1.1_AEGIS

March 8, 2018

0.1 EGS master catalogue

0.2 Preparation of AEGIS data

This resource contains the near-infrared catalogue of Extended Groth Strip observations with the WIRC instrument at the Palomar Observatory.: the catalogue comes from `dmu0_AEGIS`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The magnitude for each band in 2 arcsecond aperture.
- The auto magnitude to be used as total magnitude.

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:28:01.897812
```

0.3 I - Column selection

```
WARNING: UnitsWarning: 'vega' did not parse as fits unit: At col 0, Unit 'vega' not supported by
```

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
Out[7]: <IPython.core.display.HTML object>
```

0.4 II - Removal of duplicated sources

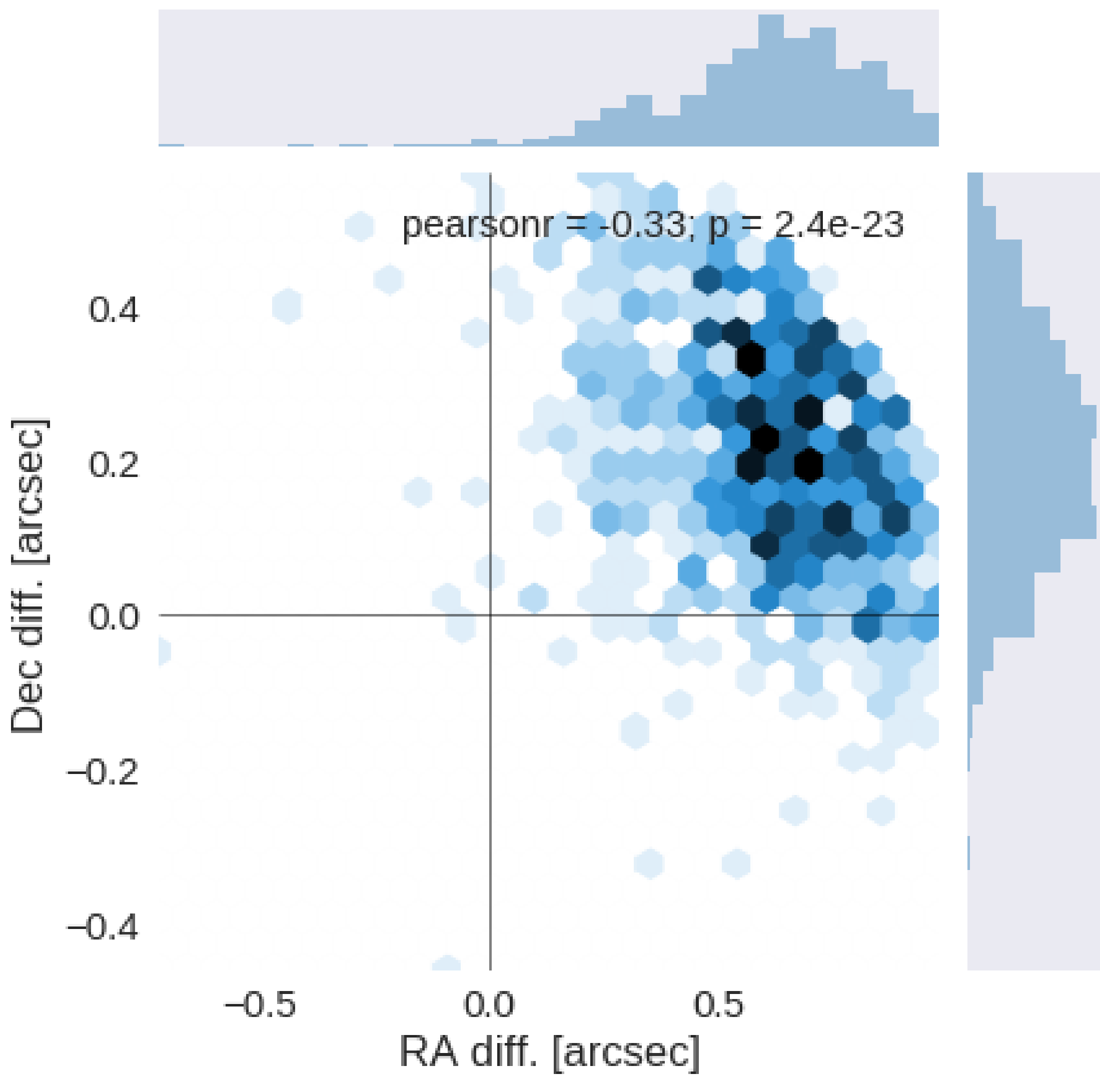
We remove duplicated objects from the input catalogues.

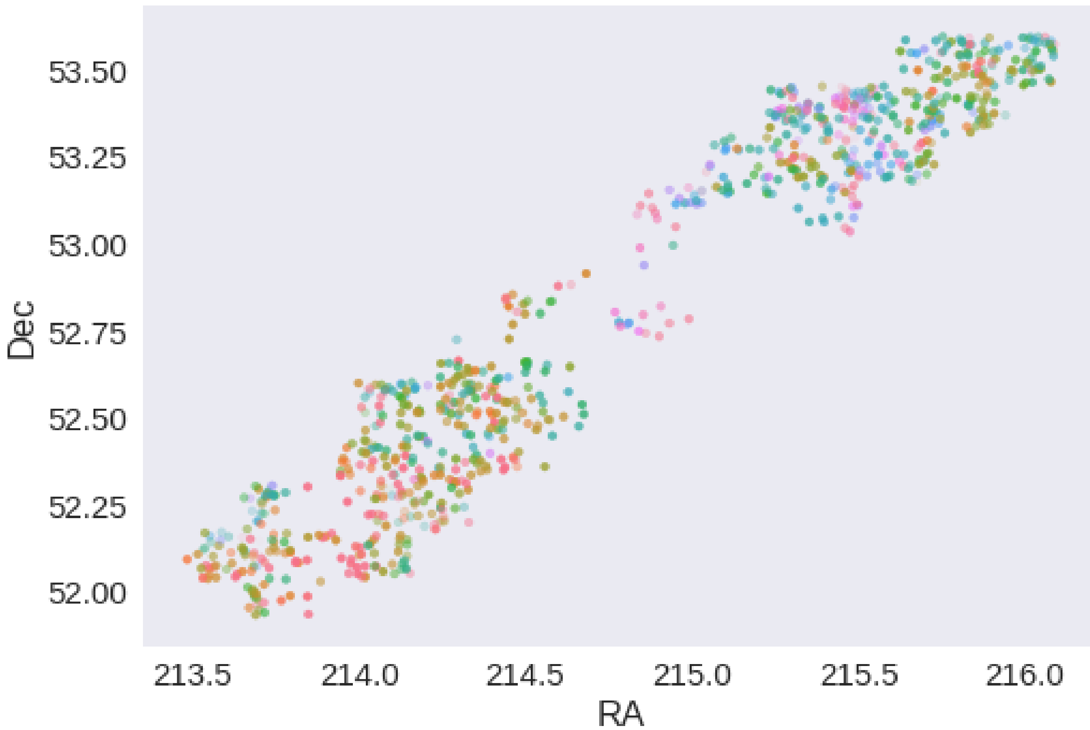
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 45065 sources.
The cleaned catalogue has 45065 sources (0 removed).
The cleaned catalogue has 0 sources flagged as having been cleaned
```

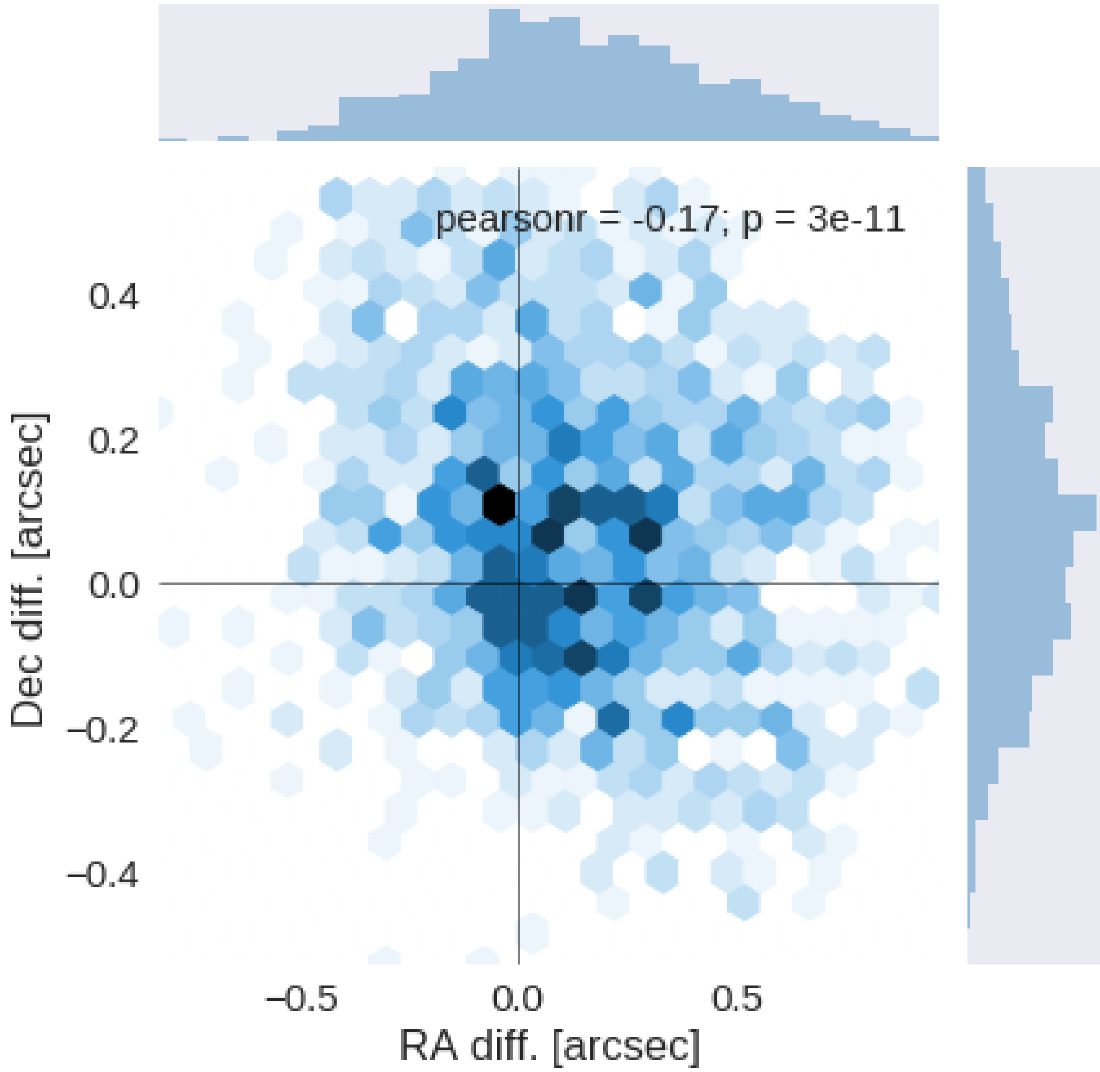
0.5 III - Astrometry correction

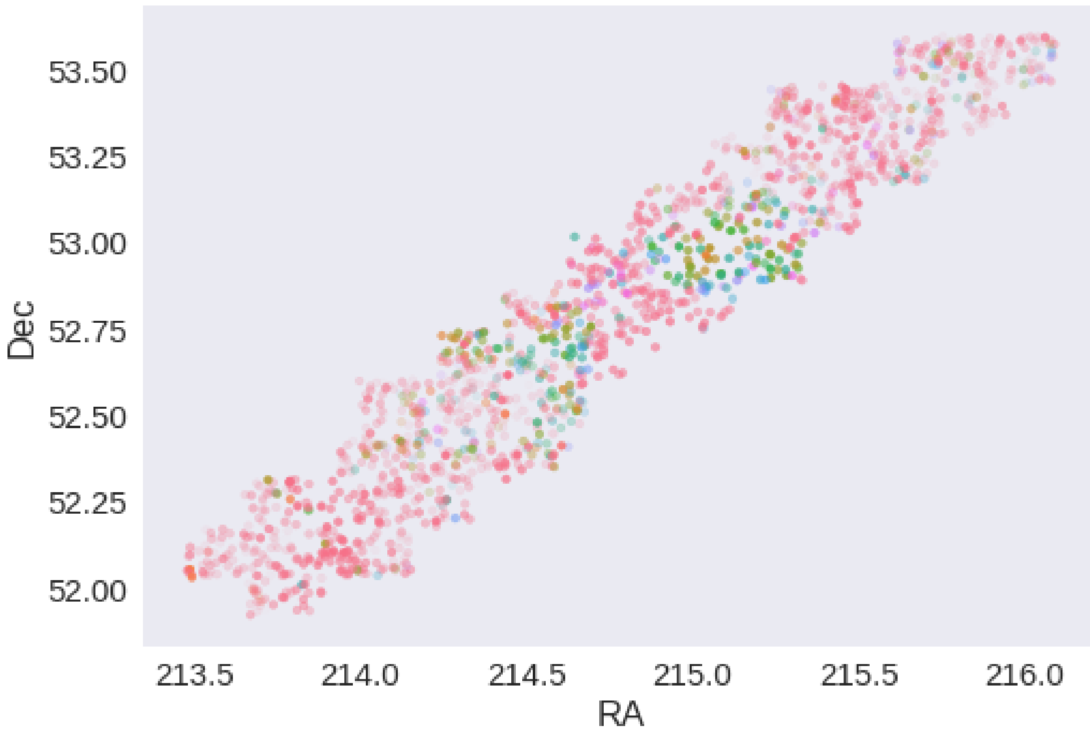
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.6291472751286165 arcsec
Dec correction: -0.21136460382251698 arcsec
```


pearsonr = -0.17; p = 3e-11
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



0.6 IV - Flagging Gaia objects

```
1680 sources flagged.
```

1 V - Saving to disk

1.2_CANDELS-3D-HST

March 8, 2018

1 EGS master catalogue

1.1 Preparation of HST CANDELS-3D data

The catalogue comes from `dmu0_CANDELS-3D-HST`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The kron magnitude, there doesn't appear to be aperture magnitudes. This may mean the survey is unusable.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:28:11.002418
```

1.2 I - Column selection

```
WARNING: UnitsWarning: '0.3631uJy' did not parse as fits unit: Numeric factor not supported by F
WARNING: UnitsWarning: '[Msun]' did not parse as fits unit: Invalid character at col 0 [astropy.
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: divide by zero enc
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:80: RuntimeWarning: invalid value enco
  errors = 2.5 / np.log(10) * errors_on_fluxes / fluxes
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: invalid value enco
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
```

```
Out[6]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

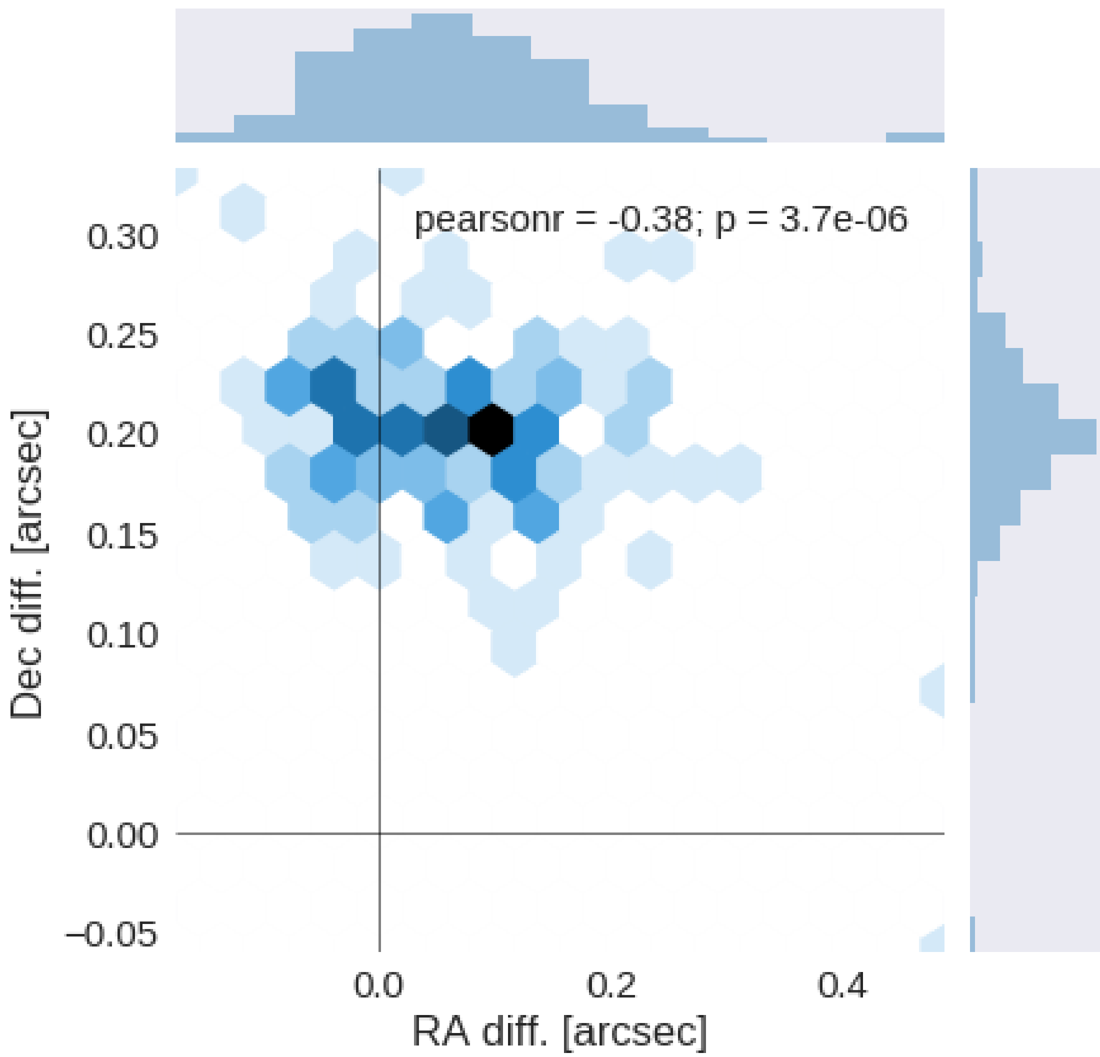
We remove duplicated objects from the input catalogues.

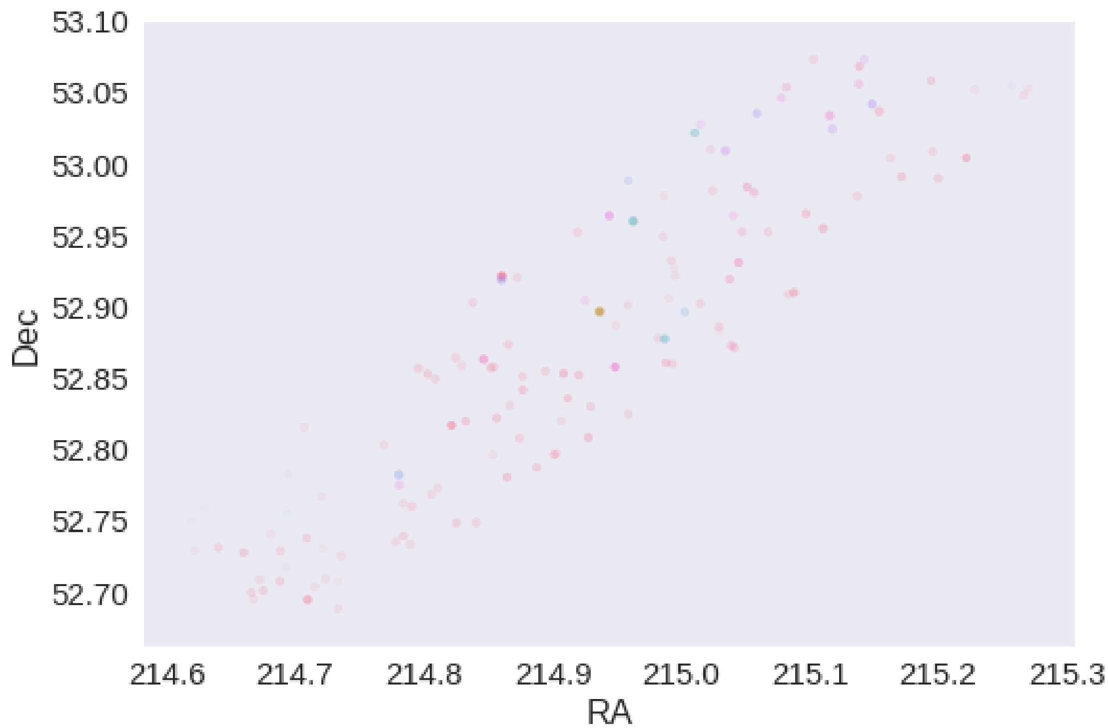
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 41200 sources.
The cleaned catalogue has 41067 sources (133 removed).
The cleaned catalogue has 133 sources flagged as having been cleaned
```

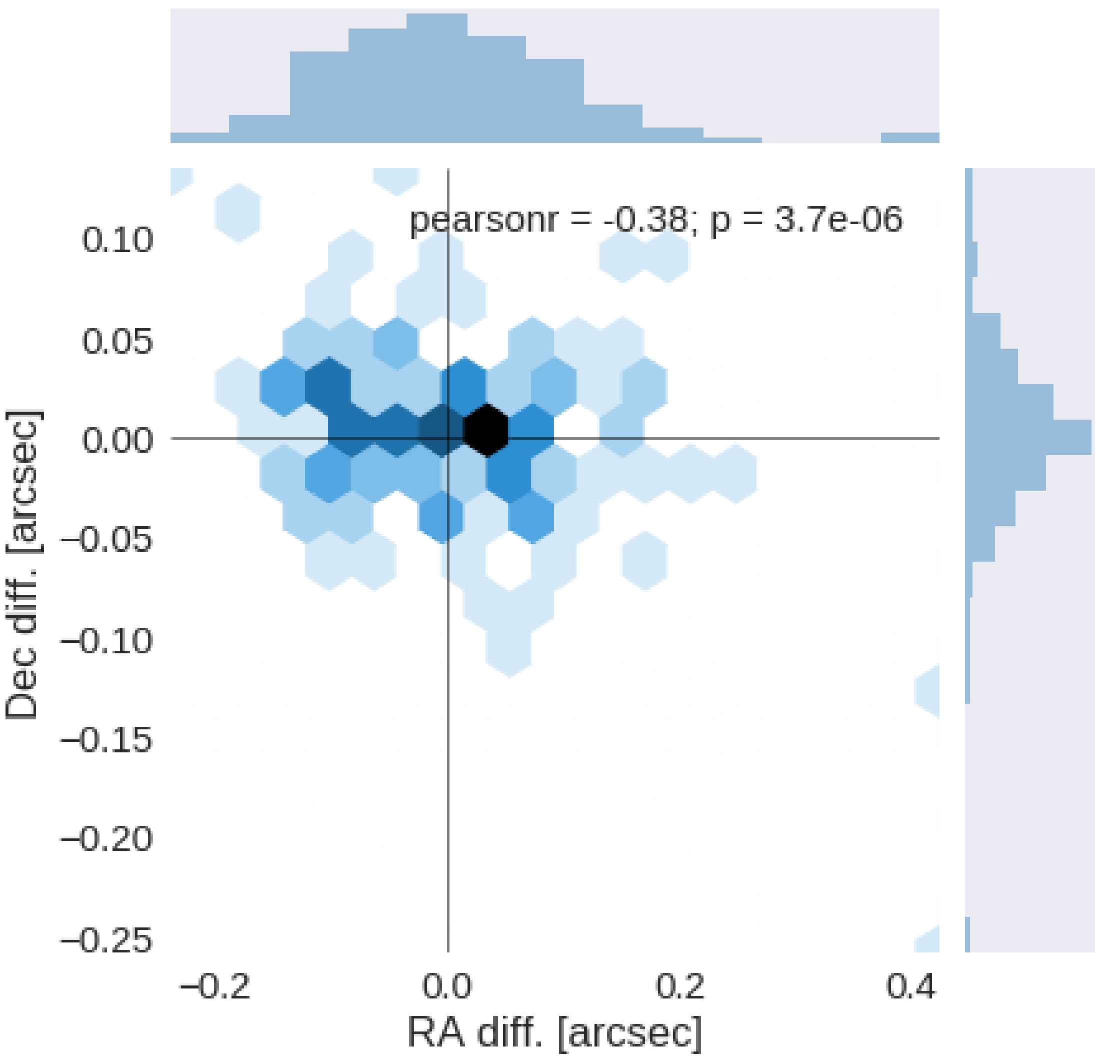
1.4 III - Astrometry correction

We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

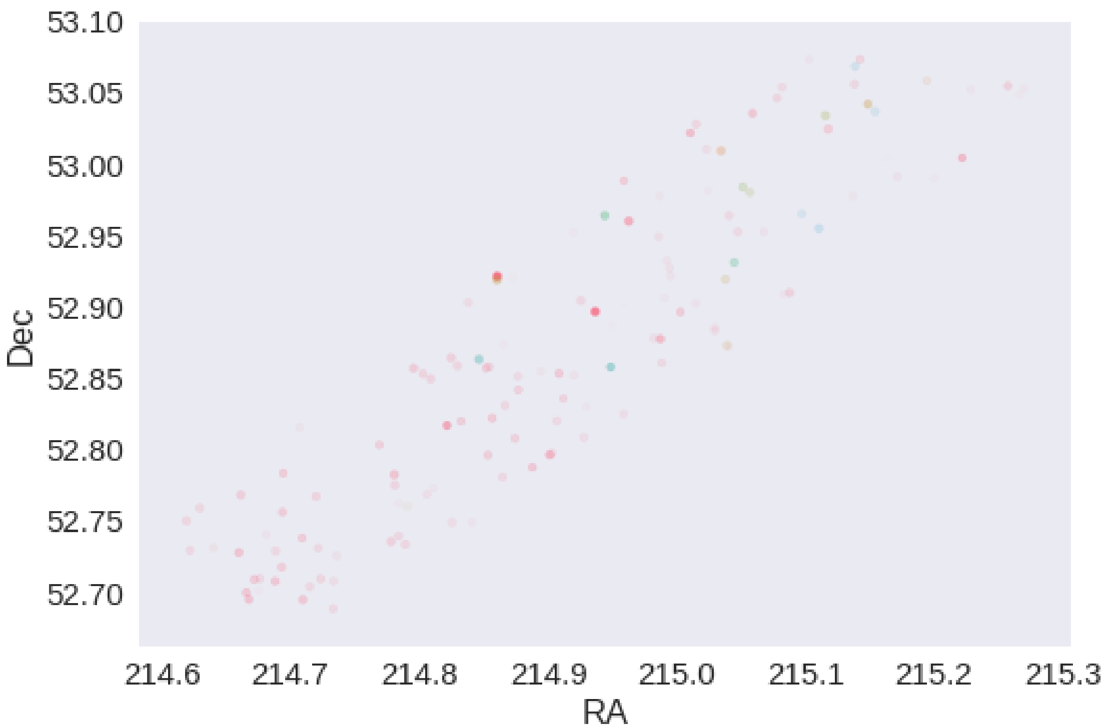





```
RA correction: -0.06336958314250296 arcsec
Dec correction: -0.19814636340669267 arcsec
```



pearsonr = -0.38; p = 3.7e-06
0.10
0.05
0.00
−0.05
−0.10
−0.15
−0.20
−0.25
Dec diff. [arcsec]
−0.2
0.0
0.2
0.4
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
145 sources flagged.
```

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.3_CFHT-WIRDS

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Canada France Hawaii Telescope WIRDS Survey (CFHT-WIRDS) data

The catalogue is in `dmu0_CFHT-WIRDS`.

In the catalogue, we keep:

- The position;
- The stellarity;
- The aperture magnitude (3 arcsec).
- The total magnitude (Kron like aperture magnitude).

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:28:20.058540
```

1.2 I - Column selection

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/ipykernel/__main__.py:63:
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/ipykernel/__main__.py:64:
```

```
Out[5]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

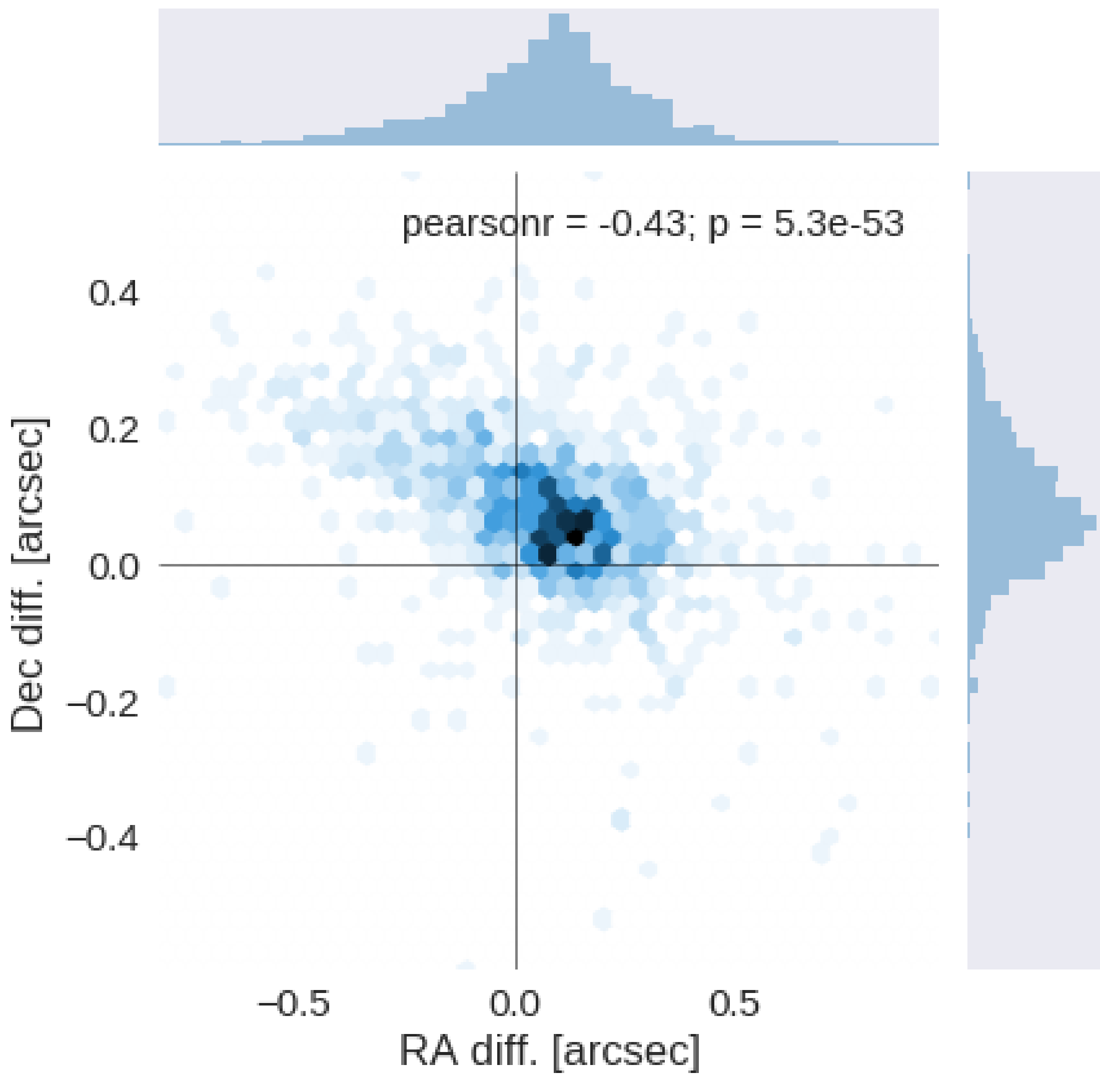
We remove duplicated objects from the input catalogues.

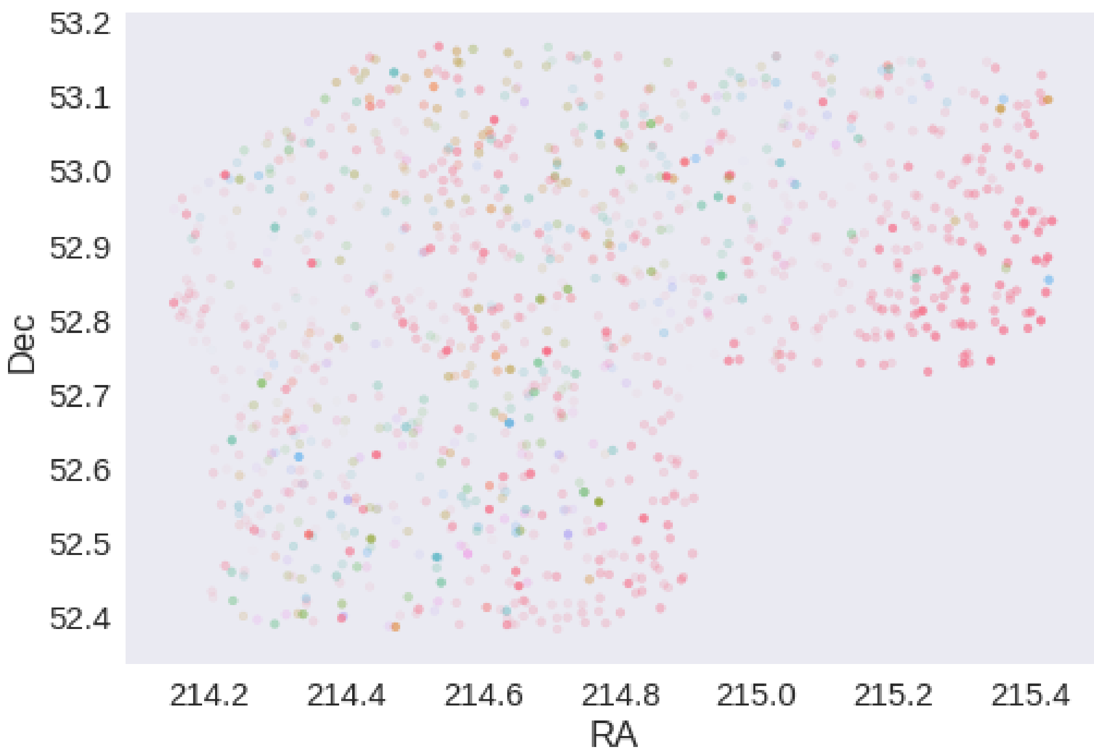
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 100317 sources.
The cleaned catalogue has 100317 sources (0 removed).
The cleaned catalogue has 0 sources flagged as having been cleaned
```

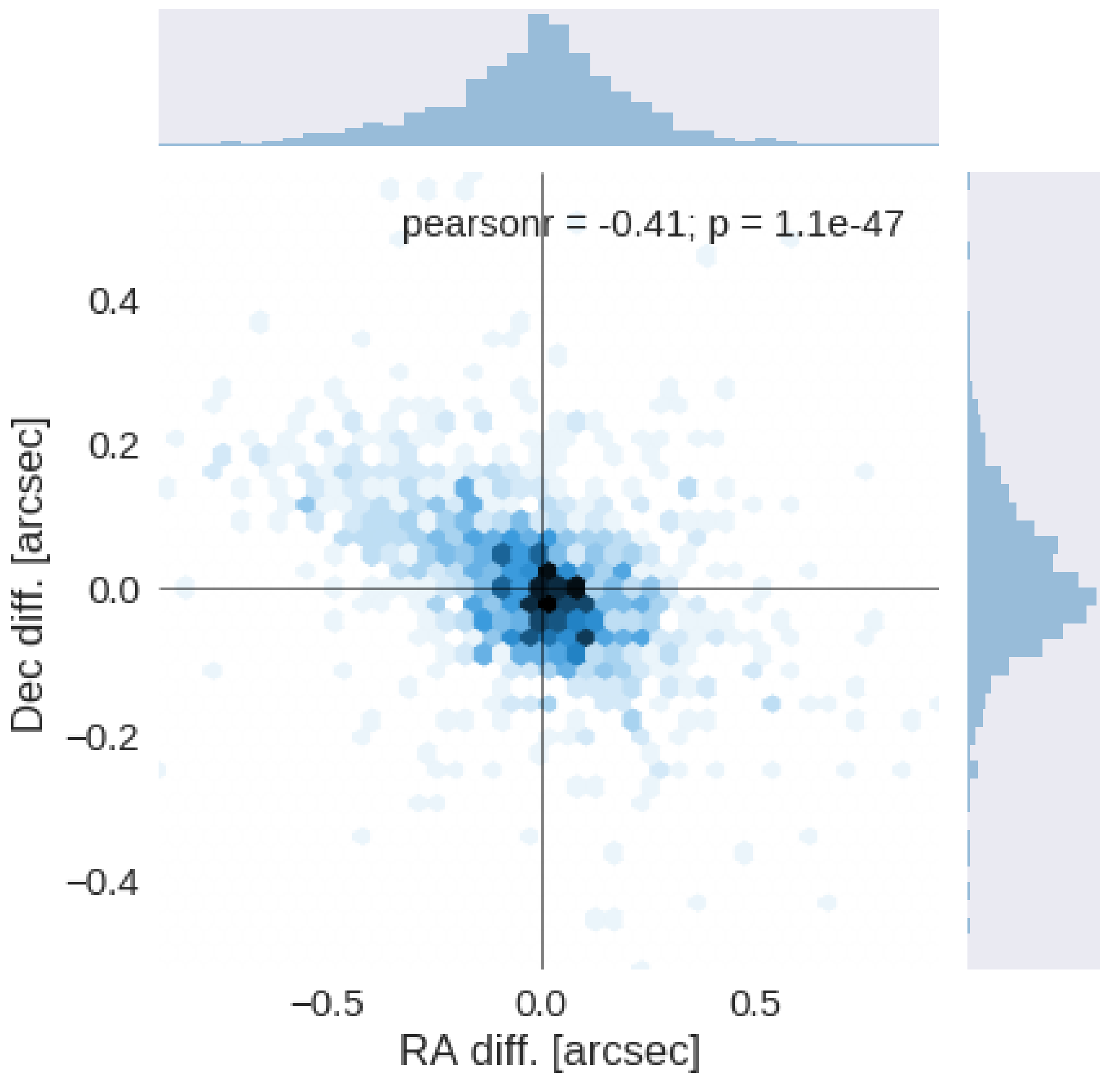
1.4 III - Astrometry correction

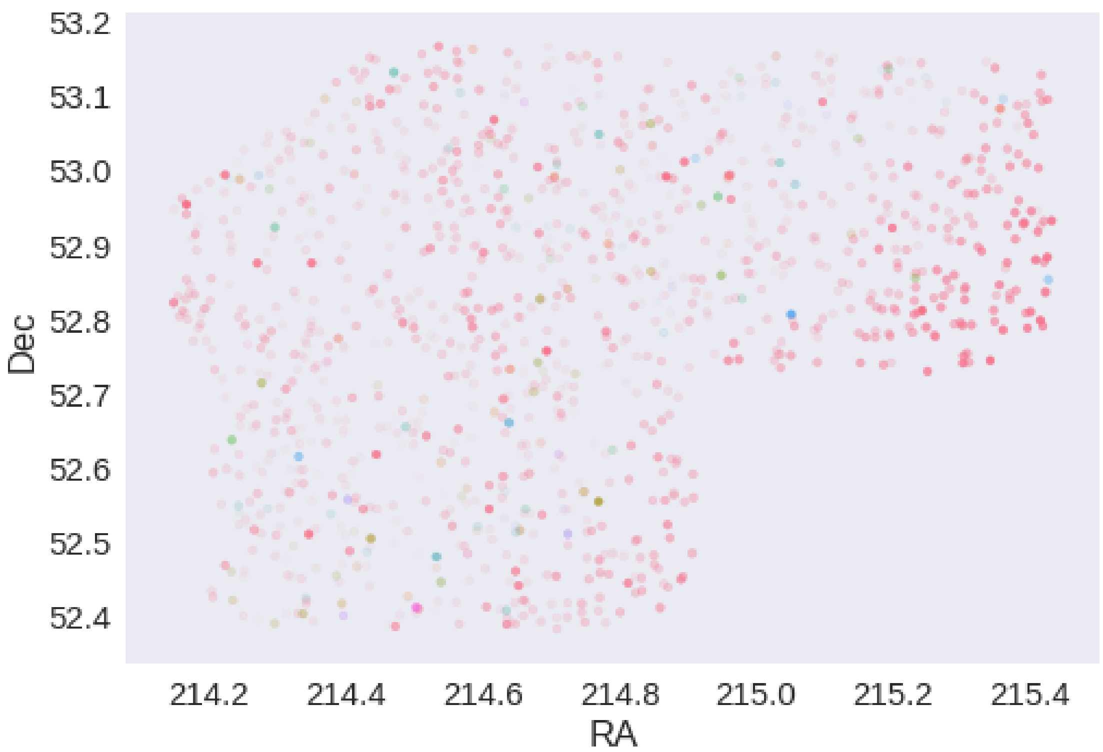
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.08794029236014467 arcsec
Dec correction: -0.0733593735006366 arcsec
```


pearsonr = -0.41; p = 1.1e-47
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
1193 sources flagged.
```

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.4a_CFHTLS-WIDE

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Canada France Hawaii Telescope Legacy Survey (CFHTLS) wide data

CFHTLS has both a wide area across EGS and a smaller deep field. We will process each independently and add them both to the master catalogue, taking the deep photometry where both are available.

The catalogue is in `dmu0_CFHTLS`.

In the catalogue, we keep:

- The position;
- The stellarity (g band stellarity);
- The aperture magnitude (3 arcsec).
- The total magnitude (Kron like aperture magnitude).

We use the 2007 release, which we take as the date.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:28:32.237264
```

1.2 I - Column selection

```
Out[6]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

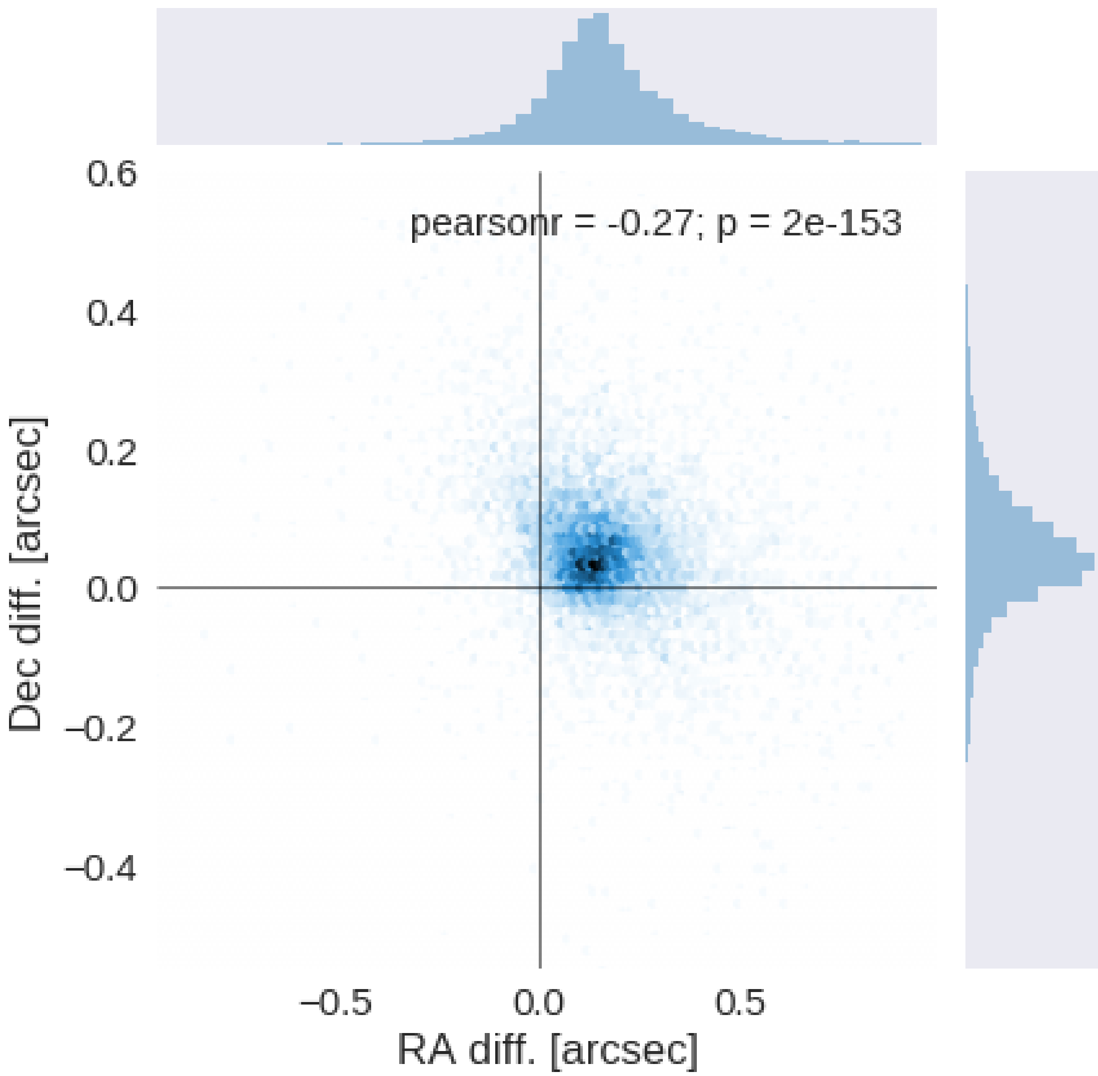
We remove duplicated objects from the input catalogues.

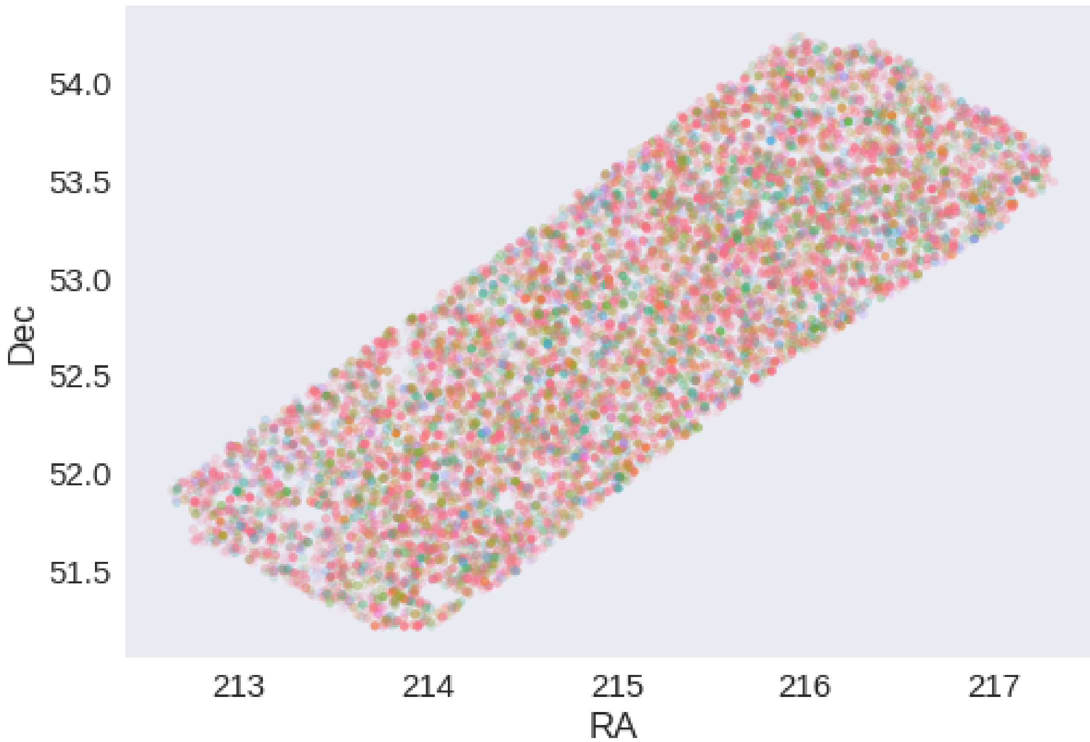
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)


The initial catalogue had 780583 sources.
The cleaned catalogue has 780559 sources (24 removed).
The cleaned catalogue has 24 sources flagged as having been cleaned
```

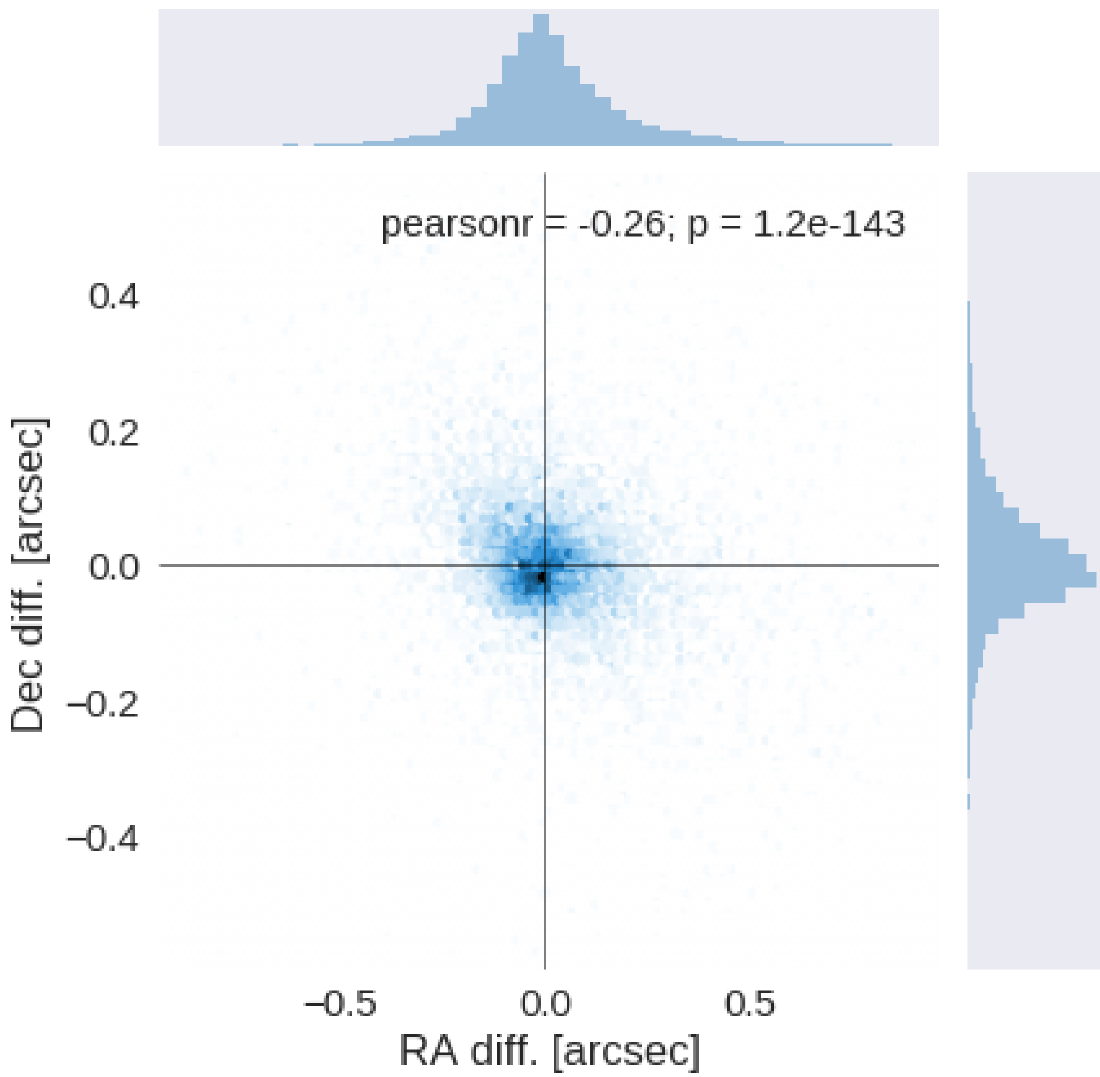
1.4 III - Astrometry correction

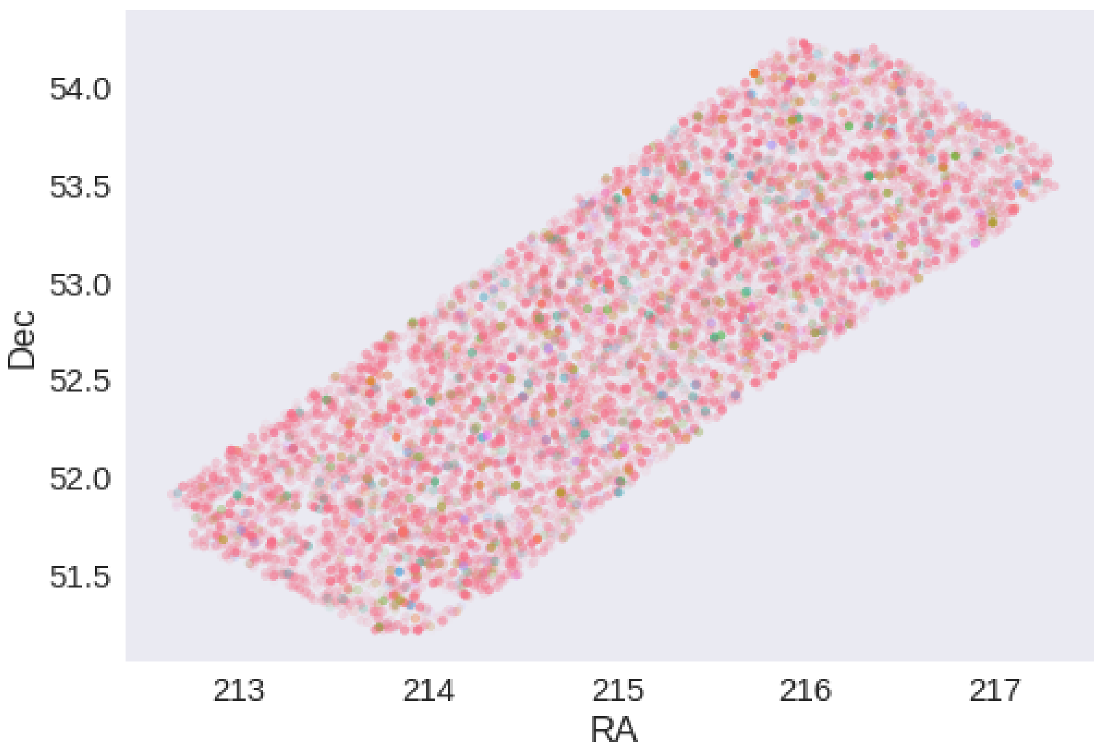
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.148947314437446423 arcsec
Dec correction: -0.04603114763597205 arcsec
```


pearsonr = -0.26; p = 1.2e-143
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
9254 sources flagged.
```

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.4b_CFHTLS-DEEP

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Canada France Hawaii Telescope Legacy Survey (CFHTLS) data

The catalogue is in `dmu0_CFHTLS`.

In the catalogue, we keep:

- The position;
- The stellarity (g band stellarity);
- The aperture magnitude (3 arcsec).
- The total magnitude (Kron like aperture magnitude).

We use the 2007 release, which we take as the date.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:29:17.397499
```

1.2 I - Column selection

```
Out[6]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

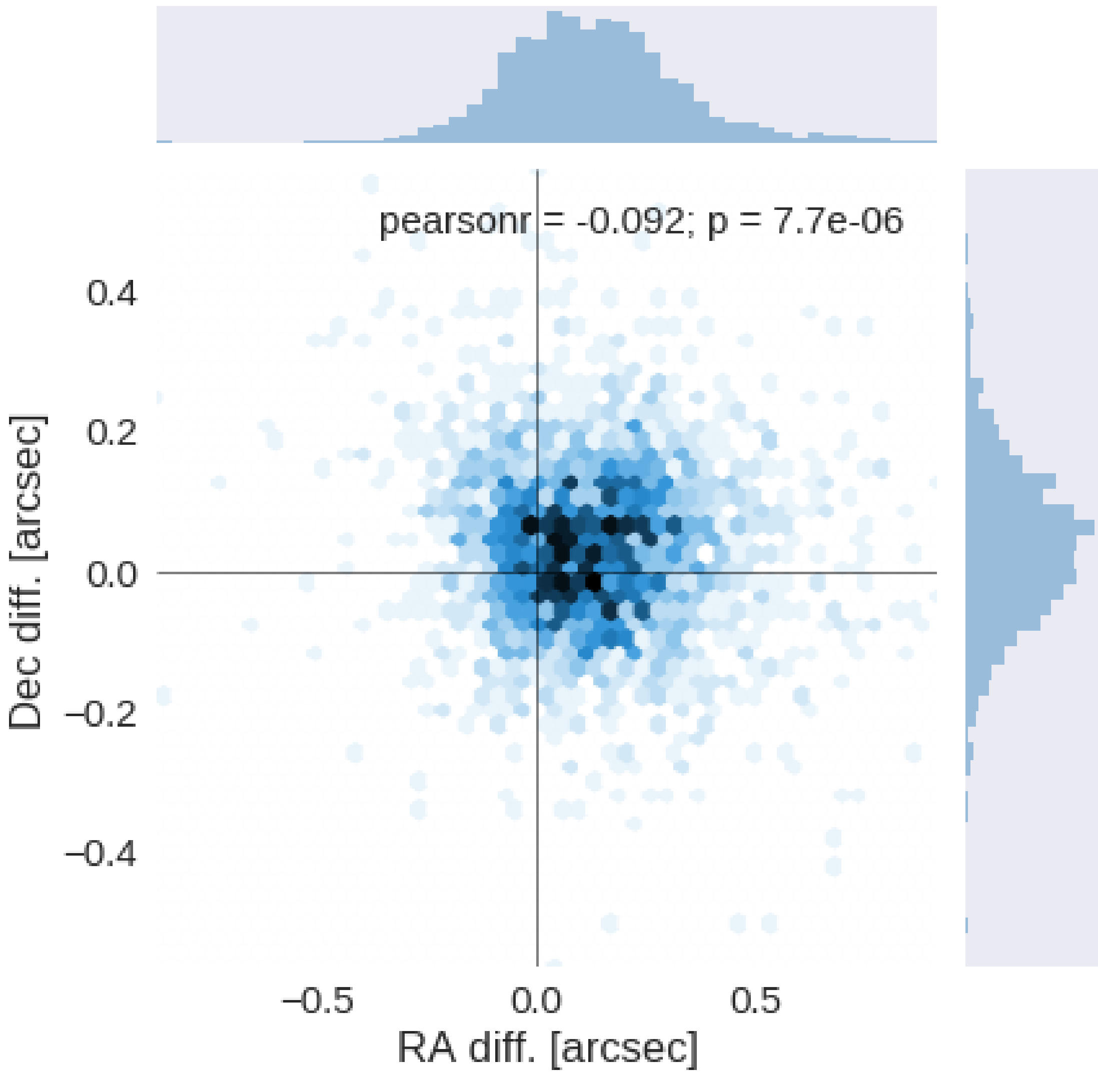
We remove duplicated objects from the input catalogues.

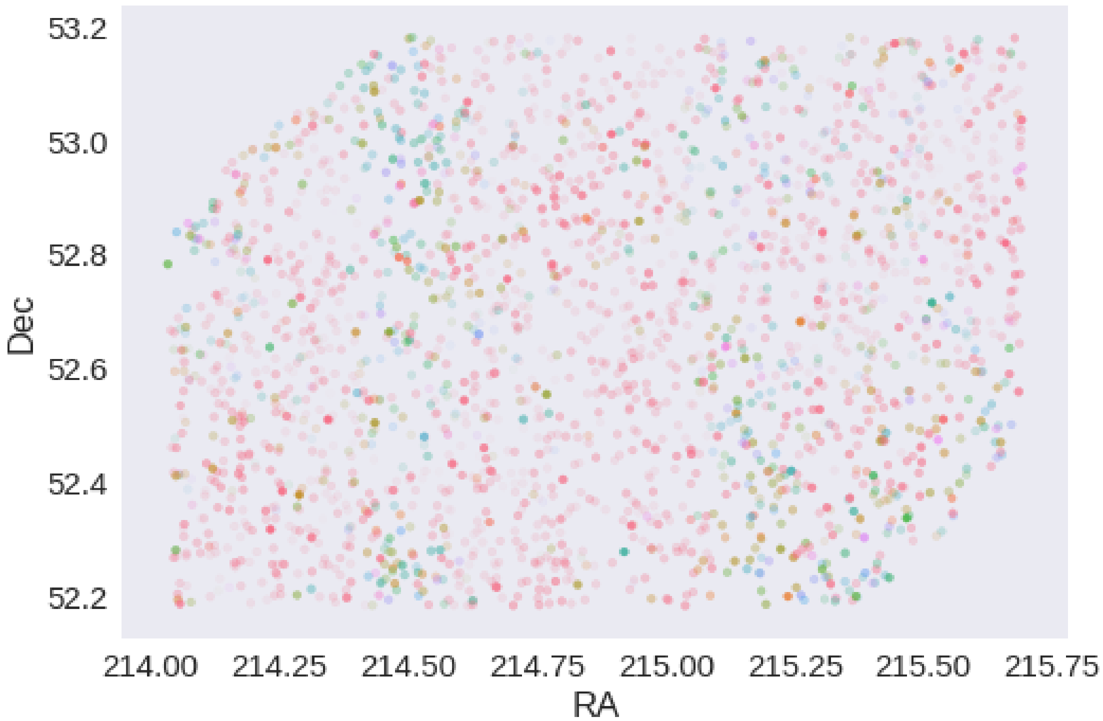
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)


The initial catalogue had 566572 sources.
The cleaned catalogue has 566572 sources (0 removed).
The cleaned catalogue has 0 sources flagged as having been cleaned
```

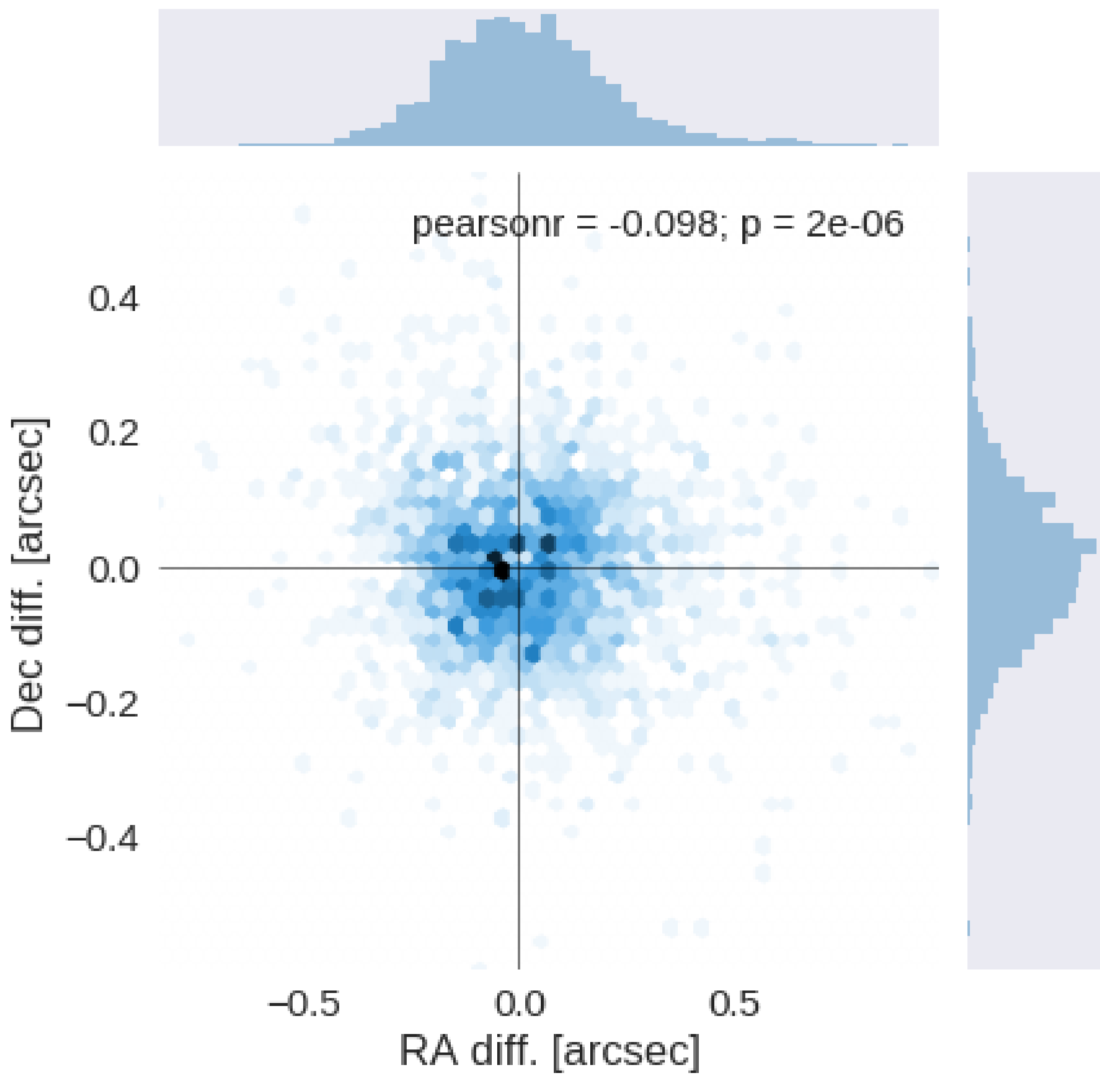
1.4 III - Astrometry correction

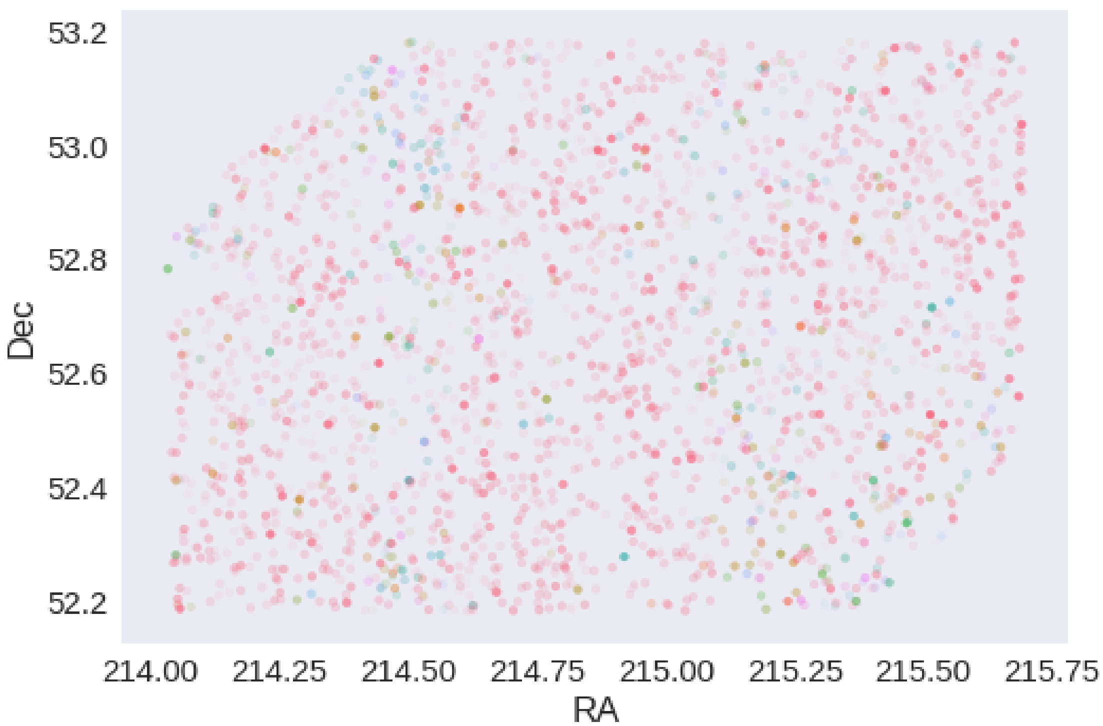
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.11242272060485448 arcsec
Dec correction: -0.033367632829595095 arcsec
```


pearsonr = -0.098; p = 2e-06
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
2390 sources flagged.
```

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.5_CFHTLenS

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Canada France Hawaii Telescope Lensing Survey (CFHTLenS) data

CFHTLenS catalogue: the catalogue comes from `dmu0_CFHTLenS`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The kron magnitude, there doesn't appear to be aperture magnitudes. This may mean the survey is unusable.

We use the publication year 2012 for the epoch.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:29:53.426721
```

1.2 I - Column selection

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/ipykernel/__main__.py:10:
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/ipykernel/__main__.py:11:
```

```
Out[6]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

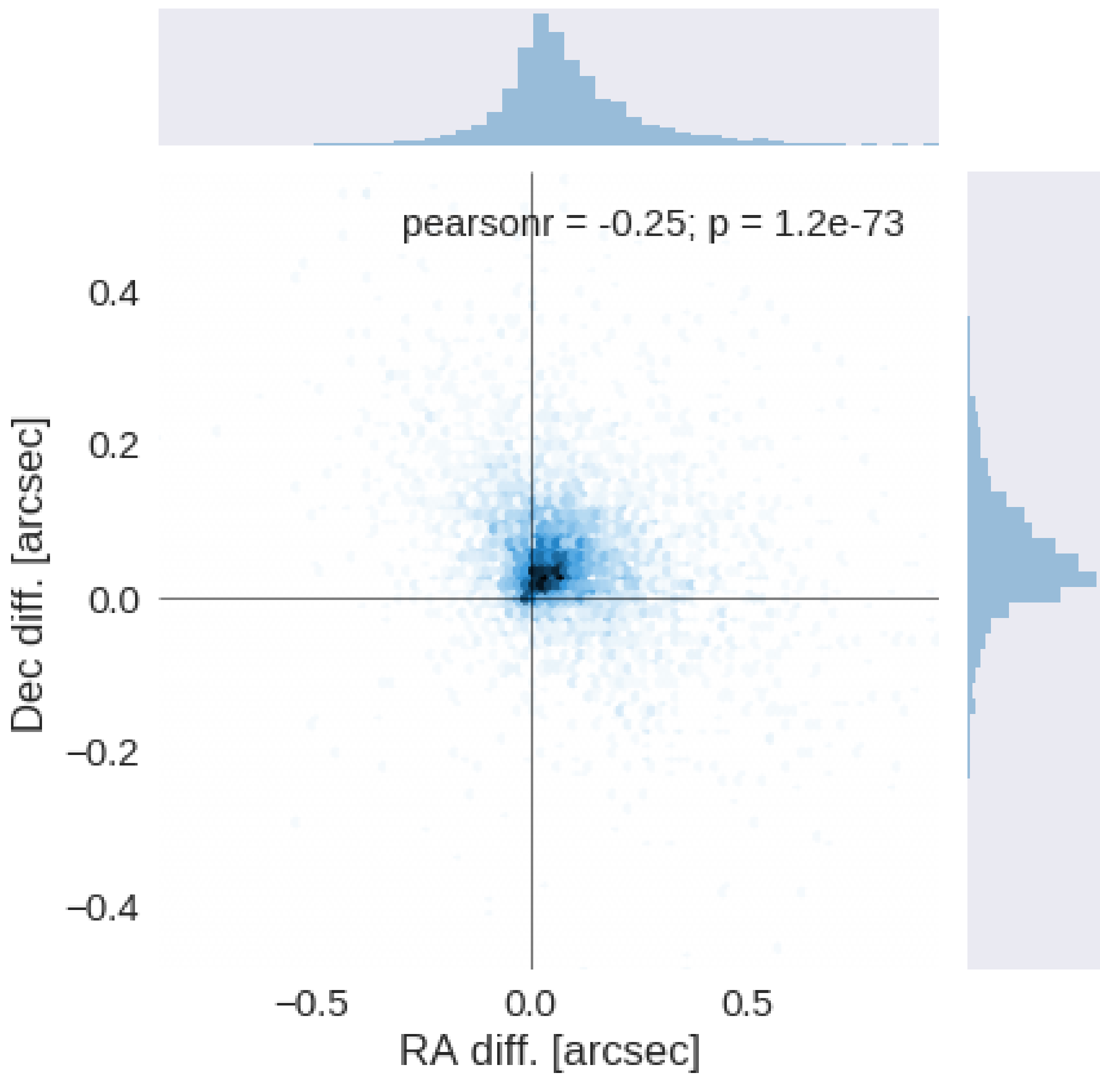
We remove duplicated objects from the input catalogues.

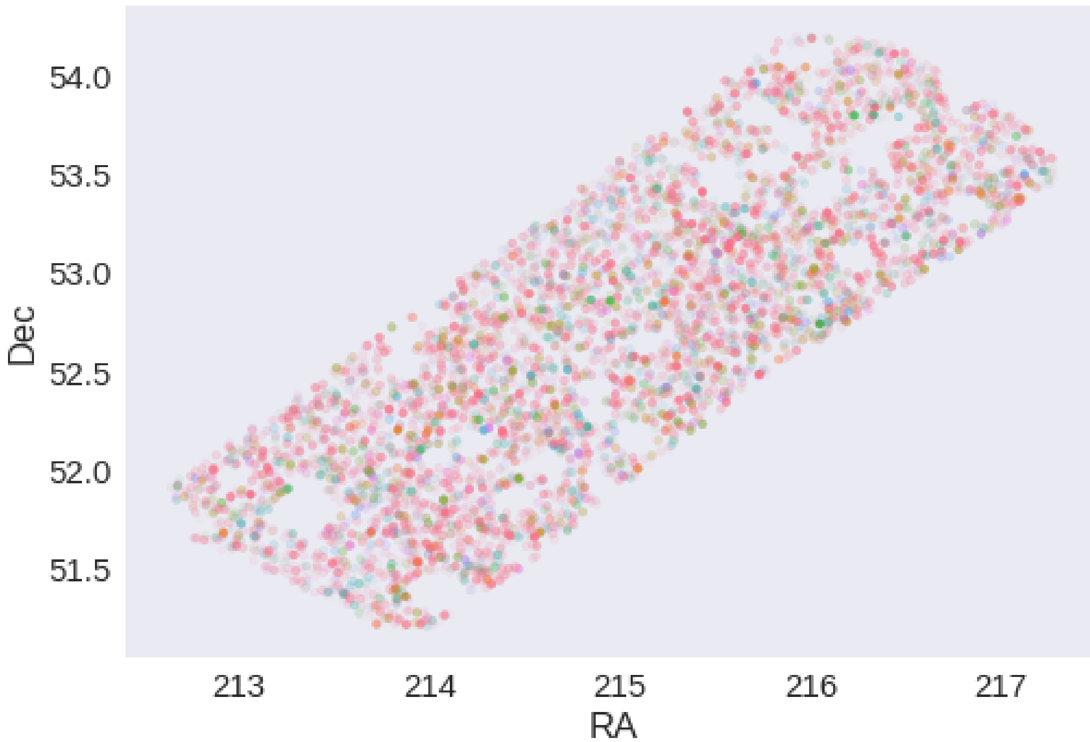
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 466735 sources.
The cleaned catalogue has 466731 sources (4 removed).
The cleaned catalogue has 4 sources flagged as having been cleaned
```

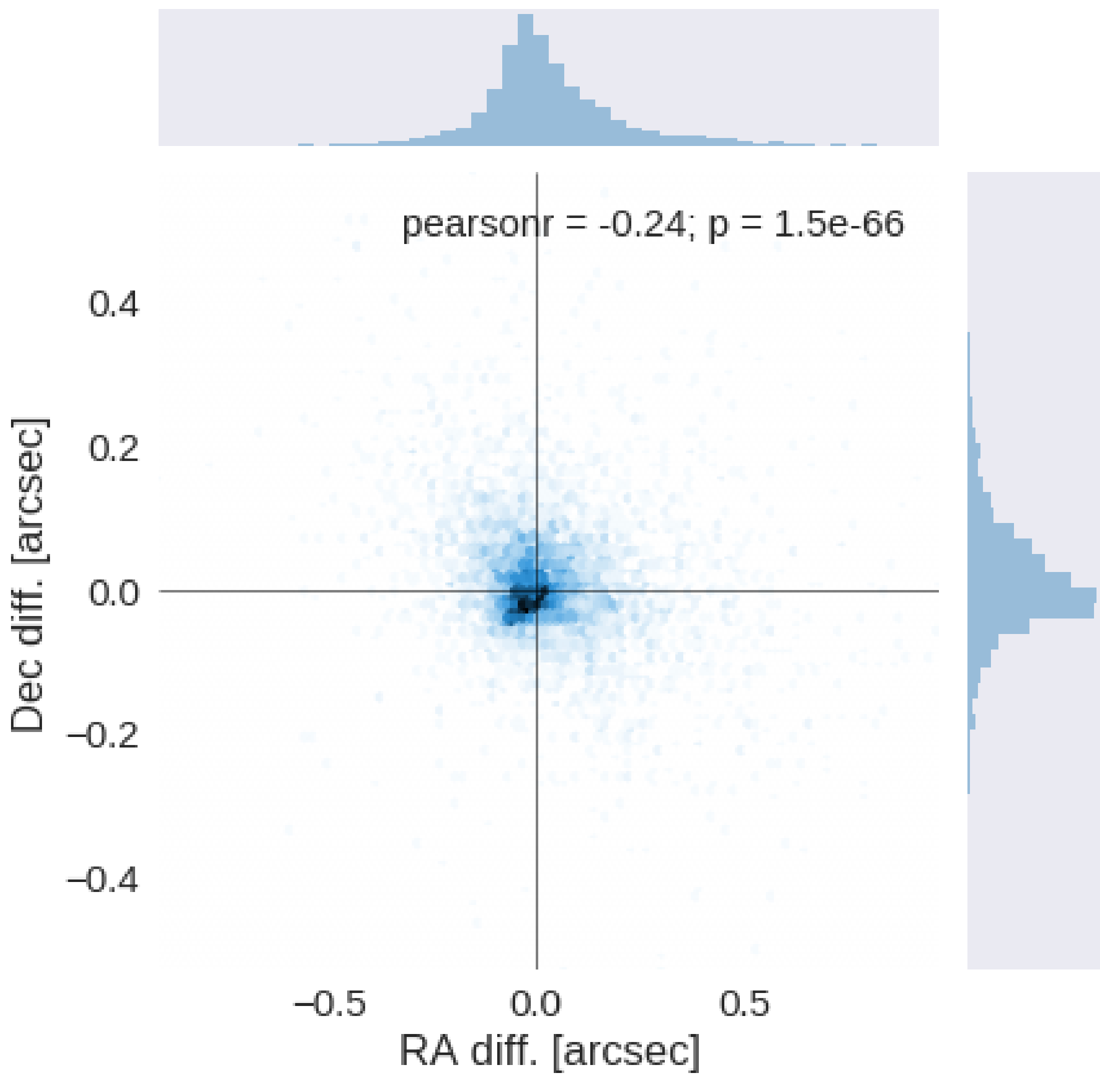
1.4 III - Astrometry correction

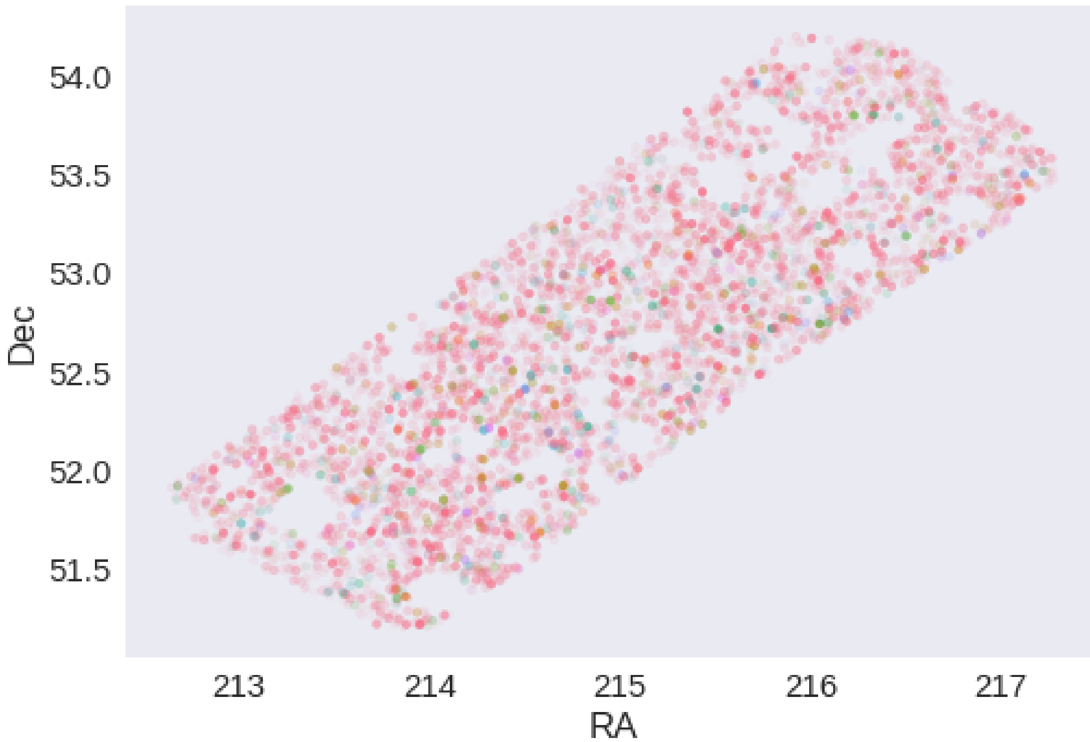
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.054139660204555184 arcsec
Dec correction: -0.043344491388097595 arcsec
```


pearsonr = -0.24; p = 1.5e-66
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
5159 sources flagged.
```

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.6_CANDELS-EGS

March 8, 2018

1 EGS master catalogue

1.1 Preparation of CANDELS-EGS data

CANDELS-EGS catalogue: the catalogue comes from `dmu0_CANDELS-EGS`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The magnitude for each band in 2 arcsec aperture (aperture 10).
- The kron magnitude to be used as total magnitude (no "auto" magnitude is provided).

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:30:38.471667
```

1.2 I - Column selection

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: invalid value enco
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: divide by zero enc
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:80: RuntimeWarning: divide by zero enc
  errors = 2.5 / np.log(10) * errors_on_fluxes / fluxes
```

```
Out[6]: <IPython.core.display.HTML object>
```

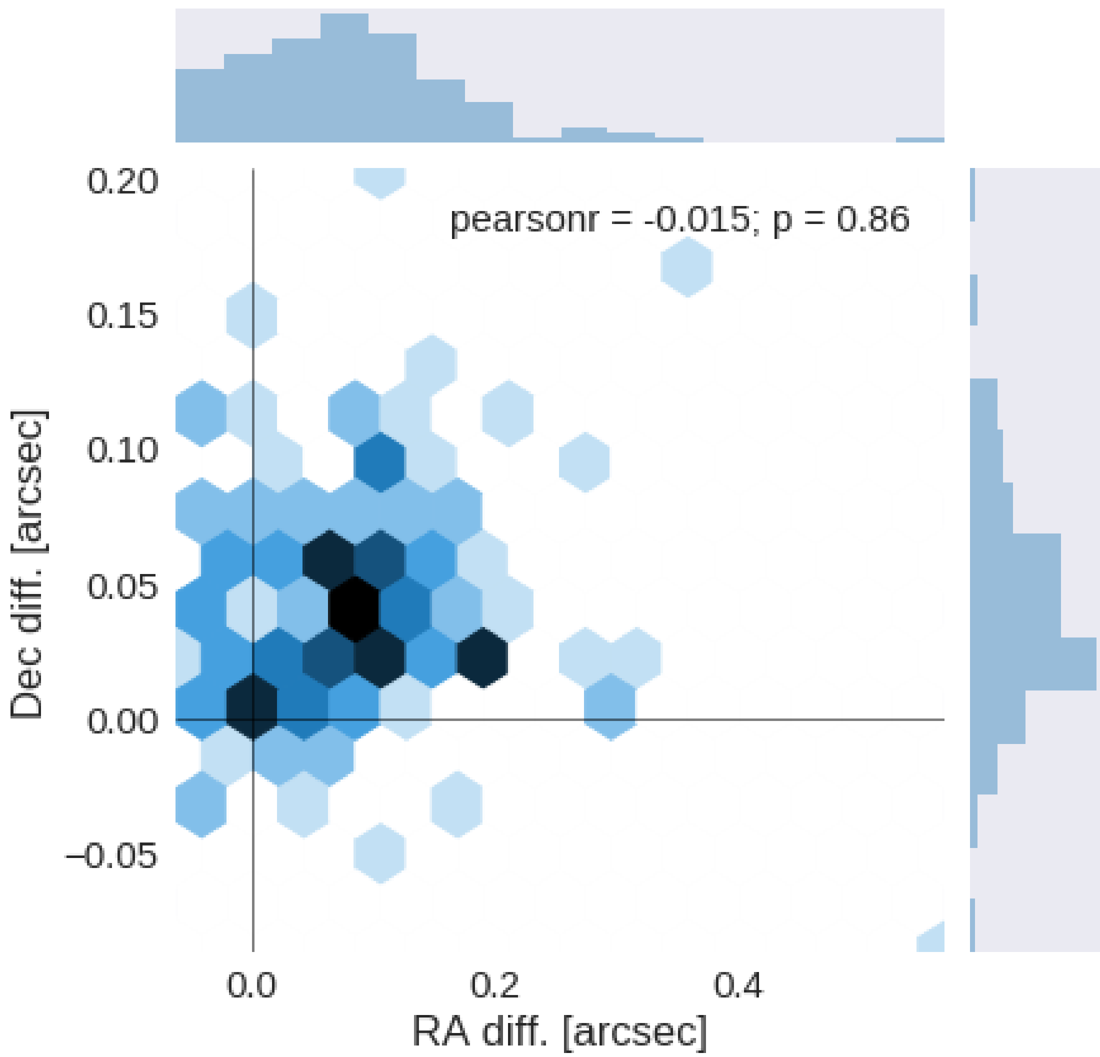
1.3 II - Removal of duplicated sources

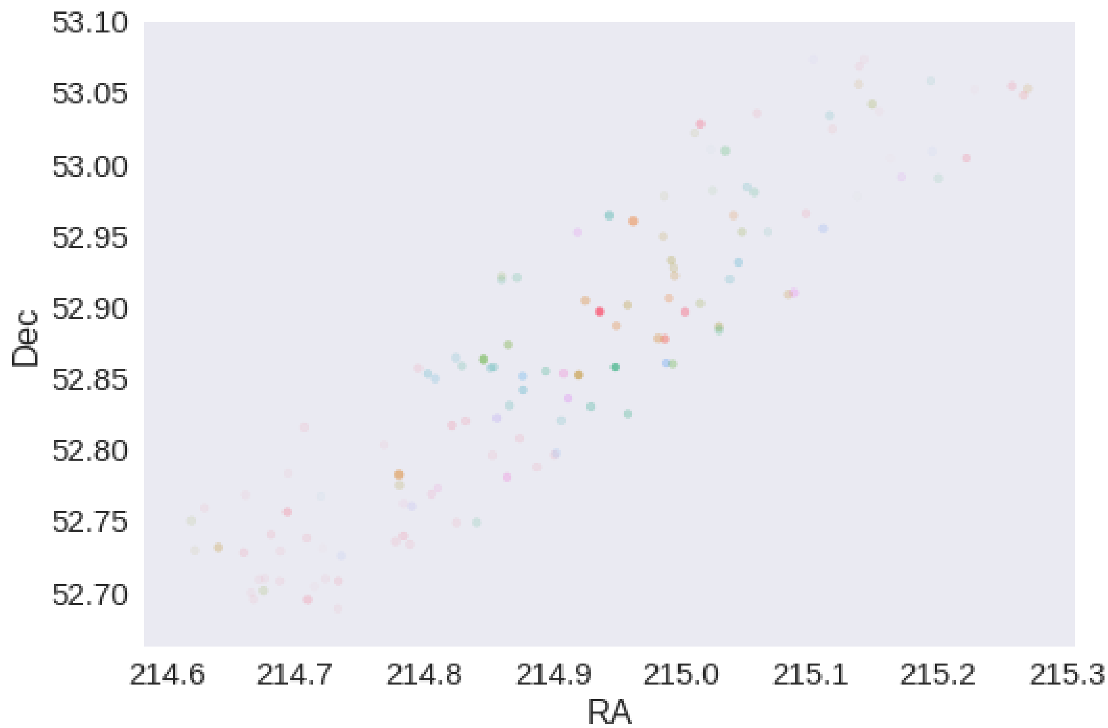
We remove duplicated objects from the input catalogues.

```
The initial catalogue had 41457 sources.
The cleaned catalogue has 41449 sources (8 removed).
The cleaned catalogue has 8 sources flagged as having been cleaned
```

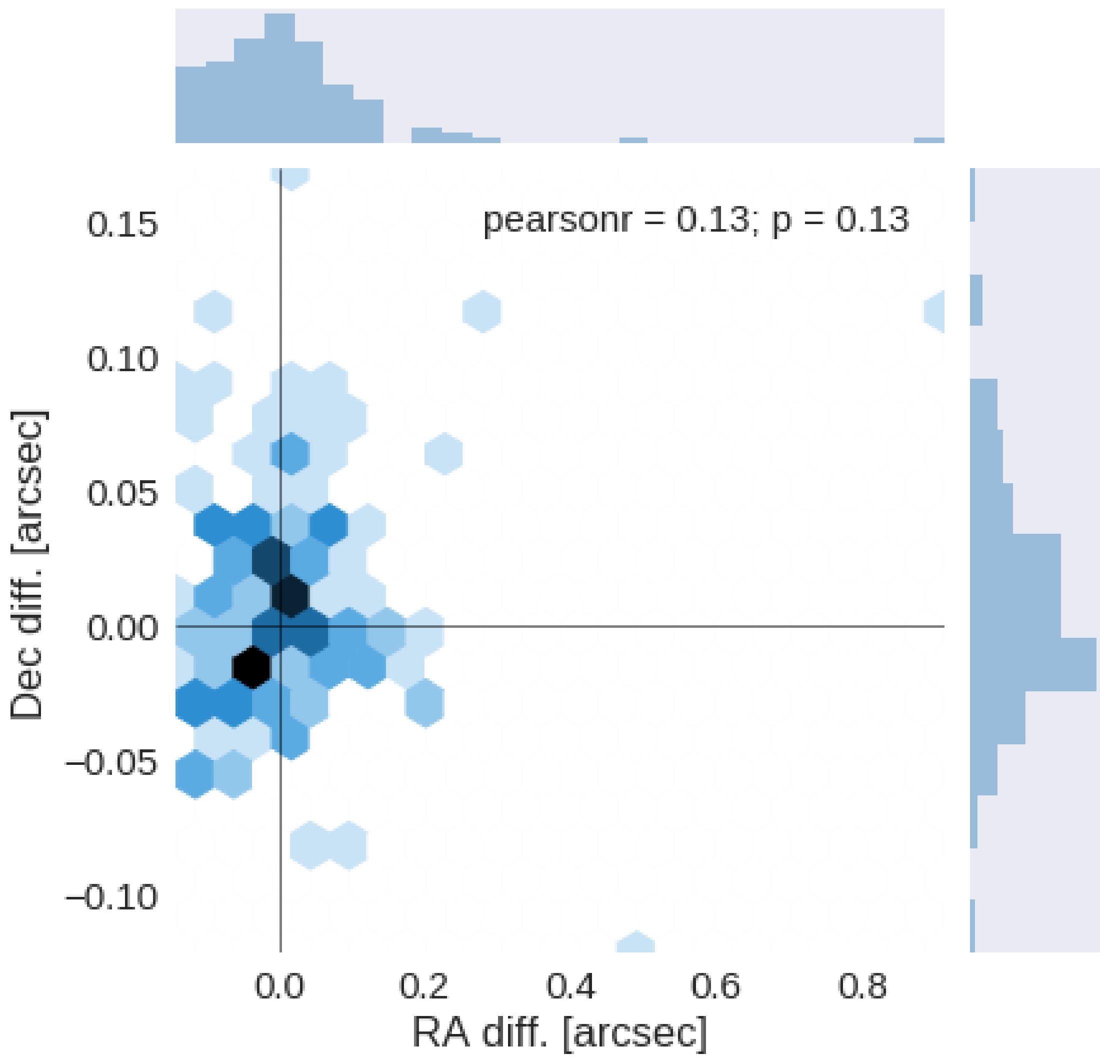
1.4 III - Astrometry correction

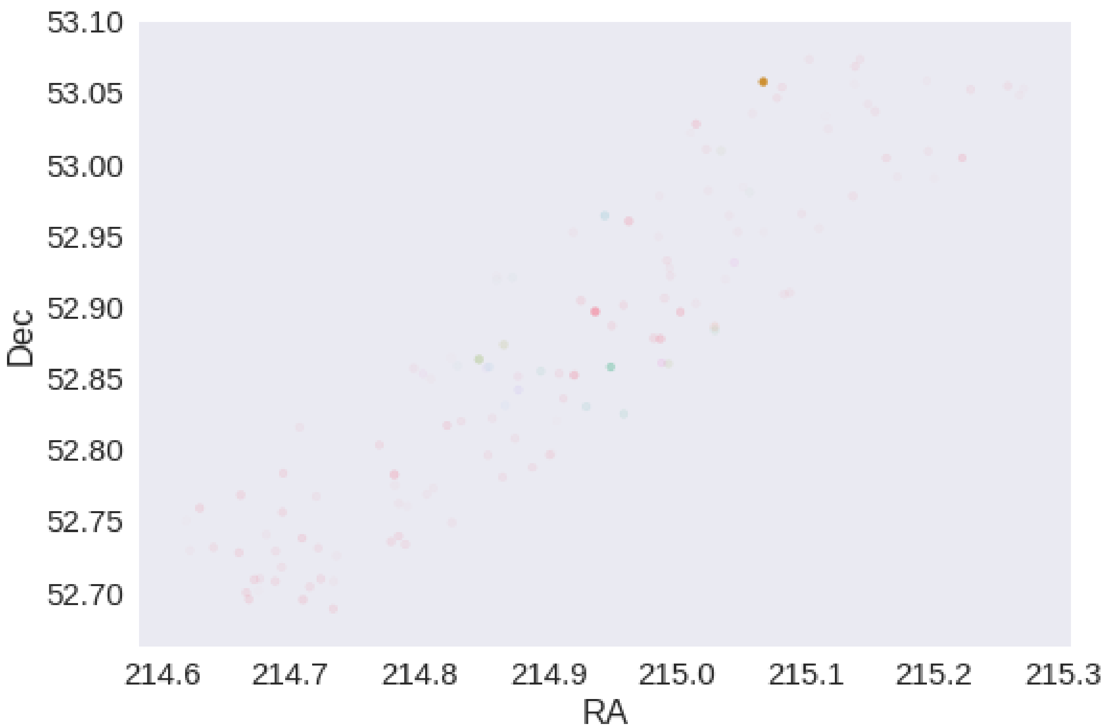
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.07893977393678142 arcsec
Dec correction: -0.034441607530766305 arcsec
```


pearsonr = 0.13; p = 0.13
0.15
0.10
0.05
0.00
−0.05
−0.10
Dec diff. [arcsec]
0.0
0.2
0.4
0.6
0.8
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
160 sources flagged.
```

2 V - Saving to disk

1.7_DEEP2

March 8, 2018

1 EGS master catalogue

1.1 Preparation of DEEP2 data

DEEP2 catalogue: the catalogue comes from `dmu0_DEEP2`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The total magnitude. No aperture magnitudes are given.

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:30:51.539432
```

1.2 I - Column selection

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
Out[6]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

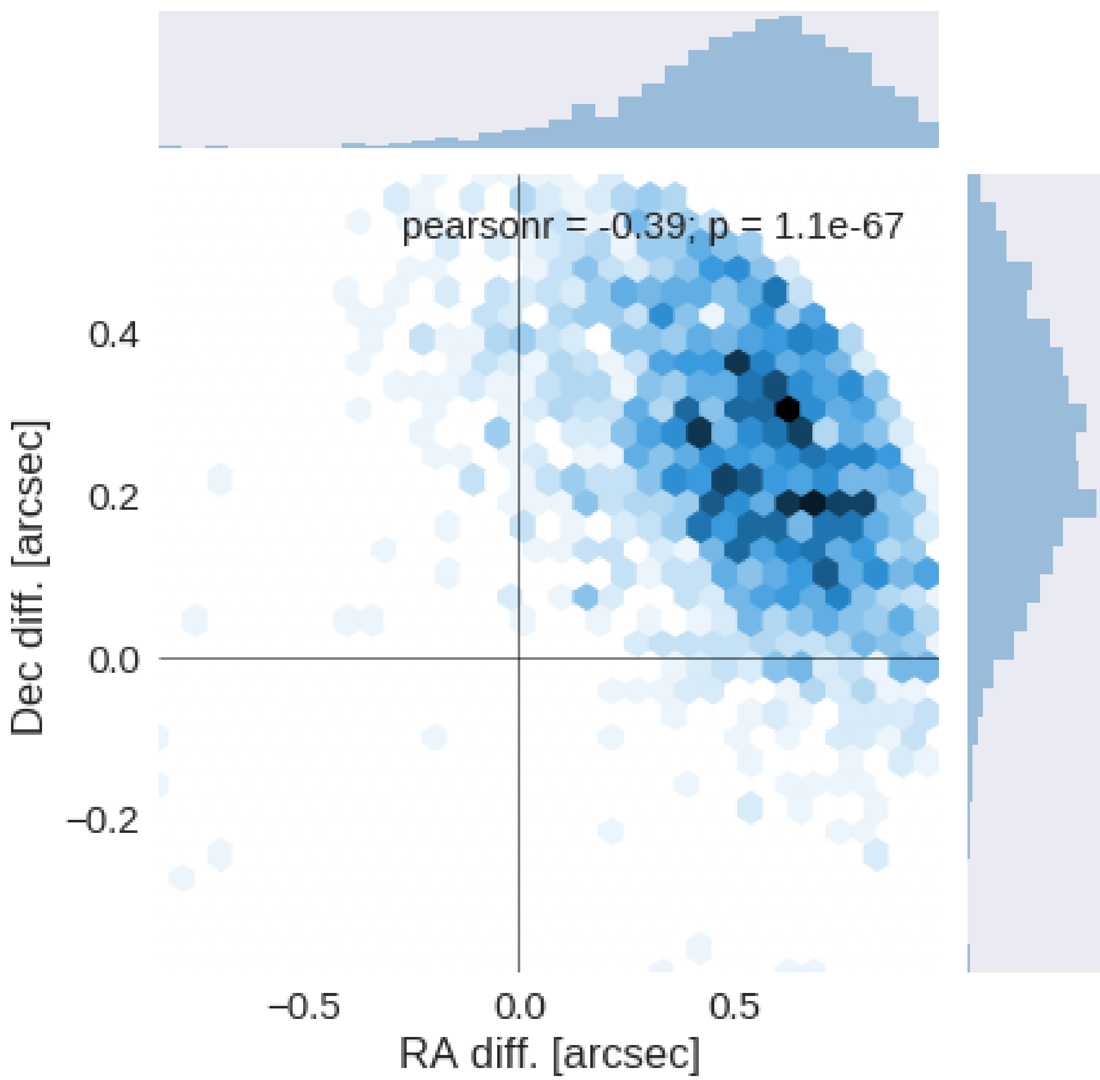
We remove duplicated objects from the input catalogues.

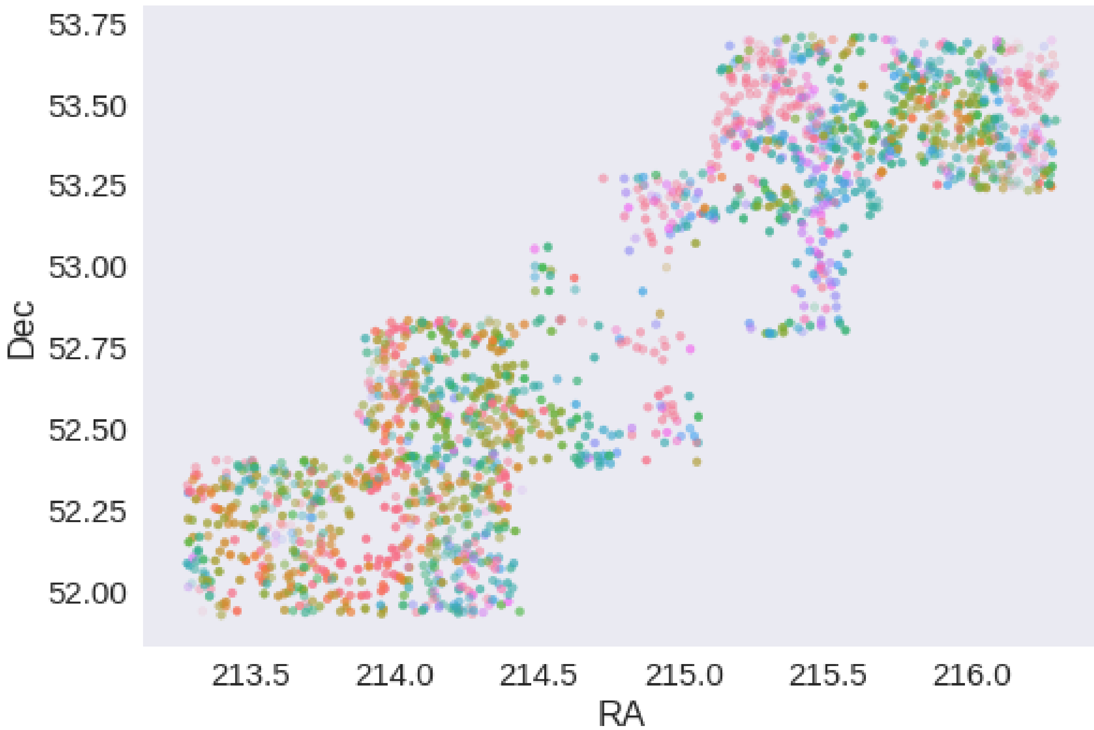
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 208517 sources.
The cleaned catalogue has 204382 sources (4135 removed).
The cleaned catalogue has 4134 sources flagged as having been cleaned
```

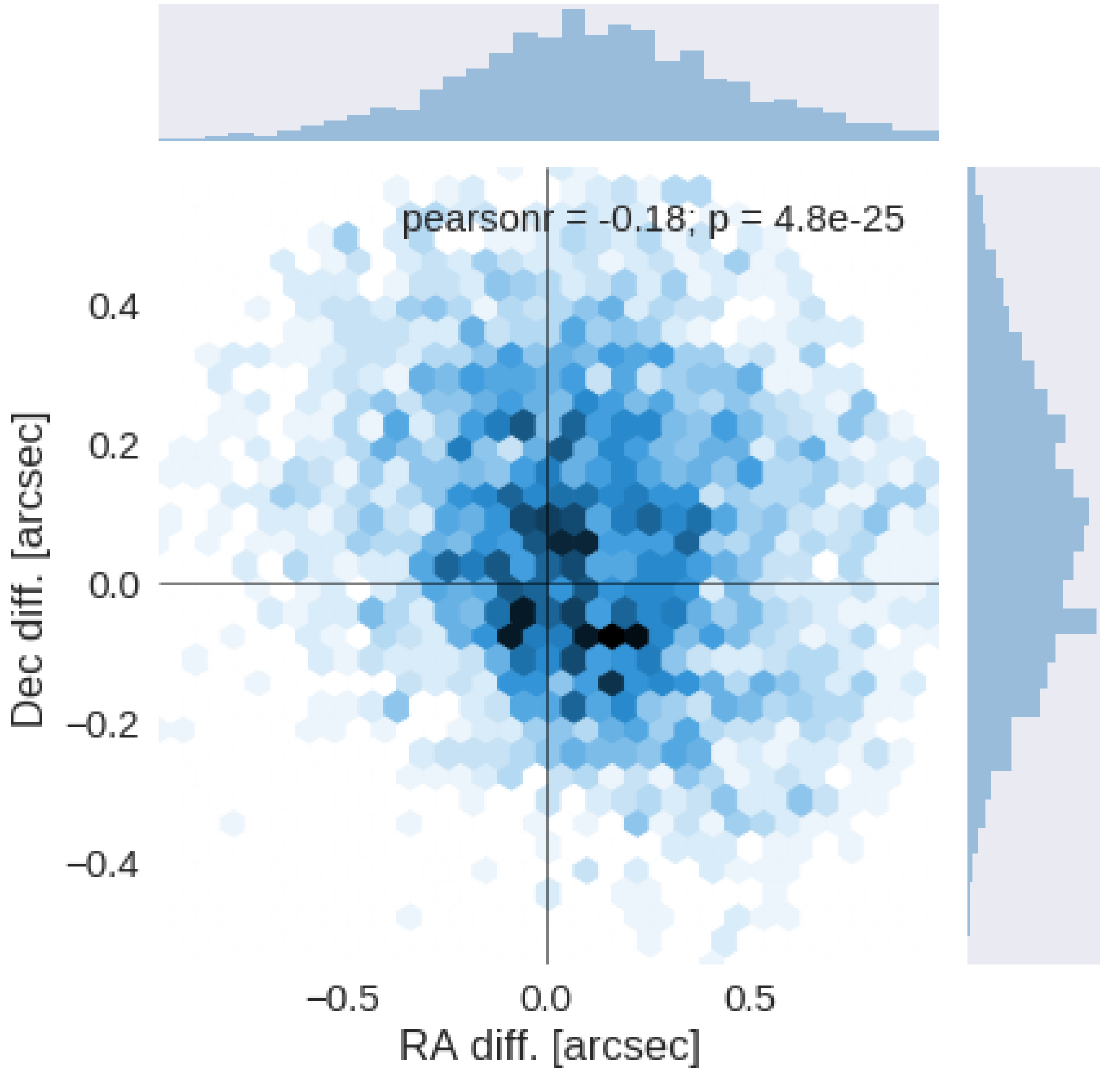
1.4 III - Astrometry correction

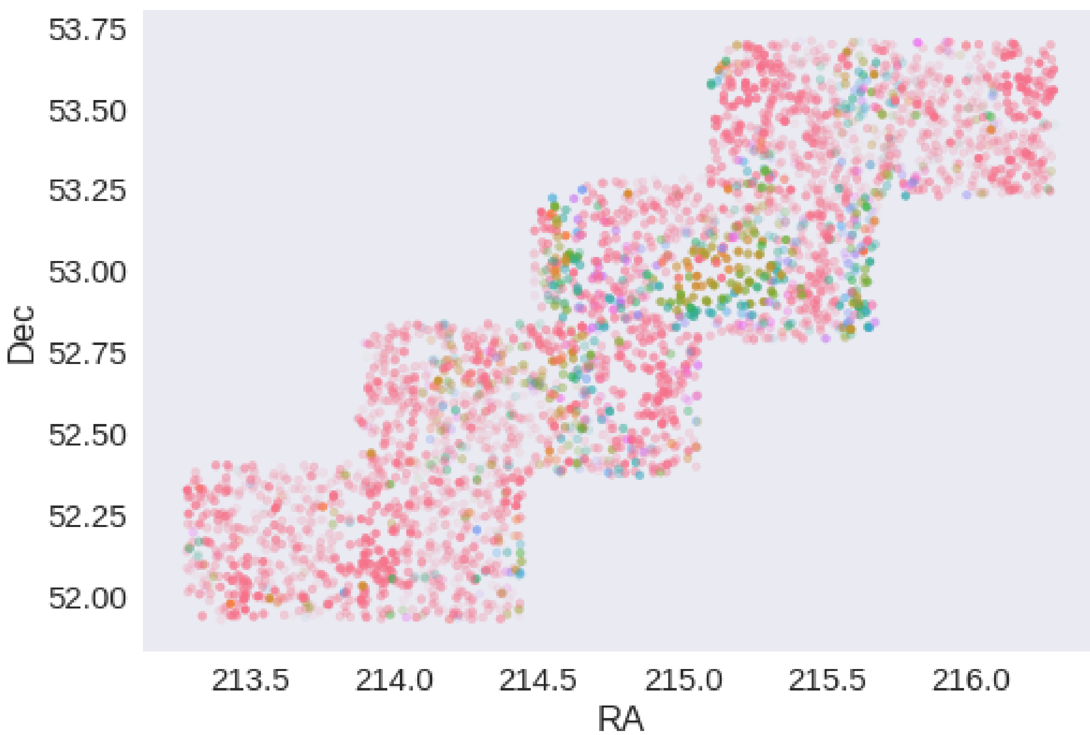
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.






```
RA correction: -0.5583843305942082 arcsec
Dec correction: -0.24953763438304577 arcsec
```


pearsonr = -0.18; p = 4.8e-25
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
3592 sources flagged.
```

2 V - Saving to disk

1.8_IRAC-EGS

March 8, 2018

1 EGS master catalogue

1.1 Preparation of IRAC-EGS data

IRAC-EGS catalogue: the catalogue comes from `dmu0_IRAC-EGS`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The total flux (no aperture fluxes given).

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-17 12:58:20.299746
```

1.2 I - Column selection

```
Out[6]: <IPython.core.display.HTML object>
```

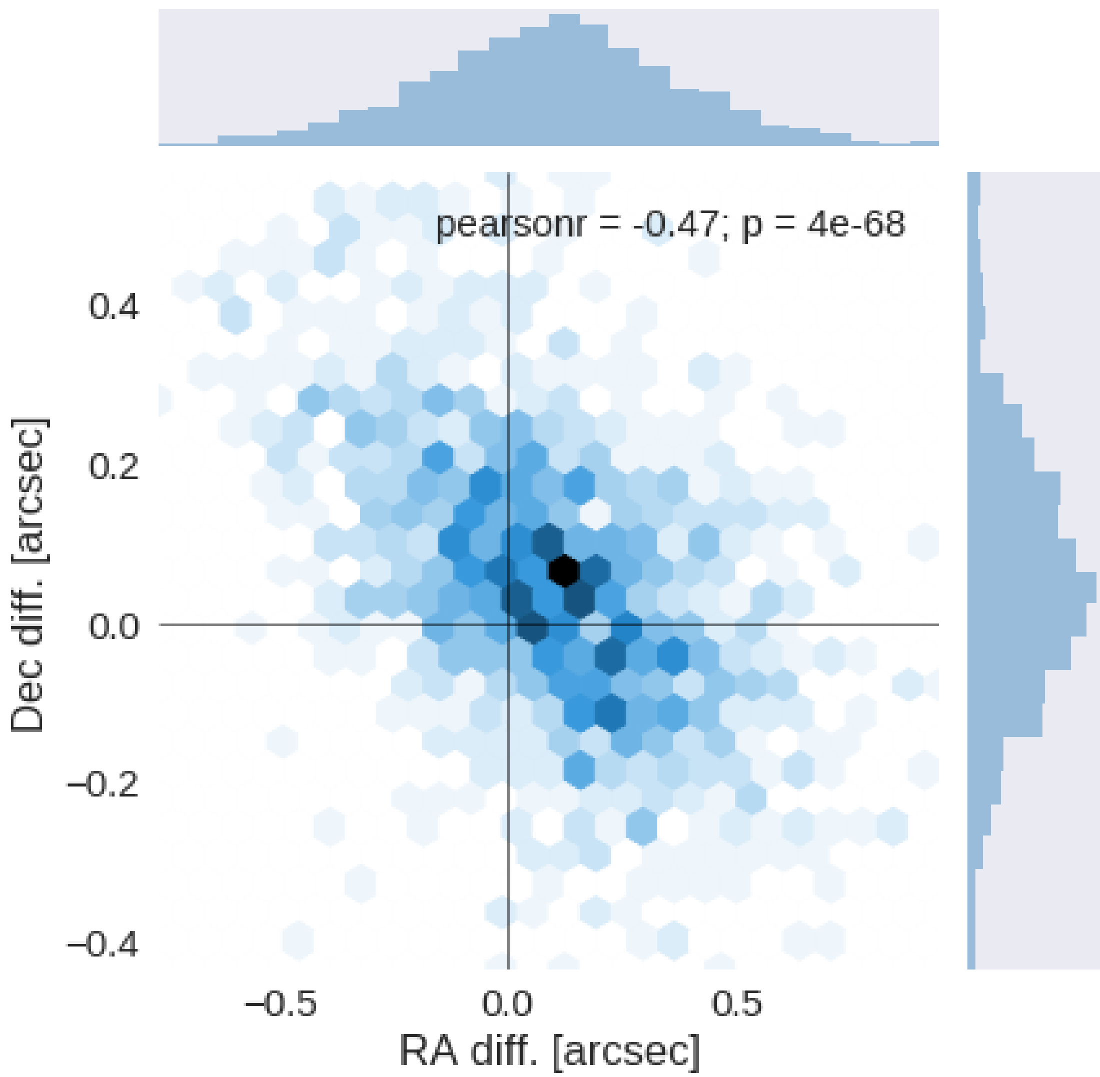
1.3 II - Removal of duplicated sources

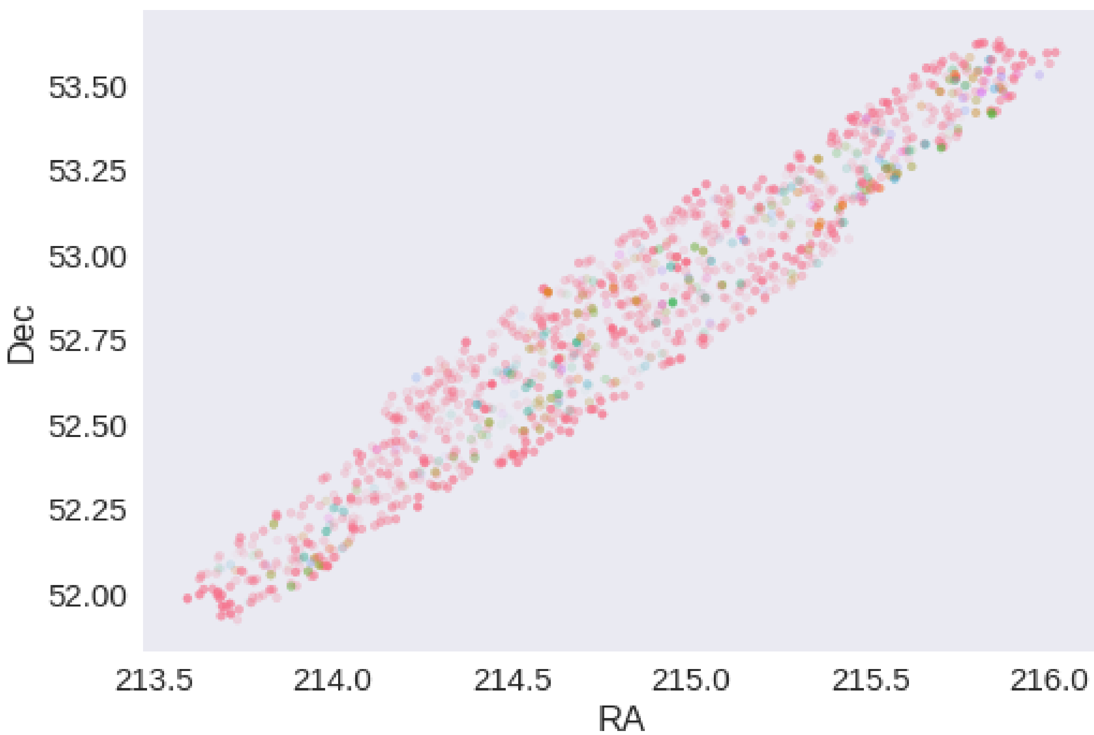
We remove duplicated objects from the input catalogues.

```
The initial catalogue had 117929 sources.
The cleaned catalogue has 117929 sources (0 removed).
The cleaned catalogue has 0 sources flagged as having been cleaned
```

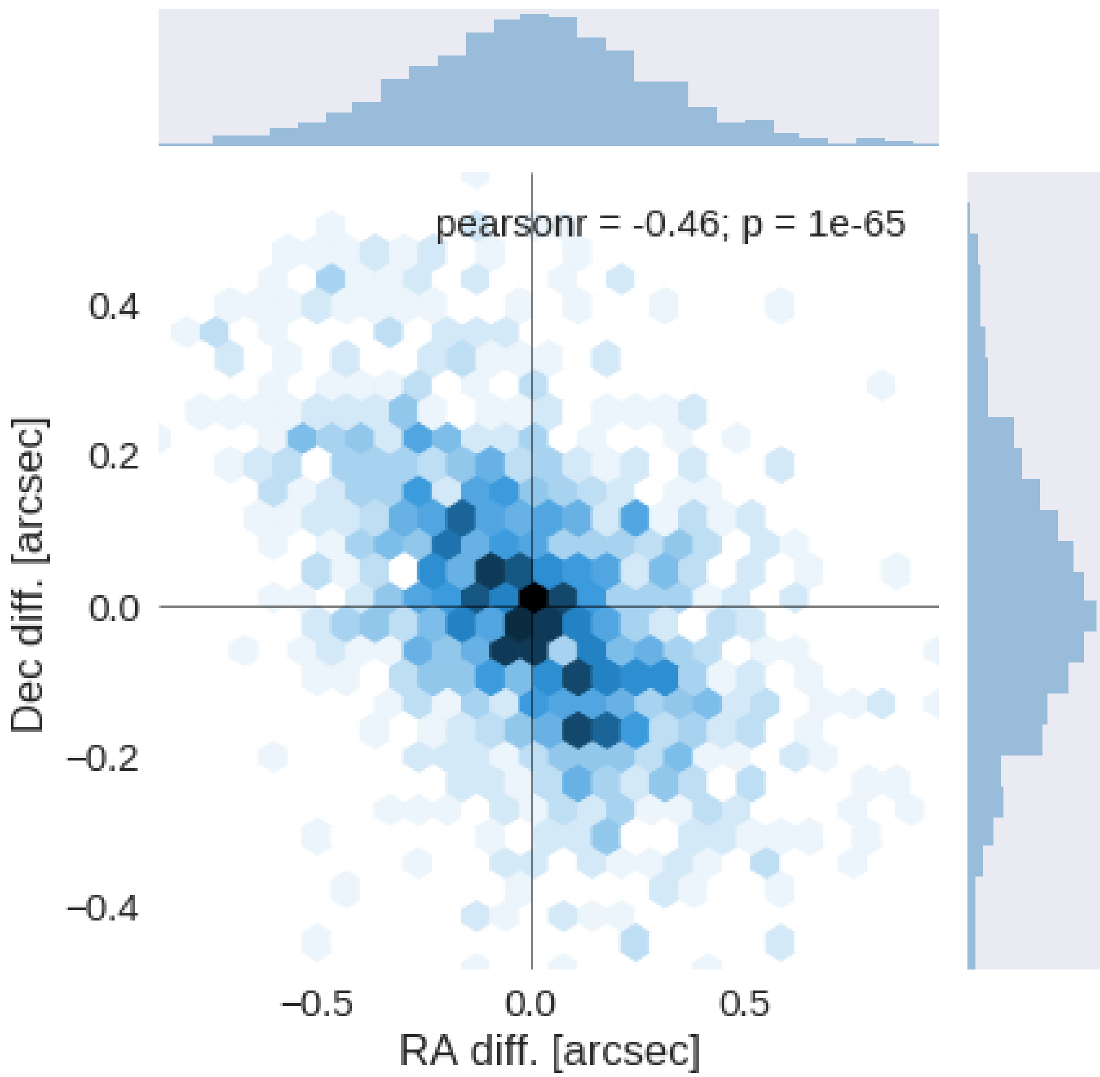
1.4 III - Astrometry correction

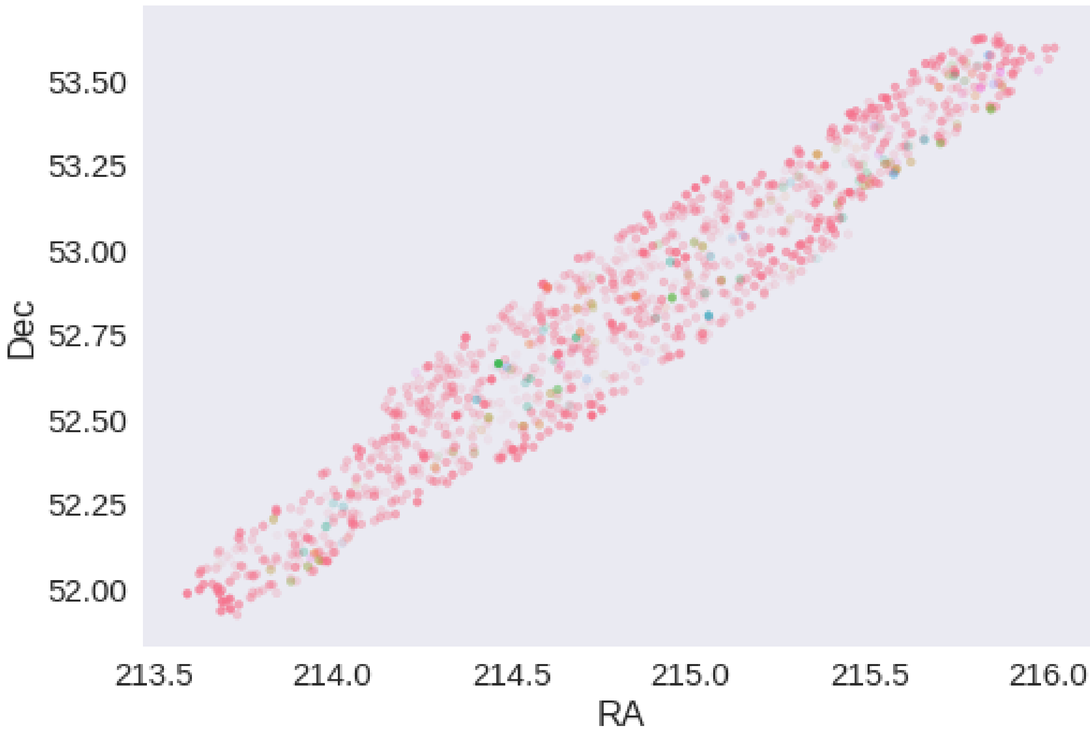
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.


pearsonr = -0.47; p = 4e-68
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]




```
RA correction: -0.10139878082782161 arcsec
Dec correction: -0.05154244758358573 arcsec
```


pearsonr = -0.46; p = 1e-65
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
1297 sources flagged.
```

2 V - Saving to disk

1.9_HSC

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Hyper Suprime-Cam Subaru Strategic Program Catalogues (HSC-SSP) wide data

This catalogue comes from `dmu0_HSC`. We only have n921 and n816 photometry on the ultradeep field.

In the catalogue, we keep:

- The `object_id` as unique object identifier;
- The position;
- The g, r, i, z, y aperture magnitude in 2" that we aperture correct;
- The g, r, i, z, y kron fluxes and magnitudes.
- The extended flag that we convert to a stellariy.

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:31:20.726269
```

1.2 I - Aperture correction

To compute aperture correction we need to dertermine two parametres: the target aperture and the range of magnitudes for the stars that will be used to compute the correction.

Target aperture: To determine the target aperture, we simulate a curve of growth using the provided apertures and draw two figures:

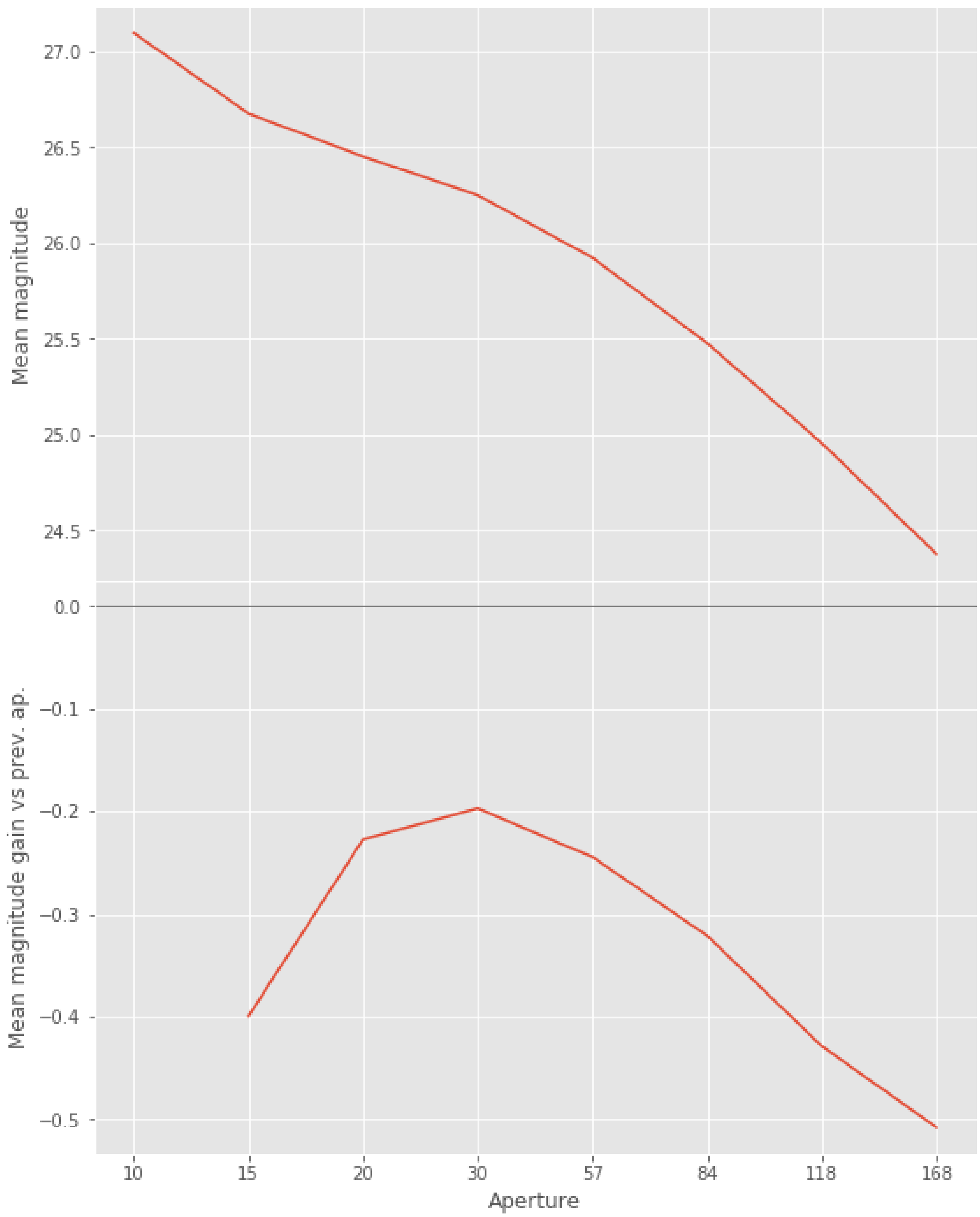
- The evolution of the magnitudes of the objects by plotting on the same plot aperture number vs the mean magnitude.
- The mean gain (loss when negative) of magnitude is each aperture compared to the previous (except for the first of course).

As target aperture, we should use the smallest (i.e. less noisy) aperture for which most of the flux is captures.

Magnitude range: To know what limits in aperture to use when doing the aperture correction, we plot for each magnitude bin the correction that is computed and its RMS. We should then use the wide limits (to use more stars) where the correction is stable and with few dispersion.

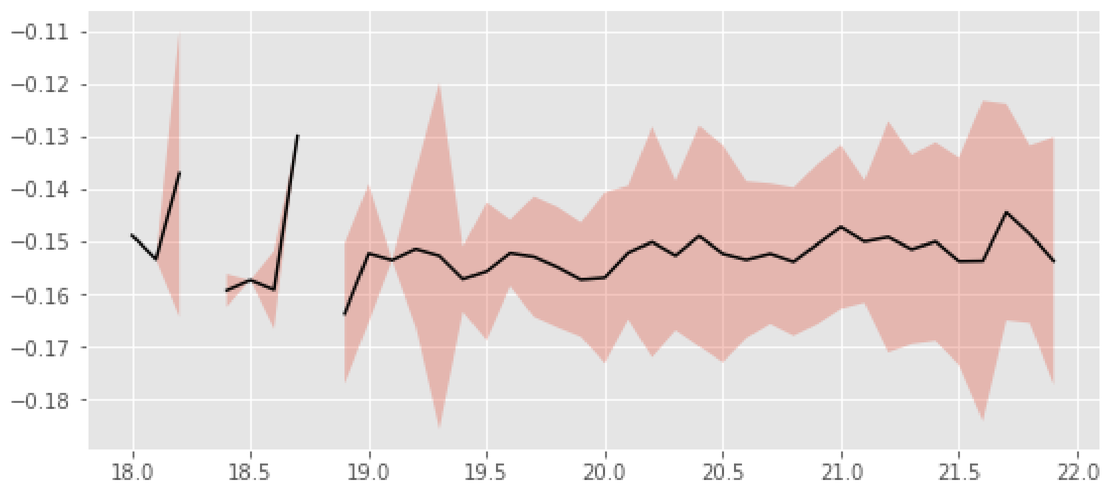
1.2.1 I.a - g band

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid valu
  mags = magnitudes[:, stellarity > stel_threshold].copy()
```



We will use aperture 57 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid valu
  mask = stellarity > .9
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```



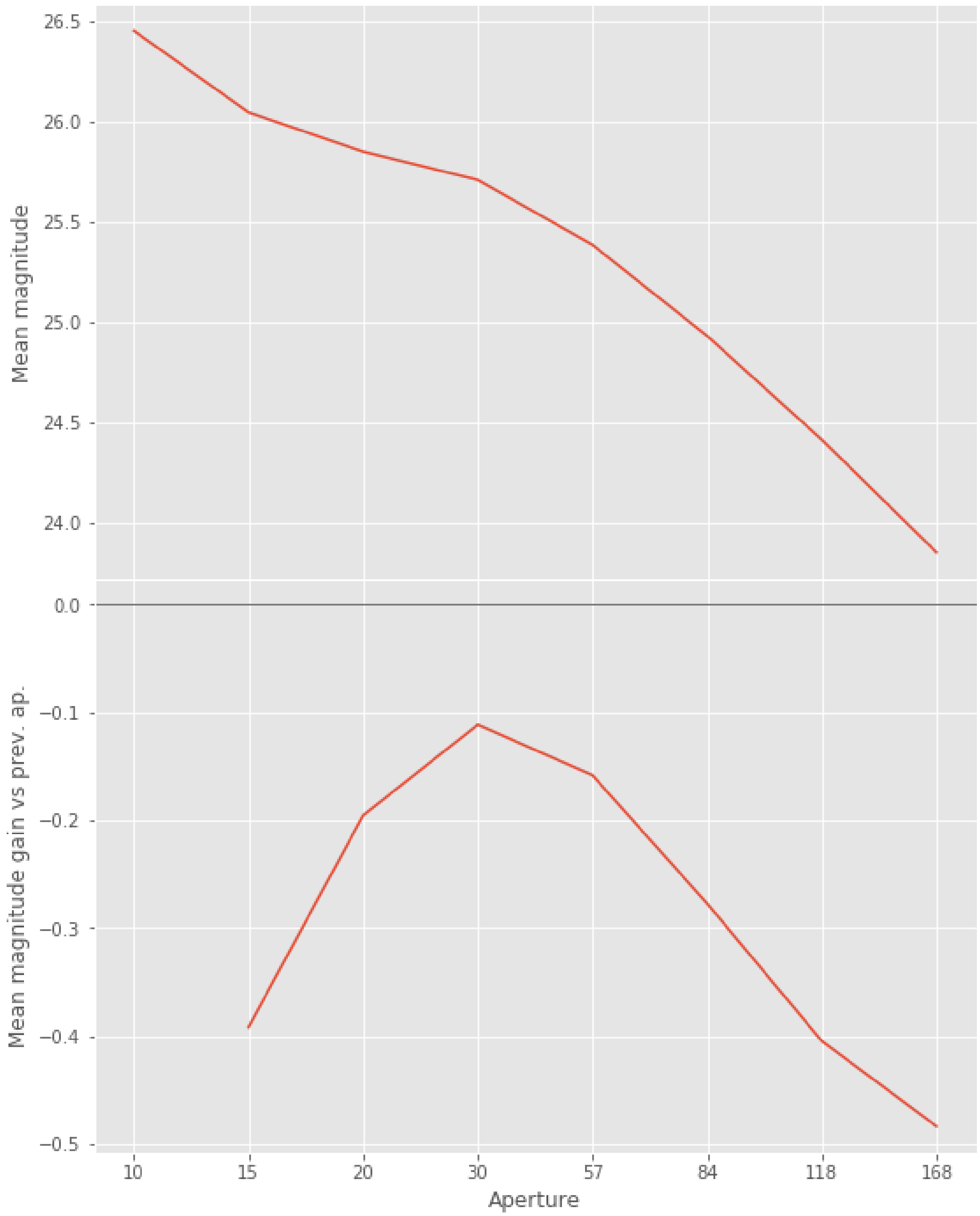
We will use magnitudes between 18.5 and 20.8

```
Aperture correction for g band:
Correction: -0.1536693572998047
Number of source used: 477
RMS: 0.013336935836438763
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```

1.2.2 I.b - r band

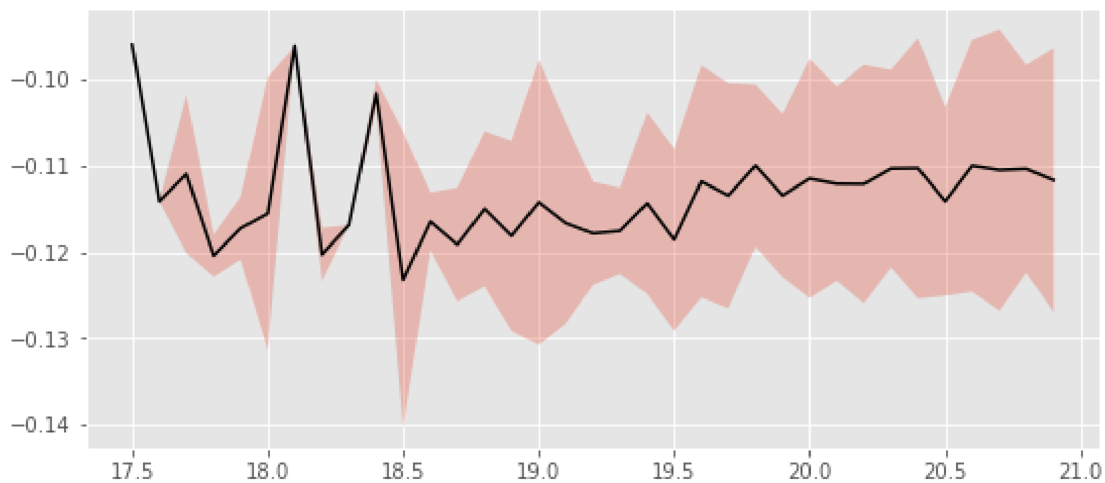
```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid valu
  mags = magnitudes[:, stellarity > stel_threshold].copy()
```



We will use aperture 57 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid valu
  mask = stellarity > .9
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
```

```
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```



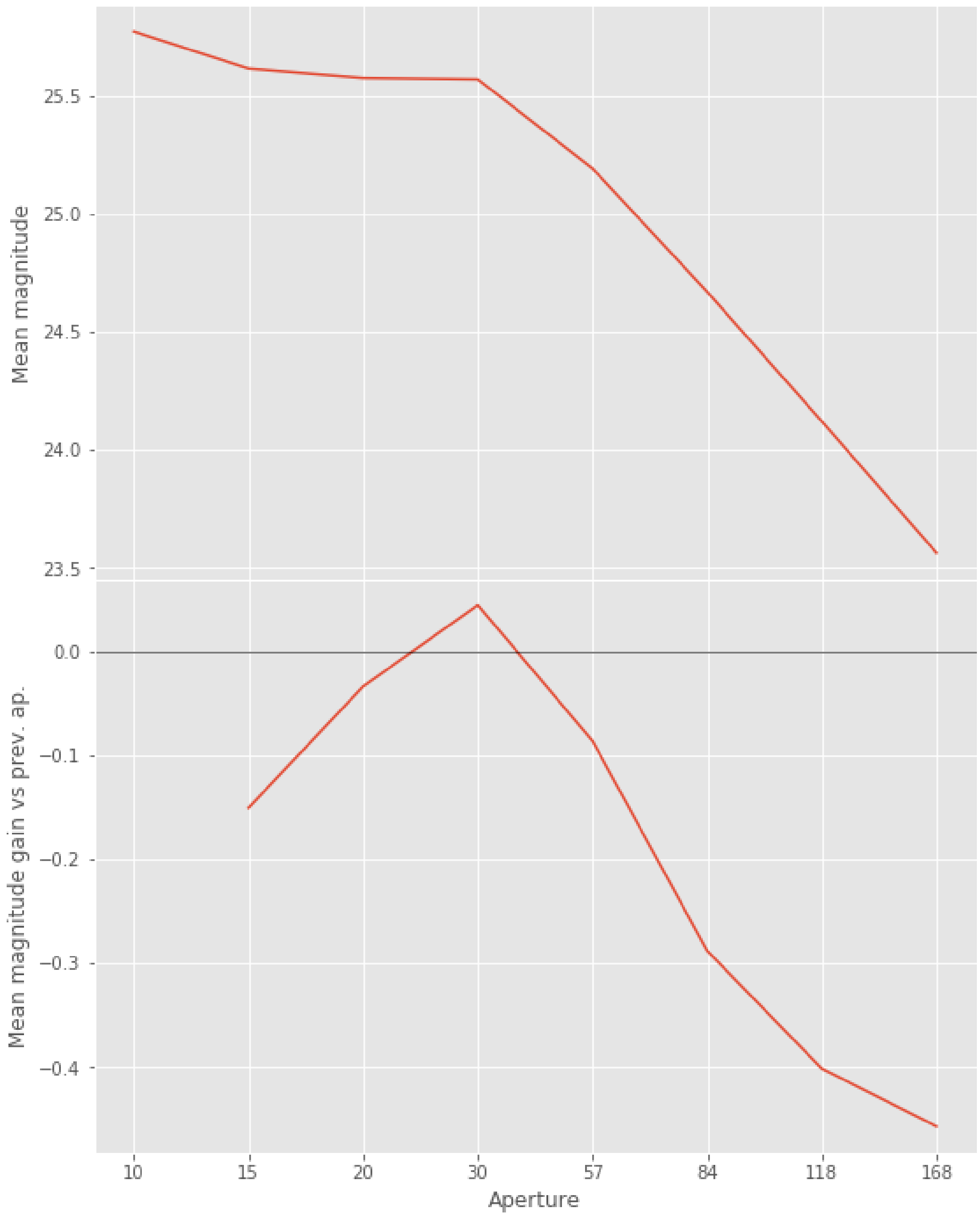
We use magnitudes between 19.5 and 20.5.

```
Aperture correction for r band:
Correction: -0.11204338073730469
Number of source used: 606
RMS: 0.012112590040337011
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```

1.2.3 I.c - i band

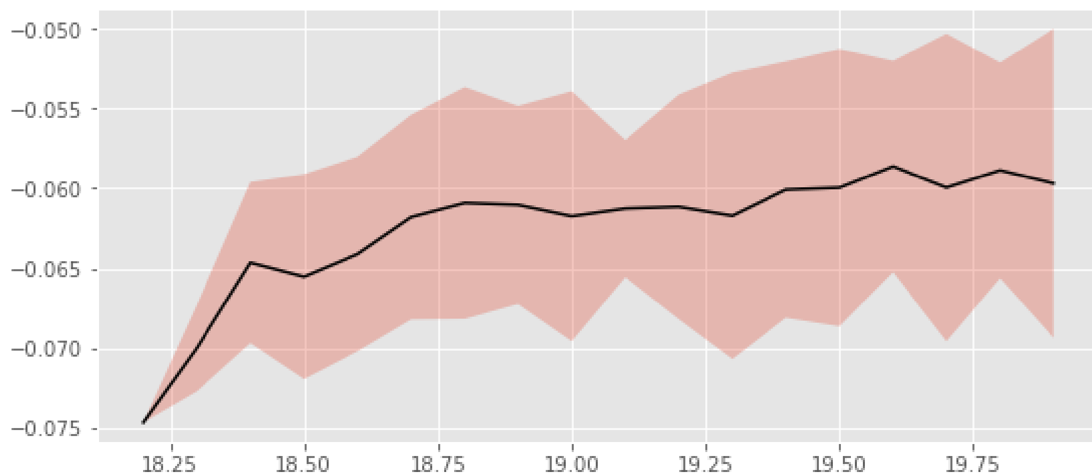
```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid valu
  mags = magnitudes[:, stellarity > stel_threshold].copy()
```



We will use aperture 57 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid valu
  mask = stellarity > .9
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```



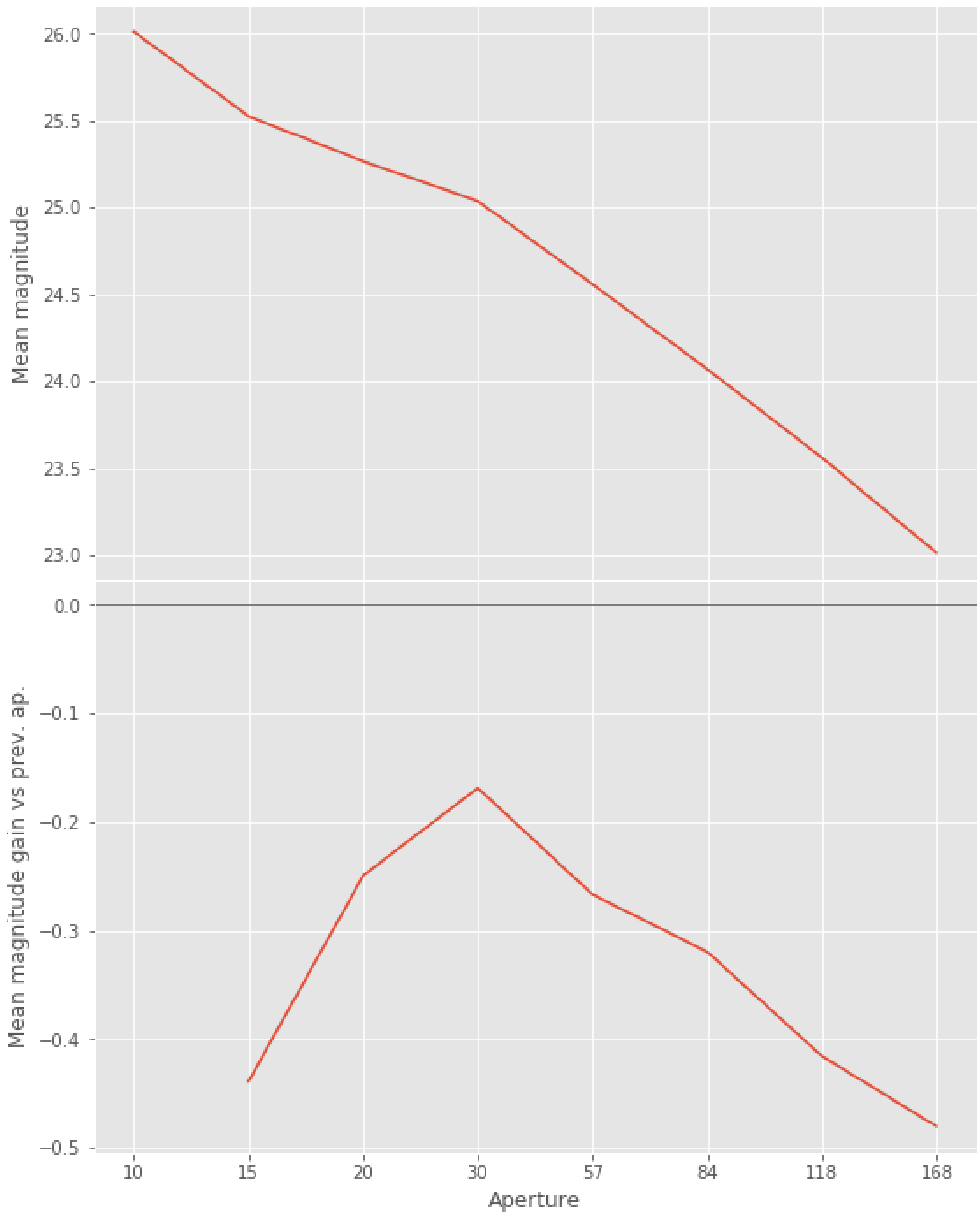
We use magnitudes between 18.5 and 19.8.

```
Aperture correction for i band:
Correction: -0.06093025207519531
Number of source used: 831
RMS: 0.007157356612245586
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```

1.2.4 I.d - z band

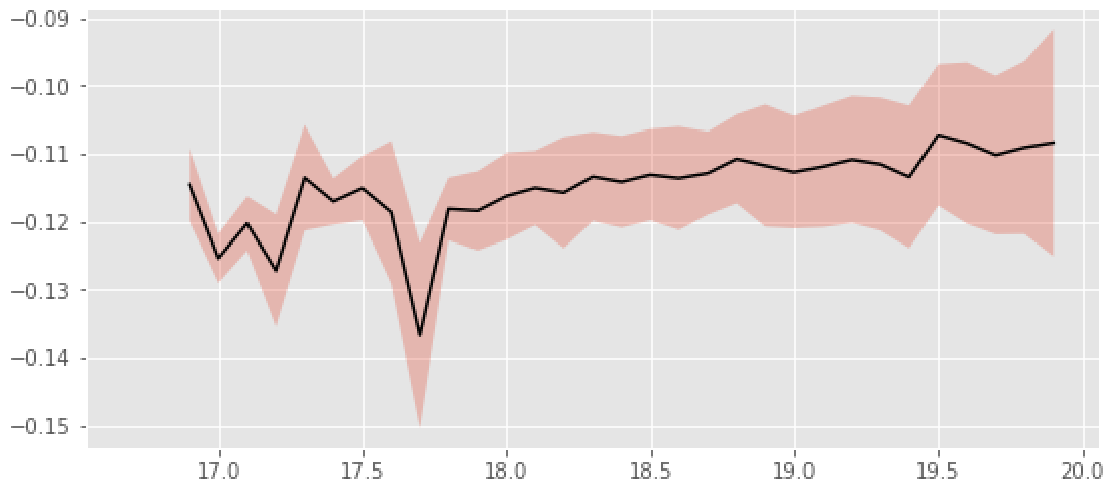
```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid valu
  mags = magnitudes[:, stellarity > stel_threshold].copy()
```



We will use aperture 57 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid valu
  mask = stellarity > .9
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```



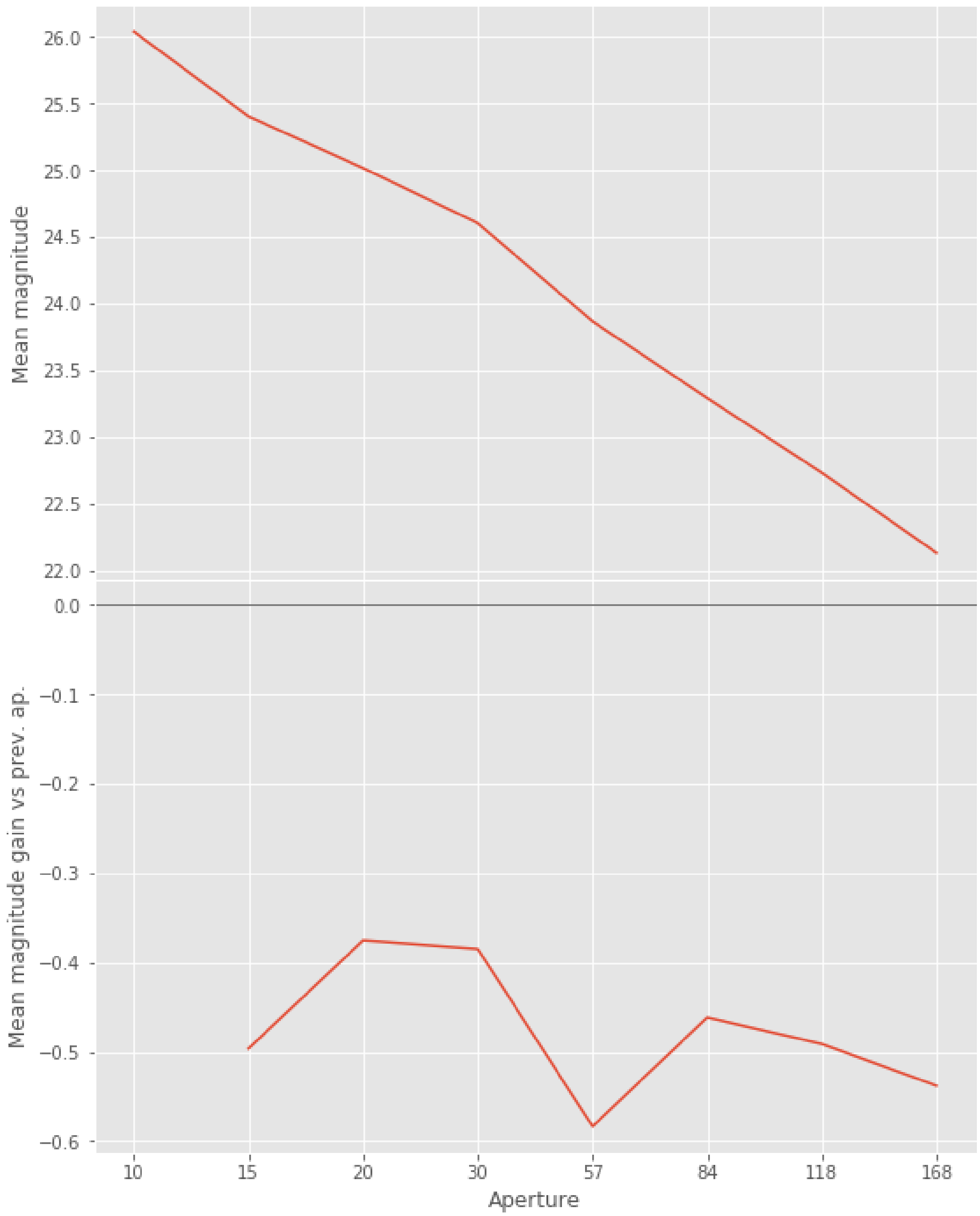
We use magnitudes between 17.5 and 18.8.

```
Aperture correction for z band:
Correction: -0.1141510009765625
Number of source used: 333
RMS: 0.00688200402082919
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```

1.2.5 I.e - y band

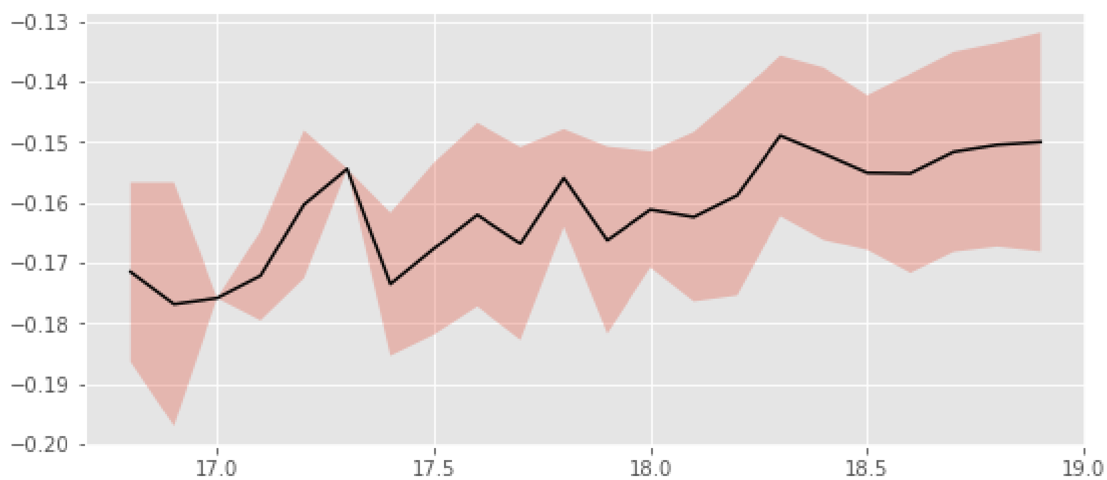
```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid valu
  mags = magnitudes[:, stellarity > stel_threshold].copy()
```



We will use aperture 57 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid valu
  mask = stellarity > .9
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```



We use magnitudes between 17.6 and 18.7.

```
Aperture correction for y band:
Correction: -0.15555763244628906
Number of source used: 334
RMS: 0.015017790515423833
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value enc
  mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value enc
  mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
  mask &= (mag <= mag_max)
```

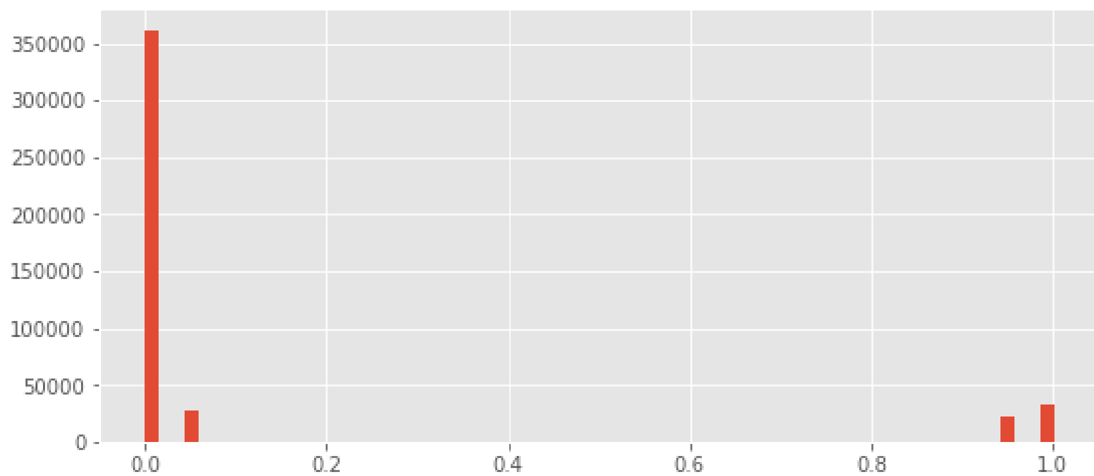
1.3 II - Stellarity

HSC does not provide a 0 to 1 stellarity value but a 0/1 extended flag in each band. We are using the same method as UKIDSS (cf this page) to compute a stellarity based on the class in each band:

$$P(star) = \frac{\prod_i P(star)_i}{\prod_i P(star)_i + \prod_i P(galaxy)_i}$$

where i is the band, and with using the same probabilities as UKDISS:

HSC flag	UKIDSS flag	Meaning	P(star)	P(galaxy)	P(noise)	P(saturated)
	-9	Saturated	0.0	0.0	5.0	95.0
	-3	Probable galaxy	25.0	70.0	5.0	0.0
	-2	Probable star	70.0	25.0	5.0	0.0
0	-1	Star	90.0	5.0	5.0	0.0
	0	Noise	5.0	5.0	90.0	0.0
1	+1	Galaxy	5.0	90.0	5.0	0.0



1.4 II - Column selection

```
Out[29]: <IPython.core.display.HTML object>
```

1.5 III - Removal of duplicated sources

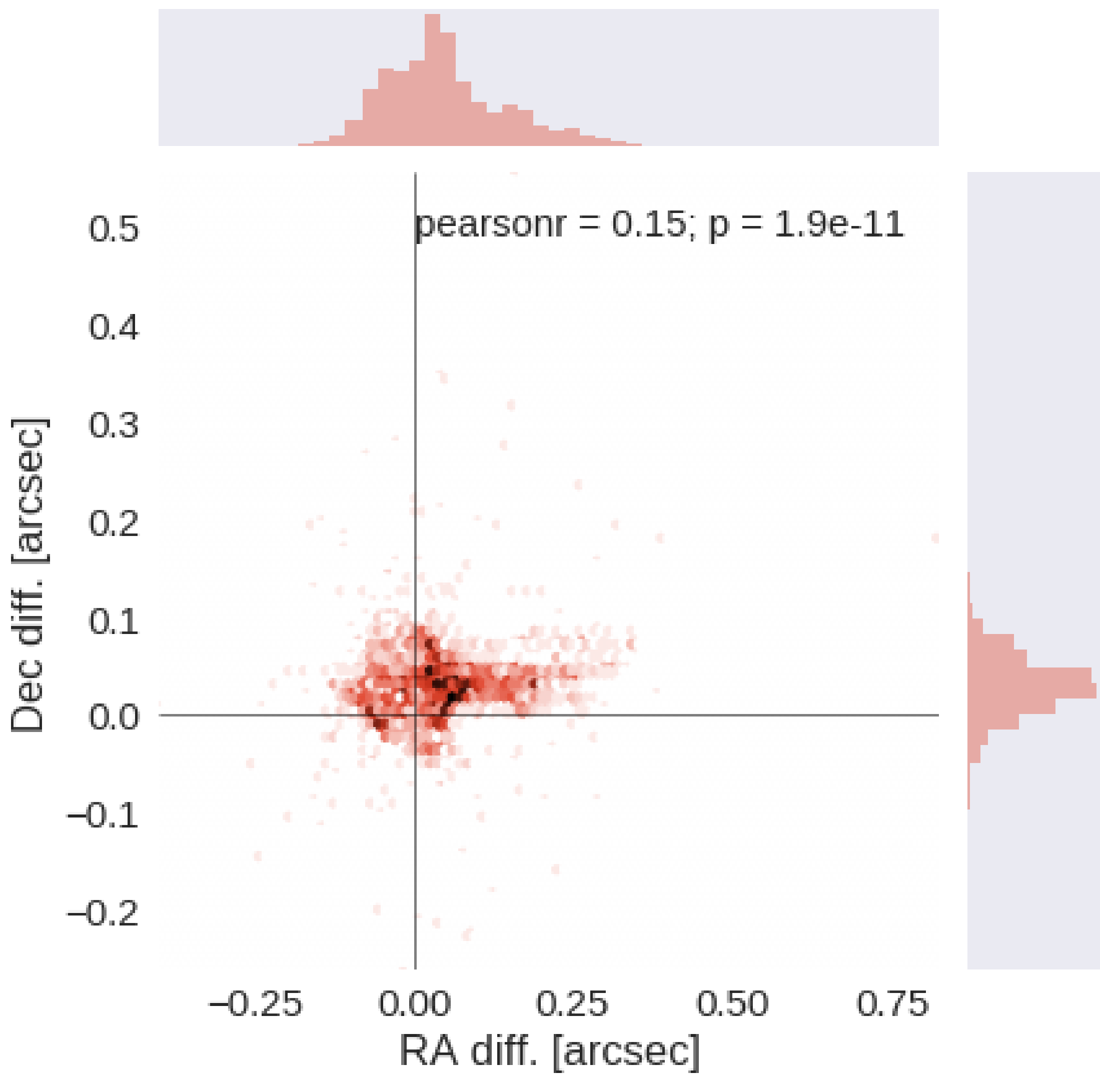
We remove duplicated objects from the input catalogues.

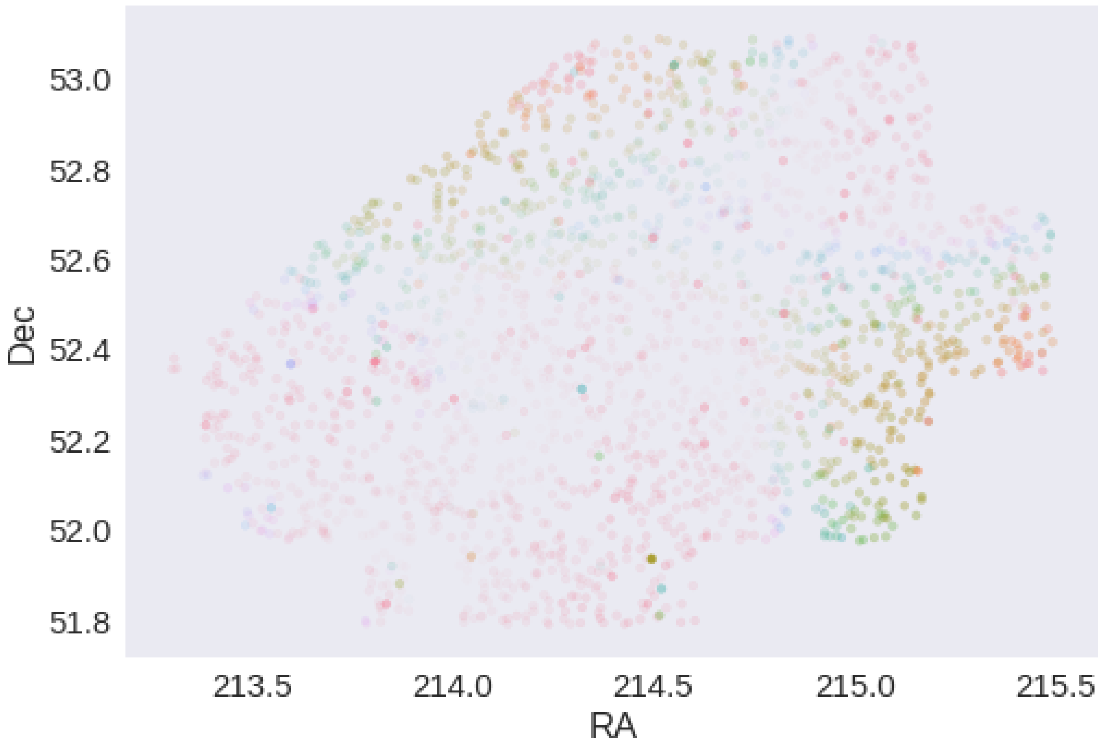
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)


The initial catalogue had 444602 sources.
The cleaned catalogue has 444573 sources (29 removed).
The cleaned catalogue has 29 sources flagged as having been cleaned
```

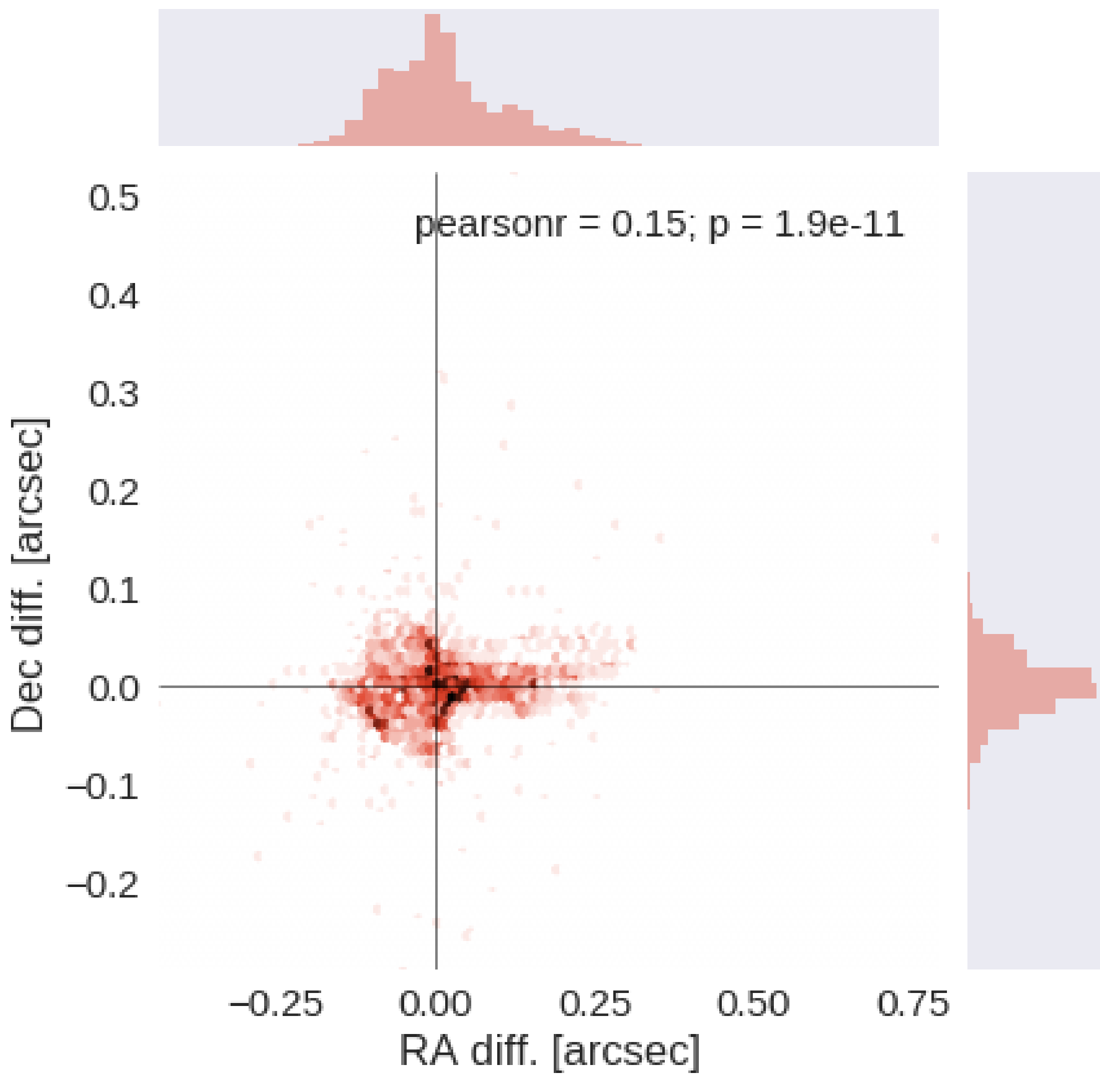
1.6 III - Astrometry correction

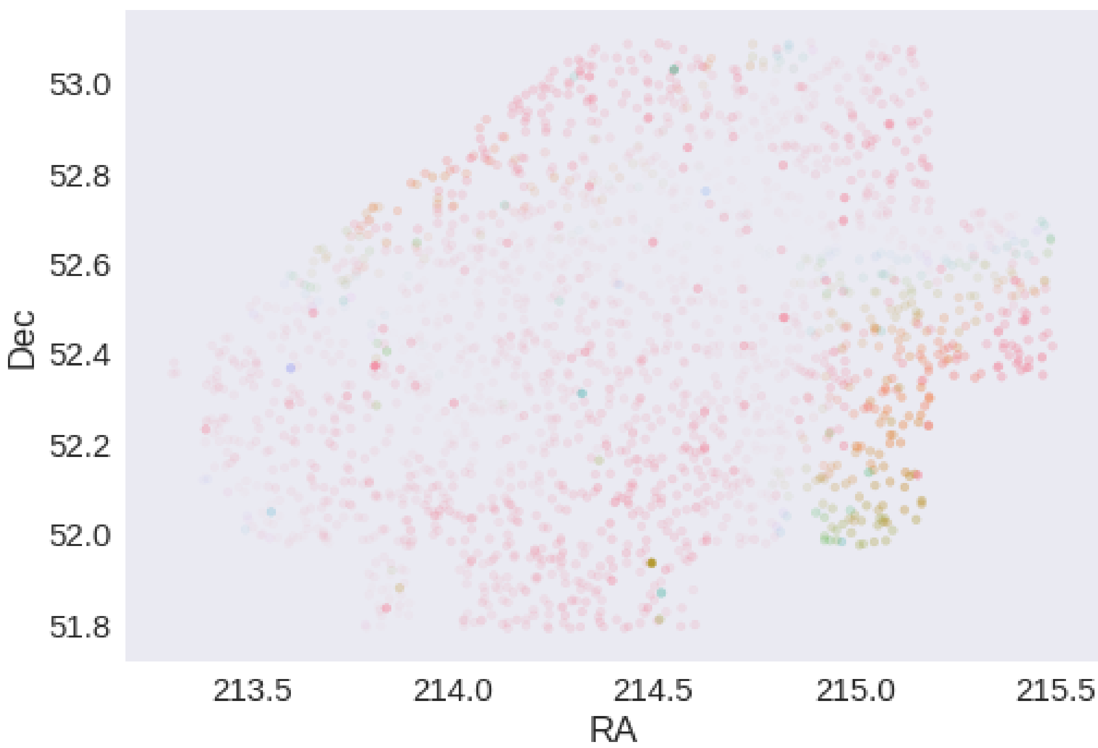
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.


pearsonr = 0.15; p = 1.9e-11
0.5
0.4
0.3
0.2
0.1
0.0
−0.1
−0.2
Dec diff. [arcsec]
−0.25
0.00
0.25
0.50
0.75
RA diff. [arcsec]




```
RA correction: -0.03406401734764586 arcsec
Dec correction: -0.03037861431209876 arcsec
```


pearsonr = 0.15; p = 1.9e-11
0.5
0.4
0.3
0.2
0.1
0.0
−0.1
−0.2
Dec diff. [arcsec]
−0.25
0.00
0.25
0.50
0.75
RA diff. [arcsec]



1.7 IV - Flagging Gaia objects

```
2264 sources flagged.
```

2 V - Saving to disk

1.10_PanSTARRS1-3SS

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Pan-STARRS1 - 3pi Steradian Survey (3SS) data

This catalogue comes from `dmu0_PanSTARRS1-3SS`.

In the catalogue, we keep:

- The `uniquePspsSTid` as unique object identifier;
- The r-band position which is given for all the sources;
- The grizy `<band>FApMag` aperture magnitude (see below);
- The grizy `<band>FKronMag` as total magnitude.

The Pan-STARRS1-3SS catalogue provides for each band an aperture magnitude defined as "In PS1, an 'optimal' aperture radius is determined based on the local PSF. The wings of the same analytic PSF are then used to extrapolate the flux measured inside this aperture to a 'total' flux."

The observations used for the catalogue where done between 2010 and 2015 (ref).

TODO: Check if the detection flag can be used to know in which bands an object was detected to construct the coverage maps.

TODO: Check for stellarity.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:32:35.006844
```

1.2 I - Column selection

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
Out[6]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

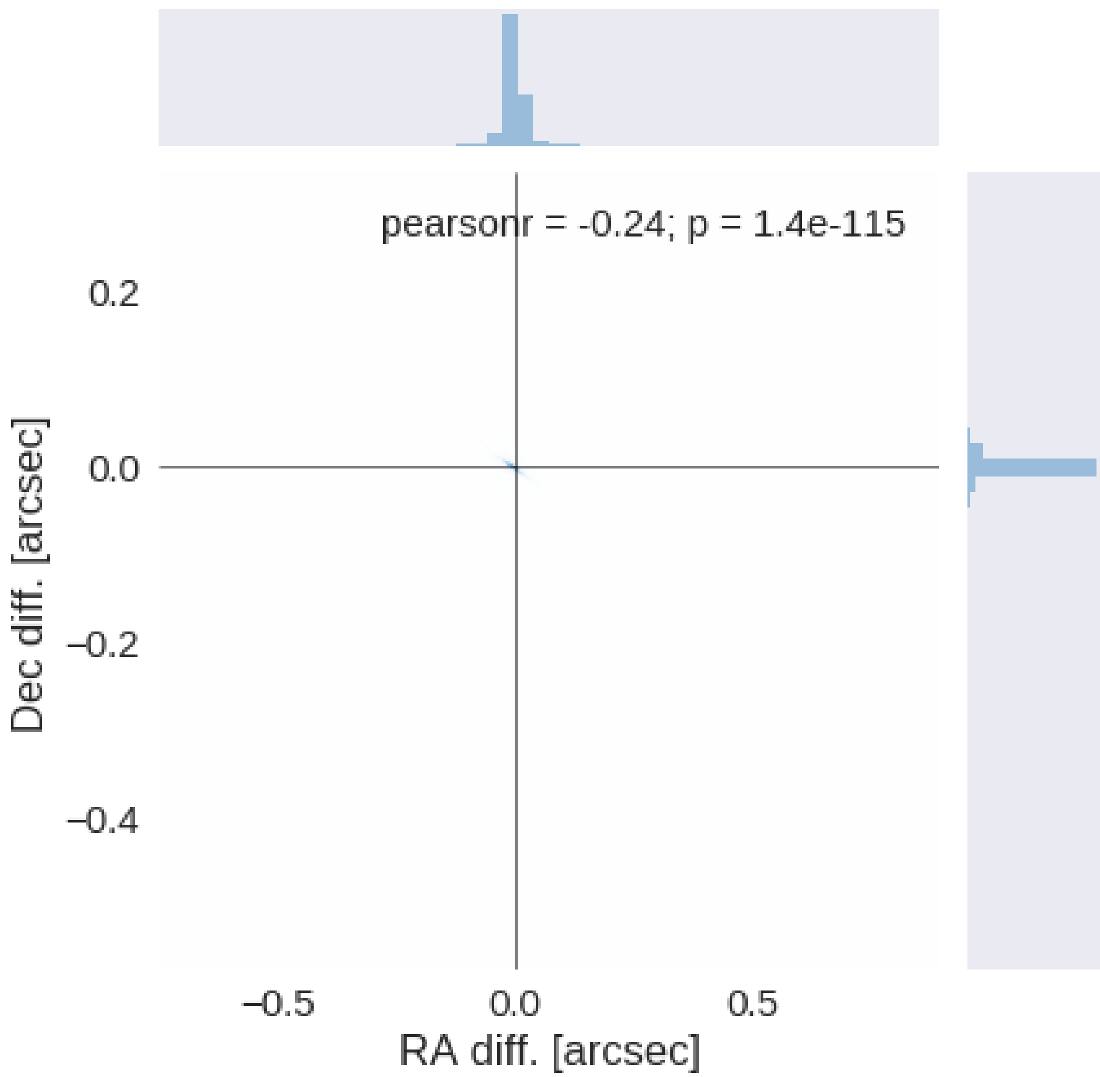
We remove duplicated objects from the input catalogues.

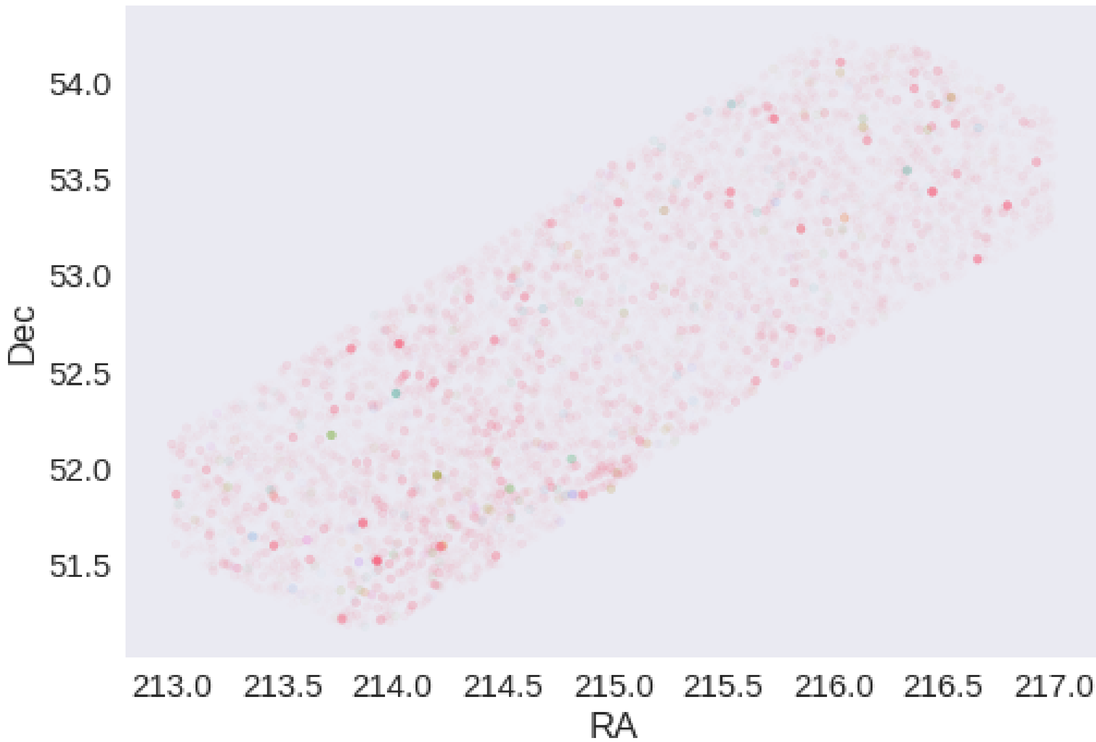
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 59217 sources.
The cleaned catalogue has 59207 sources (10 removed).
The cleaned catalogue has 10 sources flagged as having been cleaned
```

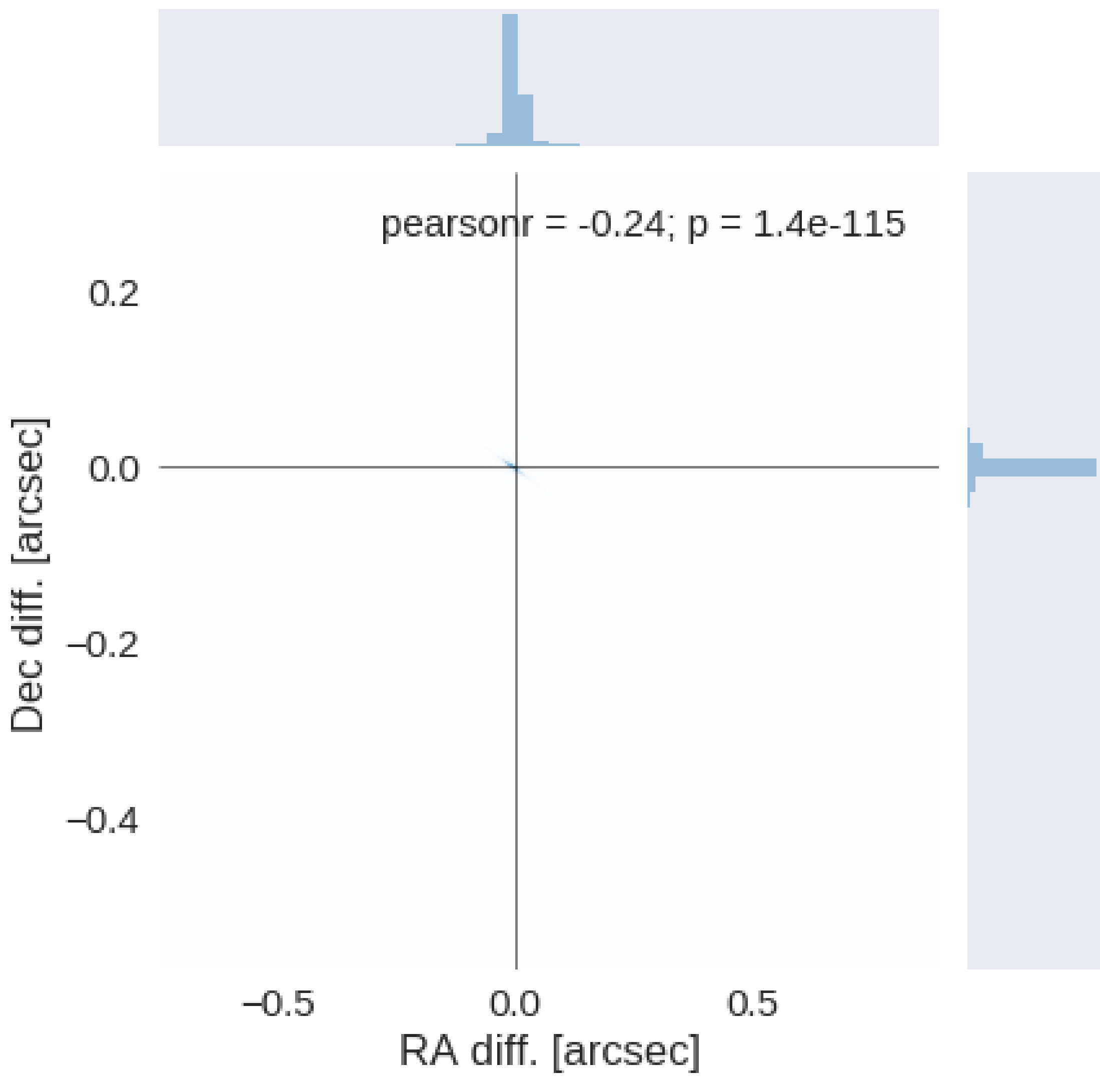
1.4 III - Astrometry correction

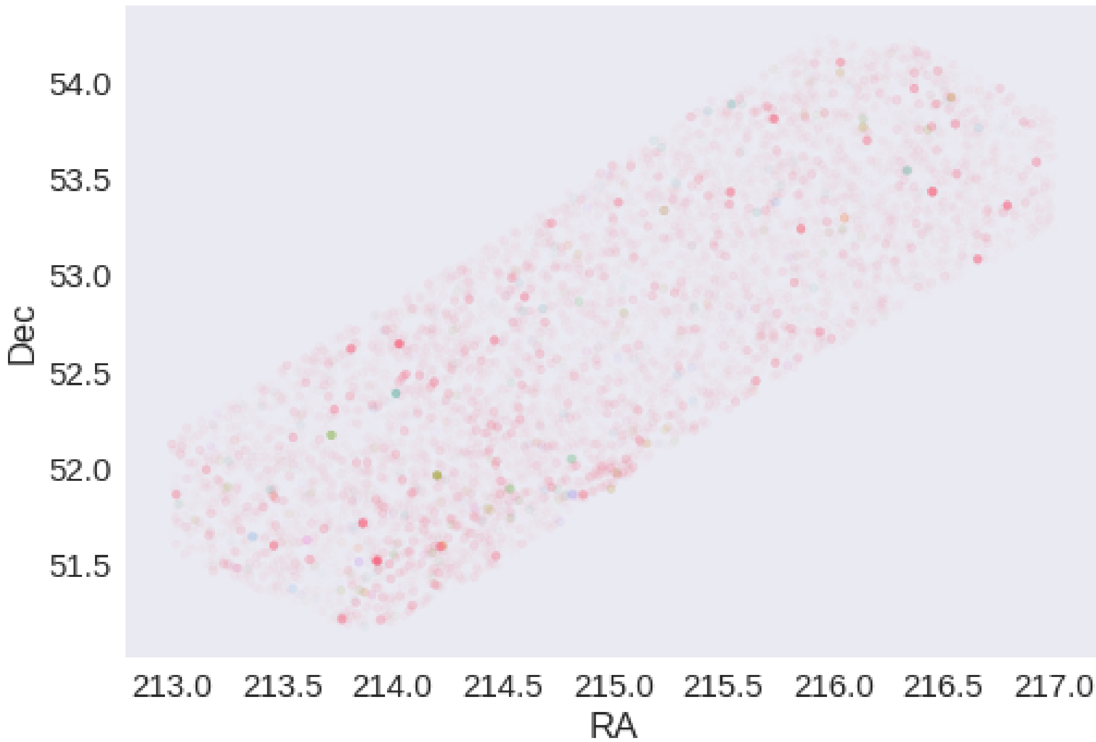
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.


pearsonr = -0.24; p = 1.4e-115
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]




```
RA correction: 0.0004886441843154898 arcsec
Dec correction: -0.000554433862021142 arcsec
```


pearsonr = -0.24; p = 1.4e-115
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
9109 sources flagged.
```

2 V - Saving to disk

1.11_LegacySurvey

March 8, 2018

1 EGS master catalogue

1.1 Preparation of Legacy Survey data

The catalogue comes from `dmu0_LegacySurvey`.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The aperture fluxes. Are these aperture corrected?
- The kron magnitude to be used as total magnitude (no "auto" magnitude is provided).

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-17 01:25:06.846749
```

```
WARNING: UnitsWarning: '1/deg^2' did not parse as fits unit: Numeric factor not supported by FIT
WARNING: UnitsWarning: 'nanomaggy' did not parse as fits unit: At col 0, Unit 'nanomaggy' not su
WARNING: UnitsWarning: '1/nanomaggy^2' did not parse as fits unit: Numeric factor not supported
WARNING: UnitsWarning: '1/arcsec^2' did not parse as fits unit: Numeric factor not supported by
```

1.2 I - Aperture correction

To compute aperture correction we need to dertermine two parametres: the target aperture and the range of magnitudes for the stars that will be used to compute the correction.

Target aperture: To determine the target aperture, we simulate a curve of growth using the provided apertures and draw two figures:

- The evolution of the magnitudes of the objects by plotting on the same plot aperture number vs the mean magnitude.

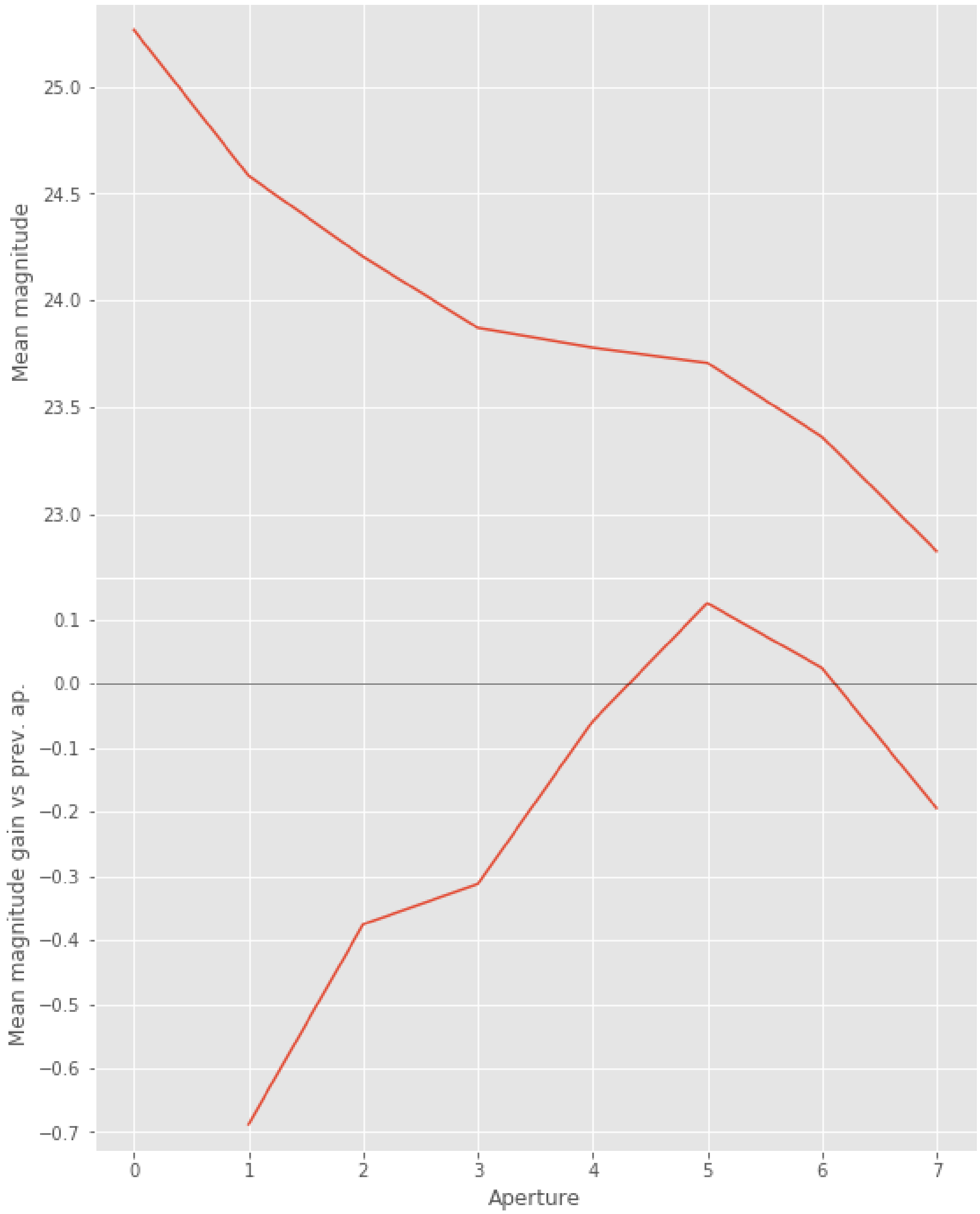
- The mean gain (loss when negative) of magnitude is each aperture compared to the previous (except for the first of course).

As target aperture, we should use the smallest (i.e. less noisy) aperture for which most of the flux is captures.

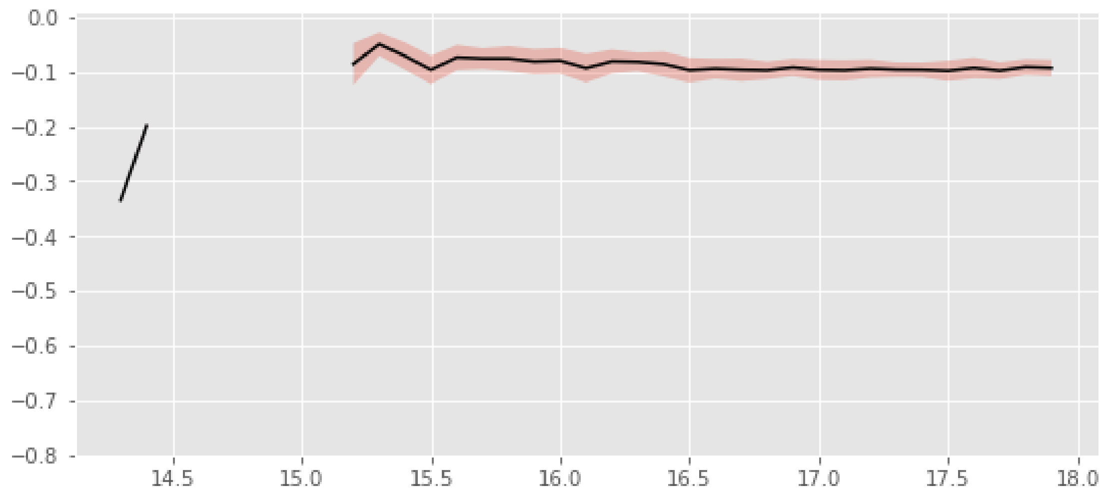
Magnitude range: To know what limits in aperture to use when doing the aperture correction, we plot for each magnitude bin the correction that is computed and its RMS. We should then use the wide limits (to use more stars) where the correction is stable and with few dispersion.

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: invalid value enco
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: divide by zero enc
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:80: RuntimeWarning: invalid value enco
  errors = 2.5 / np.log(10) * errors_on_fluxes / fluxes
```

1.2.1 I.a - g band



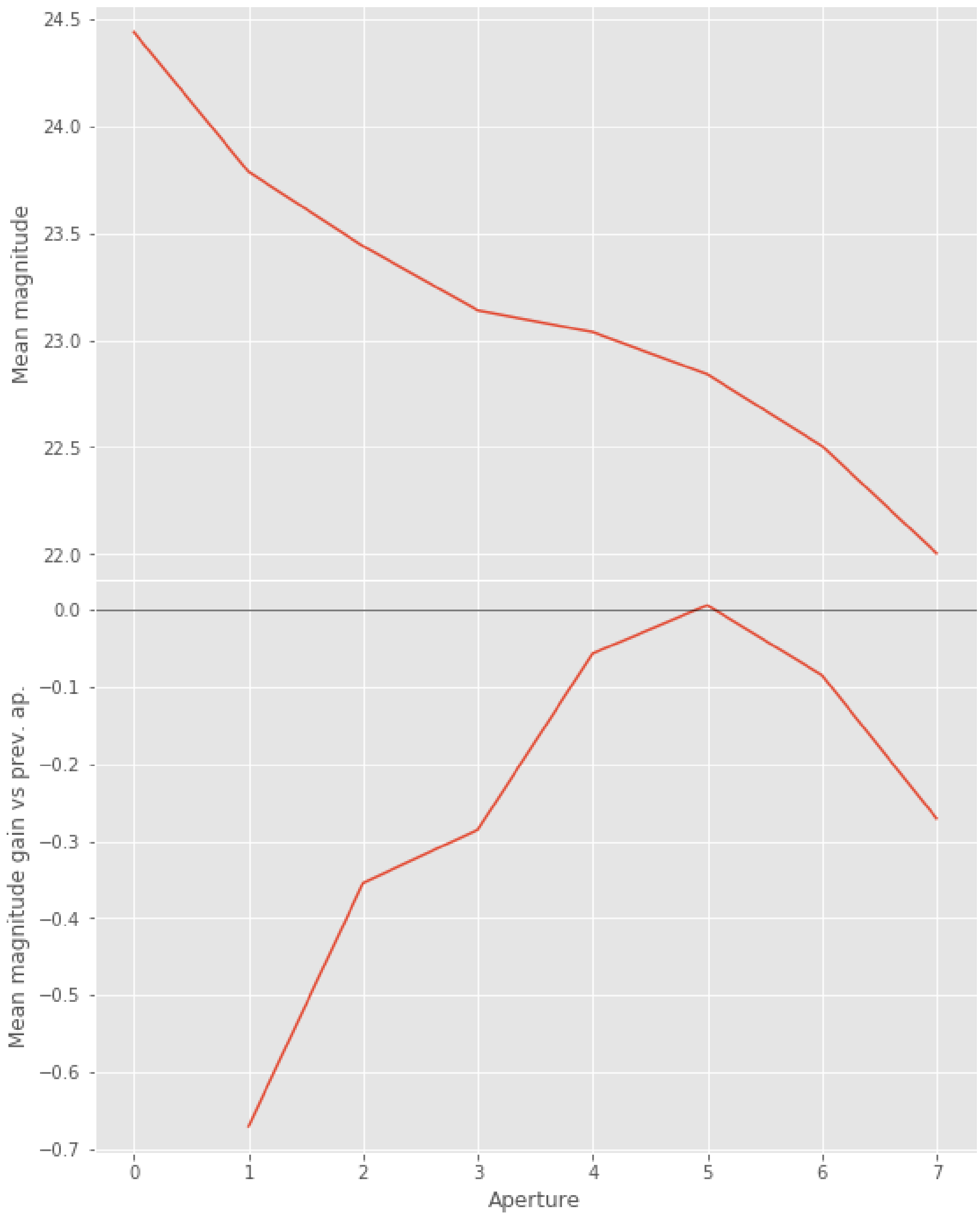
We will use aperture 5 as target.



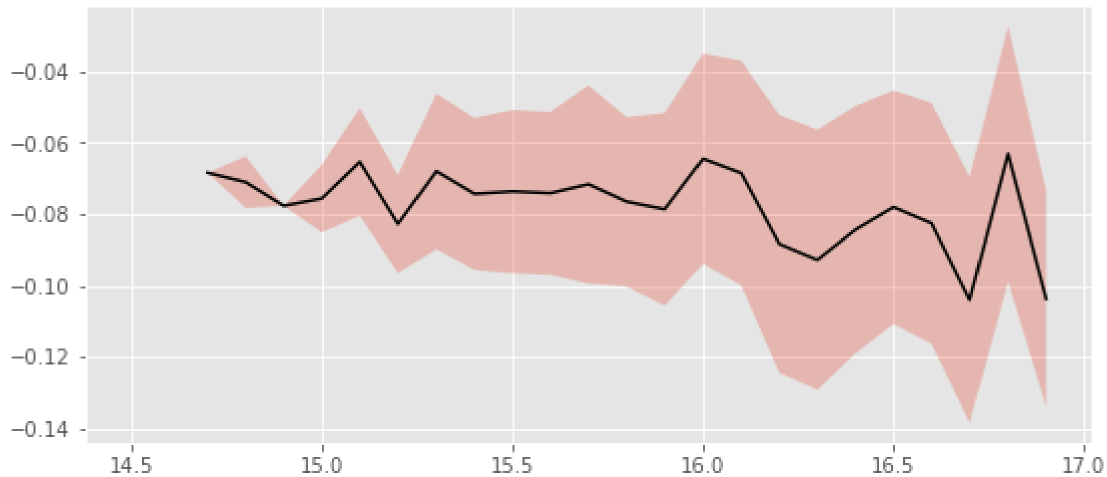
We will use magnitudes between 17.0 and 18.5

```
Aperture correction for g band:
Correction: -0.09441636798258202
Number of source used: 1084
RMS: 0.01606272315484677
```

1.2.2 I.b - r band



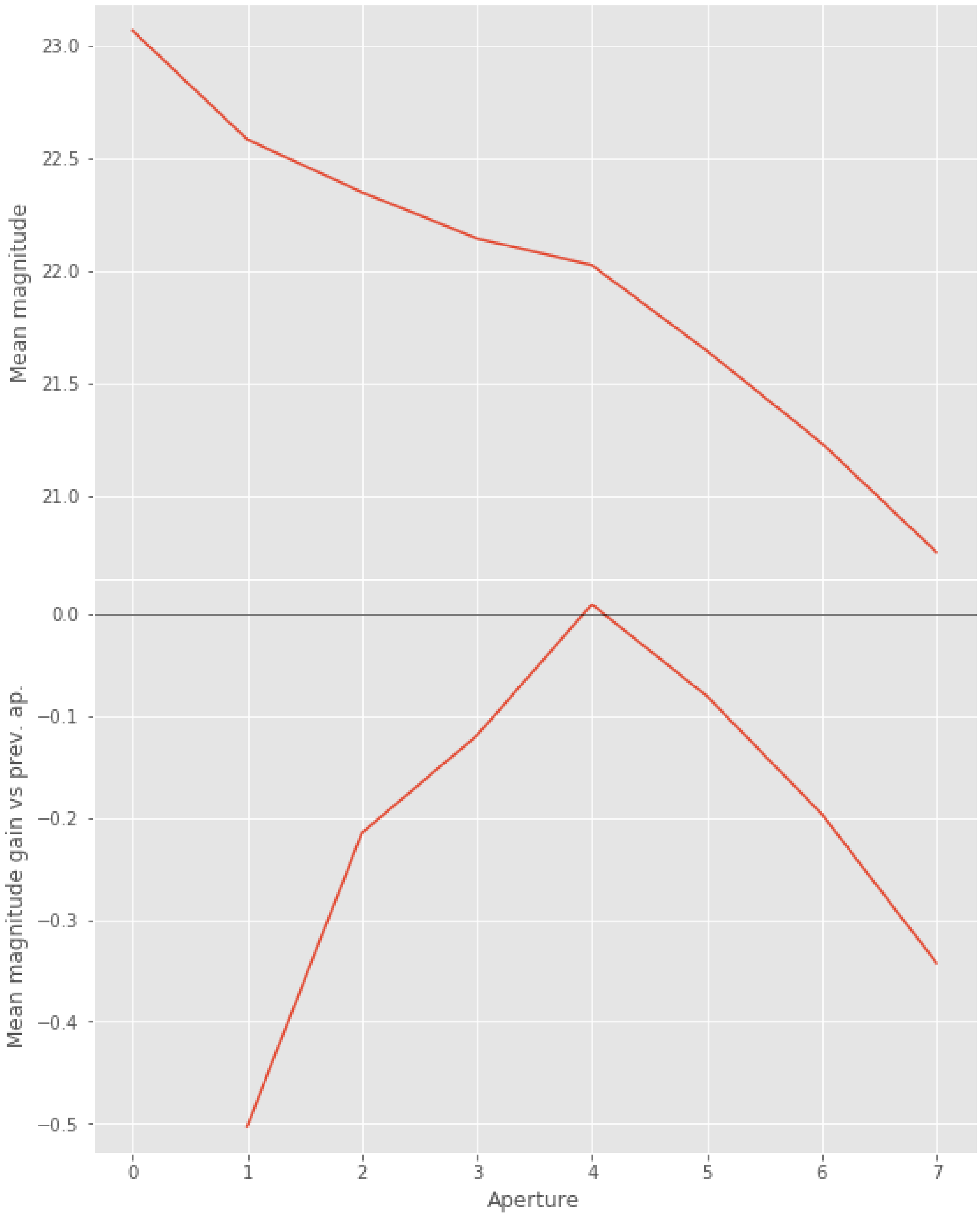
We will use aperture 5 as target.



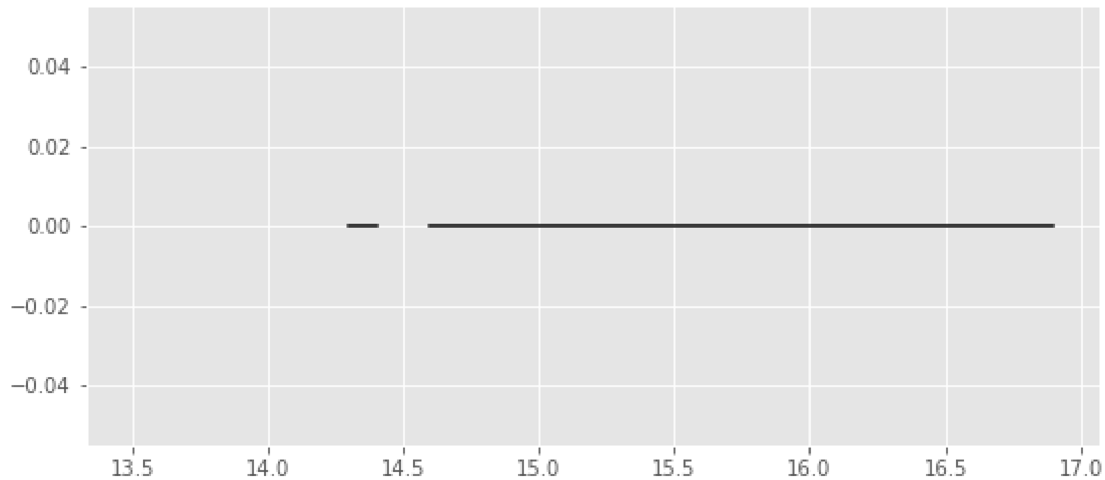
We use magnitudes between 17.0 and 18.5.

```
Aperture correction for r band:
Correction: -0.08614945231256144
Number of source used: 1513
RMS: 0.03438196144974404
```

1.2.3 I.c - z band



We will use aperture 4 as target.



We use magnitudes between 16.0 and 17.5.

```
Aperture correction for z band:
Correction: -0.033215372542812815
Number of source used: 1183
RMS: 0.012679290276947705
```

1.3 II - Stellarity

Legacy Survey does not provide a 0 to 1 stellarity so we replace items flagged as PSF accpording to the following table:

$$P(star) = \frac{\prod_i P(star)_i}{\prod_i P(star)_i + \prod_i P(galaxy)_i}$$

where i is the band, and with using the same probabilities as UKDISS:

HSC flag	UKIDSS flag	Meaning	P(star)	P(galaxy)	P(noise)	P(saturated)
	-9	Saturated	0.0	0.0	5.0	95.0
	-3	Probable galaxy	25.0	70.0	5.0	0.0
	-2	Probable star	70.0	25.0	5.0	0.0
0	-1	Star	90.0	5.0	5.0	0.0
	0	Noise	5.0	5.0	90.0	0.0
1	+1	Galaxy	5.0	90.0	5.0	0.0

1.4 II - Column selection

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/ipykernel/__main__.py:17:
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: divide by zero enc
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
```

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: invalid value enco
  magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:43: RuntimeWarning: invalid value enco
  errors = np.log(10)/2.5 * fluxes * errors_on_magnitudes
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:80: RuntimeWarning: divide by zero enc
  errors = 2.5 / np.log(10) * errors_on_fluxes / fluxes
```

```
Out[19]: <IPython.core.display.HTML object>
```

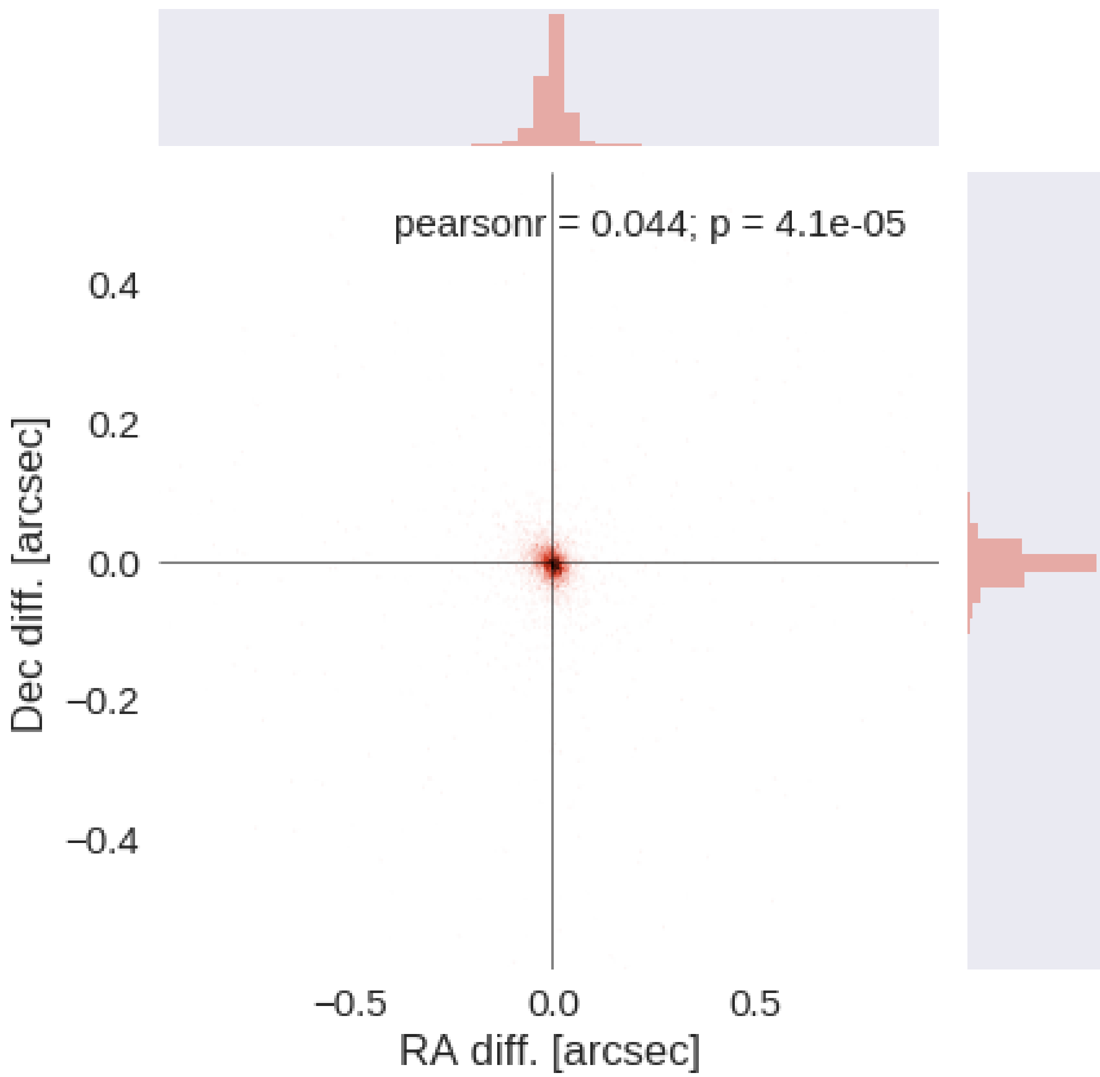
1.5 III - Removal of duplicated sources

We remove duplicated objects from the input catalogues.

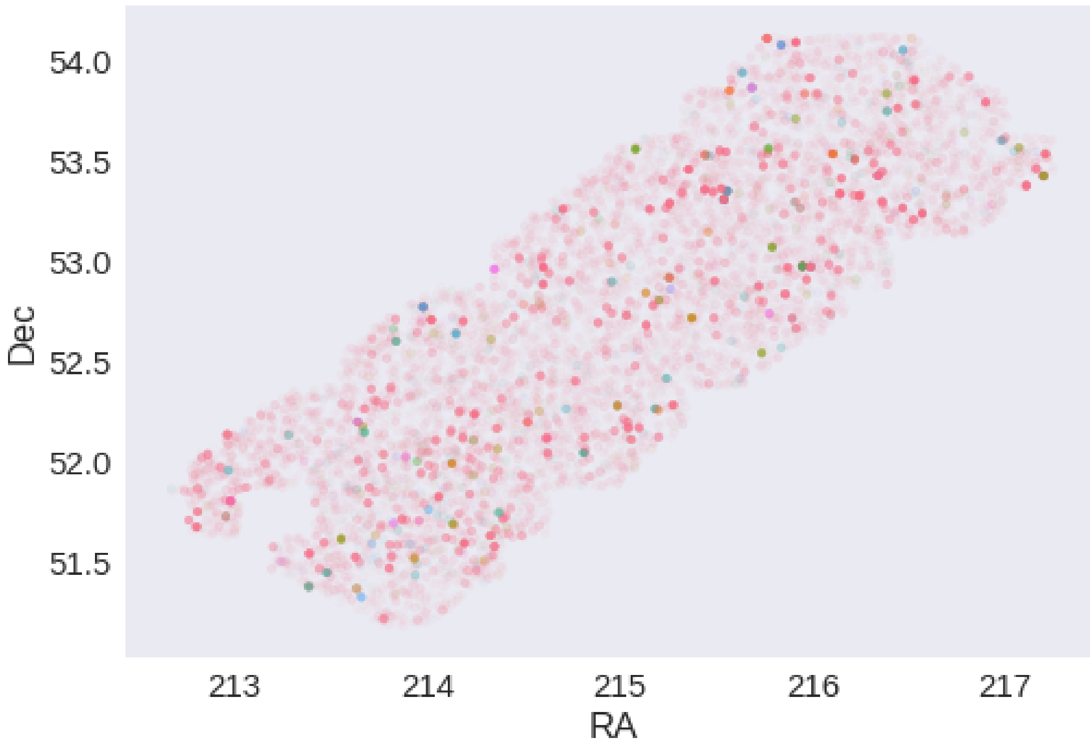
```
The initial catalogue had 166758 sources.
The cleaned catalogue has 163539 sources (3219 removed).
The cleaned catalogue has 3171 sources flagged as having been cleaned
```

1.6 III - Astrometry correction

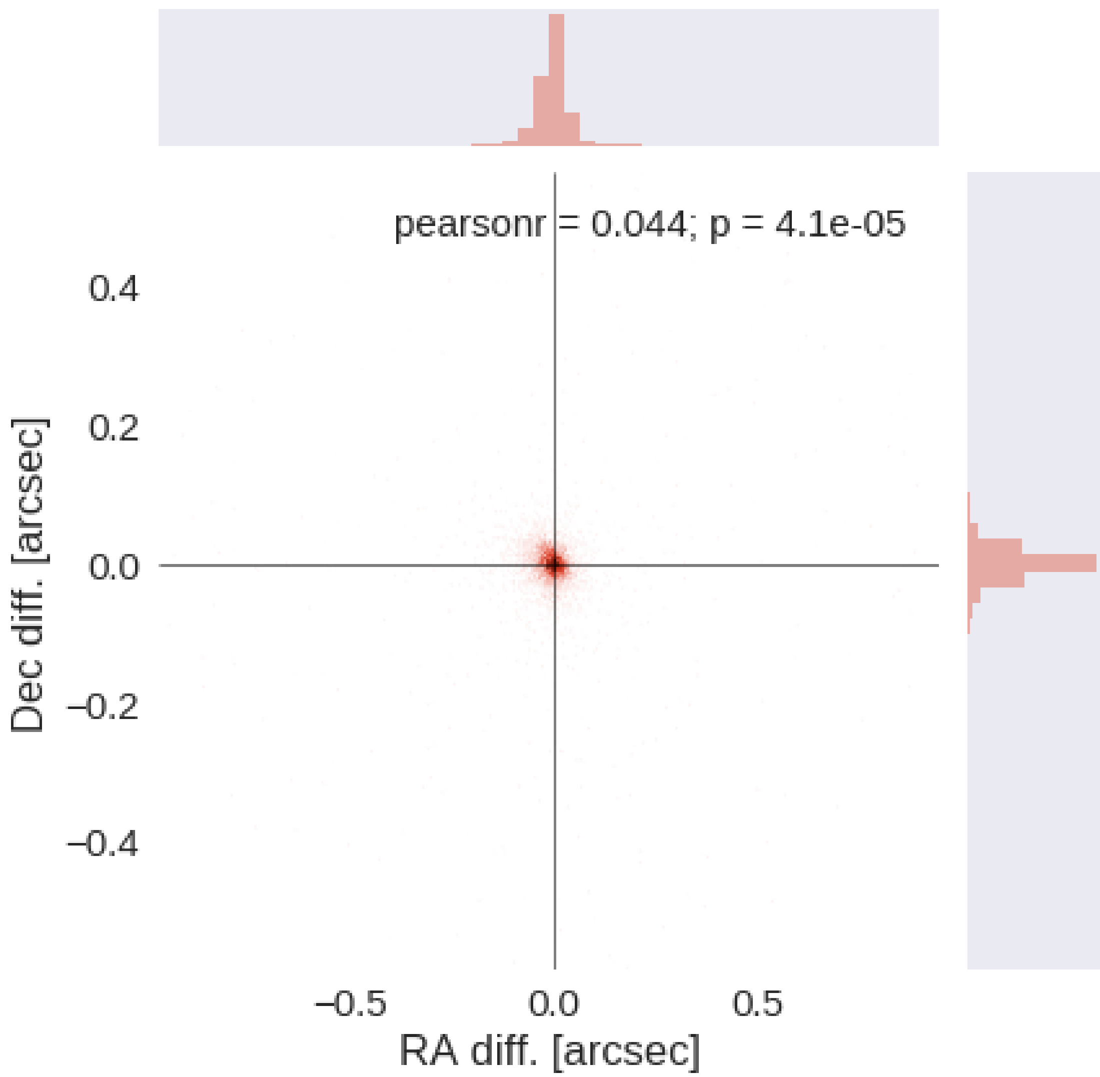
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

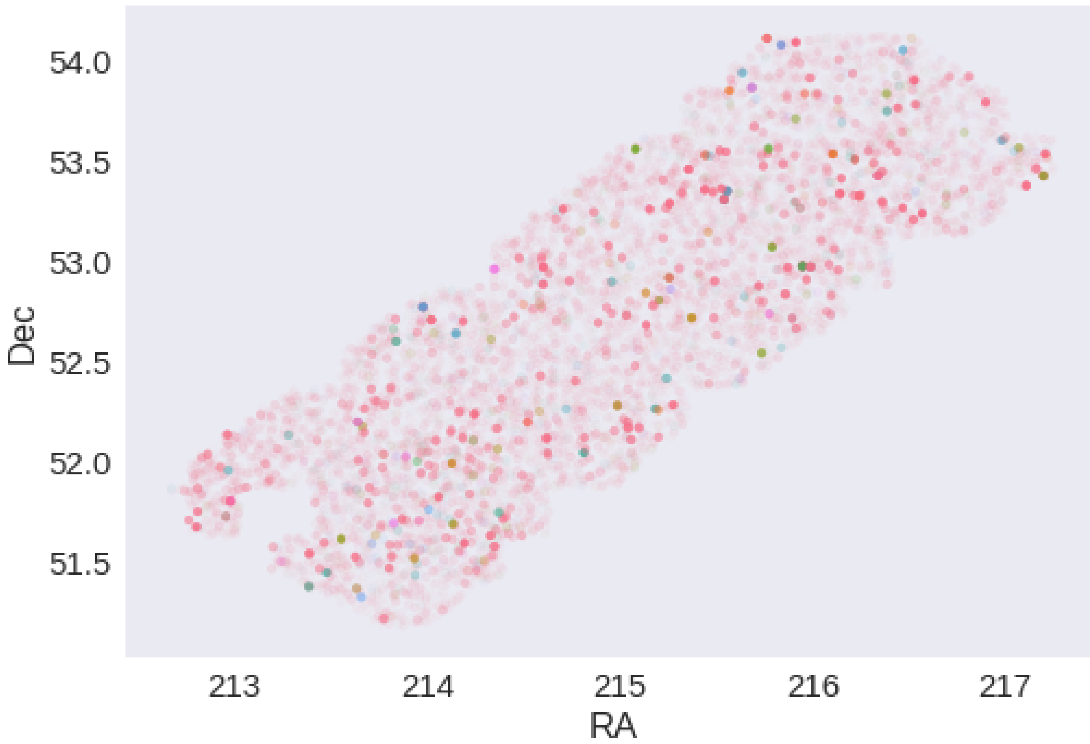


pearsonr = 0.044; p = 4.1e-05
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]




```
RA correction: -0.003632177259760283 arcsec
Dec correction: 0.004341531230522833 arcsec
```


pearsonr = 0.044; p = 4.1e-05
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.7 IV - Flagging Gaia objects

```
9145 sources flagged.
```

2 V - Saving to disk

1.12_UHS

March 8, 2018

1 EGS master catalogue

1.1 Preparation of UKIRT Hemisphere Survey (UHS) data

The catalogue comes from `dmu0_UHS`. This is a J band only survey documented in https://arxiv.org/pdf/1707.09975.pdf

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The magnitude for each band in aperture 4 (2 arcsec aperture corrected).
- The kron magnitude to be used as total magnitude (no "auto" magnitude is provided).

We don't know when the maps have been observed. We will use the year of the reference paper.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-07 19:34:39.363616
```

1.2 I - Column selection

```
0.925175419285
```

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
Out[7]: <IPython.core.display.HTML object>
```

1.3 II - Removal of duplicated sources

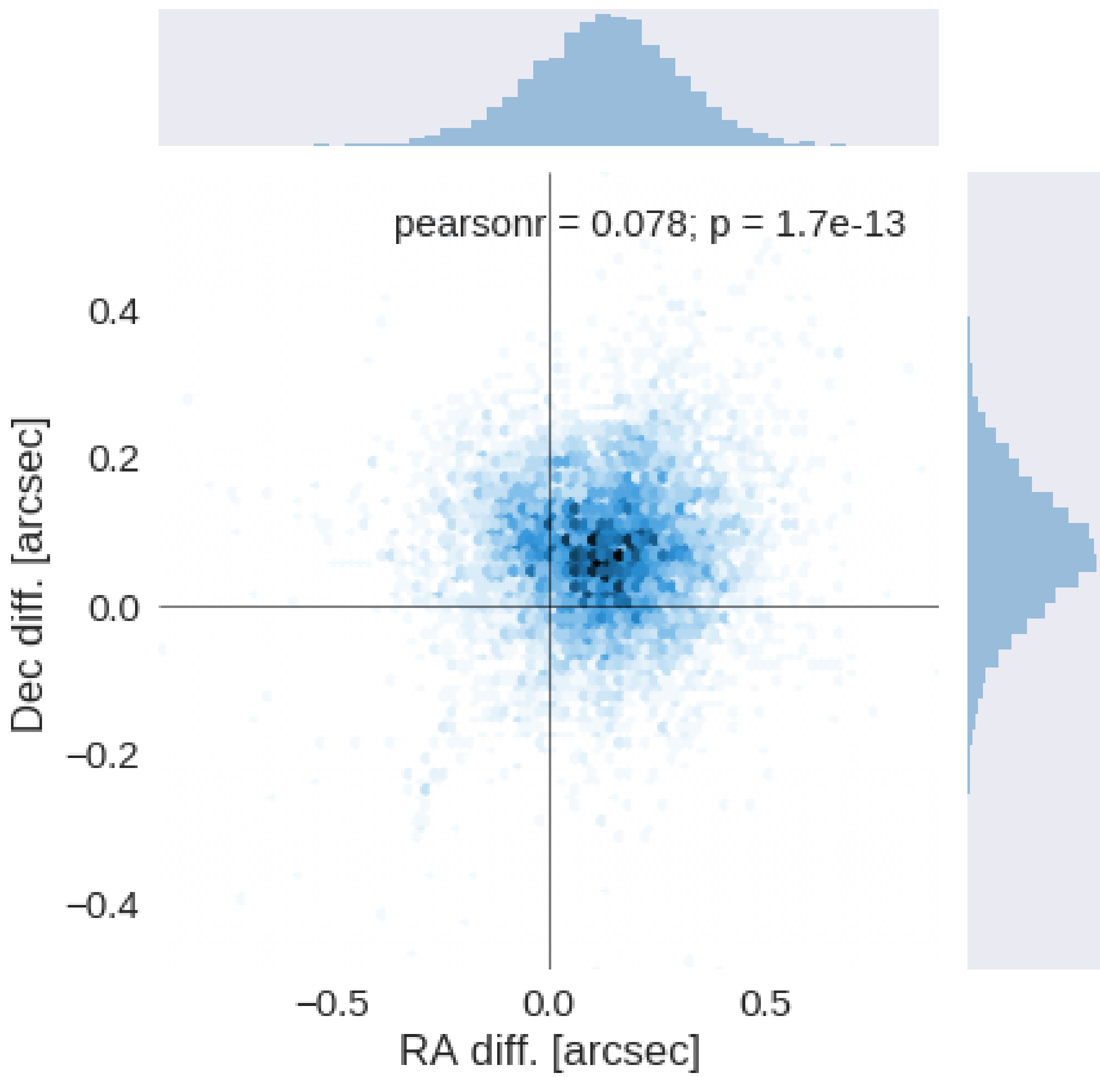
We remove duplicated objects from the input catalogues.

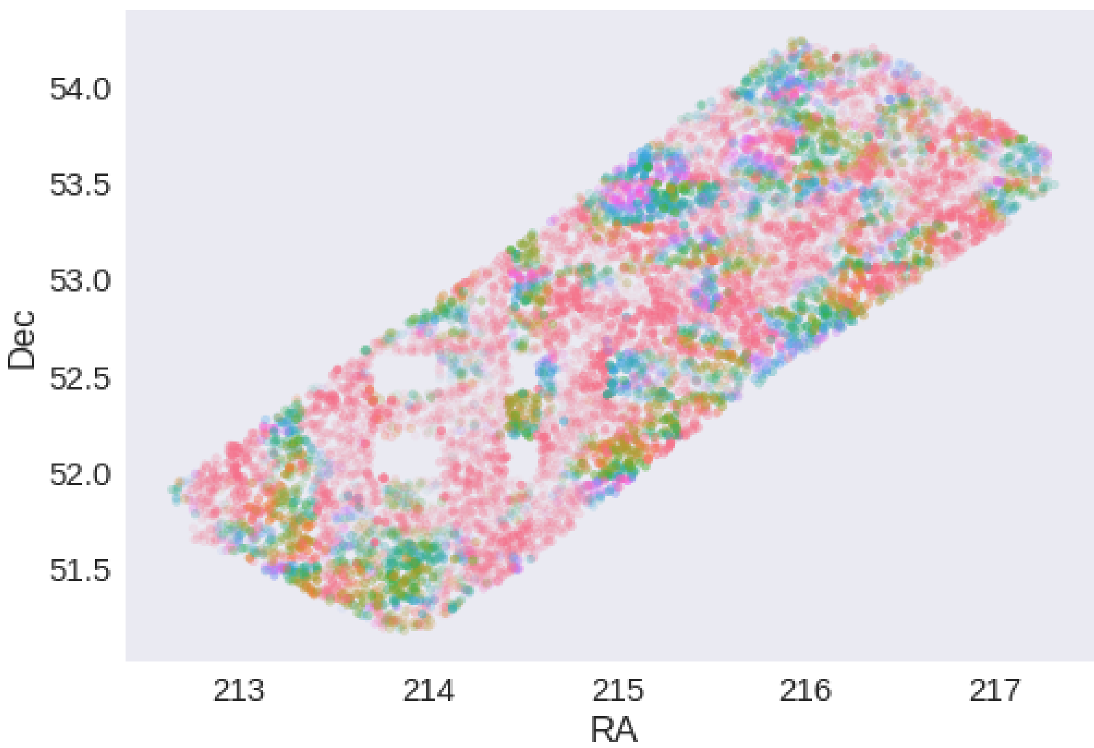
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/astropy/table/column.py:10
Check the NumPy 1.11 release notes for more information.
  ma.MaskedArray.__setitem__(self, index, value)
```

```
The initial catalogue had 34310 sources.
The cleaned catalogue has 31771 sources (2539 removed).
The cleaned catalogue has 2427 sources flagged as having been cleaned
```

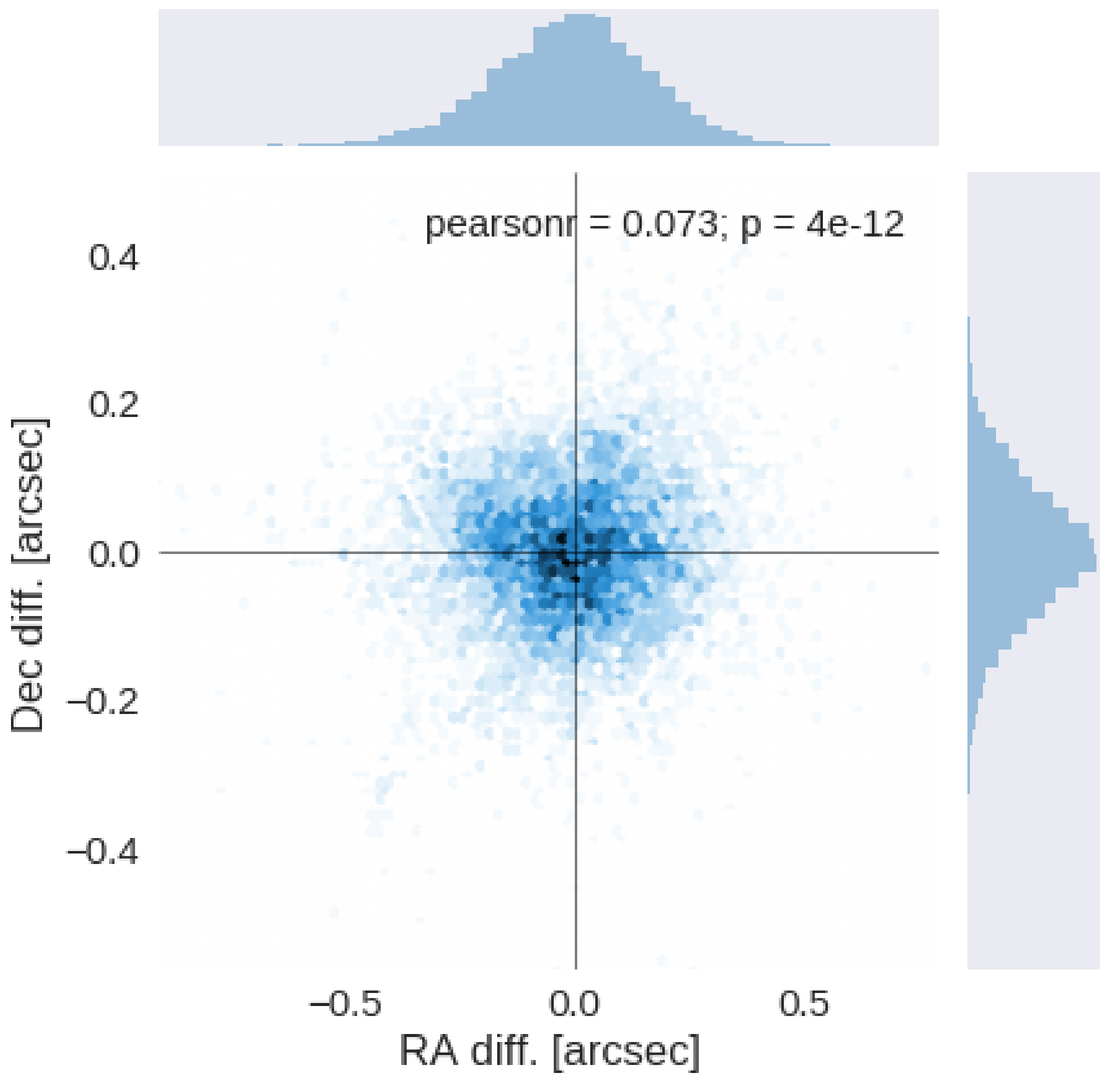
1.4 III - Astrometry correction

We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

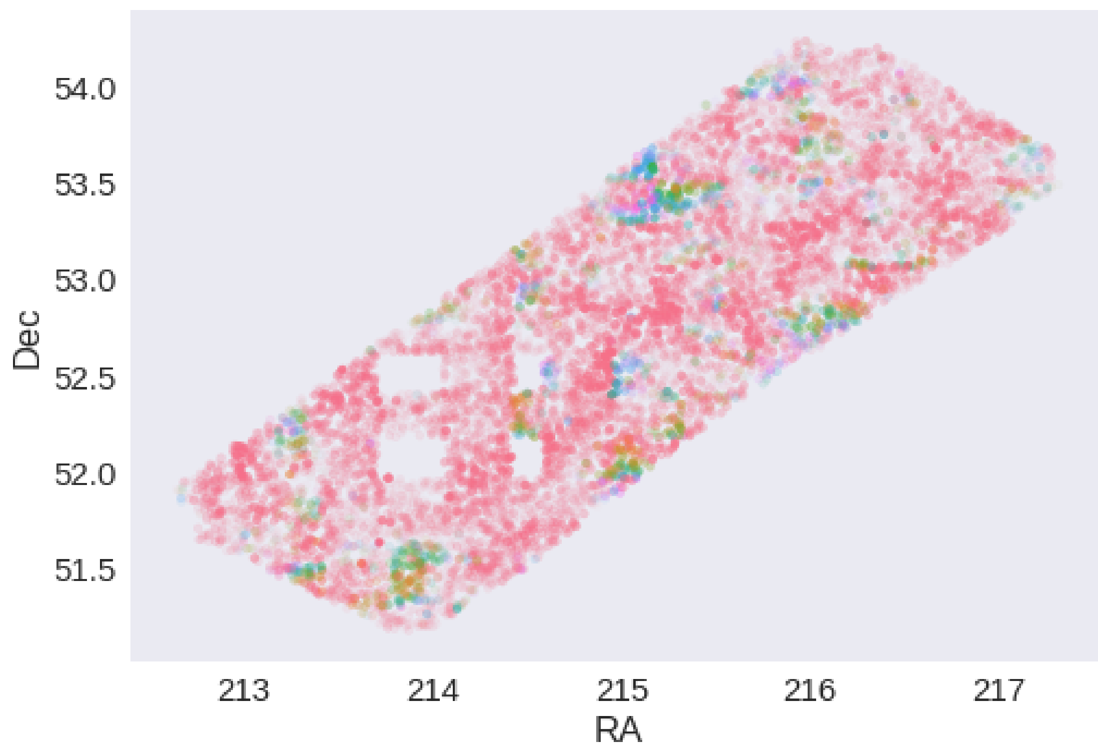

pearsonr = 0.078; p = 1.7e-13
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]




```
RA correction: -0.13122841110089212 arcsec
Dec correction: -0.07189033726717753 arcsec
```



pearsonr = 0.073; p = 4e-12
0.4
0.2
0.0
−0.2
−0.4
Dec diff. [arcsec]
−0.5
0.0
0.5
RA diff. [arcsec]



1.5 IV - Flagging Gaia objects

```
9047 sources flagged.
```

2 V - Saving to disk

2_Merging

March 8, 2018

1 EGS master catalogue

This notebook presents the merge of the various pristine catalogues to produce HELP mater catalogue on EGS.

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-17 23:59:48.408795
```

1.1 I - Reading the prepared pristine catalogues

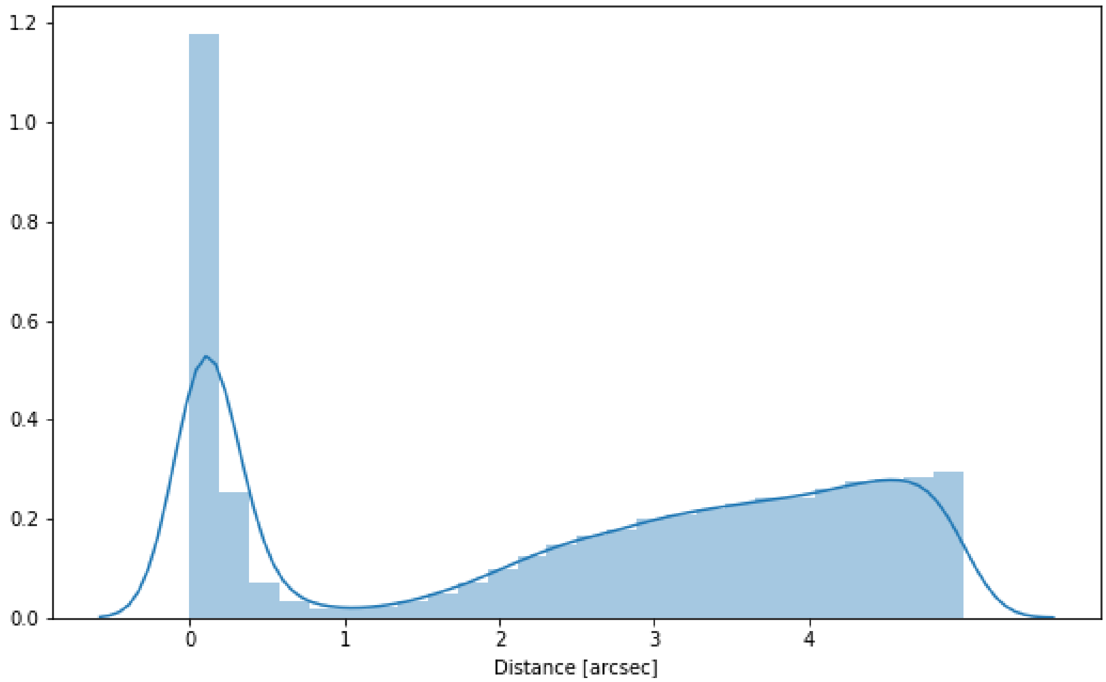
1.2 II - Merging tables

We first merge the optical catalogues and then add the infrared ones.

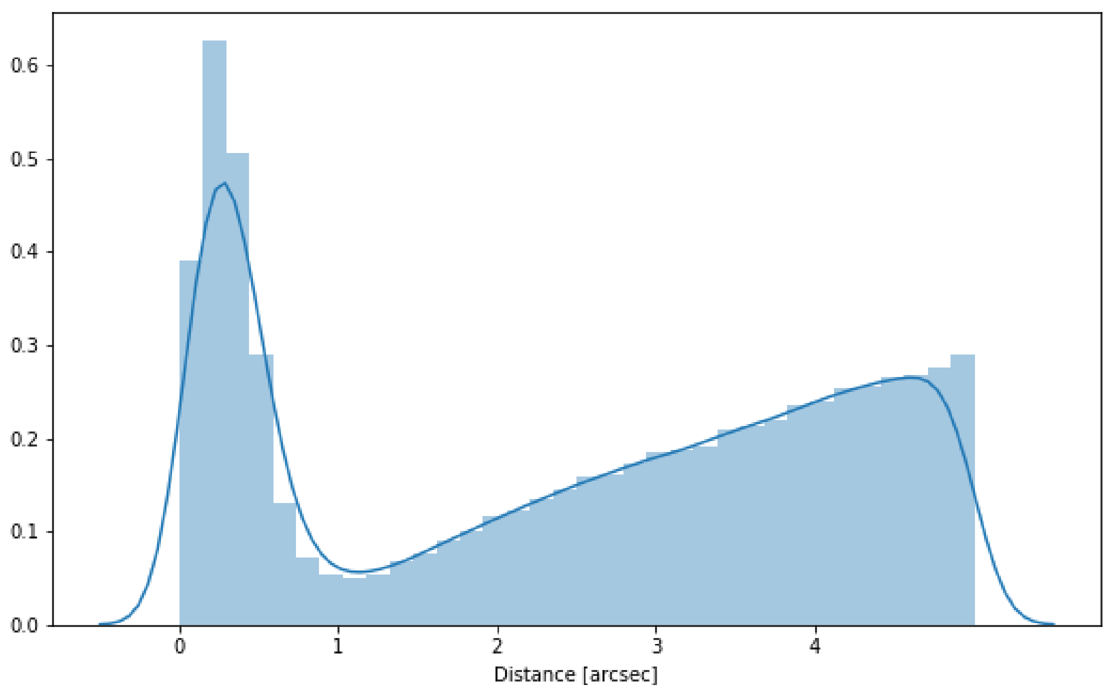
At every step, we look at the distribution of the distances to the nearest source in the merged catalogue to determine the best crossmatching radius.

1.2.1 HSC

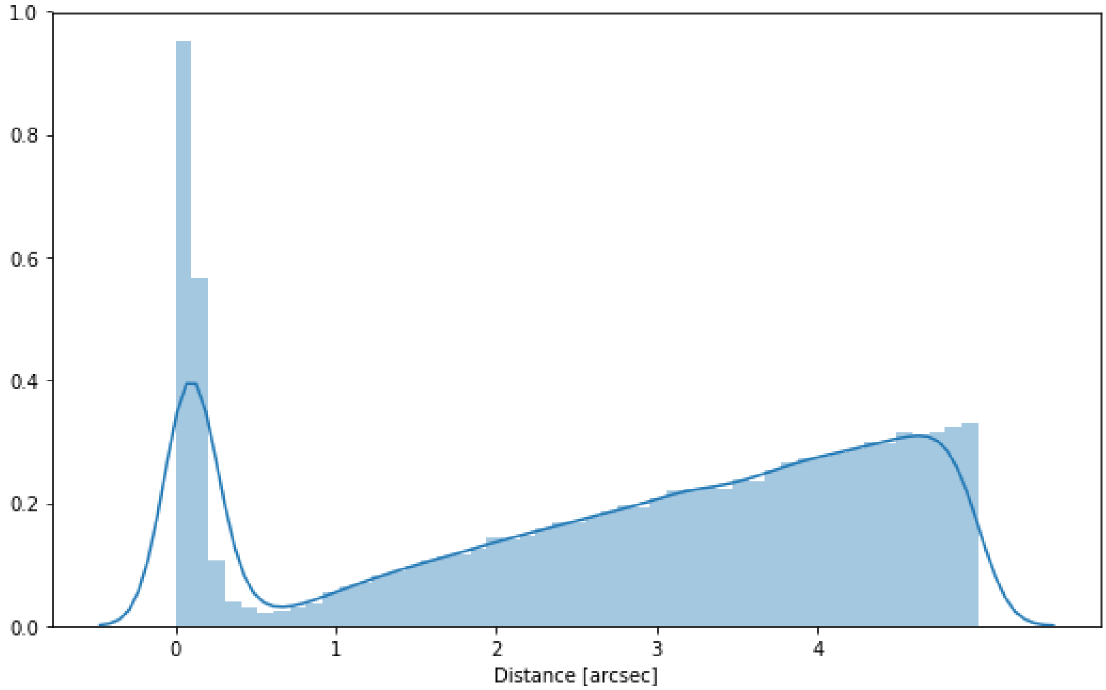
1.2.2 Add PanSTARRS



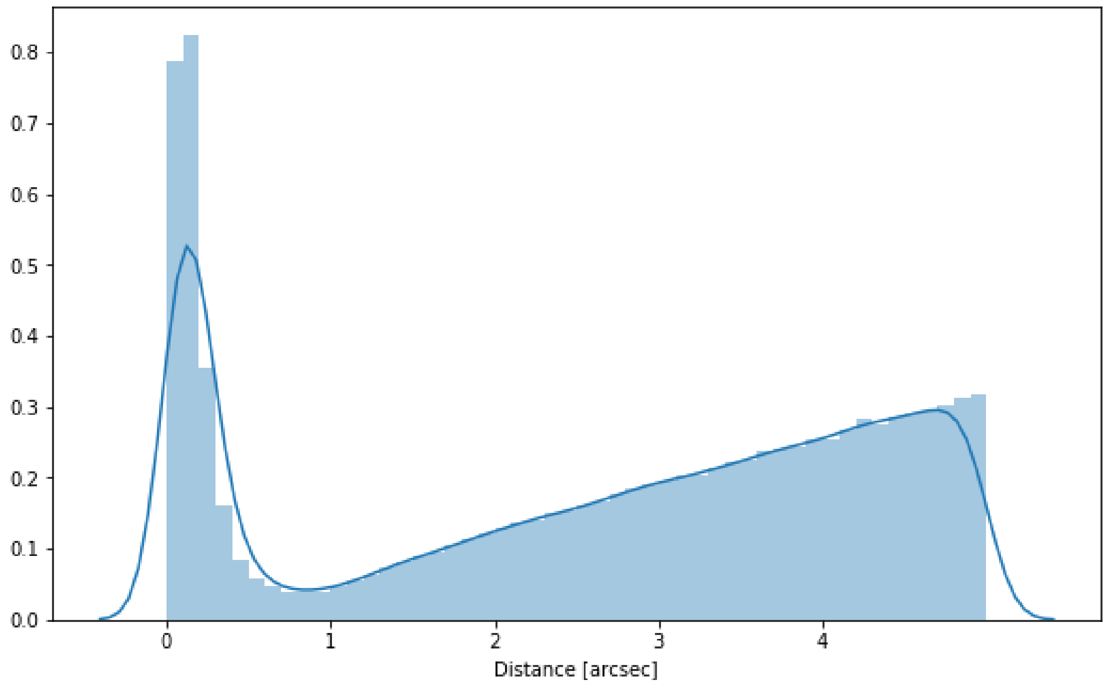
1.2.3 AEGIS



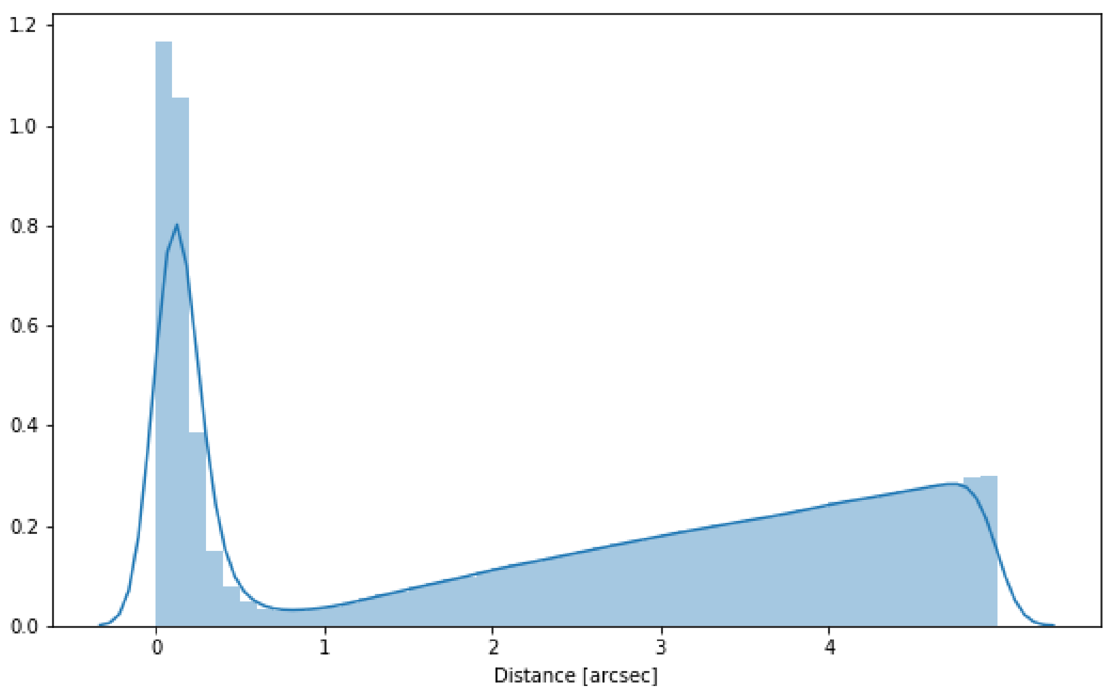
1.2.4 CANDELS



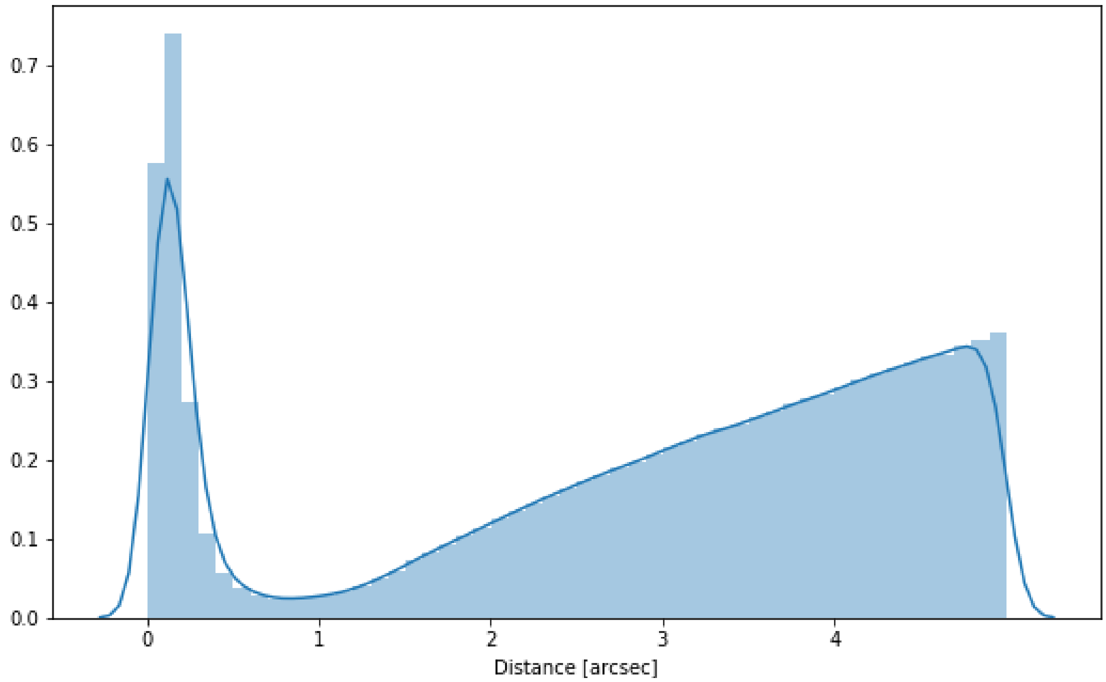
1.2.5 CFHT-WIRDS



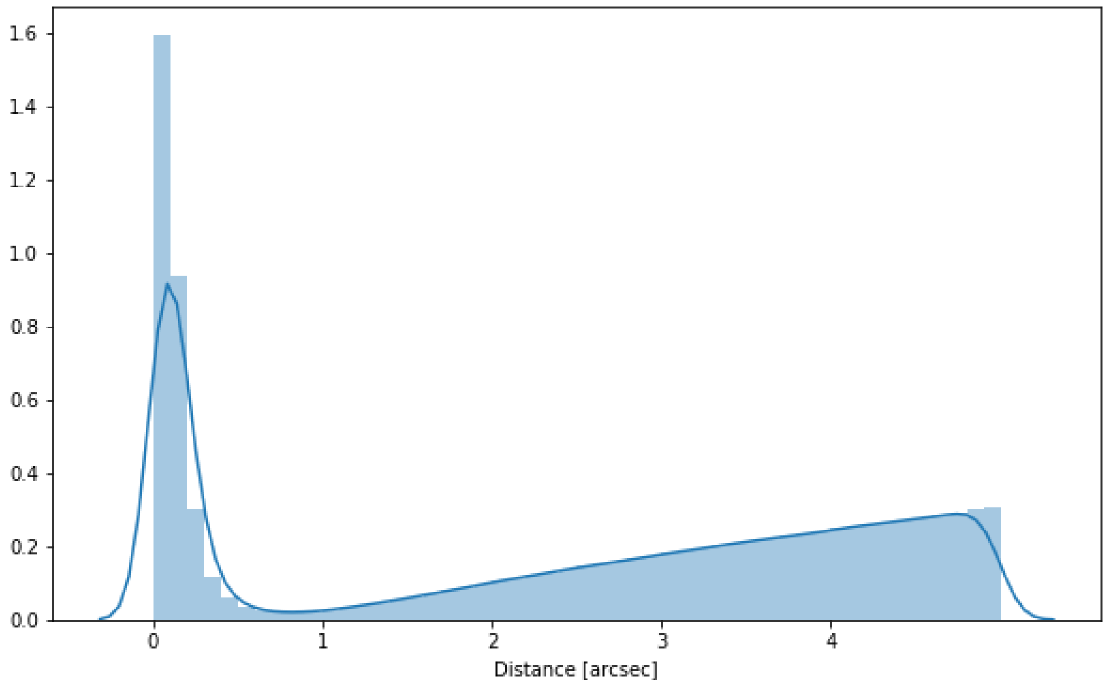
1.2.6 CFHTLS-WIDE



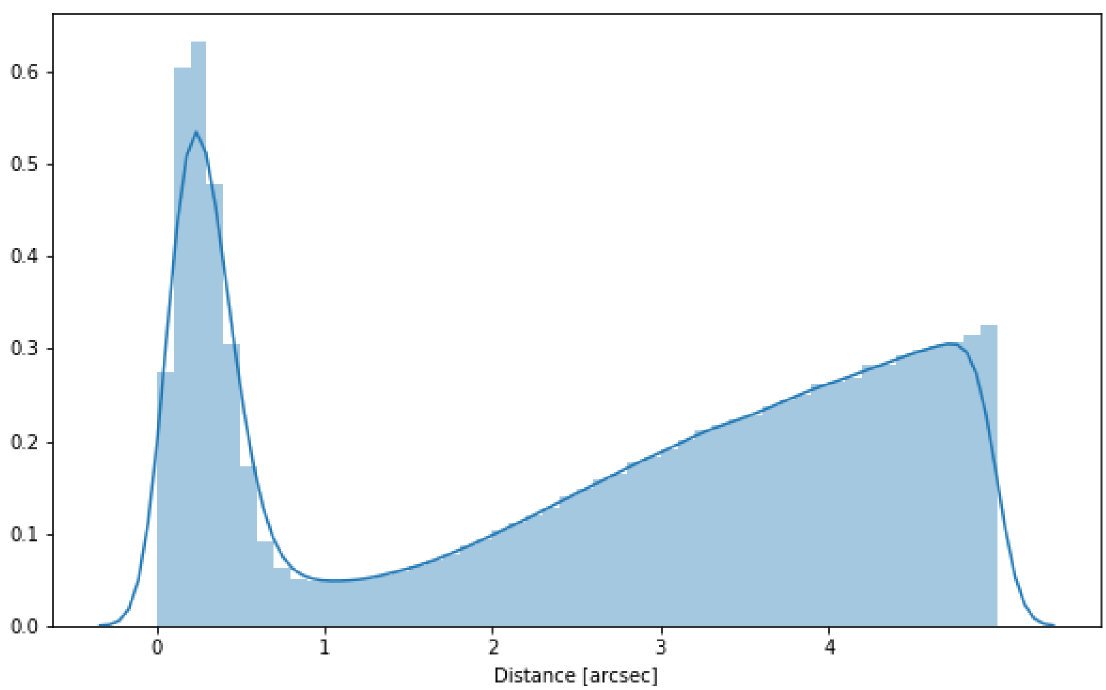
1.2.7 CFHTLS-DEEP



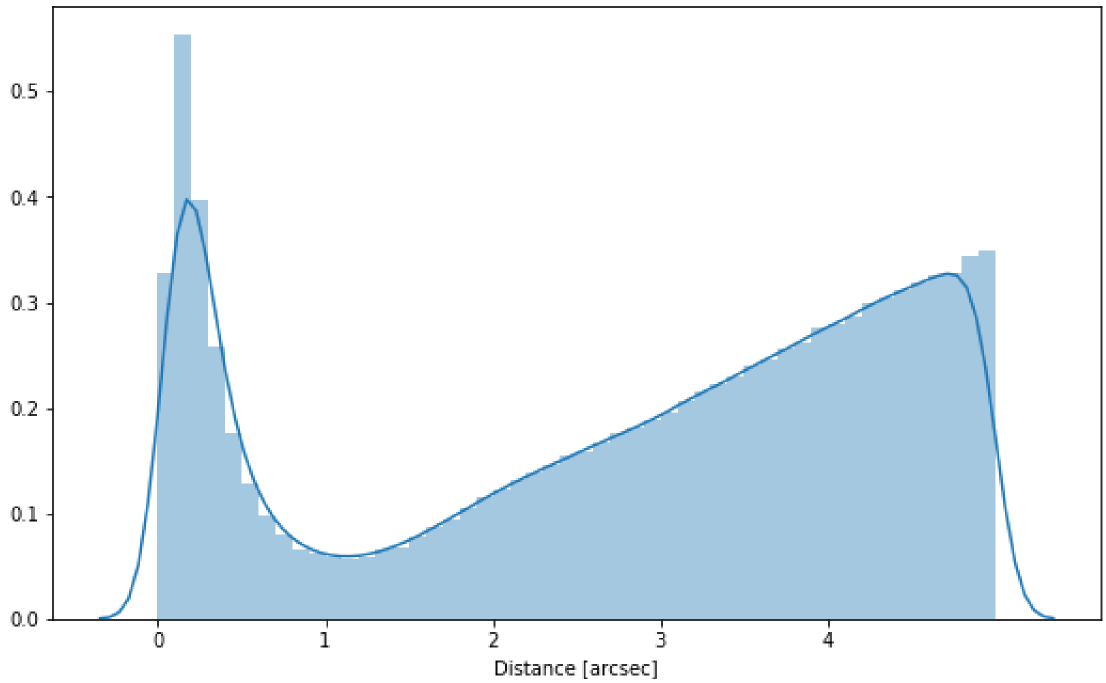
1.2.8 CFHTLenS



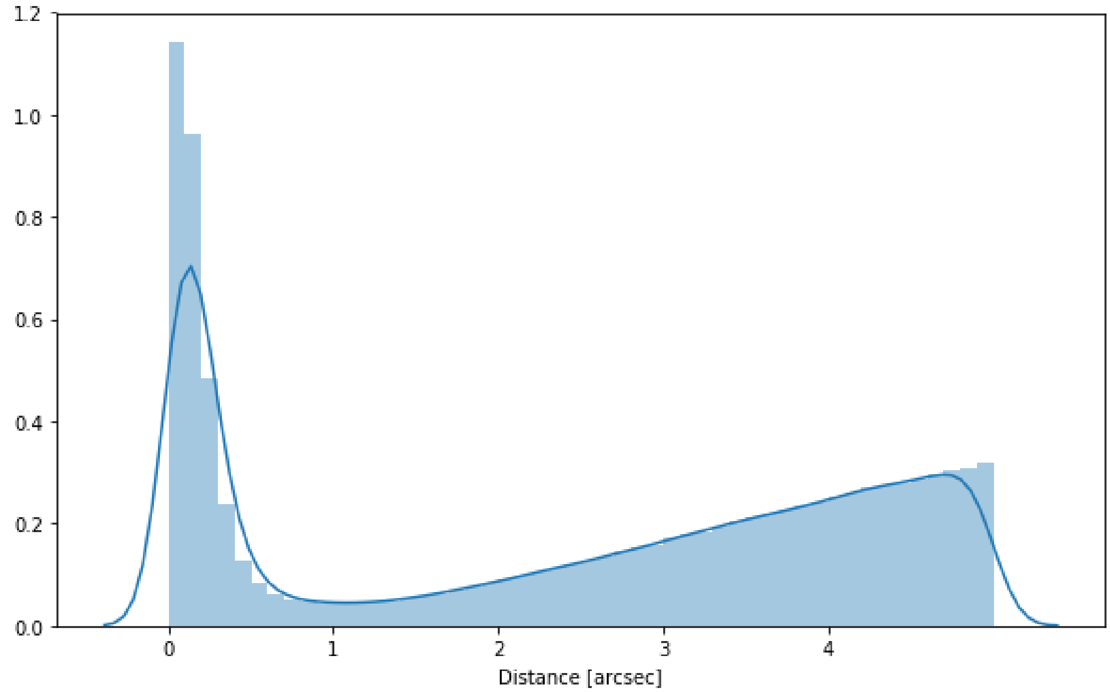
1.2.9 DEEP2



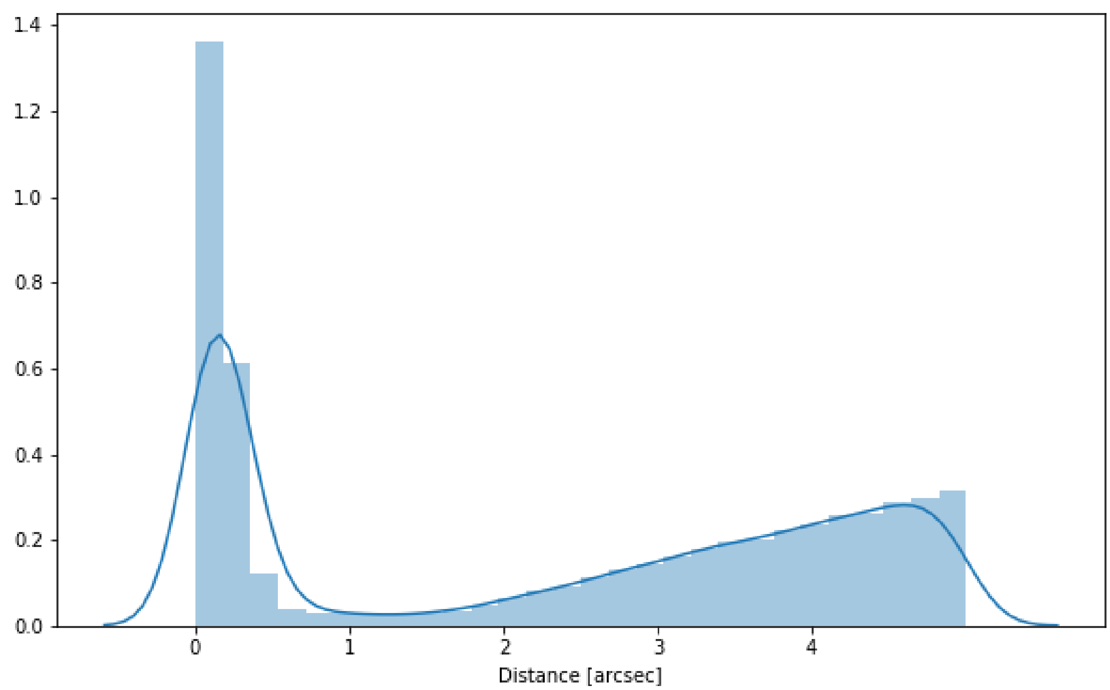
1.2.10 IRAC-EGS



1.2.11 Legacy Survey



1.2.12 UHS



1.2.13 Cleaning

When we merge the catalogues, astropy masks the non-existent values (e.g. when a row comes only from a catalogue and has no counterparts in the other, the columns from the latest are masked for that row). We indicate to use NaN for masked values for floats columns, False for flag columns and -1 for ID columns.

```
Out[29]: <IPython.core.display.HTML object>
```

1.3 III - Merging flags and stellarity

Each pristine catalogue contains a flag indicating if the source was associated to a another nearby source that was removed during the cleaning process. We merge these flags in a single one.

Each pristine catalogue contains a flag indicating the probability of a source being a Gaia object (0: not a Gaia object, 1: possibly, 2: probably, 3: definitely). We merge these flags taking the highest value.

Each prisitine catalogue may contain one or several stellarity columns indicating the probability (0 to 1) of each source being a star. We merge these columns taking the highest value. We keep trace of the origin of the stellarity.

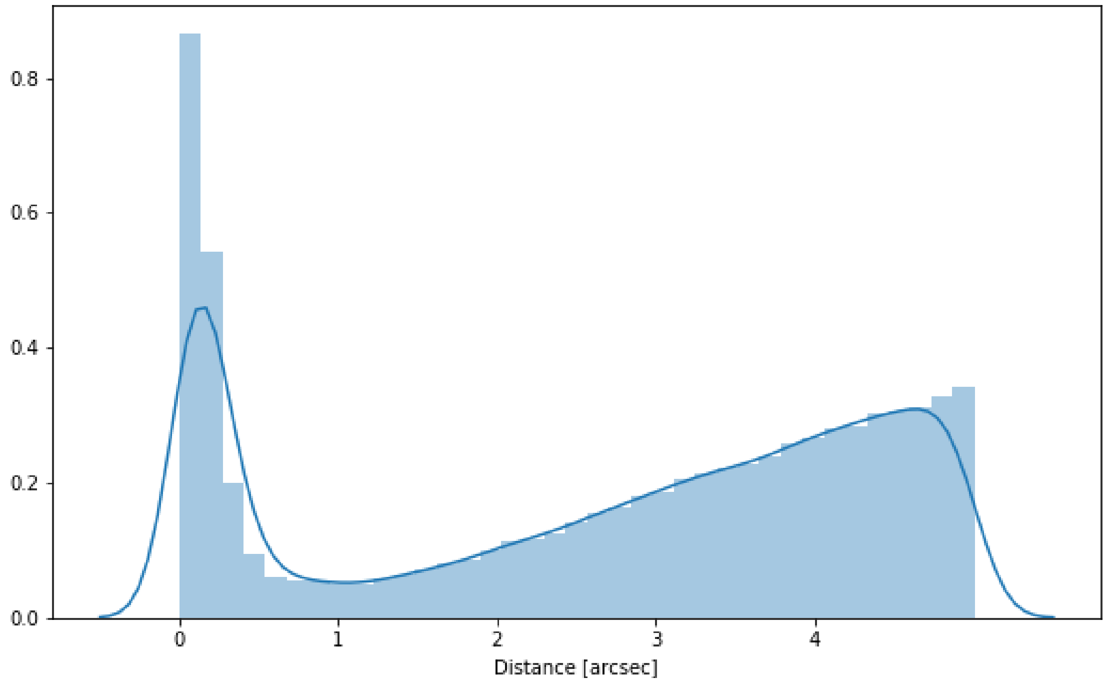
```
hsc_stellarity, candels-egs_stellarity, cfhtls-wide_stellarity, cfhtls-deep_stellarity, cfhtlens
```

1.4 IV - Adding E(B-V) column

1.5 V - Adding HELP unique identifiers and field columns

```
OK!
```

1.6 VI - Cross-matching with spec-z catalogue



1.7 VII - Choosing between multiple values for the same filter

There are many different bands to choose between here.

1.7.1 CFHT Megacam

CFHT-WIRDS is the only survey that has J, H and Ks so we take them directly. After that we need to select ugriz bands from between CFHTLS, CFHT-WIRDS and CFHTLenS. We take these in order of depth.

Survey	Bands	Notes
CFHTLS-DEEP	u, g, r, i, z	
CFHTLS-WIDE	u, g, r, i, z	
CFHT-WIRDS	u, g, r, i, z	Ks selected so may have unique objects
CFHTLenS	u, g, r, i, z	Reprocessing of CFHTLS-WIDE so not used

Survey	Bands	Notes
CANDELS-EGS	u, g, r, i, z	Priors from very deep data so may have unique objects
IRAC-EGS	u, g, r, i, z	Priors from IRAC so may have unique objects

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Out[43]: <IPython.core.display.HTML object>
```

1.8 CFHT WIRCAM

We have WIRCAM J,H, and Ks from both CFHT-WIRDS (Ks prior and blind) and CANDELS-EGS. Since the CANDELS will have very deep priors the WIRCAM fluxes are worth keepting to constrain photo-z. We therefor take the CFHT-WIRDS fluxes if they are there but keep all the CANDELS fluxes for sources that only have those.

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Out[48]: <IPython.core.display.HTML object>
```

1.8.1 IRAC

We have IRAC from the IRAC-EGS catalogue and from CANDELS. We take the CANDELS fluxes preferentially.

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Out[53]: <IPython.core.display.HTML object>
```

1.8.2 AEGIS

We have AEGIS (WIRCS instrument on Palomar telescope) data from the AEGIS catalogue and from IRAC-EGS. We take the AEGIS fluxes preferentially

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Out[58]: <IPython.core.display.HTML object>
```

1.8.3 HST: CANDELS vs IRAC-EGS

We take CANDELS over IRAC

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Out[63]: <IPython.core.display.HTML object>
```

1.8.4 CFHT12k : DEEP2 vs IRAC-EGS

We take DEEP2 preferentially

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Out[68]: <IPython.core.display.HTML object>
```

1.9 VIII.a Wavelength domain coverage

We add a binary `flag_optnir_obs` indicating that a source was observed in a given wavelength domain:

- 1 for observation in optical;
- 2 for observation in near-infrared;
- 4 for observation in mid-infrared (IRAC).

It's an integer binary flag, so a source observed both in optical and near-infrared by not in mid-infrared would have this flag at 1 + 2 = 3.

Note 1: The observation flag is based on the creation of multi-order coverage maps from the catalogues, this may not be accurate, especially on the edges of the coverage.

Note 2: Being on the observation coverage does not mean having fluxes in that wavelength domain. For sources observed in one domain but having no flux in it, one must take into consideration de different depths in the catalogue we are using.

1.10 VIII.b Wavelength domain detection

We add a binary `flag_optnir_det` indicating that a source was detected in a given wavelength domain:

- 1 for detection in optical;
- 2 for detection in near-infrared;
- 4 for detection in mid-infrared (IRAC).

It's an integer binary flag, so a source detected both in optical and near-infrared by not in mid-infrared would have this flag at 1 + 2 = 3.

Note 1: We use the total flux columns to know if the source has flux, in some catalogues, we may have aperture flux and no total flux.

To get rid of artefacts (chip edges, star flares, etc.) we consider that a source is detected in one wavelength domain when it has a flux value in **at least two bands**. That means that good sources will be excluded from this flag when they are on the coverage of only one band.

1.11 IX - Cross-identification table

We are producing a table associating to each HELP identifier, the identifiers of the sources in the pristine catalogues. This can be used to easily get additional information from them.

For convenience, we also cross-match the master list with the SDSS catalogue and add the objID associated with each source, if any. **TODO: should we correct the astrometry with respect to Gaia positions?**

```
30 master list rows had multiple associations.
```

```
['hsc_id', 'ps1_id', 'aegis_id', 'candels-egs_id', 'wirds_id', 'cfhtls-wide_id', 'cfhtls-deep_id
```

1.12 X - Adding HEALPix index

We are adding a column with a HEALPix index at order 13 associated with each source.

1.13 XI - Saving the catalogue

```
Missing columns: set()
```

3_Checks_and_diagnostics

March 8, 2018

1 EGS master catalogue

1.1 Checks and diagnostics

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-18 00:56:44.713163
```

```
Diagnostics done using: master_catalogue_egs_20180217.fits
```

1.2 0 - Quick checks

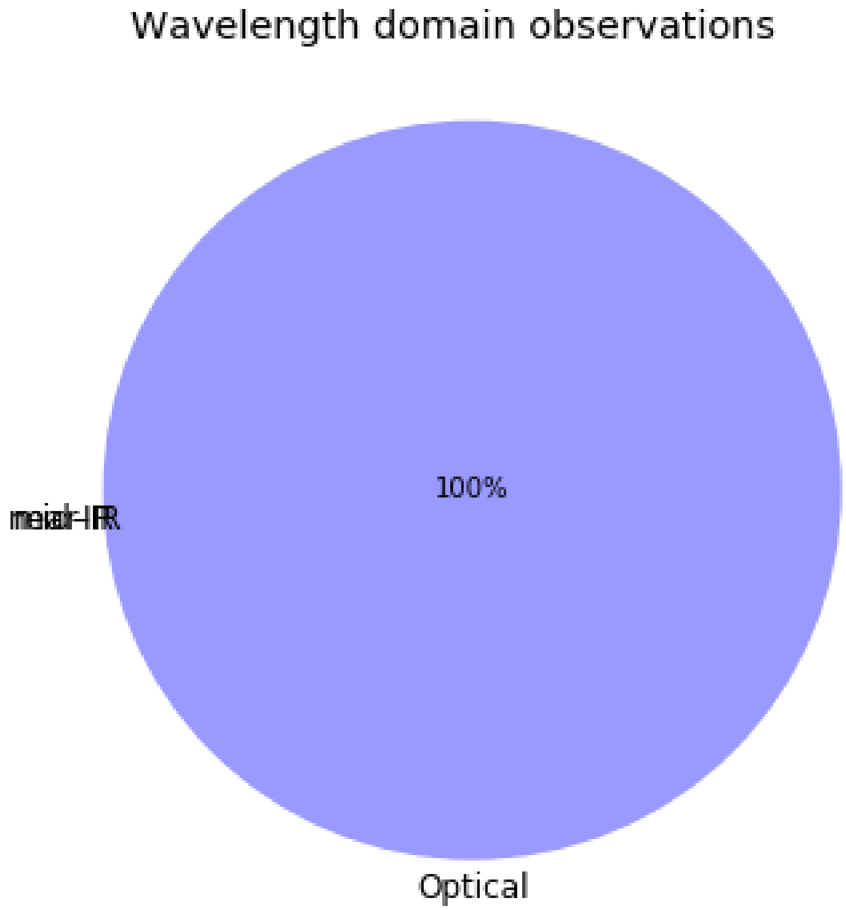
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:
  format(shape, fill_value, array(fill_value).dtype), FutureWarning)
```

```
Table shows only problematic columns.
```

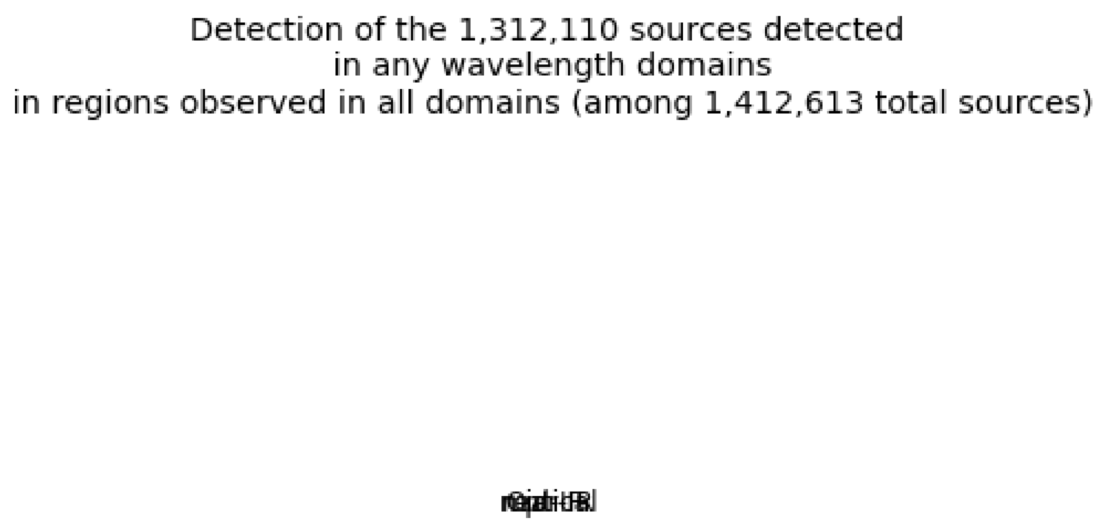
```
Out[4]: <IPython.core.display.HTML object>
```

1.3 I - Summary of wavelength domains

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/matplotlib_venn/_venn3.py:
  warnings.warn("Circle A has zero area")
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/matplotlib_venn/_venn3.py:
  warnings.warn("Circle B has zero area")
```




```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/matplotlib_venn/_venn3.py:
  warnings.warn("All circles have zero area")
```

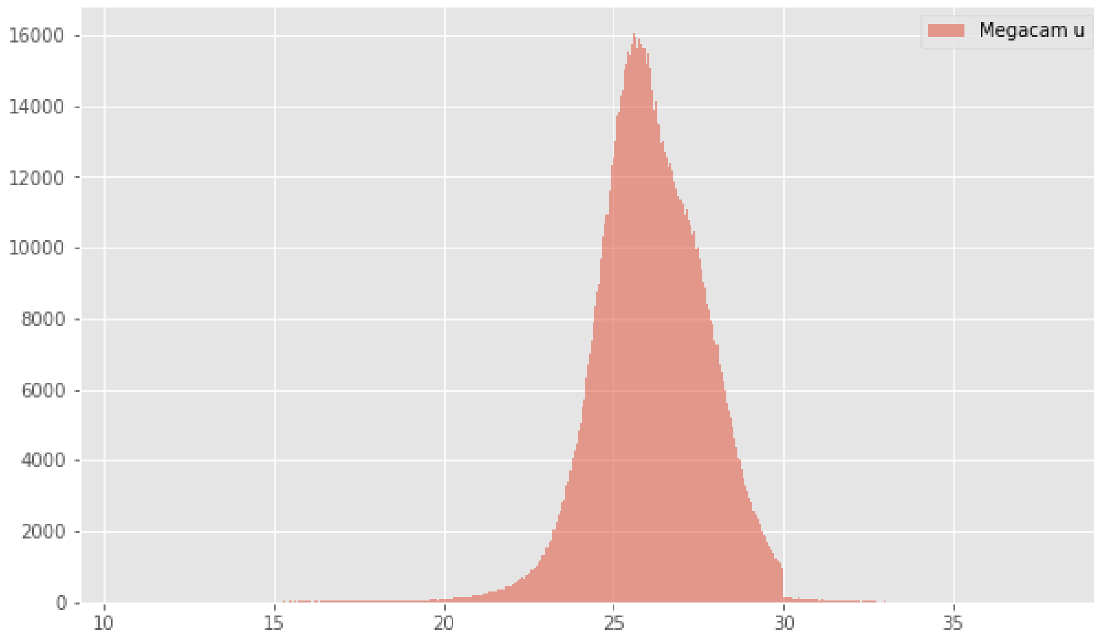


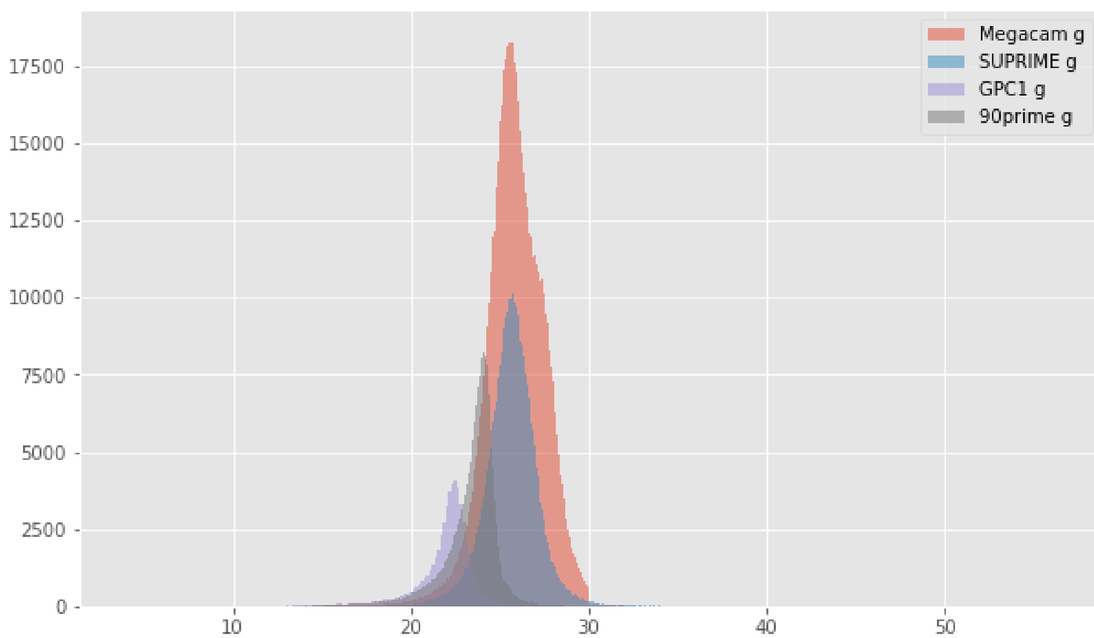
1.4 II - Comparing magnitudes in similar filters

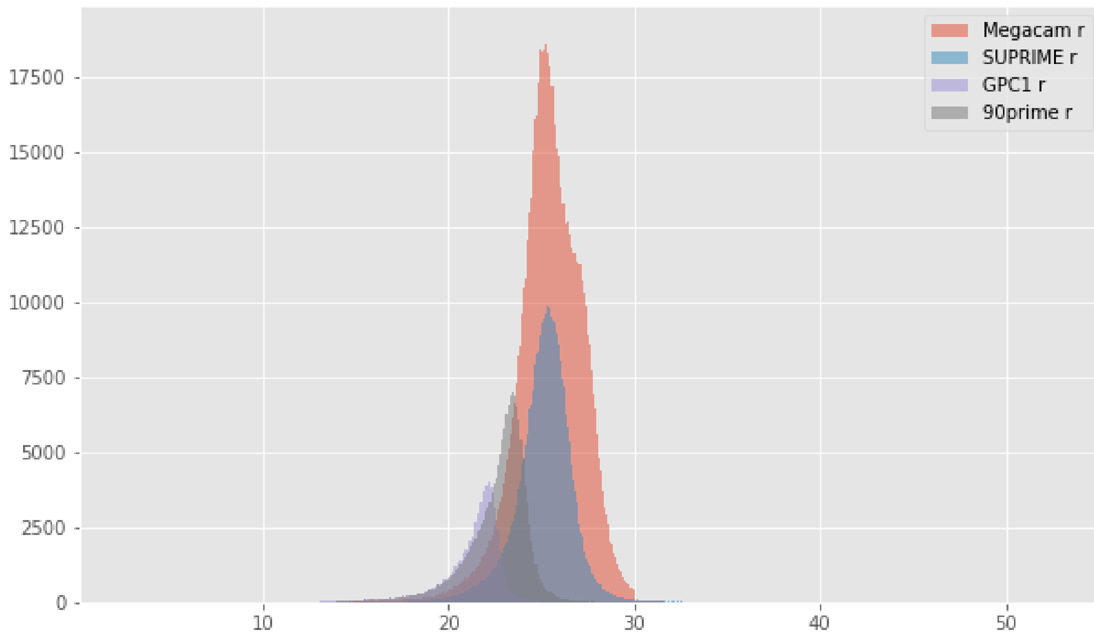
The master list if composed of several catalogues containing magnitudes in similar filters on different instruments. We are comparing the magnitudes in these corresponding filters.

1.4.1 II.a - Comparing depths

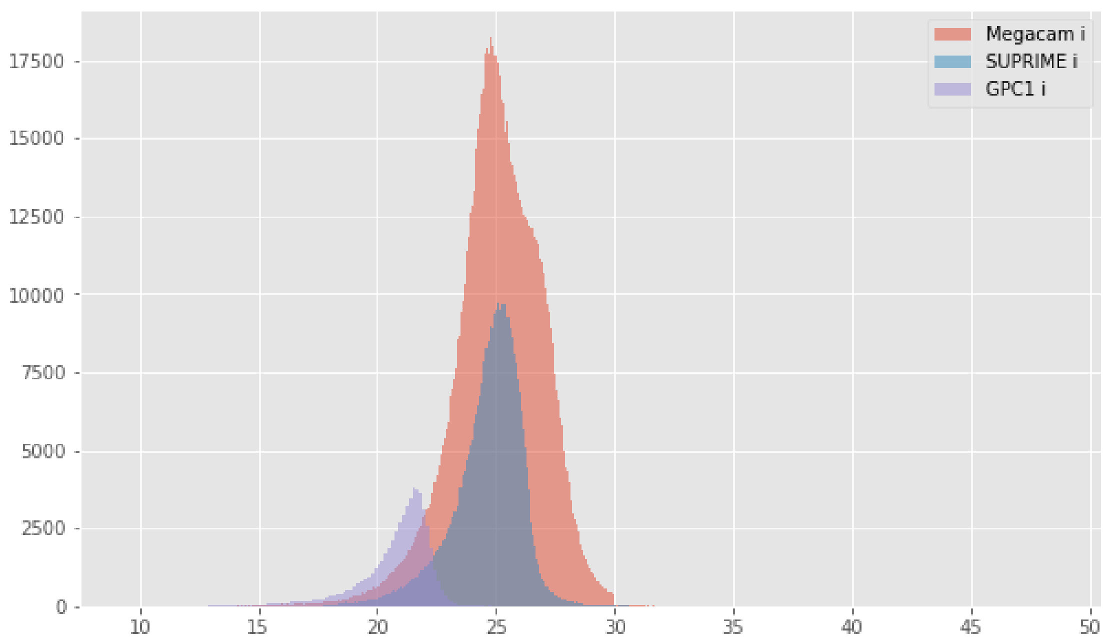
We compare the histograms of the total aperture magnitudes of similar bands.


Megacam u
0
2000
4000
6000
8000
10000
12000
14000
16000
10
15
20
25
30
35

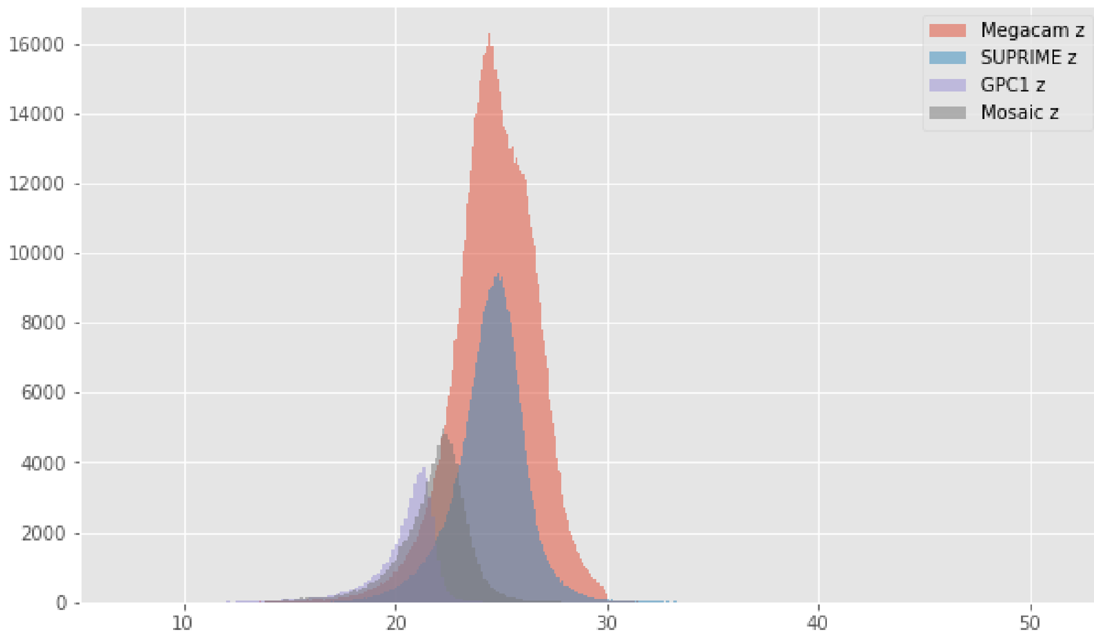

Megacam g
SUPRIME g
GPC1 g
90prime g
0
2500
5000
7500
10000
12500
15000
17500
10
20
30
40
50

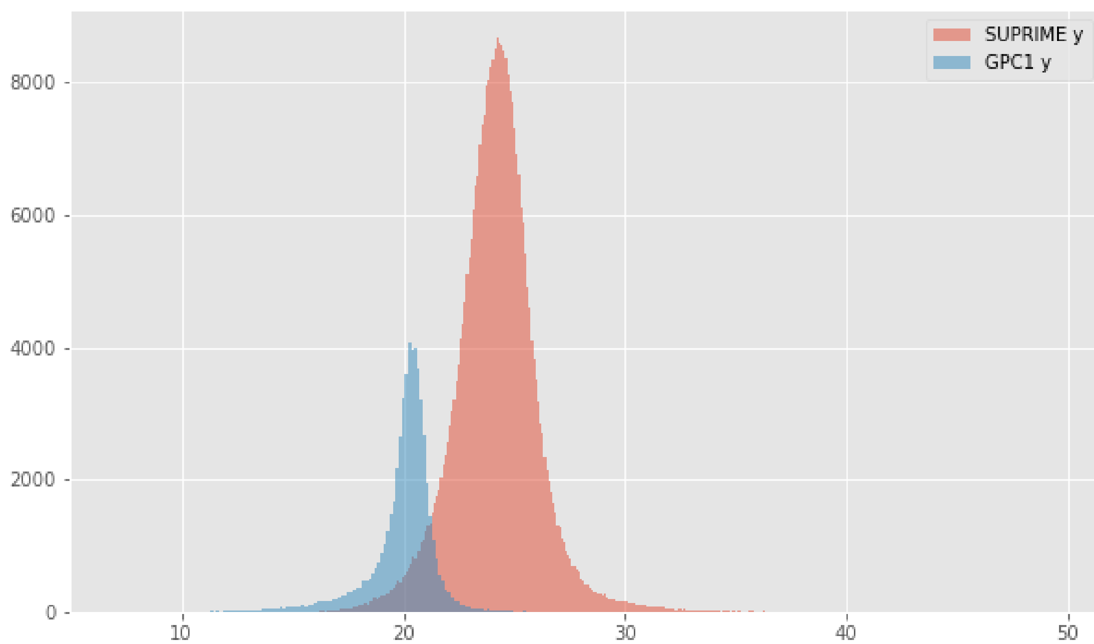


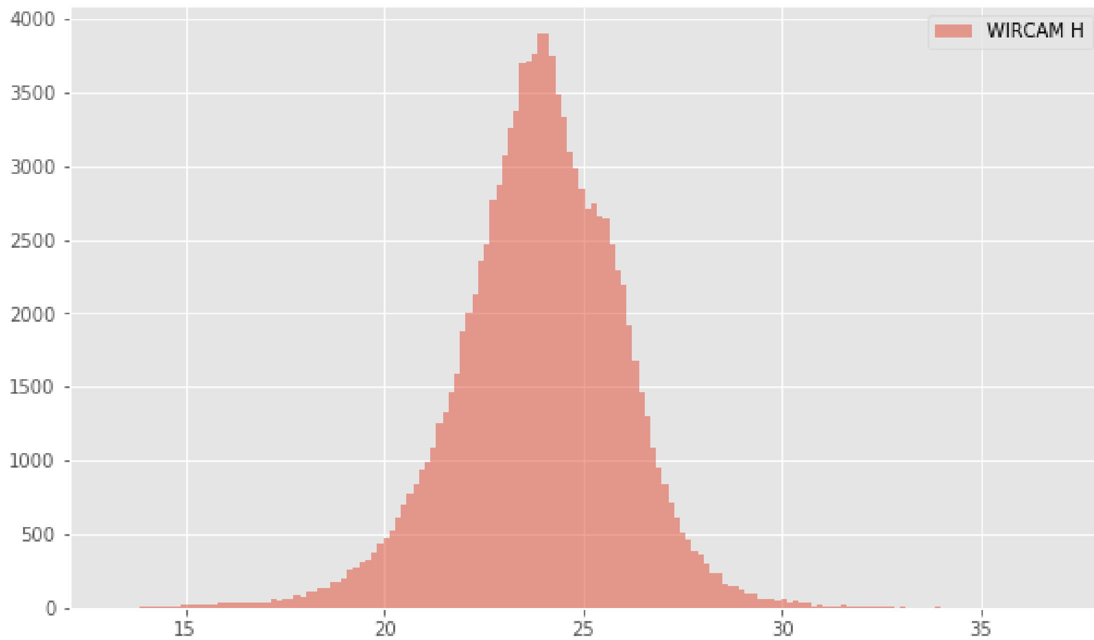
Megacam r
SUPRIME r
GPC1 r
90prime r
17500
15000
12500
10000
7500
5000
2500
0
10
20
30
40
50

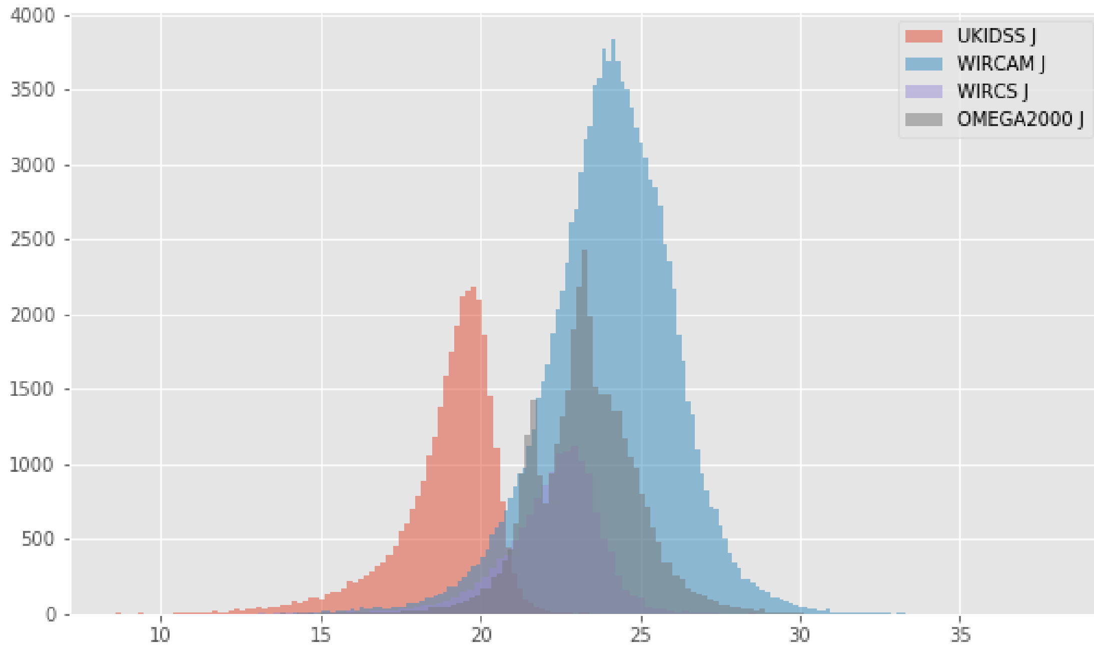


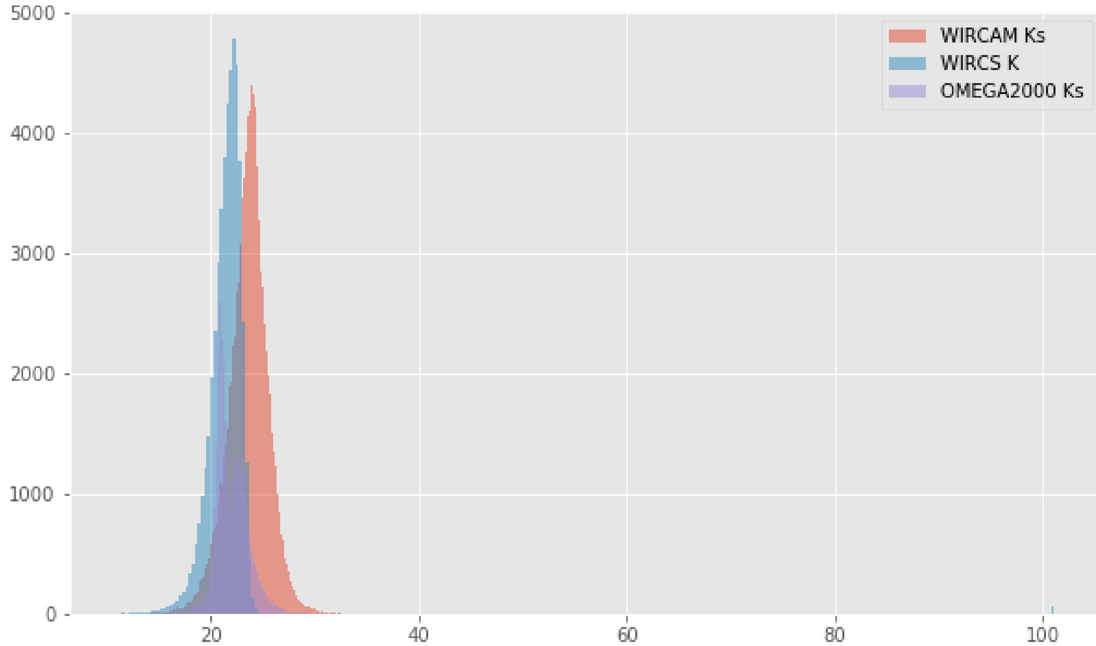
Megacam i
SUPRIME i
GPC1 i
17500
15000
12500
10000
7500
5000
2500
0
10
15
20
25
30
35
40
45
50


Megacam z
SUPRIME z
GPC1 z
Mosaic z
16000
14000
12000
10000
8000
6000
4000
2000
0
10
20
30
40
50


SUPRIME y
GPC1 y
8000
6000
4000
2000
0
10
20
30
40
50


WIRCAM H
4000
3500
3000
2500
2000
1500
1000
500
0
15
20
25
30
35

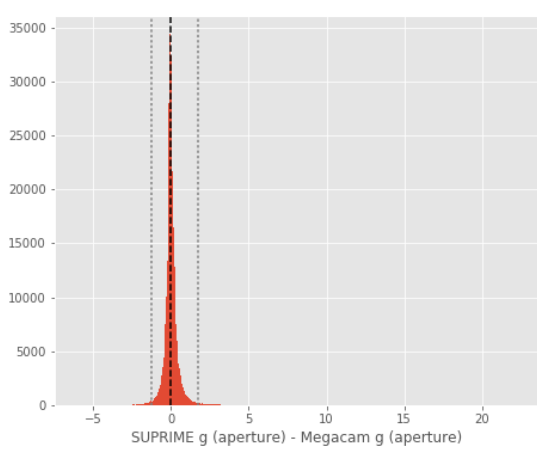

UKIDSS J
WIRCAM J
WIRCS J
OMEGA2000 J
4000
3500
3000
2500
2000
1500
1000
500
0
10
15
20
25
30
35

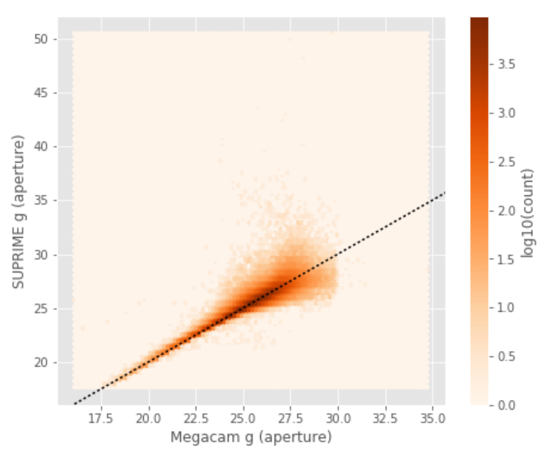


1.4.2 II.b - Comparing magnitudes

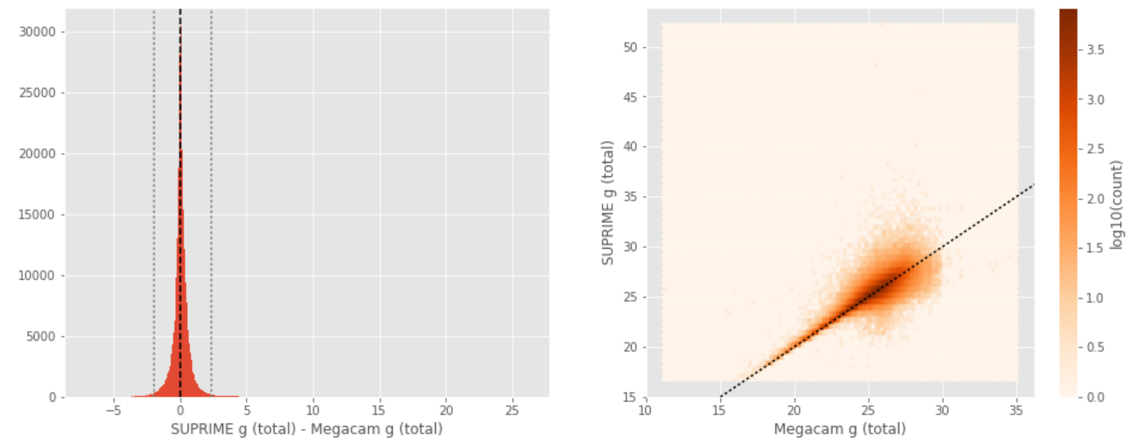
We compare one to one each magnitude in similar bands.

```
SUPRIME g (aperture) - Megacam g (aperture):
- Median: -0.03
- Median Absolute Deviation: 0.16
- 1% percentile: -1.2311116218566895
- 99% percentile: 1.7373179435729962
```

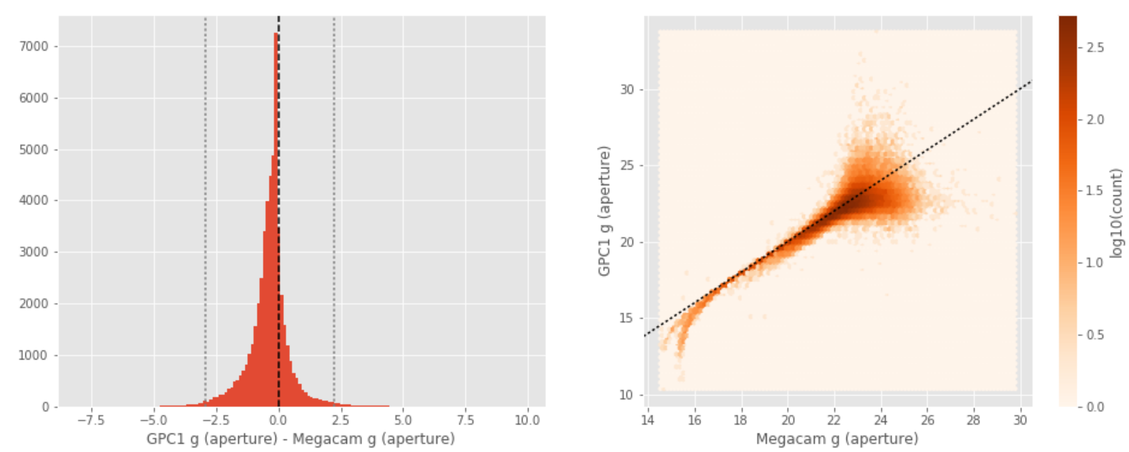




SUPRIME g (total) - Megacam g (total):
- Median: 0.04
- Median Absolute Deviation: 0.23
- 1% percentile: -1.9589151763916015
- 99% percentile: 2.314632244110094

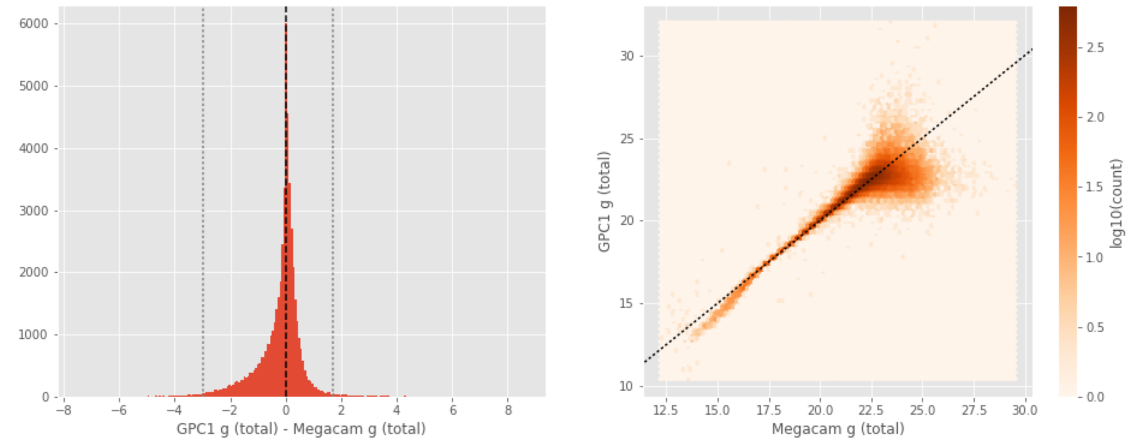


GPC1 g (aperture) - Megacam g (aperture):
- Median: -0.28
- Median Absolute Deviation: 0.32
- 1% percentile: -2.9472508430480957
- 99% percentile: 2.2309391975402826

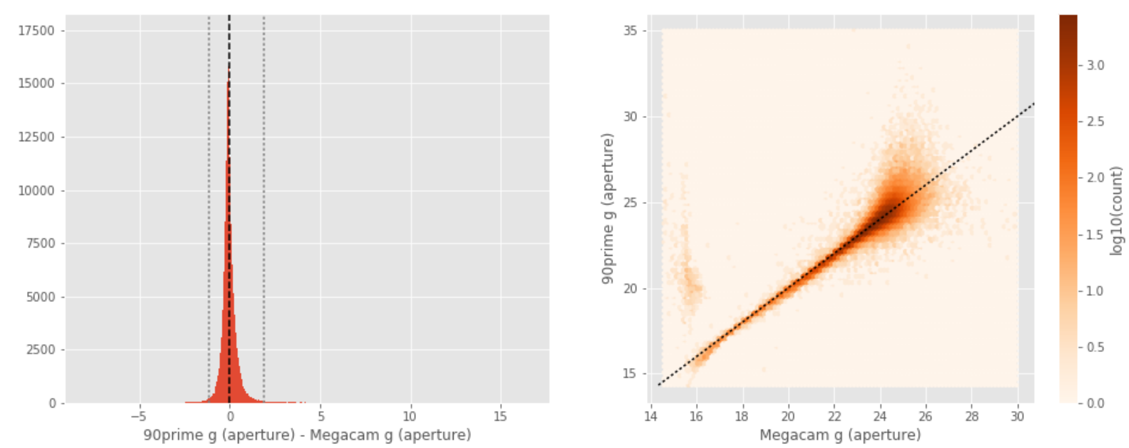


GPC1 g (total) - Megacam g (total):
- Median: -0.01

- Median Absolute Deviation: 0.27
- 1% percentile: -2.9726611137390138
- 99% percentile: 1.7023037338256806

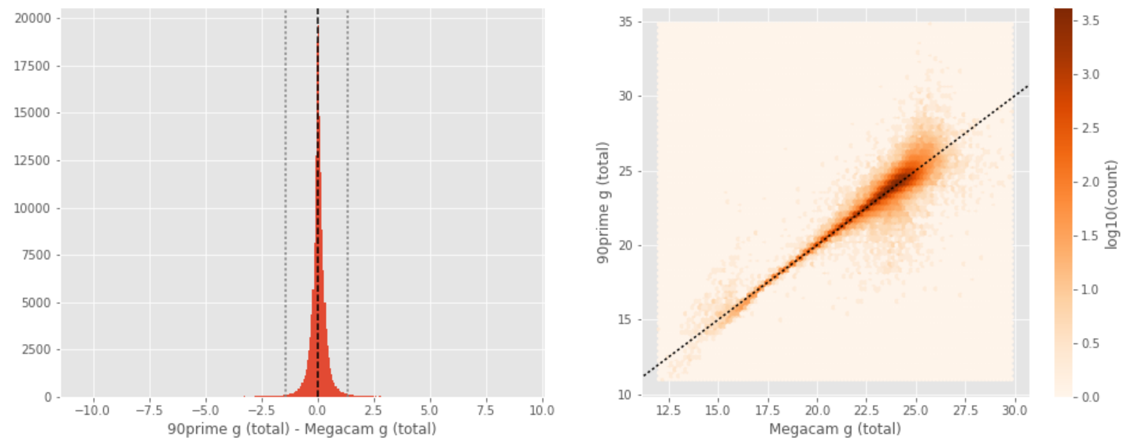


90prime g (aperture) - Megacam g (aperture):
- Median: -0.07
- Median Absolute Deviation: 0.16
- 1% percentile: -1.1429281997680663
- 99% percentile: 1.9096522521972639

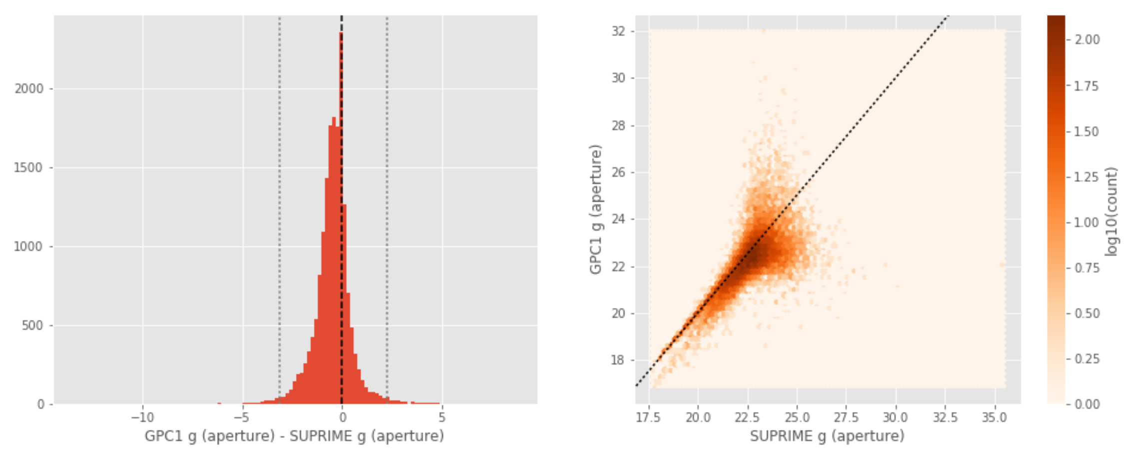


90prime g (total) - Megacam g (total):
- Median: 0.04
- Median Absolute Deviation: 0.14
- 1% percentile: -1.4339696884155273

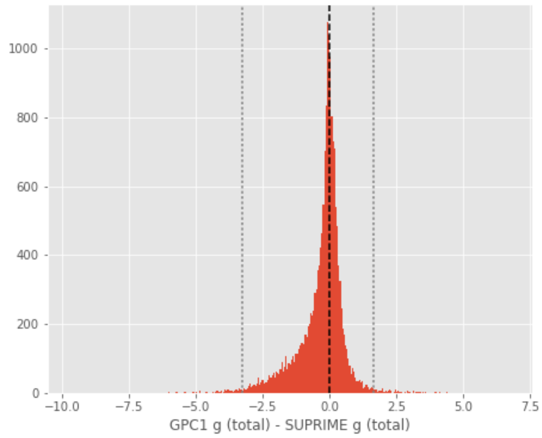
- 99% percentile: 1.3585274696350096

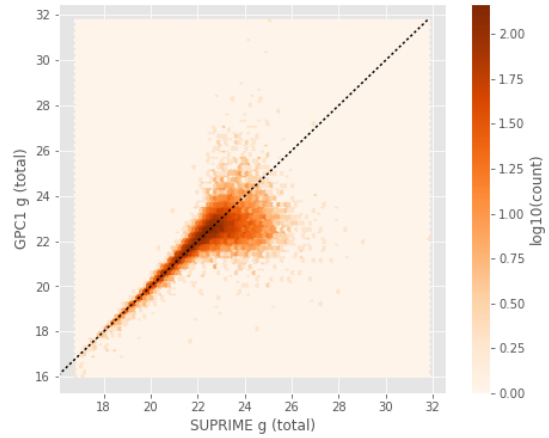


GPC1 g (aperture) - SUPRIME g (aperture):
- Median: -0.37
- Median Absolute Deviation: 0.42
- 1% percentile: -3.1368252754211428
- 99% percentile: 2.29183826446533

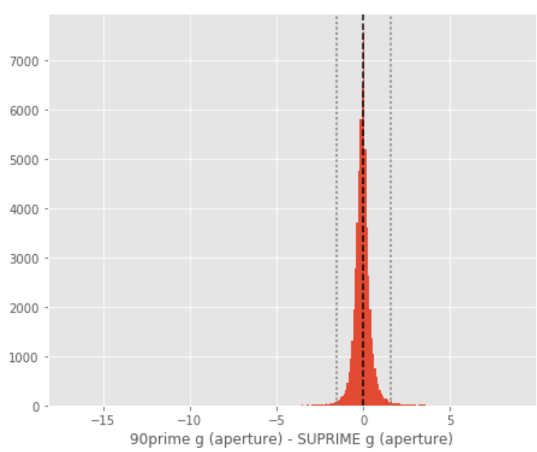


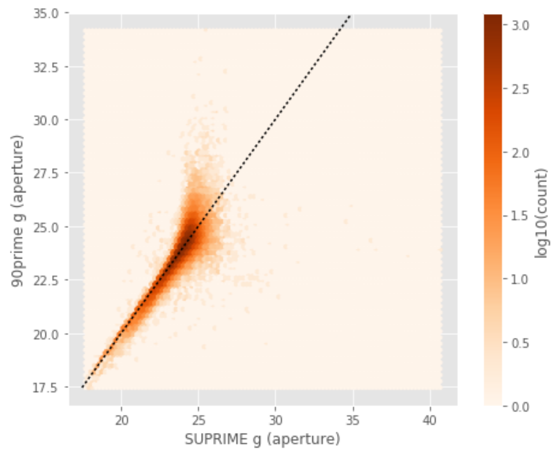
GPC1 g (total) - SUPRIME g (total):
- Median: -0.10
- Median Absolute Deviation: 0.31
- 1% percentile: -3.2804692077636717
- 99% percentile: 1.6446651077270626



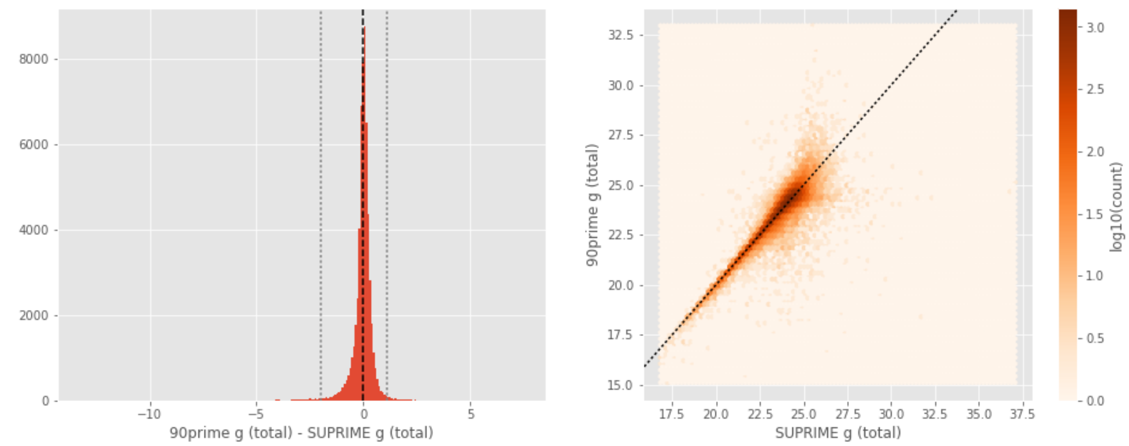


90prime g (aperture) - SUPRIME g (aperture):
- Median: -0.05
- Median Absolute Deviation: 0.22
- 1% percentile: -1.5654241561889648
- 99% percentile: 1.614810657501221

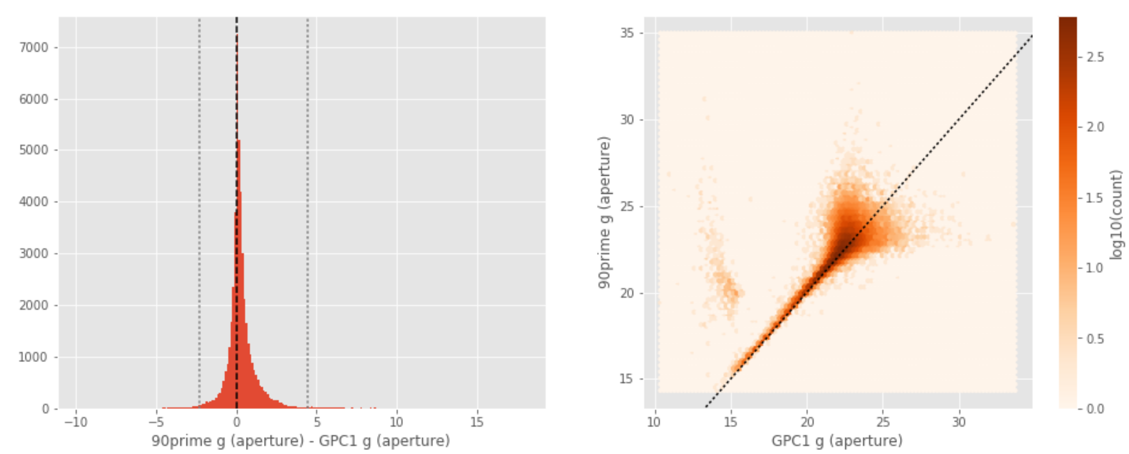




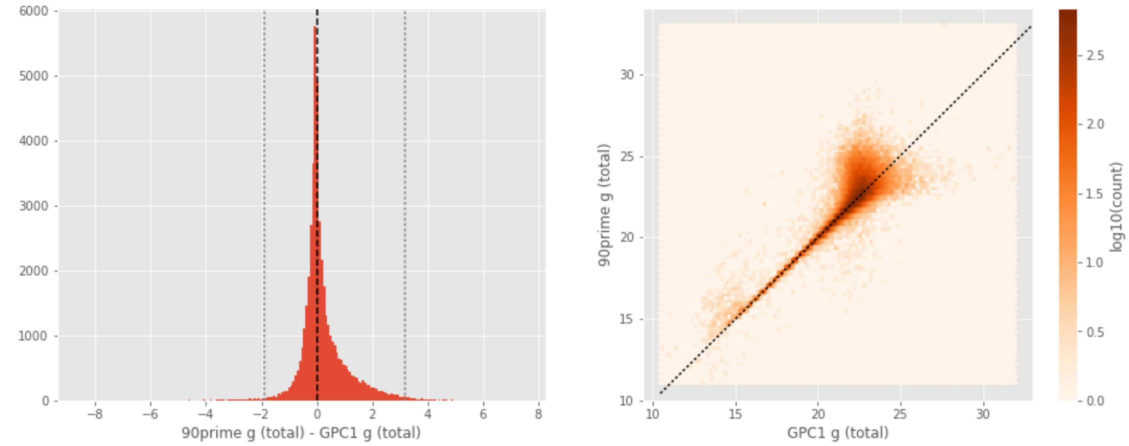
90prime g (total) - SUPRIME g (total):
- Median: 0.01
- Median Absolute Deviation: 0.16
- 1% percentile: -1.962066135406494
- 99% percentile: 1.1228723907470701



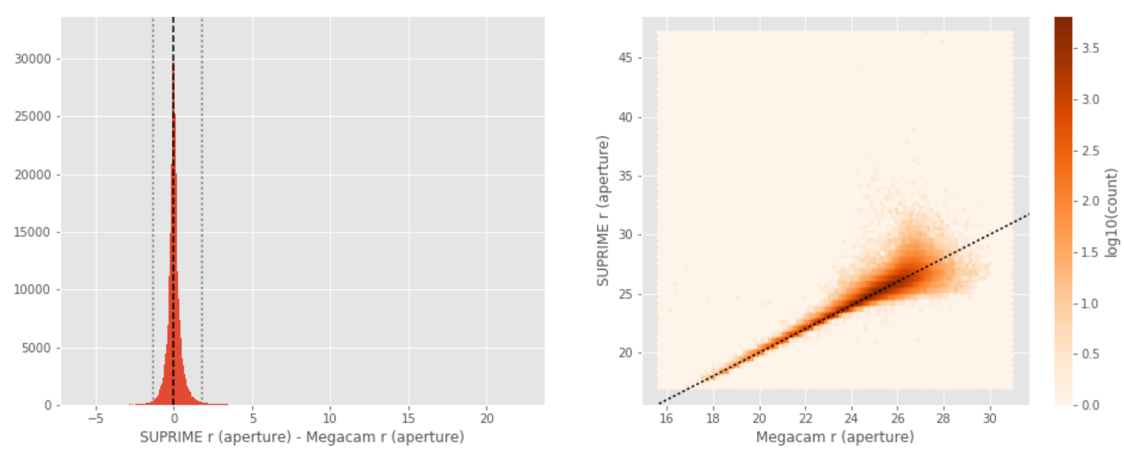
90prime g (aperture) - GPC1 g (aperture):
- Median: 0.16
- Median Absolute Deviation: 0.29
- 1% percentile: -2.3205015373229982
- 99% percentile: 4.473019647598266



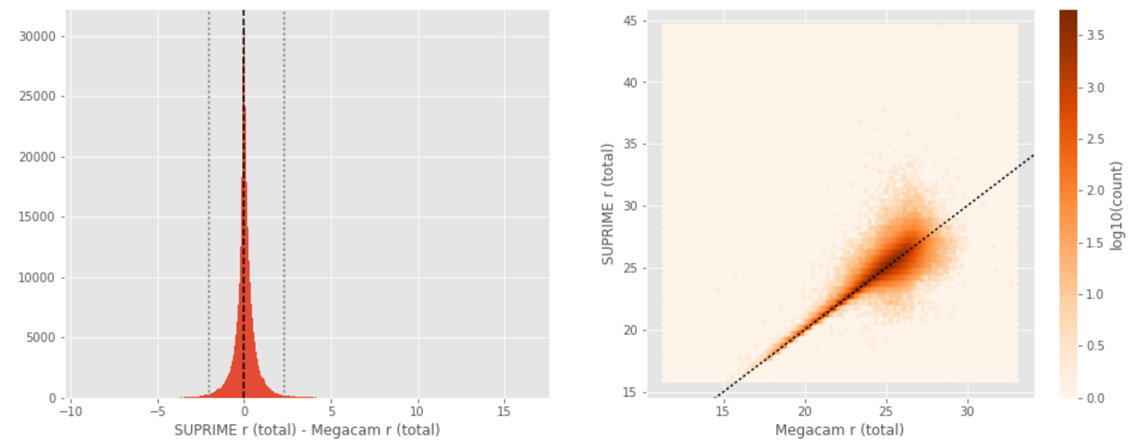
90prime g (total) - GPC1 g (total):
- Median: 0.02
- Median Absolute Deviation: 0.27
- 1% percentile: -1.8934118270874025
- 99% percentile: 3.1747922897338956



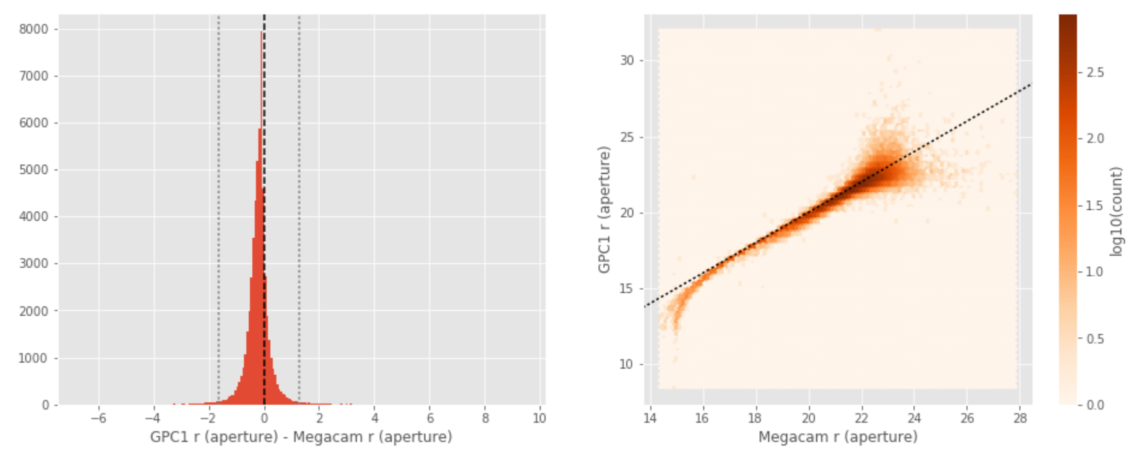
SUPRIME r (aperture) - Megacam r (aperture):
- Median: -0.01
- Median Absolute Deviation: 0.18
- 1% percentile: -1.3007946014404297
- 99% percentile: 1.773109951019285



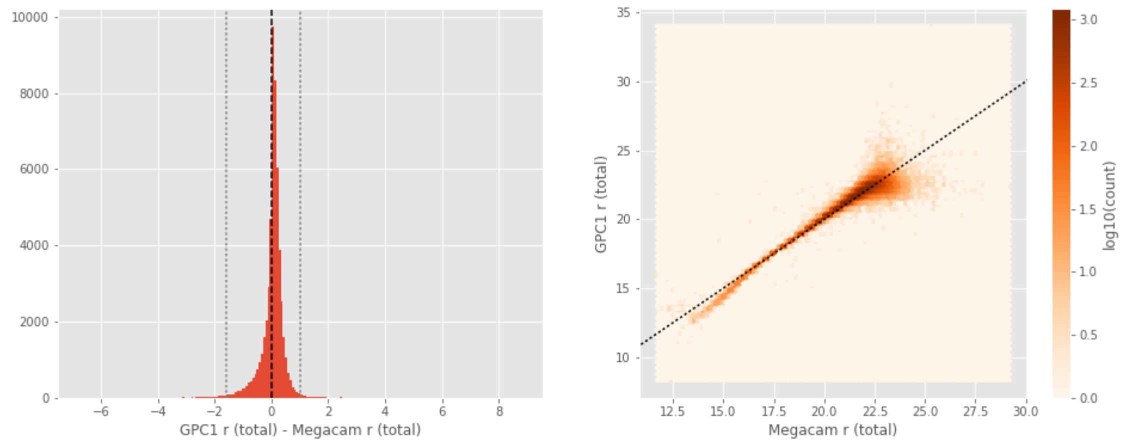
SUPRIME r (total) - Megacam r (total):
- Median: 0.02
- Median Absolute Deviation: 0.23
- 1% percentile: -2.0251371383666994
- 99% percentile: 2.288670730590823



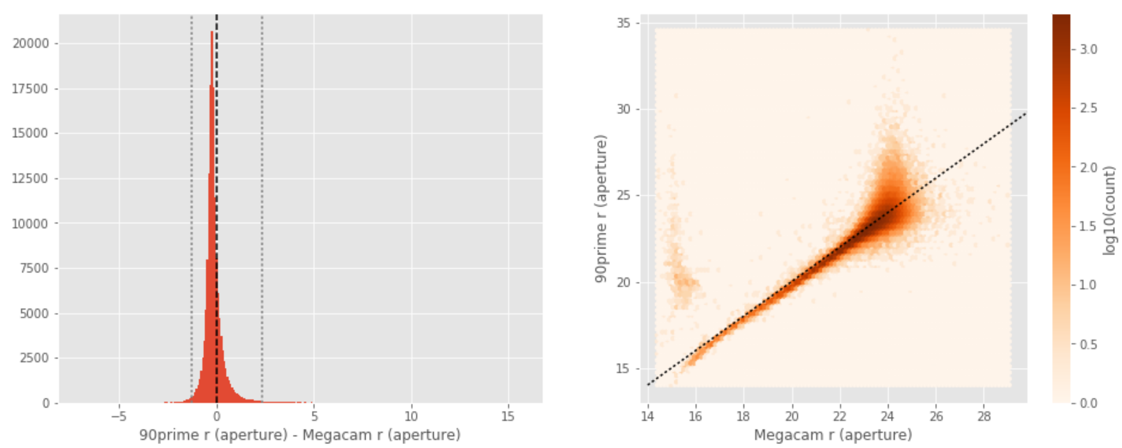
GPC1 r (aperture) - Megacam r (aperture):
- Median: -0.17
- Median Absolute Deviation: 0.17
- 1% percentile: -1.62568998336792
- 99% percentile: 1.2671497344970688



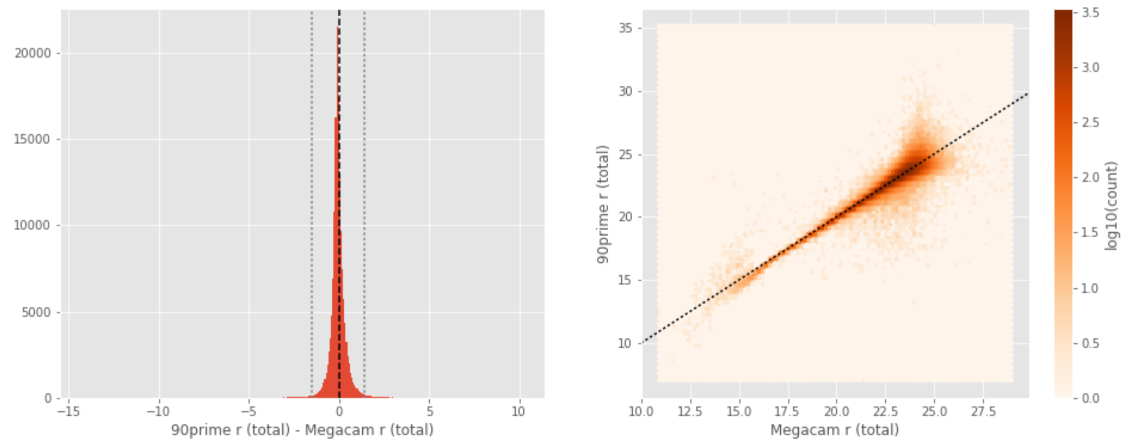
GPC1 r (total) - Megacam r (total):
- Median: 0.08
- Median Absolute Deviation: 0.14
- 1% percentile: -1.6144099235534668
- 99% percentile: 1.0029862403869614



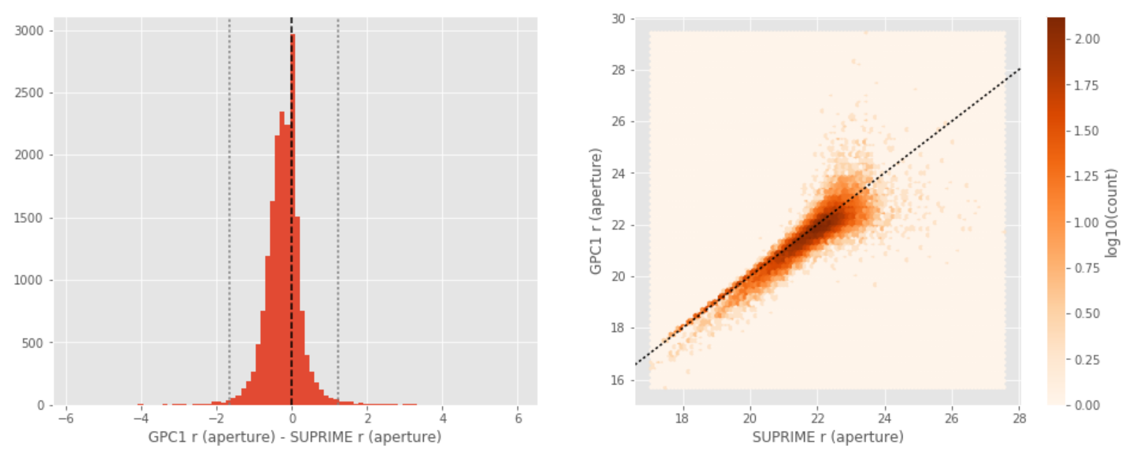
90prime r (aperture) - Megacam r (aperture):
- Median: -0.20
- Median Absolute Deviation: 0.18
- 1% percentile: -1.2824085235595704
- 99% percentile: 2.3281039810180655



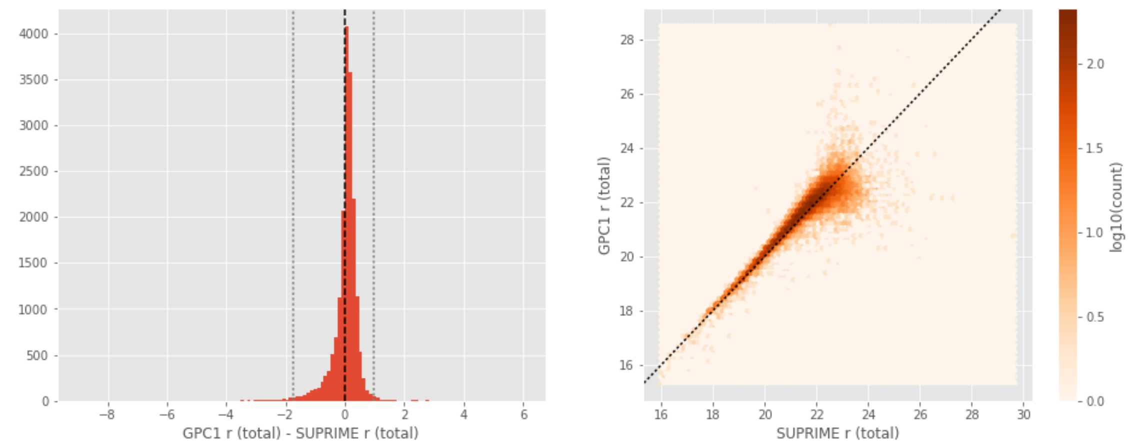
90prime r (total) - Megacam r (total):
- Median: -0.08
- Median Absolute Deviation: 0.17
- 1% percentile: -1.5235447692871094
- 99% percentile: 1.4148318481445314



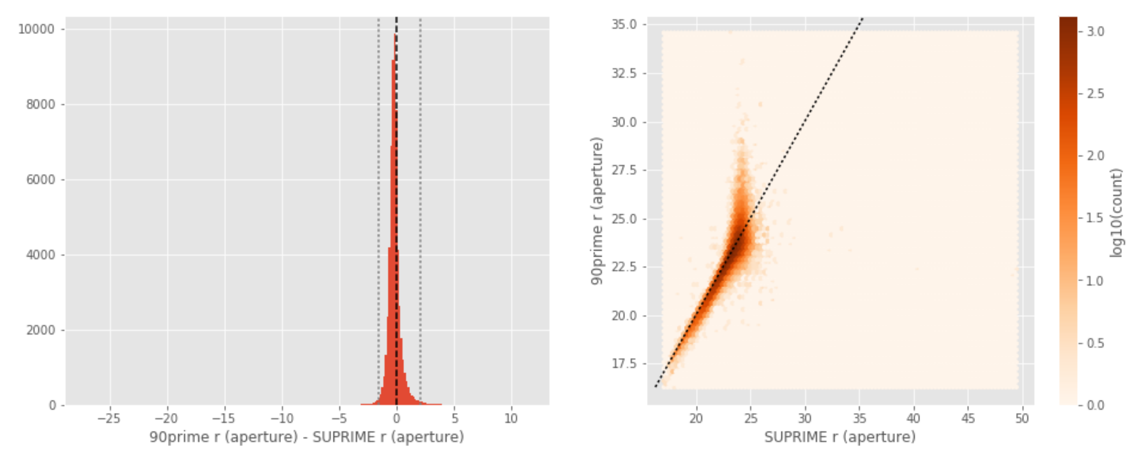
GPC1 r (aperture) - SUPRIME r (aperture):
- Median: -0.20
- Median Absolute Deviation: 0.25
- 1% percentile: -1.6588865661621093
- 99% percentile: 1.2223485565185546



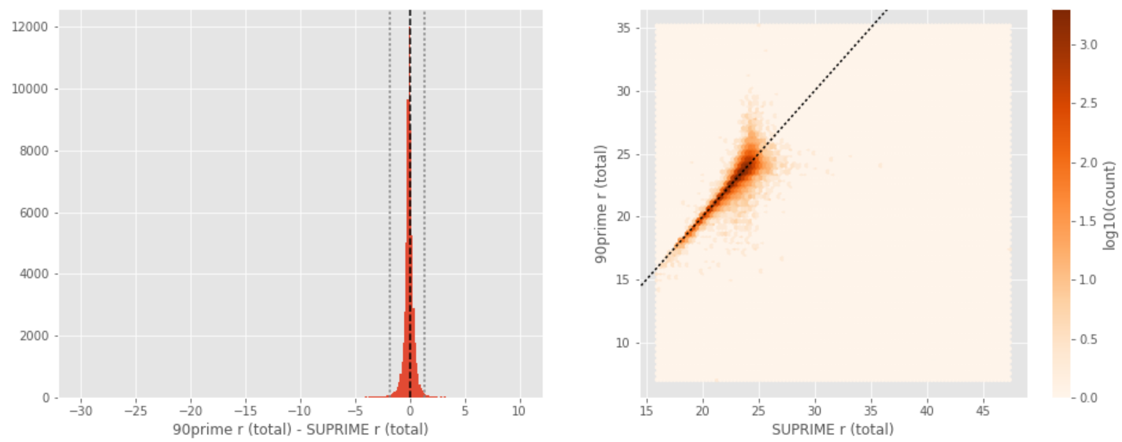
GPC1 r (total) - SUPRIME r (total):
- Median: 0.09
- Median Absolute Deviation: 0.15
- 1% percentile: -1.7492075538635254
- 99% percentile: 0.959752445220943



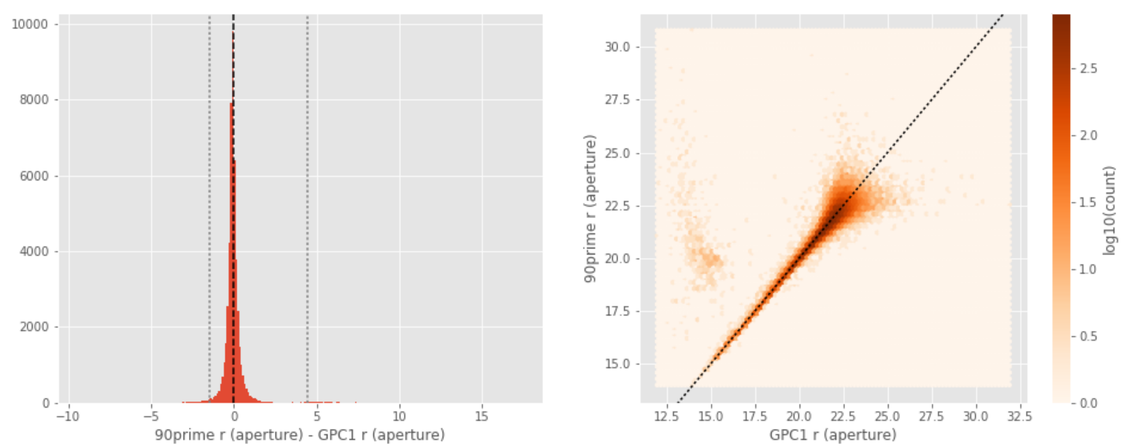
90prime r (aperture) - SUPRIME r (aperture):
- Median: -0.21
- Median Absolute Deviation: 0.24
- 1% percentile: -1.515523910522461
- 99% percentile: 2.057665939331054



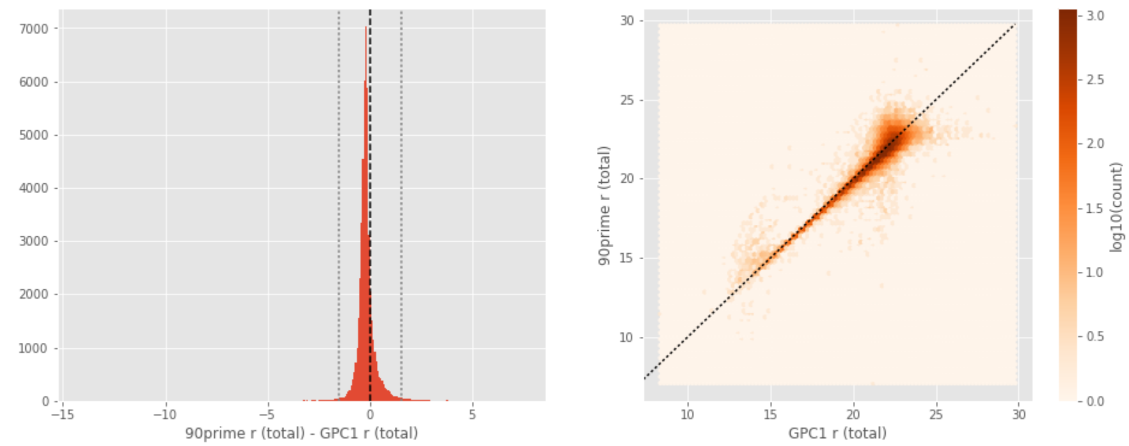
90prime r (total) - SUPRIME r (total):
- Median: -0.06
- Median Absolute Deviation: 0.19
- 1% percentile: -1.8601147270202638
- 99% percentile: 1.3585030174255361



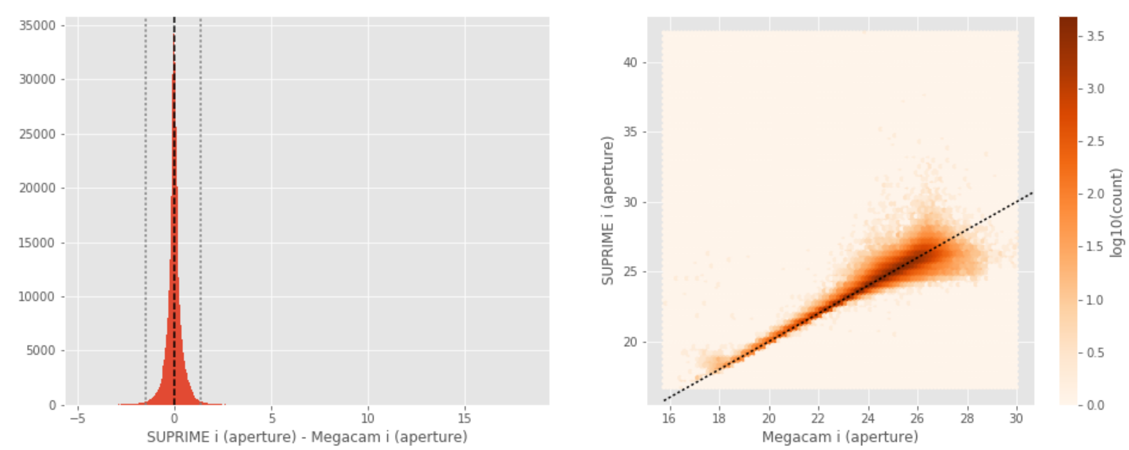
90prime r (aperture) - GPC1 r (aperture):
- Median: -0.07
- Median Absolute Deviation: 0.16
- 1% percentile: -1.485422134399414
- 99% percentile: 4.48196273803712



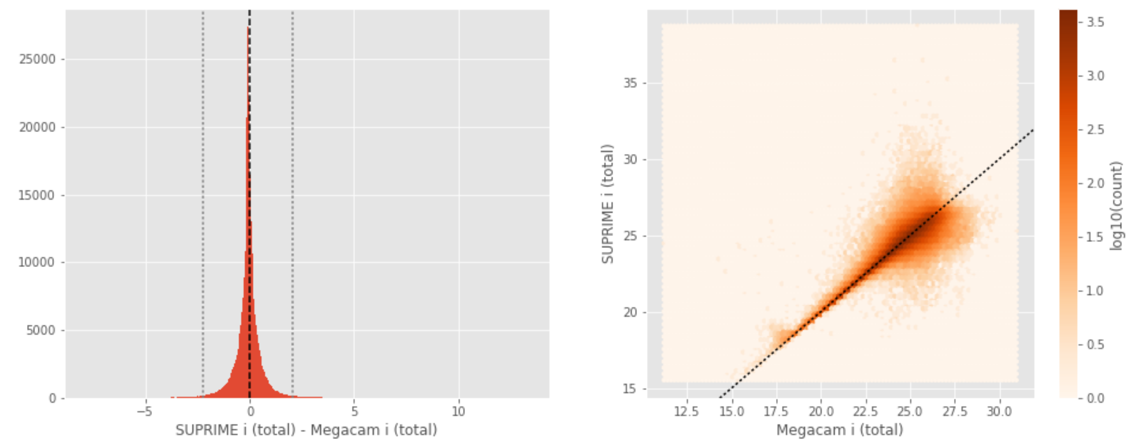
90prime r (total) - GPC1 r (total):
- Median: -0.20
- Median Absolute Deviation: 0.15
- 1% percentile: -1.518271484375
- 99% percentile: 1.5365567207336404



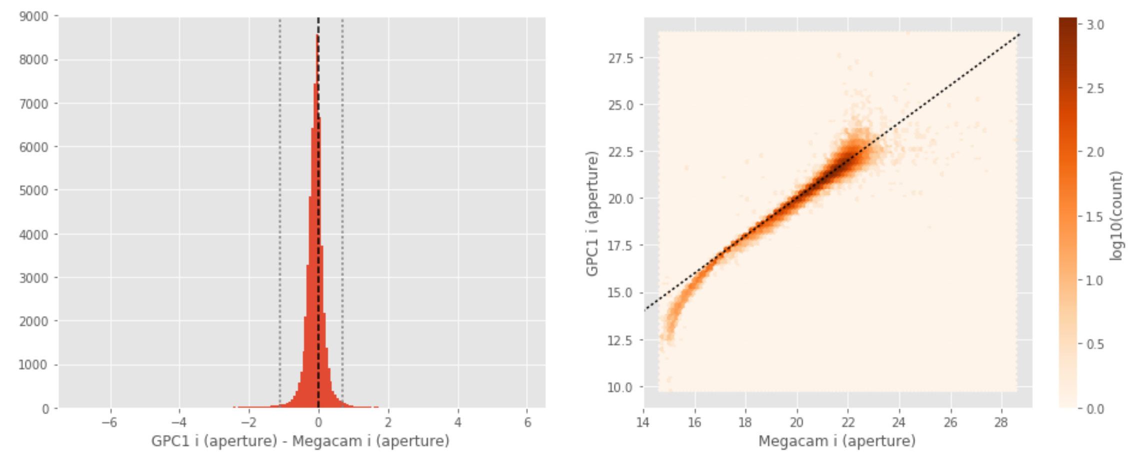
SUPRIME i (aperture) - Megacam i (aperture):
- Median: -0.02
- Median Absolute Deviation: 0.16
- 1% percentile: -1.4580886840820313
- 99% percentile: 1.3433338165283222



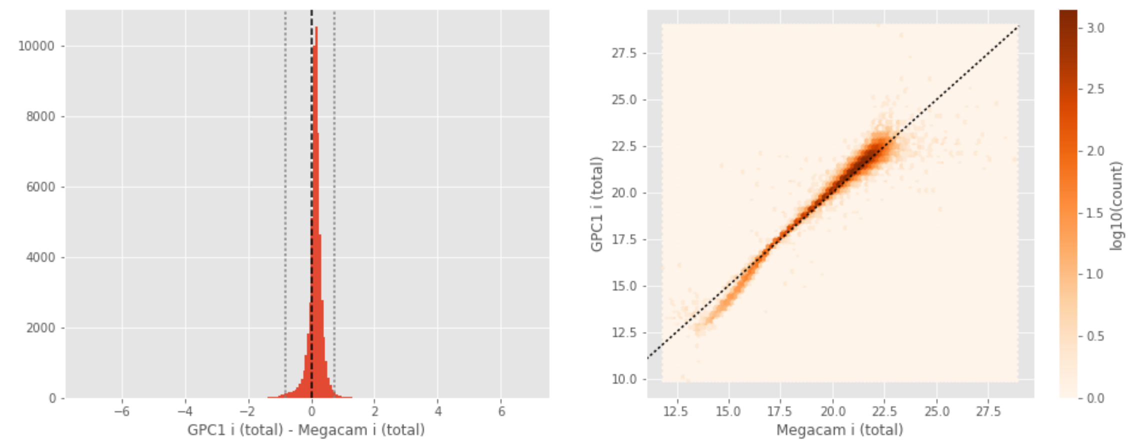
SUPRIME i (total) - Megacam i (total):
- Median: -0.07
- Median Absolute Deviation: 0.21
- 1% percentile: -2.2117546081542967
- 99% percentile: 2.071892547607423



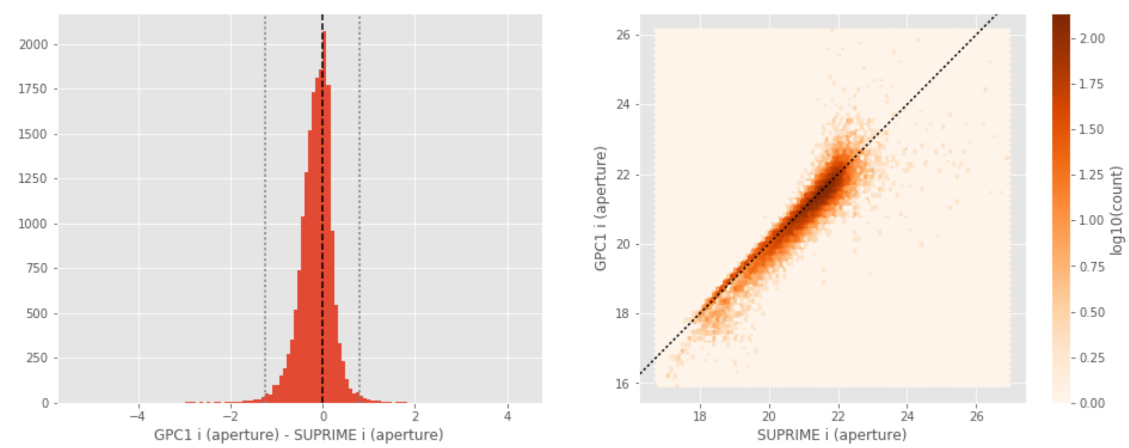
GPC1 i (aperture) - Megacam i (aperture):
- Median: -0.08
- Median Absolute Deviation: 0.12
- 1% percentile: -1.0892204284667968
- 99% percentile: 0.7077011108398423



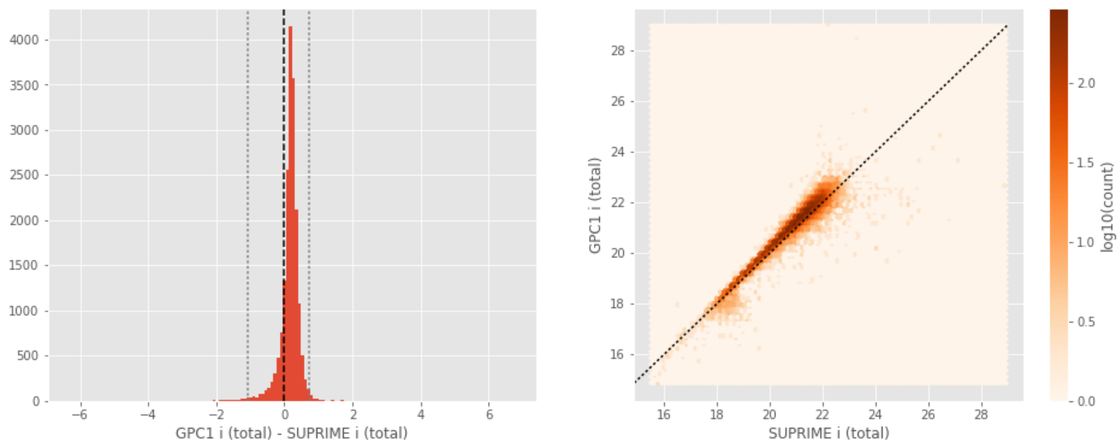
GPC1 i (total) - Megacam i (total):
- Median: 0.14
- Median Absolute Deviation: 0.09
- 1% percentile: -0.8035373115539551
- 99% percentile: 0.7253468513488748



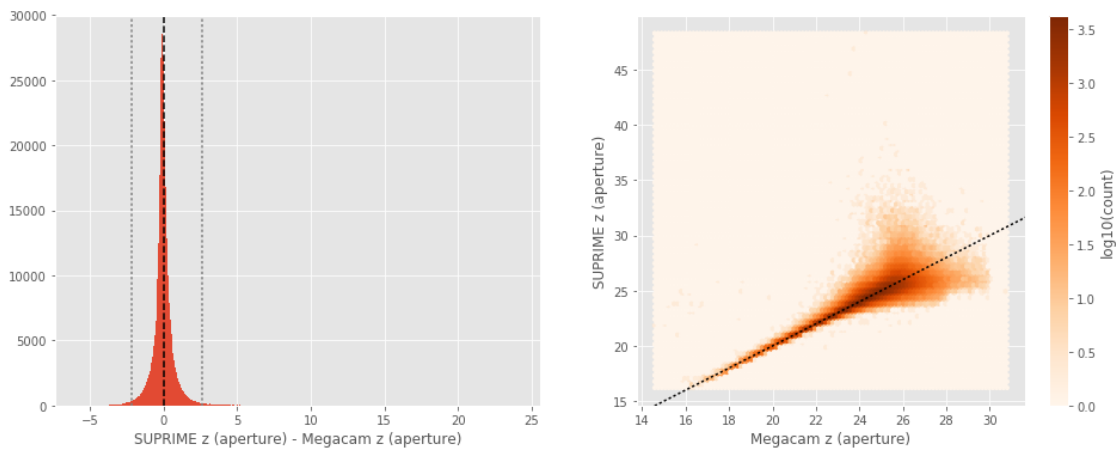
GPC1 i (aperture) - SUPRIME i (aperture):
- Median: -0.11
- Median Absolute Deviation: 0.20
- 1% percentile: -1.2585309600830077
- 99% percentile: 0.7960177612304704



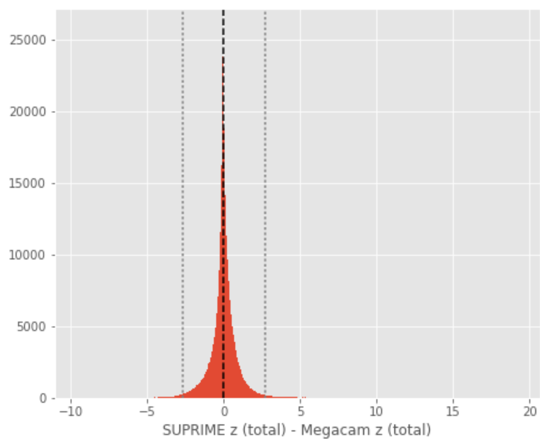
GPC1 i (total) - SUPRIME i (total):
- Median: 0.19
- Median Absolute Deviation: 0.11
- 1% percentile: -1.0757511711120604
- 99% percentile: 0.734667930603025

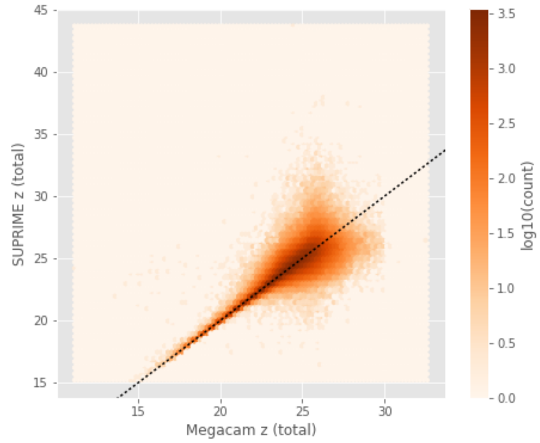


SUPRIME z (aperture) - Megacam z (aperture):
- Median: -0.04
- Median Absolute Deviation: 0.25
- 1% percentile: -2.159938545227051
- 99% percentile: 2.59332706451416

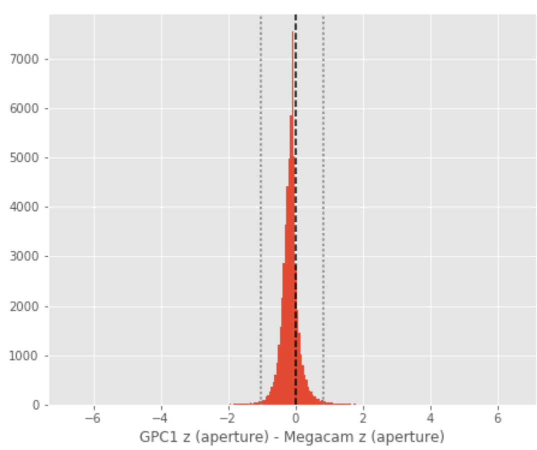


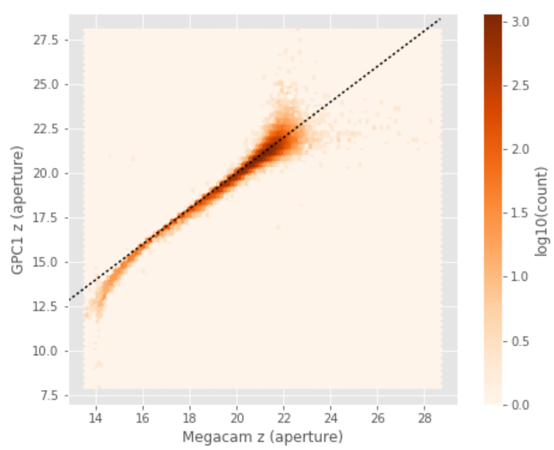
SUPRIME z (total) - Megacam z (total):
- Median: -0.03
- Median Absolute Deviation: 0.31
- 1% percentile: -2.6480859756469726
- 99% percentile: 2.7384426689147947



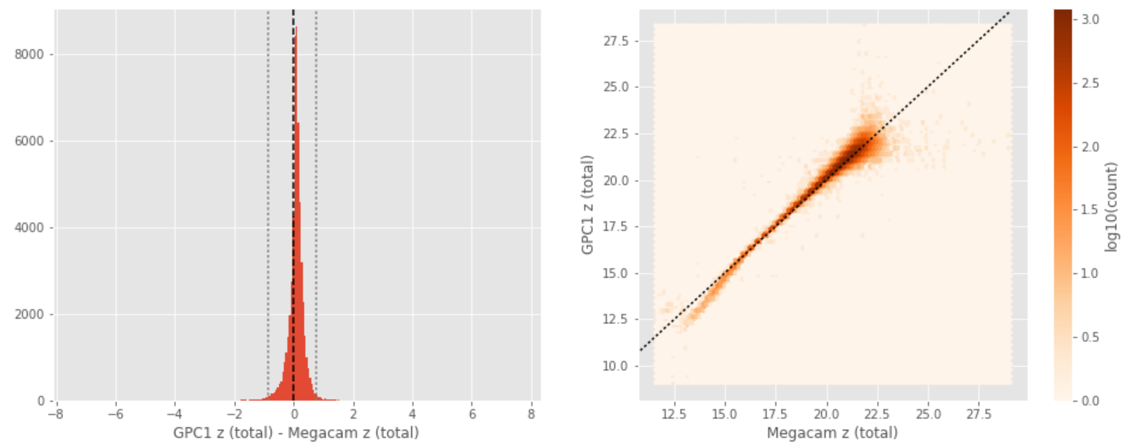


GPC1 z (aperture) - Megacam z (aperture):
- Median: -0.13
- Median Absolute Deviation: 0.12
- 1% percentile: -1.0188804626464845
- 99% percentile: 0.8210201263427732

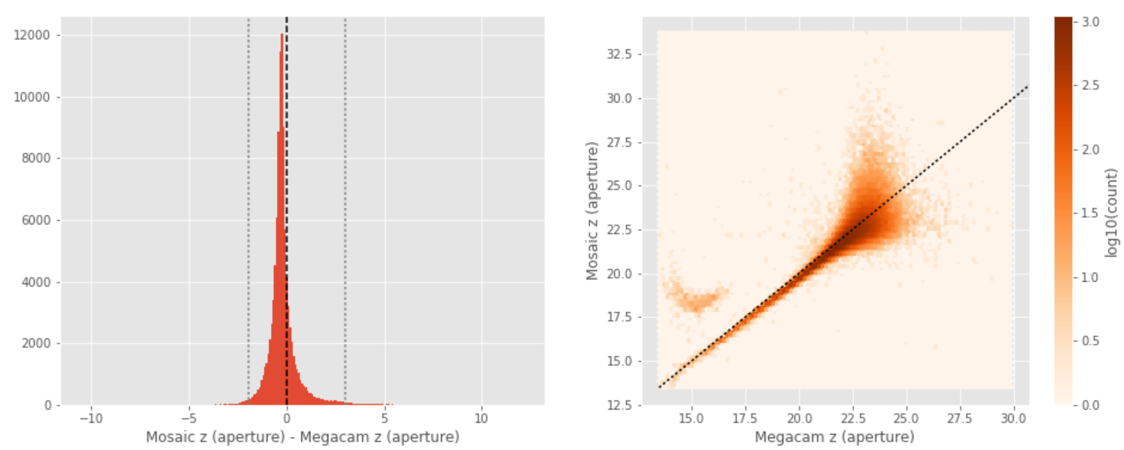




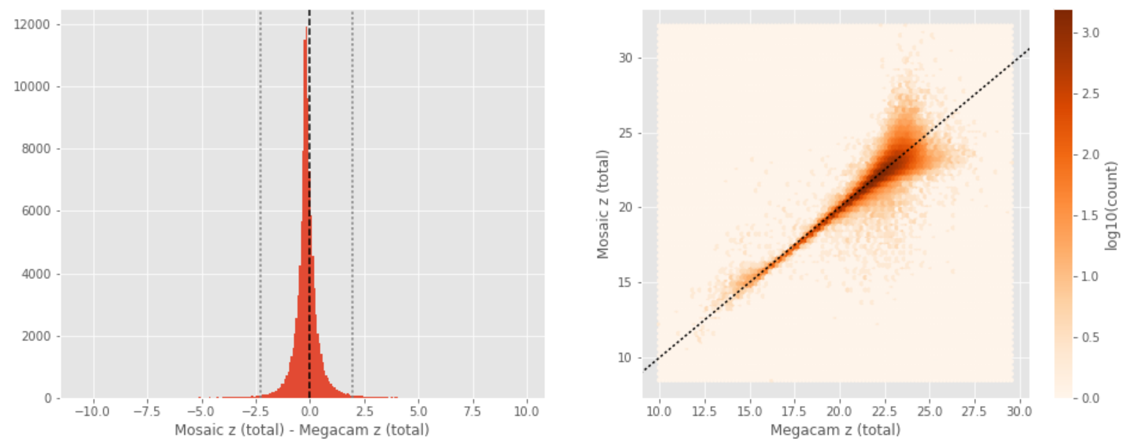
GPC1 z (total) - Megacam z (total):
- Median: 0.09
- Median Absolute Deviation: 0.11
- 1% percentile: -0.8405802231147743
- 99% percentile: 0.7753526496887206



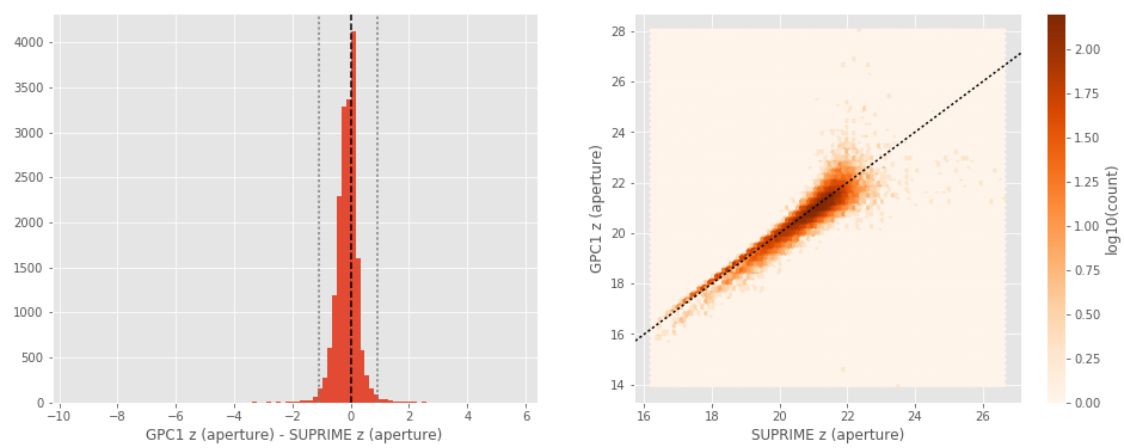
Mosaic z (aperture) - Megacam z (aperture):
- Median: -0.27
- Median Absolute Deviation: 0.24
- 1% percentile: -1.9307139205932617
- 99% percentile: 2.980490236282348



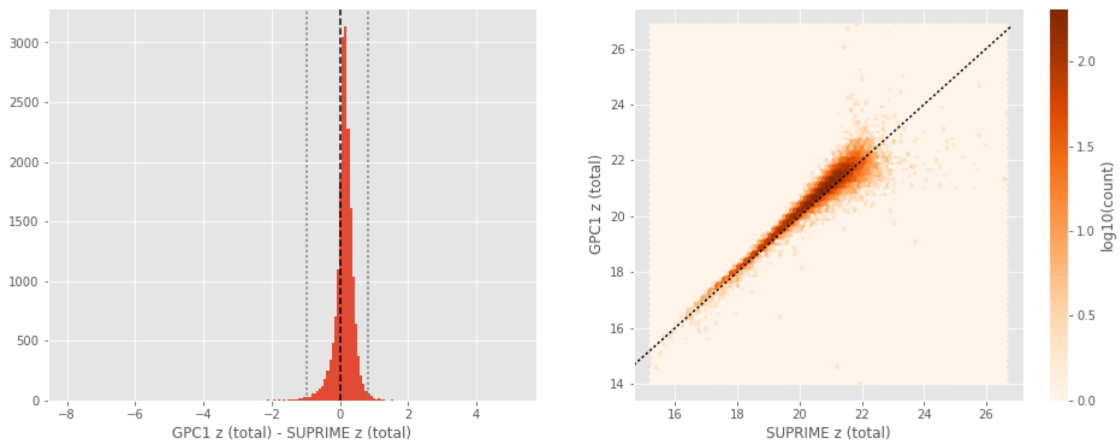
Mosaic z (total) - Megacam z (total):
- Median: -0.17
- Median Absolute Deviation: 0.22
- 1% percentile: -2.2553145980834963
- 99% percentile: 1.9777140045165917



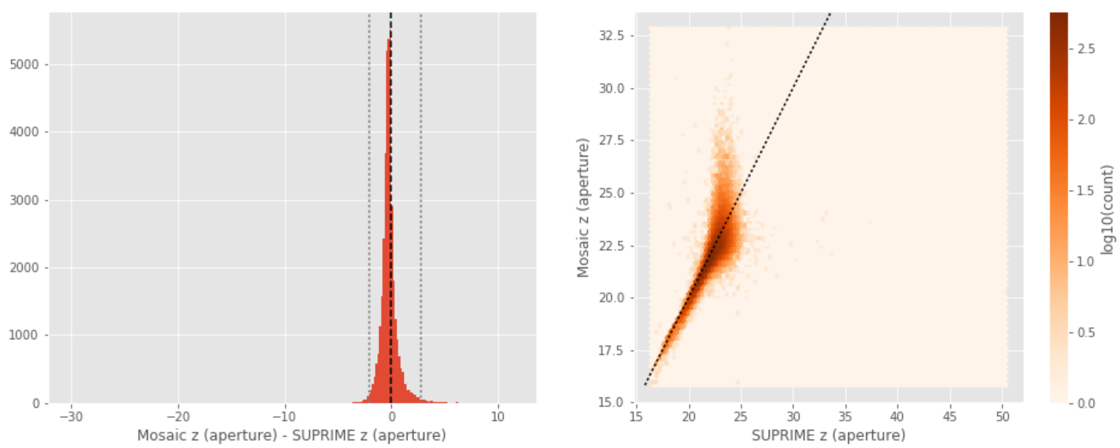
GPC1 z (aperture) - SUPRIME z (aperture):
- Median: -0.10
- Median Absolute Deviation: 0.21
- 1% percentile: -1.1059716796874999
- 99% percentile: 0.9145635223388655



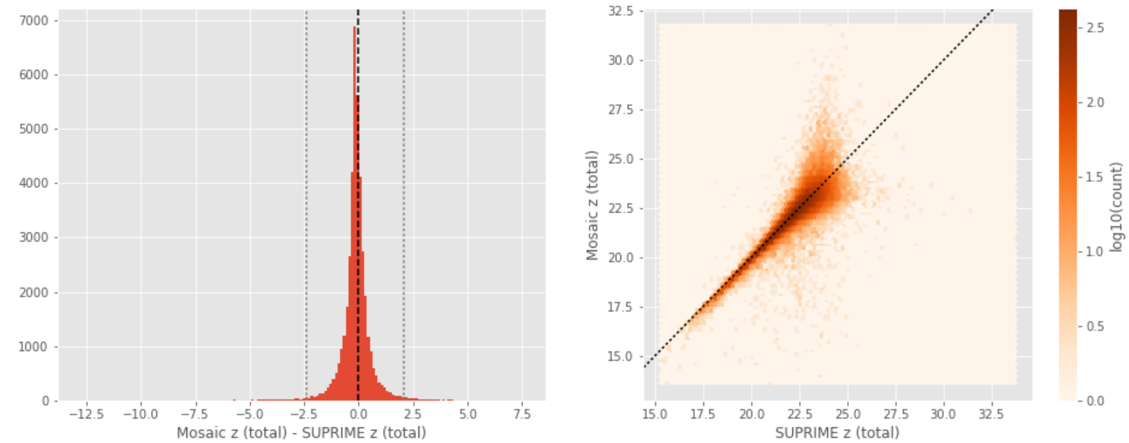
GPC1 z (total) - SUPRIME z (total):
- Median: 0.14
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9915233230590821
- 99% percentile: 0.8064051818847633



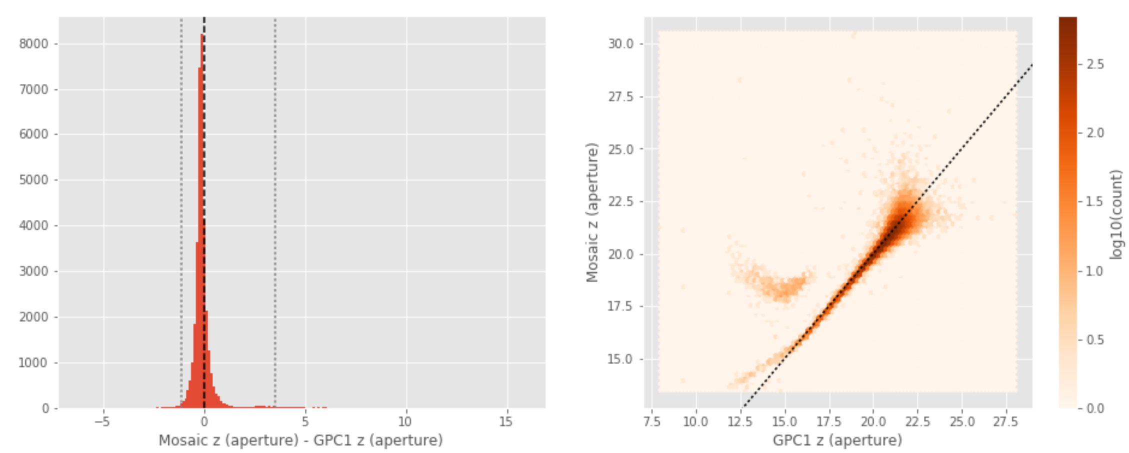
Mosaic z (aperture) - SUPRIME z (aperture):
- Median: -0.25
- Median Absolute Deviation: 0.31
- 1% percentile: -2.062076530456543
- 99% percentile: 2.7850425529479987



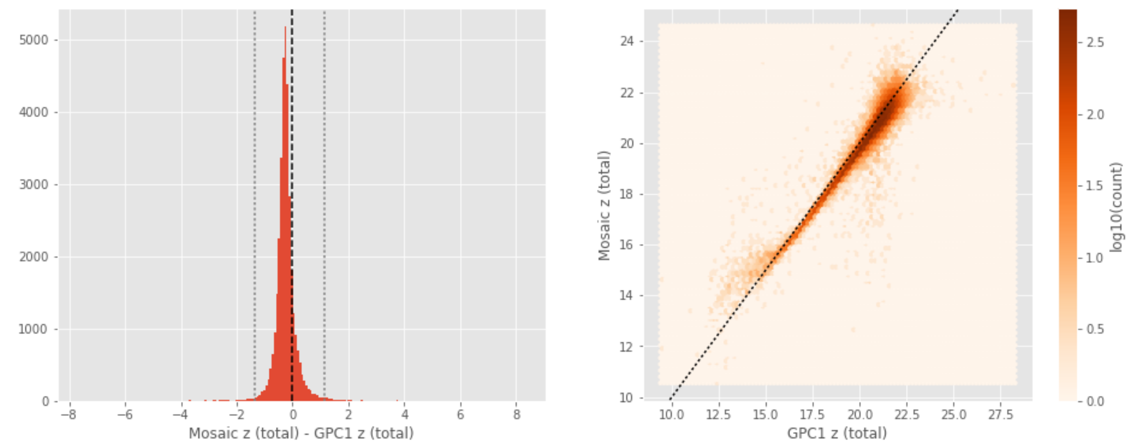
Mosaic z (total) - SUPRIME z (total):
- Median: -0.12
- Median Absolute Deviation: 0.24
- 1% percentile: -2.3780593872070312
- 99% percentile: 2.10675048828125



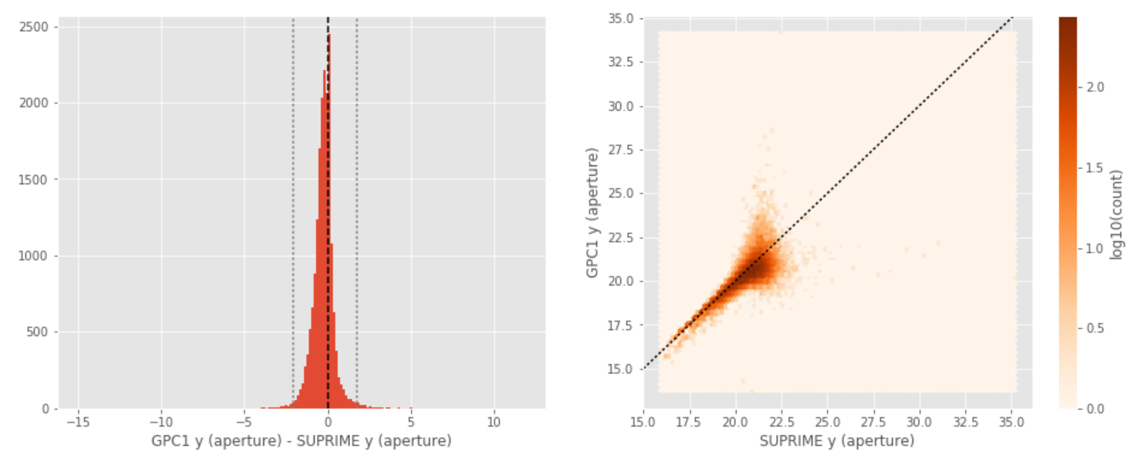
Mosaic z (aperture) - GPC1 z (aperture):
- Median: -0.12
- Median Absolute Deviation: 0.13
- 1% percentile: -1.0750649642944334
- 99% percentile: 3.547717075347901



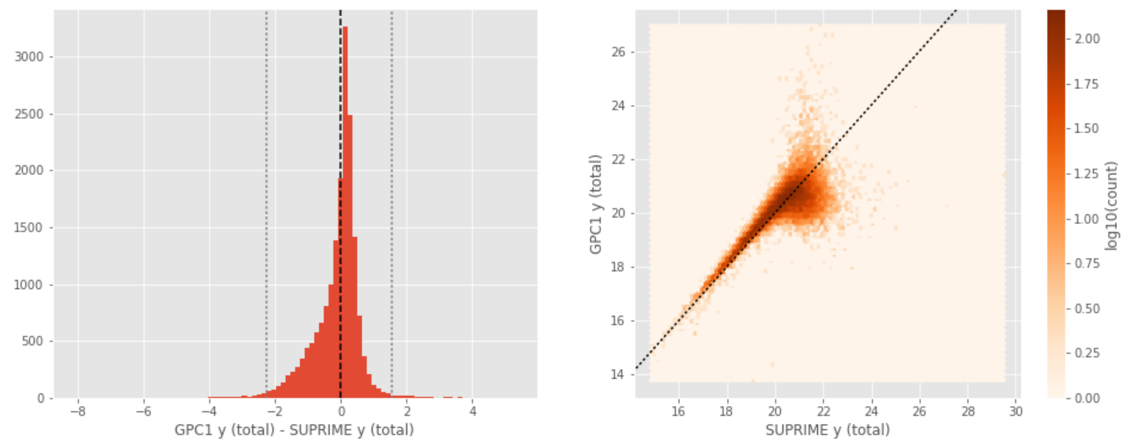
Mosaic z (total) - GPC1 z (total):
- Median: -0.27
- Median Absolute Deviation: 0.15
- 1% percentile: -1.3680257034301757
- 99% percentile: 1.1284795379638703



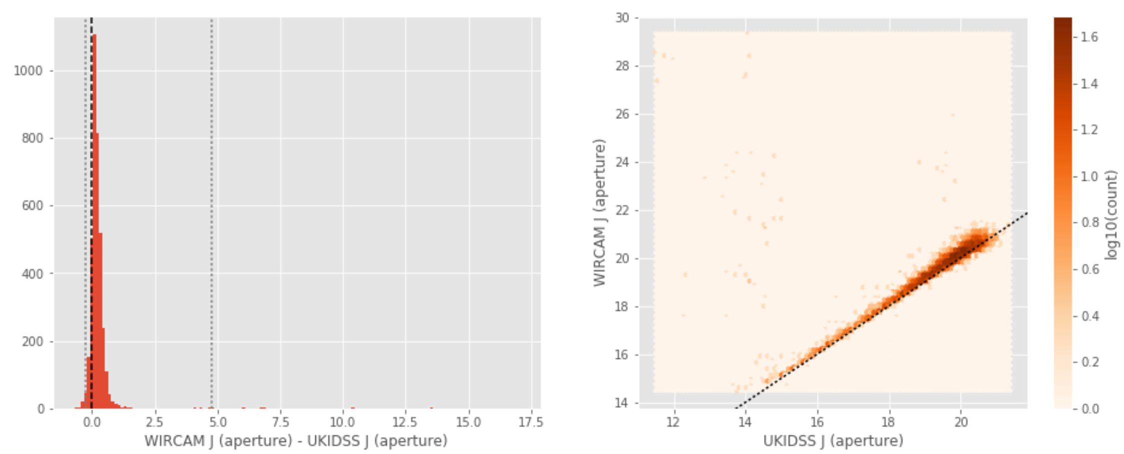
GPC1 y (aperture) - SUPRIME y (aperture):
- Median: -0.24
- Median Absolute Deviation: 0.31
- 1% percentile: -2.071452808380127
- 99% percentile: 1.7521905326843257



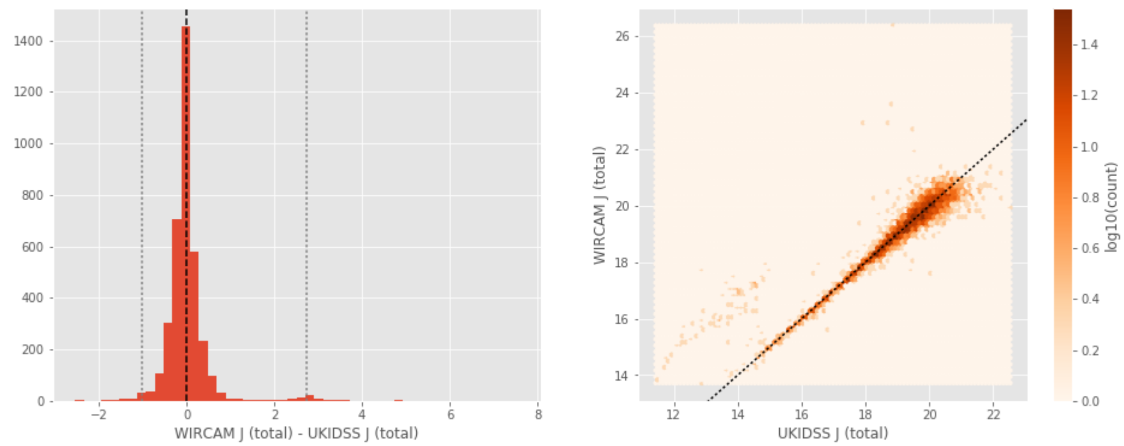
GPC1 y (total) - SUPRIME y (total):
- Median: 0.05
- Median Absolute Deviation: 0.28
- 1% percentile: -2.2786521530151367
- 99% percentile: 1.549367561340333



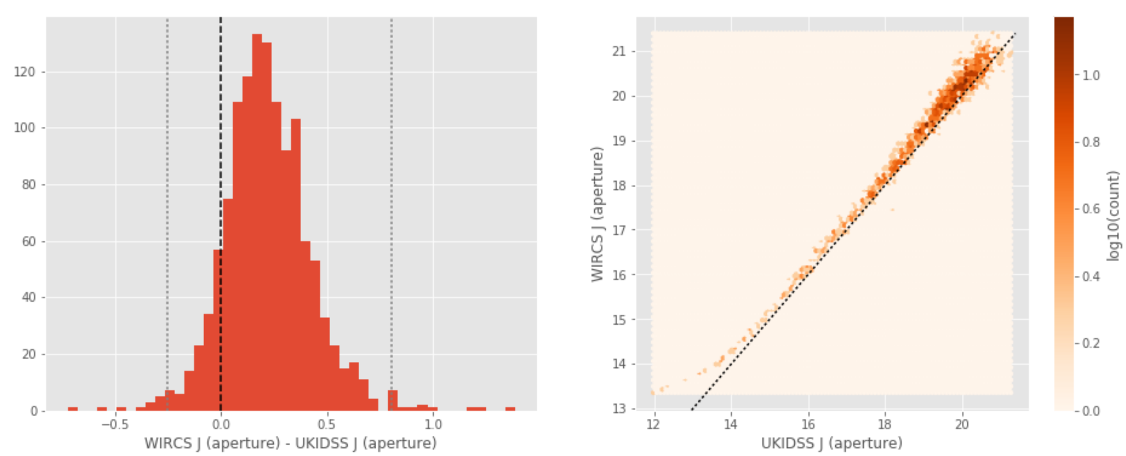
WIRCAM J (aperture) - UKIDSS J (aperture):
- Median: 0.17
- Median Absolute Deviation: 0.11
- 1% percentile: -0.2681165313720703
- 99% percentile: 4.793179264068609



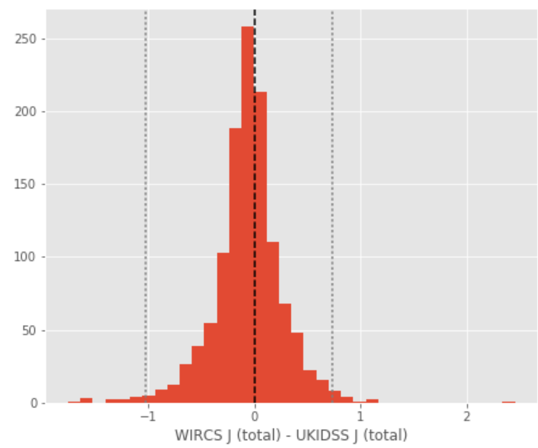
WIRCAM J (total) - UKIDSS J (total):
- Median: -0.04
- Median Absolute Deviation: 0.14
- 1% percentile: -1.0240702629089355
- 99% percentile: 2.7405741691589363

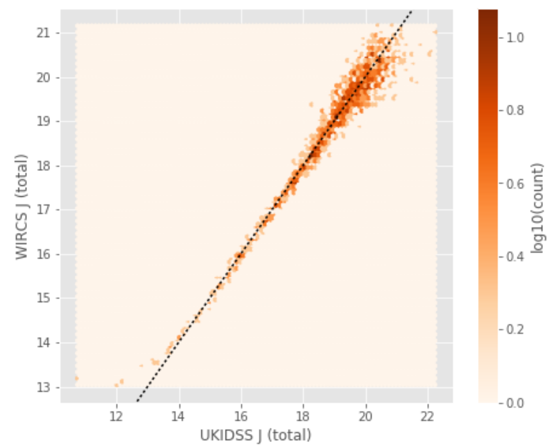


WIRCS J (aperture) - UKIDSS J (aperture):
- Median: 0.21
- Median Absolute Deviation: 0.12
- 1% percentile: -0.25164802551269533
- 99% percentile: 0.8024152374267579

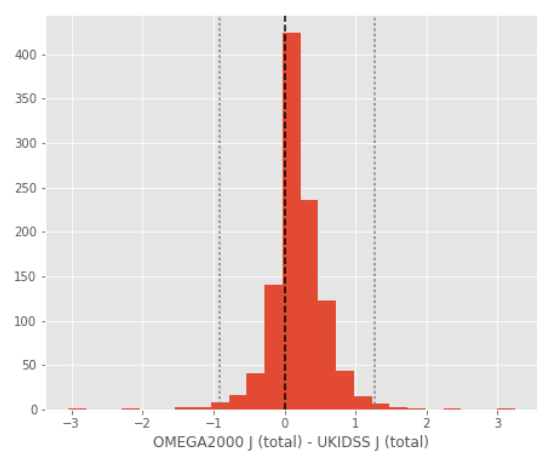


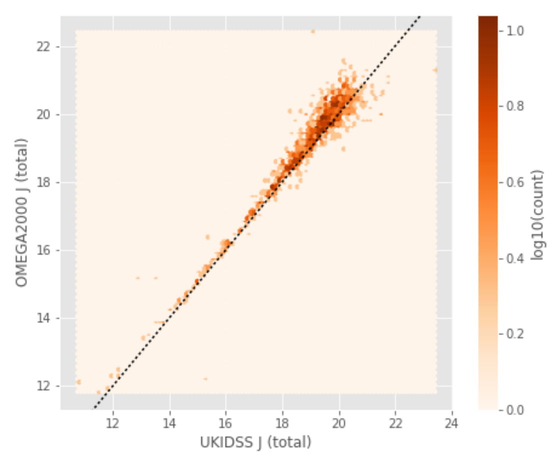
WIRCS J (total) - UKIDSS J (total):
- Median: -0.05
- Median Absolute Deviation: 0.16
- 1% percentile: -1.0222941231513345
- 99% percentile: 0.7326684272432907



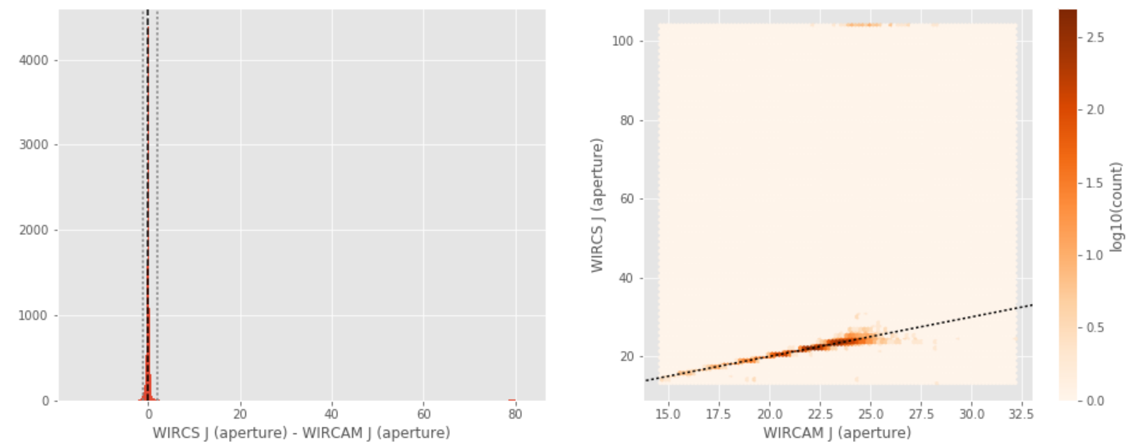



```
OMEGA2000 J (total) - UKIDSS J (total):
- Median: 0.17
- Median Absolute Deviation: 0.18
- 1% percentile: -0.9172623350937272
- 99% percentile: 1.277964303811214
```

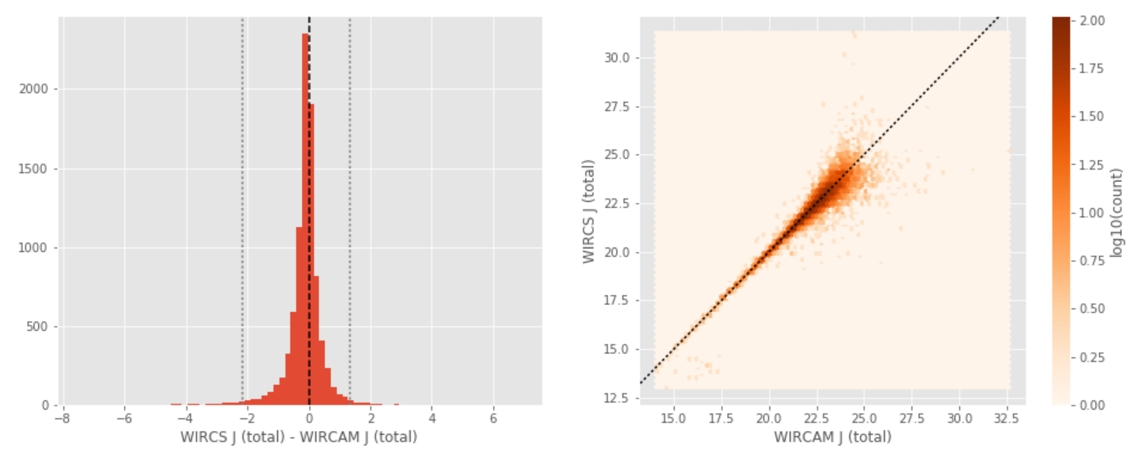




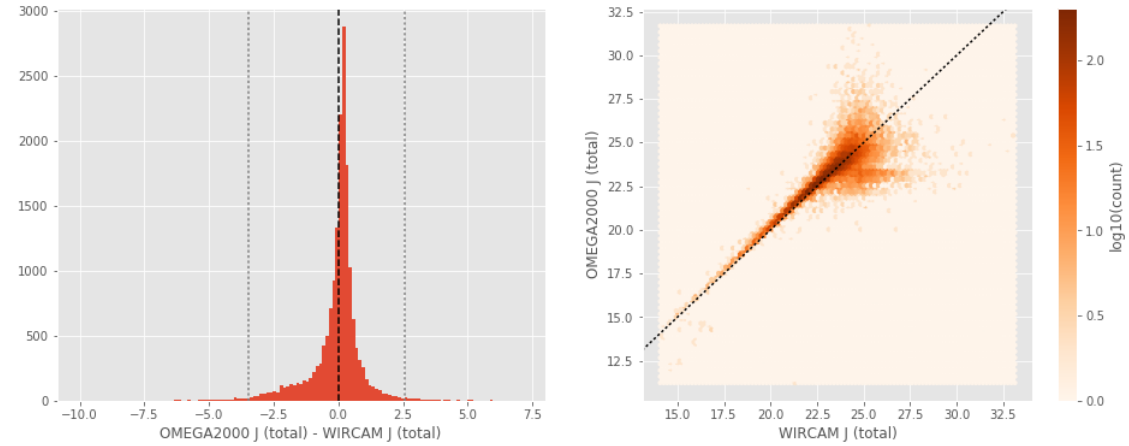

```
WIRCS J (aperture) - WIRCAM J (aperture):
- Median: -0.01
- Median Absolute Deviation: 0.12
- 1% percentile: -1.2420825958251953
- 99% percentile: 2.15362884521476
```



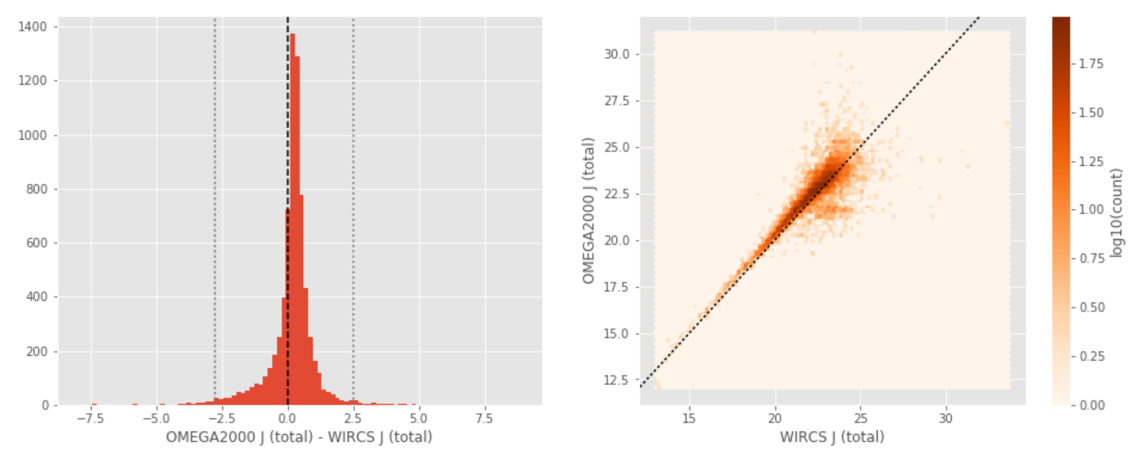
WIRCS J (total) - WIRCAM J (total):
- Median: -0.07
- Median Absolute Deviation: 0.19
- 1% percentile: -2.17553723343571
- 99% percentile: 1.3230694812733537



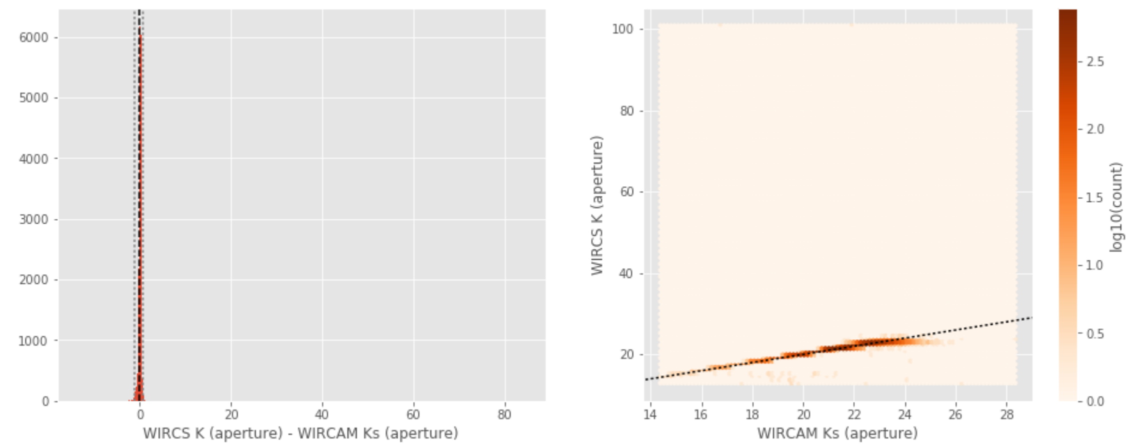
OMEGA2000 J (total) - WIRCAM J (total):
- Median: 0.13
- Median Absolute Deviation: 0.28
- 1% percentile: -3.472065096034579
- 99% percentile: 2.5744826985010194



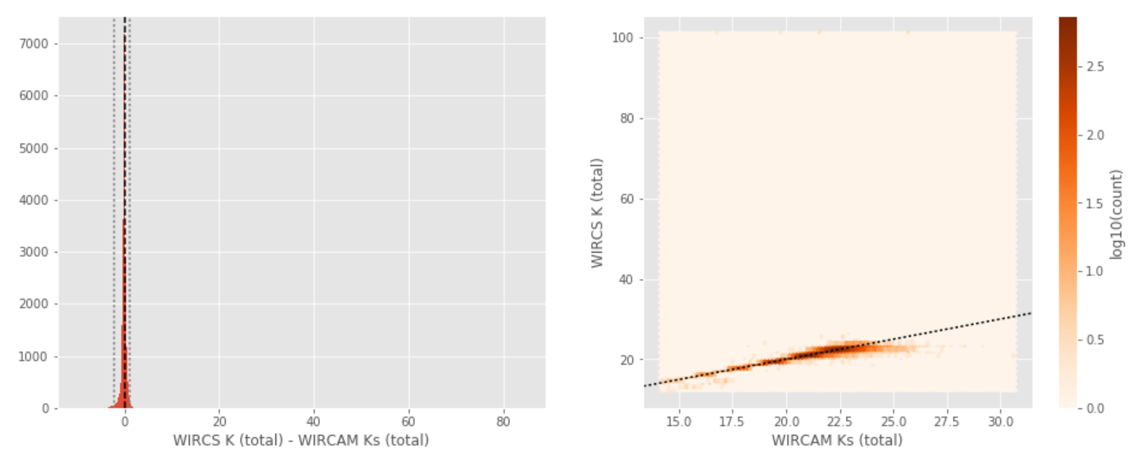
OMEGA2000 J (total) - WIRCS J (total):
- Median: 0.25
- Median Absolute Deviation: 0.26
- 1% percentile: -2.7778746810021477
- 99% percentile: 2.511969500930081



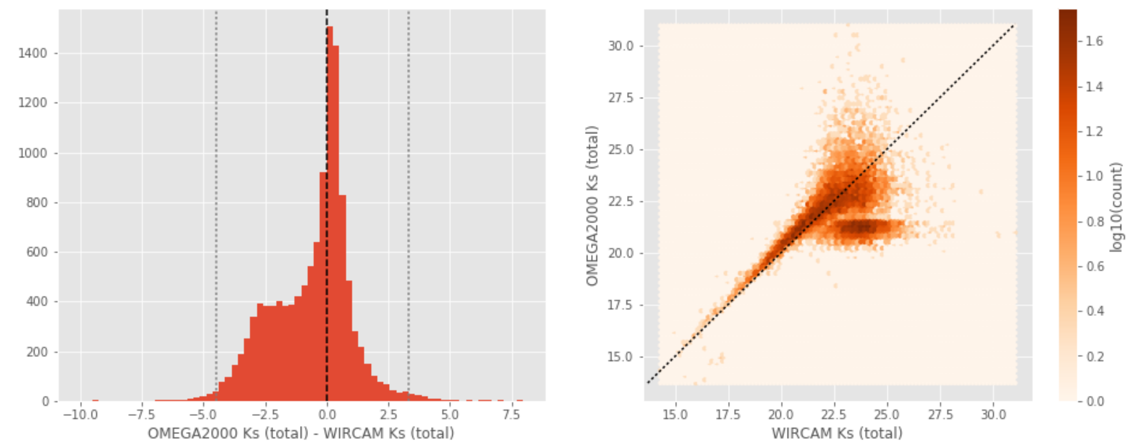
WIRCS K (aperture) - WIRCAM Ks (aperture):
- Median: 0.10
- Median Absolute Deviation: 0.13
- 1% percentile: -1.1782847595214845
- 99% percentile: 0.670378494262695



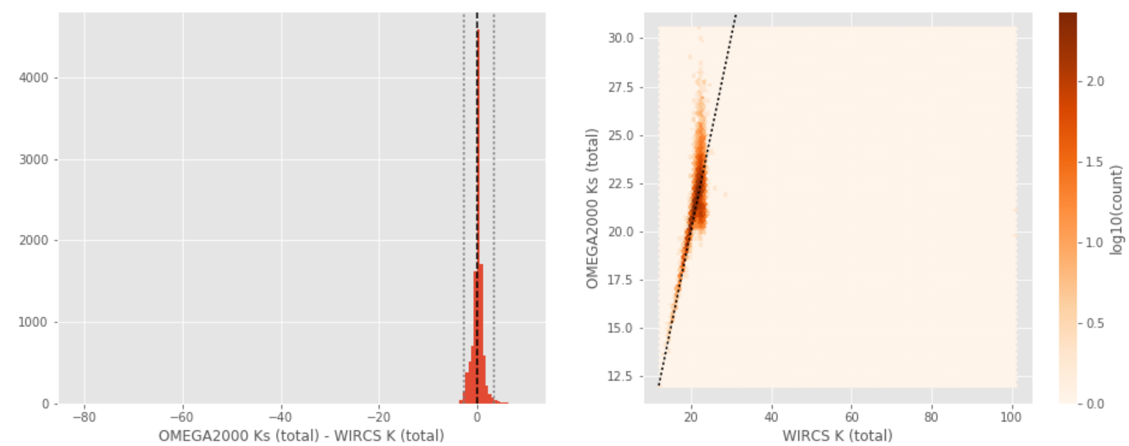
WIRCS K (total) - WIRCAM Ks (total):
- Median: -0.04
- Median Absolute Deviation: 0.18
- 1% percentile: -2.2269728473756403
- 99% percentile: 0.9948908233642549



OMEGA2000 Ks (total) - WIRCAM Ks (total):
- Median: -0.17
- Median Absolute Deviation: 0.82
- 1% percentile: -4.469104660835899
- 99% percentile: 3.3247569722418473




```
OMEGA2000 Ks (total) - WIRCS K (total):
- Median: 0.19
- Median Absolute Deviation: 0.39
- 1% percentile: -2.6414857360575437
- 99% percentile: 3.362703368538393
```



1.5 III - Comparing magnitudes to reference bands

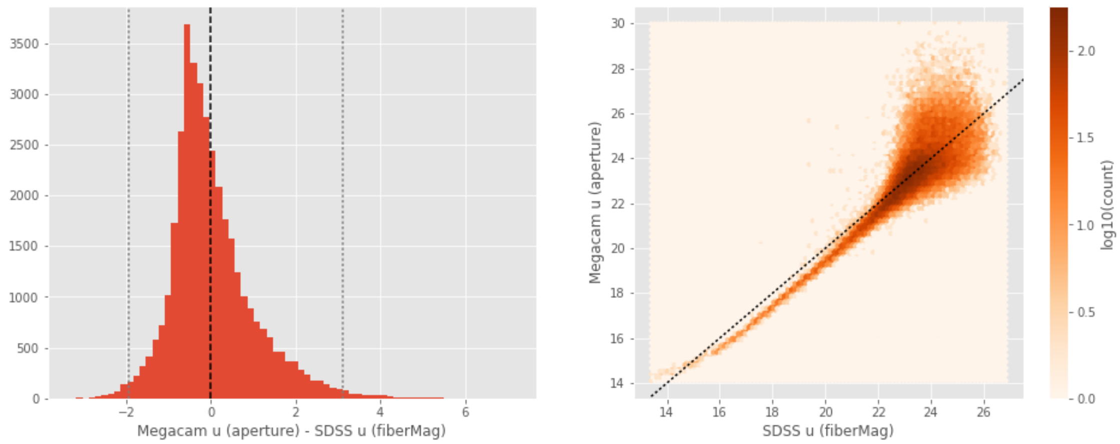
Cross-match the master list to SDSS and 2MASS to compare its magnitudes to SDSS and 2MASS ones.

1.5.1 III.a - Comparing u, g, r, i, and z bands to SDSS

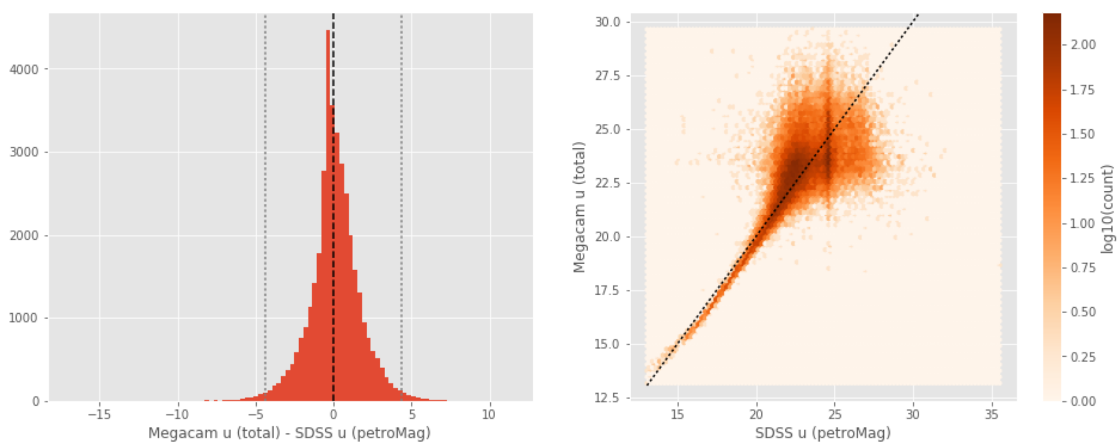
The catalogue is cross-matched to SDSS-DR13 withing 0.2 arcsecond.

We compare the u, g, r, i, and z magnitudes to those from SDSS using `fiberMag` for the aperture magnitude and `petroMag` for the total magnitude.

Megacam u (aperture) - SDSS u (fiberMag):
- Median: -0.16
- Median Absolute Deviation: 0.49
- 1% percentile: -1.9366635704040527
- 99% percentile: 3.1243225669860886

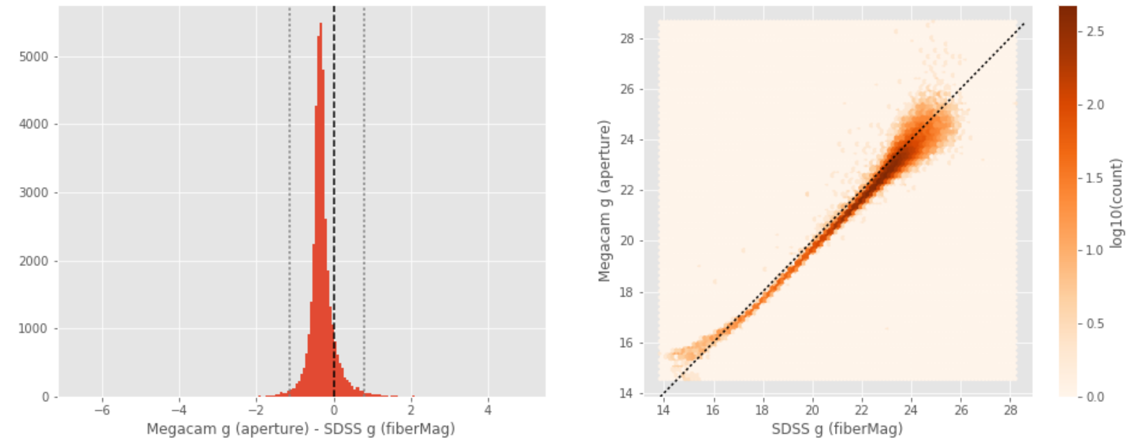


Megacam u (total) - SDSS u (petroMag):
- Median: 0.02
- Median Absolute Deviation: 0.82
- 1% percentile: -4.3767438316345215
- 99% percentile: 4.338490314483641

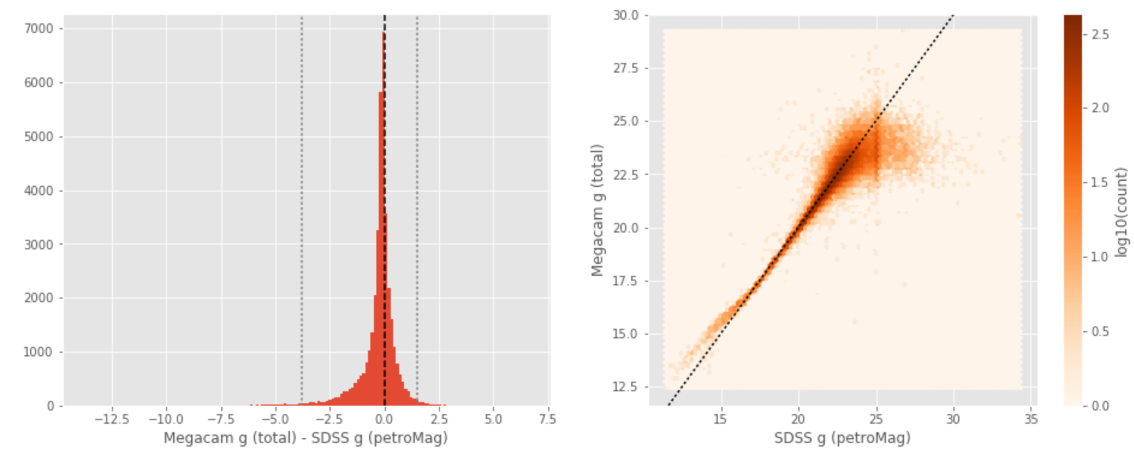


Megacam g (aperture) - SDSS g (fiberMag):
- Median: -0.34

- Median Absolute Deviation: 0.12
- 1% percentile: -1.1357846069335937
- 99% percentile: 0.7837402153015139

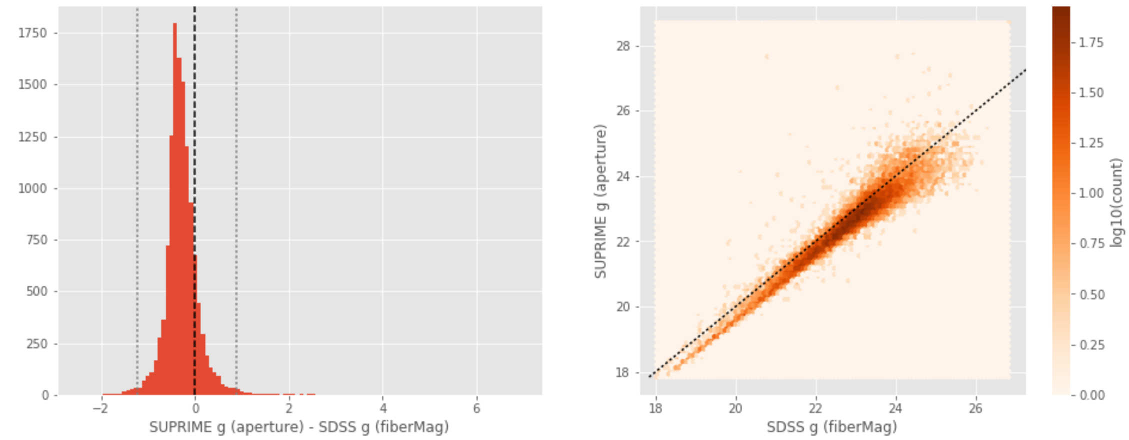


Megacam g (total) - SDSS g (petroMag):
- Median: -0.11
- Median Absolute Deviation: 0.24
- 1% percentile: -3.761180114746094
- 99% percentile: 1.5096294403076134

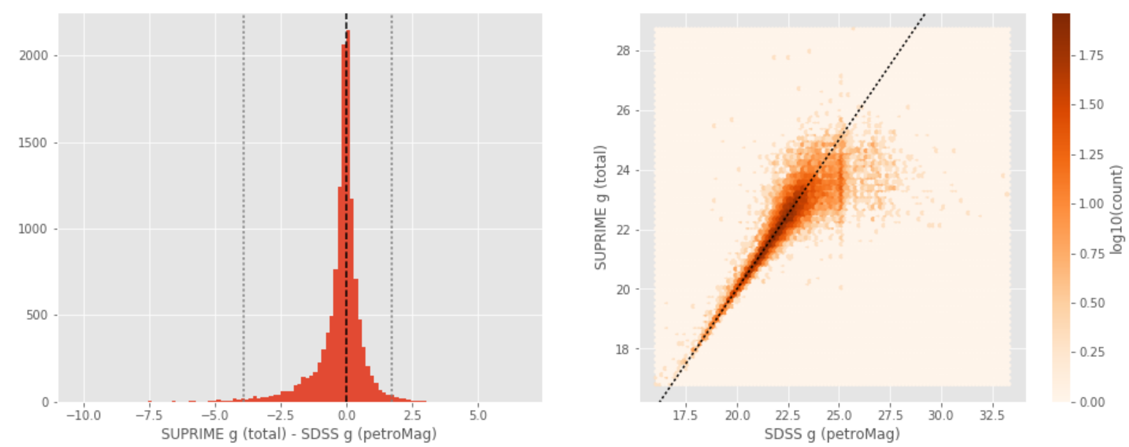


SUPRIME g (aperture) - SDSS g (fiberMag):
- Median: -0.31
- Median Absolute Deviation: 0.17
- 1% percentile: -1.2186662673950195

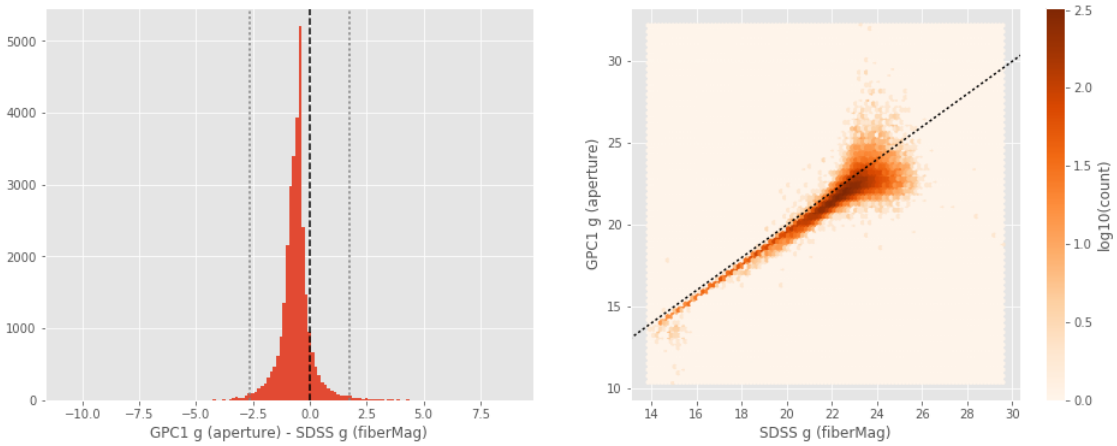
- 99% percentile: 0.8938865852355956



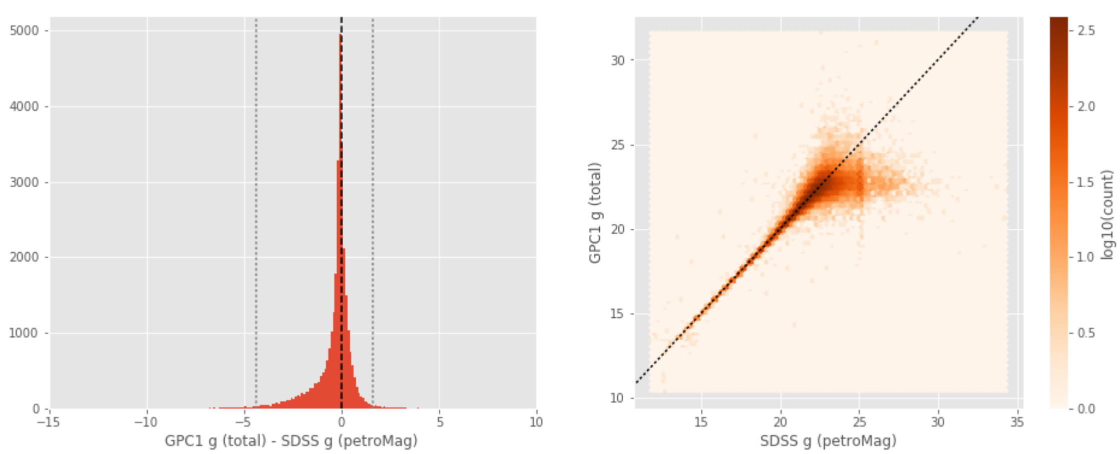
SUPRIME g (total) - SDSS g (petroMag):
- Median: -0.07
- Median Absolute Deviation: 0.28
- 1% percentile: -3.9051974487304686
- 99% percentile: 1.7005122375488266



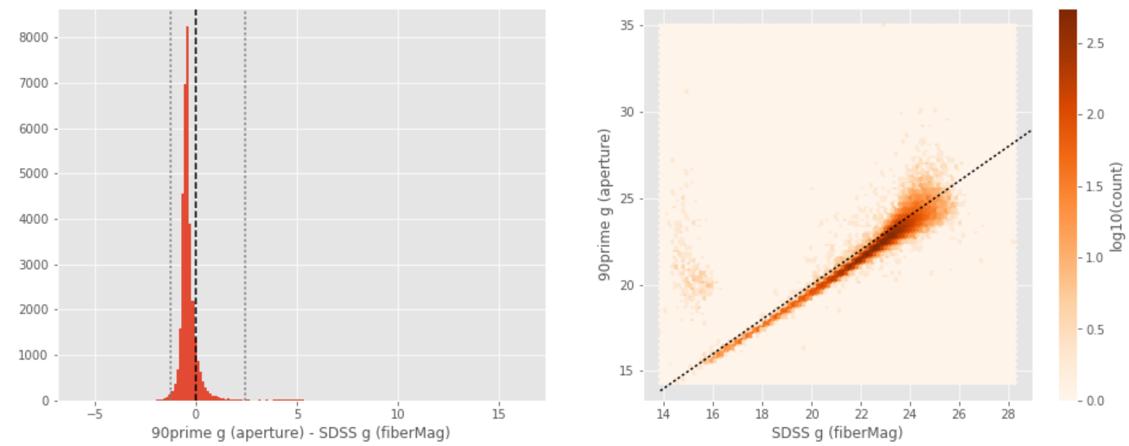
GPC1 g (aperture) - SDSS g (fiberMag):
- Median: -0.58
- Median Absolute Deviation: 0.27
- 1% percentile: -2.649733161926269
- 99% percentile: 1.7384460449218742



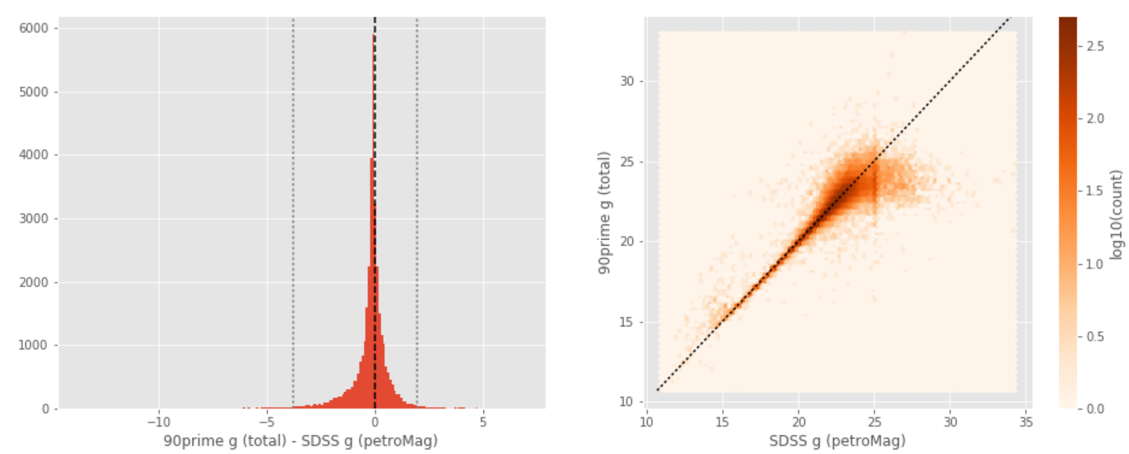
GPC1 g (total) - SDSS g (petroMag):
- Median: -0.10
- Median Absolute Deviation: 0.27
- 1% percentile: -4.364132404327393
- 99% percentile: 1.6011075401306156



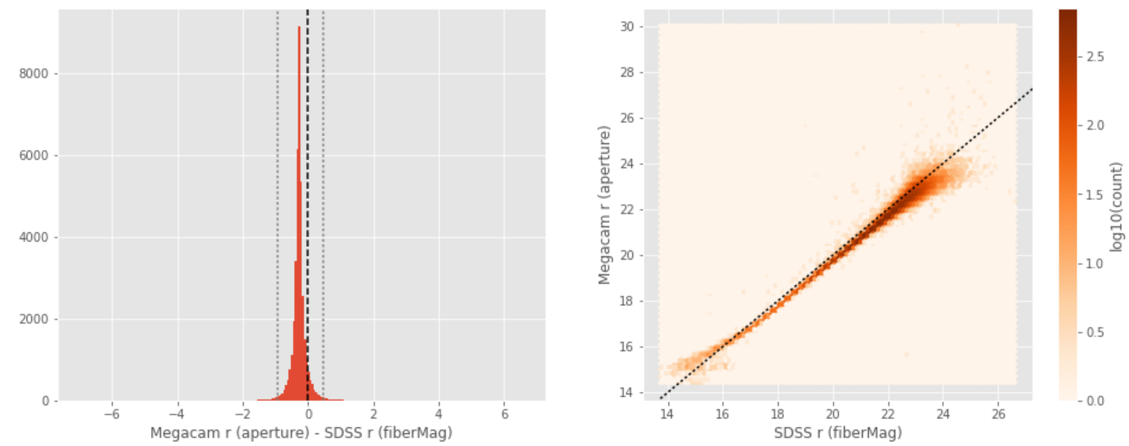
90prime g (aperture) - SDSS g (fiberMag):
- Median: -0.43
- Median Absolute Deviation: 0.15
- 1% percentile: -1.2594728088378906
- 99% percentile: 2.4230271911621117



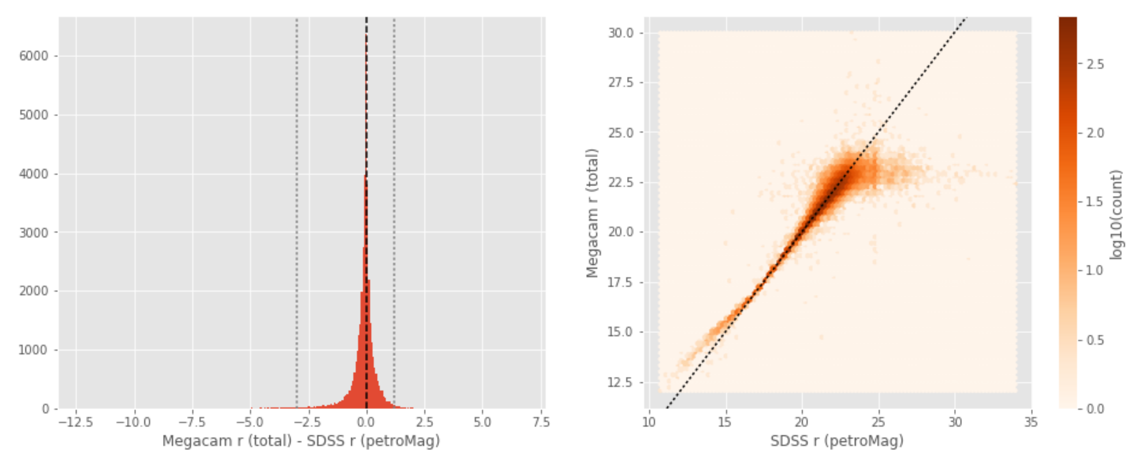
90prime g (total) - SDSS g (petroMag):
- Median: -0.10
- Median Absolute Deviation: 0.24
- 1% percentile: -3.810558967590332
- 99% percentile: 1.9305360031127938



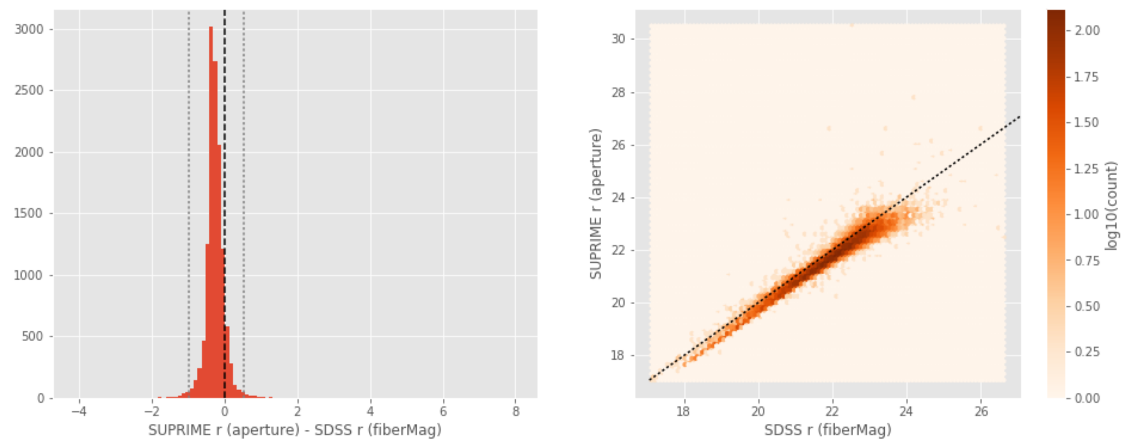
Megacam r (aperture) - SDSS r (fiberMag):
- Median: -0.28
- Median Absolute Deviation: 0.07
- 1% percentile: -0.9402611541748047
- 99% percentile: 0.4672513961791987



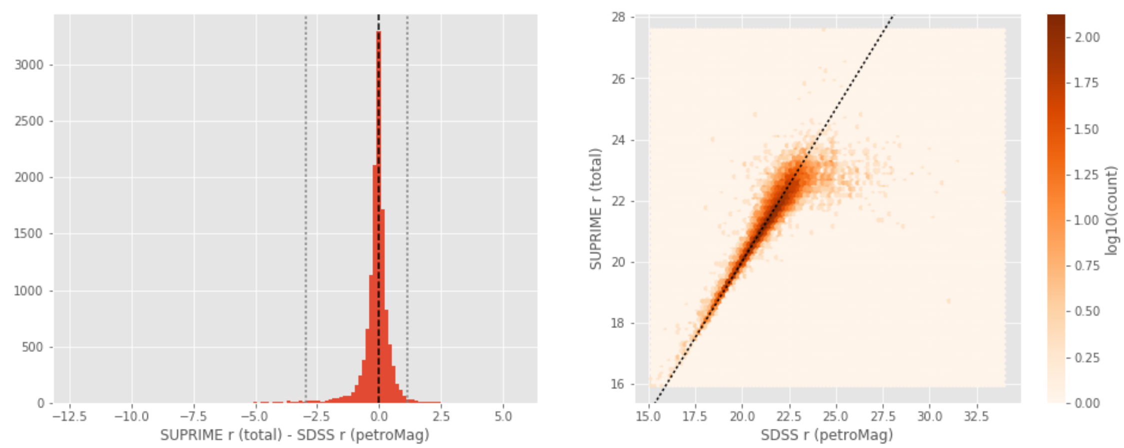
Megacam r (total) - SDSS r (petroMag):
- Median: -0.03
- Median Absolute Deviation: 0.15
- 1% percentile: -2.972134037017822
- 99% percentile: 1.1820969390869123



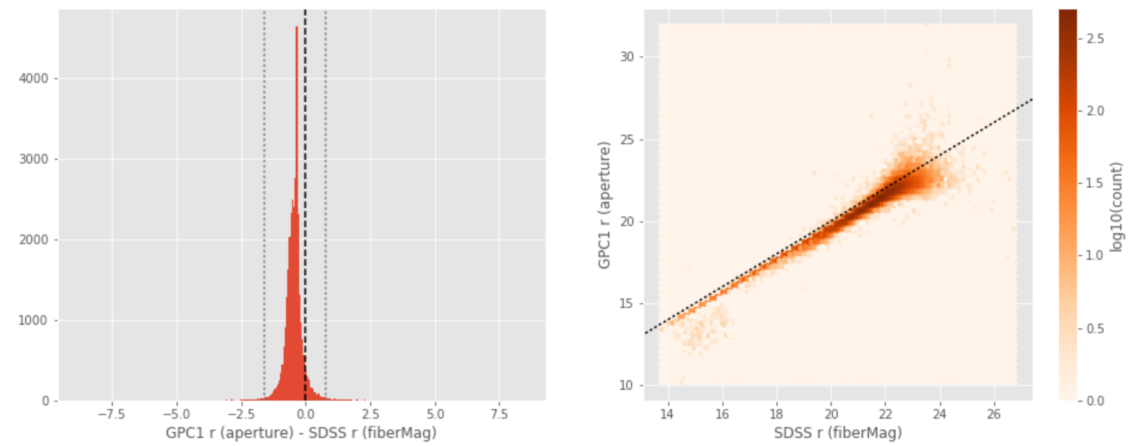
SUPRIME r (aperture) - SDSS r (fiberMag):
- Median: -0.27
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9828863334655762
- 99% percentile: 0.5160082817077647



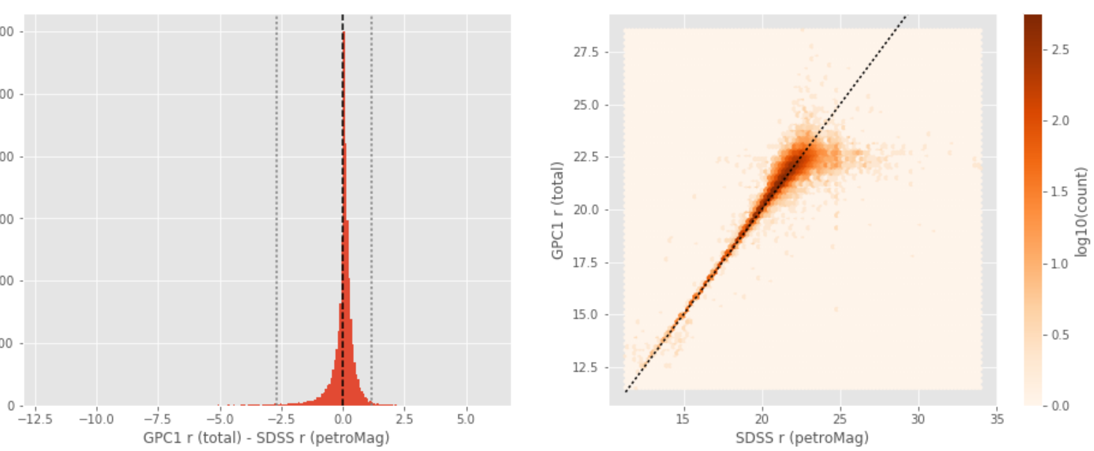
SUPRIME r (total) - SDSS r (petroMag):
- Median: -0.04
- Median Absolute Deviation: 0.18
- 1% percentile: -2.9352737426757813
- 99% percentile: 1.1703060150146454



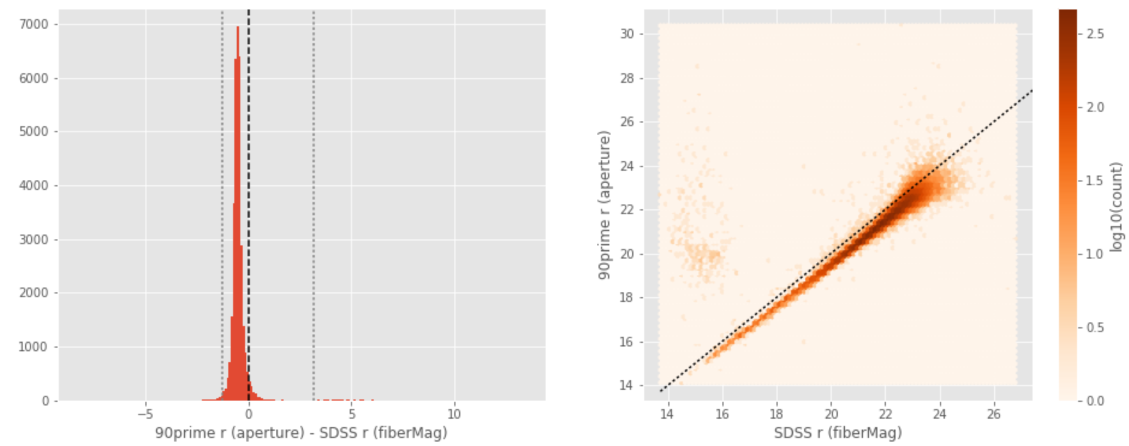
GPC1 r (aperture) - SDSS r (fiberMag):
- Median: -0.43
- Median Absolute Deviation: 0.15
- 1% percentile: -1.5799267196655273
- 99% percentile: 0.7769848442077639



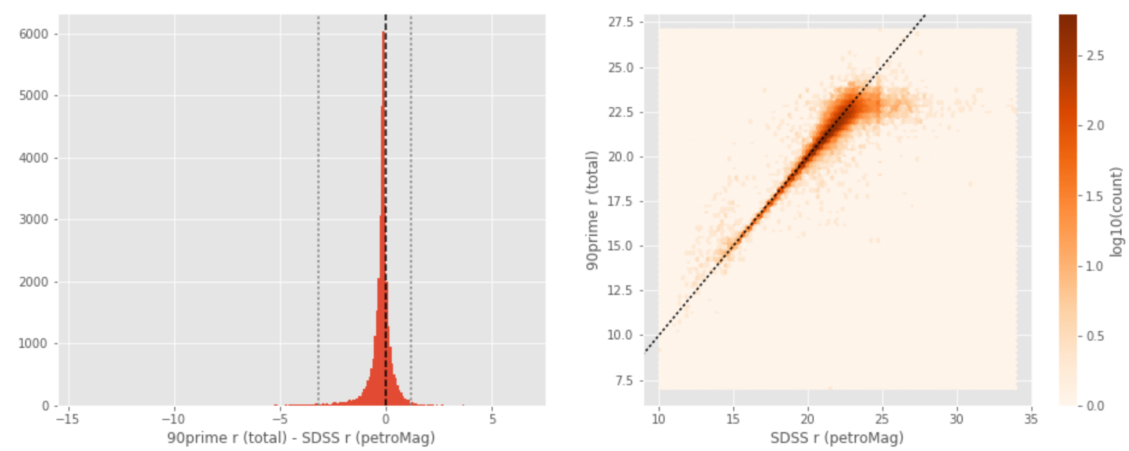
GPC1 r (total) - SDSS r (petroMag):
- Median: 0.06
- Median Absolute Deviation: 0.15
- 1% percentile: -2.7020758628845214
- 99% percentile: 1.1553139686584473



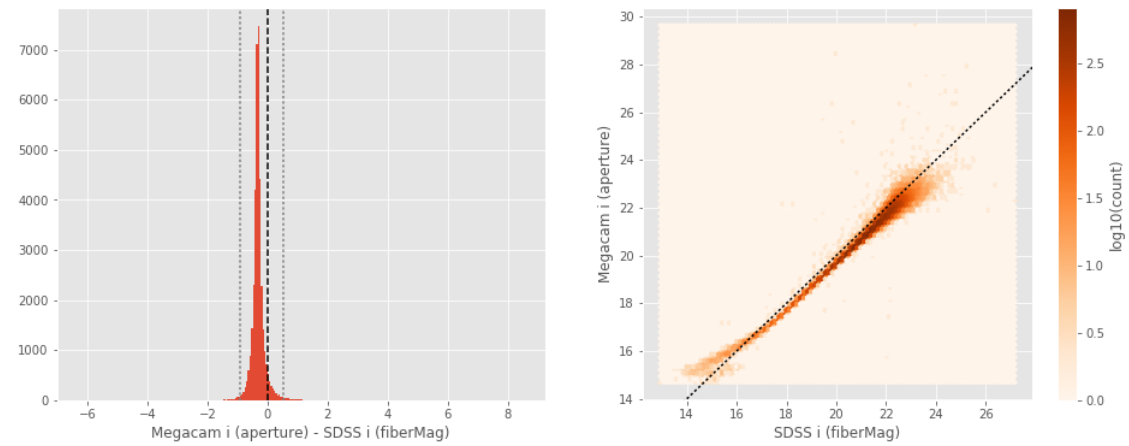
90prime r (aperture) - SDSS r (fiberMag):
- Median: -0.51
- Median Absolute Deviation: 0.12
- 1% percentile: -1.2341129684448242
- 99% percentile: 3.1871963500976754



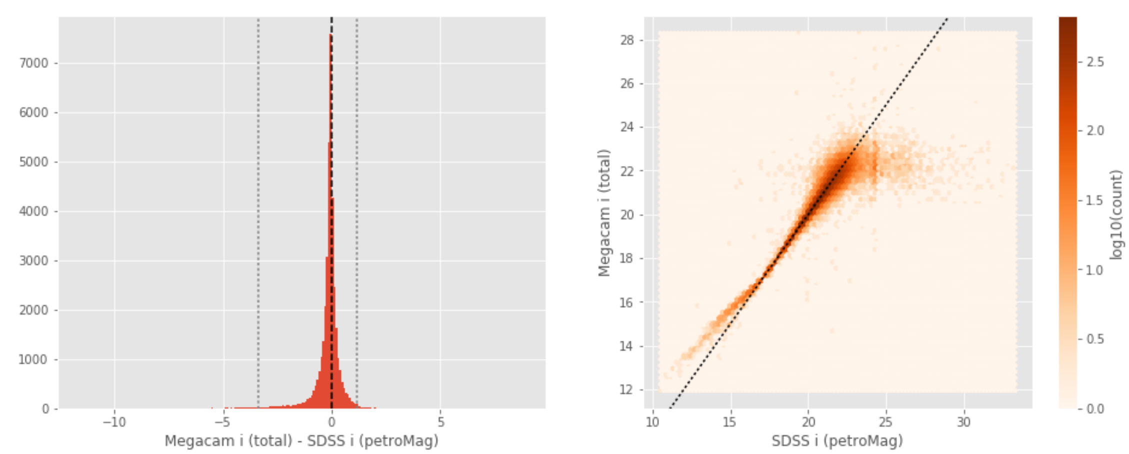
90prime r (total) - SDSS r (petroMag):
- Median: -0.14
- Median Absolute Deviation: 0.17
- 1% percentile: -3.155589656829834
- 99% percentile: 1.2127995872497555



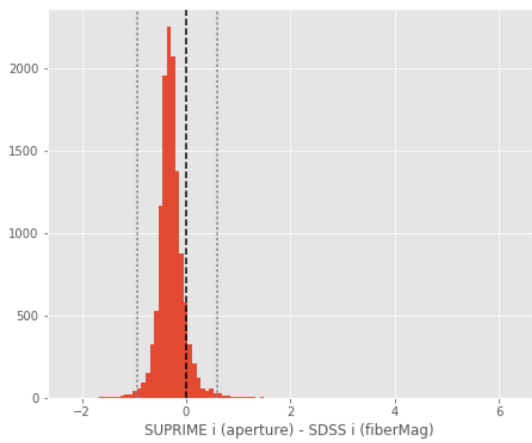
Megacam i (aperture) - SDSS i (fiberMag):
- Median: -0.33
- Median Absolute Deviation: 0.08
- 1% percentile: -0.9073835754394531
- 99% percentile: 0.5248305892944336

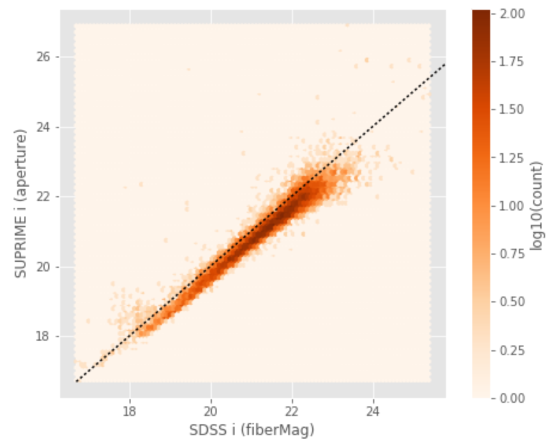



```
Megacam i (total) - SDSS i (petroMag):
- Median: -0.06
- Median Absolute Deviation: 0.15
- 1% percentile: -3.3607371139526365
- 99% percentile: 1.1595533752441383
```

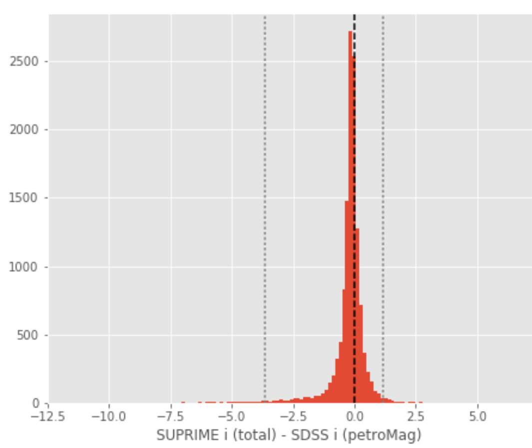


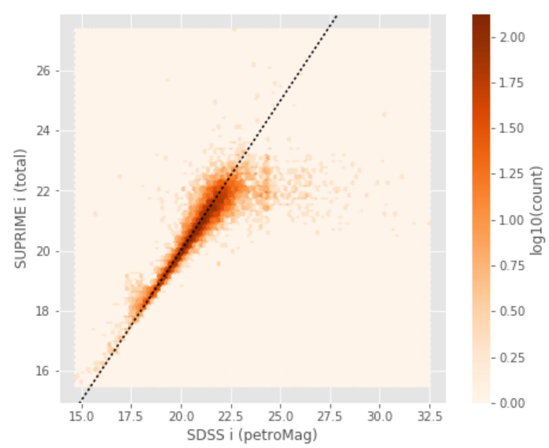

```
SUPRIME i (aperture) - SDSS i (fiberMag):
- Median: -0.31
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9429589080810548
- 99% percentile: 0.5862416458129882
```



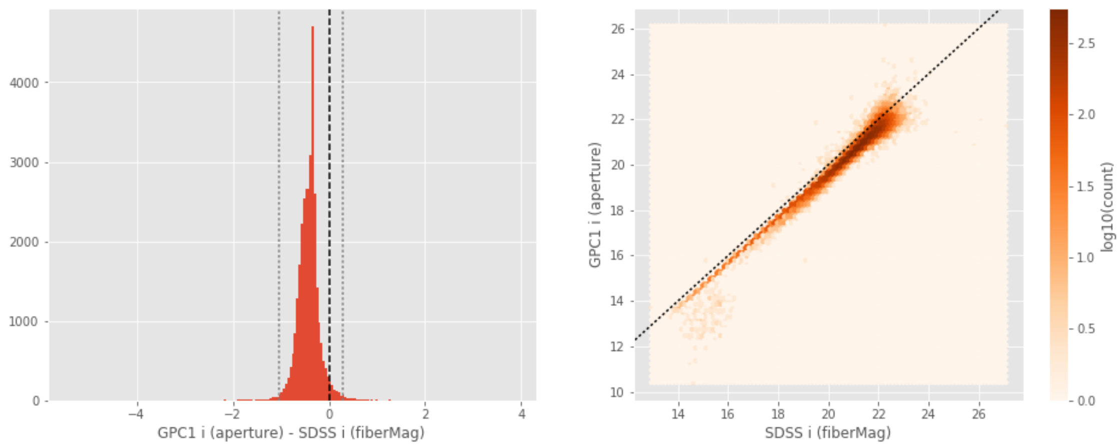


SUPRIME i (total) - SDSS i (petroMag):
- Median: -0.11
- Median Absolute Deviation: 0.18
- 1% percentile: -3.6674454498291014
- 99% percentile: 1.1874368286132808

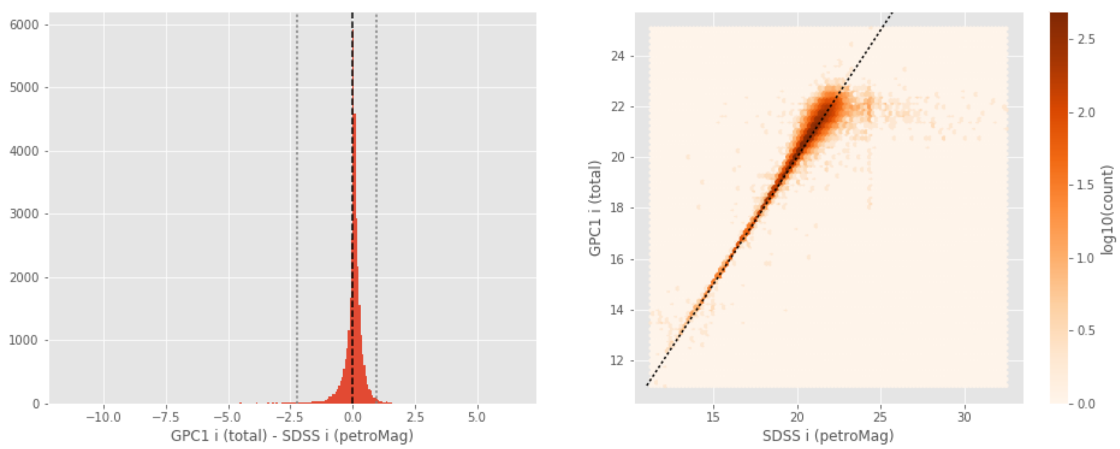




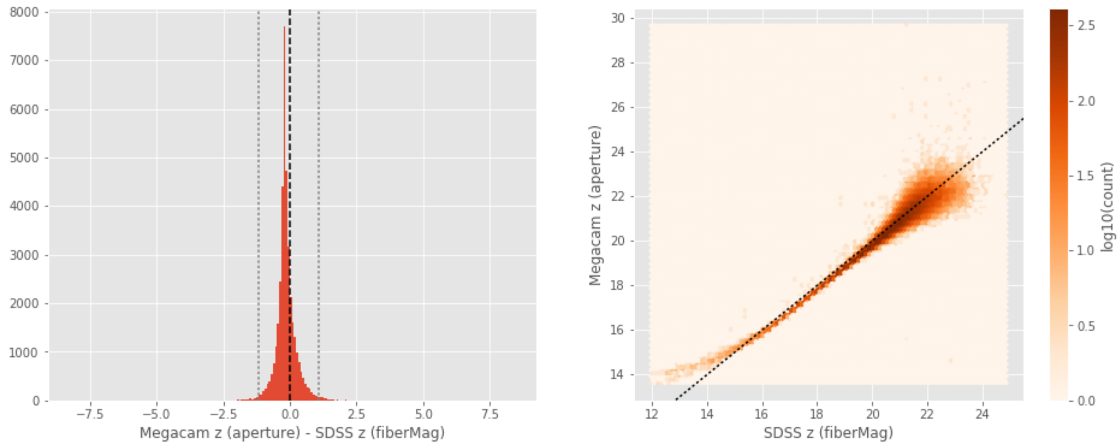
GPC1 i (aperture) - SDSS i (fiberMag):
- Median: -0.41
- Median Absolute Deviation: 0.11
- 1% percentile: -1.0385213470458985
- 99% percentile: 0.2873053741455075



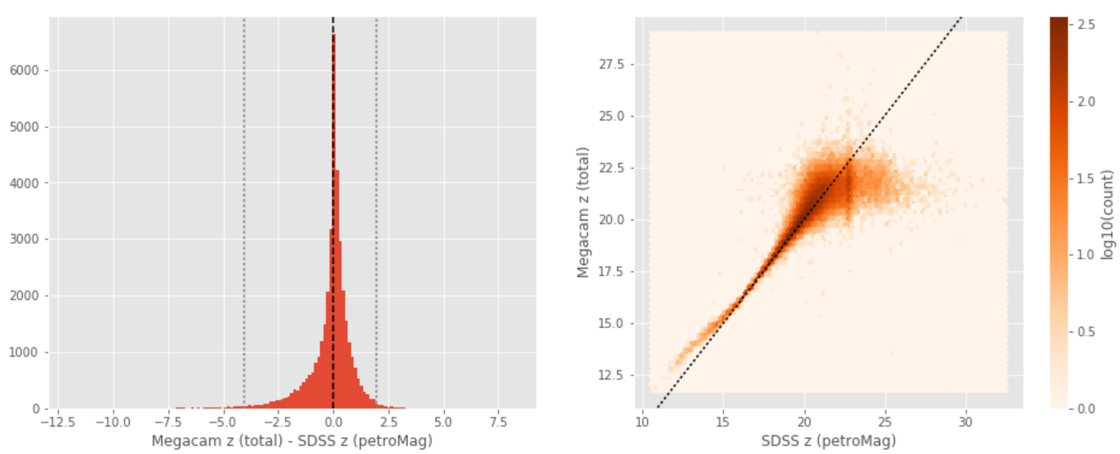
GPC1 i (total) - SDSS i (petroMag):
- Median: 0.06
- Median Absolute Deviation: 0.13
- 1% percentile: -2.239541530609131
- 99% percentile: 0.9614152908325195



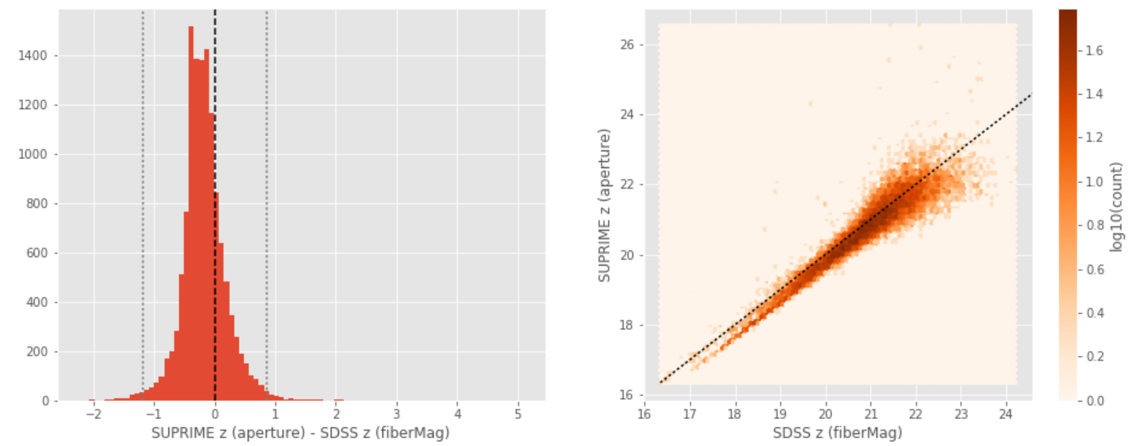
Megacam z (aperture) - SDSS z (fiberMag):
- Median: -0.18
- Median Absolute Deviation: 0.14
- 1% percentile: -1.1557494163513184
- 99% percentile: 1.0748854446411142



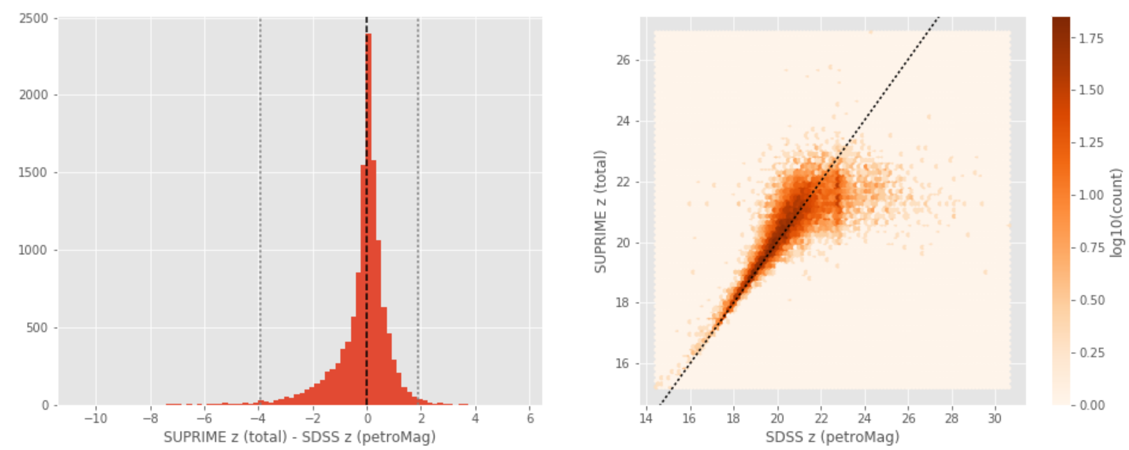
Megacam z (total) - SDSS z (petroMag):
- Median: 0.05
- Median Absolute Deviation: 0.34
- 1% percentile: -4.064633178710937
- 99% percentile: 1.9631100463867177



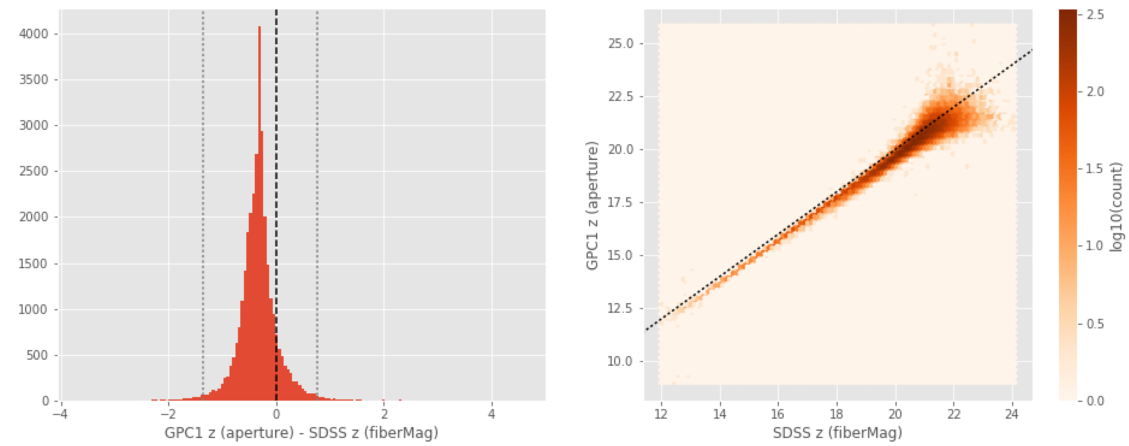
SUPRIME z (aperture) - SDSS z (fiberMag):
- Median: -0.20
- Median Absolute Deviation: 0.19
- 1% percentile: -1.1774482727050781
- 99% percentile: 0.8522415161132812



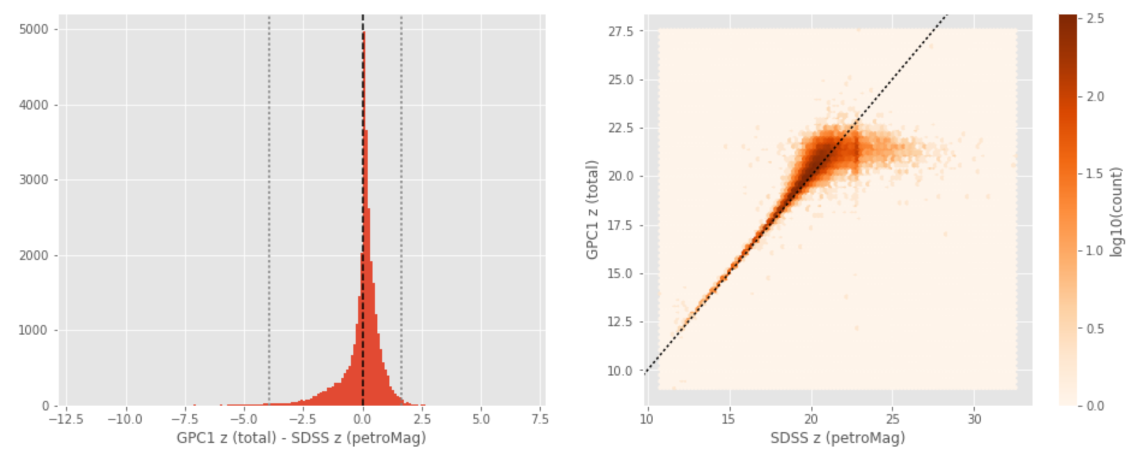
SUPRIME z (total) - SDSS z (petroMag):
- Median: 0.03
- Median Absolute Deviation: 0.35
- 1% percentile: -3.9494243621826173
- 99% percentile: 1.8766554641723663



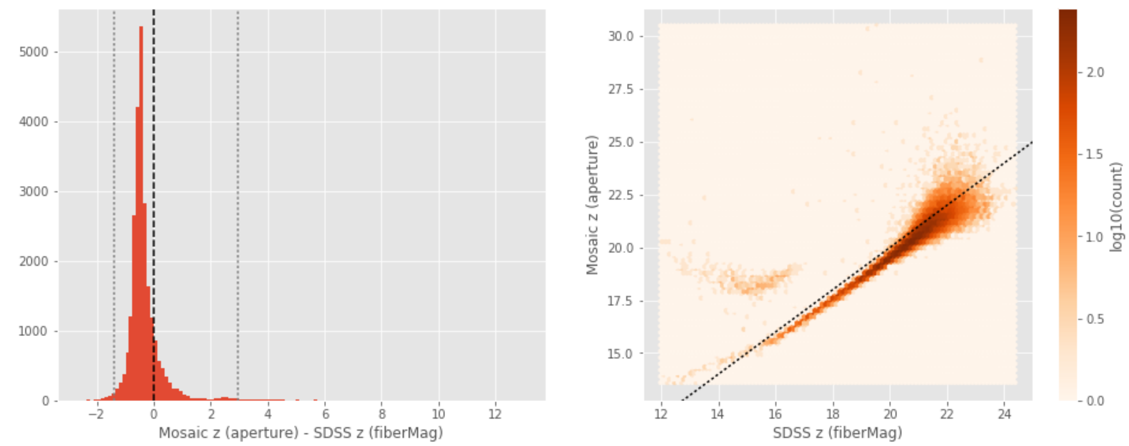
GPC1 z (aperture) - SDSS z (fiberMag):
- Median: -0.33
- Median Absolute Deviation: 0.16
- 1% percentile: -1.3514610290527345
- 99% percentile: 0.7569400787353526



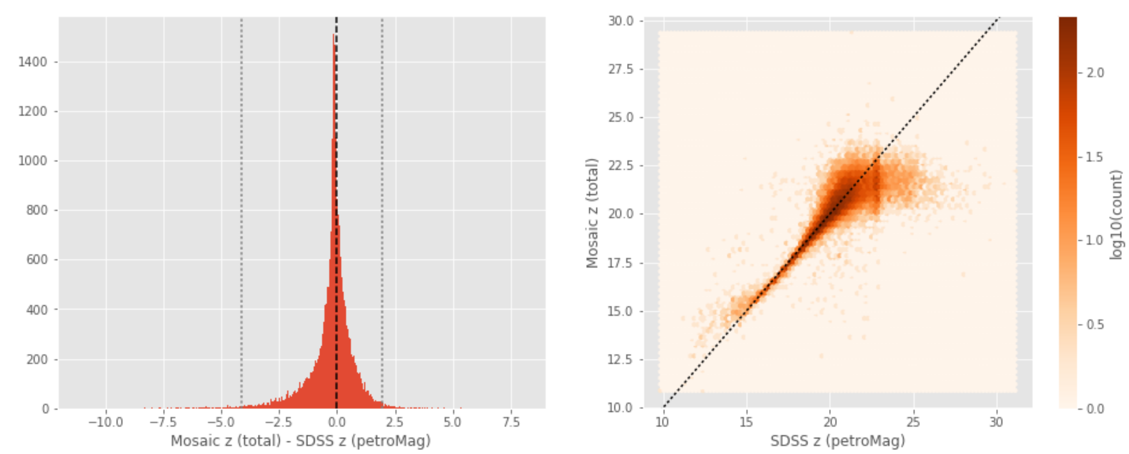
GPC1 z (total) - SDSS z (petroMag):
- Median: 0.11
- Median Absolute Deviation: 0.29
- 1% percentile: -3.9312356185913084
- 99% percentile: 1.631981315612793



Mosaic z (aperture) - SDSS z (fiberMag):
- Median: -0.43
- Median Absolute Deviation: 0.18
- 1% percentile: -1.3934378242492675
- 99% percentile: 2.9719256210327214




```
Mosaic z (total) - SDSS z (petroMag):
- Median: -0.12
- Median Absolute Deviation: 0.35
- 1% percentile: -4.1280372428894045
- 99% percentile: 1.9757478904724097
```



1.5.2 III.b - Comparing J and K bands to 2MASS

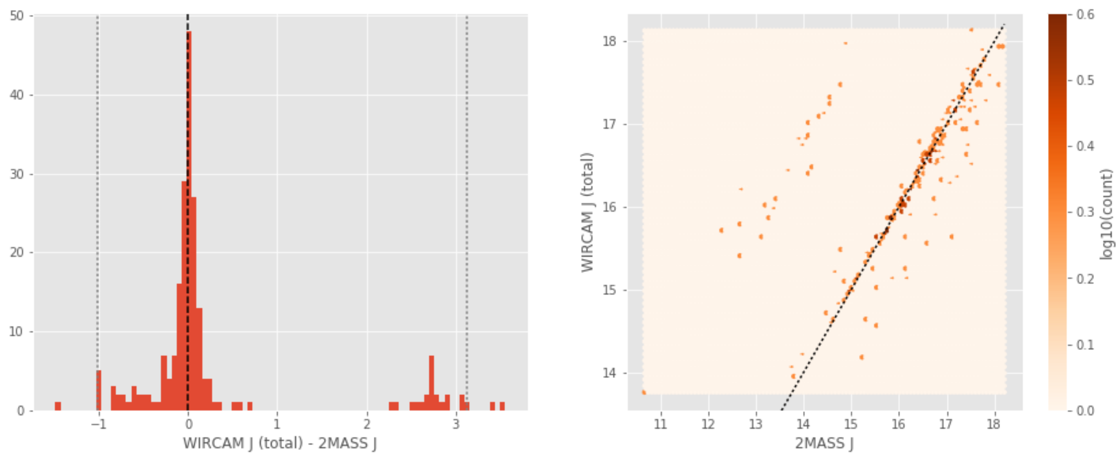
The catalogue is cross-matched to 2MASS-PSC withing 0.2 arcsecond. We compare the WIRCAM total J and K magnitudes to those from 2MASS.

The 2MASS magnitudes are “*Vega-like*” and we have to convert them to AB magnitudes using the zero points provided on this page:

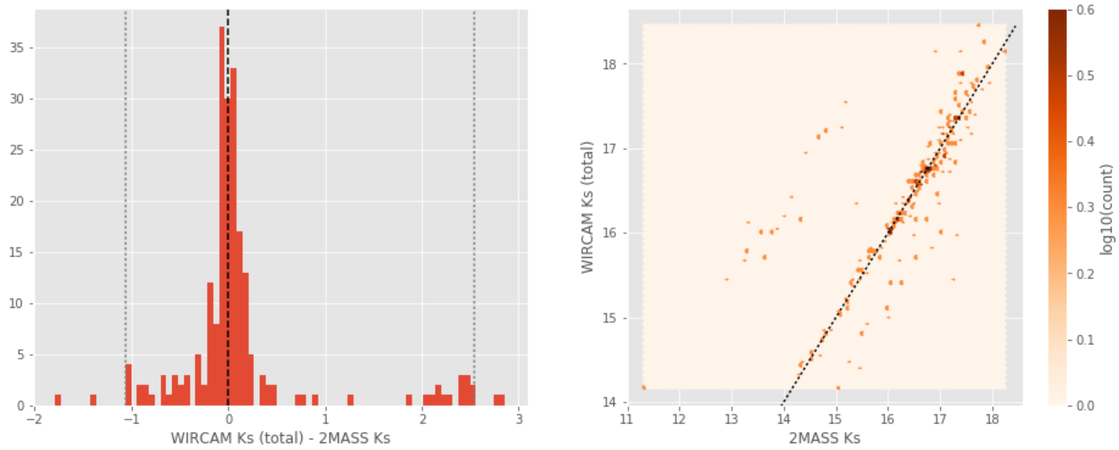
Band	F - 0 mag (Jy)
J	1594
H	1024
Ks	666.7

2MASS and WIRCAM both use Ks so no conversion is required.

```
WIRCAM J (total) - 2MASS J:
- Median: 0.00
- Median Absolute Deviation: 0.09
- 1% percentile: -1.0202204724027446
- 99% percentile: 3.129319943551843
```




```
WIRCAM Ks (total) - 2MASS Ks:
- Median: -0.00
- Median Absolute Deviation: 0.10
- 1% percentile: -1.0586832237871677
- 99% percentile: 2.5413844028607815
```



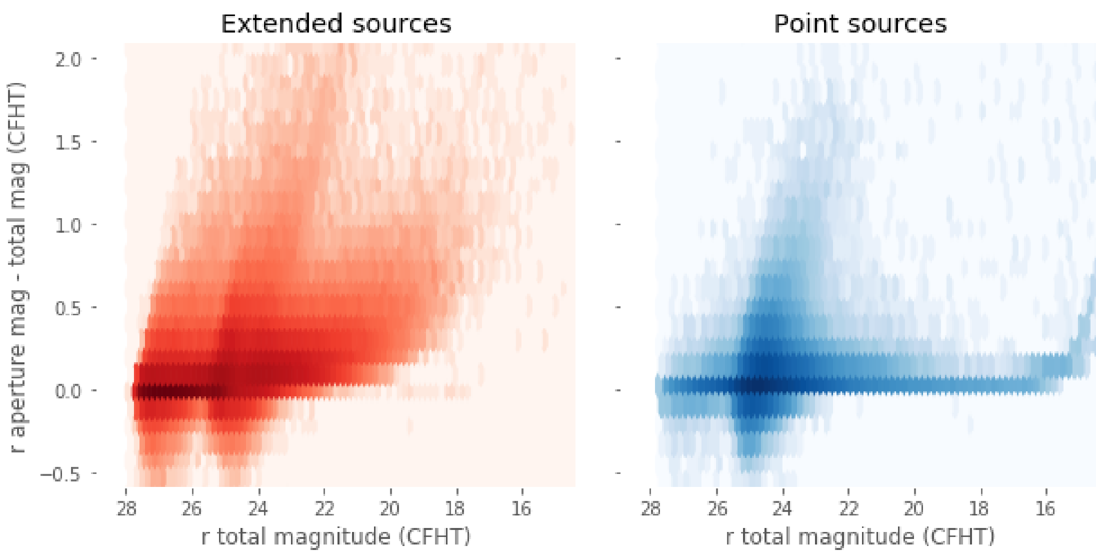
1.6 Keeping only sources with good signal to noise ratio

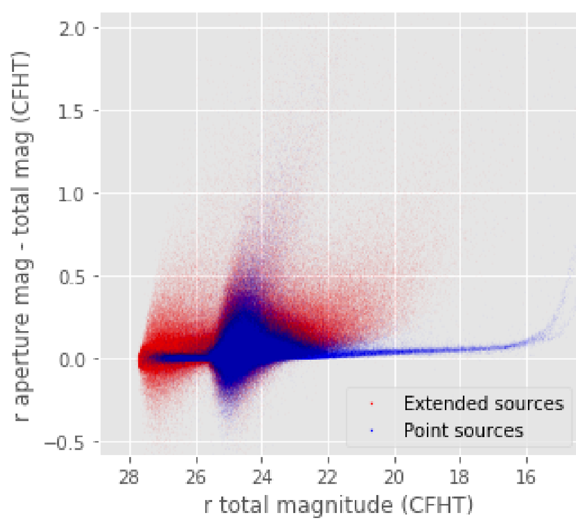
From here, we are only comparing sources with a signal to noise ratio above 3, i.e. roughly we a magnitude error below 0.3.

To make it easier, we are setting to NaN in the catalogue the magnitudes associated with an error above 0.3 so we can't use these magnitudes after the next cell.

1.7 IV - Comparing aperture magnitudes to total ones.

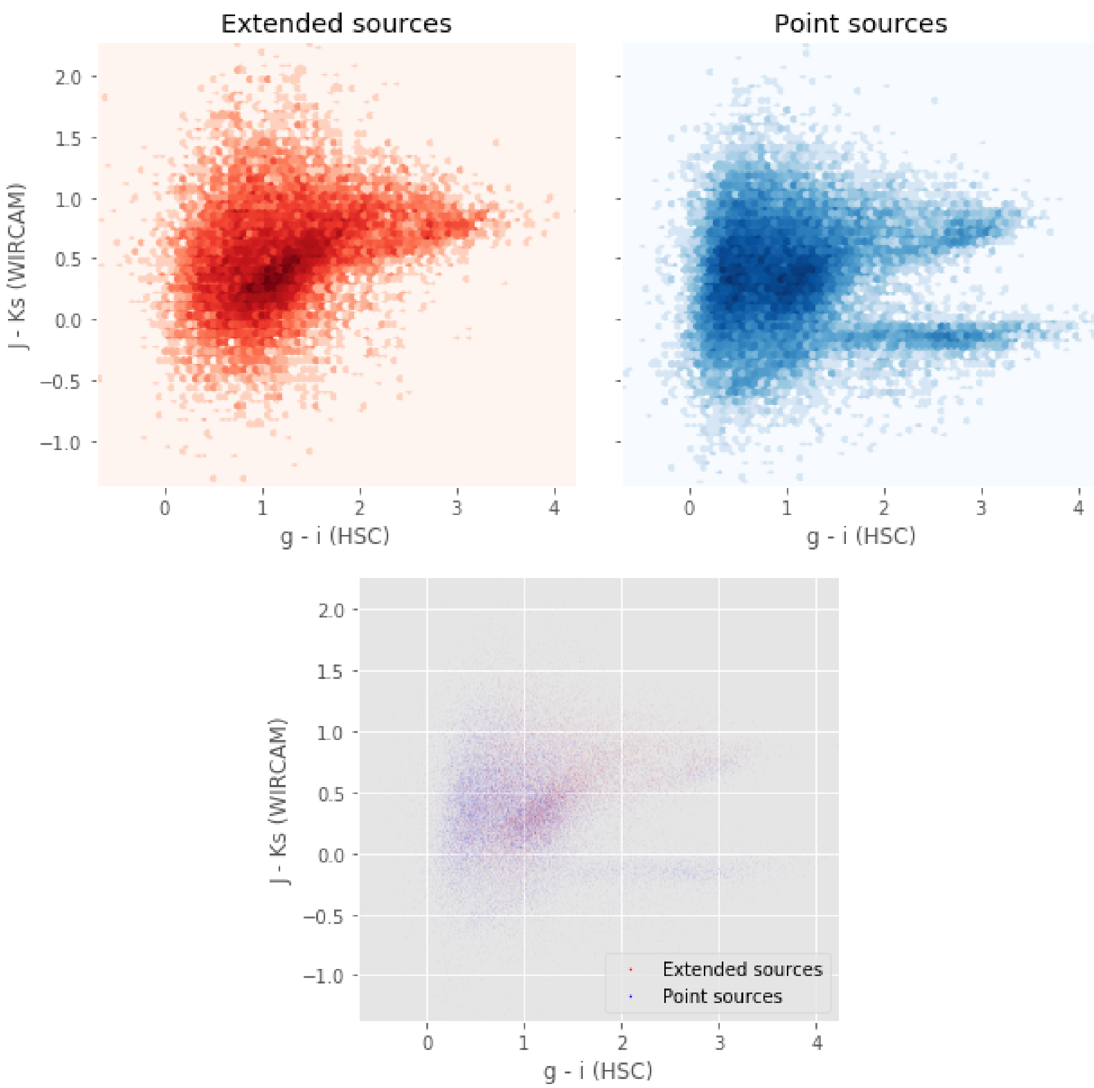
```
Number of source used: 830349 / 1412613 (58.78%)
```



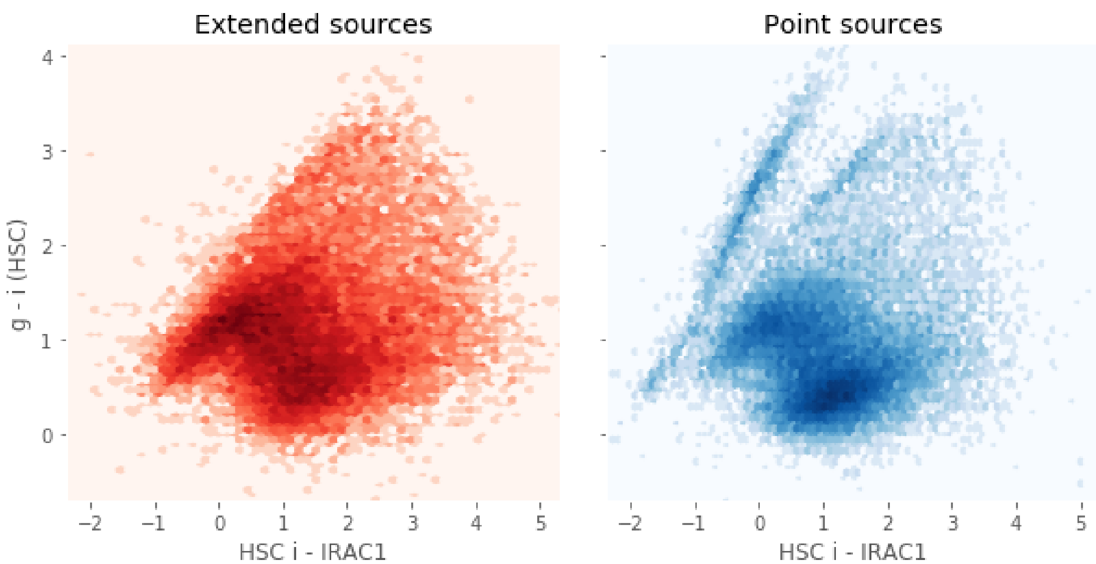


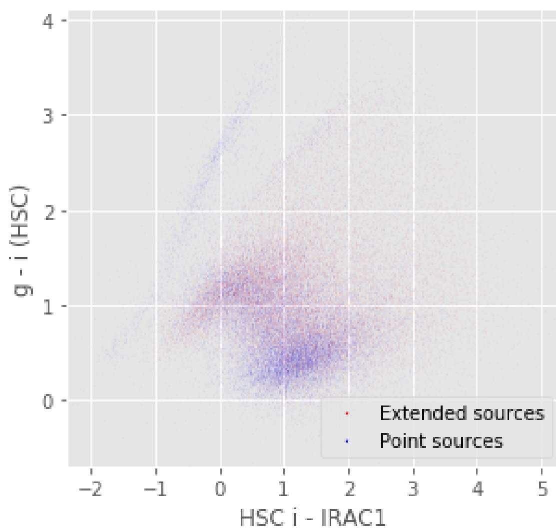
1.8 V - Color-color and magnitude-color plots

```
Number of source used: 41504 / 1412613 (2.94%)
```

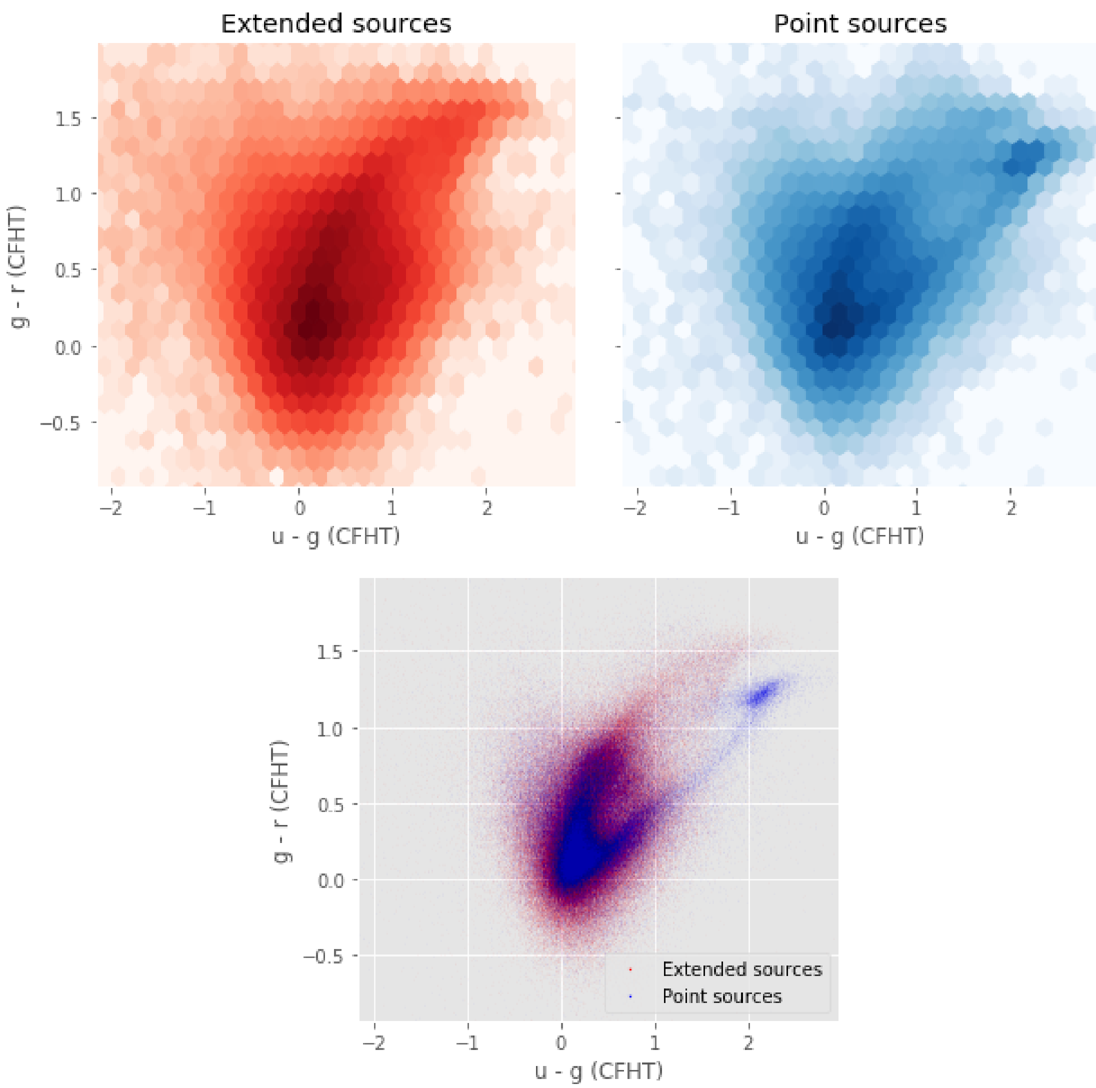


Number of source used: 49791 / 1412613 (3.52%)

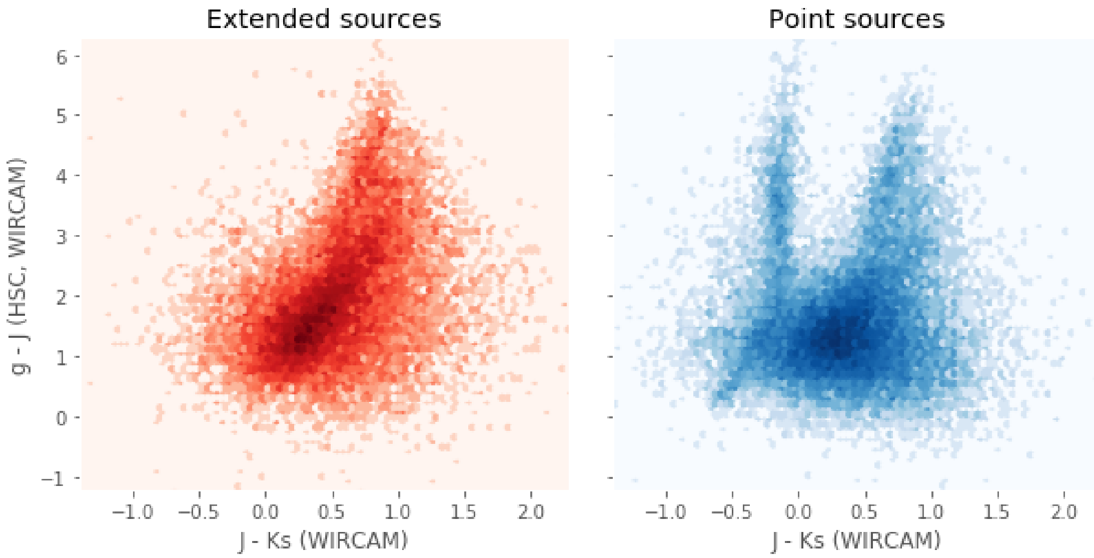


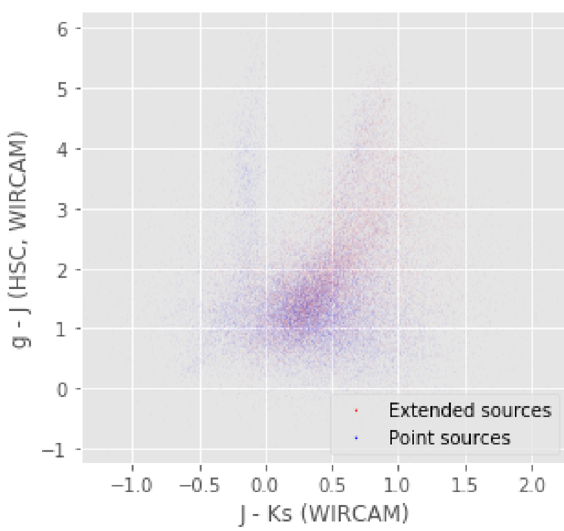


Number of source used: 496561 / 1412613 (35.15%)

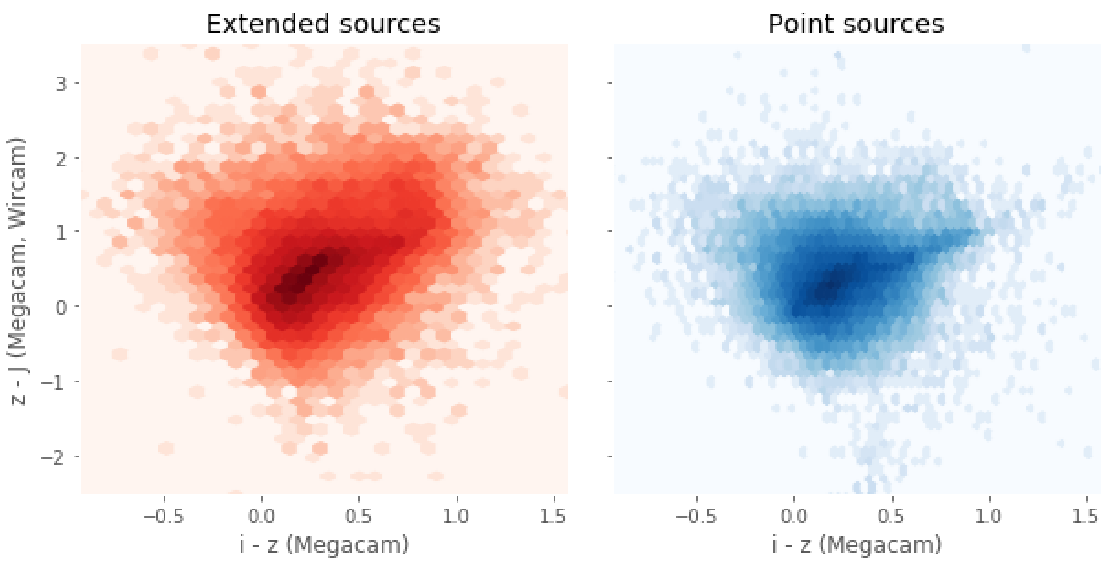


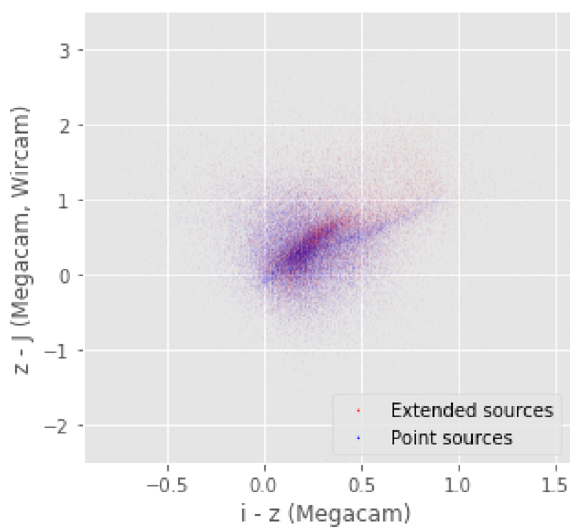
Number of source used: 42964 / 1412613 (3.04%)



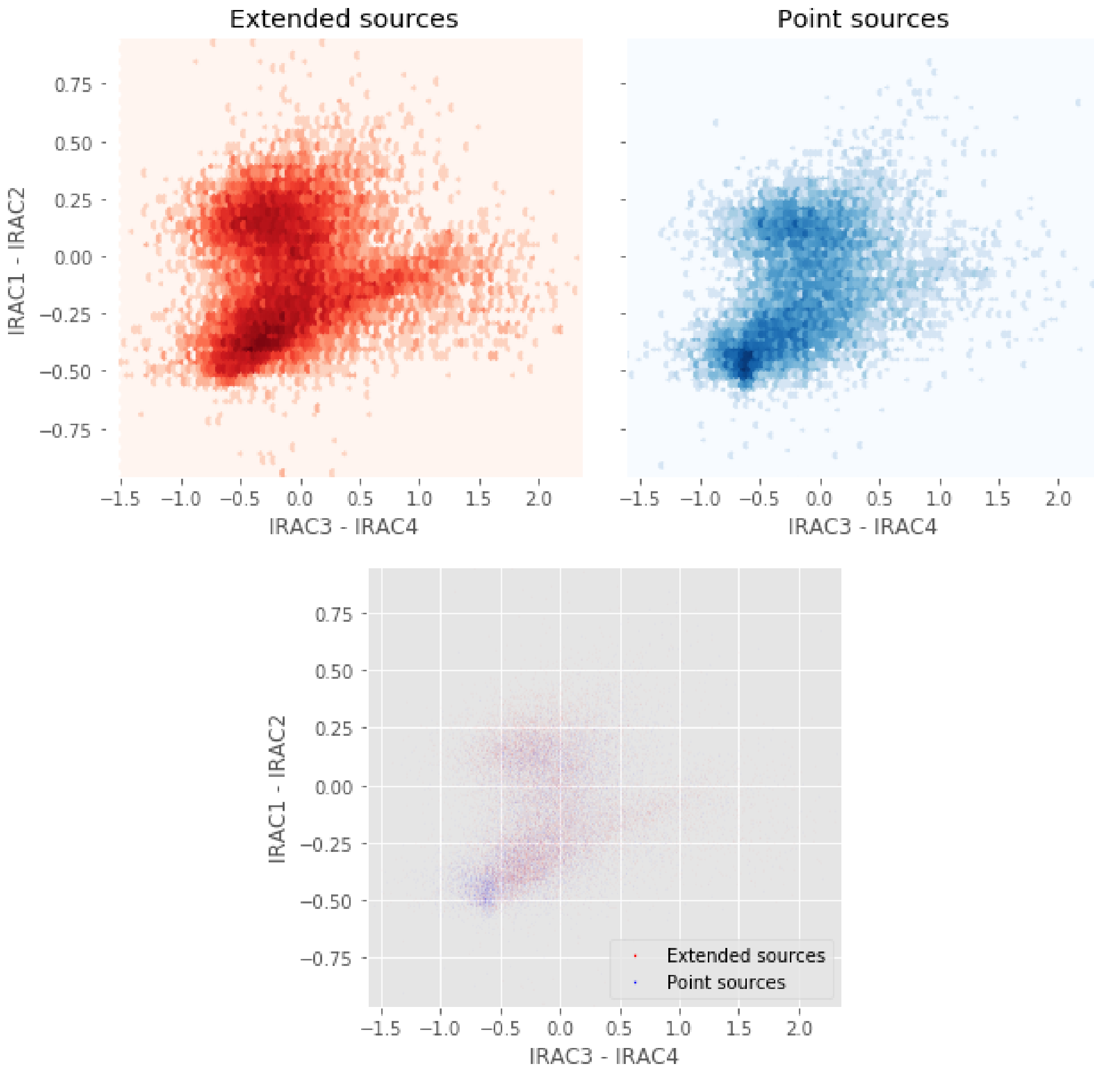


Number of source used: 62946 / 1412613 (4.46%)





Number of source used: 25853 / 1412613 (1.83%)


Extended sources
Point sources
IRAC1 - IRAC2
IRAC3 - IRAC4
IRAC3 - IRAC4
IRAC1 - IRAC2
IRAC3 - IRAC4
Extended sources
Point sources

4_Selection_function

March 8, 2018

1 EGS Selection Functions

1.1 Depth maps and selection functions

The simplest selection function available is the field MOC which specifies the area for which there is Herschel data. Each pristine catalogue also has a MOC defining the area for which that data is available.

The next stage is to provide mean flux standard deviations which act as a proxy for the catalogue's 5σ depth

```
This notebook was run with herschelhelp_internal version:
0246c5d (Thu Jan 25 17:01:47 2018 +0000) [with local modifications]
This notebook was executed on:
2018-02-27 19:14:37.465020
```

```
Depth maps produced using: master_catalogue_egs_20180217.fits
```

1.2 I - Group masterlist objects by healpix cell and calculate depths

We add a column to the masterlist catalogue for the target order healpix cell per object.

1.3 II Create a table of all Order=13 healpix cells in the field and populate it

We create a table with every order=13 healpix cell in the field MOC. We then calculate the healpix cell at lower order that the order=13 cell is in. We then fill in the depth at every order=13 cell as calculated for the lower order cell that that the order=13 cell is inside.

```
Out[9]: <IPython.core.display.HTML object>
```

```
Out[11]: <IPython.core.display.HTML object>
```

```
Out[12]: <IPython.core.display.HTML object>
```

1.4 III - Save the depth map table

1.5 IV - Overview plots

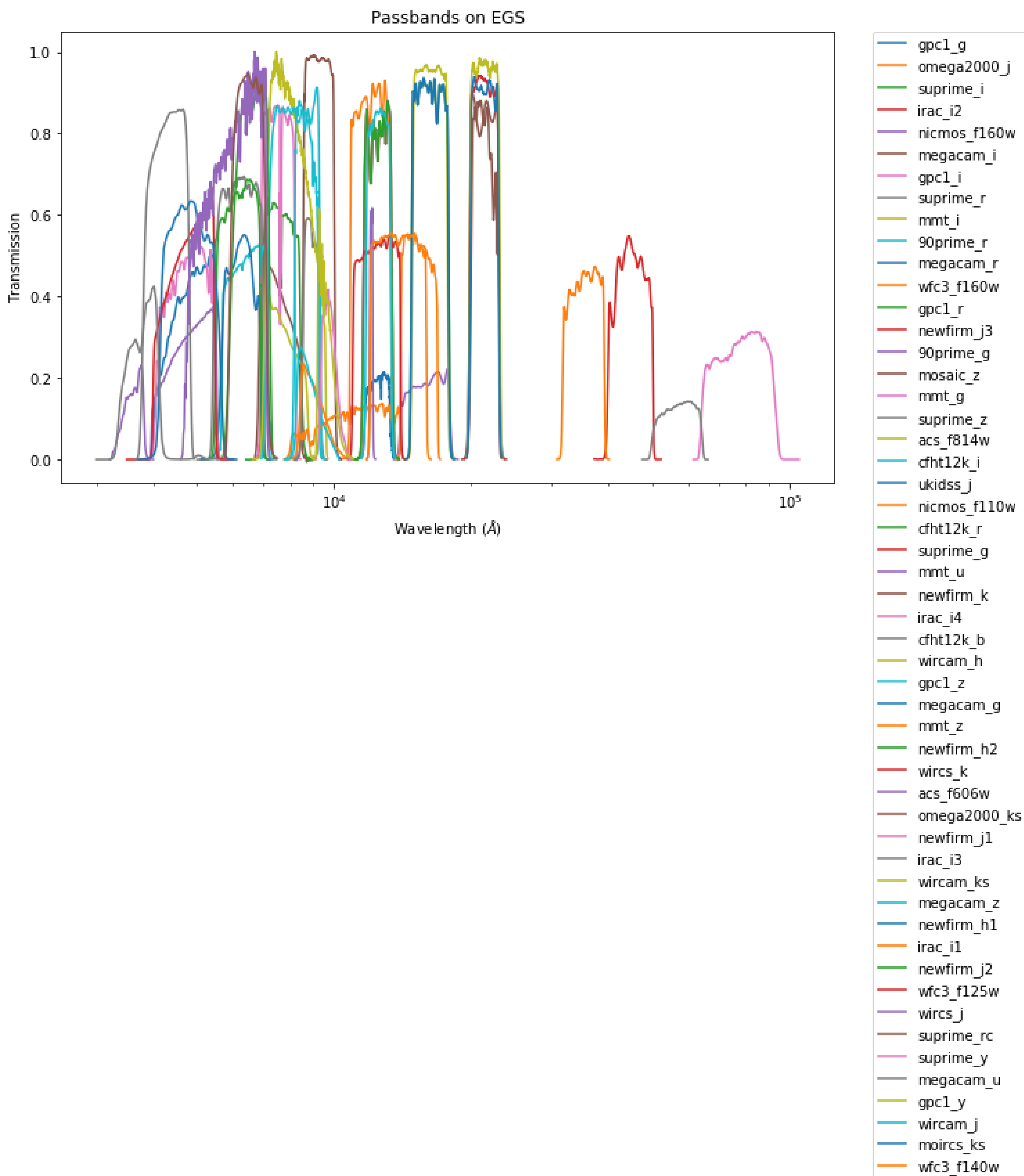
1.5.1 IV.a - Filters

First we simply plot all the filters available on this field to give an overview of coverage.

```
Out[14]: {'90prime_g',
          '90prime_r',
          'acs_f606w',
          'acs_f814w',
          'cfht12k_b',
          'cfht12k_i',
          'cfht12k_r',
          'gpc1_g',
          'gpc1_i',
          'gpc1_r',
          'gpc1_y',
          'gpc1_z',
          'irac_i1',
          'irac_i2',
          'irac_i3',
          'irac_i4',
          'megacam_g',
          'megacam_i',
          'megacam_r',
          'megacam_u',
          'megacam_z',
          'mmt_g',
          'mmt_i',
          'mmt_u',
          'mmt_z',
          'moircs_ks',
          'mosaic_z',
          'newfirm_h1',
          'newfirm_h2',
          'newfirm_j1',
          'newfirm_j2',
          'newfirm_j3',
          'newfirm_k',
          'nicmos_f110w',
          'nicmos_f160w',
          'omega2000_j',
          'omega2000_ks',
          'suprime_g',
          'suprime_i',
          'suprime_r',
          'suprime_rc',
```

```
         'suprime_y',
         'suprime_z',
         'ukidss_j',
         'wfc3_f125w',
         'wfc3_f140w',
         'wfc3_f160w',
         'wircam_h',
         'wircam_j',
         'wircam_ks',
         'wircs_j',
         'wircs_k'}
```

```
Out[15]: <matplotlib.text.Text at 0x7f0bf8bdf7f0>
```



1.5.2 IV.a - Depth overview

Then we plot the mean depths available across the area a given band is available

```
suprime_g: mean flux error: 0.019375529140233994, 3sigma in AB mag (Aperture): 26.98906293370067
suprime_r: mean flux error: inf, 3sigma in AB mag (Aperture): -inf
suprime_i: mean flux error: 0.03772468492388725, 3sigma in AB mag (Aperture): 26.265632810099568
suprime_z: mean flux error: 0.09303078055381775, 3sigma in AB mag (Aperture): 25.28563020114499
```

```
suprime_y: mean flux error: 0.2268095463514328, 3sigma in AB mag (Aperture): 24.318043538348654
gpc1_g: mean flux error: 385.0546080277341, 3sigma in AB mag (Aperture): 16.243391050576697
gpc1_r: mean flux error: 70.26057445642947, 3sigma in AB mag (Aperture): 18.090417622453025
gpc1_i: mean flux error: 8.255579140436186, 3sigma in AB mag (Aperture): 20.4153280006171
gpc1_z: mean flux error: 18.50239630361413, 3sigma in AB mag (Aperture): 19.5391269159715
gpc1_y: mean flux error: 45.967758277785876, 3sigma in AB mag (Aperture): 18.55106355092787
acs_f606w: mean flux error: 0.04573498269163535, 3sigma in AB mag (Aperture): 26.05657556554403
acs_f814w: mean flux error: 0.08567304007494089, 3sigma in AB mag (Aperture): 25.375086418332693
wfc3_f125w: mean flux error: 0.11511747838942188, 3sigma in AB mag (Aperture): 25.05434369331418
wfc3_f140w: mean flux error: 0.056422697138618326, 3sigma in AB mag (Aperture): 25.8285622566486
wfc3_f160w: mean flux error: 0.07076677996853135, 3sigma in AB mag (Aperture): 25.58262327625473
newfirm_j1: mean flux error: nan, 3sigma in AB mag (Aperture): nan
newfirm_j2: mean flux error: nan, 3sigma in AB mag (Aperture): nan
newfirm_j3: mean flux error: nan, 3sigma in AB mag (Aperture): nan
newfirm_h1: mean flux error: nan, 3sigma in AB mag (Aperture): nan
newfirm_h2: mean flux error: nan, 3sigma in AB mag (Aperture): nan
newfirm_k: mean flux error: nan, 3sigma in AB mag (Aperture): nan
90prime_g: mean flux error: 1.0900010494196977e-07, 3sigma in AB mag (Aperture): 40.113629573035
90prime_r: mean flux error: 2.9483857133527636e-07, 3sigma in AB mag (Aperture): 39.033236117893
mosaic_z: mean flux error: 1.4521265256917104e-06, 3sigma in AB mag (Aperture): 37.3021857165472
ukidss_j: mean flux error: 6.556758880615234, 3sigma in AB mag (Aperture): 20.665473830351353
megacam_u: mean flux error: 0.05411689921944996, 3sigma in AB mag (Aperture): 25.87386460192632
megacam_g: mean flux error: 0.030917038441619915, 3sigma in AB mag (Aperture): 26.48170214831140
megacam_r: mean flux error: 0.05508580863947114, 3sigma in AB mag (Aperture): 25.854597540454073
megacam_i: mean flux error: 0.08481895398709512, 3sigma in AB mag (Aperture): 25.38596458243517
megacam_z: mean flux error: 0.1700147393669768, 3sigma in AB mag (Aperture): 24.63098042816309
wircam_j: mean flux error: 0.14134602284648362, 3sigma in AB mag (Aperture): 24.831487880838544
wircam_h: mean flux error: 0.15621462427260513, 3sigma in AB mag (Aperture): 24.722892641722886
wircam_ks: mean flux error: 0.18613083094640154, 3sigma in AB mag (Aperture): 24.532651072758547
wircs_j: mean flux error: 0.8129140441304107, 3sigma in AB mag (Aperture): 22.93208529667381
wircs_k: mean flux error: 1.616166722943082, 3sigma in AB mag (Aperture): 22.185981462328222
suprime_g: mean flux error: 0.0305919349193573, 3sigma in AB mag (Total): 26.49317949648087
suprime_r: mean flux error: inf, 3sigma in AB mag (Total): -inf
suprime_i: mean flux error: inf, 3sigma in AB mag (Total): -inf
suprime_z: mean flux error: inf, 3sigma in AB mag (Total): -inf
suprime_y: mean flux error: 0.34690940380096436, 3sigma in AB mag (Total): 23.85665668174564
gpc1_g: mean flux error: 163.68540026551338, 3sigma in AB mag (Total): 17.172172001367493
gpc1_r: mean flux error: 71.42557464309743, 3sigma in AB mag (Total): 18.07256250541085
gpc1_i: mean flux error: 5.302472784678861, 3sigma in AB mag (Total): 20.896000742833827
gpc1_z: mean flux error: 17.074567605487328, 3sigma in AB mag (Total): 19.6263225770356
gpc1_y: mean flux error: 44.44112435141717, 3sigma in AB mag (Total): 18.587734268275888
acs_f606w: mean flux error: -0.003801187491360624, 3sigma in AB mag (Total): nan
acs_f814w: mean flux error: -0.0032003030302804594, 3sigma in AB mag (Total): nan
wfc3_f125w: mean flux error: 0.08452447744871103, 3sigma in AB mag (Total): 25.389740626876154
wfc3_f140w: mean flux error: 0.04970858877871873, 3sigma in AB mag (Total): 25.96611827884535
wfc3_f160w: mean flux error: 0.06608457307581464, 3sigma in AB mag (Total): 25.656946641491167
newfirm_j1: mean flux error: 20672984.10823371, 3sigma in AB mag (Total): 4.418688936243349
newfirm_j2: mean flux error: 619.0175909819058, 3sigma in AB mag (Total): 15.727939386216697
```

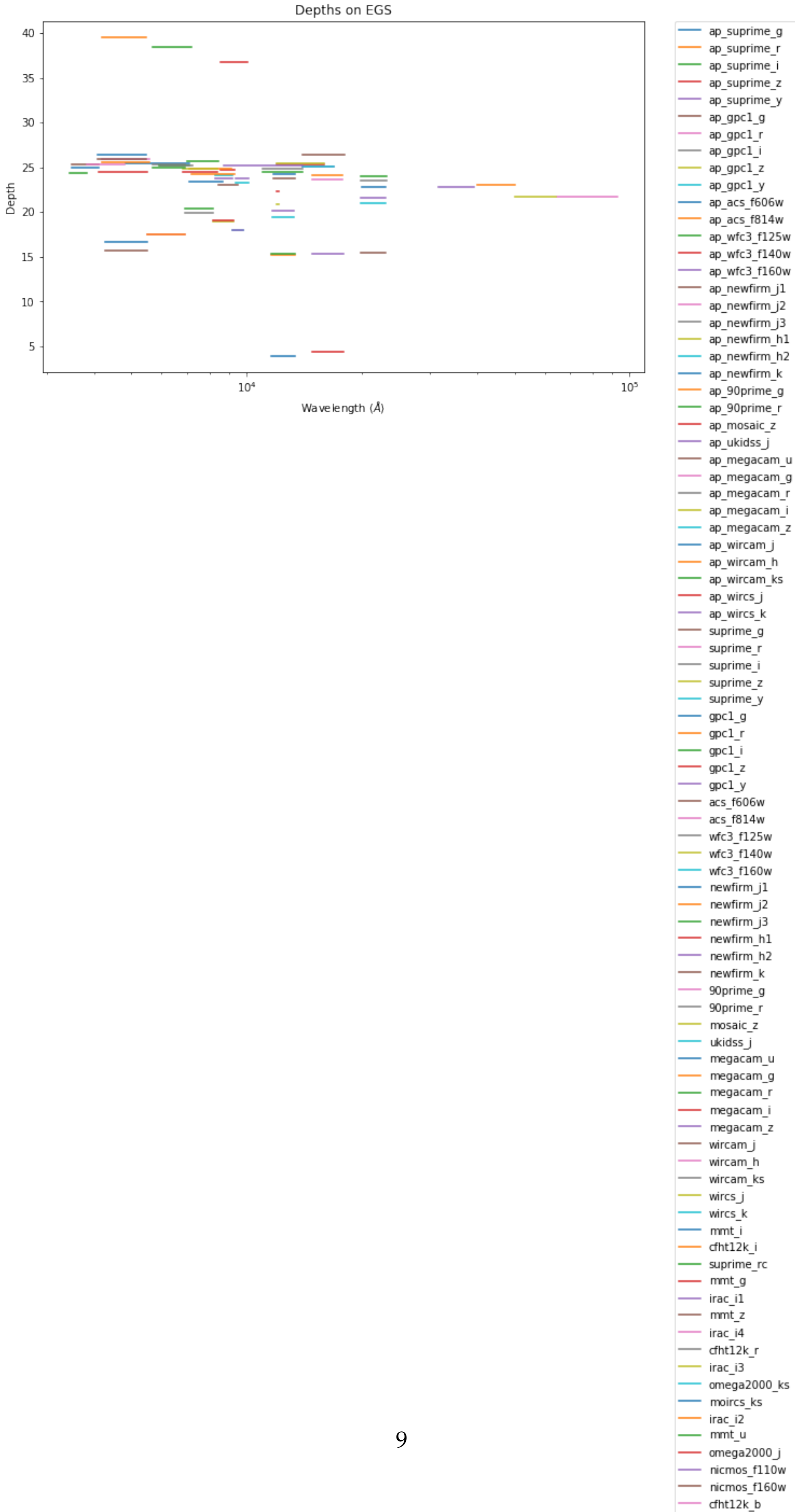
```
newfirm_j3: mean flux error: 542.0554880889088, 3sigma in AB mag (Total): 15.872087498619798
newfirm_h1: mean flux error: 13183366.247884728, 3sigma in AB mag (Total): 4.907131069684375
newfirm_h2: mean flux error: 516.382674240655, 3sigma in AB mag (Total): 15.924767707409636
newfirm_k: mean flux error: 480.36450044260914, 3sigma in AB mag (Total): 16.003269600717694
90prime_g: mean flux error: inf, 3sigma in AB mag (Total): -inf
90prime_r: mean flux error: inf, 3sigma in AB mag (Total): -inf
mosaic_z: mean flux error: inf, 3sigma in AB mag (Total): -inf
ukidss_j: mean flux error: 12.750082015991211, 3sigma in AB mag (Total): 19.943414417162607
megacam_u: mean flux error: 0.0712575167445799, 3sigma in AB mag (Total): 25.575120154358892
megacam_g: mean flux error: 0.04469344850595754, 3sigma in AB mag (Total): 26.081587198896806
megacam_r: mean flux error: 0.07879723935262516, 3sigma in AB mag (Total): 25.46591935738696
megacam_i: mean flux error: 0.11769594842682417, 3sigma in AB mag (Total): 25.030293080904464
megacam_z: mean flux error: 0.23093746470394308, 3sigma in AB mag (Total): 24.29846087895546
wircam_j: mean flux error: 0.22998000957951764, 3sigma in AB mag (Total): 24.30297164388093
wircam_h: mean flux error: 0.25222617507345546, 3sigma in AB mag (Total): 24.202721478186128
wircam_ks: mean flux error: 0.2961568305164641, 3sigma in AB mag (Total): 24.028392479213615
wircs_j: mean flux error: 3.1906943143922235, 3sigma in AB mag (Total): 21.44748386707925
wircs_k: mean flux error: 2.785600675150898, 3sigma in AB mag (Total): 21.594899715615888
mmt_i: mean flux error: 0.3006706793838812, 3sigma in AB mag (Total): 24.01196916593465
cfht12k_i: mean flux error: 0.14635251430735757, 3sigma in AB mag (Total): 24.793696393382028
suprime_rc: mean flux error: 0.05942396667088162, 3sigma in AB mag (Total): 25.772292767008288
mmt_g: mean flux error: 0.11584410855891057, 3sigma in AB mag (Total): 25.04751198336742
irac_i1: mean flux error: 0.5675425041195329, 3sigma in AB mag (Total): 23.32220088306071
mmt_z: mean flux error: 0.42238354225426744, 3sigma in AB mag (Total): 23.642929393170796
irac_i4: mean flux error: 1.442685143110741, 3sigma in AB mag (Total): 22.309267964659576
cfht12k_r: mean flux error: 0.05830061221608726, 3sigma in AB mag (Total): 25.793014074902253
irac_i3: mean flux error: 1.4370553467392526, 3sigma in AB mag (Total): 22.313513126023643
omega2000_ks: mean flux error: -0.307867495860336, 3sigma in AB mag (Total): nan
moircs_ks: mean flux error: 0.5230879305224959, 3sigma in AB mag (Total): 23.41076011459446
irac_i2: mean flux error: 0.4592791551864558, 3sigma in AB mag (Total): 23.55200502568983
mmt_u: mean flux error: 0.12413515594889839, 3sigma in AB mag (Total): 24.97245987777793
omega2000_j: mean flux error: -2.082777573581747, 3sigma in AB mag (Total): nan
nicmos_f110w: mean flux error: 0.05968099777978974, 3sigma in AB mag (Total): 25.767606674951743
nicmos_f160w: mean flux error: 0.019907068872343756, 3sigma in AB mag (Total): 26.95967856575397
cfht12k_b: mean flux error: 0.056505097068885846, 3sigma in AB mag (Total): 25.8269777998891
```

```
ap_suprime_g (4090.0, 5460.0, 1370.0)
ap_suprime_r (5440.0, 6960.0, 1520.0)
ap_suprime_i (6980.0, 8420.0, 1440.0)
ap_suprime_z (8540.0, 9280.0, 740.0)
ap_suprime_y (9360.0, 10120.0, 760.0)
ap_gpc1_g (4260.0, 5500.0, 1240.0)
ap_gpc1_r (5500.0, 6900.0, 1400.0)
ap_gpc1_i (6910.0, 8190.0, 1280.0)
ap_gpc1_z (8190.0, 9210.0, 1020.0)
ap_gpc1_y (9200.0, 9820.0, 620.0)
ap_acs_f606w (4835.3999, 7088.4702, 2253.0703)
```

```
ap_acs_f814w (7069.6699, 9138.1104, 2068.4404)
ap_wfc3_f125w (10993.5, 13997.47, 3003.9697)
ap_wfc3_f140w (12005.91, 15946.44, 3940.5303)
ap_wfc3_f160w (13996.34, 16869.92, 2873.5801)
ap_newfirm_j1 (11600.0, 13387.0, 1787.0)
ap_newfirm_j2 (11600.0, 13387.0, 1787.0)
ap_newfirm_j3 (11600.0, 13387.0, 1787.0)
ap_newfirm_h1 (14795.0, 17860.0, 3065.0)
ap_newfirm_h2 (14795.0, 17860.0, 3065.0)
ap_newfirm_k (19845.0, 23060.0, 3215.0)
ap_90prime_g (4180.0, 5470.0, 1290.0)
ap_90prime_r (5680.0, 7150.0, 1470.0)
ap_mosaic_z (8552.0, 10018.0, 1466.0)
ap_ukidss_j (11695.0, 13280.0, 1585.0)
ap_megacam_u (3500.0, 4100.0, 600.0)
ap_megacam_g (4180.0, 5580.0, 1400.0)
ap_megacam_r (5680.0, 6880.0, 1200.0)
ap_megacam_i (6831.7305, 8388.5557, 1556.8252)
ap_megacam_z (8280.0, 9160.0, 880.0)
ap_wircam_j (11748.0, 13334.0, 1586.0)
ap_wircam_h (14855.0, 17760.0, 2905.0)
ap_wircam_ks (19870.0, 23135.0, 3265.0)
ap_wircs_j (11976.79, 12146.47, 169.67969)
ap_wircs_k (19870.109, 23046.93, 3176.8203)
suprime_g (4090.0, 5460.0, 1370.0)
suprime_r (5440.0, 6960.0, 1520.0)
suprime_i (6980.0, 8420.0, 1440.0)
suprime_z (8540.0, 9280.0, 740.0)
suprime_y (9360.0, 10120.0, 760.0)
gpc1_g (4260.0, 5500.0, 1240.0)
gpc1_r (5500.0, 6900.0, 1400.0)
gpc1_i (6910.0, 8190.0, 1280.0)
gpc1_z (8190.0, 9210.0, 1020.0)
gpc1_y (9200.0, 9820.0, 620.0)
acs_f606w (4835.3999, 7088.4702, 2253.0703)
acs_f814w (7069.6699, 9138.1104, 2068.4404)
wfc3_f125w (10993.5, 13997.47, 3003.9697)
wfc3_f140w (12005.91, 15946.44, 3940.5303)
wfc3_f160w (13996.34, 16869.92, 2873.5801)
newfirm_j1 (11600.0, 13387.0, 1787.0)
newfirm_j2 (11600.0, 13387.0, 1787.0)
newfirm_j3 (11600.0, 13387.0, 1787.0)
newfirm_h1 (14795.0, 17860.0, 3065.0)
newfirm_h2 (14795.0, 17860.0, 3065.0)
newfirm_k (19845.0, 23060.0, 3215.0)
90prime_g (4180.0, 5470.0, 1290.0)
90prime_r (5680.0, 7150.0, 1470.0)
mosaic_z (8552.0, 10018.0, 1466.0)
```

```
ukidss_j (11695.0, 13280.0, 1585.0)
megacam_u (3500.0, 4100.0, 600.0)
megacam_g (4180.0, 5580.0, 1400.0)
megacam_r (5680.0, 6880.0, 1200.0)
megacam_i (6831.7305, 8388.5557, 1556.8252)
megacam_z (8280.0, 9160.0, 880.0)
wircam_j (11748.0, 13334.0, 1586.0)
wircam_h (14855.0, 17760.0, 2905.0)
wircam_ks (19870.0, 23135.0, 3265.0)
wircs_j (11976.79, 12146.47, 169.67969)
wircs_k (19870.109, 23046.93, 3176.8203)
mmt_i (7085.0, 8655.0, 1570.0)
cfht12k_i (7160.0, 9300.0, 2140.0)
suprime_rc (5919.8999, 7079.5, 1159.6001)
mmt_g (4115.0, 5485.0, 1370.0)
irac_i1 (31754.0, 39164.801, 7410.8008)
mmt_z (8410.0, 9485.0, 1075.0)
irac_i4 (64415.199, 92596.797, 28181.598)
cfht12k_r (5960.0, 7200.0, 1240.0)
irac_i3 (50246.301, 64096.699, 13850.398)
omega2000_ks (19991.0, 23026.0, 3035.0)
moircs_ks (19915.0, 23010.0, 3095.0)
irac_i2 (39980.102, 50052.301, 10072.199)
mmt_u (3455.0, 3815.0, 360.0)
omega2000_j (10854.4, 13313.6, 2459.1992)
nicmos_f110w (8695.9062, 13957.38, 5261.4736)
nicmos_f160w (13983.17, 17968.711, 3985.541)
cfht12k_b (3820.0, 4800.0, 980.0)
```

```
Out[20]: <matplotlib.text.Text at 0x7f0b16dd0748>
```

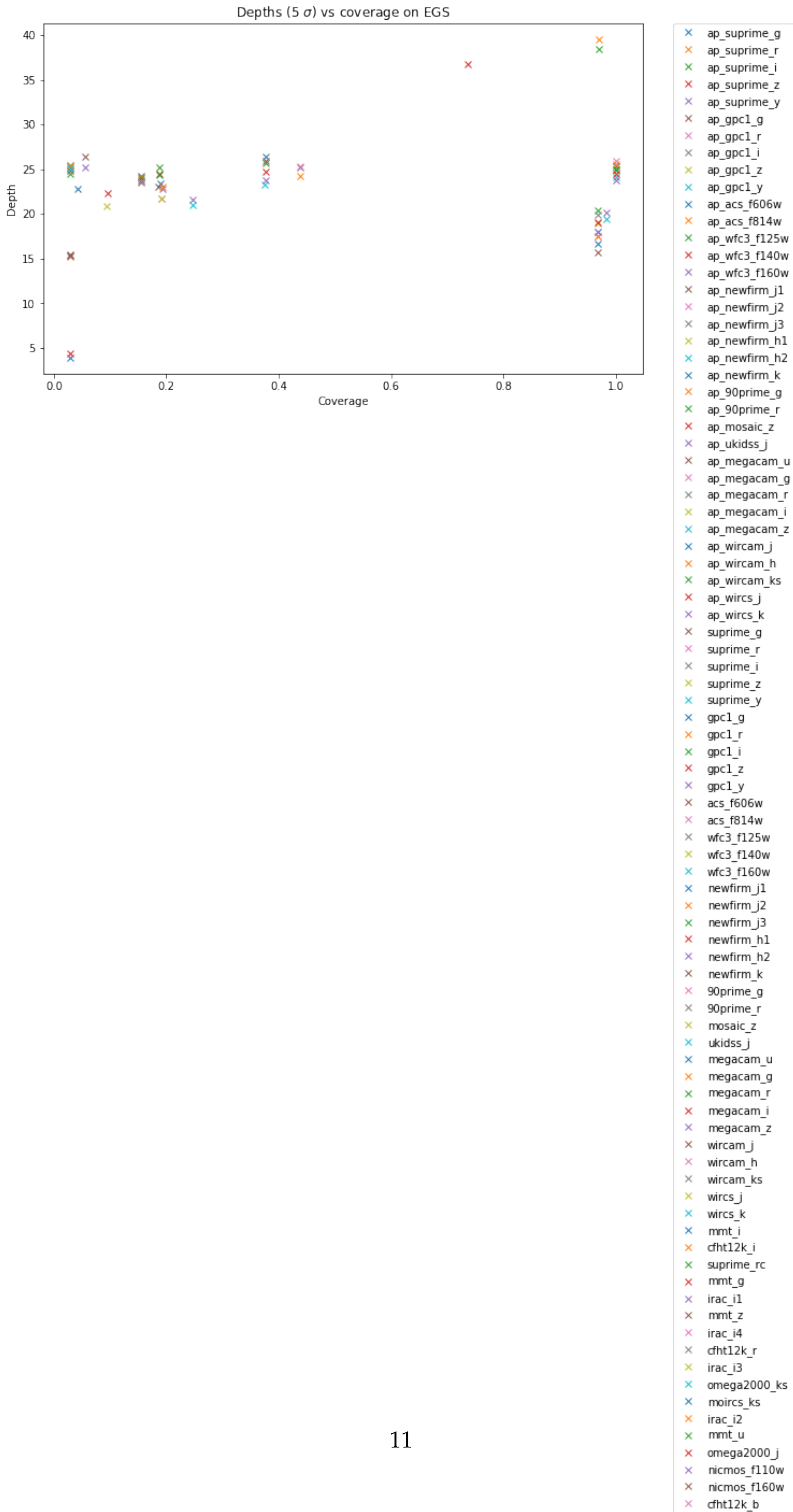


Depths on EGS
Depth
40
35
30
25
20
15
10
5
10^4
10^5
Wavelength (Å)
ap_suprime_g
ap_suprime_r
ap_suprime_i
ap_suprime_z
ap_suprime_y
ap_gpc1_g
ap_gpc1_r
ap_gpc1_i
ap_gpc1_z
ap_gpc1_y
ap_acs_f606w
ap_acs_f814w
ap_wfc3_f125w
ap_wfc3_f140w
ap_wfc3_f160w
ap_newfirm_j1
ap_newfirm_j2
ap_newfirm_j3
ap_newfirm_h1
ap_newfirm_h2
ap_newfirm_k
ap_90prime_g
ap_90prime_r
ap_mosaic_z
ap_ukidss_j
ap_megacam_u
ap_megacam_g
ap_megacam_r
ap_megacam_i
ap_megacam_z
ap_wircam_j
ap_wircam_h
ap_wircam_ks
ap_wircs_j
ap_wircs_k
suprime_g
suprime_r
suprime_i
suprime_z
suprime_y
gpc1_g
gpc1_r
gpc1_i
gpc1_z
gpc1_y
acs_f606w
acs_f814w
wfc3_f125w
wfc3_f140w
wfc3_f160w
newfirm_j1
newfirm_j2
newfirm_j3
newfirm_h1
newfirm_h2
newfirm_k
90prime_g
90prime_r
mosaic_z
ukidss_j
megacam_u
megacam_g
megacam_r
megacam_i
megacam_z
wircam_j
wircam_h
wircam_ks
wircs_j
wircs_k
mmt_i
cfht12k_i
suprime_rc
mmt_g
irac_i1
mmt_z
irac_i4
cfht12k_r
irac_i3
omega2000_ks
moircs_ks
irac_i2
mmt_u
omega2000_j
nicmos_f110w
nicmos_f160w
cfht12k_b

1.5.3 IV.c - Depth vs coverage comparison

How best to do this? Colour/intensity plot over area? Percentage coverage vs mean depth?

```
Out[21]: <matplotlib.text.Text at 0x7f0b15082e10>
```


Depths (5 σ) vs coverage on EGS
Depth
Coverage
40
35
30
25
20
15
10
5
0.0
0.2
0.4
0.6
0.8
1.0
ap_suprime_g
ap_suprime_r
ap_suprime_i
ap_suprime_z
ap_suprime_y
ap_gpc1_g
ap_gpc1_r
ap_gpc1_i
ap_gpc1_z
ap_gpc1_y
ap_acs_f606w
ap_acs_f814w
ap_wfc3_f125w
ap_wfc3_f140w
ap_wfc3_f160w
ap_newfirm_j1
ap_newfirm_j2
ap_newfirm_j3
ap_newfirm_h1
ap_newfirm_h2
ap_newfirm_k
ap_90prime_g
ap_90prime_r
ap_mosaic_z
ap_ukidss_j
ap_megacam_u
ap_megacam_g
ap_megacam_r
ap_megacam_i
ap_megacam_z
ap_wircam_j
ap_wircam_h
ap_wircam_ks
ap_wircs_j
ap_wircs_k
suprime_g
suprime_r
suprime_i
suprime_z
suprime_y
gpc1_g
gpc1_r
gpc1_i
gpc1_z
gpc1_y
acs_f606w
acs_f814w
wfc3_f125w
wfc3_f140w
wfc3_f160w
newfirm_j1
newfirm_j2
newfirm_j3
newfirm_h1
newfirm_h2
newfirm_k
90prime_g
90prime_r
mosaic_z
ukidss_j
megacam_u
megacam_g
megacam_r
megacam_i
megacam_z
wircam_j
wircam_h
wircam_ks
wircs_j
wircs_k
mmt_i
cfht12k_i
suprime_rc
mmt_g
irac_i1
mmt_z
irac_i4
cfht12k_r
irac_i3
omega2000_ks
moircs_ks
irac_i2
mmt_u
omega2000_j
nicmos_f110w
nicmos_f160w
cfht12k_b