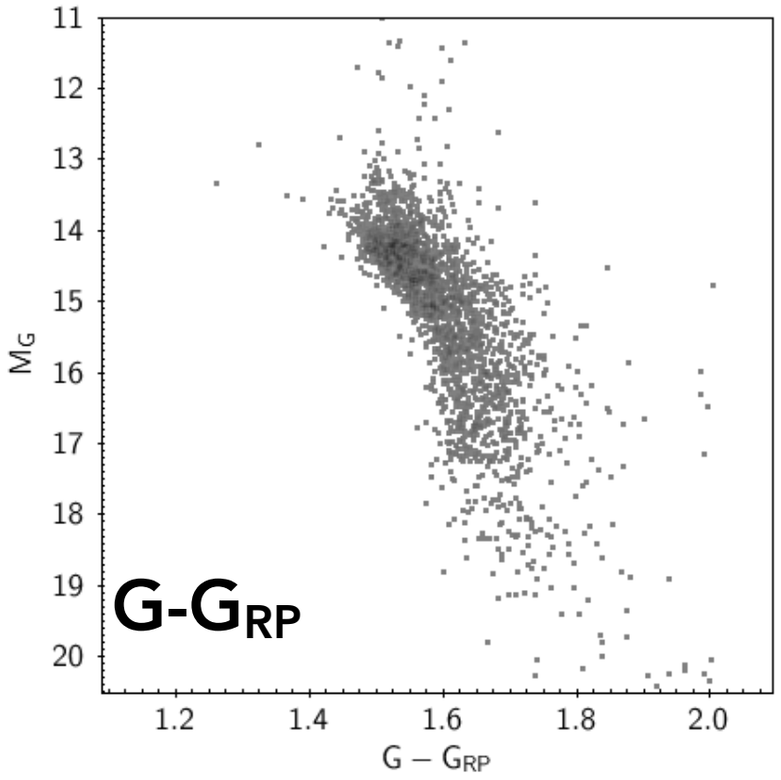
(Reylé18, Smart+19)

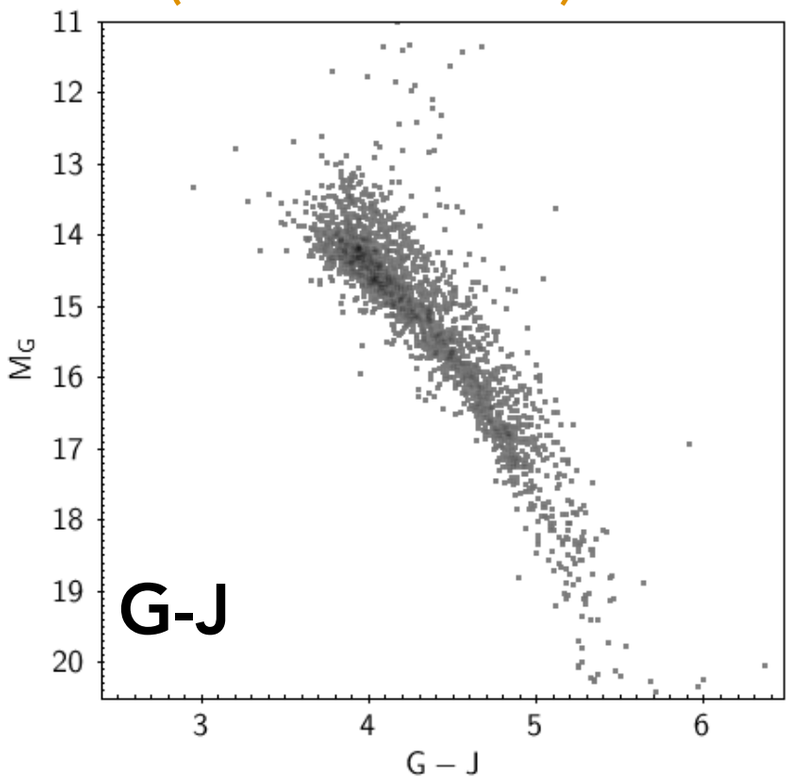


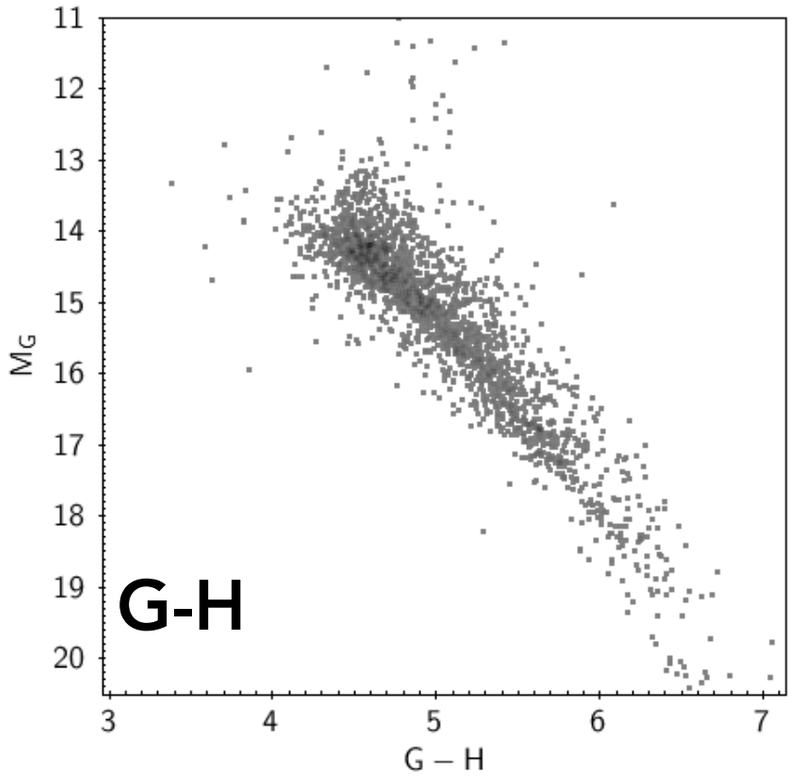

11
12
13
14
15
16
17
18
19
20
M_G
1.2
1.4
1.6
1.8
2.0
$G - G_{RP}$

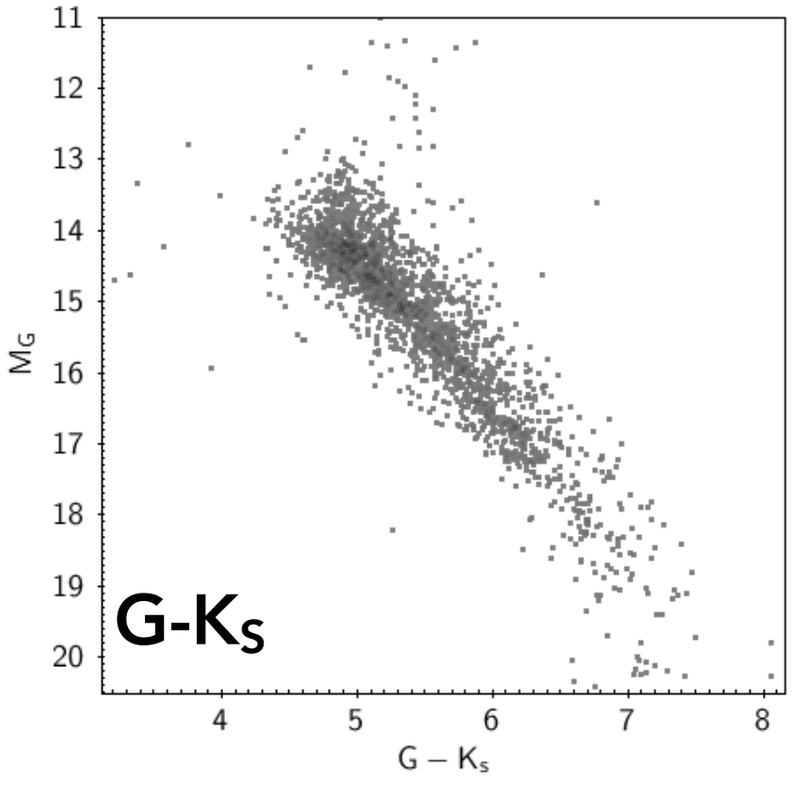

G-G_RP
M_G
G − G_RP
11
12
13
14
15
16
17
18
19
20
1.2
1.4
1.6
1.8
2.0

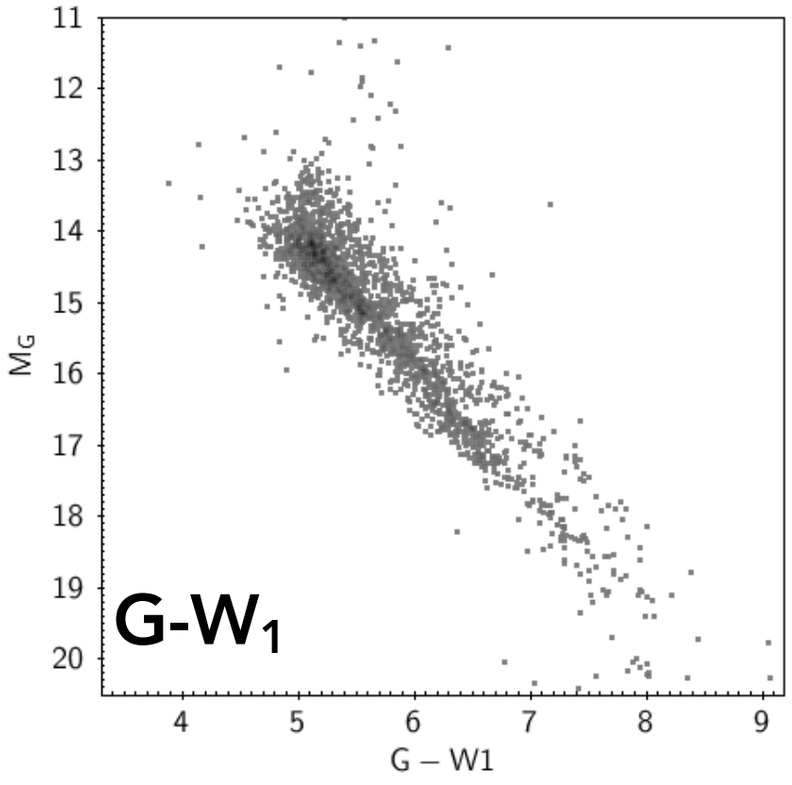
(Marrese+17)

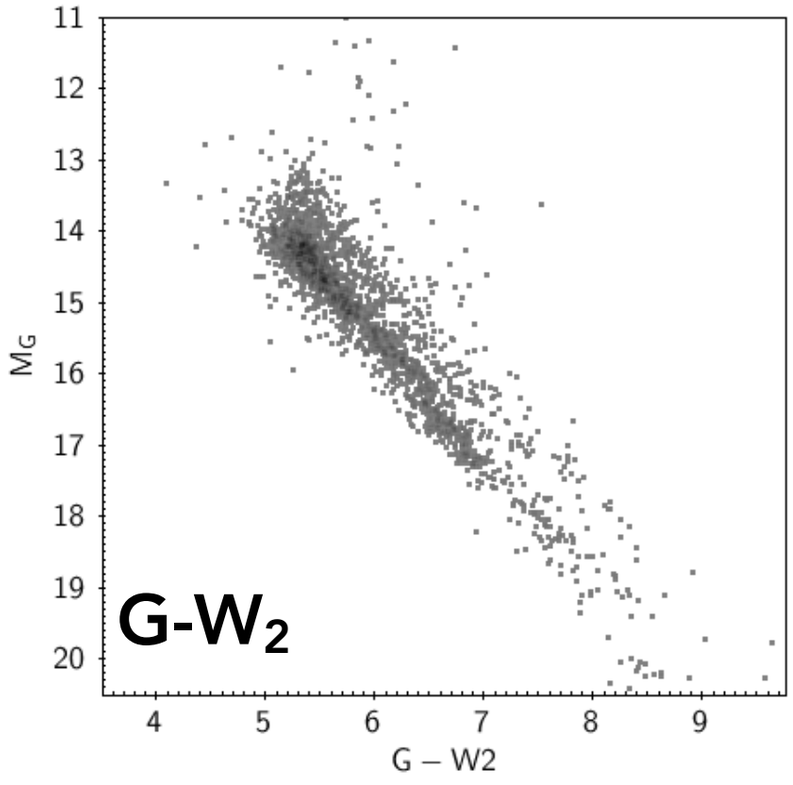




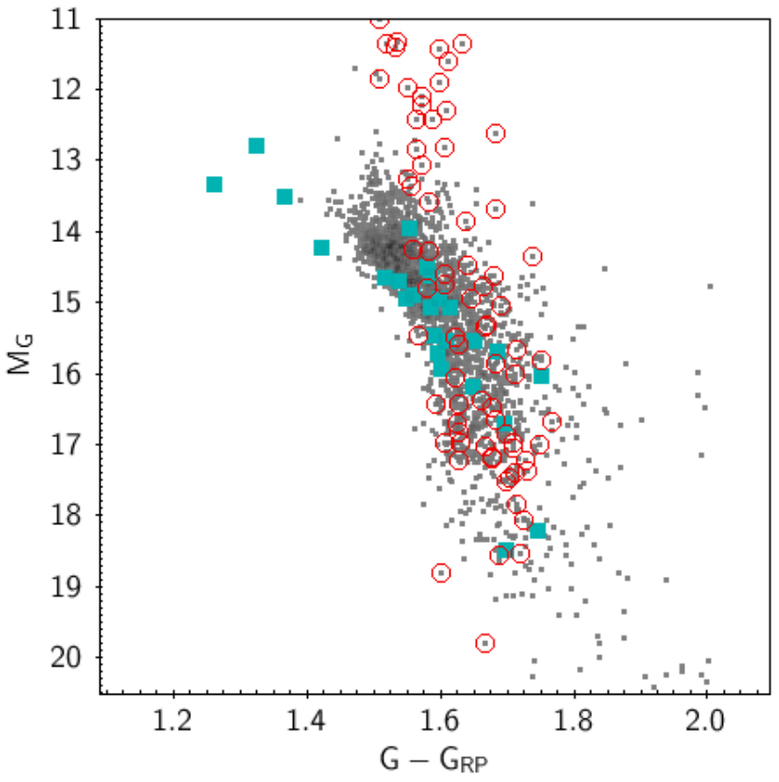


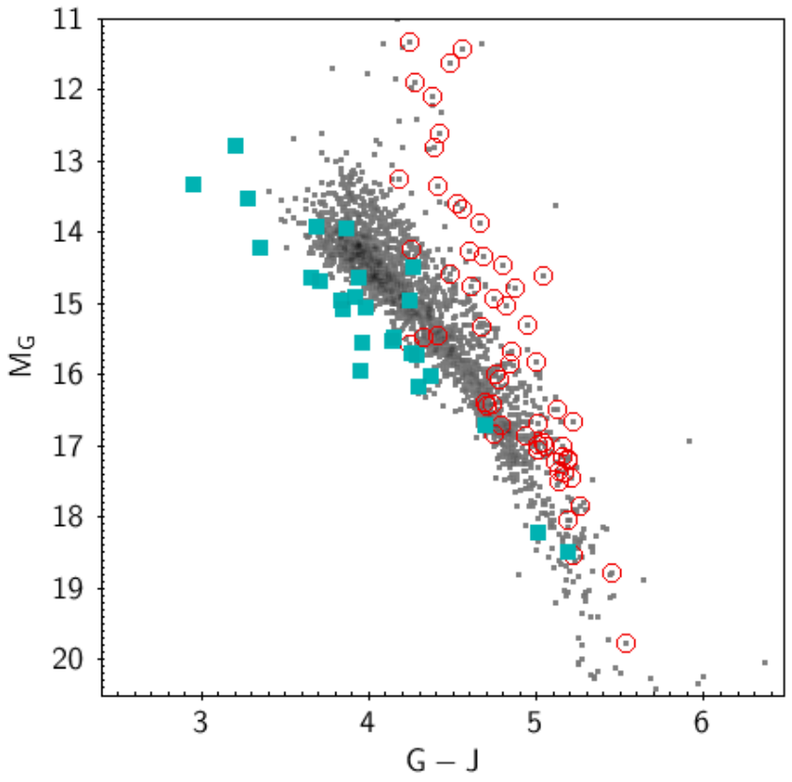


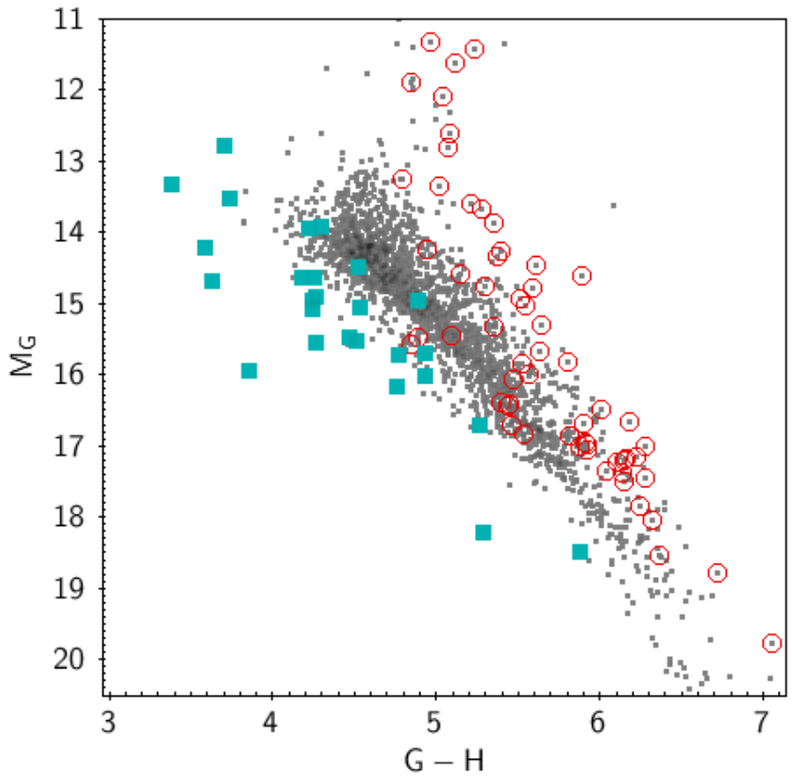


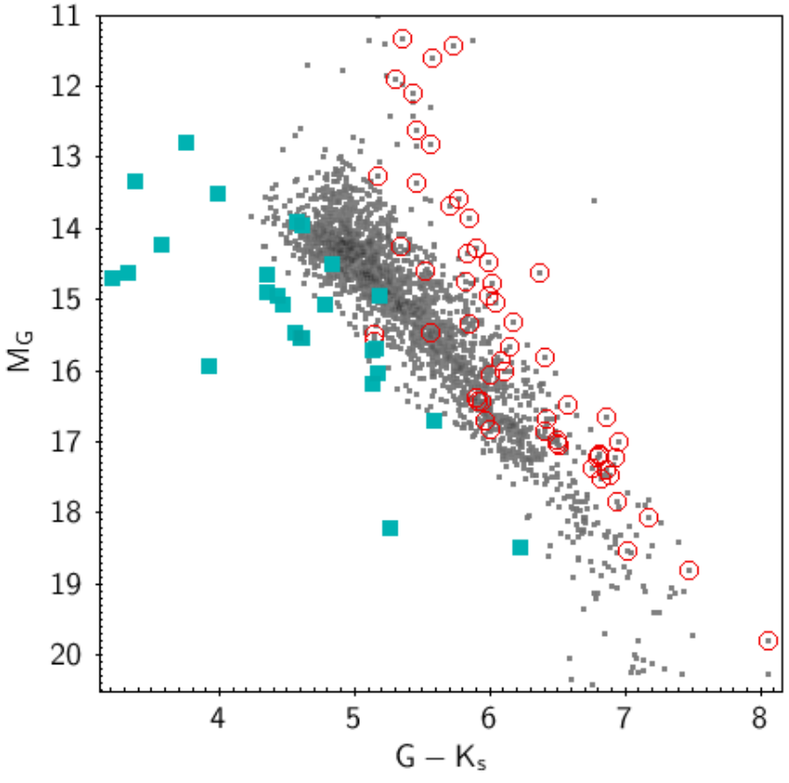


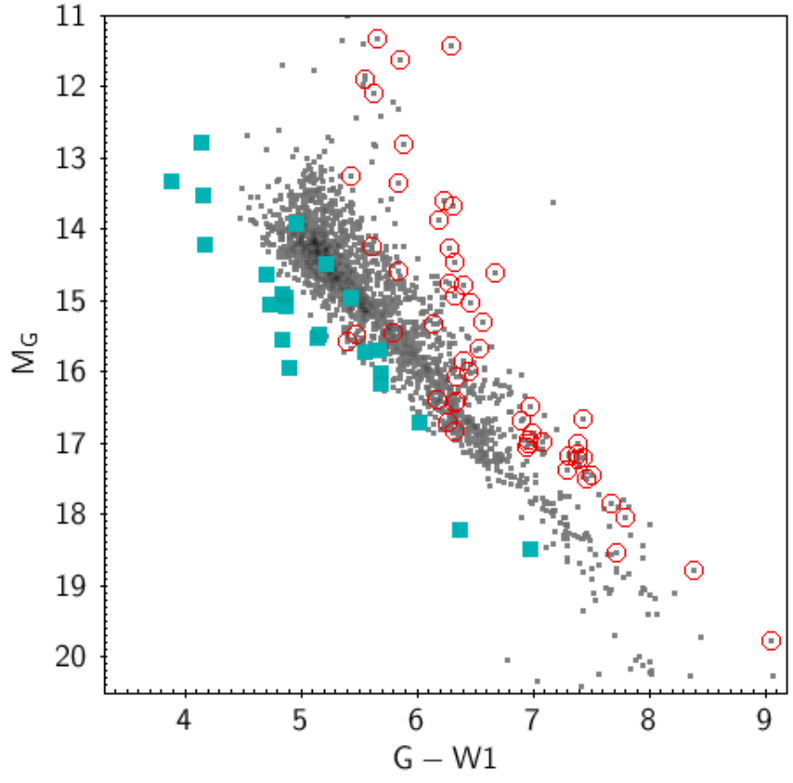
Subdwarfs
Young

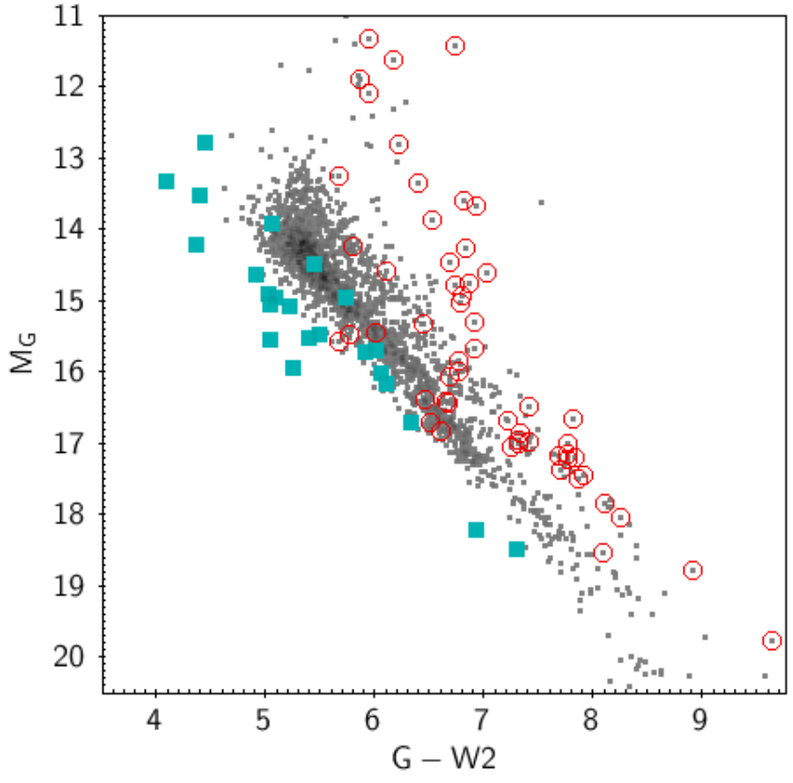




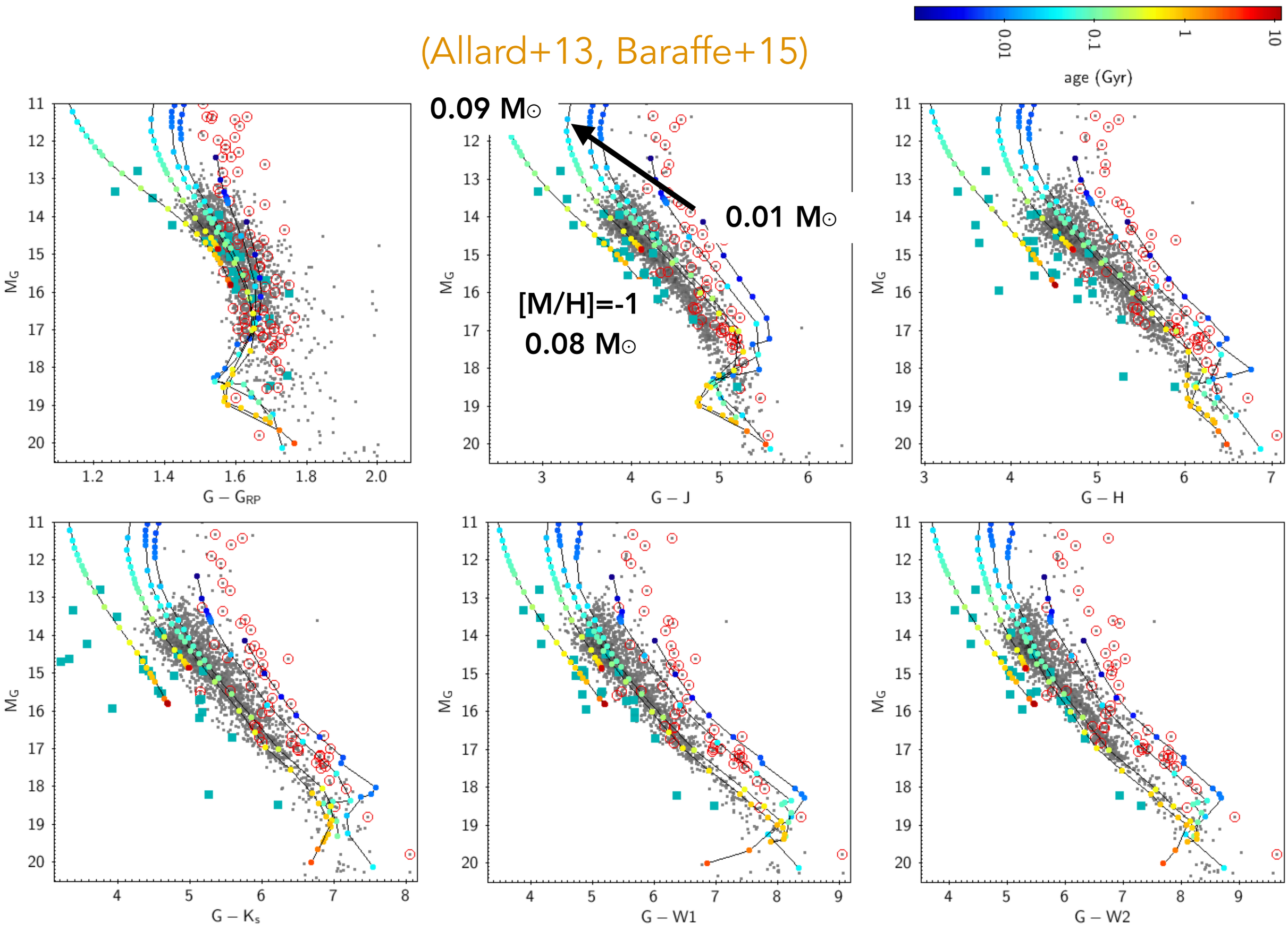


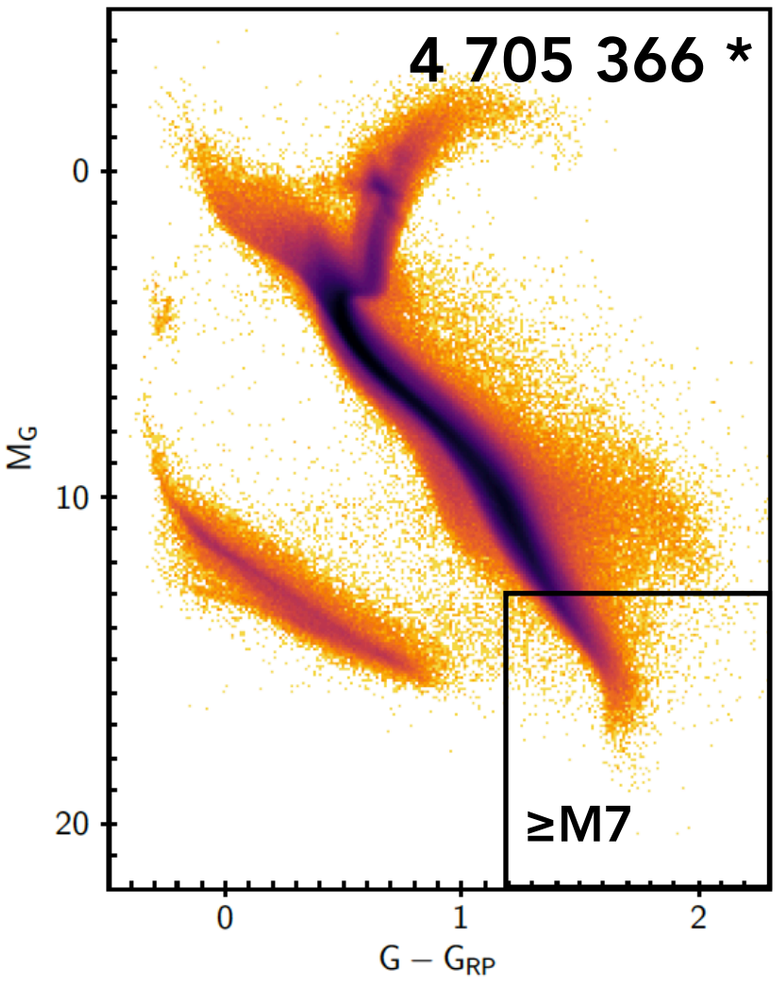






(Allard+13, Baraffe+15)



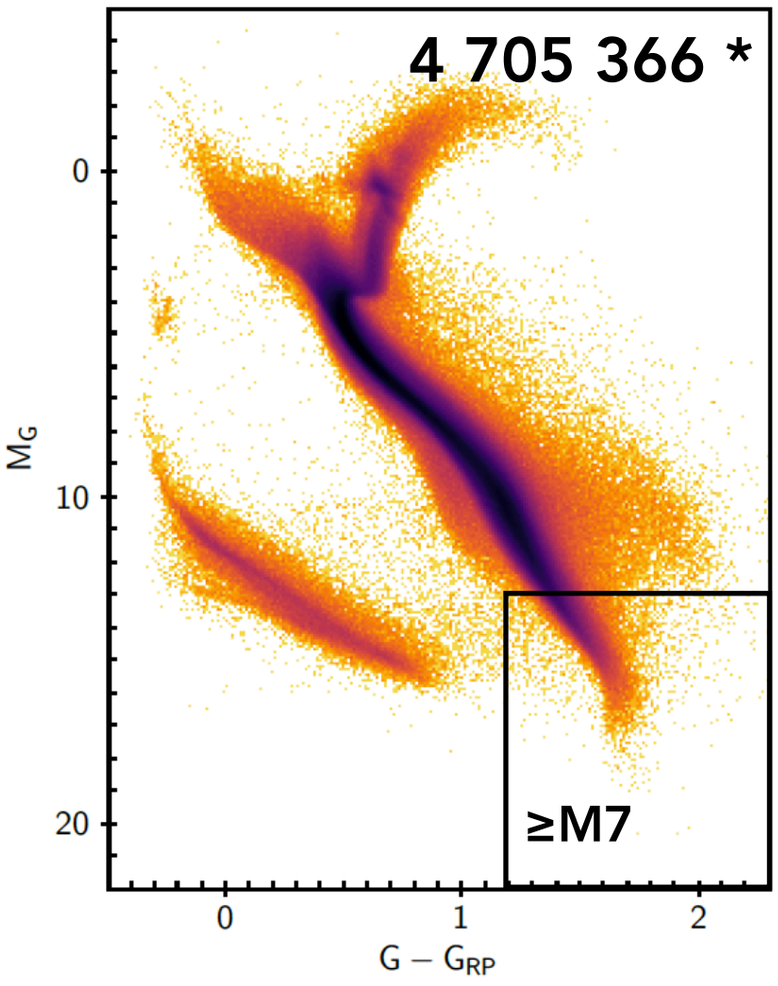


In order to select **robust candidates** from their excepted locus in the HR diagram, we filtered DR2 data following Gaia coll., Babusiaux+18.

→ $\sigma_{parallax}$<10%, σ_{MG}<0.22

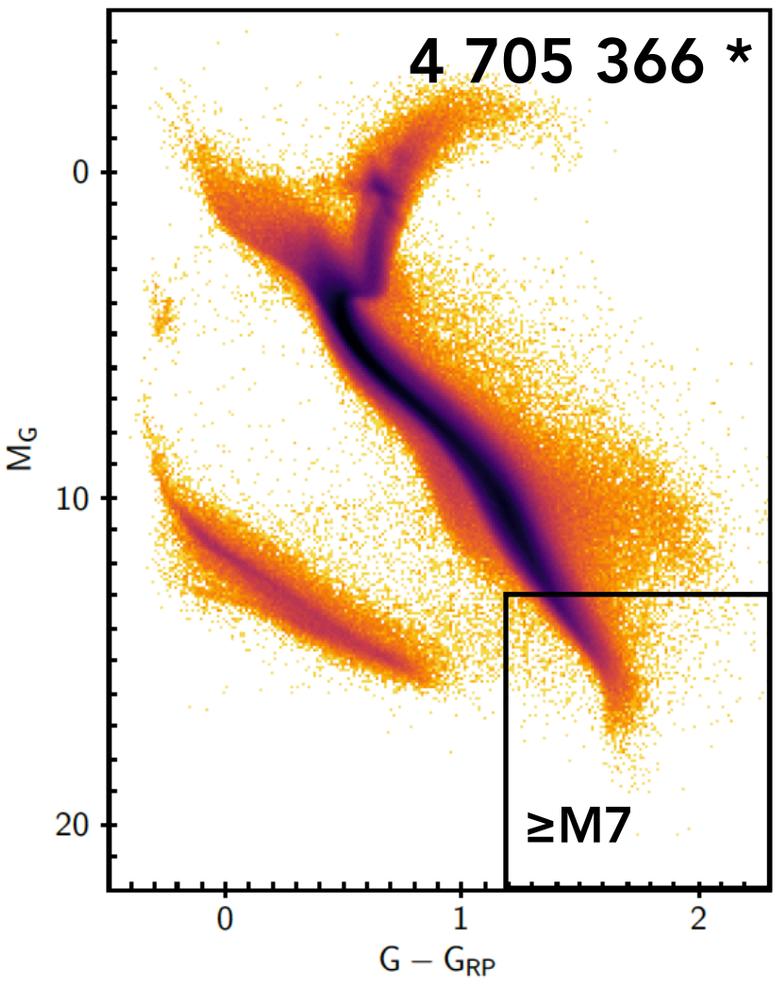
→ σ_G<0.022, σ_{GRP}<0.054

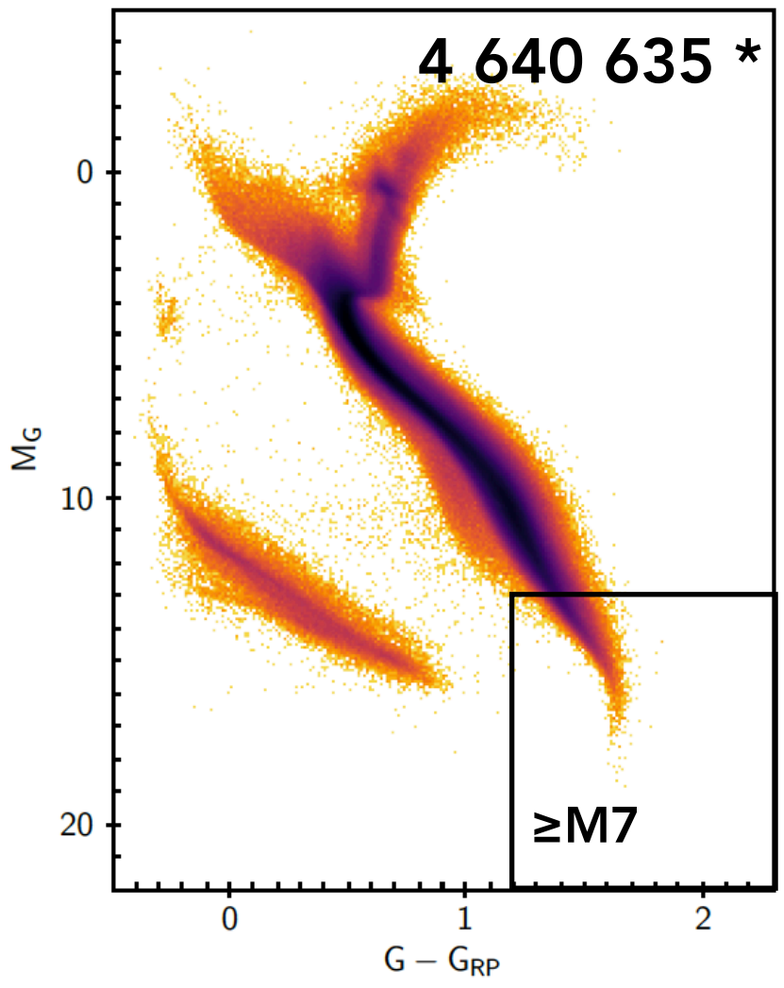
We also restricted to low extinct sources using Capitanio+17 3D extinction map:

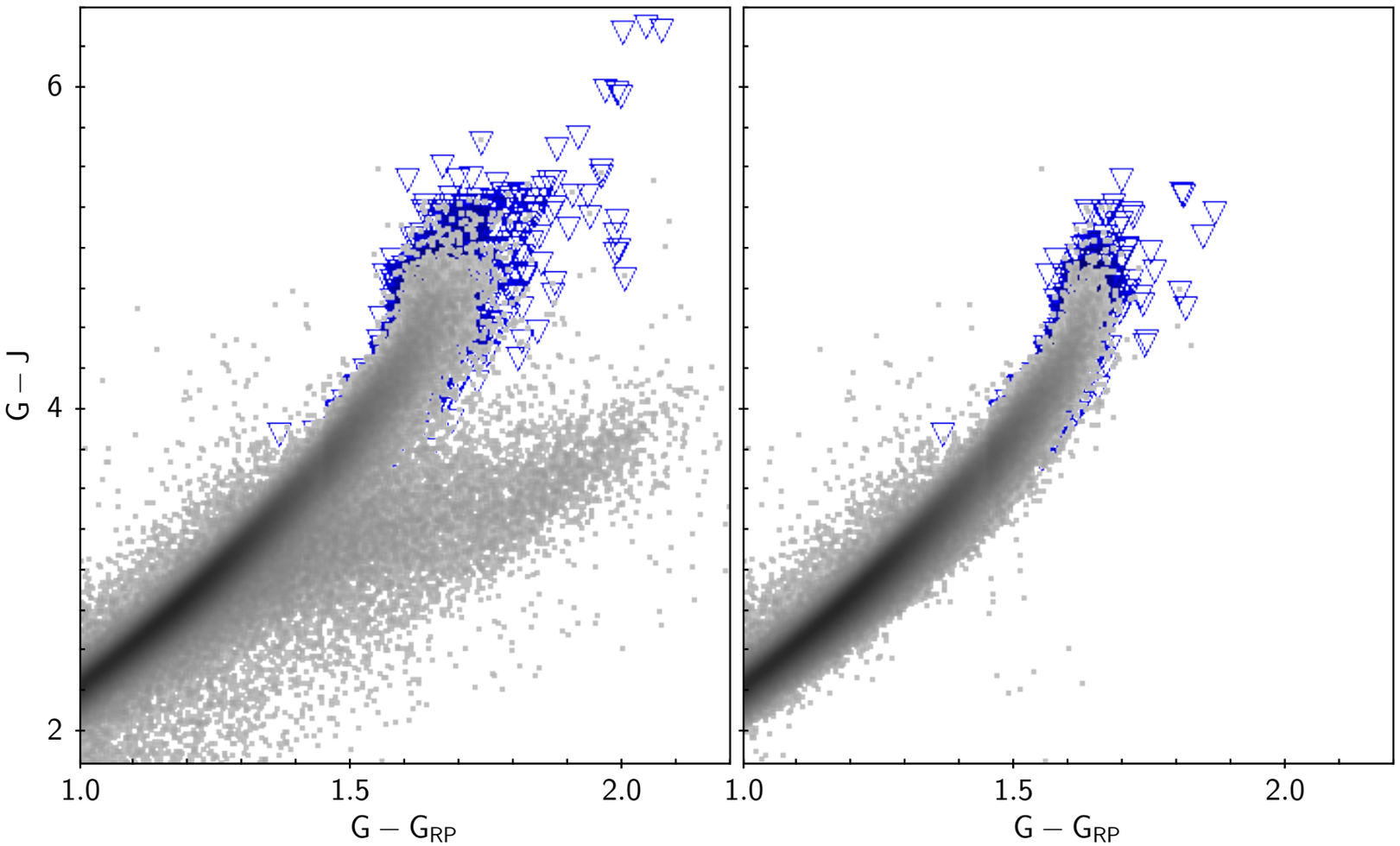


(Evans+18, Arenou+18)

$$(I_{BP} + I_{RP})/I_G \geq 1.3 + 0.06 \times (G_{BP} - G_{RP})^2$$

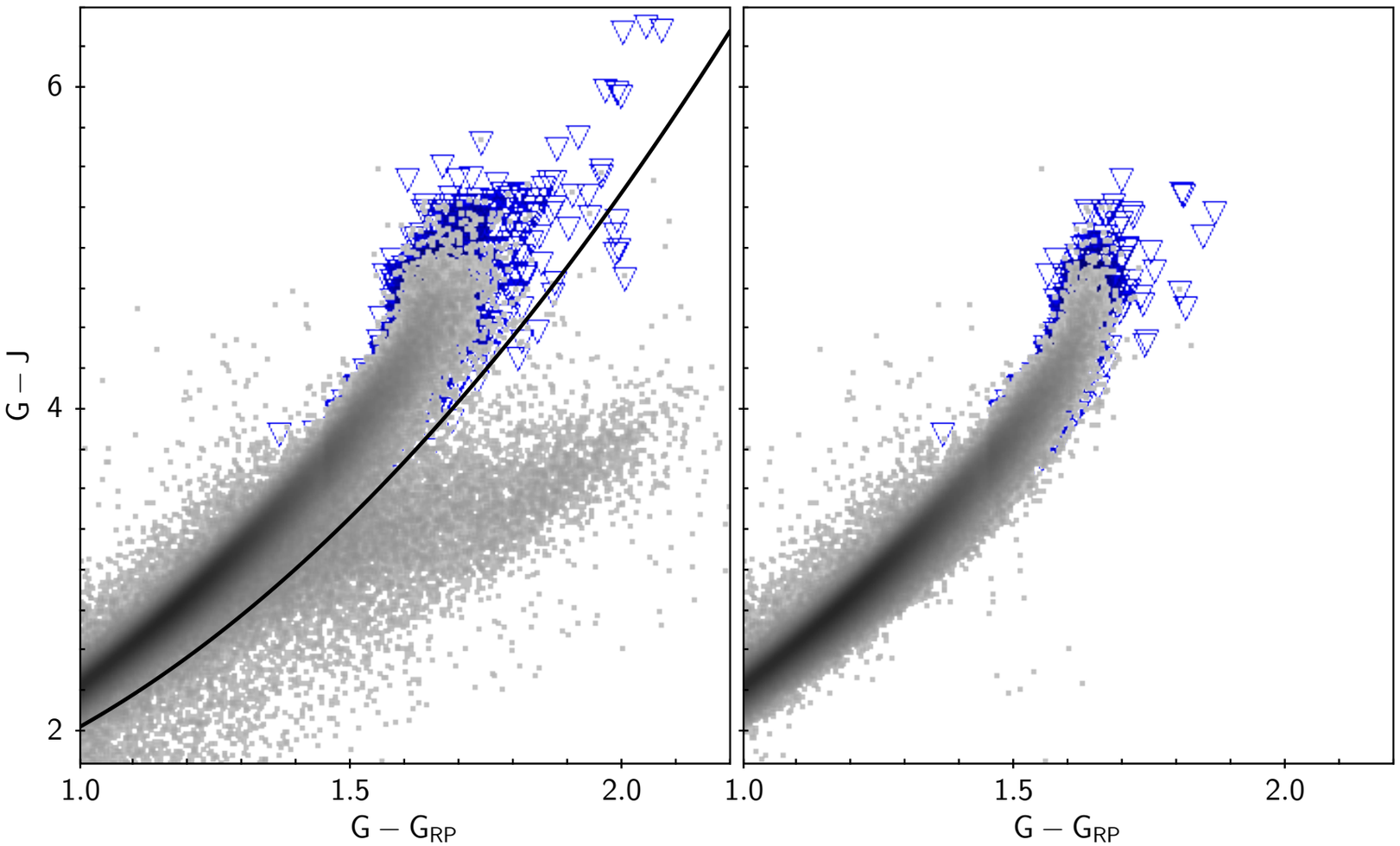

4 705 366 *
0
10
20
M_G
≥M7
0
1
2
$G - G_{RP}$


4 640 635 *
0
10
20
M_G
≥M7
0
1
2
$G - G_{RP}$



▽Input catalog

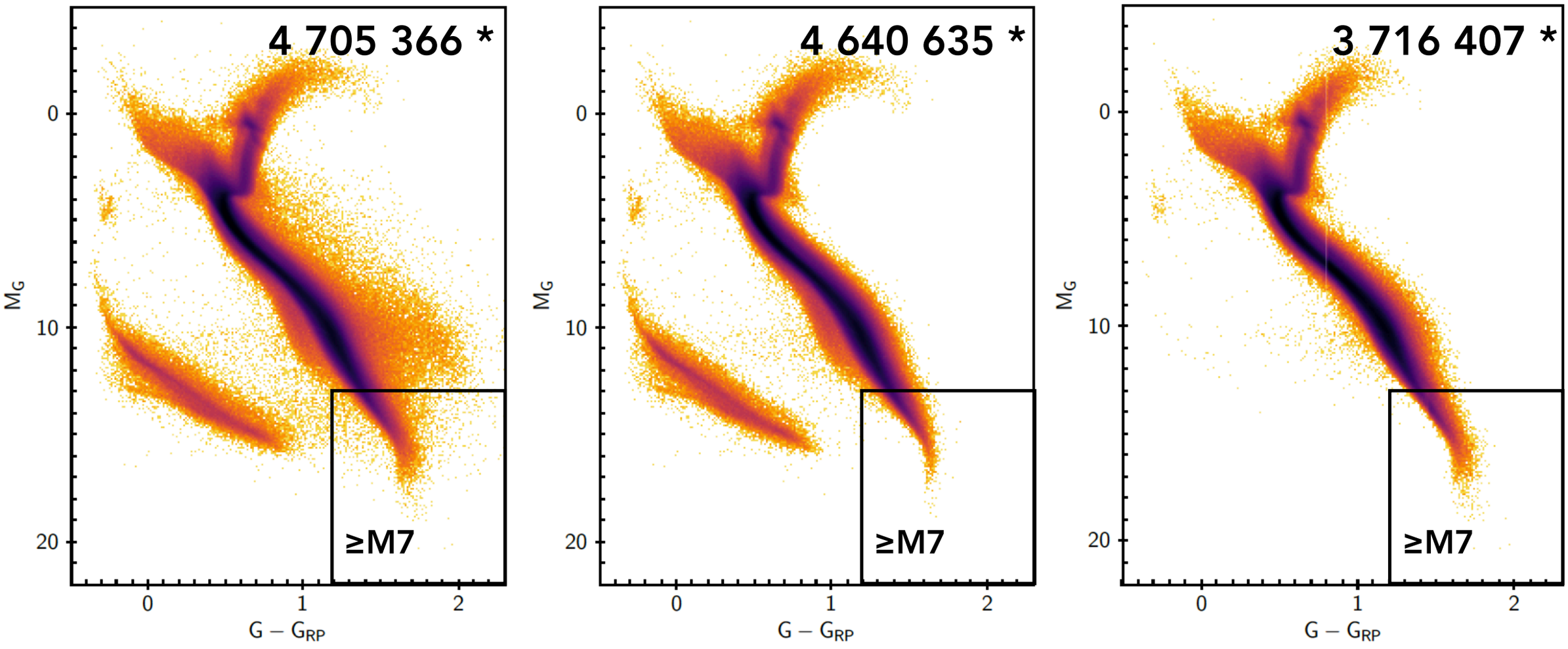
. *Gaia* DR2

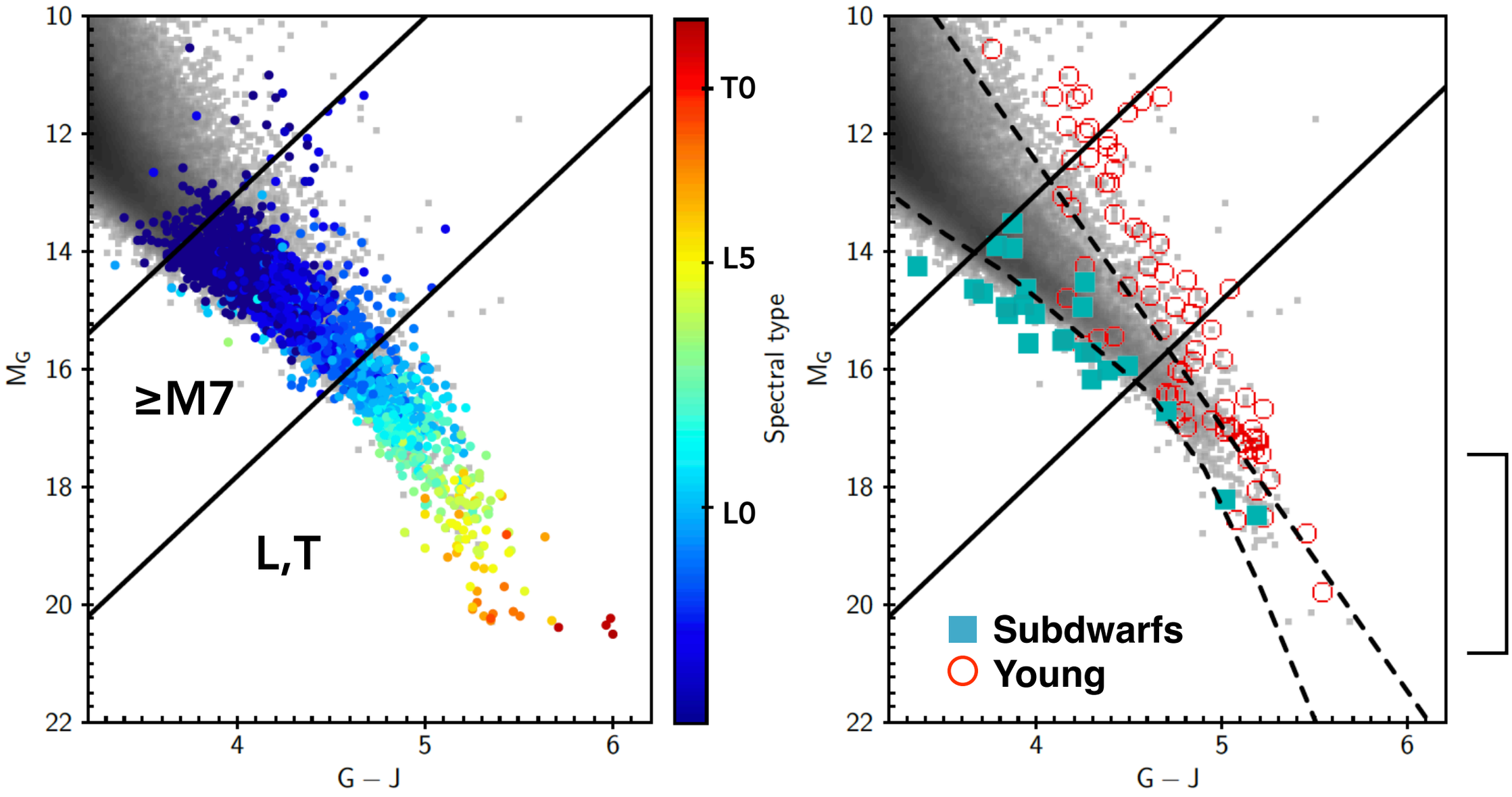


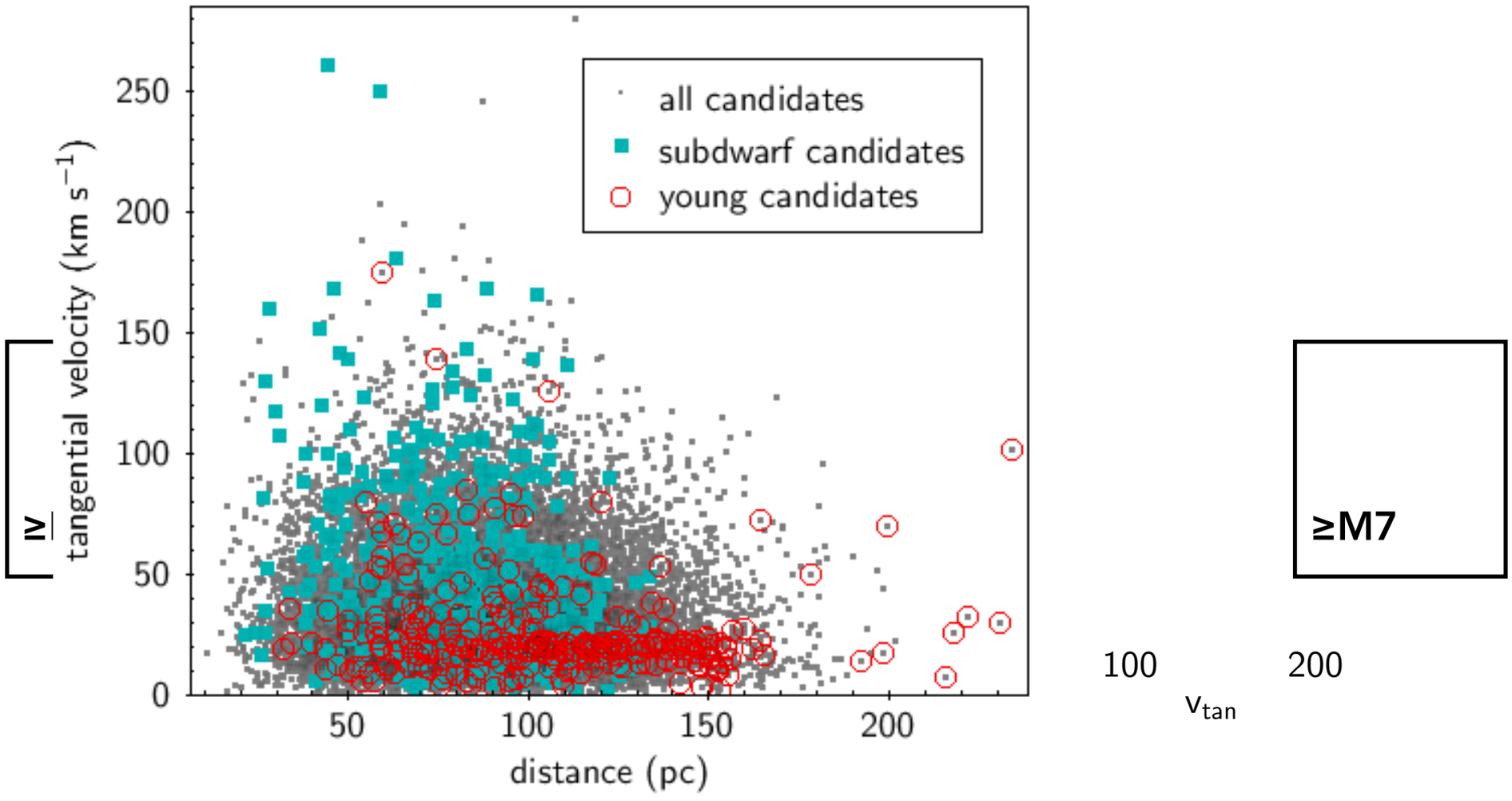
▽Input catalog

. *Gaia* DR2

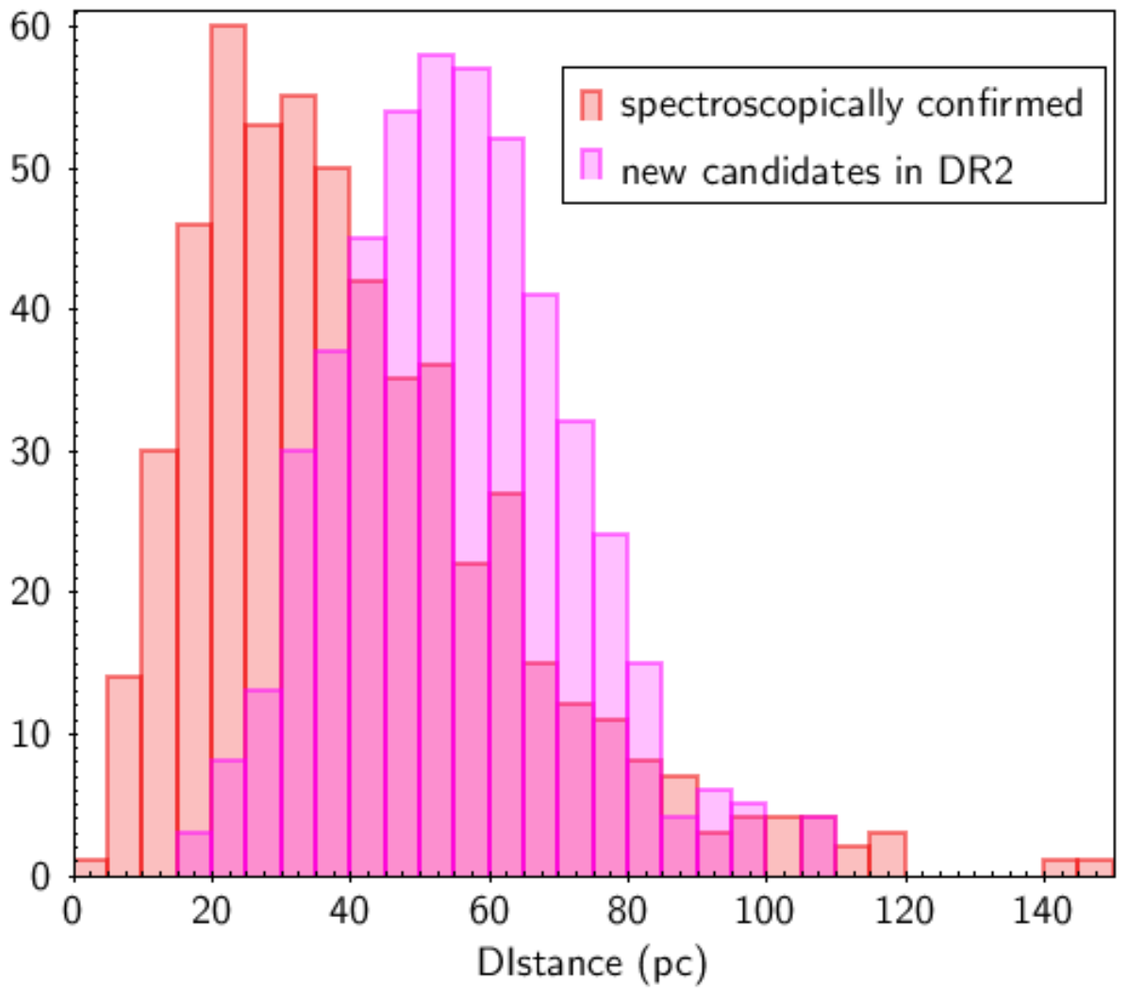
$$G - J \geq 1.42 \times (G - G_{\mathrm{RP}})^2 - 0.94 \times (G - G_{\mathrm{RP}}) + 1.55.$$

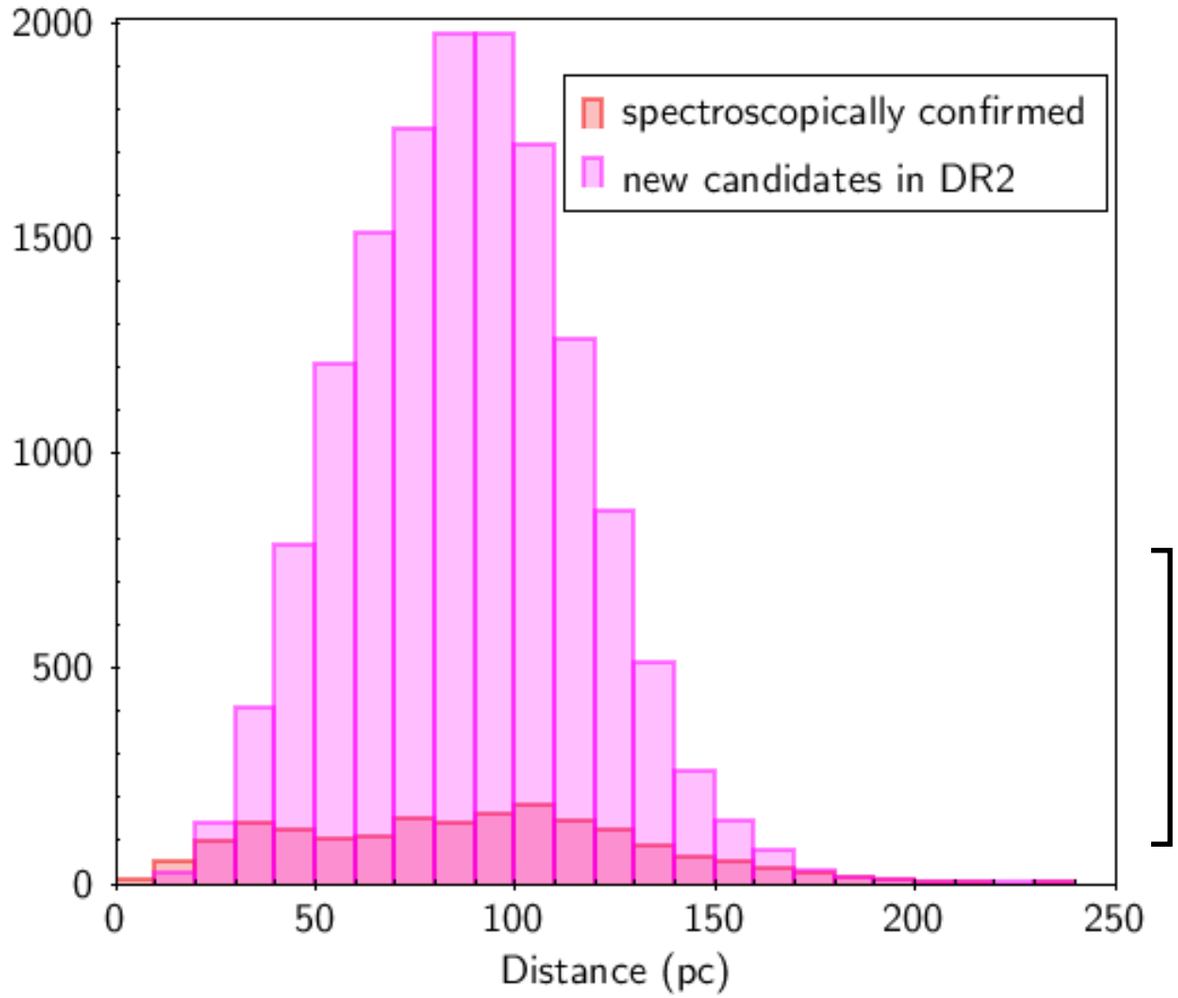

4 705 366 *
4 640 635 *
3 716 407 *
≥M7
≥M7
≥M7
M_G
$G - G_{RP}$
0
10
20
1
2


10
12
14
16
18
20
22
M_G
≥M7
L,T
4
5
6
G – J
T0
L5
L0
Spectral type
Subdwarfs
Young


all candidates
subdwarf candidates
young candidates
≥M7
tangential velocity (km s^{-1})
distance (pc)
250
200
150
100
50
0
50
100
150
200
100
200
v_{tan}

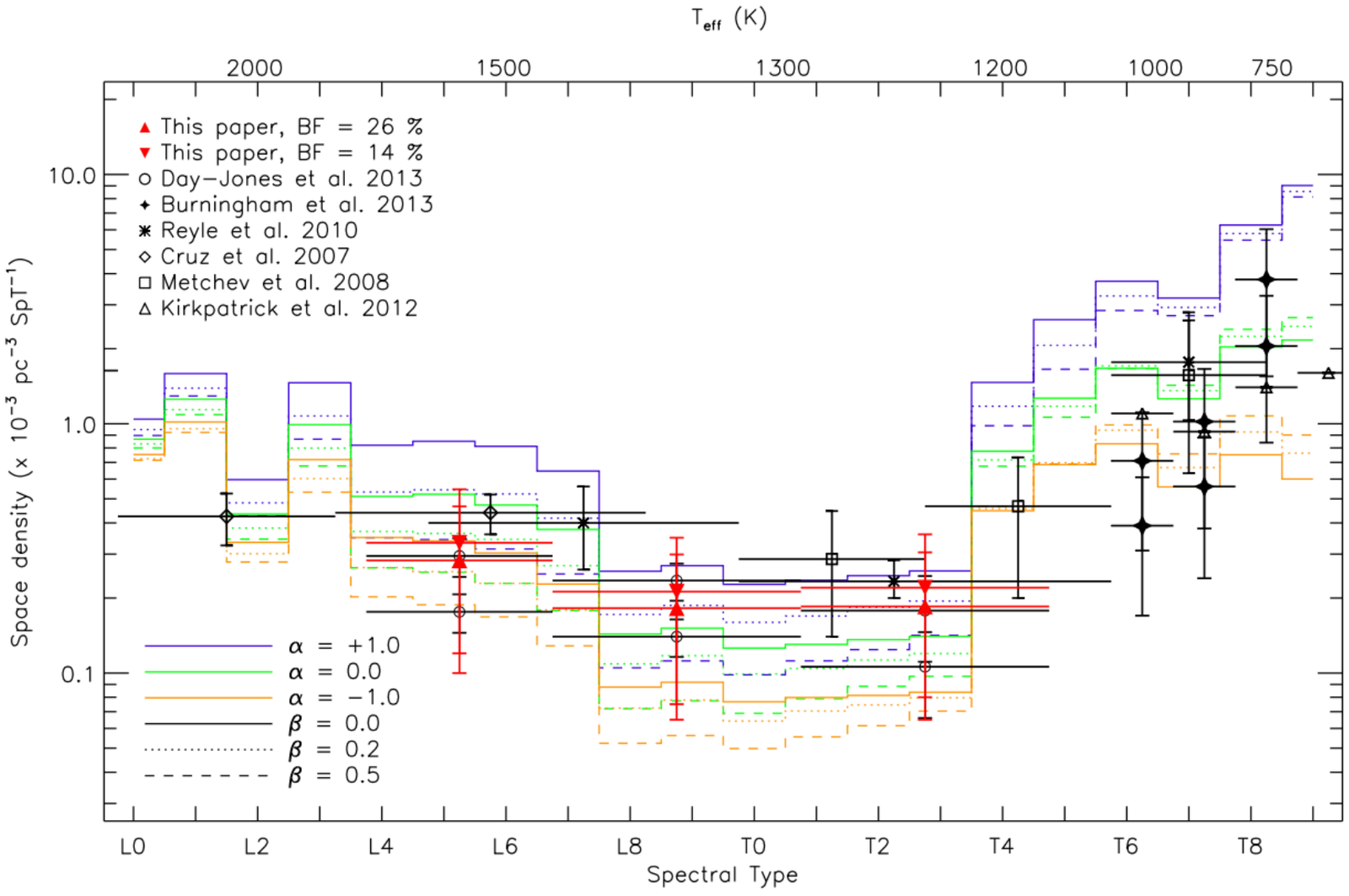
≥M7


spectroscopically confirmed
new candidates in DR2
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
DIstance (pc)


spectroscopically confirmed
new candidates in DR2
2000
1500
1000
500
0
0
50
100
150
200
250
Distance (pc)

(e.g.

Deacon&Hambly06)



≥M7

Marocco+15

CONCLUSIONS

1 There are numerous ultracool dwarf candidates in Gaia DR2
High number, high precision, 5D information!

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2 The high precision of the HR diagram gives an indication on the nature of the object: young, low metallicity.
A well-characterized sample with spectroscopic follow-up will be powerful to **test (sub)stellar models** (evolution, interior)

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1 There are numerous ultracool dwarf candidates in Gaia DR2
High number, high precision, 5D information!

2 The high precision of the HR diagram gives an indication on the nature of the object: young, low metallicity.
A well-characterized sample with spectroscopic follow-up will be powerful to **test (sub)stellar models** (evolution, interior)

3 A well-characterized and complete volume-limited sample:
- provide luminosity and mass functions free of biases that plagued previous determinations
- provide strong constraints on stellar and substellar formation theories.

New candidates are expected to be found in DR3 to complete the nearby census