

1.1 DECaLS

January 18, 2018

1 GAMA-12 master catalogue

1.1 Preparation of DECam Legacy Survey data

This catalogue comes from dmu0_DECaLS.

In the catalogue, we keep:

- The object_id as unique object identifier;
- The position;
- The u, g, r, i, z, Y aperture magnitude ($2''$);
- The u, g, r, i, z, Y kron fluxes and magnitudes.

We check for all ugrizY then only take bands for which there are measurements

This notebook was run with herschelhelp_internal version:

44f1ae0 (Thu Nov 30 18:27:54 2017 +0000)

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

1.2 I - Aperture correction

To compute aperture correction we need to determine two parameters: 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).

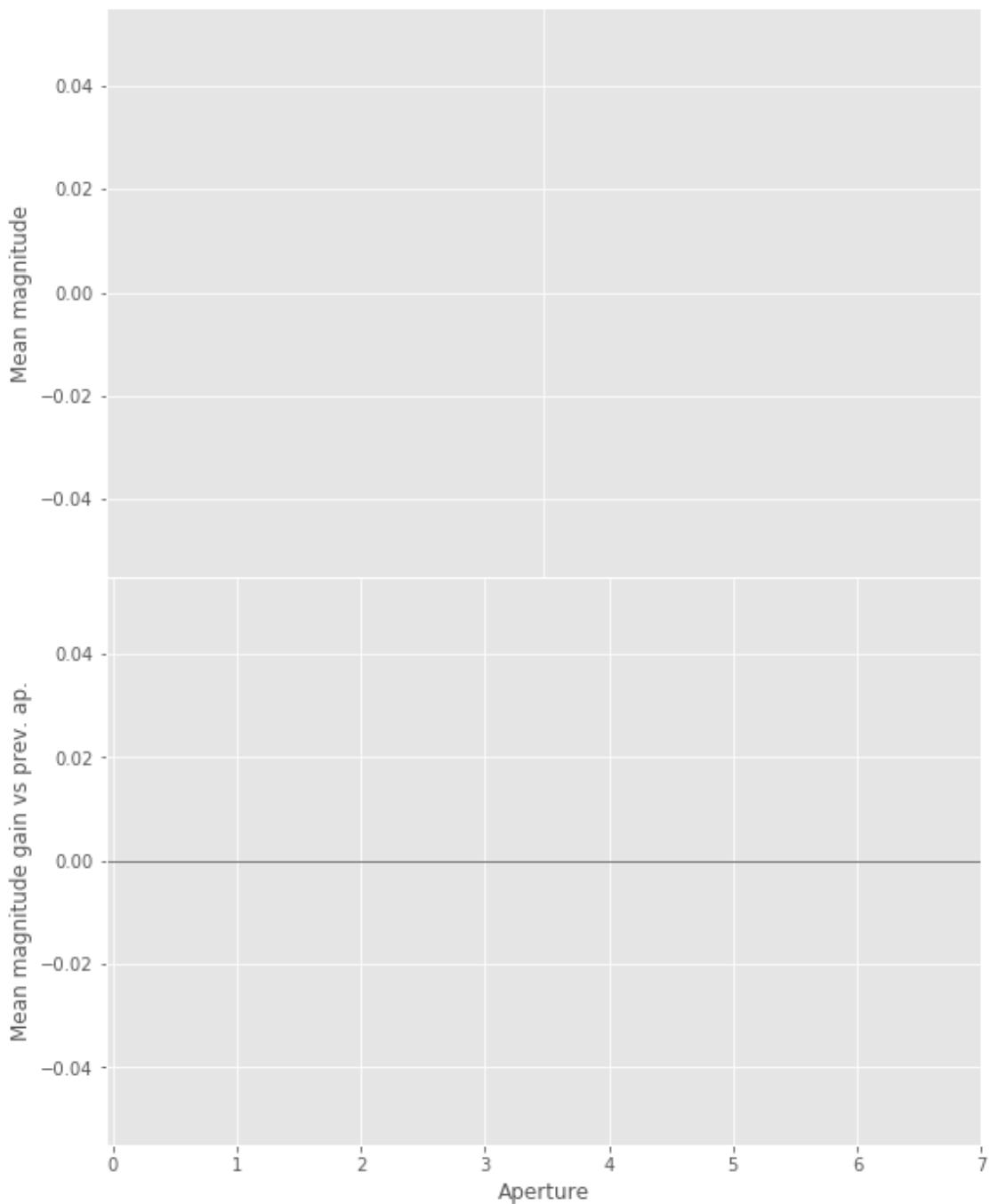
As target aperture, we should use the smallest (i.e. less noisy) aperture for which most of the flux is captured.

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

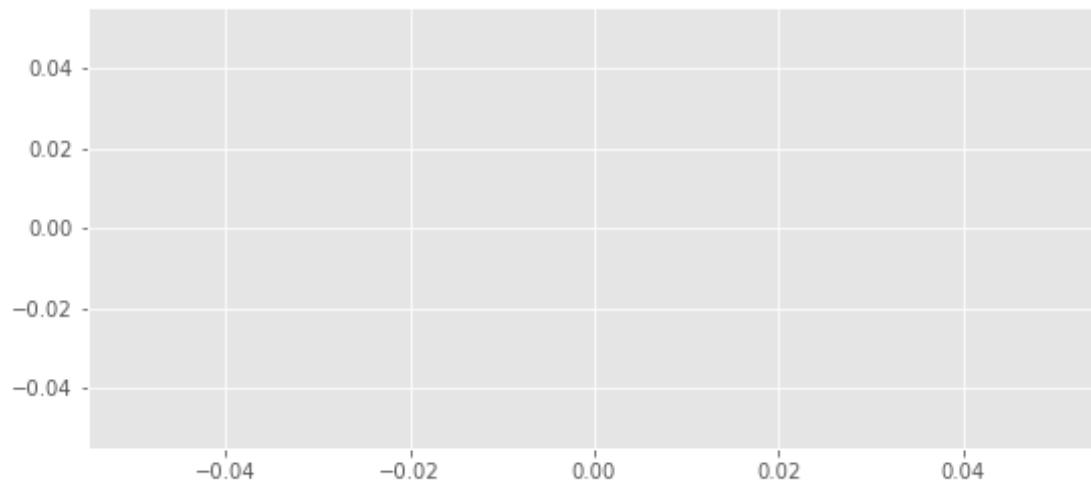
1.2.1 1.a u band

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:56: RuntimeWarning: Mean of empty slice
  warnings.warn("Mean of empty slice", RuntimeWarning)
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:56: RuntimeWarning: Mean of empty slice
  warnings.warn("Mean of empty slice", RuntimeWarning)
```

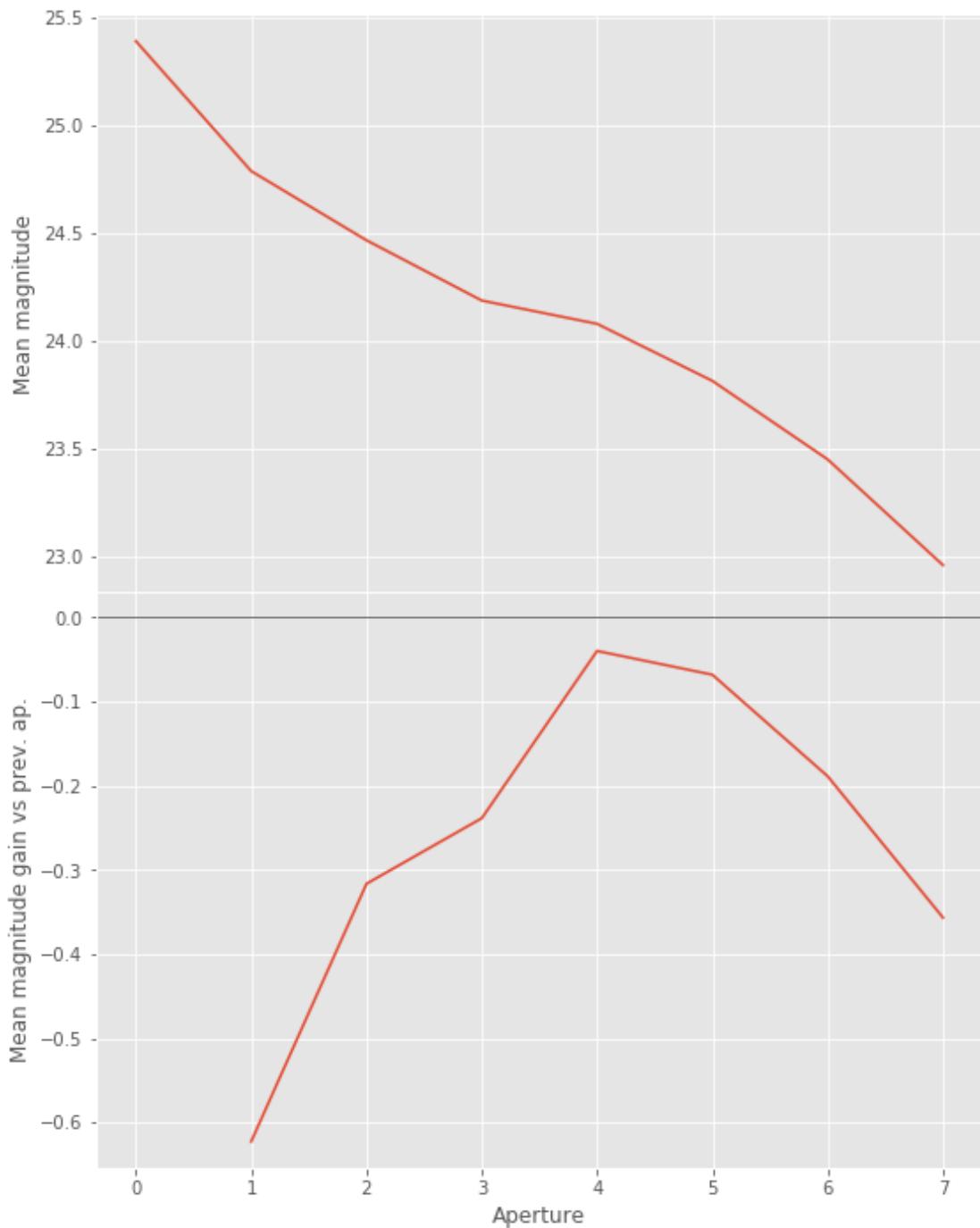


u band is all nan

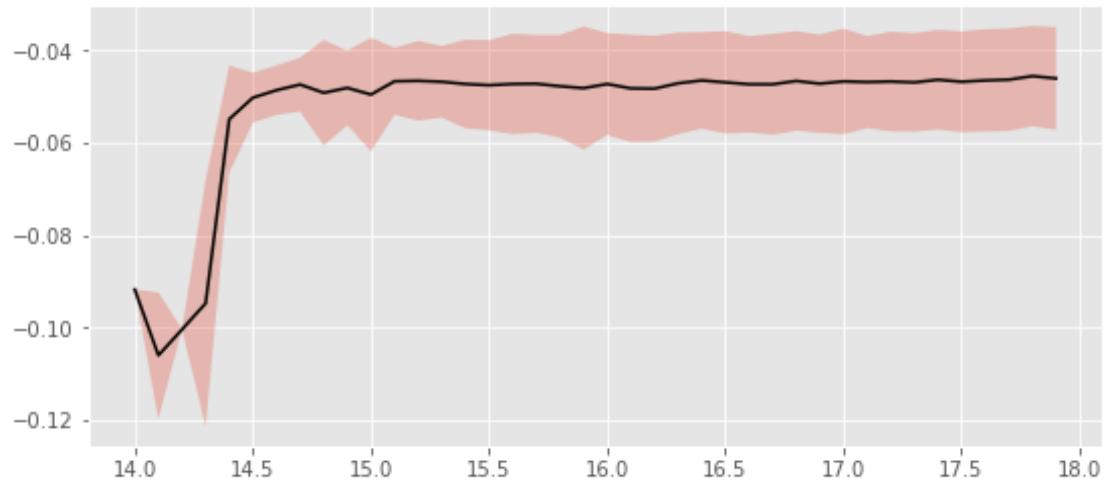
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("All-NaN slice encountered", RuntimeWarning)
```



1.2.2 I.a - g band



We will use aperture 5 as target.



We will use magnitudes between 16.0 and 19.0

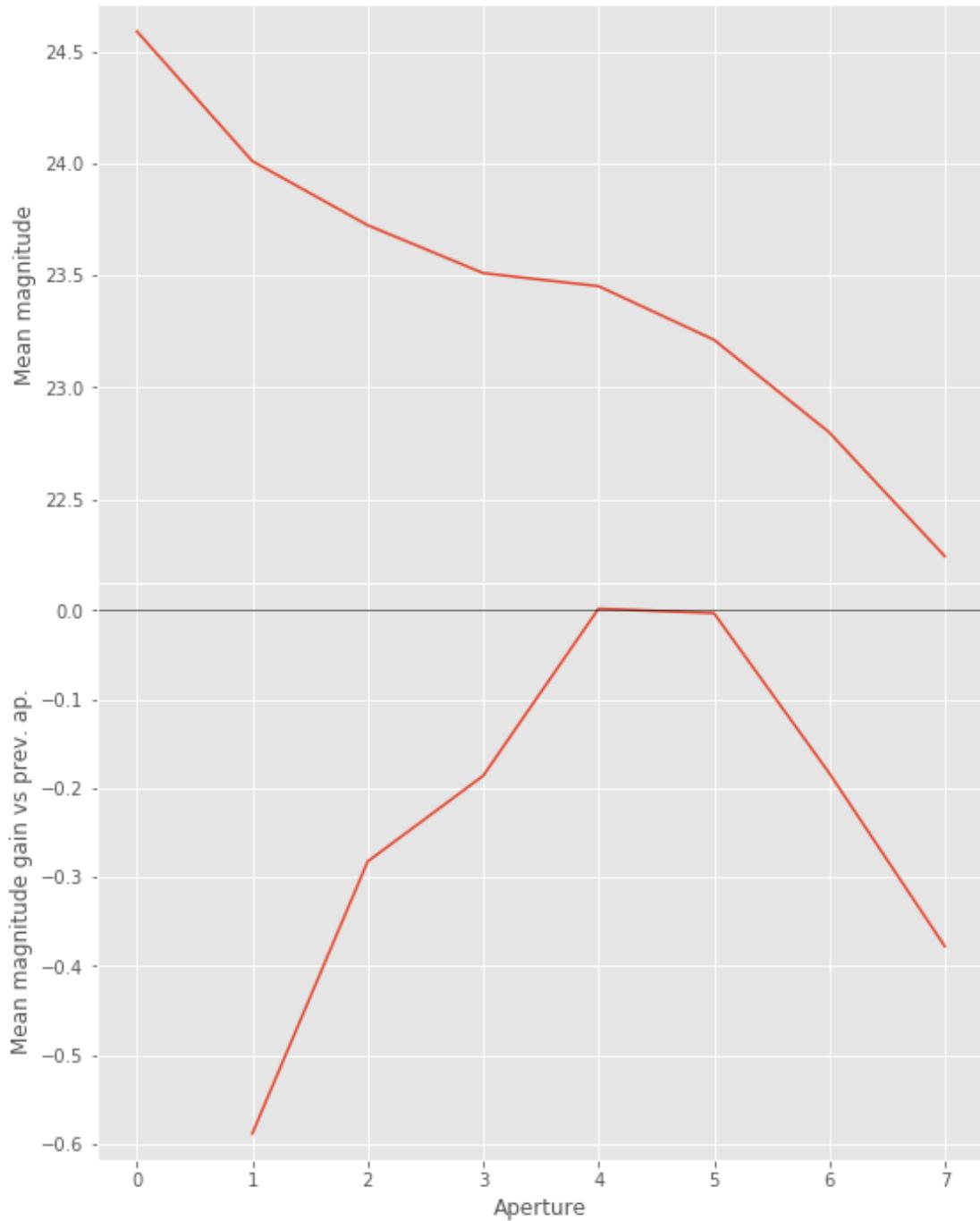
Aperture correction for g band:

Correction: -0.04667313830054809

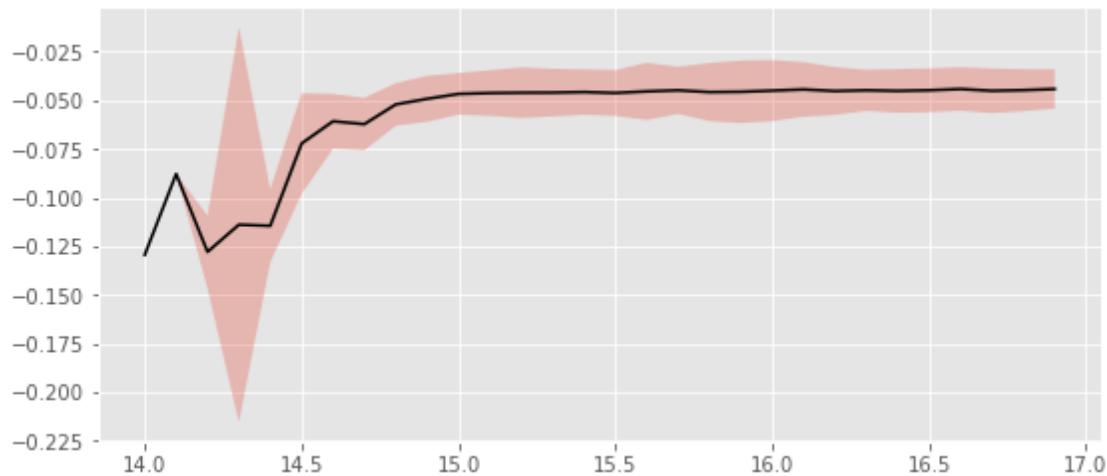
Number of source used: 23717

RMS: 0.011444360751639541

1.2.3 I.b - r band



We will use aperture 5 as target.

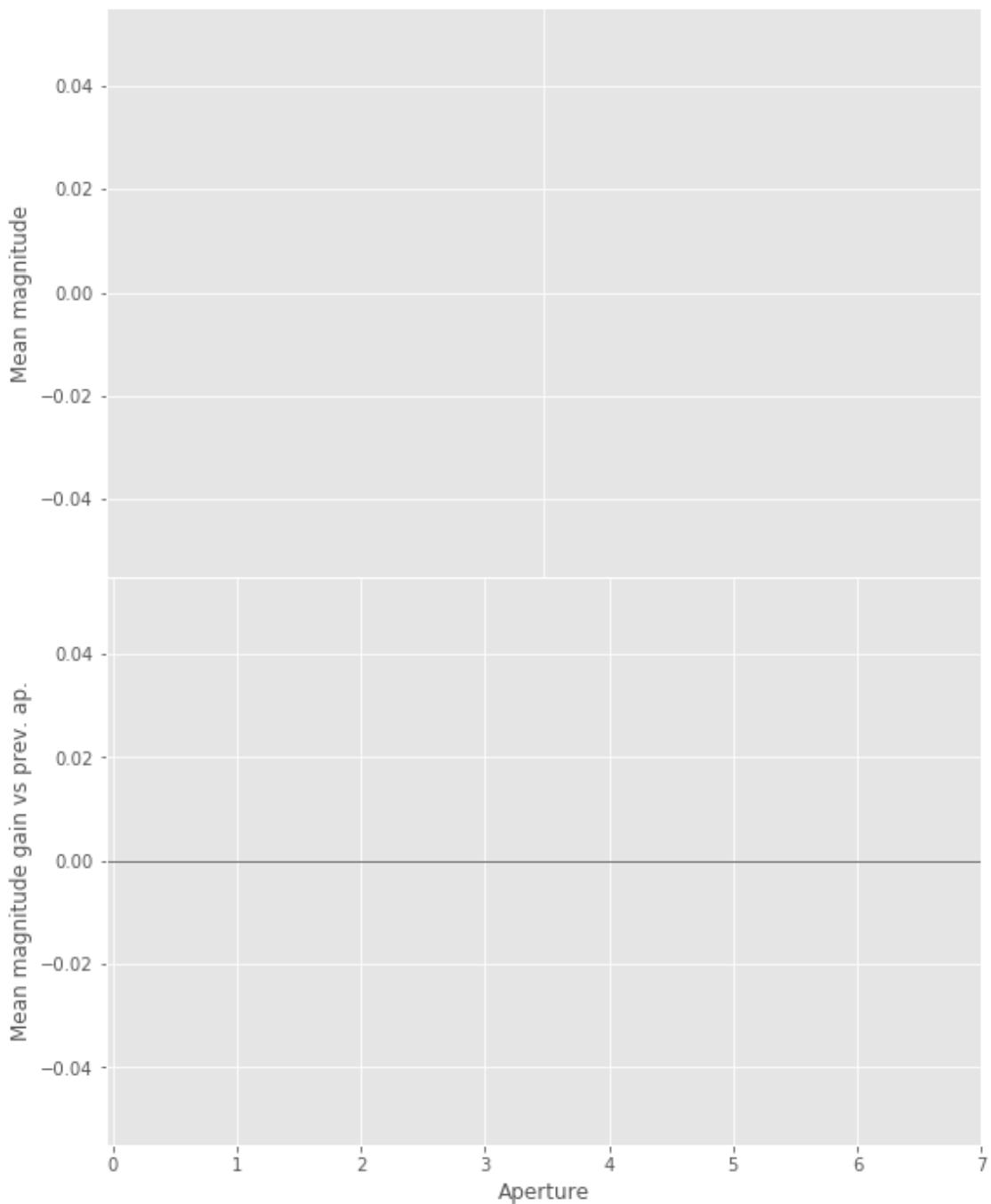


We use magnitudes between 16.0 and 18.0.

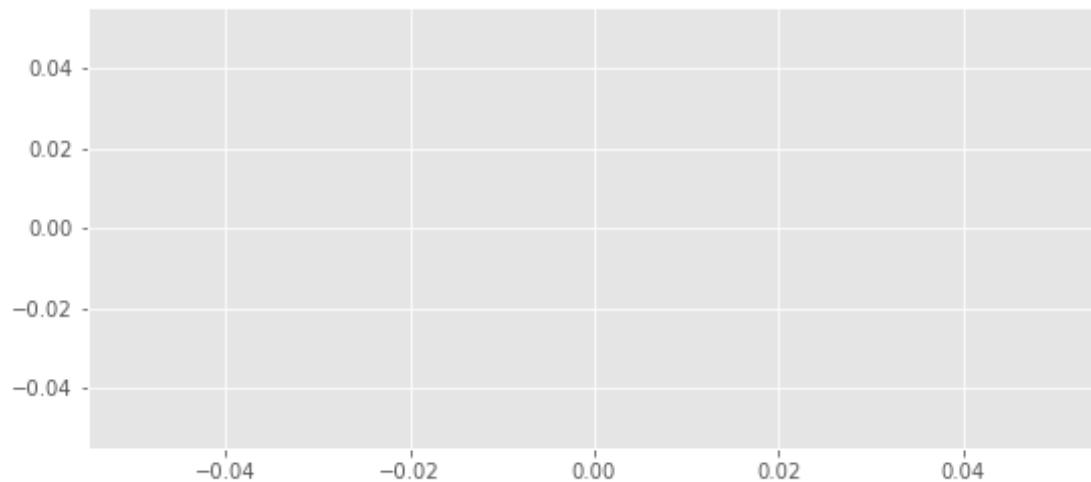
```
Aperture correction for r band:  
Correction: -0.04464416991417153  
Number of source used: 19270  
RMS: 0.011583695530186974
```

1.2.4 I.d - i band

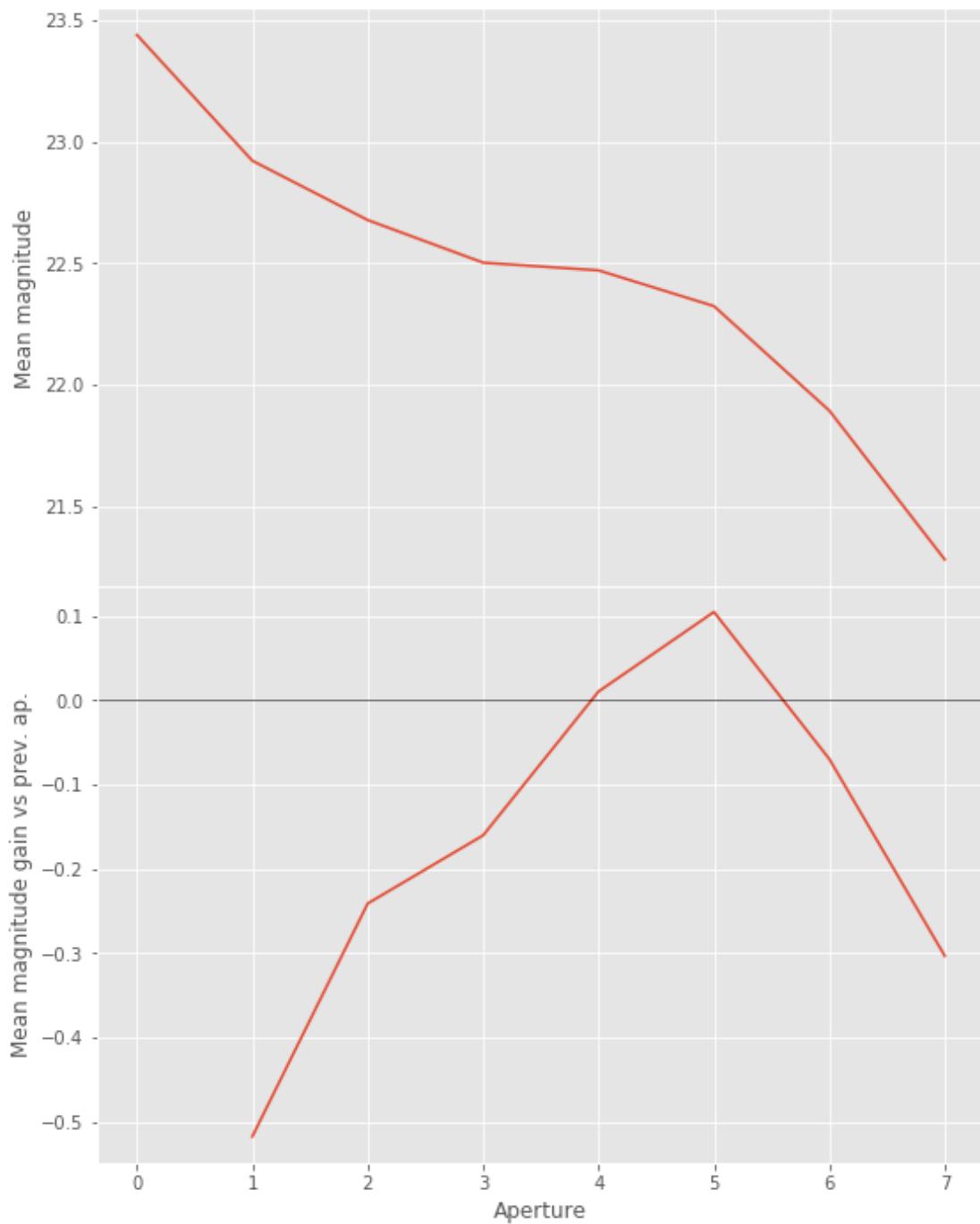
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("Mean of empty slice", RuntimeWarning)  
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("Mean of empty slice", RuntimeWarning)
```



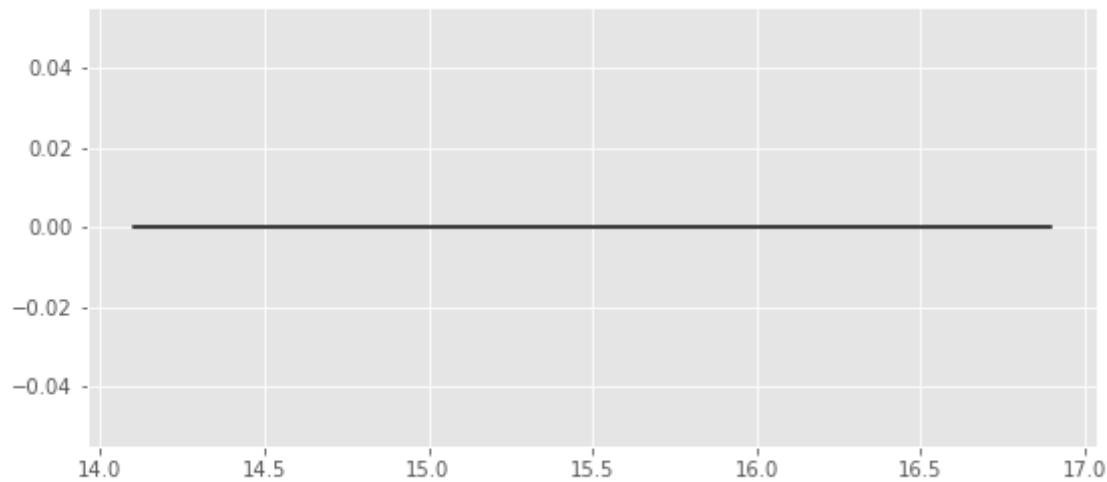
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
  warnings.warn("All-NaN slice encountered", RuntimeWarning)
```



1.2.5 I.e - z band



We will use aperture 4 as target.

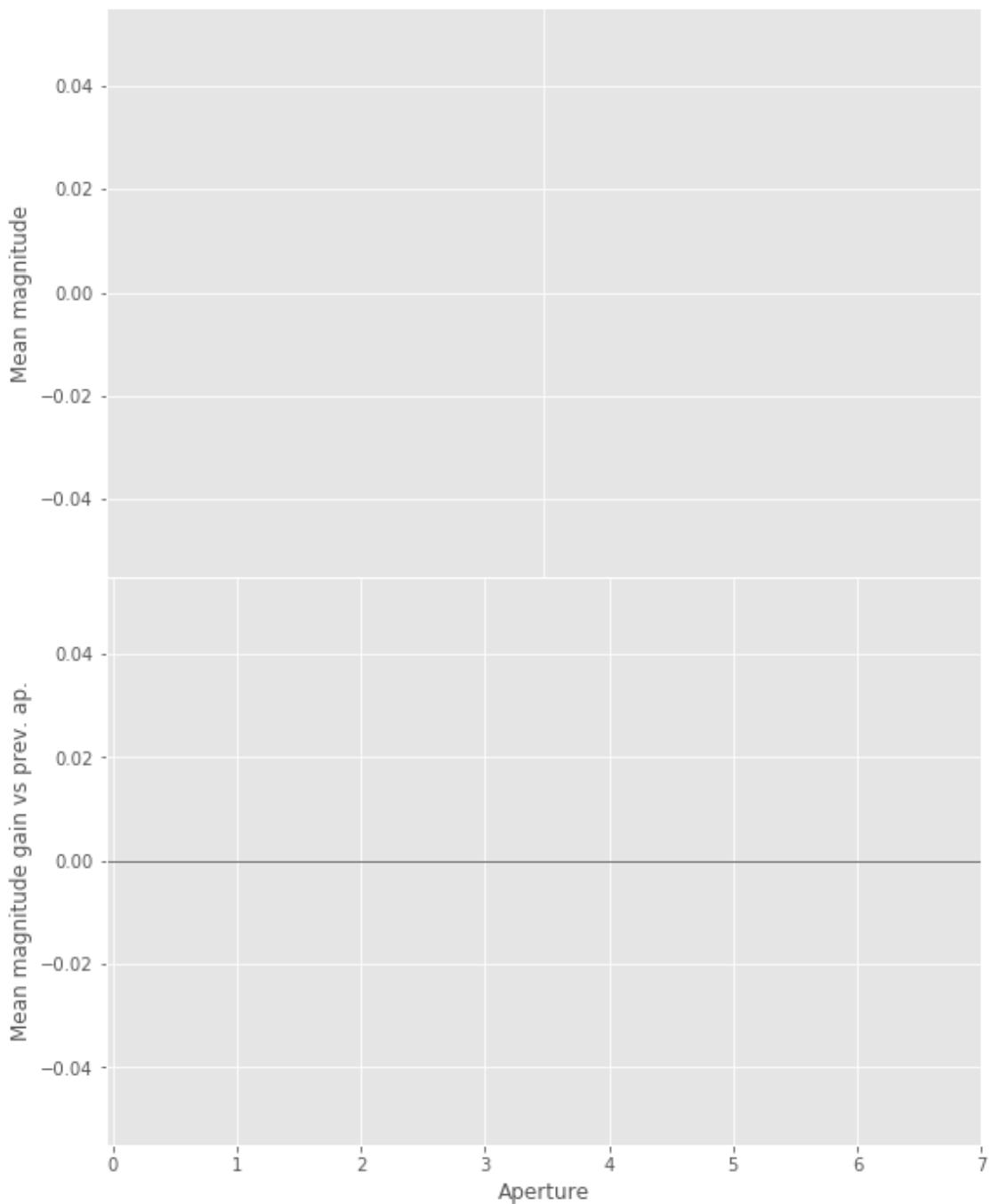


We use magnitudes between 16.0 and 17.5.

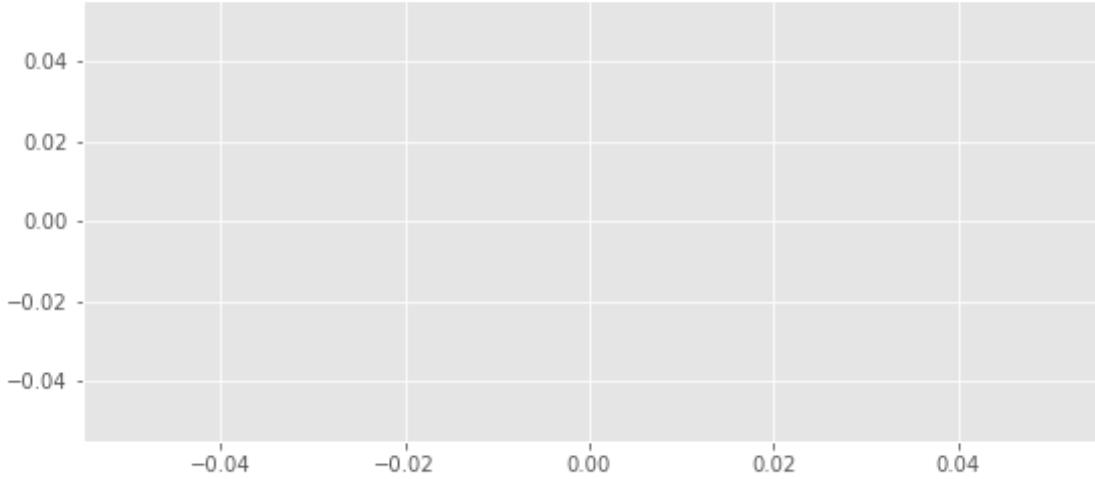
```
Aperture correction for z band:  
Correction: -0.06427007912088101  
Number of source used: 34963  
RMS: 0.017483249006434255
```

1.2.6 I.f - Y band

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("Mean of empty slice", RuntimeWarning)  
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("Mean of empty slice", RuntimeWarning)
```



```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("All-NaN slice encountered", RuntimeWarning)
```



1.3 II - Stellarity

Legacy Survey does not provide a 0 to 1 stellarity so we replace items flagged as PSF according 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)
0	-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
	-1	Star	90.0	5.0	5.0	0.0
	0	Noise	5.0	5.0	90.0	0.0
	+1	Galaxy	5.0	90.0	5.0	0.0

1.4 II - Column selection

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

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:76: RuntimeWarning: invalid value encountered in multiply
    magnitudes = 2.5 * (23 - np.log10(fluxes)) - 48.6
```

Out[27]: <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)
```

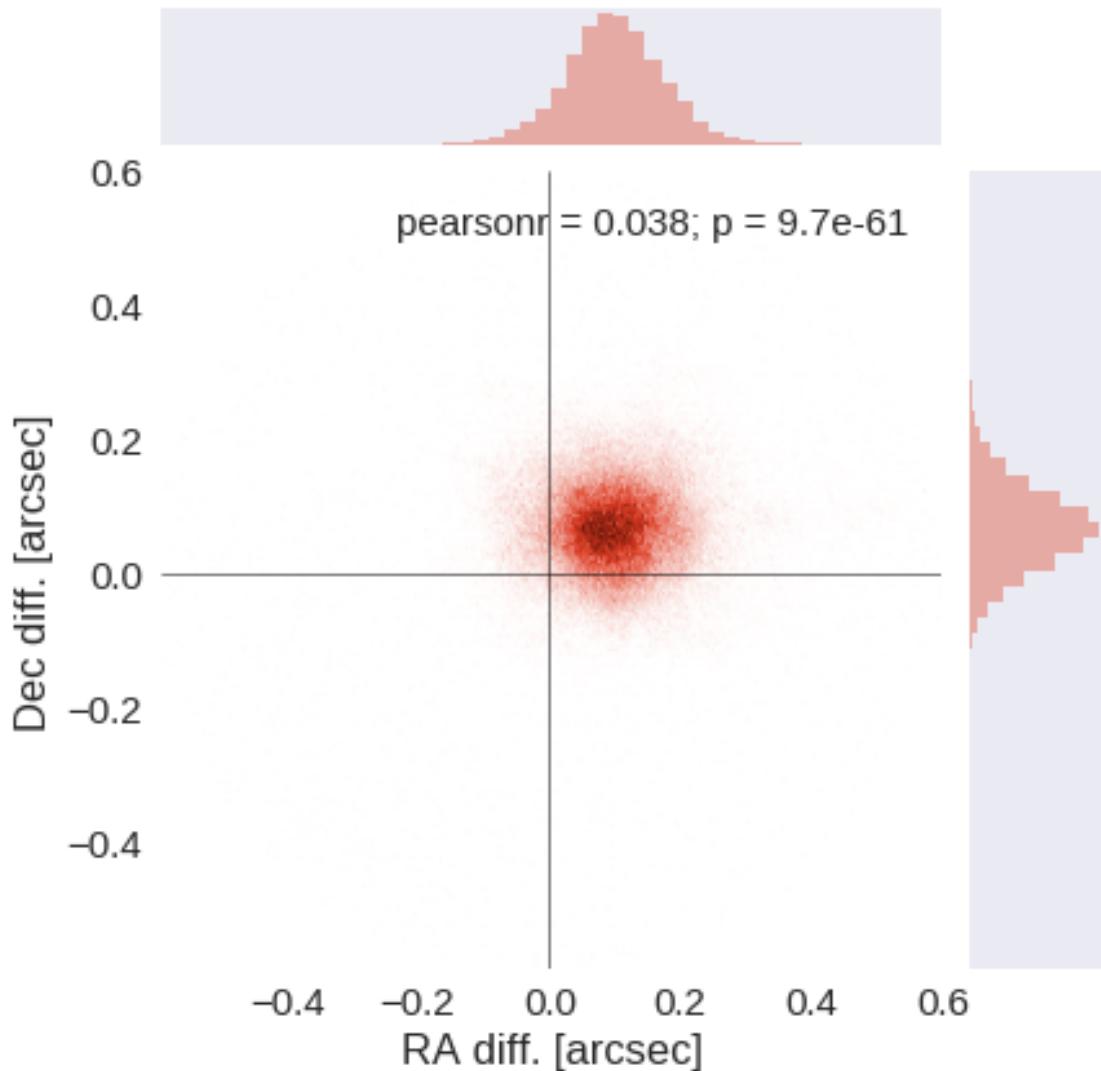
The initial catalogue had 3844247 sources.

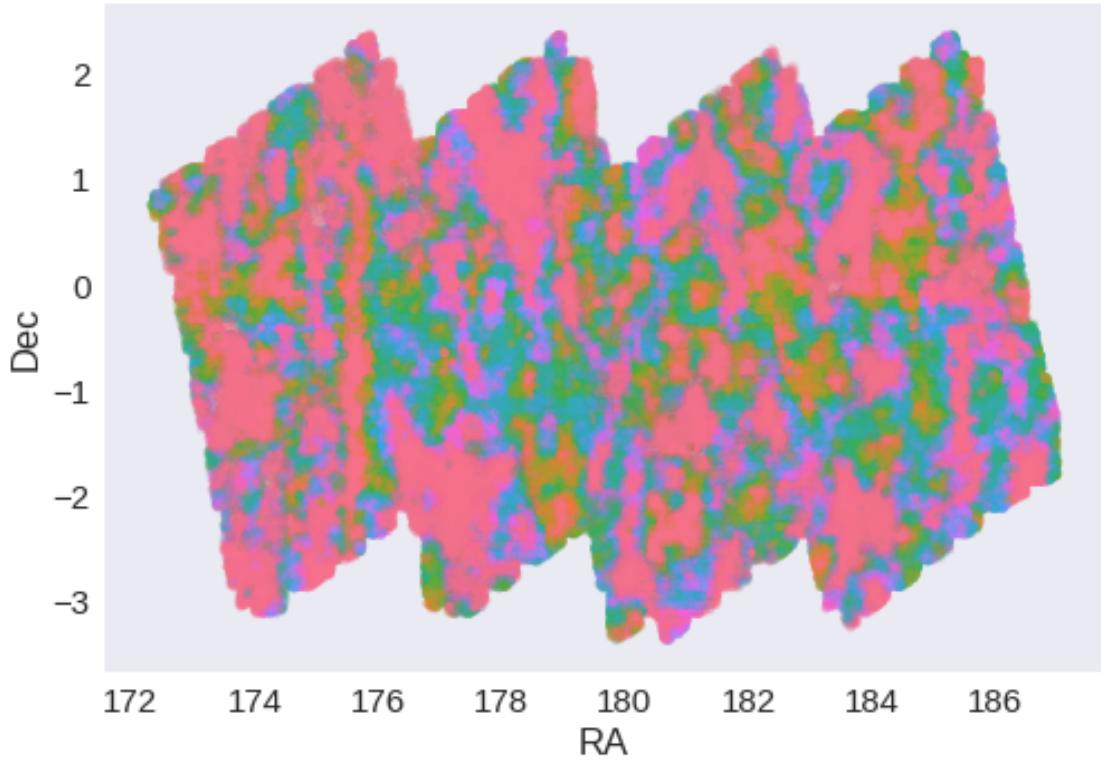
The cleaned catalogue has 3843655 sources (592 removed).

The cleaned catalogue has 591 sources flagged as having been cleaned

1.6 III - Astrometry correction

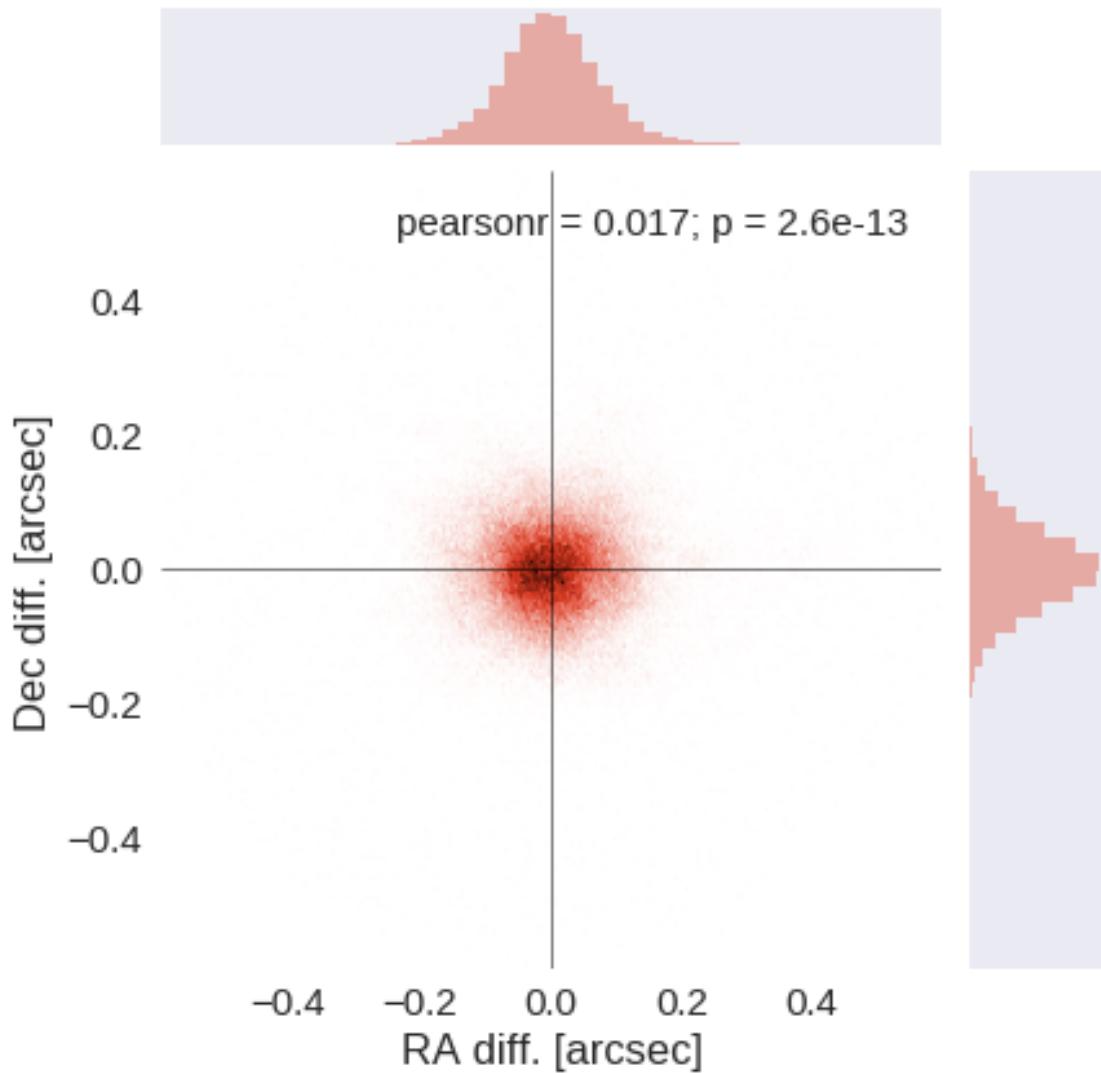
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

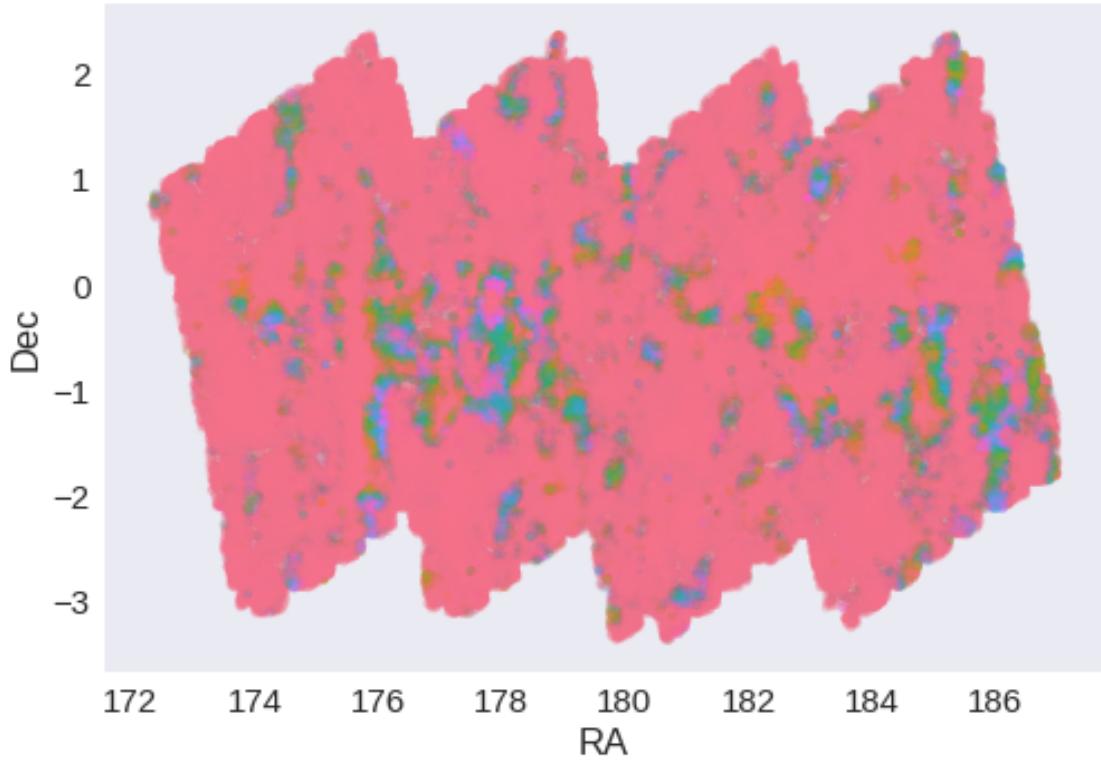




RA correction: -0.09793402824698205 arcsec

Dec correction: -0.06714987024245556 arcsec





1.7 IV - Flagging Gaia objects

191008 sources flagged.

2 V - Saving to disk

1.2_HSC-SSP

January 18, 2018

1 GAMA-12 master catalogue

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

This catalogue comes from `dmu0_HSC`.

In the catalogue, we keep:

- The `object_id` as unique object identifier;
- The position;
- The `g, r, i, z, y` (no N921) aperture magnitude in 2'' that we aperture correct;
- The `g, r, i, z, y` (no N921) kron fluxes and magnitudes.
- The extended flag that we convert to a stellariy.

Note: On ELAIS-N1 the HSC-SSP catalogue does not contain any N816 magnitudes.

We use 2016 as the epoch.

This notebook was run with `herschelhelp_internal` version:
`44f1ae0` (Thu Nov 30 18:27:54 2017 +0000)

1.2 I - Aperture correction

To compute aperture correction we need to determine two parameters: 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 in each aperture compared to the previous (except for the first of course).

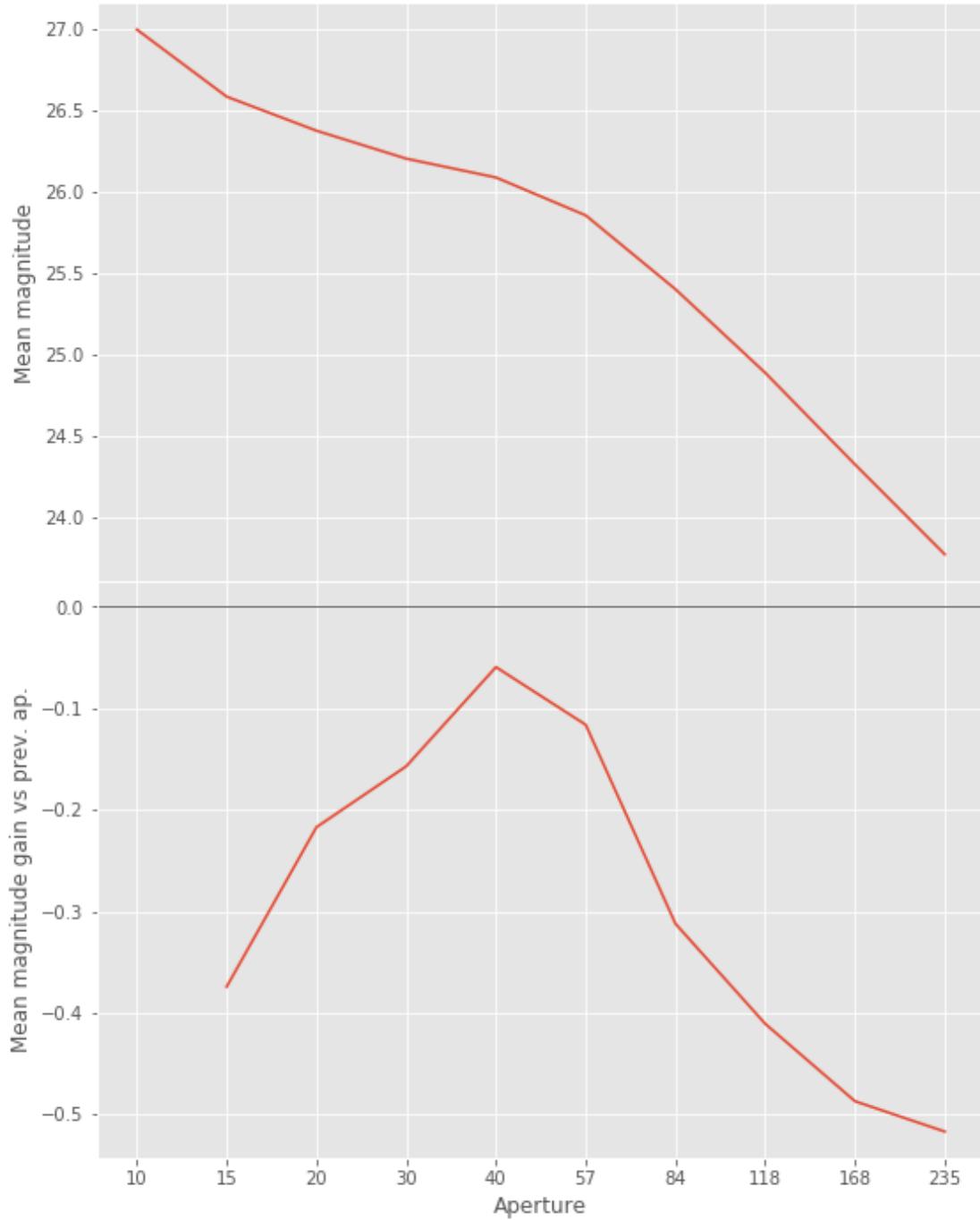
As target aperture, we should use the smallest (i.e. less noisy) aperture for which most of the flux is captured.

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.

No error column for a `y` band aperture magnitude.

1.2.1 I.a - g band

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid value encountered in less than  
mags = magnitudes[:, stellarity > stel_threshold].copy()
```

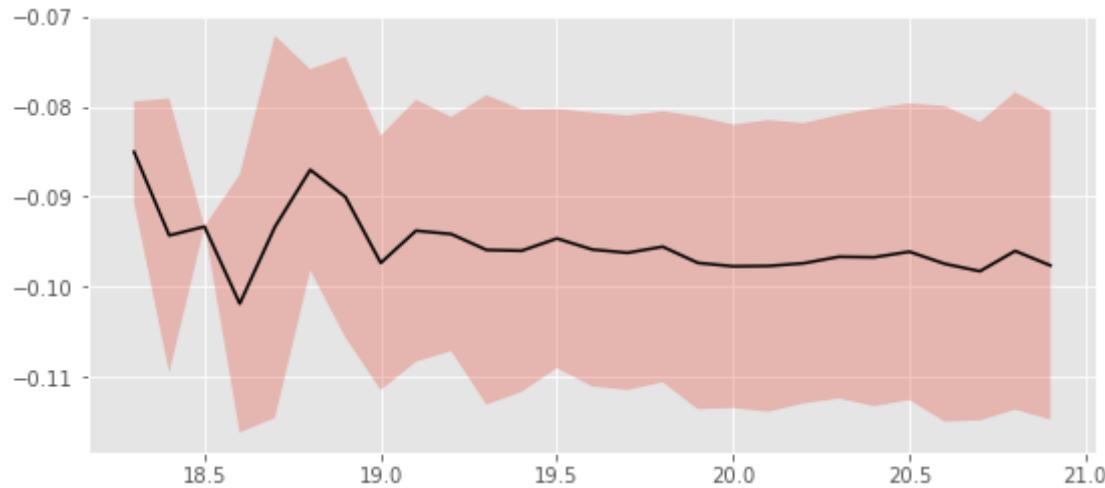


We will use aperture 40 as target.

```

/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid value
    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: -0.09674453735351562
 Number of source used: 6713
 RMS: 0.016023767426012712

```

/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)

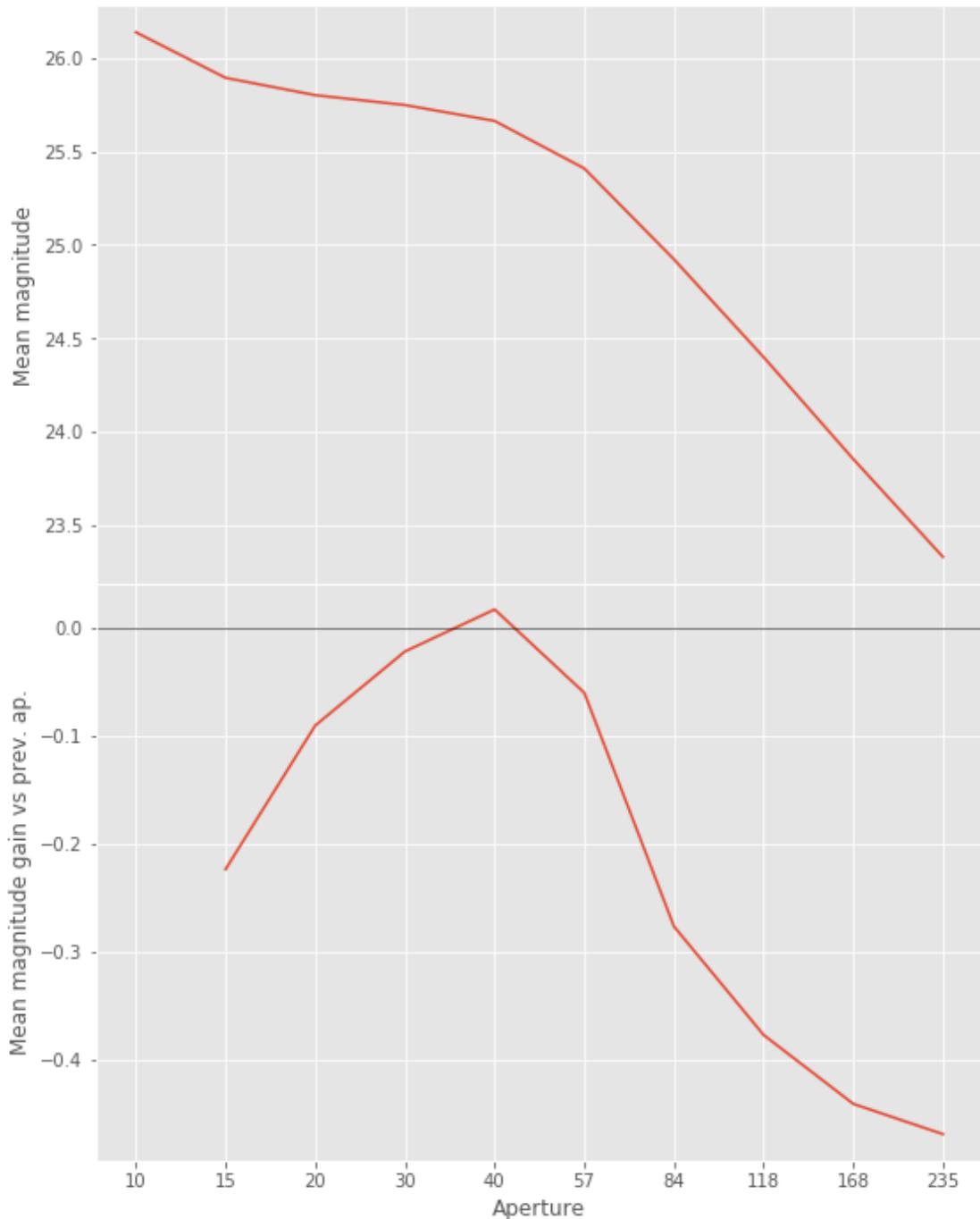
```

1.2.2 I.b - r band

```

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

```



We will use aperture 40 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid value
  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
```

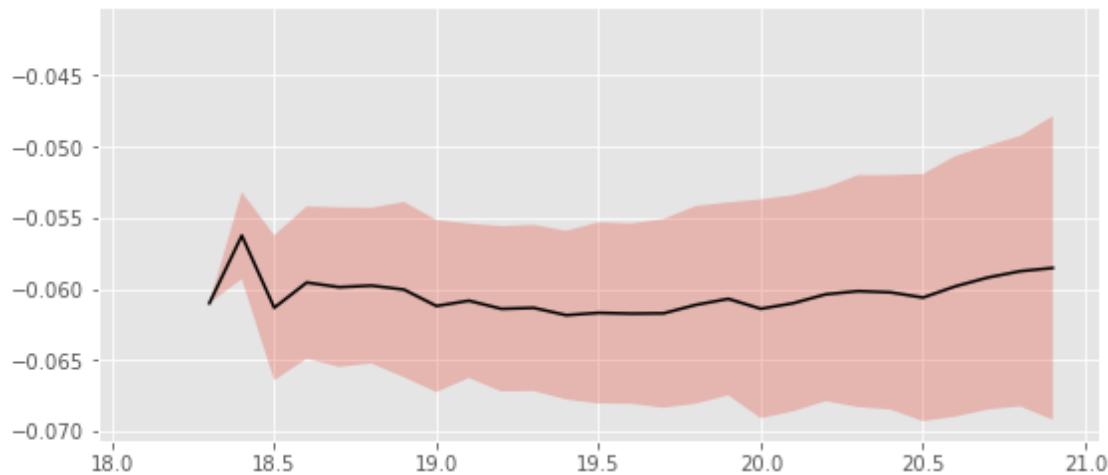
```
    mask &= (stellarity > 0.9)
```

```
/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 19.7.

Aperture correction for r band:

Correction: -0.06122016906738281

Number of source used: 3680

RMS: 0.00599616115561753

```
/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)
```

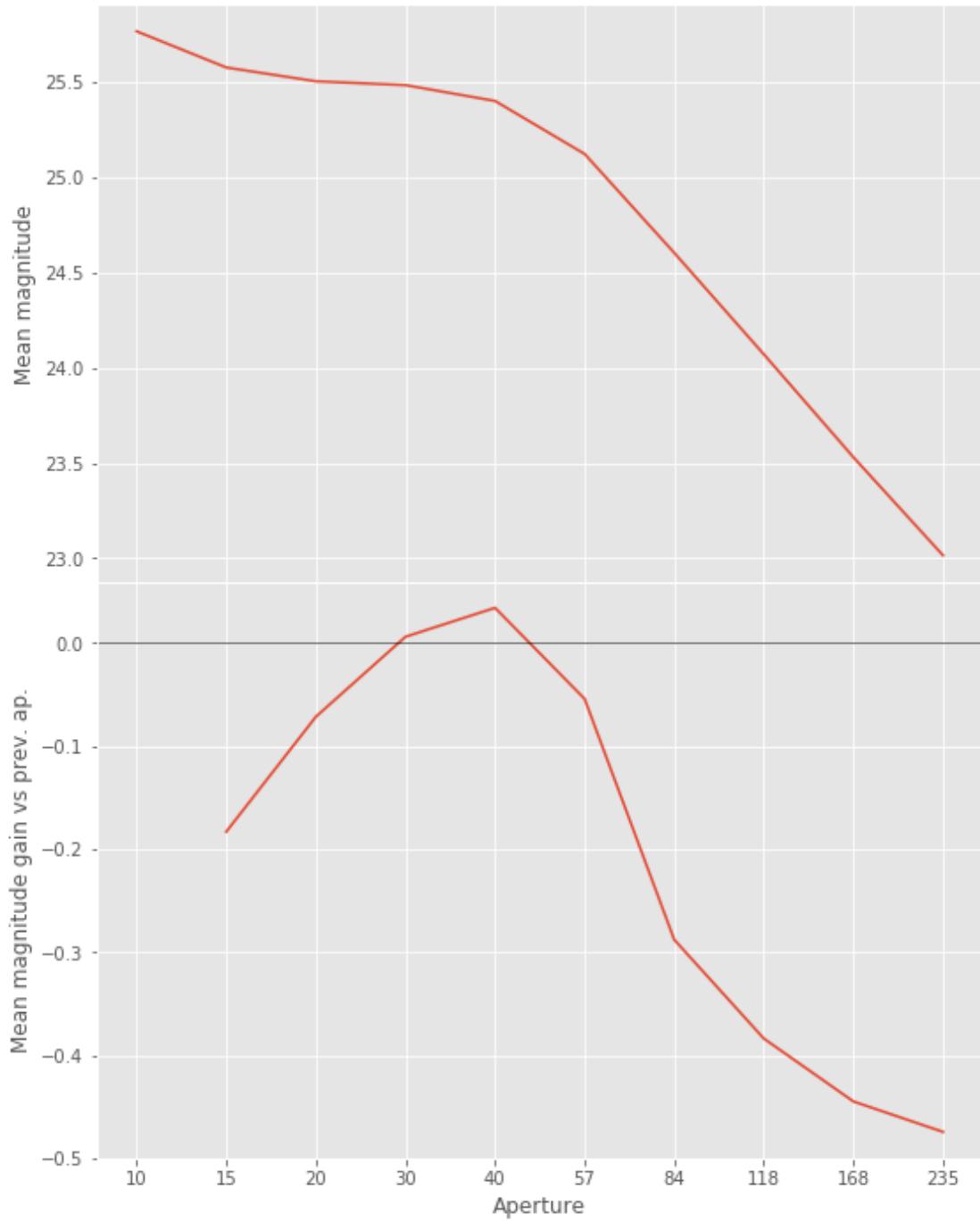
```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value enc
```

```
    mask &= (mag <= mag_max)
```

1.2.3 I.c - i band

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid val
```

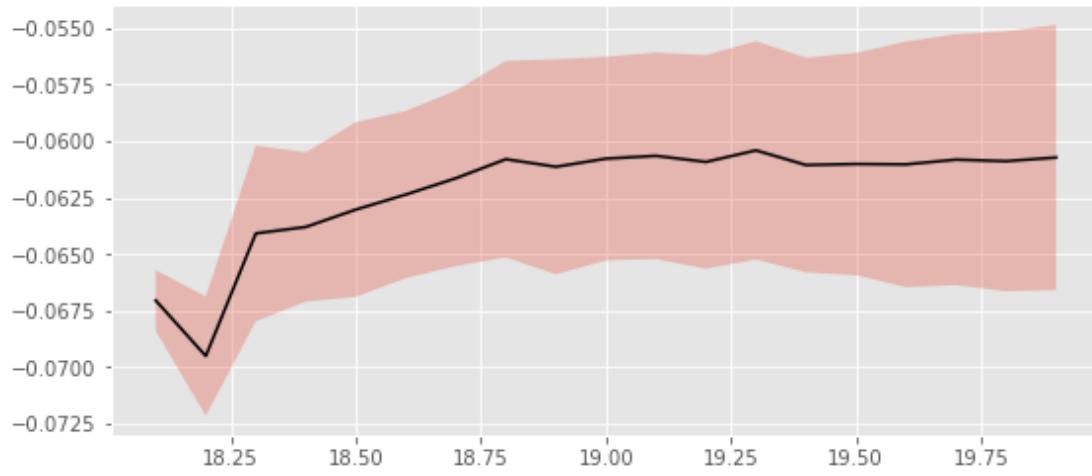
```
    mags = magnitudes[:, stellarity > stel_threshold].copy()
```



We will use aperture 40 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid value
  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 encountered in less than or equal to
    mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value encountered in greater than or equal to
    mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value encountered in less than or equal to
    mask &= (mag <= mag_max)
```



We use magnitudes between 18.5 and 19.8.

Aperture correction for i band:

Correction: -0.061016082763671875

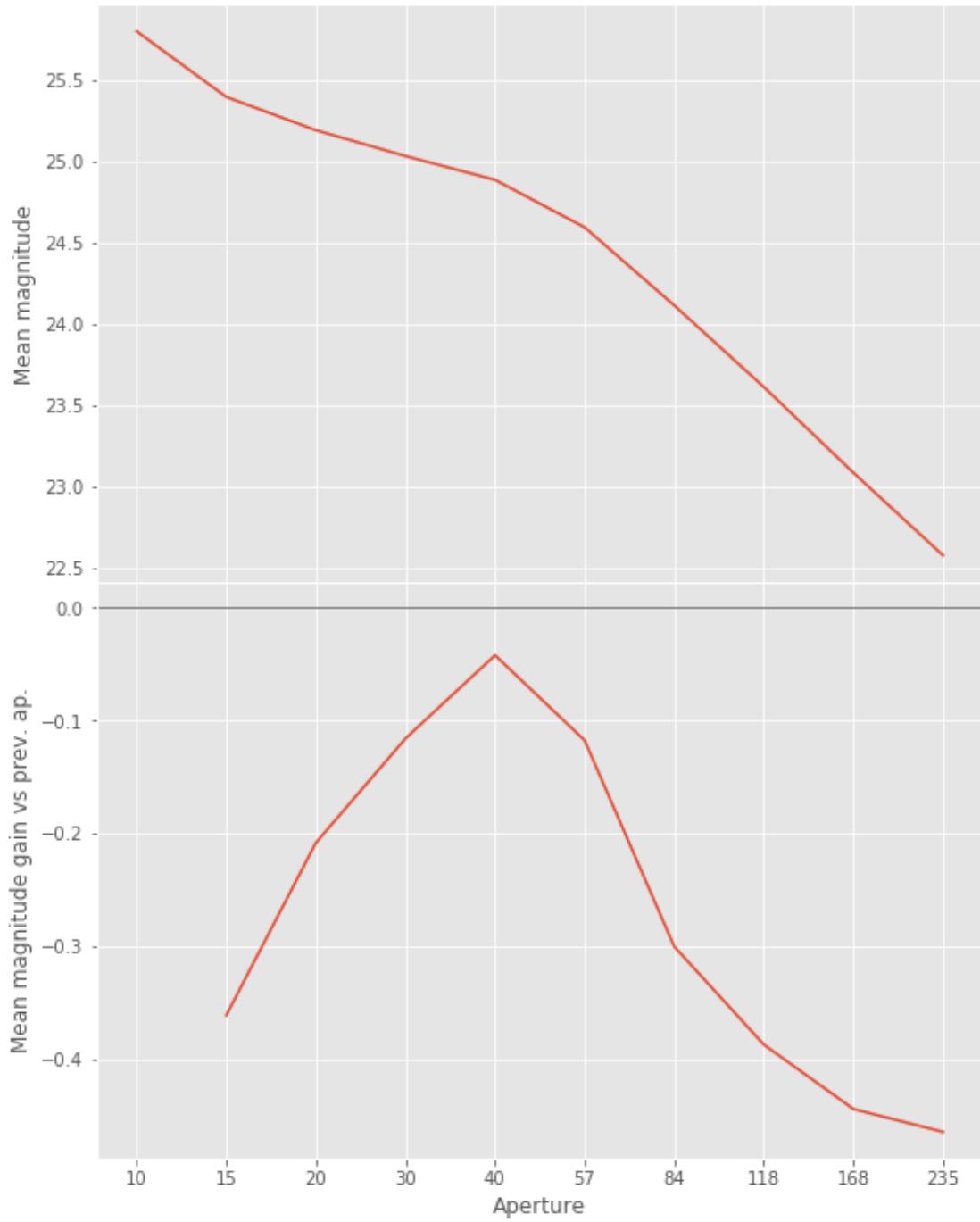
Number of source used: 10687

RMS: 0.004784361518138592

```
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value encountered in less than or equal to
    mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value encountered in greater than or equal to
    mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value encountered in less than or equal to
    mask &= (mag <= mag_max)
```

1.2.4 I.d - z band

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid value encountered in less than or equal to
    mags = magnitudes[:, stellarity > stel_threshold].copy()
```



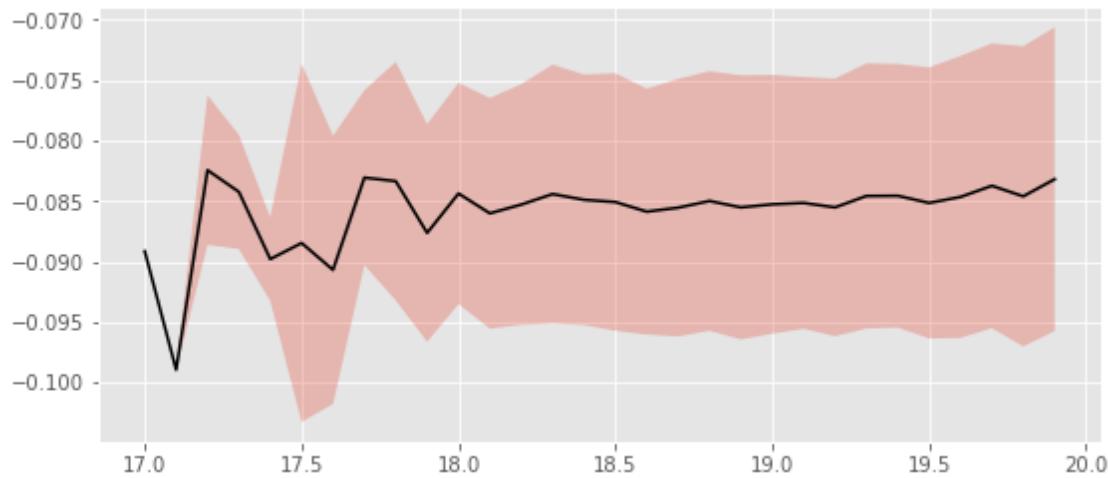
We will use aperture 40 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid value
  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 encountered in less than equal
    mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag <= mag_max)

```



We use magnitudes between 17.5 and 19.8.

Aperture correction for z band:
 Correction: -0.08498001098632812
 Number of source used: 15443
 RMS: 0.010872531231867034

```

/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value encountered in less than equal
    mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag <= mag_max)

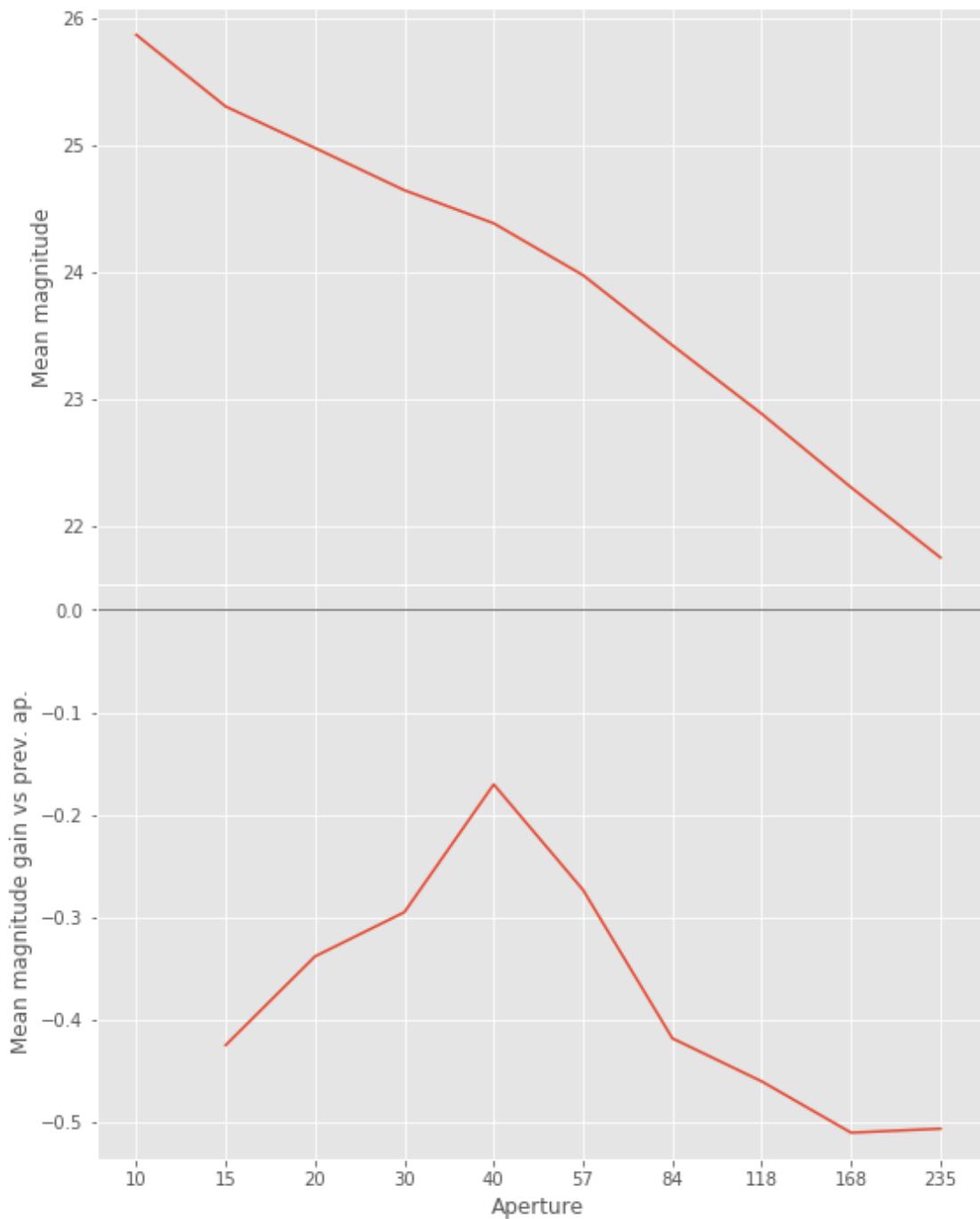
```

1.2.5 I.e - y band

```

/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:850: RuntimeWarning: invalid value encountered in less than equal
    mags = magnitudes[:, stellarity > stel_threshold].copy()

```



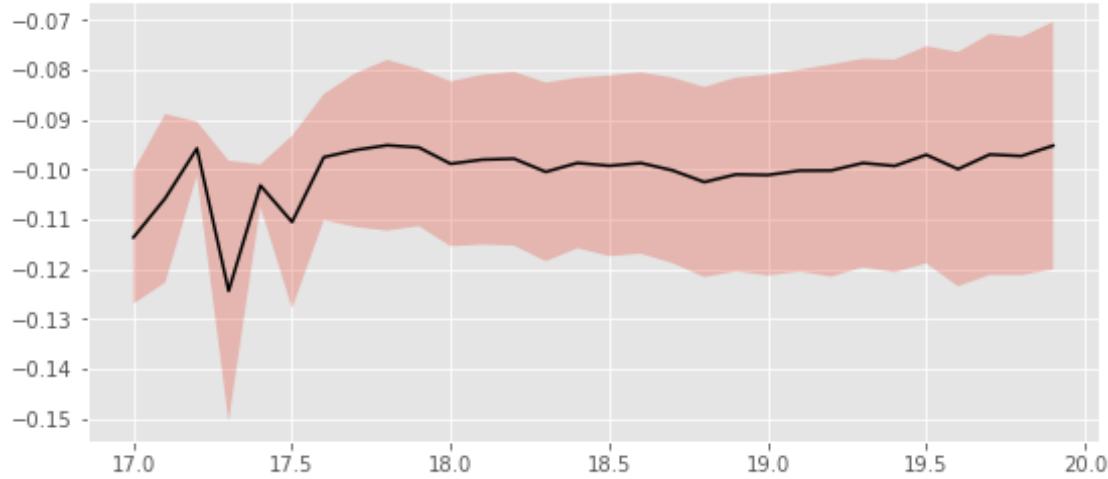
We will use aperture 40 as target.

```
/opt/herschelhelp_internal/herschelhelp_internal/masterlist.py:903: RuntimeWarning: invalid value
  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 encountered in less than equal
    mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag <= mag_max)

```



We use magnitudes between 17 and 18.7.

Aperture correction for y band:

Correction: -0.098480224609375

Number of source used: 3877

RMS: 0.01754249850290026

```

/opt/herschelhelp_internal/herschelhelp_internal/utils.py:129: RuntimeWarning: invalid value encountered in less than equal
    mask &= (stellarity > 0.9)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:131: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag >= mag_min)
/opt/herschelhelp_internal/herschelhelp_internal/utils.py:133: RuntimeWarning: invalid value encountered in less than equal
    mask &= (mag <= mag_max)

```

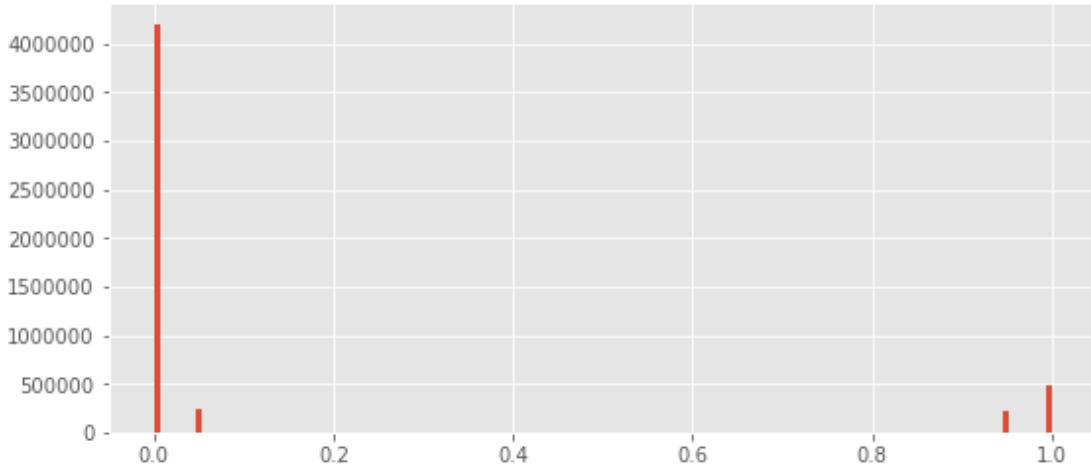
1.3 II - Stellarity

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)
0	-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
	-1	Star	90.0	5.0	5.0	0.0
	0	Noise	5.0	5.0	90.0	0.0
	+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)
```

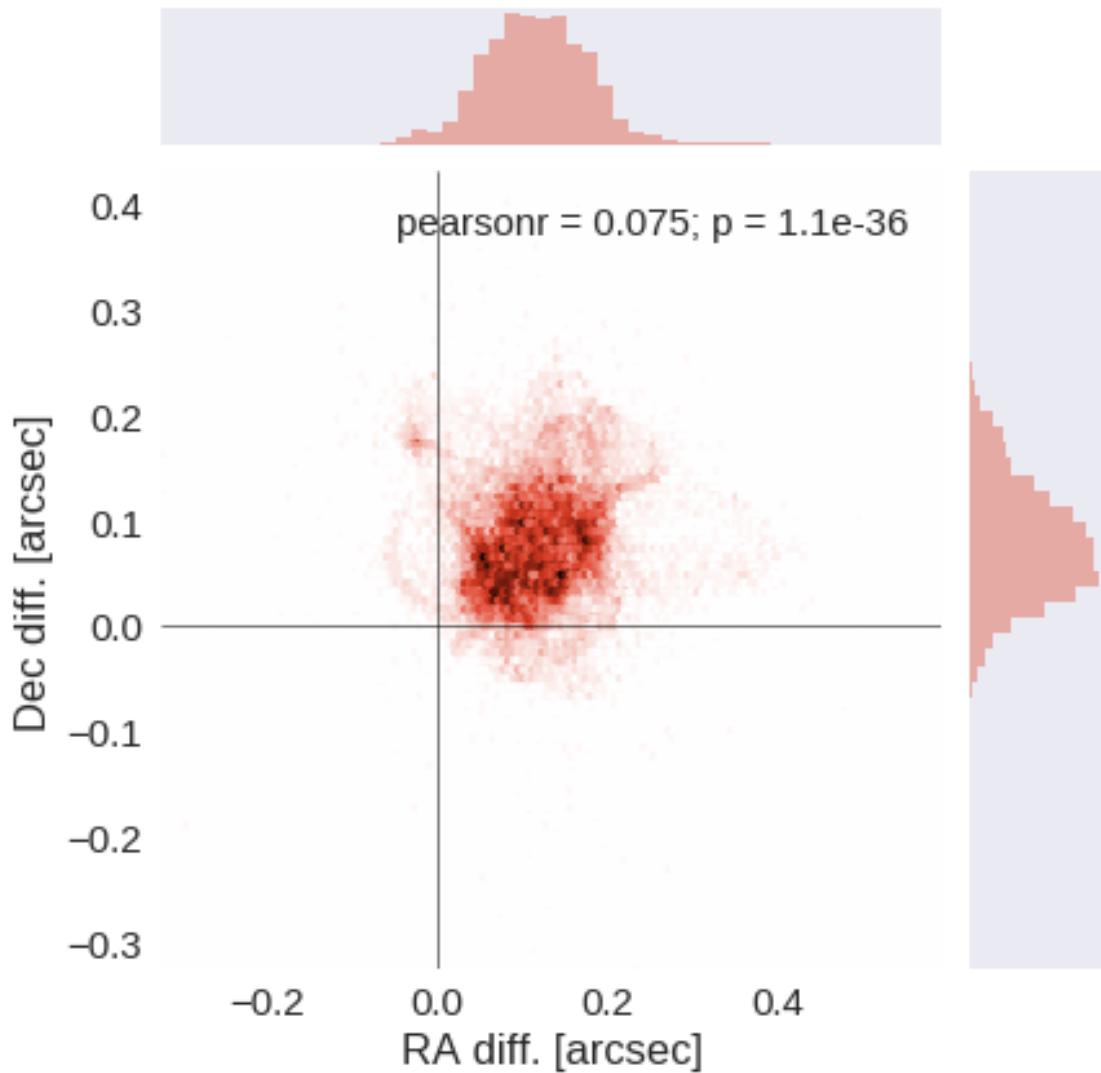
The initial catalogue had 5144451 sources.

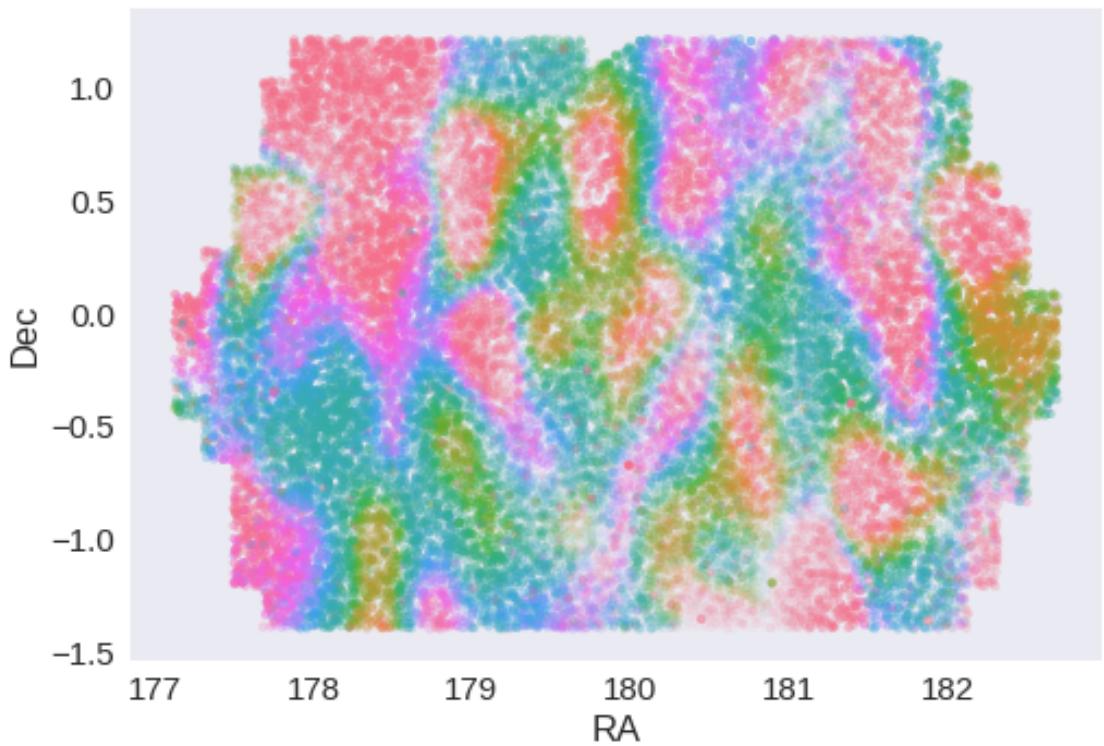
The cleaned catalogue has 5144219 sources (232 removed).

The cleaned catalogue has 230 sources flagged as having been cleaned

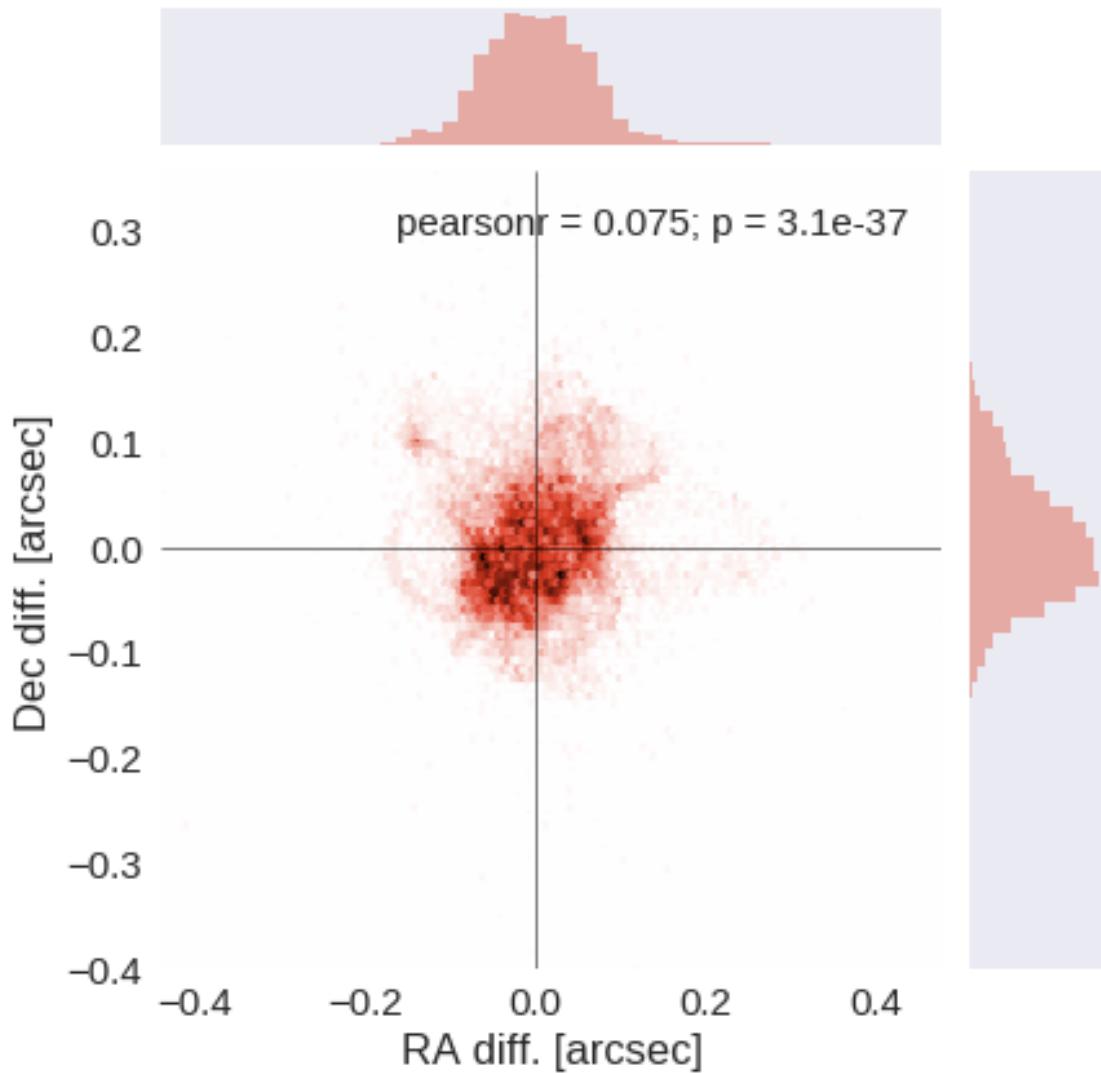
1.6 III - Astrometry correction

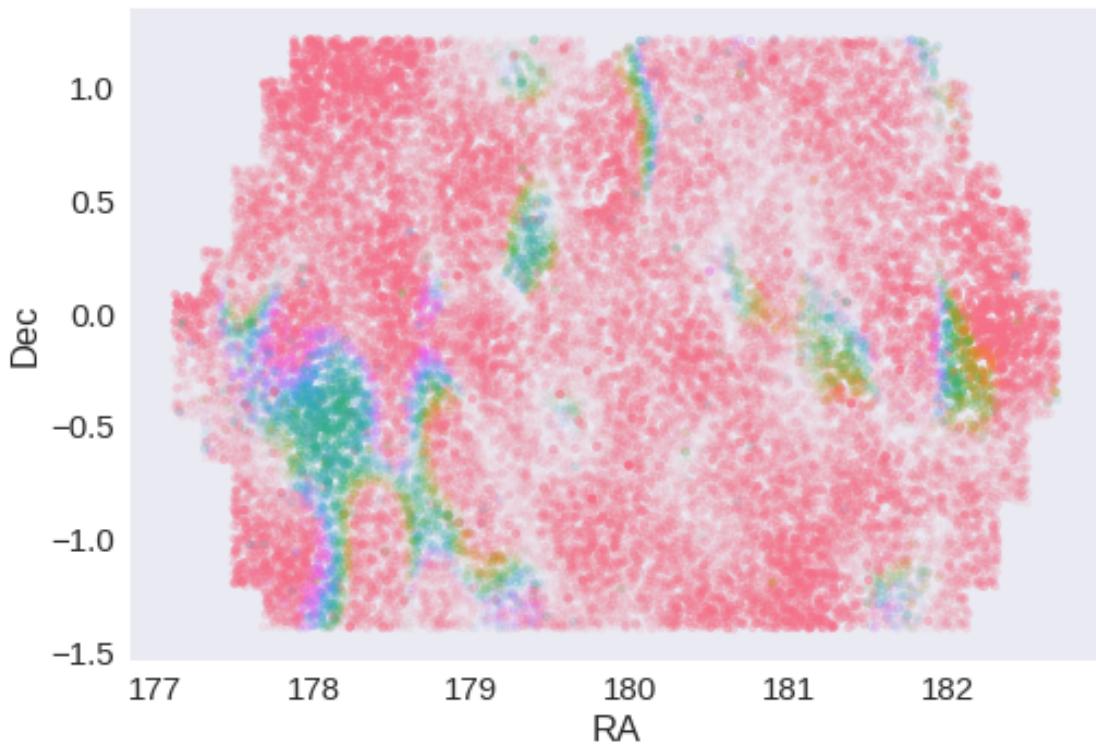
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.





RA correction: -0.1140621750266746 arcsec
Dec correction: -0.07552225386344702 arcsec





1.7 IV - Flagging Gaia objects

31250 sources flagged.

1.8 V - Flagging objects near bright stars

2 VI - Saving to disk

1.3_KIDS

January 18, 2018

1 GAMA-12 master catalogue

1.1 Preparation of KIDS/VST data

Kilo Degree Survey/VLT Survey Telescope catalogue: the catalogue comes from dmu0_KIDS.

In the catalogue, we keep:

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

We take 2014 as the observation year from a typical image header.

This notebook was run with herschelhelp_internal version:
44f1ae0 (Thu Nov 30 18:27:54 2017 +0000)

1.2 I - Column selection

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

```
/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)
```

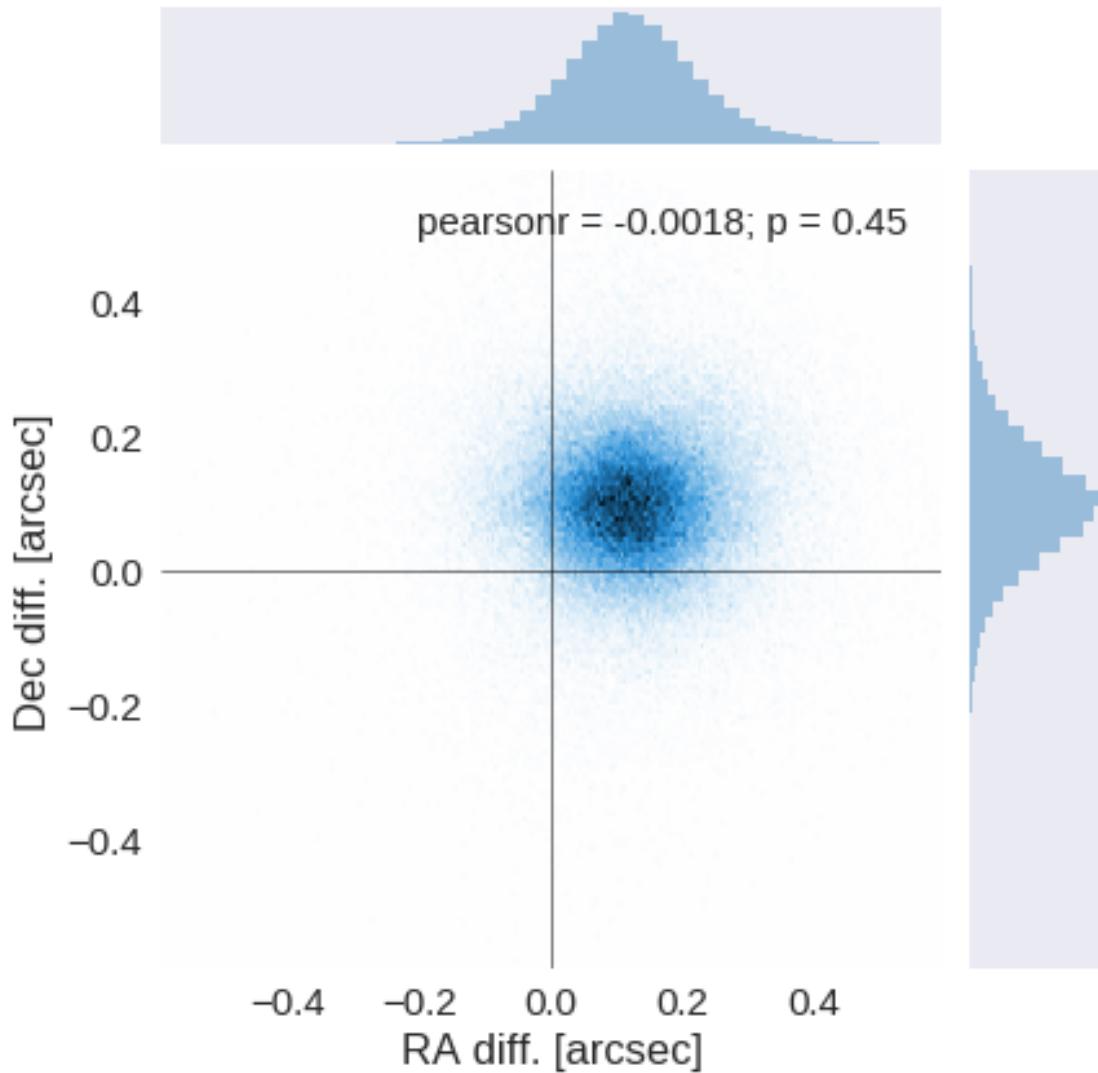
The initial catalogue had 6582267 sources.

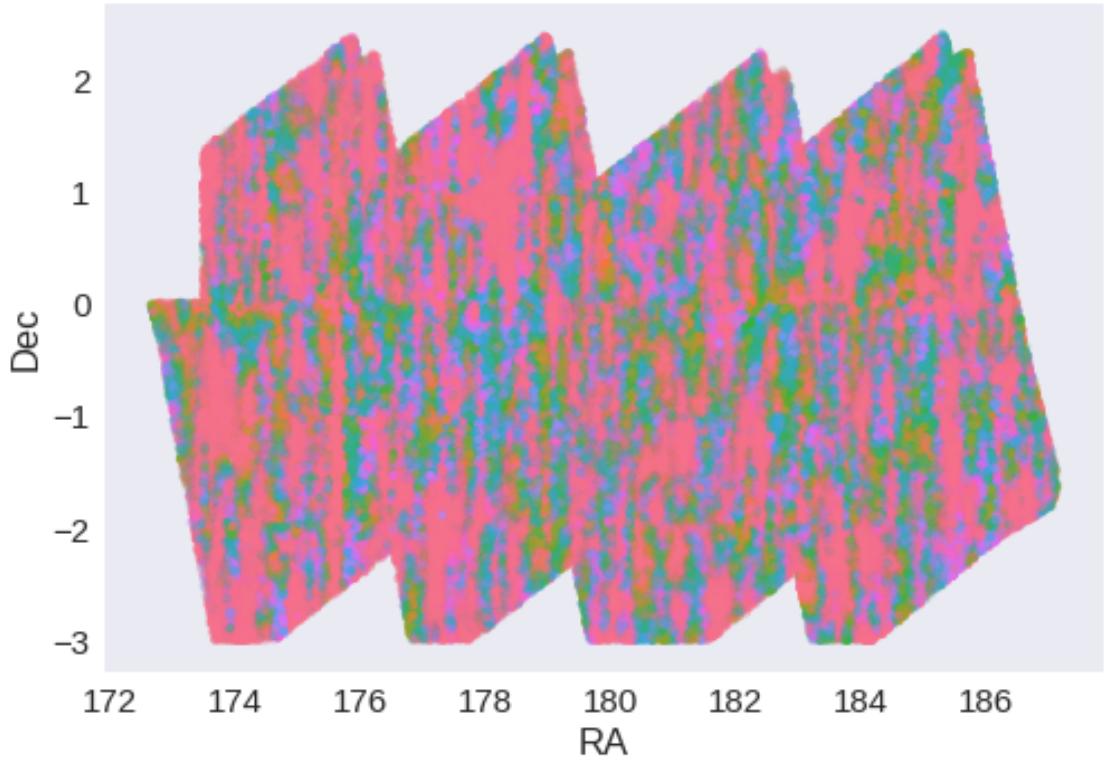
The cleaned catalogue has 6582157 sources (110 removed).

The cleaned catalogue has 110 sources flagged as having been cleaned

1.4 III - Astrometry correction

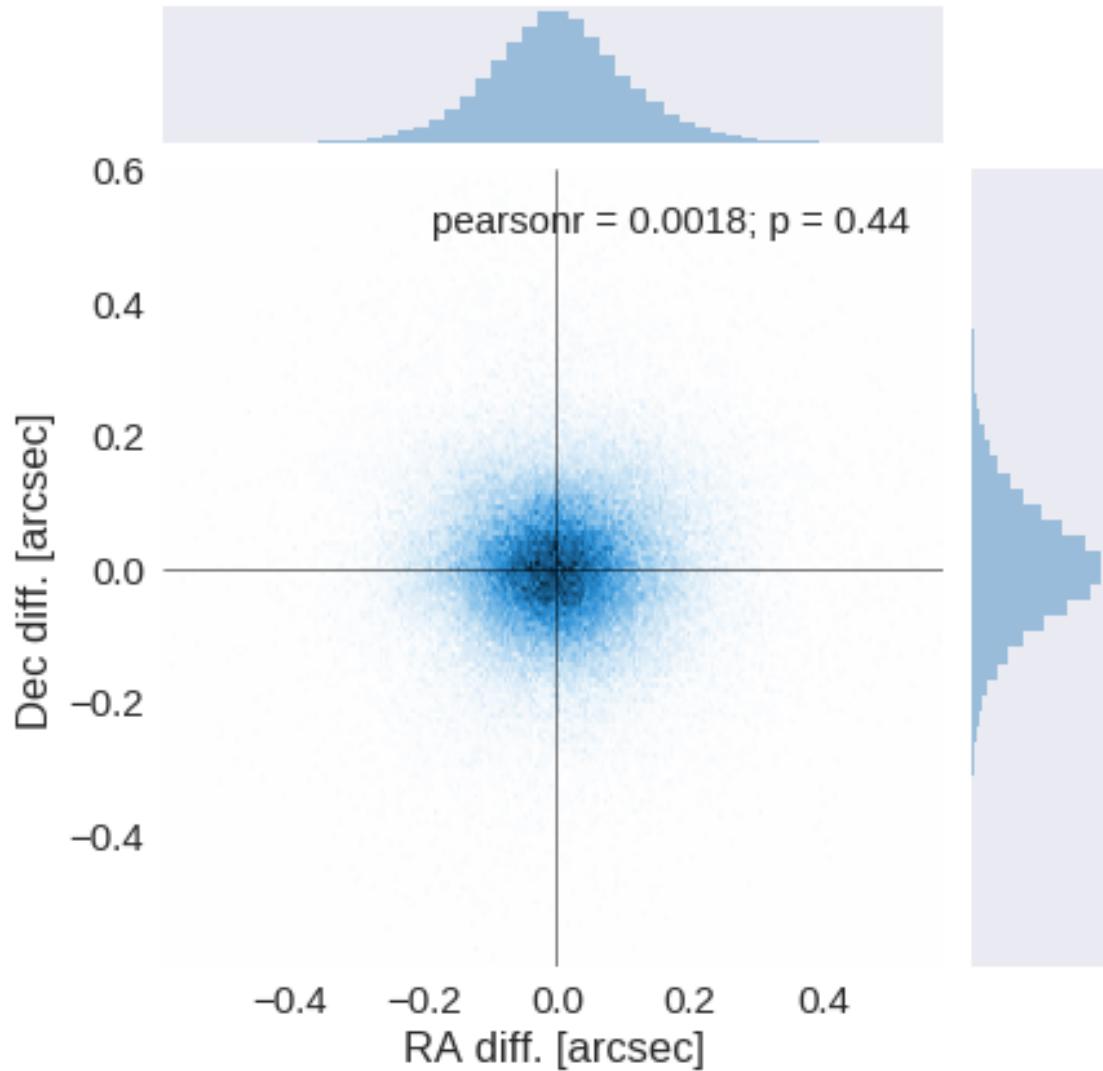
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

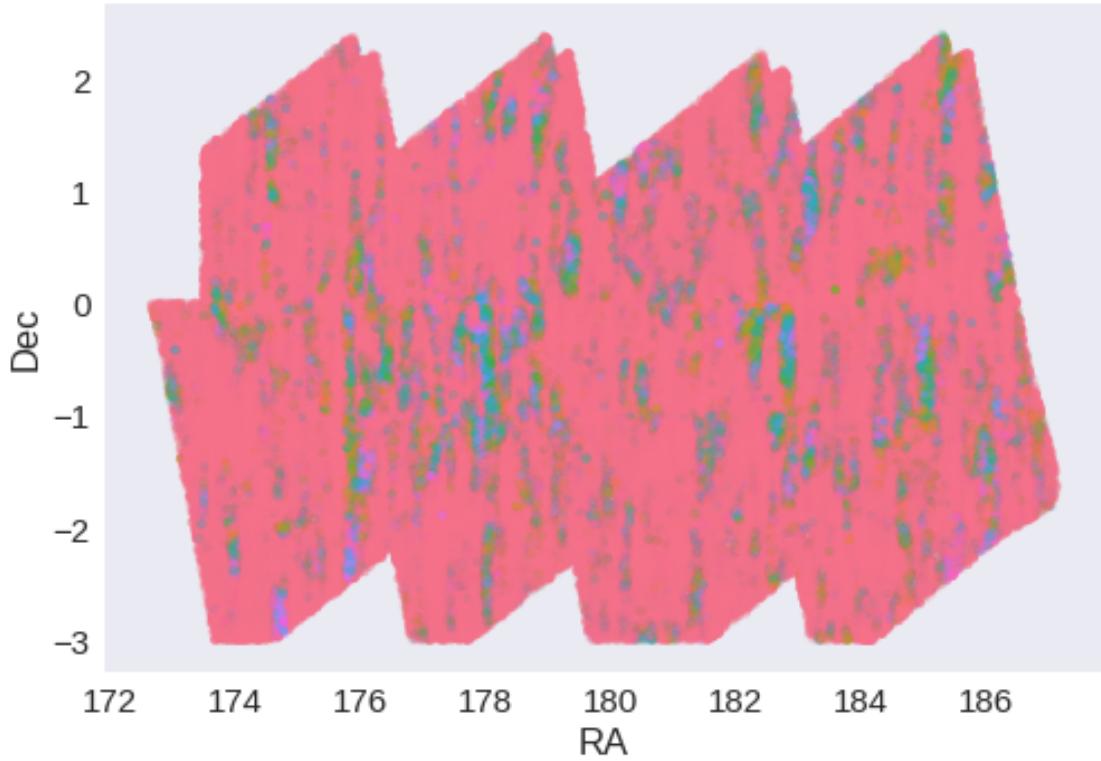




RA correction: -0.12011726085461305 arcsec

Dec correction: -0.10001507929536801 arcsec





1.5 IV - Flagging Gaia objects

196511 sources flagged.

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.4_PanSTARRS

January 18, 2018

1 GAMA-12 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 ‘F’ above means we take the forced photometry from positions in the chi-squared image. We are also using an updated catalogue which has significantly fewer duplicates.

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 were done between 2010 and 2015 ([ref](#)).

This notebook was run with herschelhelp_internal version:
44f1ae0 (Thu Nov 30 18:27:54 2017 +0000)

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)
```

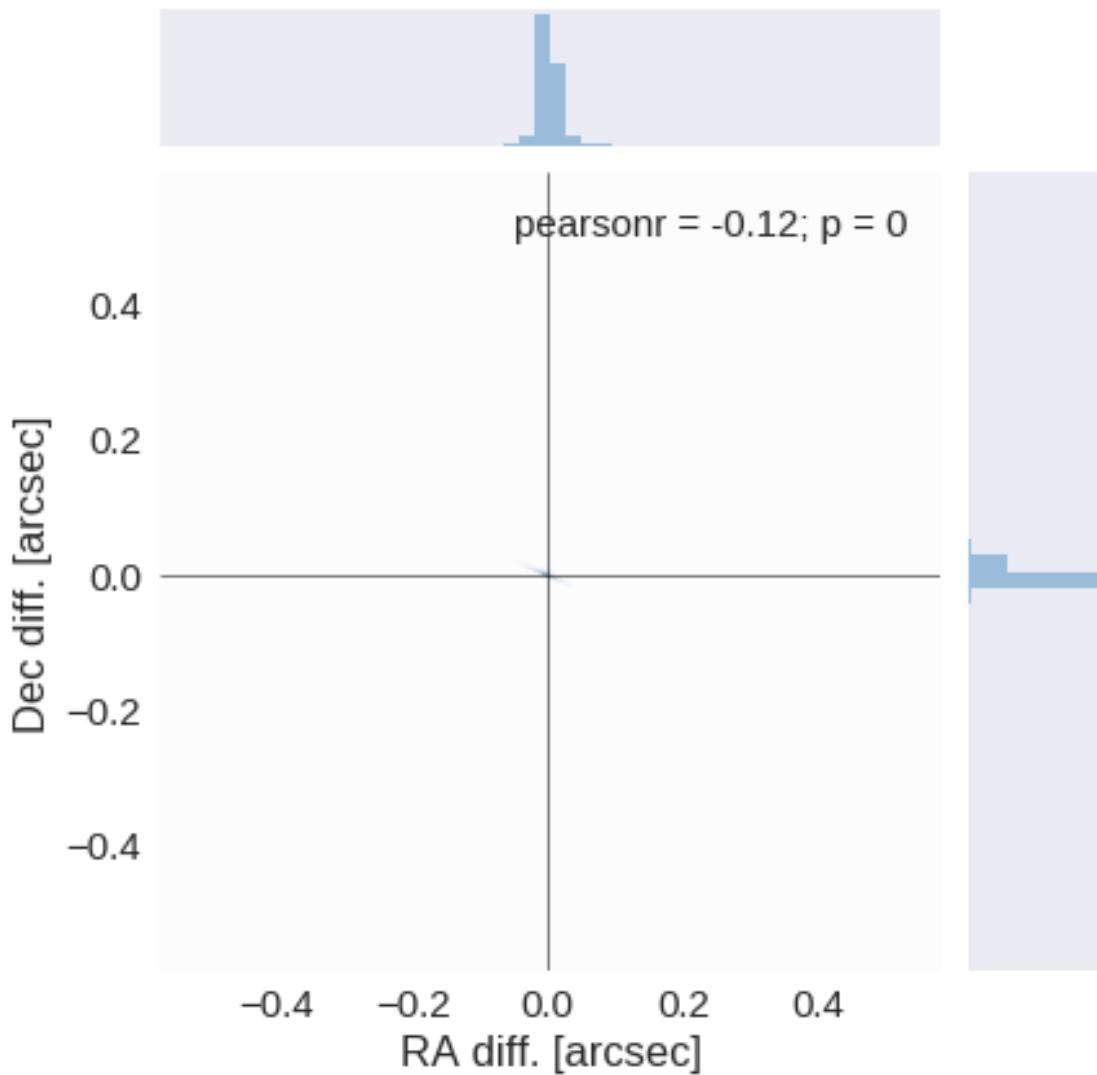
The initial catalogue had 1281409 sources.

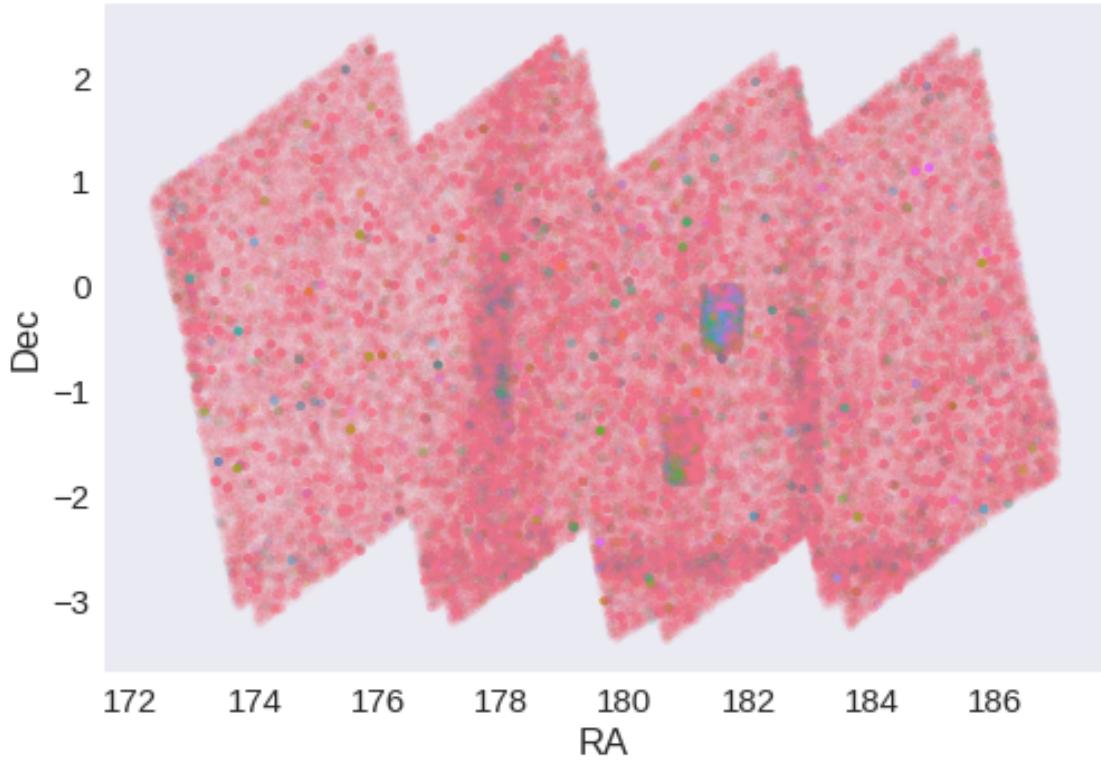
The cleaned catalogue has 1280946 sources (463 removed).

The cleaned catalogue has 463 sources flagged as having been cleaned

1.4 III - Astrometry correction

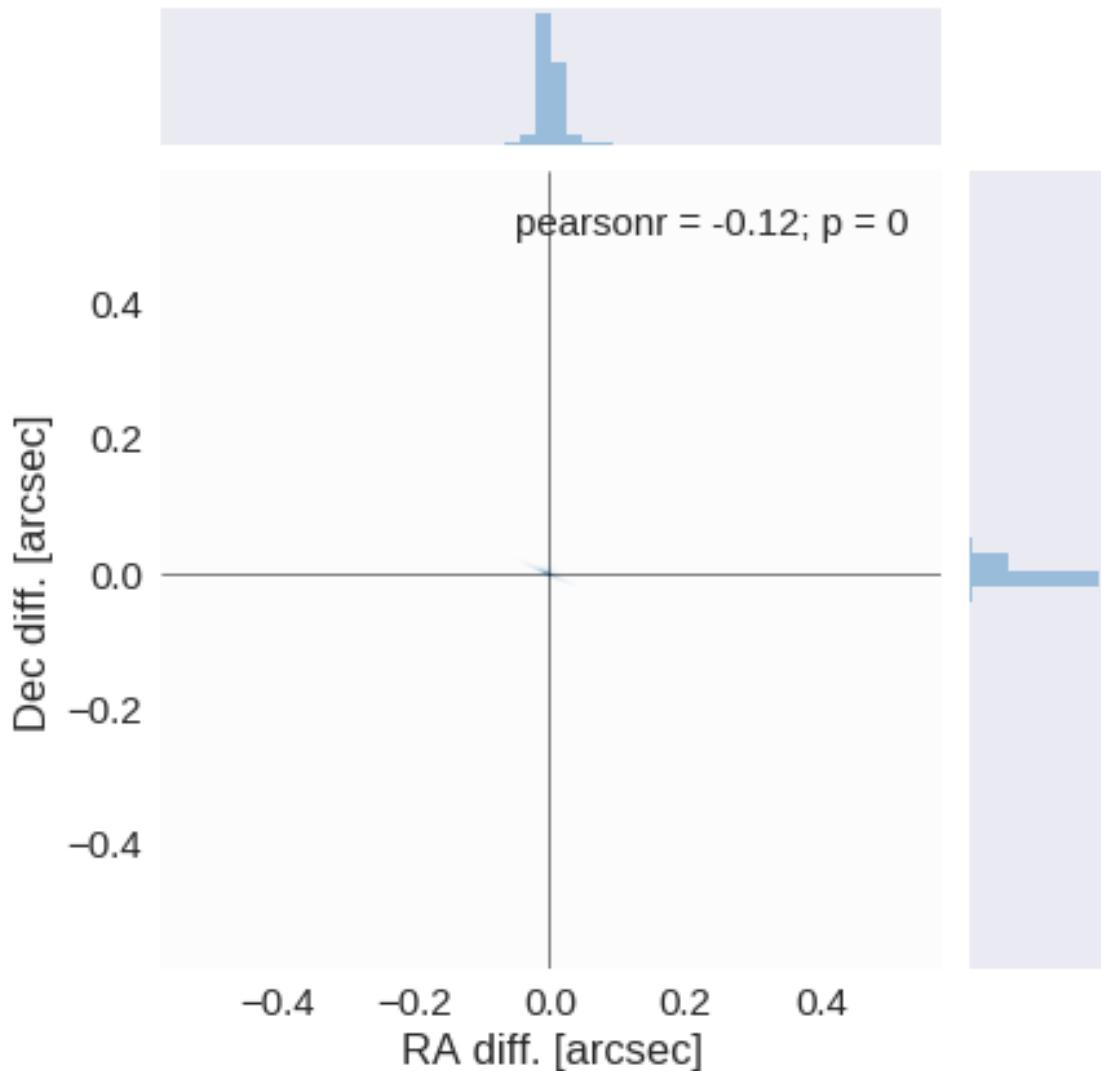
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

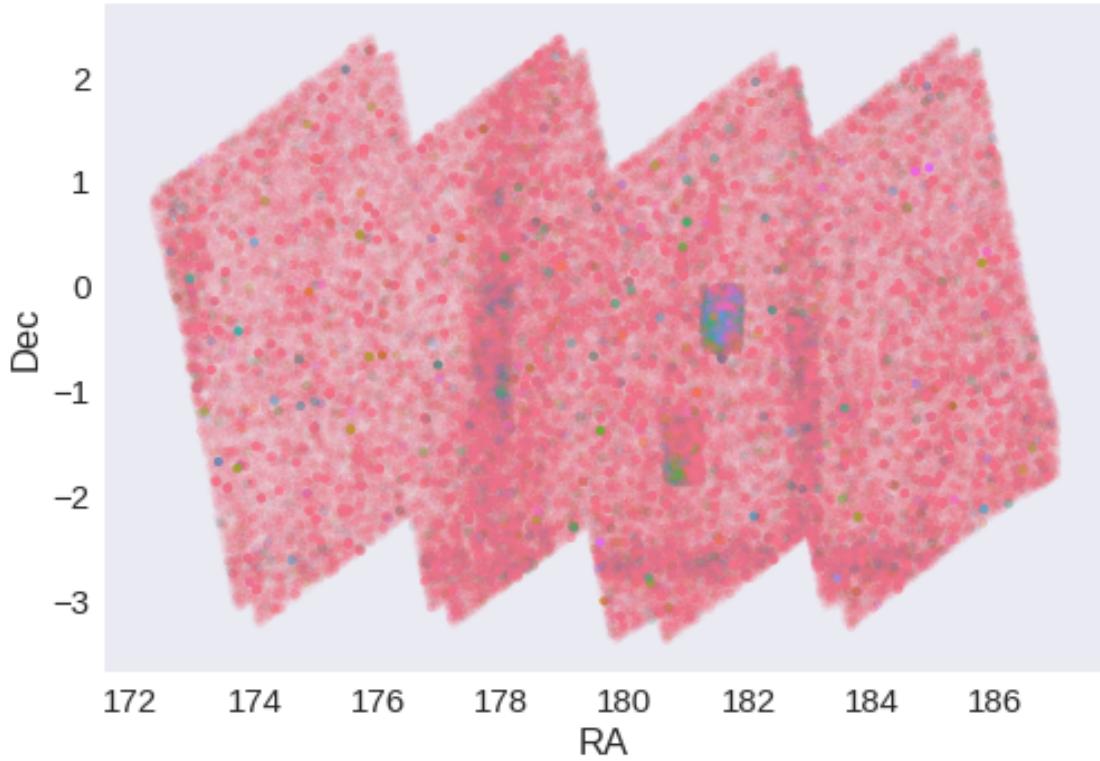




RA correction: -0.001237971645196012 arcsec

Dec correction: -0.0002818848545582675 arcsec





1.5 IV - Flagging Gaia objects

193622 sources flagged.

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.5_UKIDSS-LAS

January 18, 2018

1 GAMA-12 master catalogue

1.1 Preparation of UKIRT Infrared Deep Sky Survey / Large Area Survey (UKIDSS/LAS)

Information about UKIDSS can be found at <http://www.ukidss.org/surveys/surveys.html>

The catalogue comes from dmu0_UKIDSS-LAS.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The magnitude for each band in aperture 3 (2 arcsec).
- The hall magnitude is described as the total magnitude.

J band magnitudes are available in two eopchs. We take the first arbitrarily.

The magnitudes are "Vega like". The AB offsets are given by Hewett *et al.* (2016):

Band	AB offset
Y	0.634
J	0.938
H	1.379
K	1.900

Each source is associated with an epoch. These range between 2005 and 2007. We take 2006 for the epoch.

This notebook was run with herschelhelp_internal version:
44f1ae0 (Thu Nov 30 18:27:54 2017 +0000)

1.2 I - Column selection

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

/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)
```

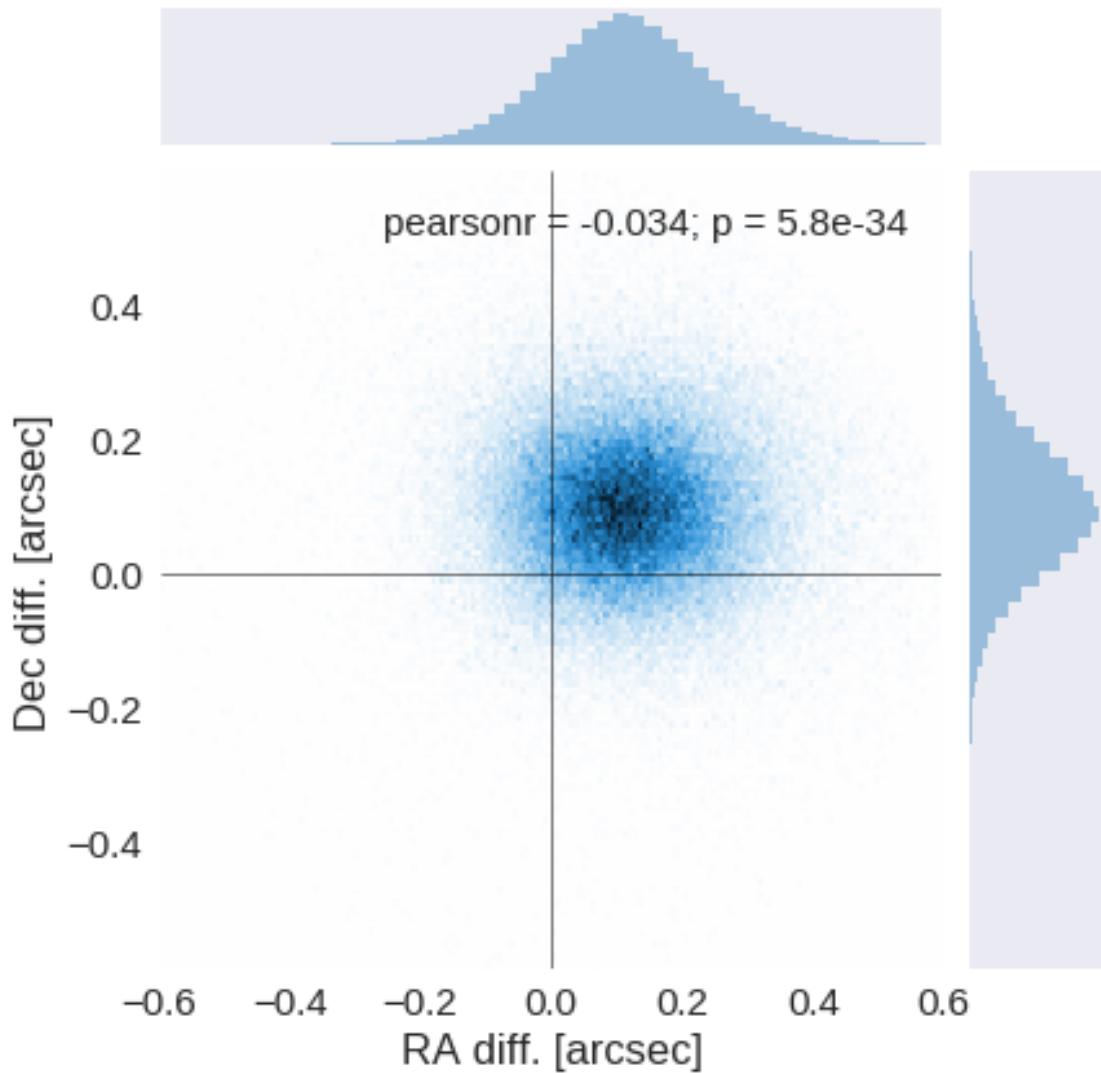
The initial catalogue had 949148 sources.

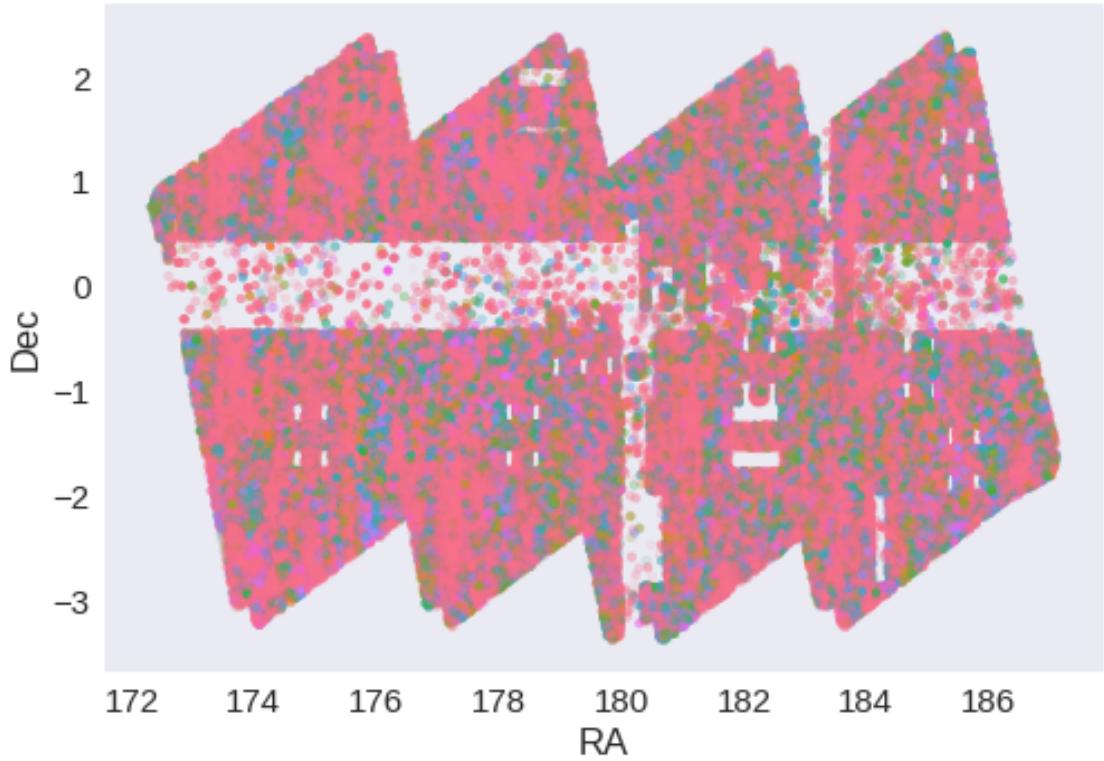
The cleaned catalogue has 948556 sources (592 removed).

The cleaned catalogue has 589 sources flagged as having been cleaned

1.4 III - Astrometry correction

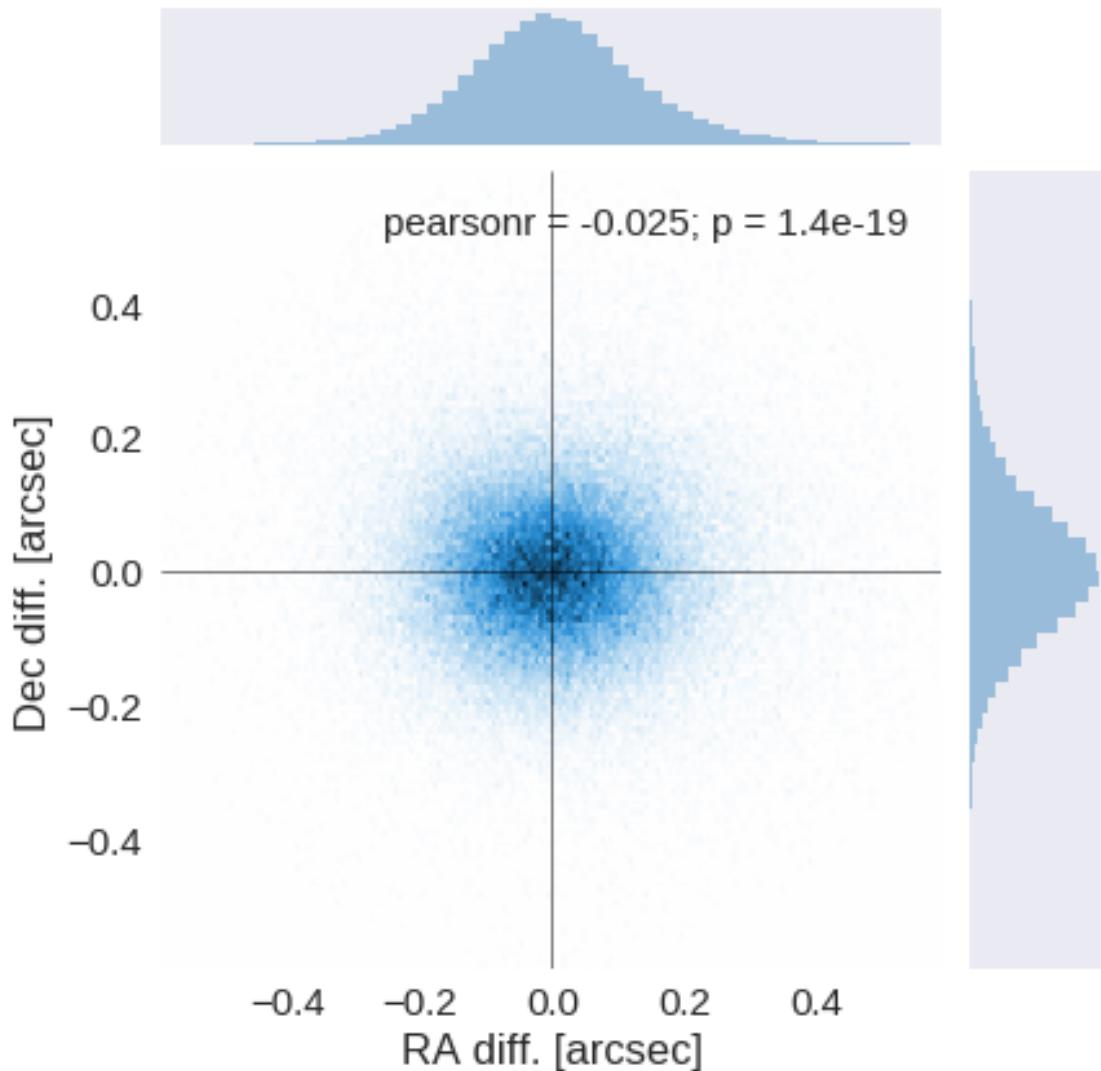
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

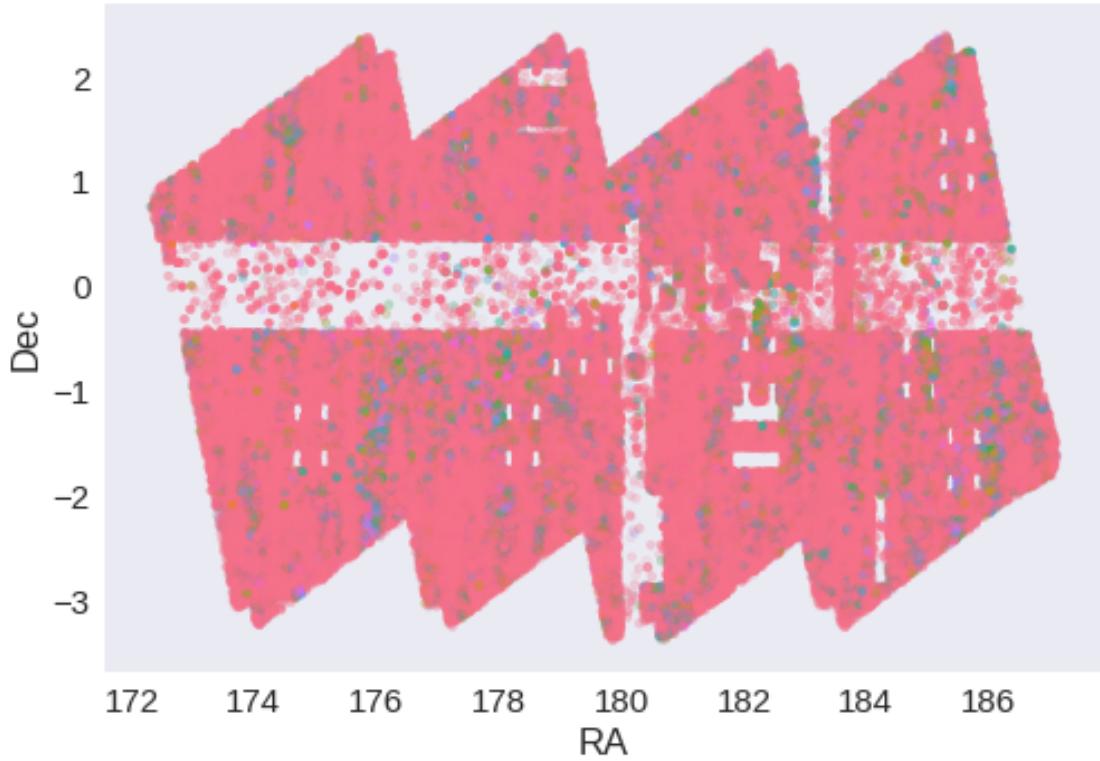




RA correction: -0.11539355086824798 arcsec

Dec correction: -0.09543808613279303 arcsec





1.5 IV - Flagging Gaia objects

135410 sources flagged.

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

1.6_VISTA-VIKING

January 18, 2018

1 GAMA-12 master catalogue

1.1 Preparation of VIKING data

VISTA telescope/VIKING catalogue: the catalogue comes from dmu0_VIKING.

In the catalogue, we keep:

- The identifier (it's unique in the catalogue);
- The position;
- The stellarity;
- The magnitude for each band.
- 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:
44f1ae0 (Thu Nov 30 18:27:54 2017 +0000)

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 [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)
```

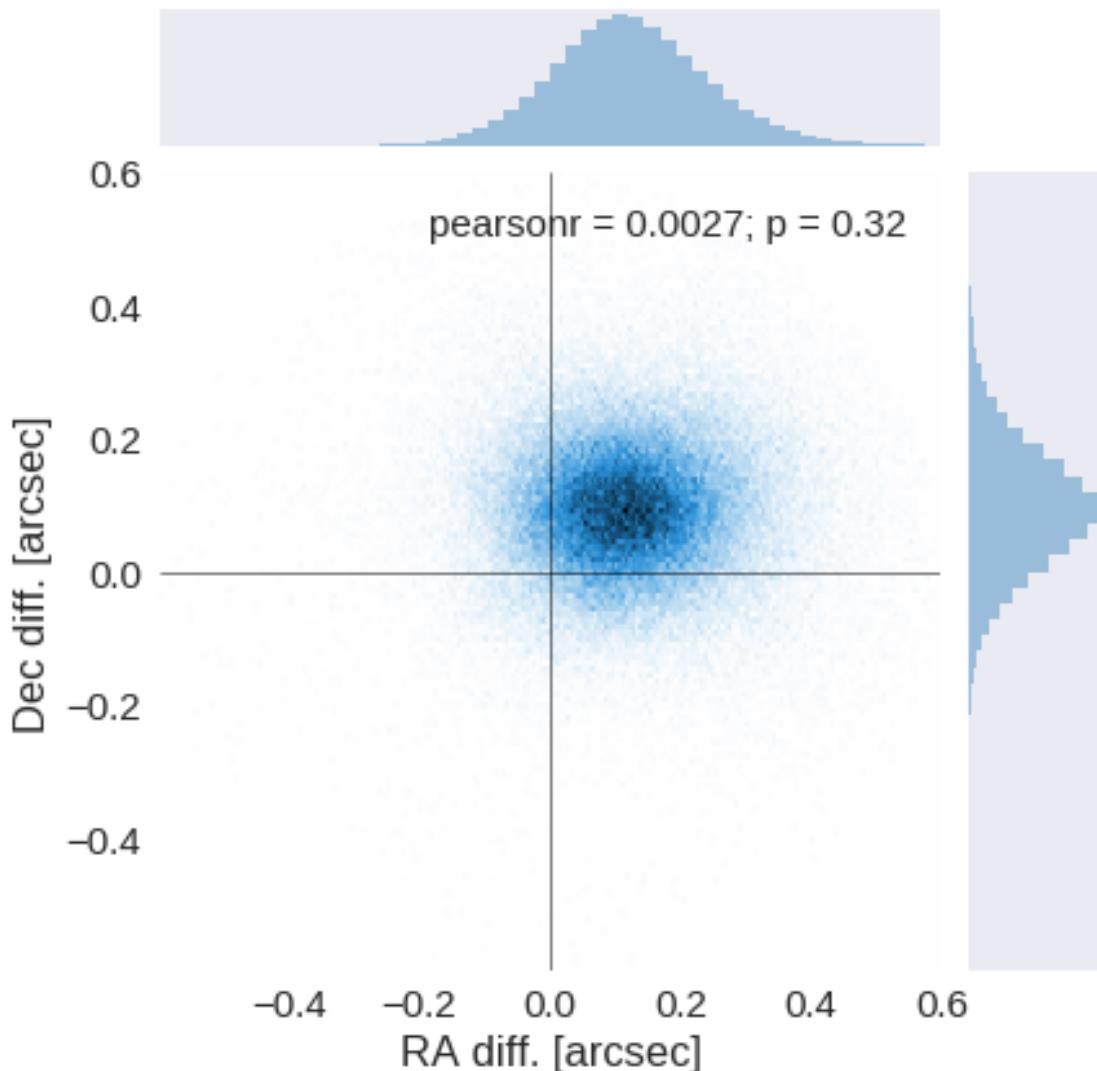
The initial catalogue had 3045586 sources.

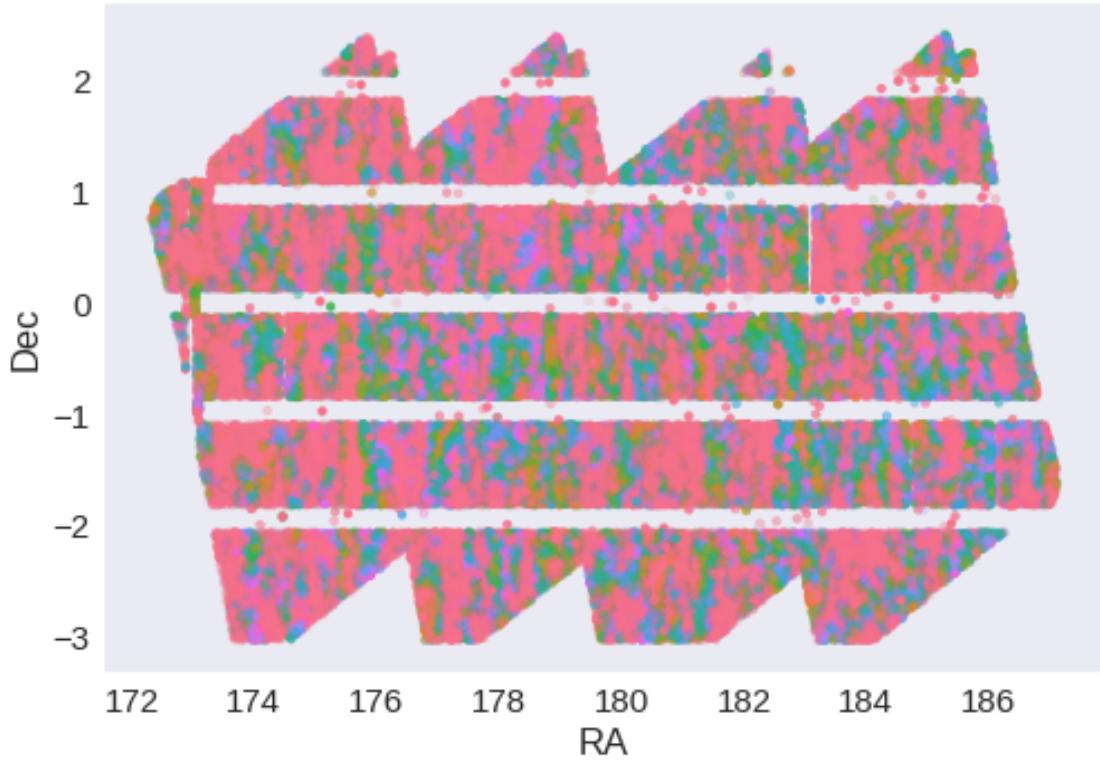
The cleaned catalogue has 3045013 sources (573 removed).

The cleaned catalogue has 572 sources flagged as having been cleaned

1.4 III - Astrometry correction

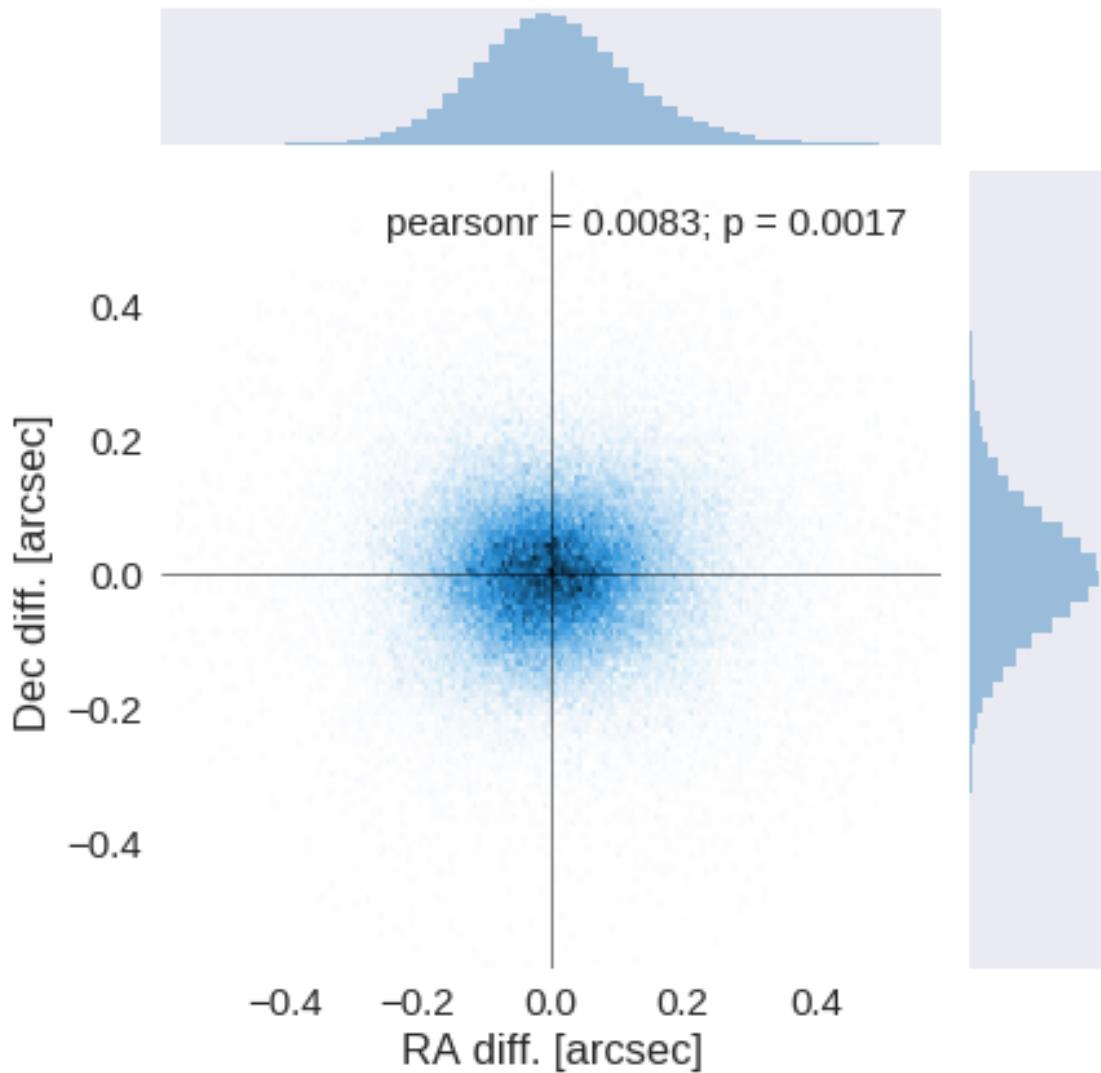
We match the astrometry to the Gaia one. We limit the Gaia catalogue to sources with a g band flux between the 30th and the 70th percentile. Some quick tests show that this give the lower dispersion in the results.

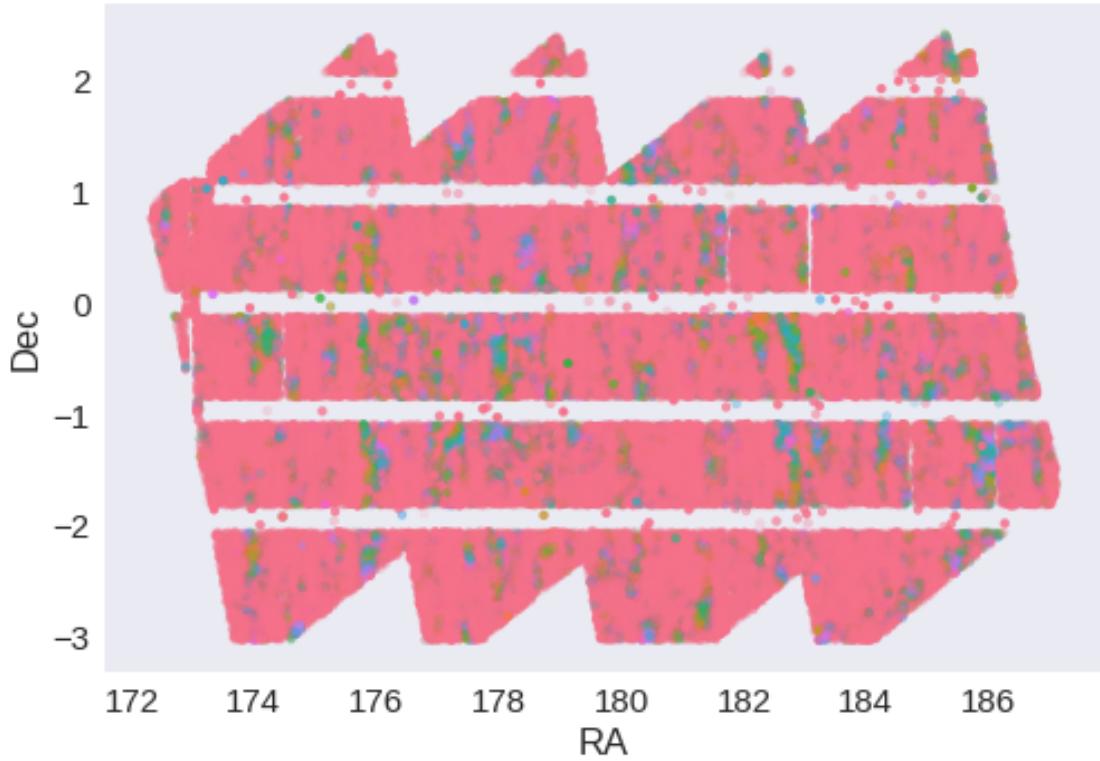




RA correction: -0.11862931214636774 arcsec

Dec correction: -0.09424492095163606 arcsec





1.5 IV - Flagging Gaia objects

145807 sources flagged.

1.6 V - Flagging objects near bright stars

2 VI - Saving to disk

2_Merging

January 18, 2018

1 GAMA-12 master catalogue

This notebook presents the merge of the various pristine catalogues to produce HELP master catalogue on GAMA-12.

This notebook was run with `herschelhelp_internal` version:
44f1ae0 (Thu Nov 30 18:27:54 2017 +0000)

1.1 I - Reading the prepared pristine catalogues

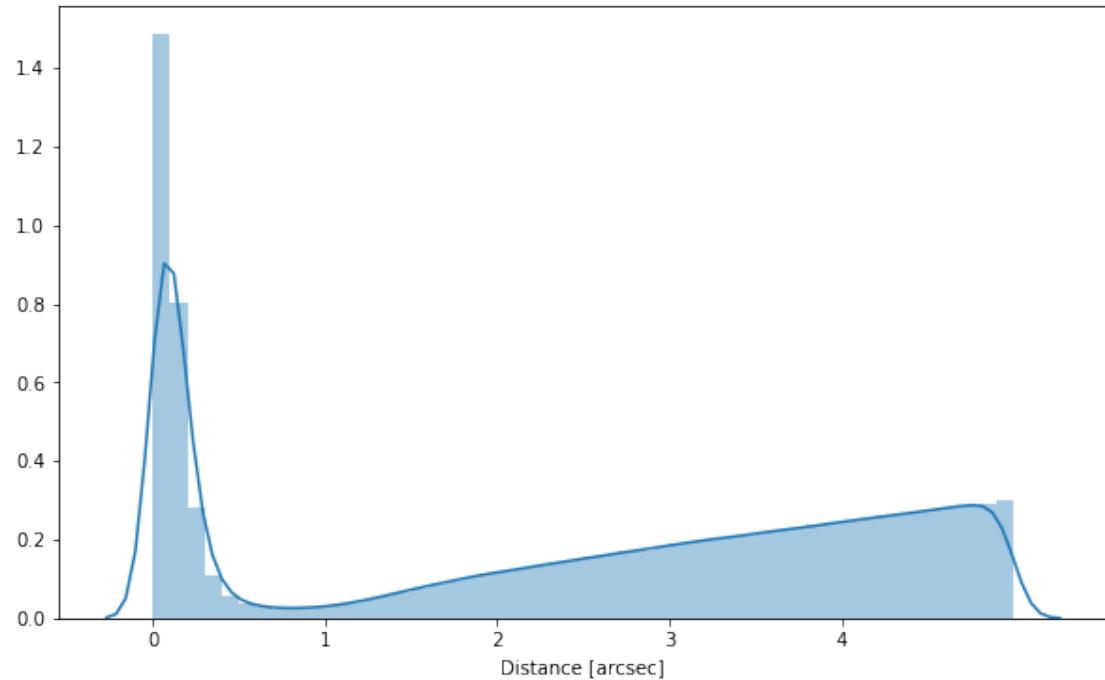
1.2 II - Merging tables

We first merge the optical catalogues and then add the infrared ones: DECaLS, HSC, KIDS, PanSTARRS, UKIDSS-LAS, and VISTA-VIKING.

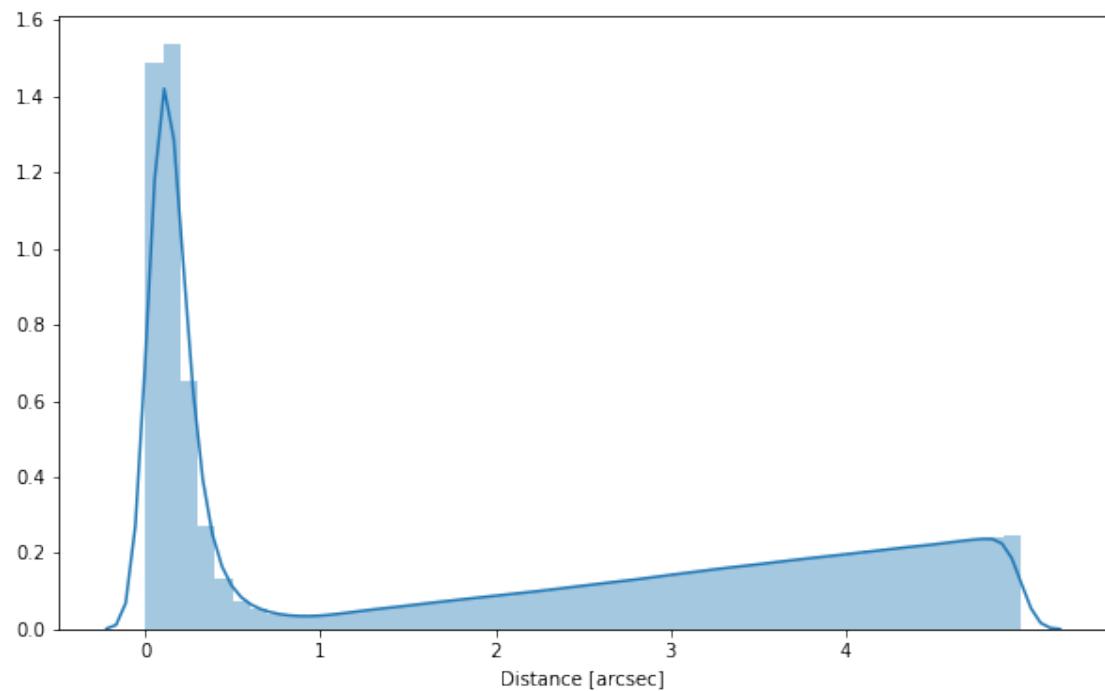
At every step, we look at the distribution of the distances to the nearest source in the merged catalogue to determine the best crossmatching radius.

1.2.1 DECaLS

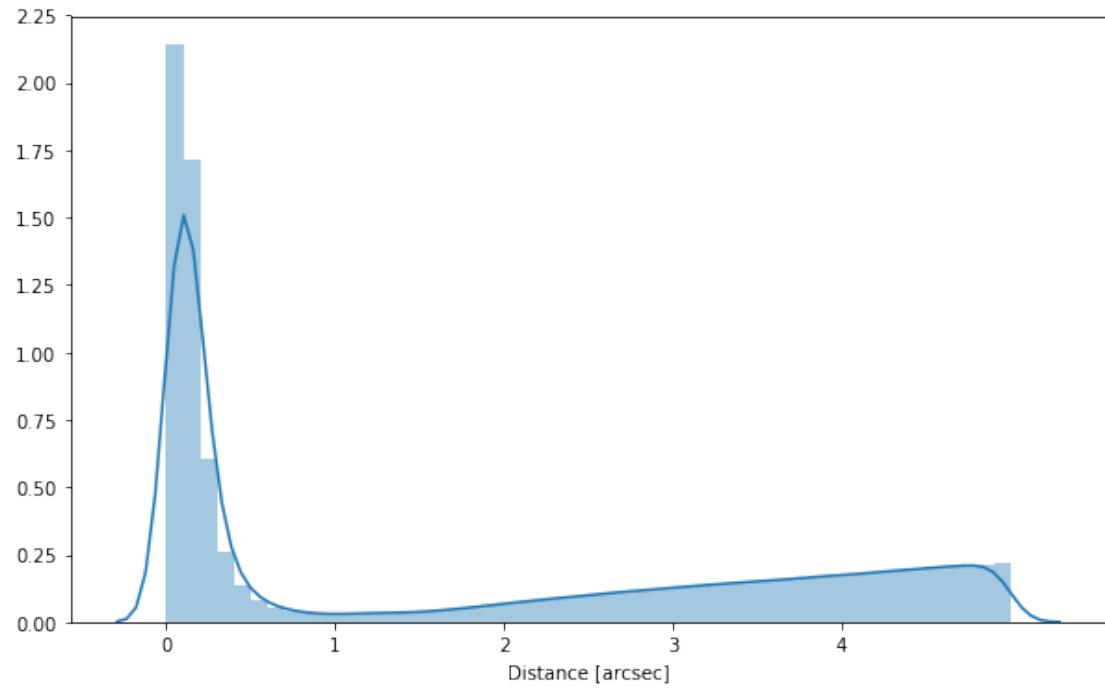
1.2.2 Add HSC-PSS



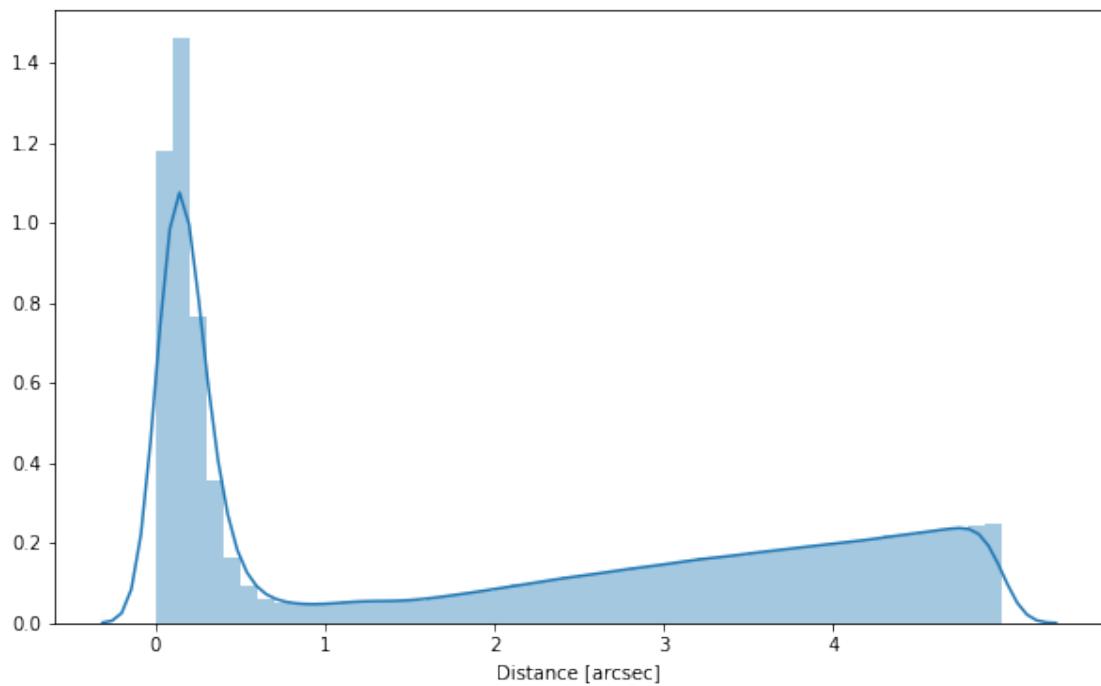
1.2.3 Add KIDS



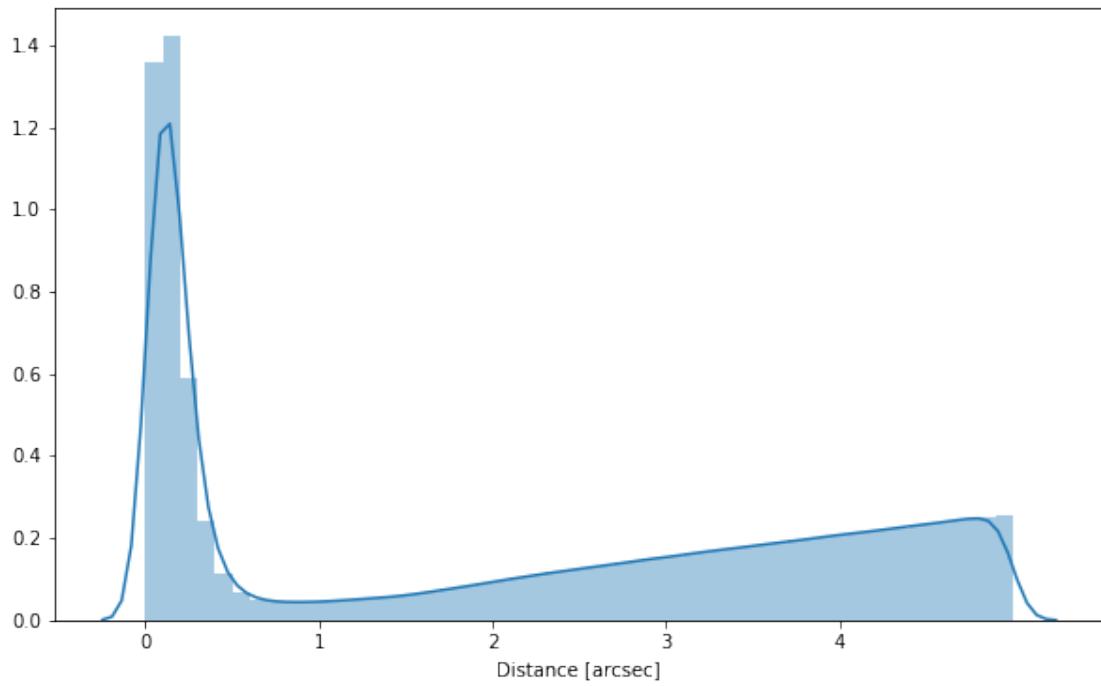
1.2.4 Add PanSTARRS



1.2.5 Add UKIDSS LAS



1.2.6 Add VIKING



1.2.7 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[17]: <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 prisitne 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.

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("All-NaN slice encountered", RuntimeWarning)
```

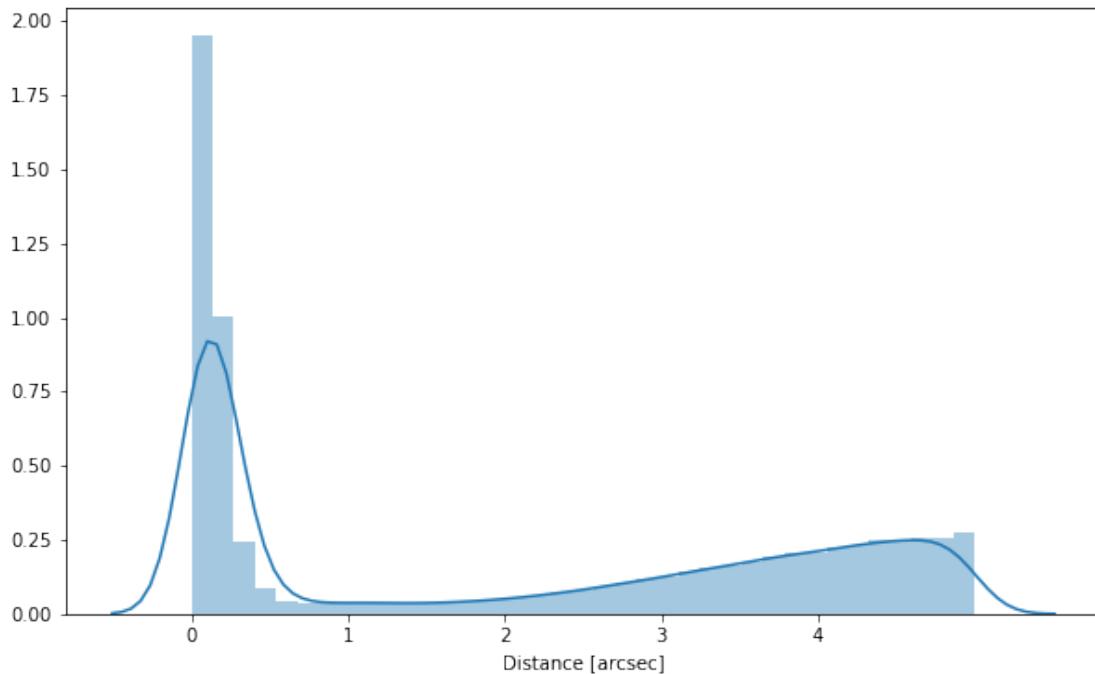
1.4 IV - Adding E(B-V) column

1.5 V - Adding HELP unique identifiers and field columns

OK!

1.6 VI - Cross-matching with spec-z catalogue

```
Out[26]: <IPython.core.display.HTML object>
```



1.7 VII - Choosing between multiple values for the same filter

In GAMA-12 we don't have any pairs of surveys from the same instruments. All we need to do is rename some columns to the name of the camera

1.8 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.

1.9 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.

1.10 IX - Cross-identification table

We are producing a table associating to each HELP identifier, the identifiers of the sources in the pristine catalogue. 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?**

921 master list rows had multiple associations.

1.11 X - Adding HEALPix index

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

1.12 XI - Saving the catalogue

Missing columns: set()

3_Checks_and_diagnostics

January 18, 2018

This notebook was run with herschelhelp_internal version:
33f5ec7 (Wed Dec 6 16:56:17 2017 +0000)

Diagnostics done using: master_catalogue_gama-12_20171210.fits

0.1 0 - Quick checks

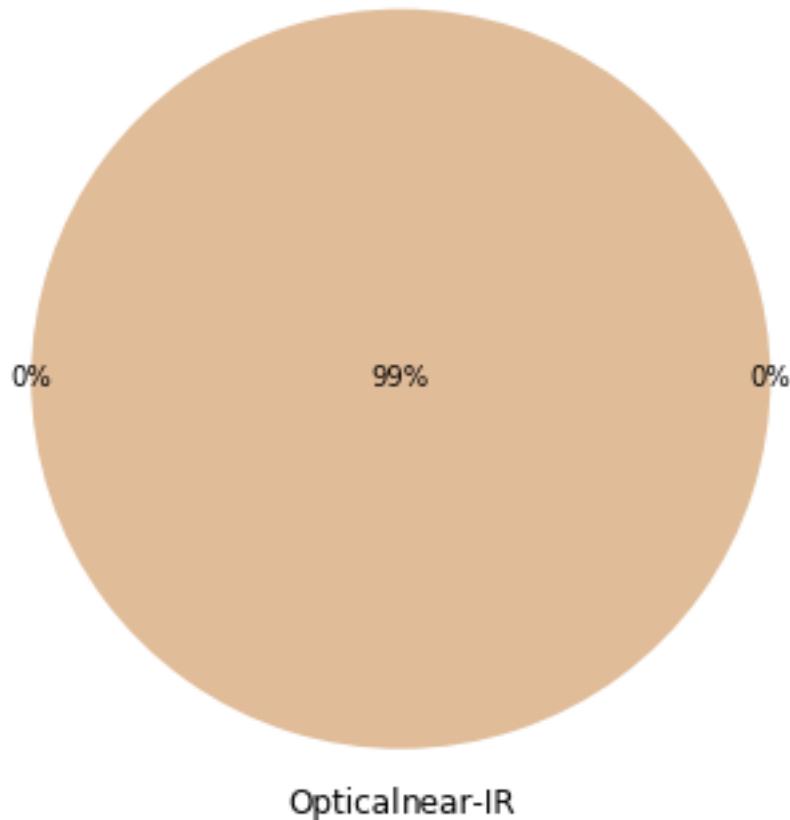
```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:  
    format(shape, fill_value, array(fill_value).dtype), FutureWarning)  
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/core/numeric.py:301:  
    format(shape, fill_value,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

Table shows only problematic columns.

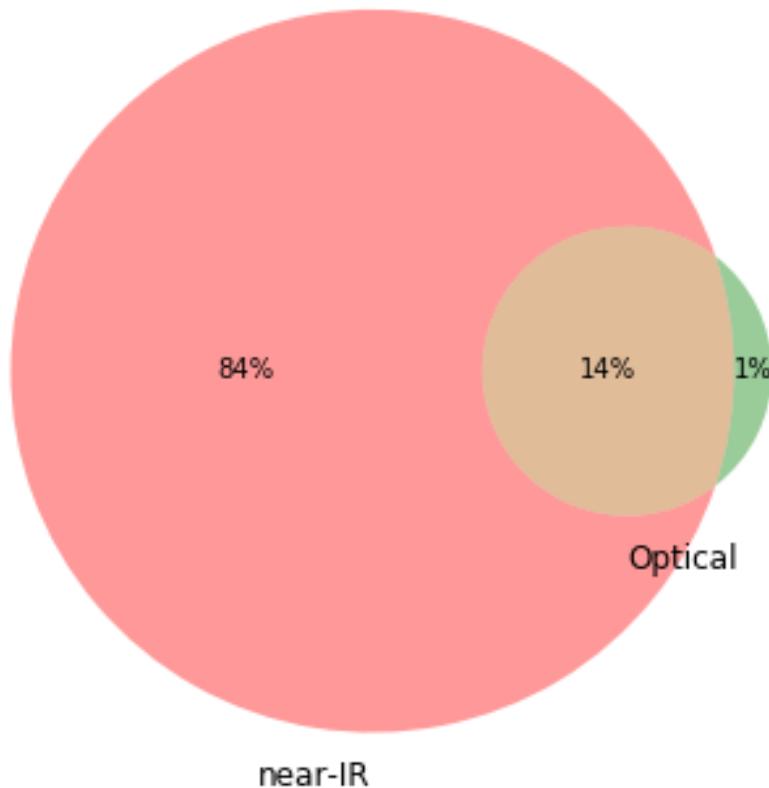
Out[4]: <IPython.core.display.HTML object>

0.2 I - Summary of wavelength domains

Wavelength domain observations



Detection of the 10,172,665 sources detected
in any wavelength domains (among 12,369,415 sources)



0.3 II - Comparing magnitudes in similar filters

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

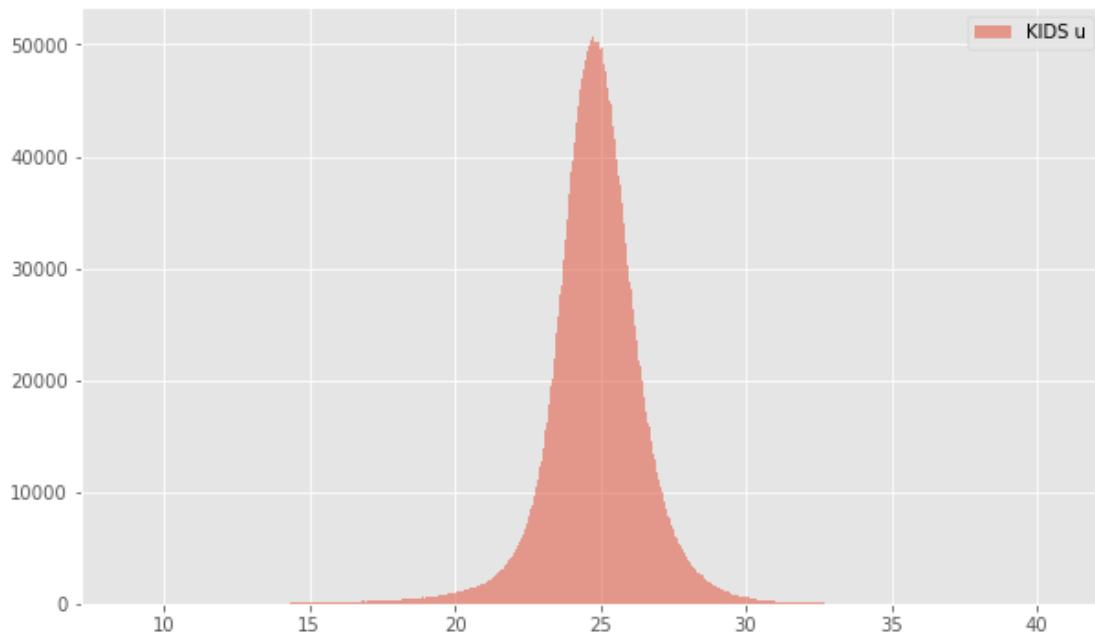
DECam g max: 39.3524
KIDS g max: 43.5271
SUPRIME g max: nan
GPC1 g max: 34.7890014648

```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/numpy/lib/nanfunctions.py:  
    warnings.warn("All-NaN axis encountered", RuntimeWarning)
```

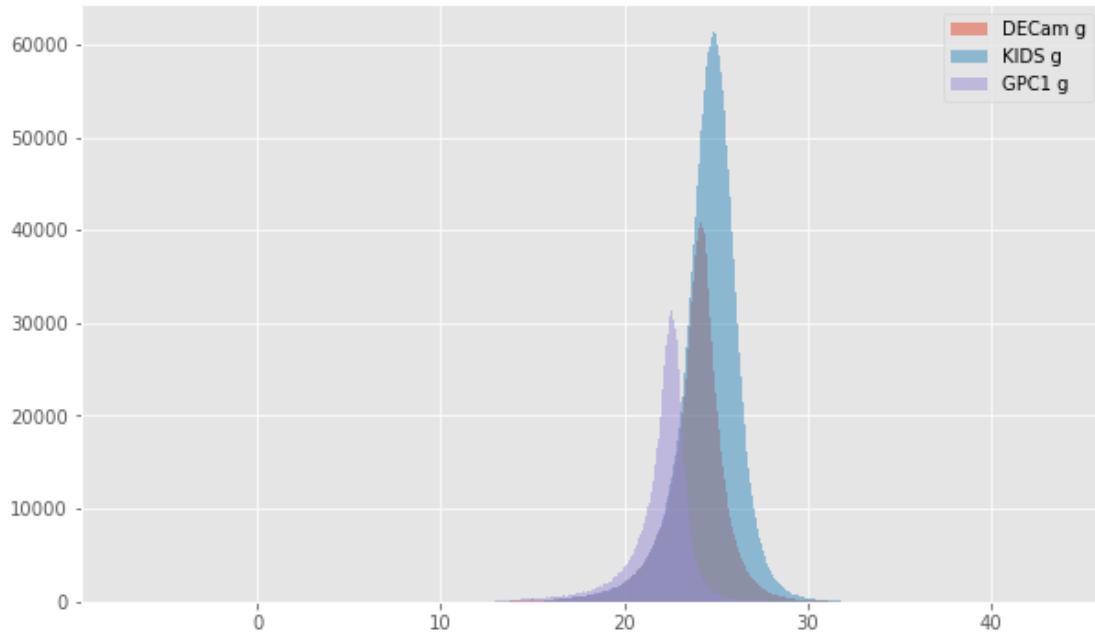
The Suprime g magnitudes are very wrong. They are almost all between 0 and 1.

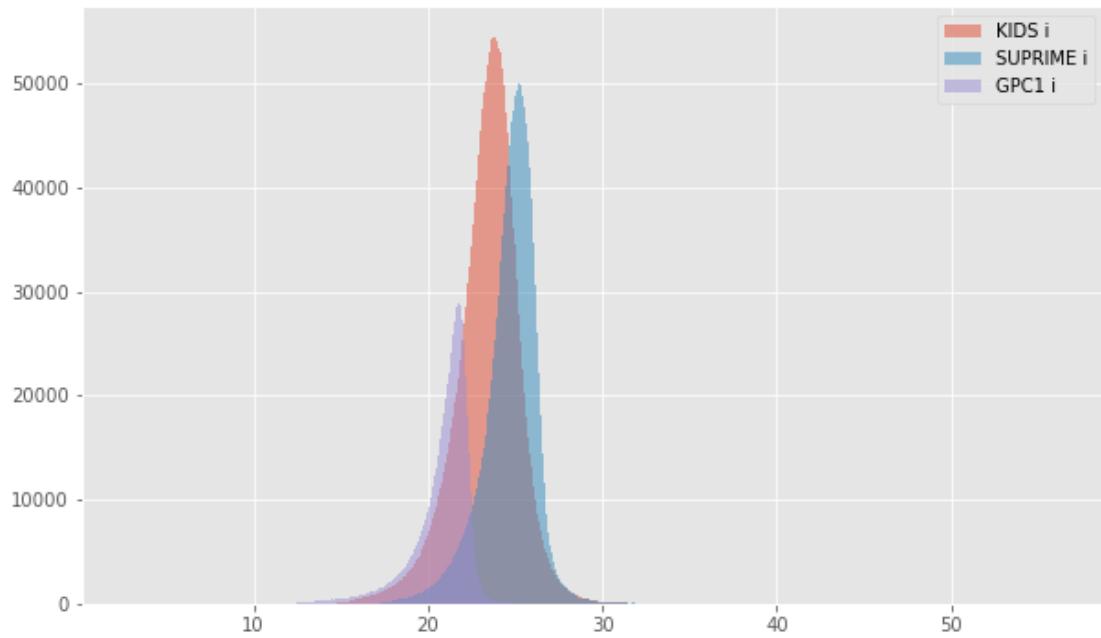
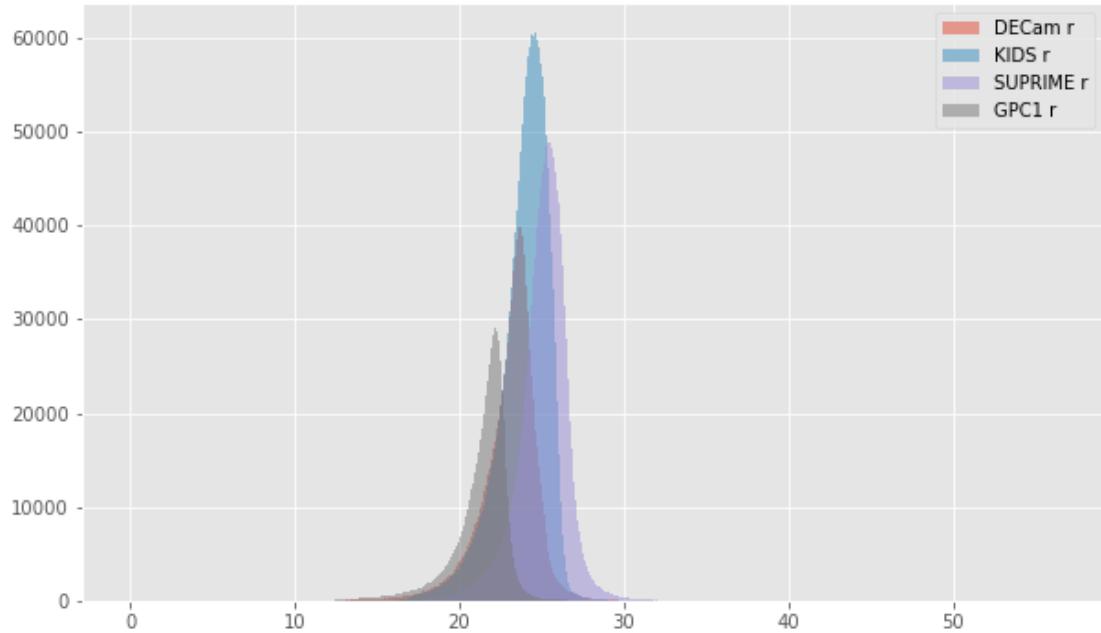
0.3.1 II.a - Comparing depths

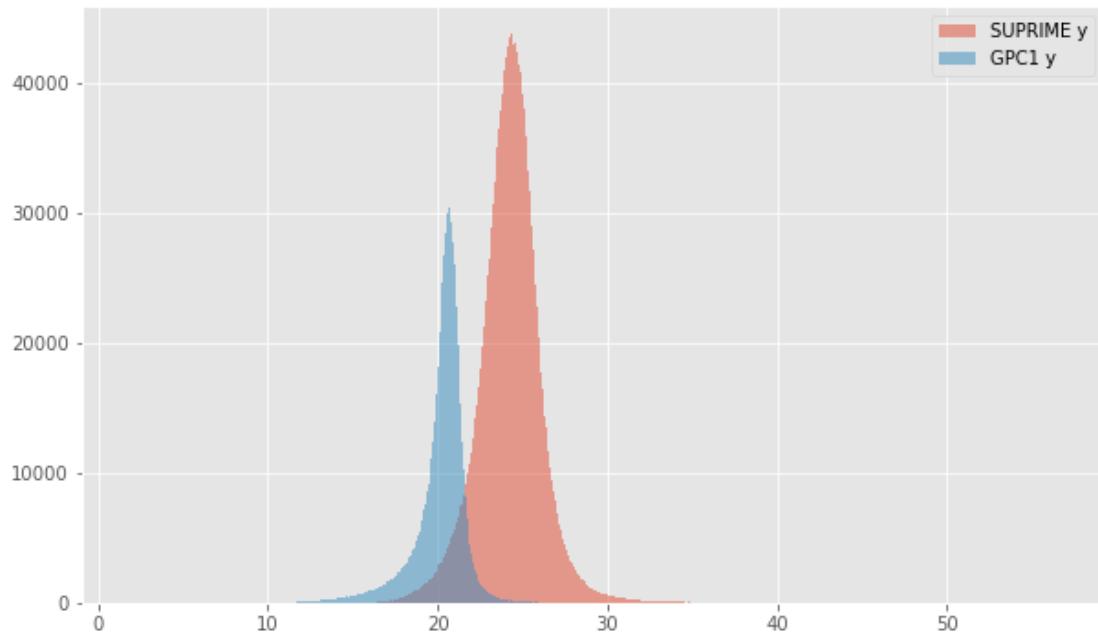
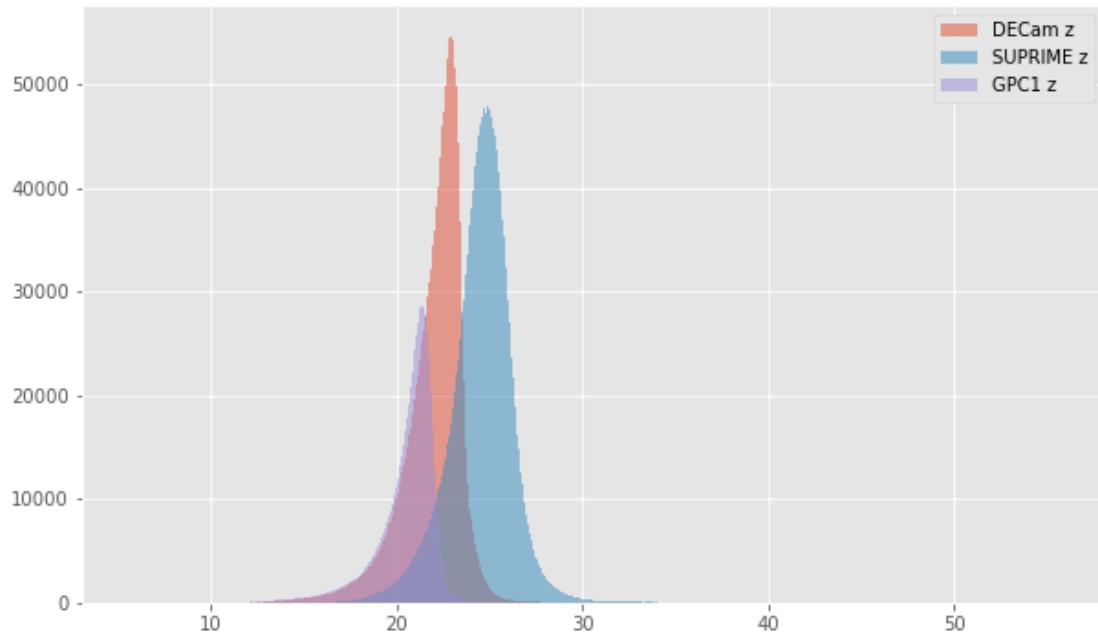
We compare the histograms of the total aperture magnitudes of similar bands.



HELP warning: the column m_suprime_g (SUPRIME g) is empty.





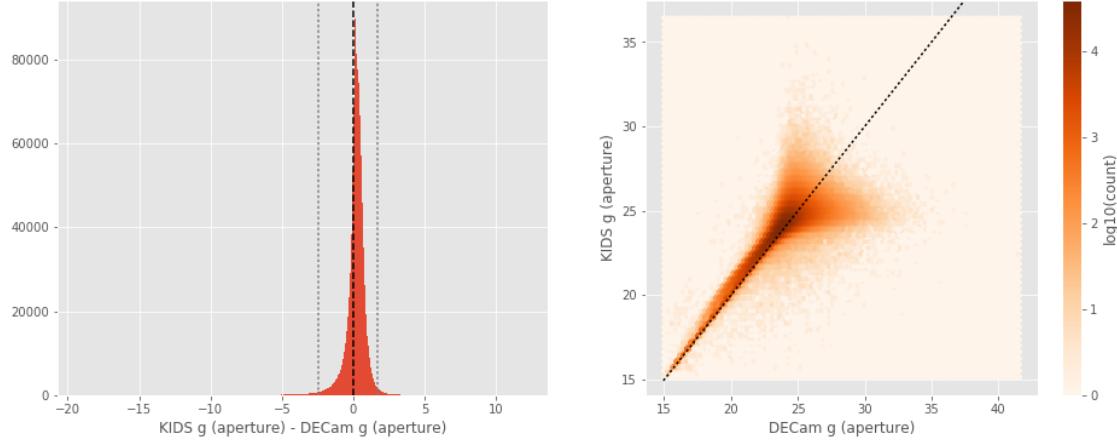


0.3.2 II.b - Comparing magnitudes

We compare one to one each magnitude in similar bands.

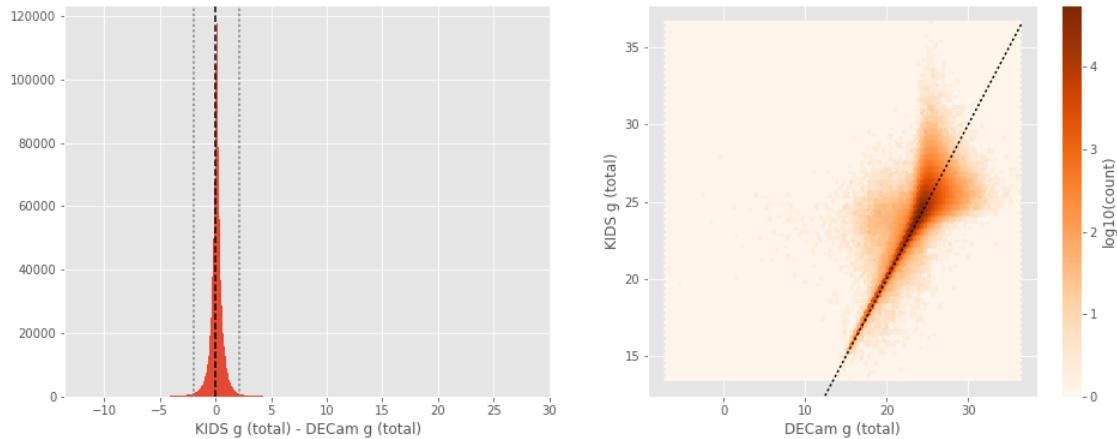
KIDS g (aperture) - DECam g (aperture):

- Median: 0.24
- Median Absolute Deviation: 0.28
- 1% percentile: -2.421456756591797
- 99% percentile: 1.7177793884277346



KIDS g (total) - DECam g (total):

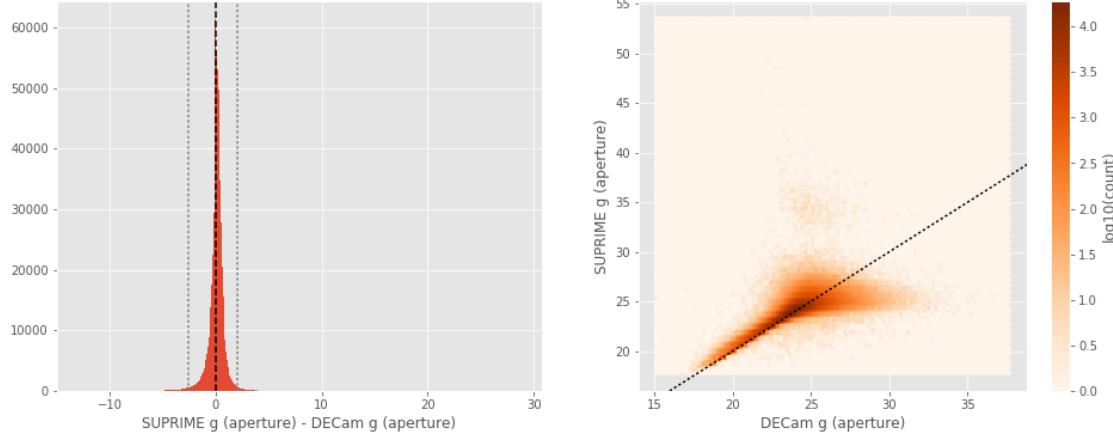
- Median: 0.12
- Median Absolute Deviation: 0.24
- 1% percentile: -1.9983771514892579
- 99% percentile: 2.143661956787107



SUPRIME g (aperture) - DECam g (aperture):

- Median: 0.11

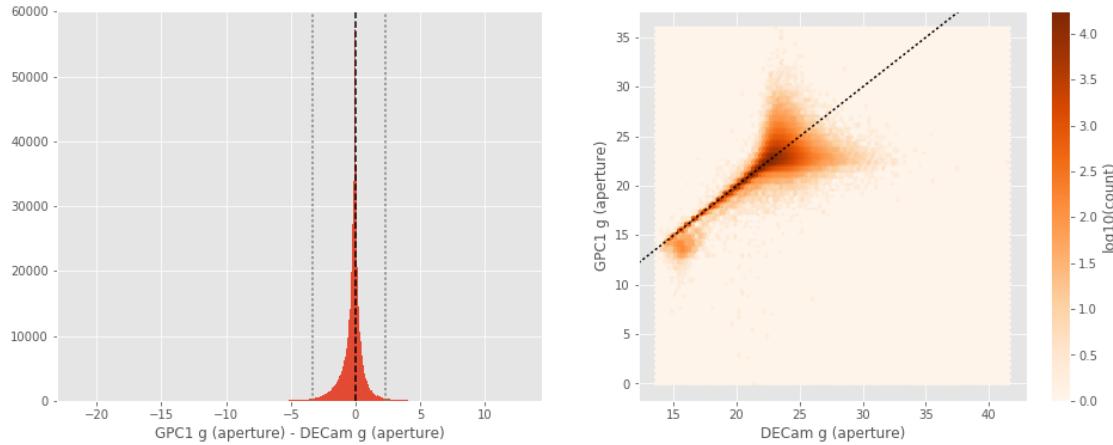
- Median Absolute Deviation: 0.28
- 1% percentile: -2.5734726333618165
- 99% percentile: 1.9980712890625032



No sources have both DECam g (total) and SUPRIME g (total) values.

GPC1 g (aperture) - DECam g (aperture):

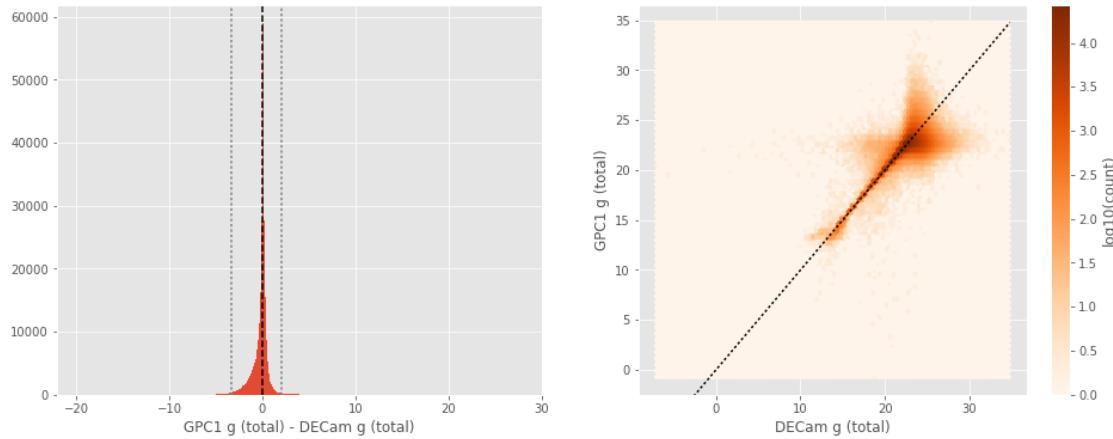
- Median: -0.10
- Median Absolute Deviation: 0.28
- 1% percentile: -3.3236003875753242
- 99% percentile: 2.2757487106323264



GPC1 g (total) - DECam g (total):

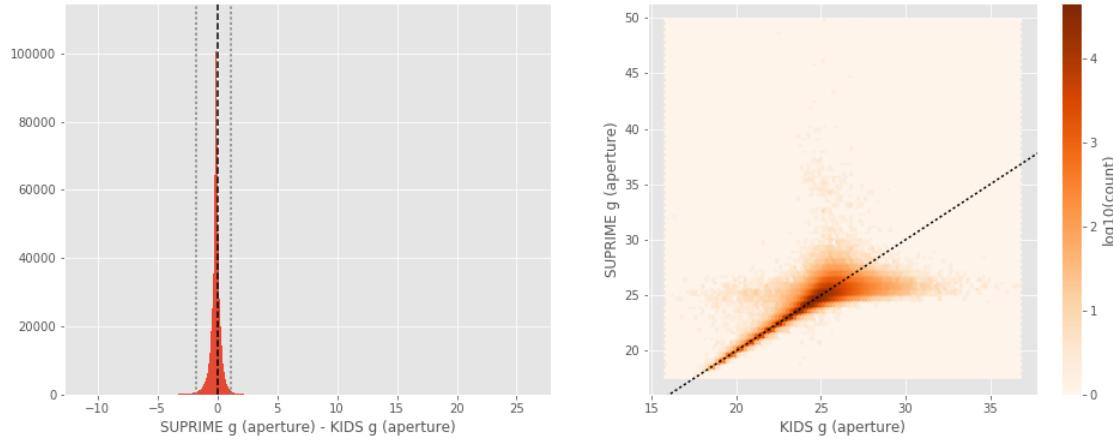
- Median: -0.00
- Median Absolute Deviation: 0.26

- 1% percentile: -3.400665760040283
- 99% percentile: 2.0117679786682143



SUPRIME g (aperture) - KIDS g (aperture):

- Median: -0.10
- Median Absolute Deviation: 0.17
- 1% percentile: -1.7694091796874998
- 99% percentile: 1.1416382789611785

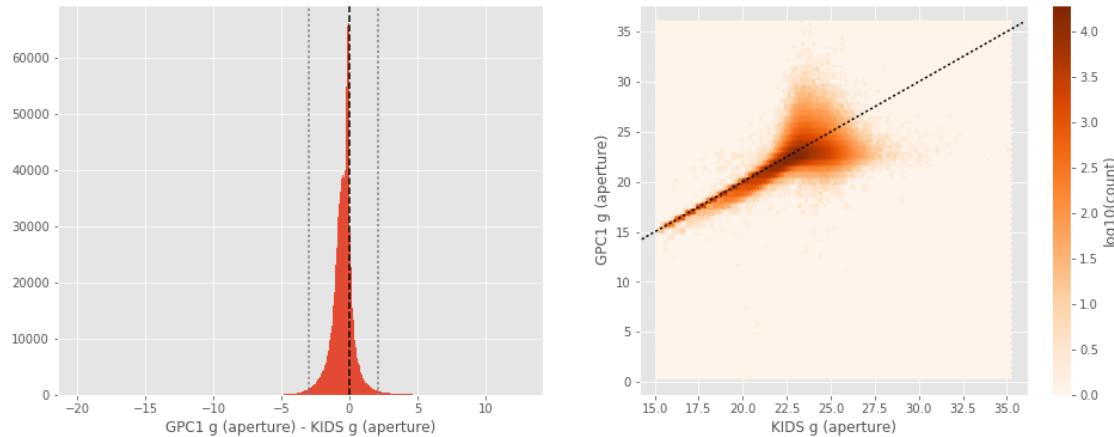


No sources have both KIDS g (total) and SUPRIME g (total) values.

GPC1 g (aperture) - KIDS g (aperture):

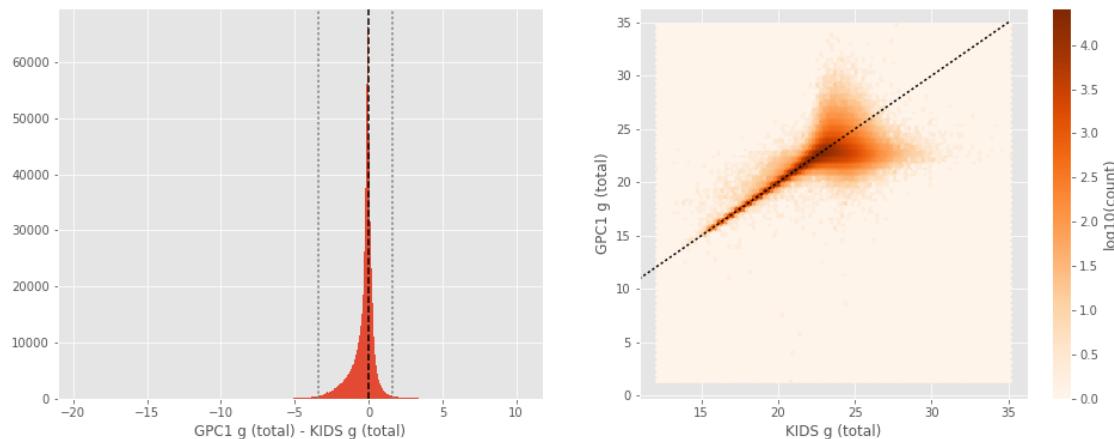
- Median: -0.40
- Median Absolute Deviation: 0.38
- 1% percentile: -2.9983723831176756

- 99% percentile: 2.0907281112671225



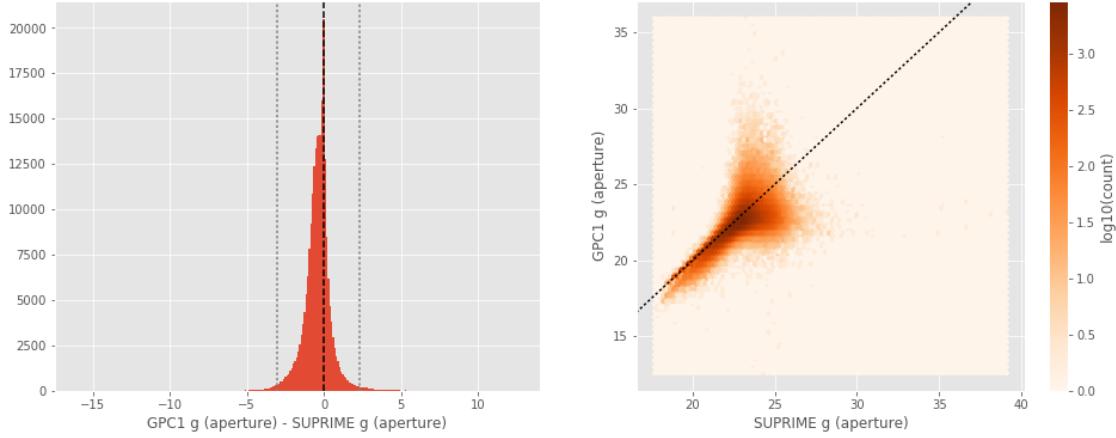
GPC1 g (total) - KIDS g (total):

- Median: -0.12
- Median Absolute Deviation: 0.25
- 1% percentile: -3.3798369407653808
- 99% percentile: 1.5962666130065895



GPC1 g (aperture) - SUPRIME g (aperture):

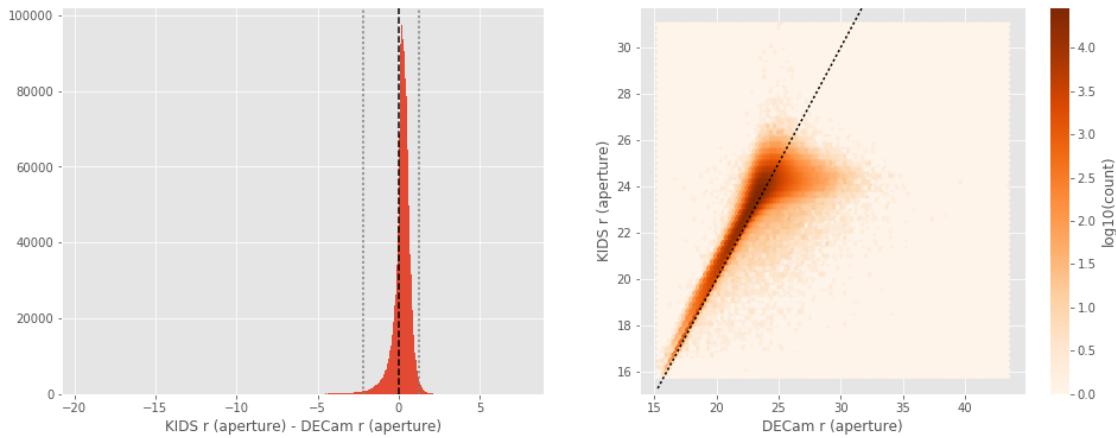
- Median: -0.33
- Median Absolute Deviation: 0.40
- 1% percentile: -3.0280526733398436
- 99% percentile: 2.2830573272705097



No sources have both SUPRIME g (total) and GPC1 g (total) values.

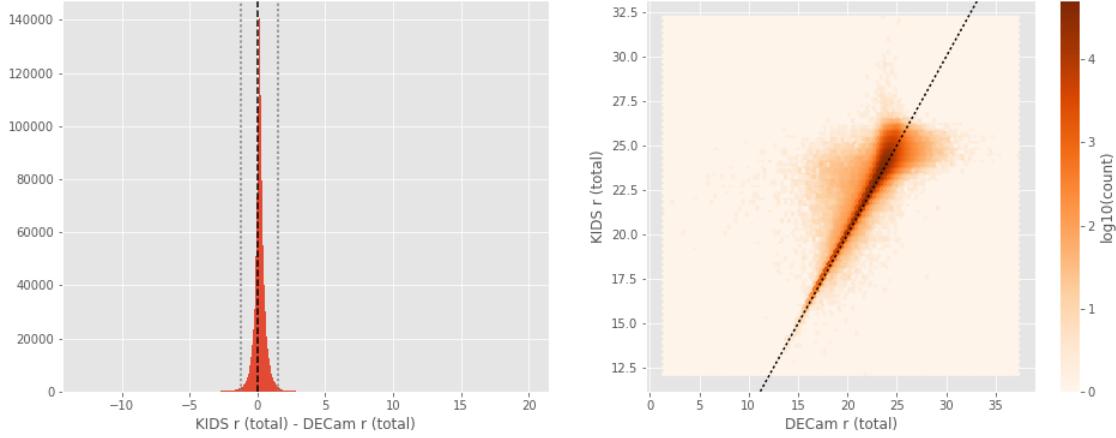
KIDS r (aperture) - DECam r (aperture):

- Median: 0.25
- Median Absolute Deviation: 0.24
- 1% percentile: -2.223689575195312
- 99% percentile: 1.2501894378662115



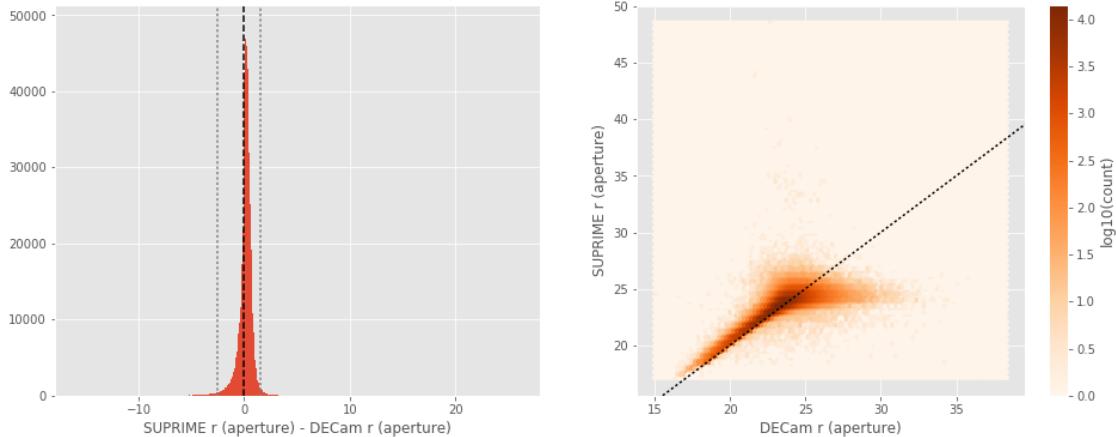
KIDS r (total) - DECam r (total):

- Median: 0.17
- Median Absolute Deviation: 0.18
- 1% percentile: -1.2137767791748046
- 99% percentile: 1.5382007598877045



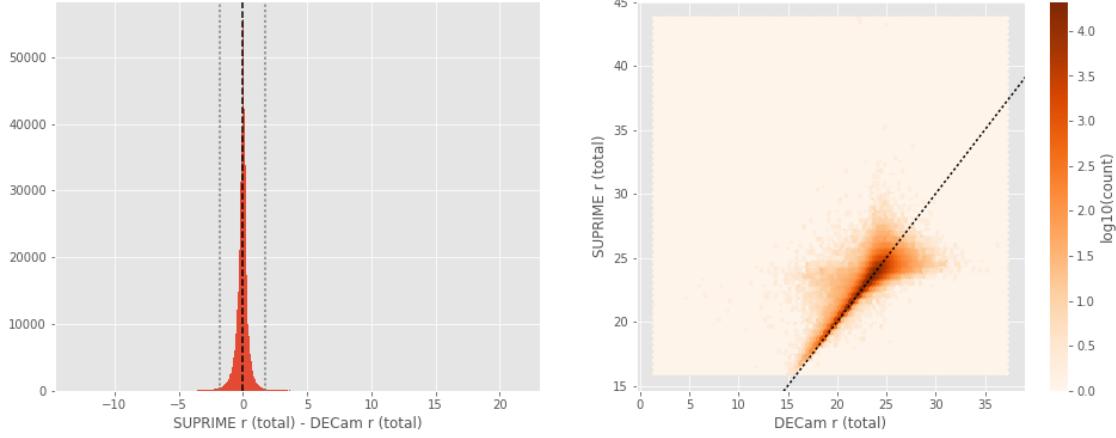
SUPRIME r (aperture) - DECam r (aperture):

- Median: 0.19
- Median Absolute Deviation: 0.26
- 1% percentile: -2.5148622894287107
- 99% percentile: 1.5698329162597655



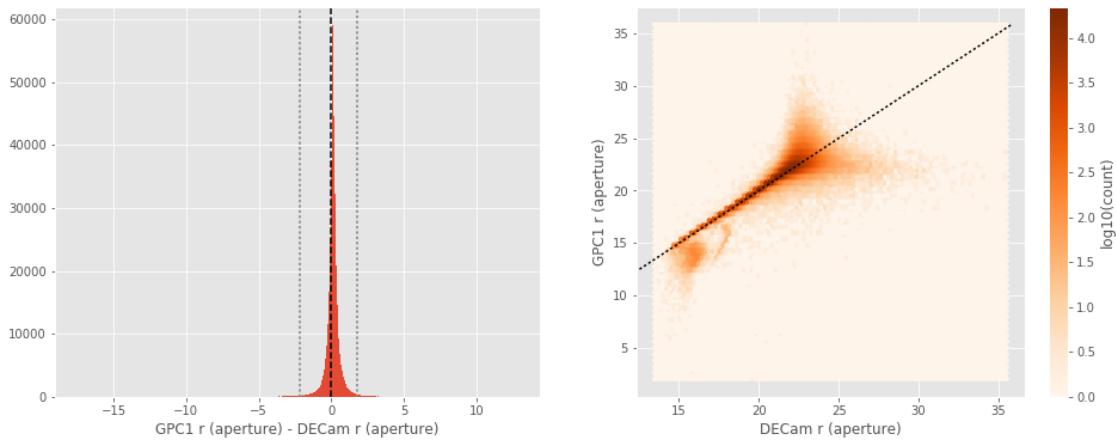
SUPRIME r (total) - DECam r (total):

- Median: -0.00
- Median Absolute Deviation: 0.19
- 1% percentile: -1.8438291549682617
- 99% percentile: 1.7042064666748047



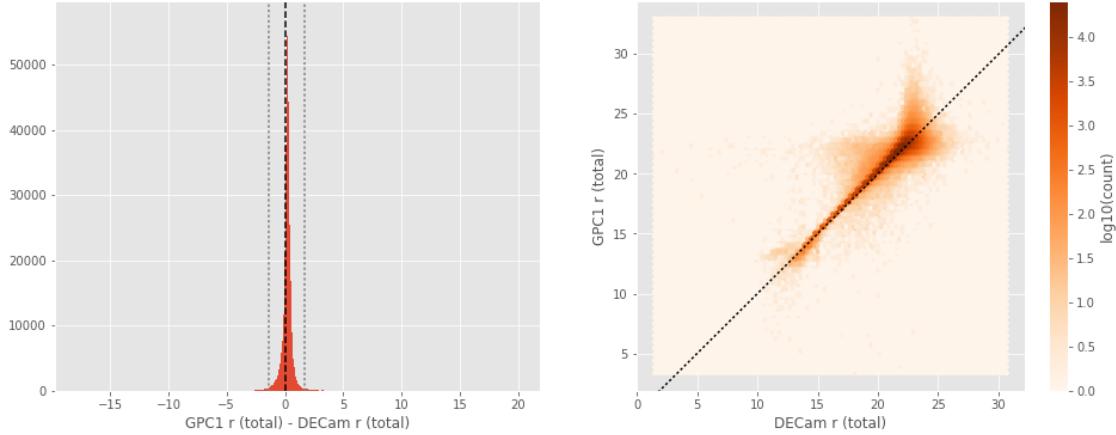
GPC1 r (aperture) - DECam r (aperture):

- Median: 0.10
- Median Absolute Deviation: 0.17
- 1% percentile: -2.1499901390075684
- 99% percentile: 1.7801751708984375



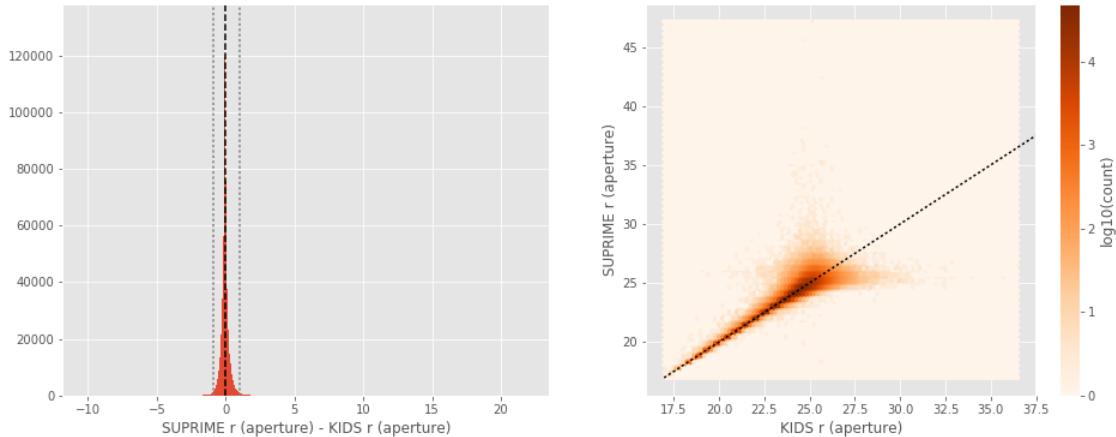
GPC1 r (total) - DECam r (total):

- Median: 0.21
- Median Absolute Deviation: 0.15
- 1% percentile: -1.3948646545410157
- 99% percentile: 1.6864162445068303



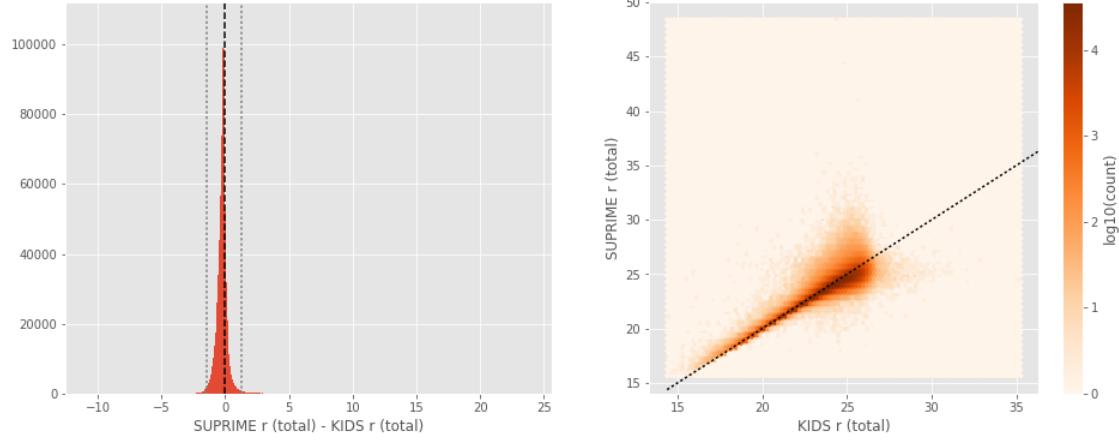
SUPRIME r (aperture) - KIDS r (aperture):

- Median: -0.04
- Median Absolute Deviation: 0.11
- 1% percentile: -0.8898246765136719
- 99% percentile: 0.9822139739990225



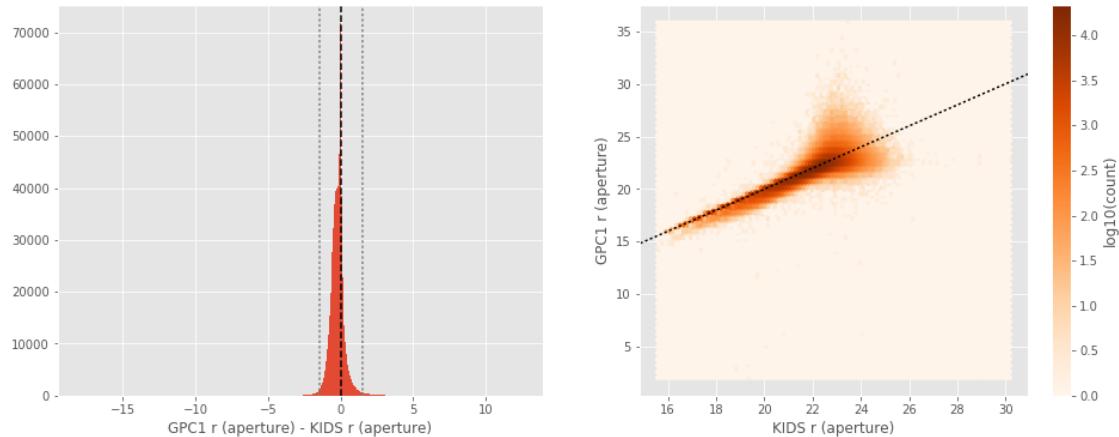
SUPRIME r (total) - KIDS r (total):

- Median: -0.21
- Median Absolute Deviation: 0.19
- 1% percentile: -1.4218847274780273
- 99% percentile: 1.2361030578613281



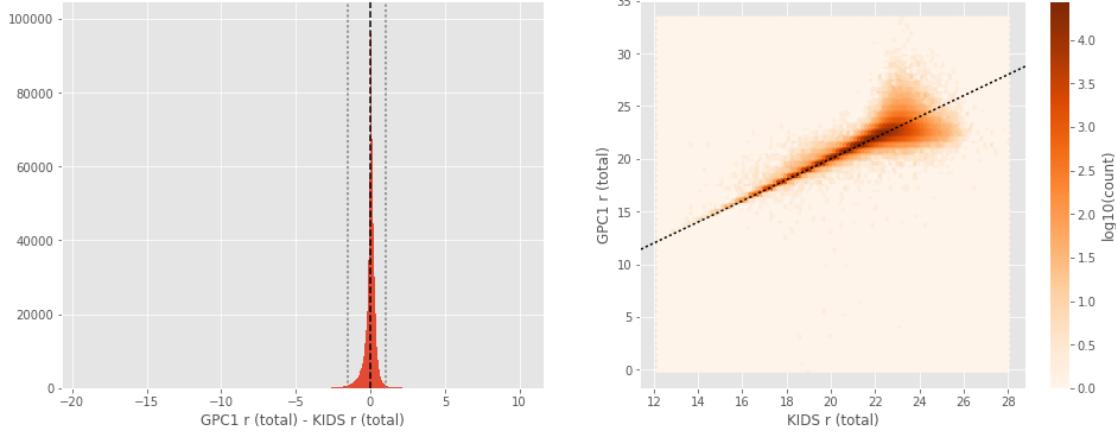
GPC1 r (aperture) - KIDS r (aperture):

- Median: -0.19
- Median Absolute Deviation: 0.24
- 1% percentile: -1.4279033660888671
- 99% percentile: 1.5094874382019094



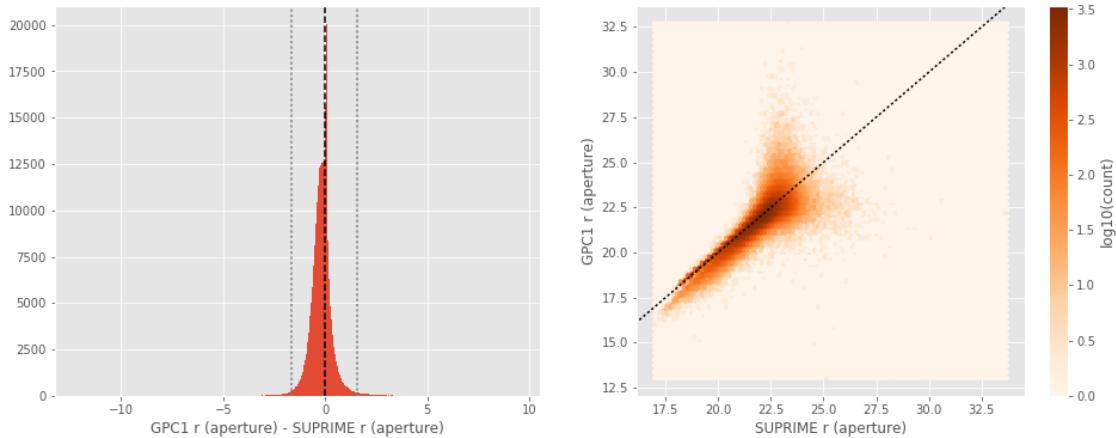
GPC1 r (total) - KIDS r (total):

- Median: 0.05
- Median Absolute Deviation: 0.13
- 1% percentile: -1.5332369995117188
- 99% percentile: 1.0504807281494113



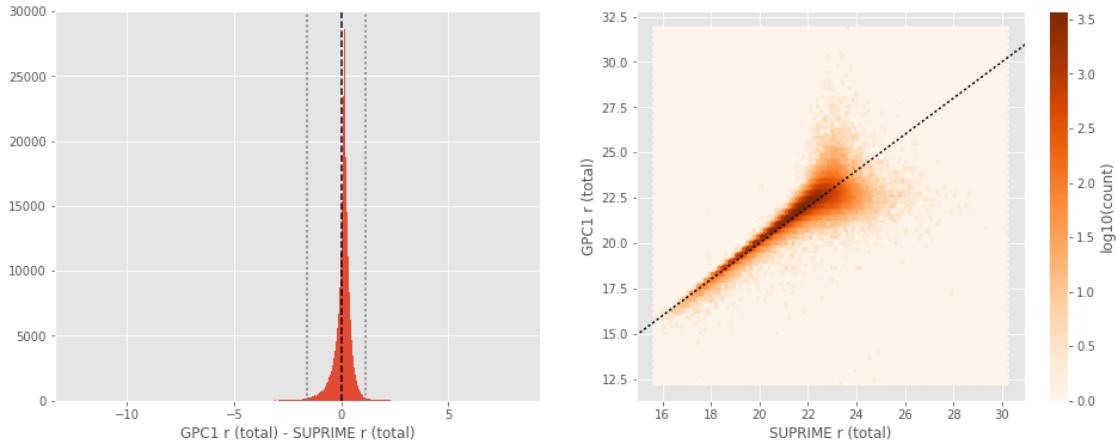
GPC1 r (aperture) - SUPRIME r (aperture):

- Median: -0.16
- Median Absolute Deviation: 0.25
- 1% percentile: -1.6482121086120607
- 99% percentile: 1.5769341278076159



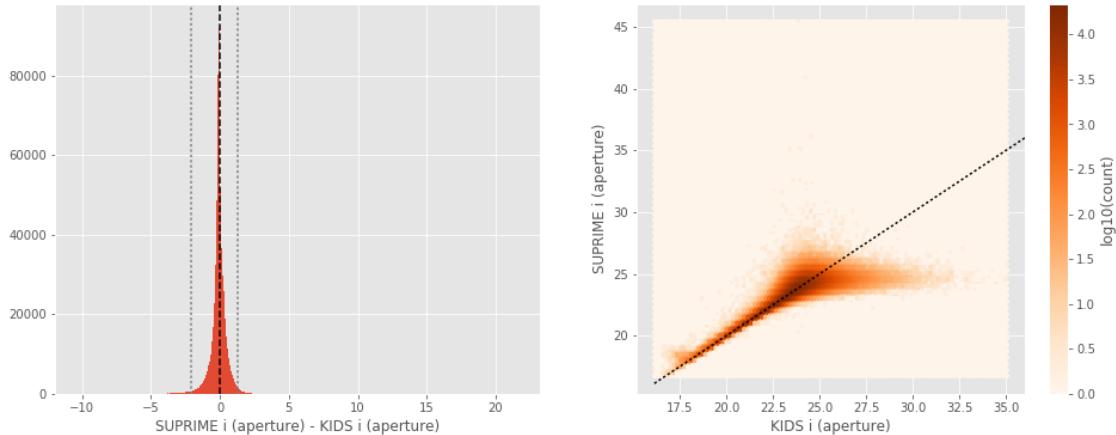
GPC1 r (total) - SUPRIME r (total):

- Median: 0.14
- Median Absolute Deviation: 0.15
- 1% percentile: -1.601072483062744
- 99% percentile: 1.1306134033203126



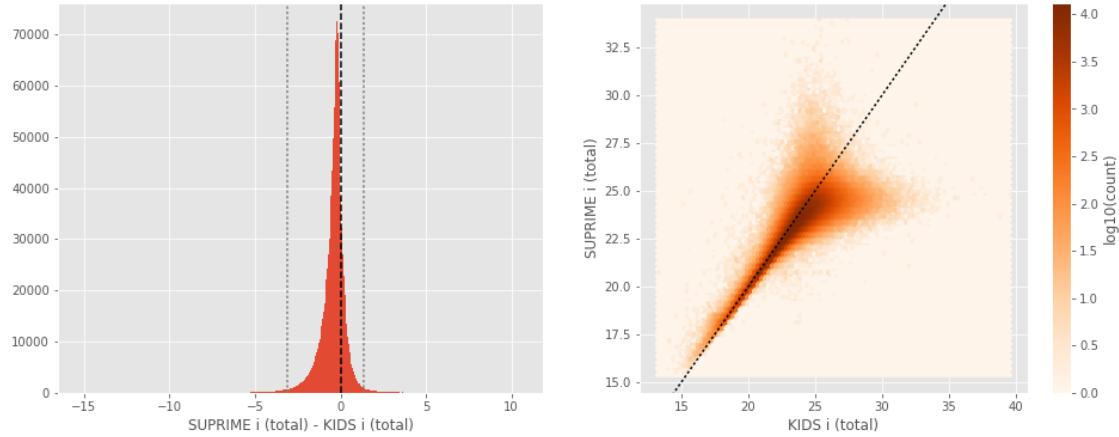
SUPRIME i (aperture) - KIDS i (aperture):

- Median: -0.08
- Median Absolute Deviation: 0.21
- 1% percentile: -2.0993301010131837
- 99% percentile: 1.3187004470825237



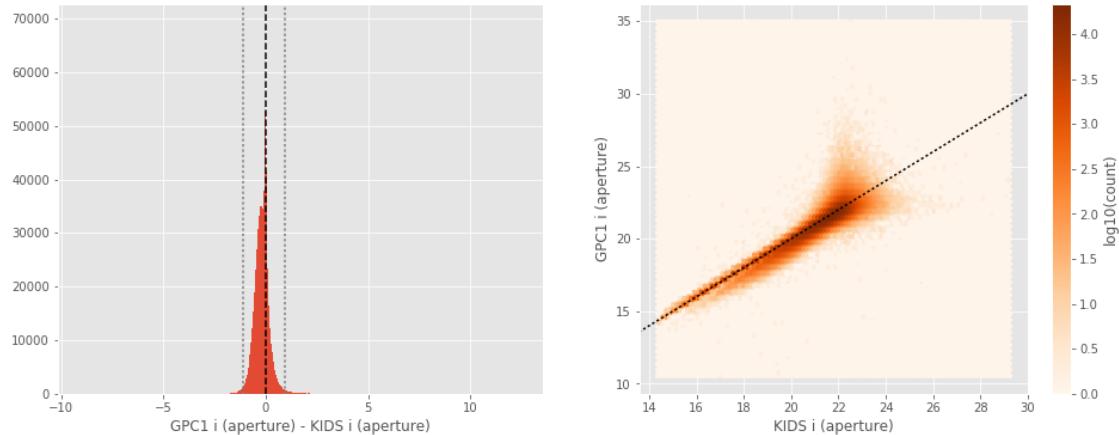
SUPRIME i (total) - KIDS i (total):

- Median: -0.30
- Median Absolute Deviation: 0.30
- 1% percentile: -3.1144363403320314
- 99% percentile: 1.3730266189575193



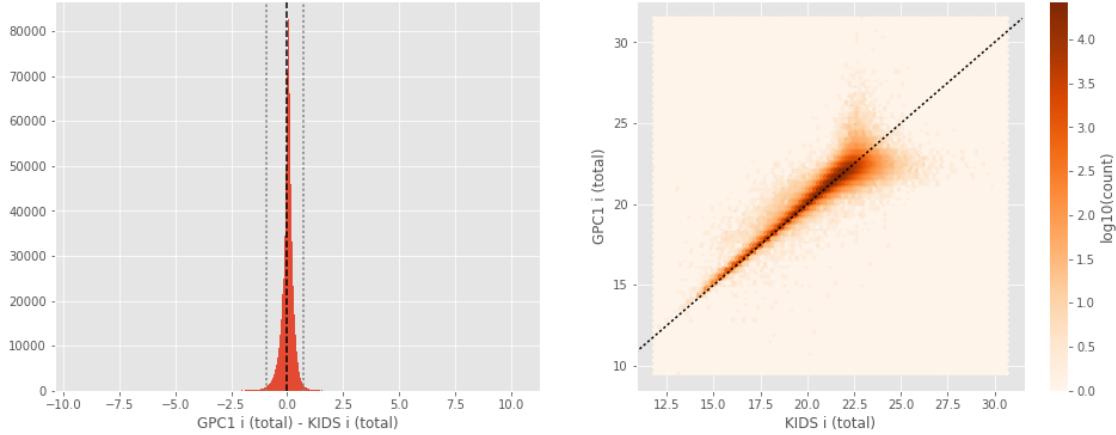
GPC1 i (aperture) - KIDS i (aperture):

- Median: -0.15
- Median Absolute Deviation: 0.19
- 1% percentile: -1.0921630859375
- 99% percentile: 0.942601203918457



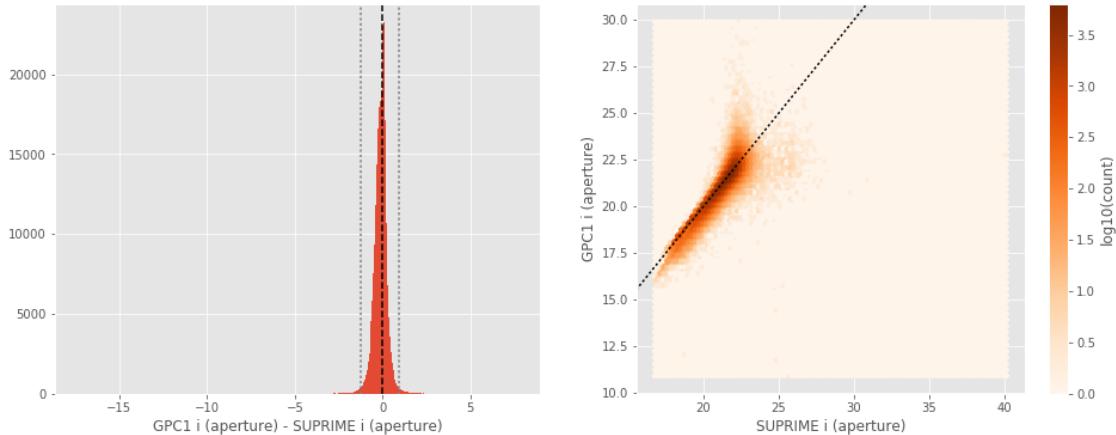
GPC1 i (total) - KIDS i (total):

- Median: 0.04
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9394100379943848
- 99% percentile: 0.7289270019531244



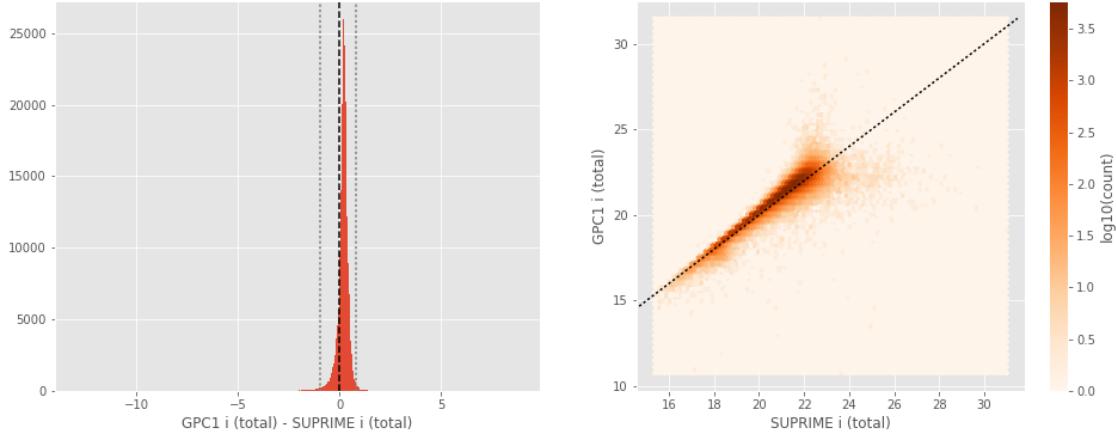
GPC1 i (aperture) - SUPRIME i (aperture):

- Median: -0.09
- Median Absolute Deviation: 0.20
- 1% percentile: -1.2597021865844726
- 99% percentile: 0.9451037597656242



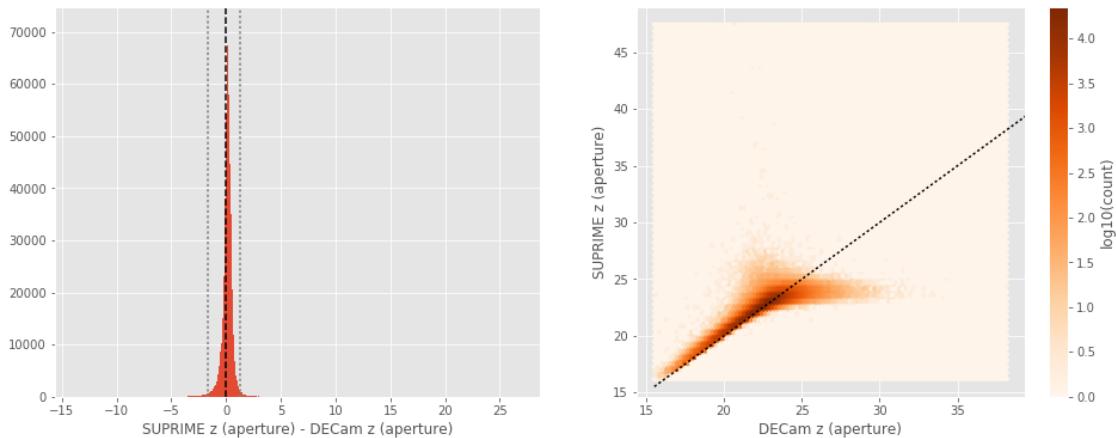
GPC1 i (total) - SUPRIME i (total):

- Median: 0.20
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9388385772705078
- 99% percentile: 0.7898092269897459



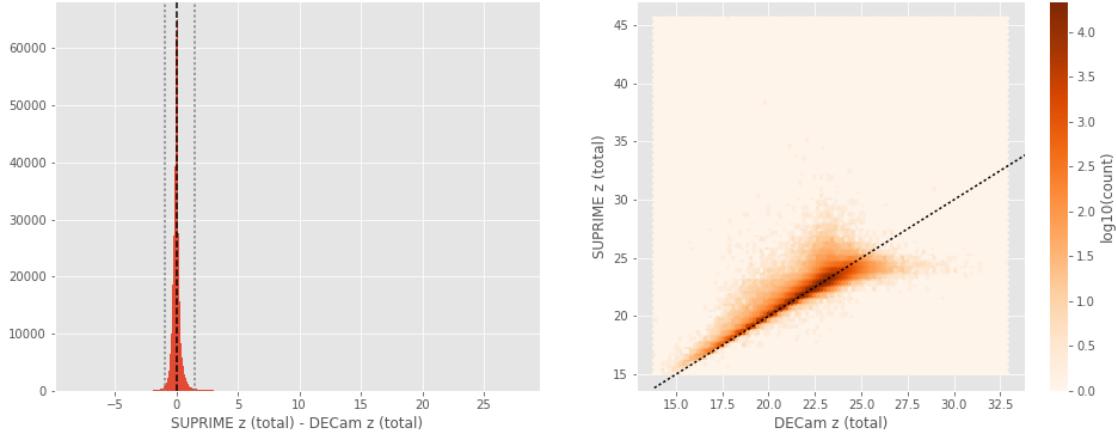
SUPRIME z (aperture) - DECam z (aperture):

- Median: 0.14
- Median Absolute Deviation: 0.20
- 1% percentile: -1.7197685241699219
- 99% percentile: 1.3337068557739267



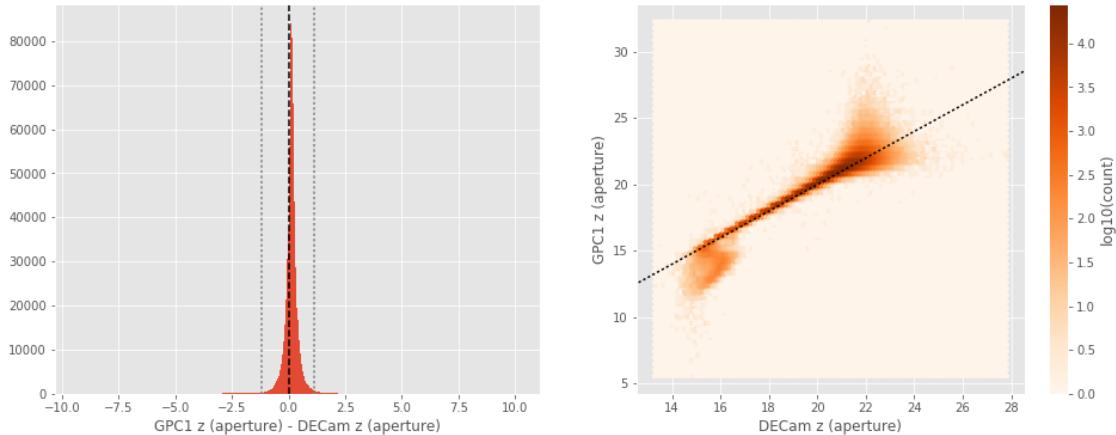
SUPRIME z (total) - DECam z (total):

- Median: 0.02
- Median Absolute Deviation: 0.14
- 1% percentile: -0.8981622886657715
- 99% percentile: 1.4719318771362397



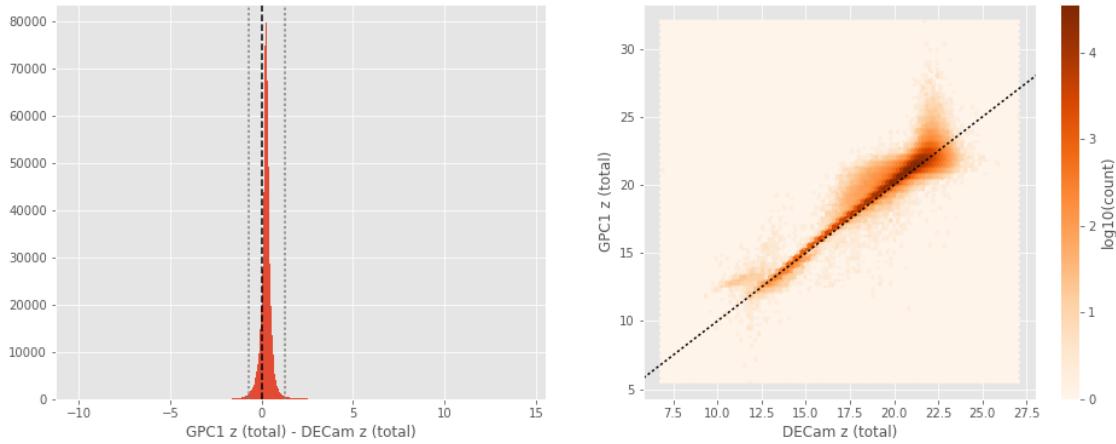
GPC1 z (aperture) - DECam z (aperture):

- Median: 0.13
- Median Absolute Deviation: 0.12
- 1% percentile: -1.197961082458496
- 99% percentile: 1.1379787445068388



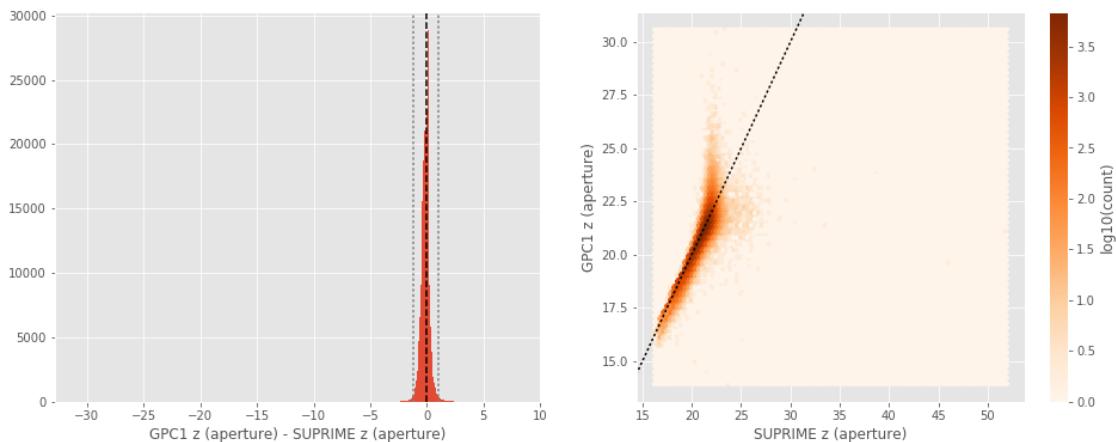
GPC1 z (total) - DECam z (total):

- Median: 0.25
- Median Absolute Deviation: 0.12
- 1% percentile: -0.7122621345520018
- 99% percentile: 1.3096992492675792



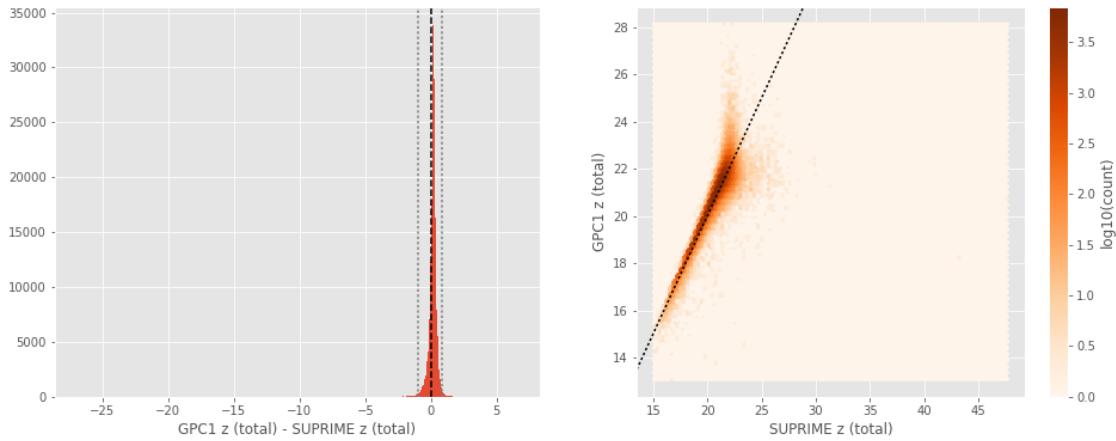
GPC1 z (aperture) - SUPRIME z (aperture) :

- Median: -0.11
- Median Absolute Deviation: 0.21
- 1% percentile: -1.1804688262939453
- 99% percentile: 1.0268697357177732



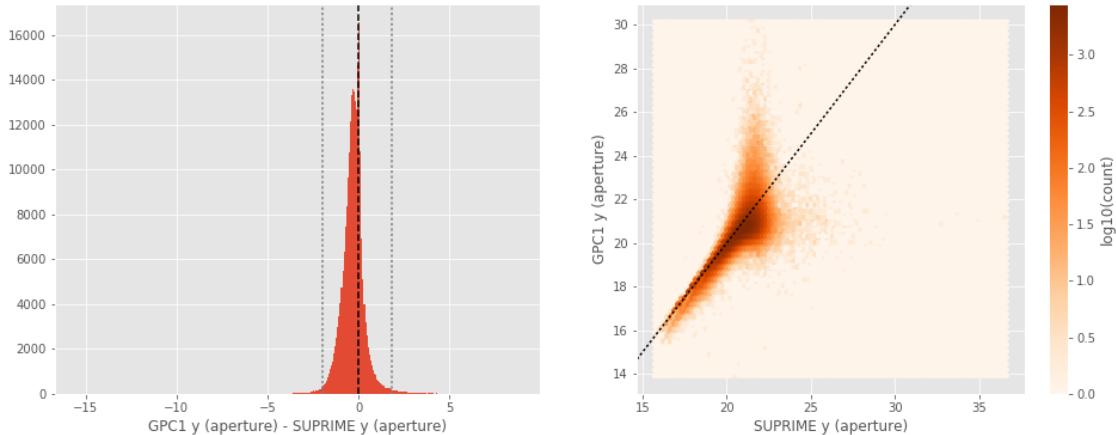
GPC1 z (total) - SUPRIME z (total) :

- Median: 0.17
- Median Absolute Deviation: 0.13
- 1% percentile: -0.9890042114257812
- 99% percentile: 0.8573753738403318



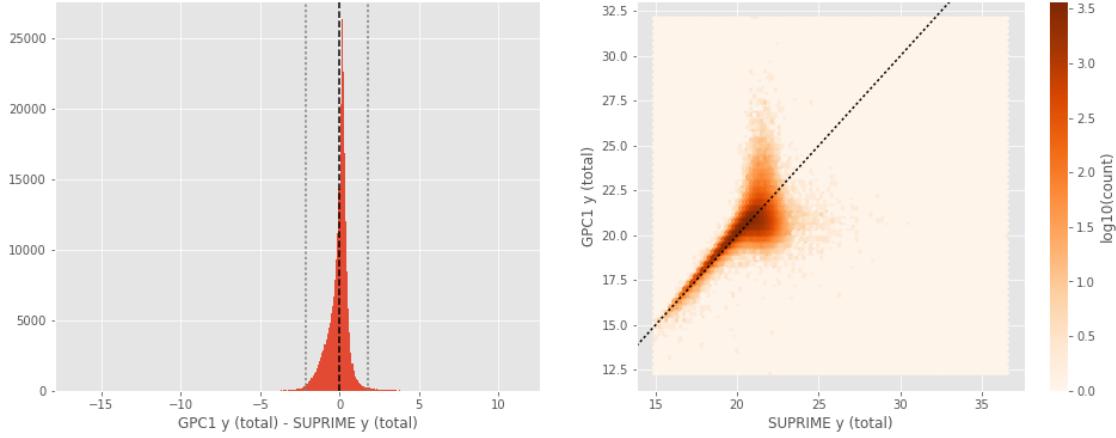
GPC1 y (aperture) - SUPRIME y (aperture):

- Median: -0.27
- Median Absolute Deviation: 0.32
- 1% percentile: -1.9547522544860838
- 99% percentile: 1.80585403442383



GPC1 y (total) - SUPRIME y (total):

- Median: 0.07
- Median Absolute Deviation: 0.27
- 1% percentile: -2.1251942443847653
- 99% percentile: 1.7523292541503808



0.4 III - Comparing magnitudes to reference bands

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

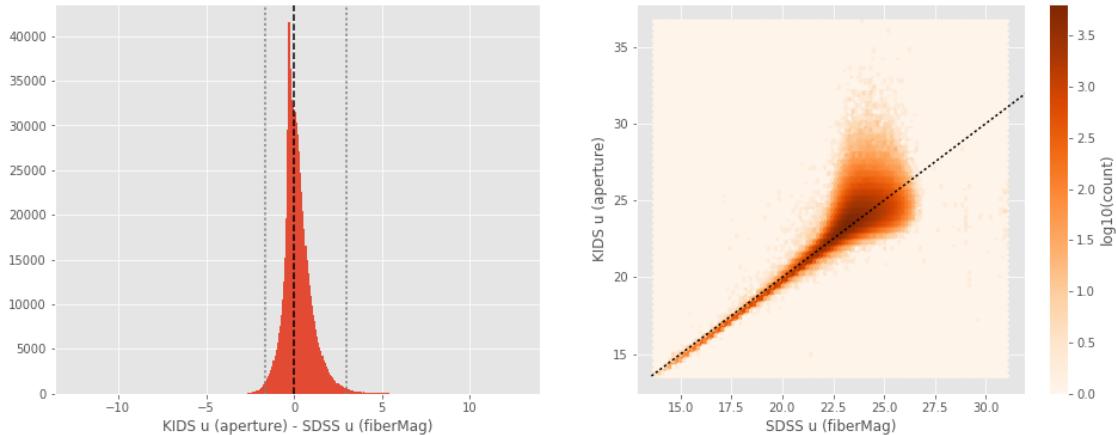
0.4.1 III.a - Comparing u, g, r, i, and z bands to SDSS

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.

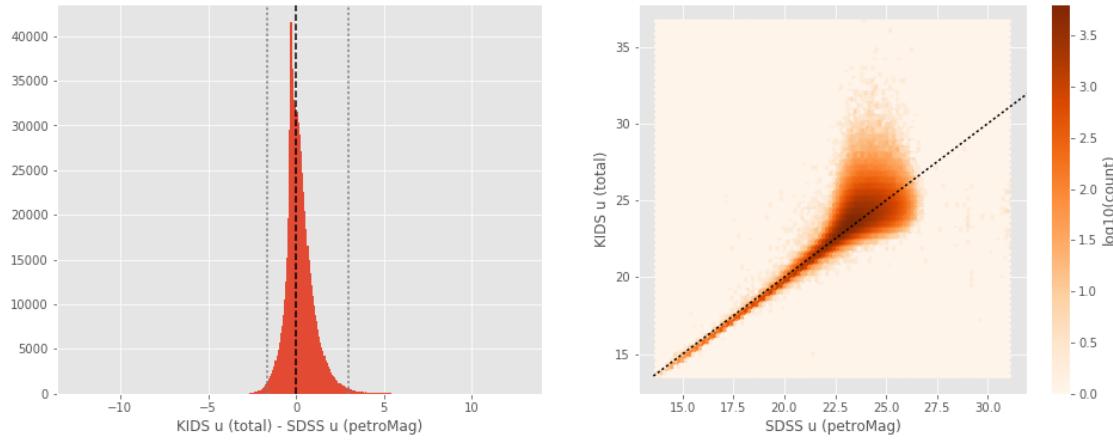
KIDS u (aperture) - SDSS u (fiberMag) :

- Median: 0.10
- Median Absolute Deviation: 0.42
- 1% percentile: -1.6068706512451172
- 99% percentile: 2.9546961784362793



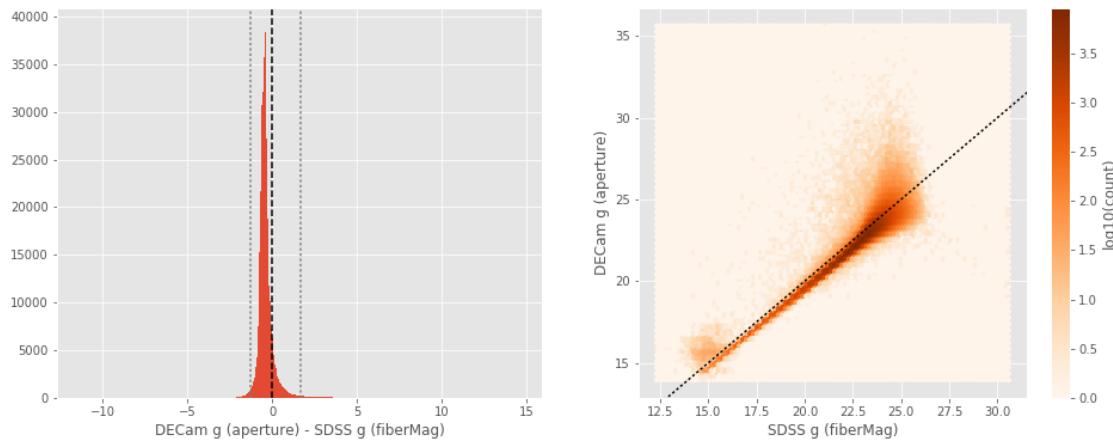
KIDS u (total) - SDSS u (petroMag):

- Median: 0.10
- Median Absolute Deviation: 0.42
- 1% percentile: -1.6068706512451172
- 99% percentile: 2.9546961784362793



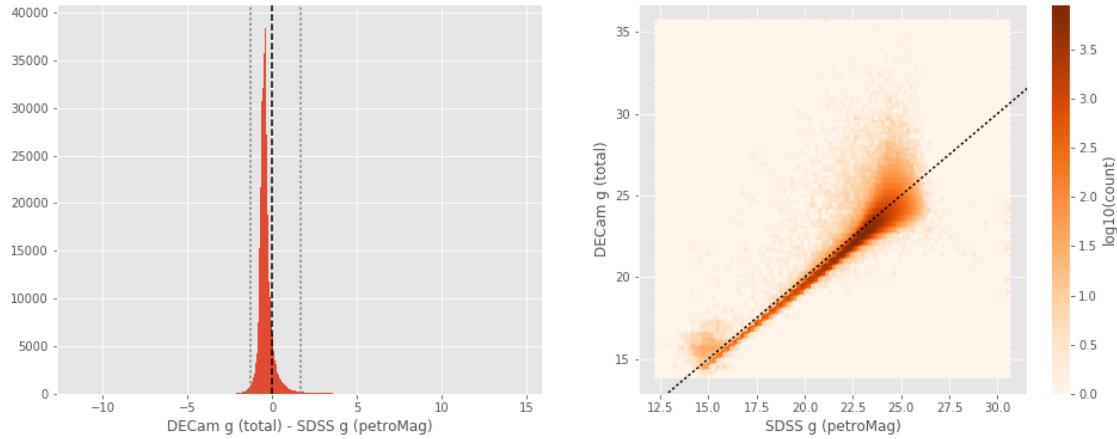
DECam g (aperture) - SDSS g (fiberMag):

- Median: -0.44
- Median Absolute Deviation: 0.16
- 1% percentile: -1.2985469055175782
- 99% percentile: 1.6975757598876973



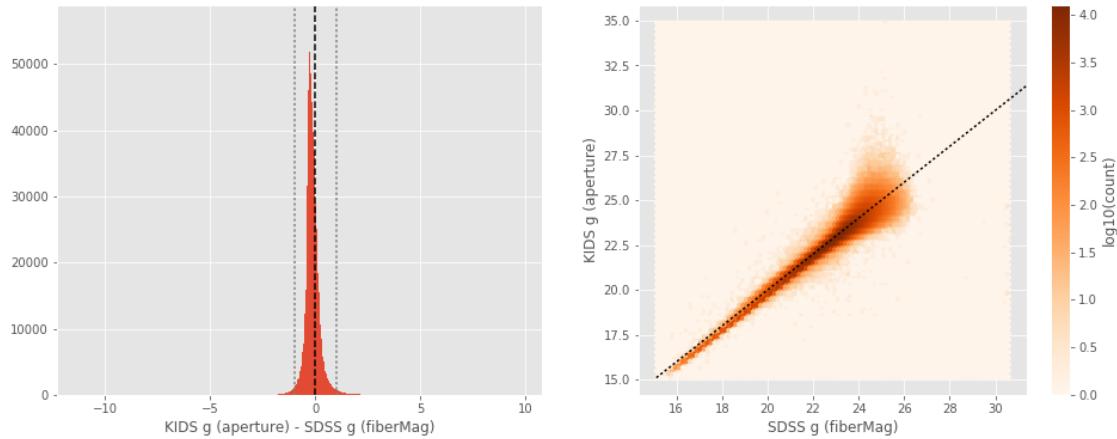
DECam g (total) - SDSS g (petroMag):

- Median: -0.44
- Median Absolute Deviation: 0.16
- 1% percentile: -1.2985469055175782
- 99% percentile: 1.6975757598876973



KIDS g (aperture) - SDSS g (fiberMag):

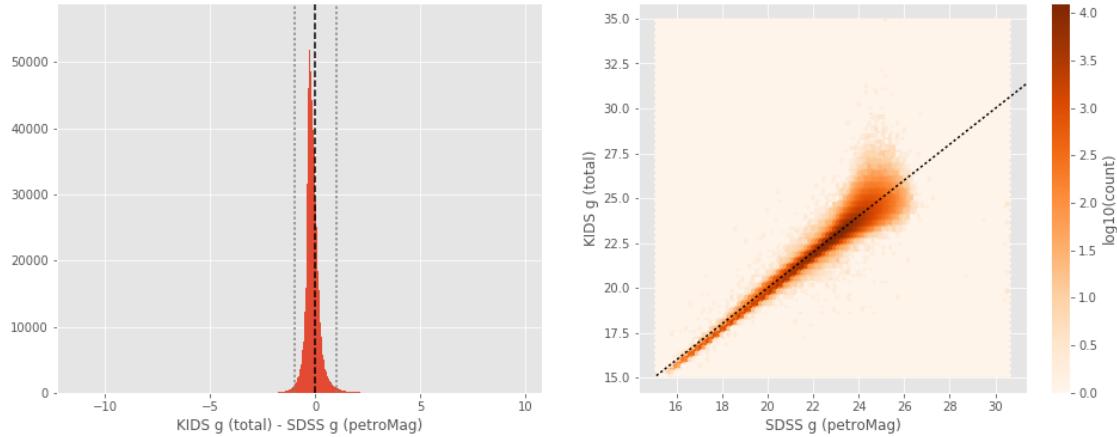
- Median: -0.17
- Median Absolute Deviation: 0.16
- 1% percentile: -0.989033203125
- 99% percentile: 1.033982009887696



KIDS g (total) - SDSS g (petroMag):

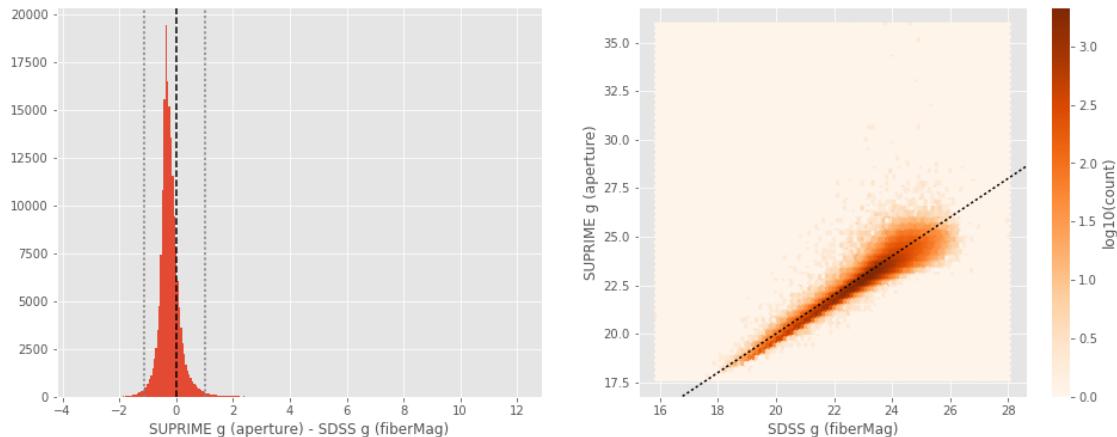
- Median: -0.17

- Median Absolute Deviation: 0.16
- 1% percentile: -0.989033203125
- 99% percentile: 1.033982009887696



SUPRIME g (aperture) - SDSS g (fiberMag) :

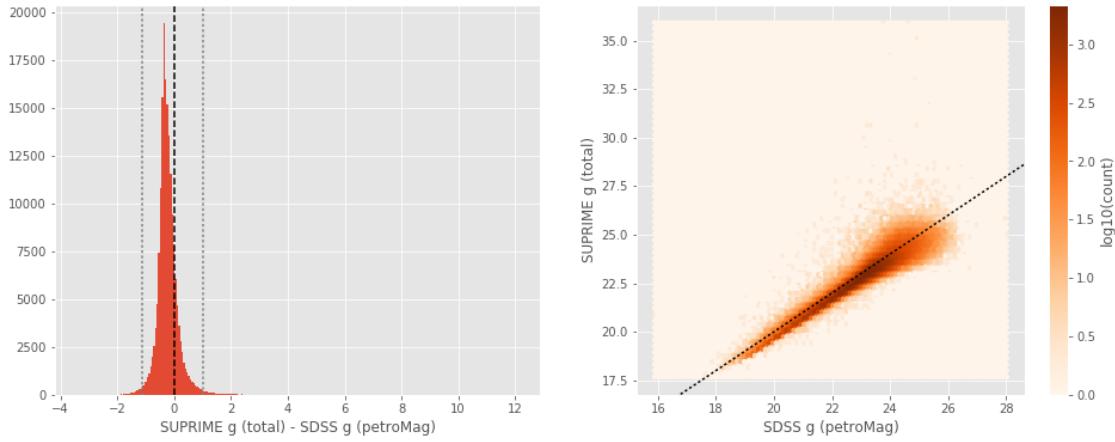
- Median: -0.27
- Median Absolute Deviation: 0.17
- 1% percentile: -1.121074981689453
- 99% percentile: 1.001533355712892



SUPRIME g (total) - SDSS g (petroMag) :

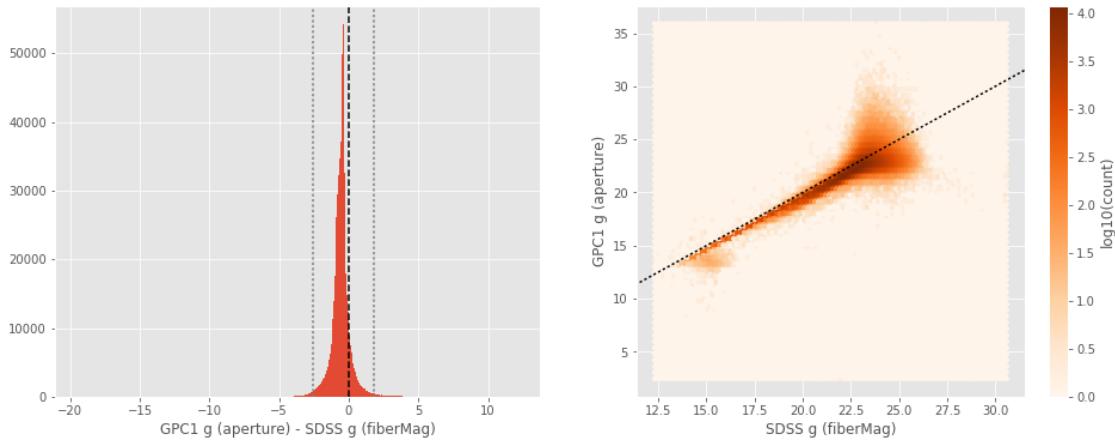
- Median: -0.27
- Median Absolute Deviation: 0.17
- 1% percentile: -1.121074981689453

- 99% percentile: 1.001533355712892



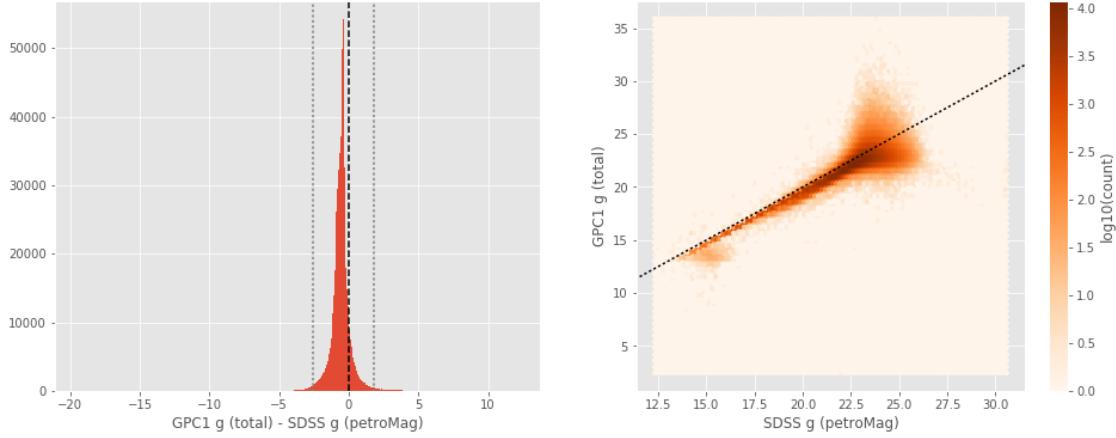
GPC1 g (aperture) - SDSS g (fiberMag):

- Median: -0.53
- Median Absolute Deviation: 0.27
- 1% percentile: -2.5304904174804688
- 99% percentile: 1.800501060485837



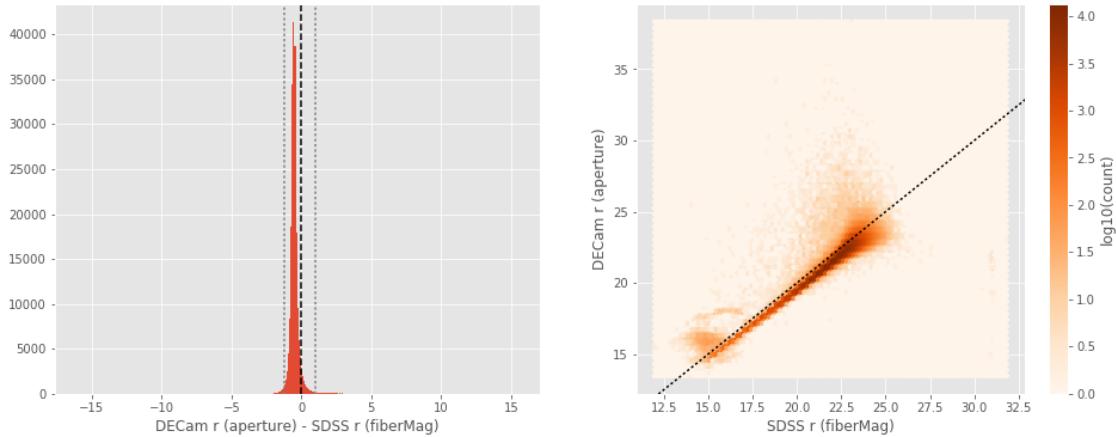
GPC1 g (total) - SDSS g (petroMag):

- Median: -0.53
- Median Absolute Deviation: 0.27
- 1% percentile: -2.5304904174804688
- 99% percentile: 1.800501060485837



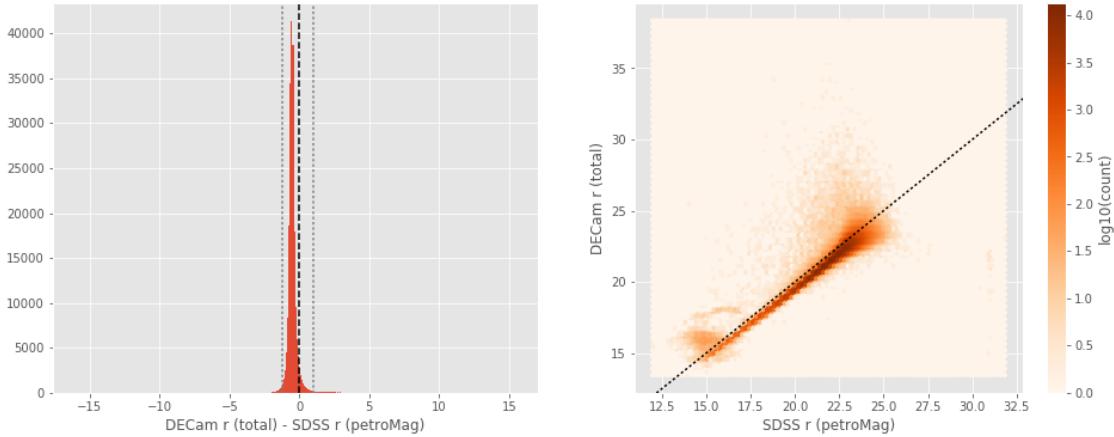
DECam r (aperture) - SDSS r (fiberMag):

- Median: -0.53
- Median Absolute Deviation: 0.13
- 1% percentile: -1.2202922821044921
- 99% percentile: 0.988734893798829



DECam r (total) - SDSS r (petroMag):

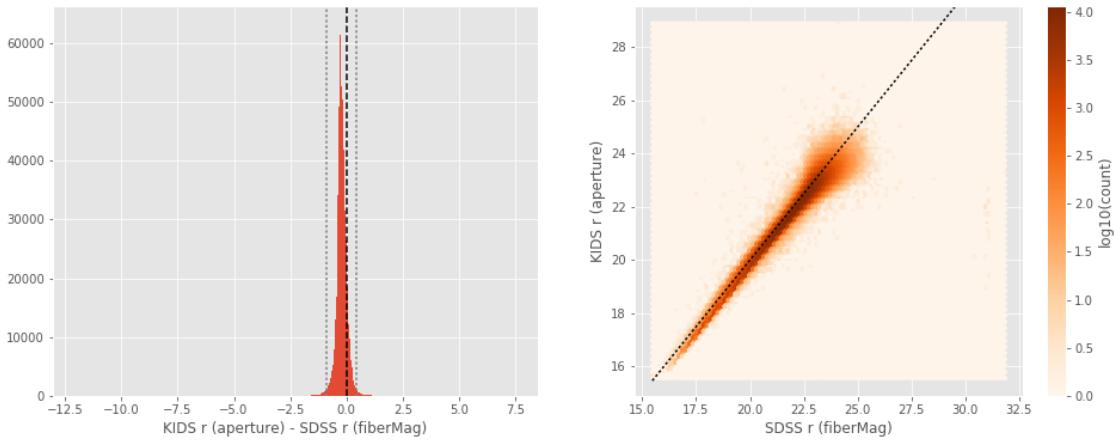
- Median: -0.53
- Median Absolute Deviation: 0.13
- 1% percentile: -1.2202922821044921
- 99% percentile: 0.988734893798829



```
/opt/anaconda3/envs/herschelhelp_internal/lib/python3.6/site-packages/ipykernel/_main_.py:8: R
```

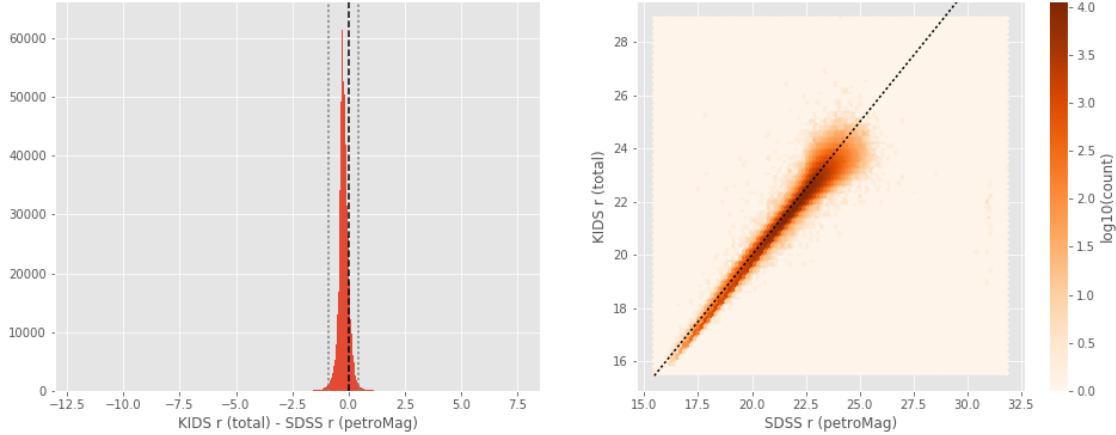
KIDS r (aperture) - SDSS r (fiberMag):

- Median: -0.23
- Median Absolute Deviation: 0.12
- 1% percentile: -0.8954694747924804
- 99% percentile: 0.42119455337524436



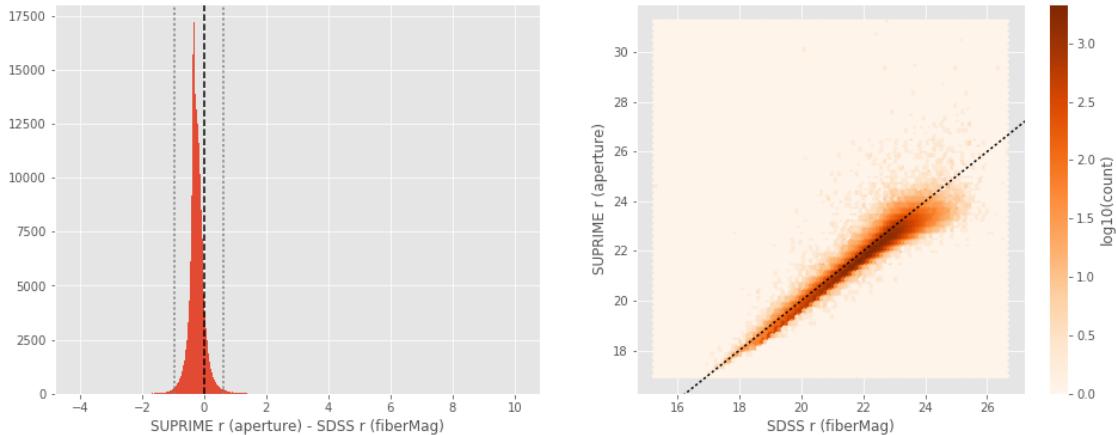
KIDS r (total) - SDSS r (petroMag):

- Median: -0.23
- Median Absolute Deviation: 0.12
- 1% percentile: -0.8954694747924804
- 99% percentile: 0.42119455337524436



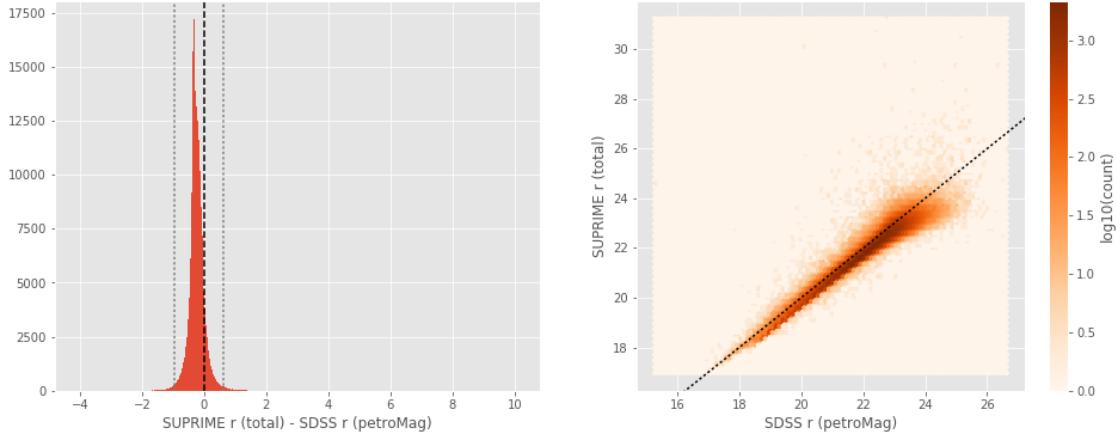
SUPRIME r (aperture) - SDSS r (fiberMag):

- Median: -0.26
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9513585090637208
- 99% percentile: 0.6181533622741703



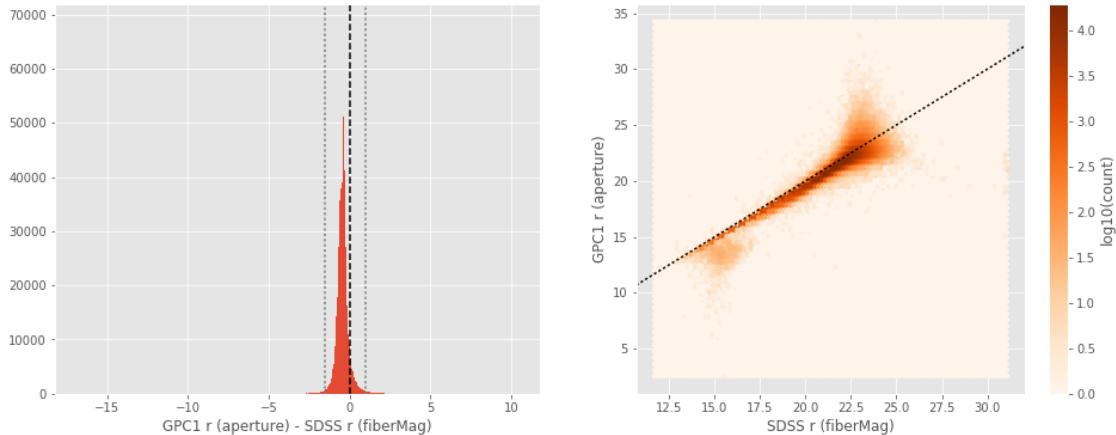
SUPRIME r (total) - SDSS r (petroMag):

- Median: -0.26
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9513585090637208
- 99% percentile: 0.6181533622741703



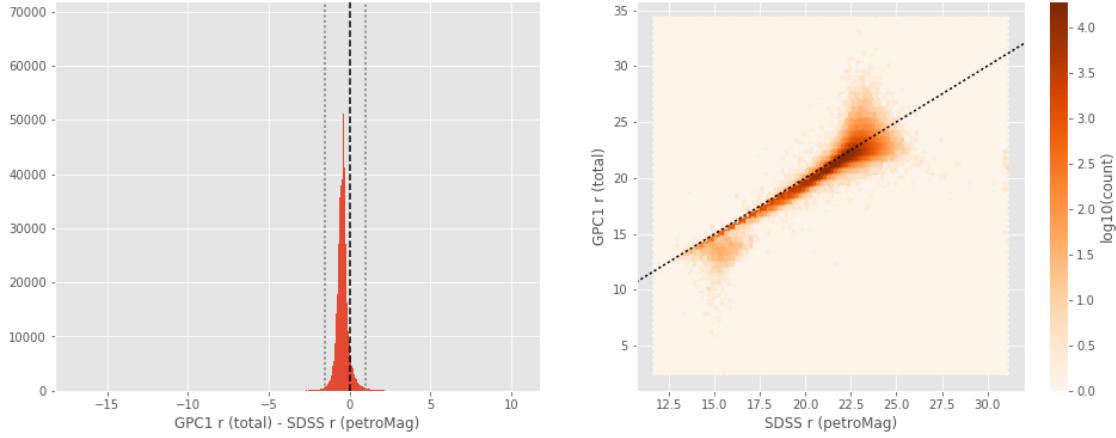
GPC1 r (aperture) - SDSS r (fiberMag):

- Median: -0.41
- Median Absolute Deviation: 0.17
- 1% percentile: -1.506801357269287
- 99% percentile: 1.0024491882324256



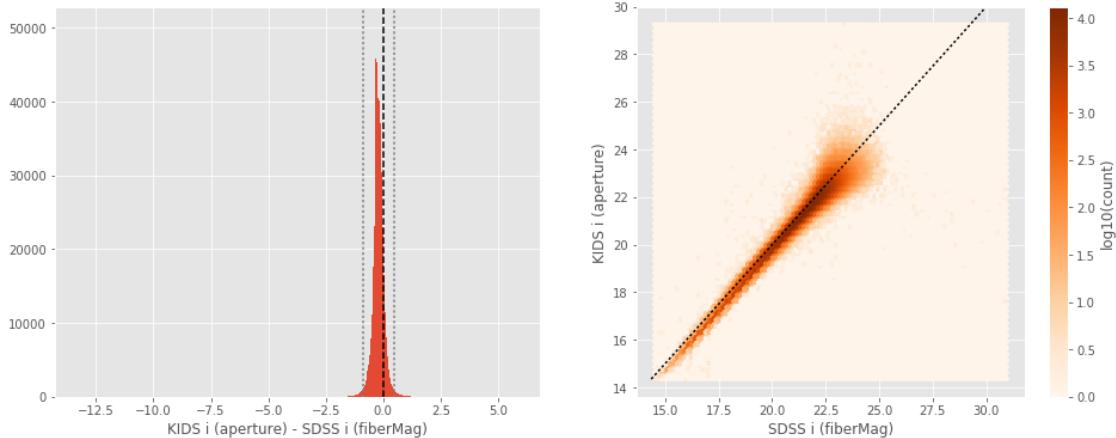
GPC1 r (total) - SDSS r (petroMag):

- Median: -0.41
- Median Absolute Deviation: 0.17
- 1% percentile: -1.506801357269287
- 99% percentile: 1.0024491882324256



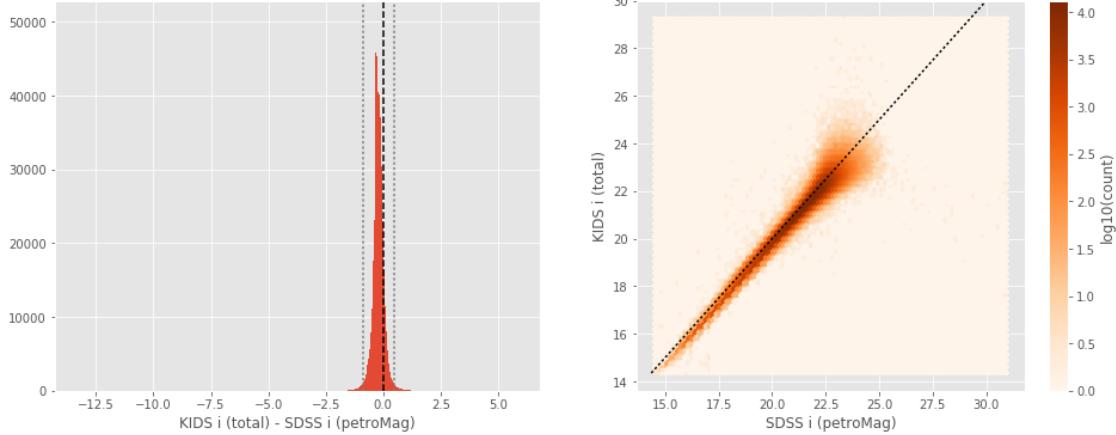
KIDS i (aperture) - SDSS i (fiberMag):

- Median: -0.22
- Median Absolute Deviation: 0.12
- 1% percentile: -0.8867022514343261
- 99% percentile: 0.4903226852416962



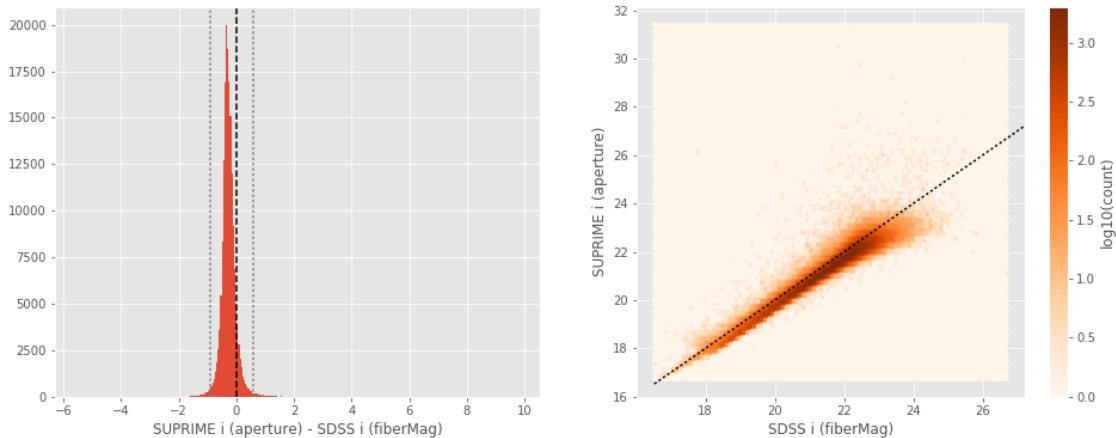
KIDS i (total) - SDSS i (petroMag):

- Median: -0.22
- Median Absolute Deviation: 0.12
- 1% percentile: -0.8867022514343261
- 99% percentile: 0.4903226852416962



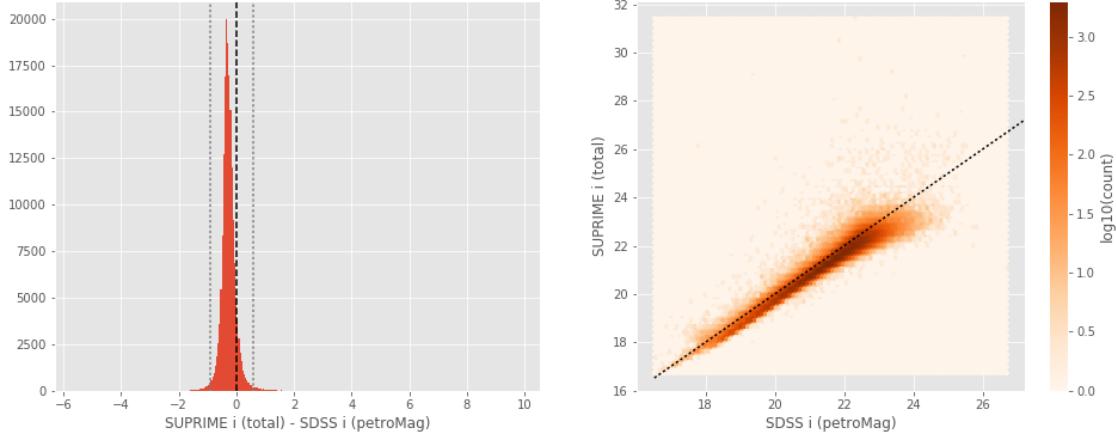
SUPRIME i (aperture) - SDSS i (fiberMag):

- Median: -0.29
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9200061035156251
- 99% percentile: 0.5815077590942384



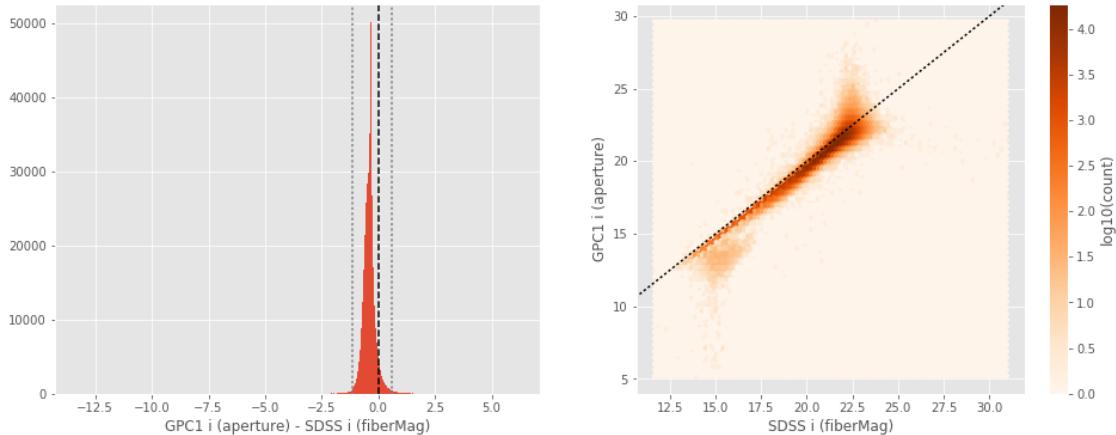
SUPRIME i (total) - SDSS i (petroMag):

- Median: -0.29
- Median Absolute Deviation: 0.12
- 1% percentile: -0.9200061035156251
- 99% percentile: 0.5815077590942384



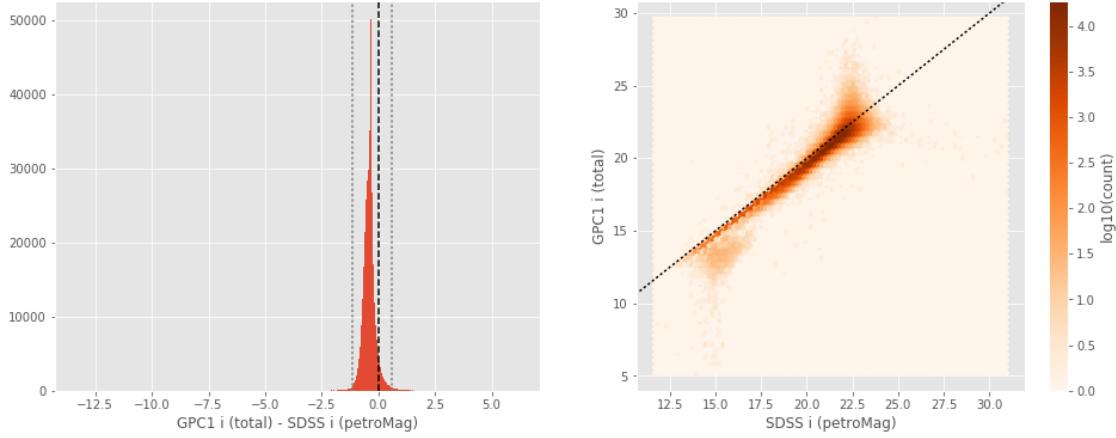
GPC1 i (aperture) - SDSS i (fiberMag):

- Median: -0.39
- Median Absolute Deviation: 0.14
- 1% percentile: -1.1198129272460937
- 99% percentile: 0.5794070434570271



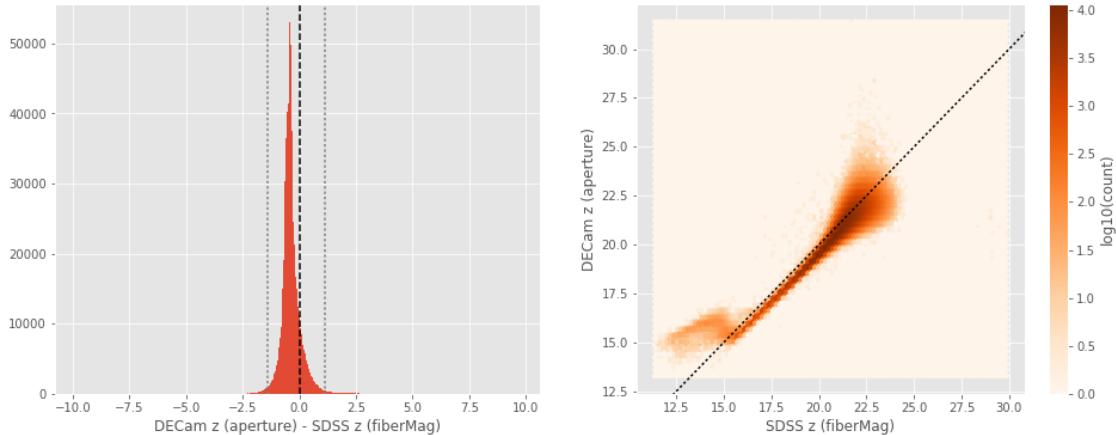
GPC1 i (total) - SDSS i (petroMag):

- Median: -0.39
- Median Absolute Deviation: 0.14
- 1% percentile: -1.1198129272460937
- 99% percentile: 0.5794070434570271



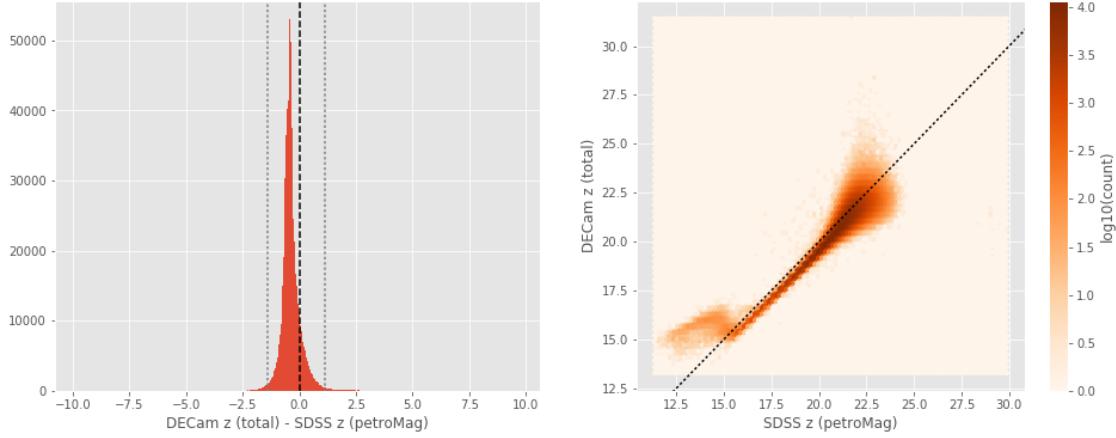
DECam z (aperture) - SDSS z (fiberMag):

- Median: -0.42
- Median Absolute Deviation: 0.18
- 1% percentile: -1.3981916618347168
- 99% percentile: 1.1099197769164975



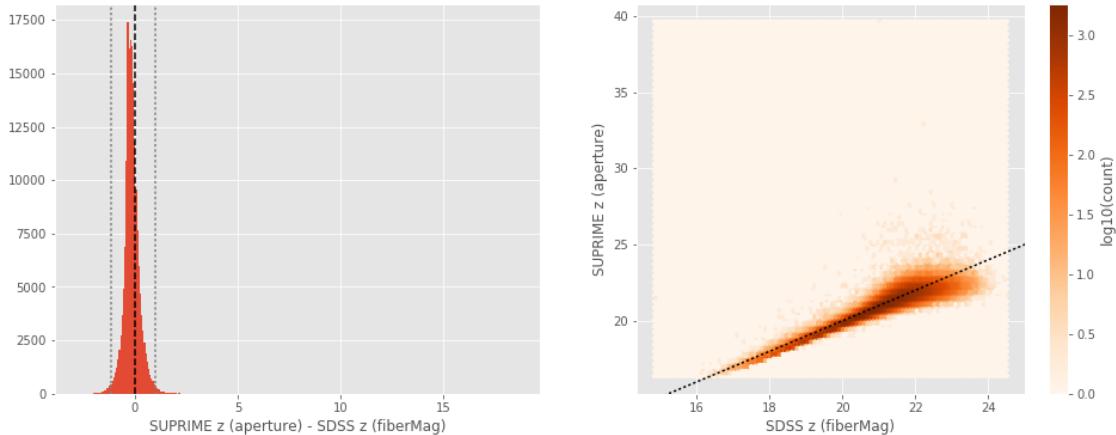
DECam z (total) - SDSS z (petroMag):

- Median: -0.42
- Median Absolute Deviation: 0.18
- 1% percentile: -1.3981916618347168
- 99% percentile: 1.1099197769164975



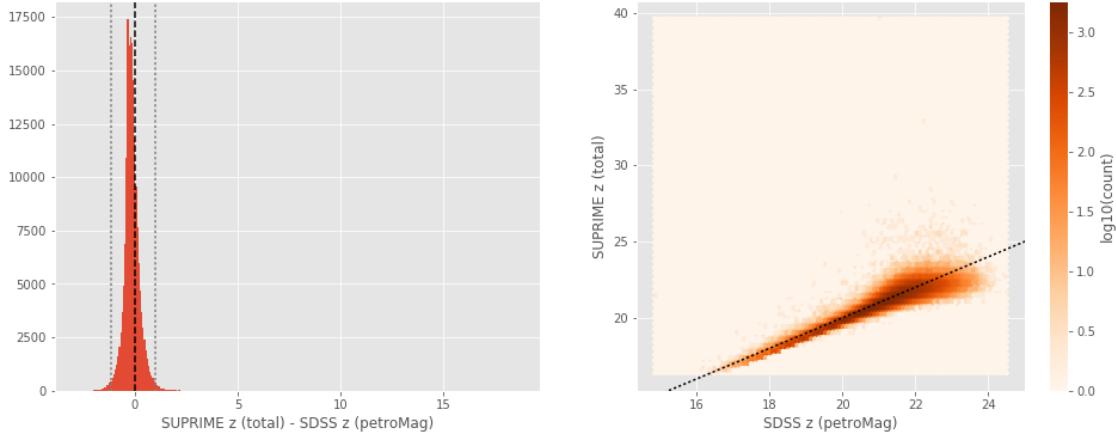
SUPRIME z (aperture) - SDSS z (fiberMag):

- Median: -0.17
- Median Absolute Deviation: 0.19
- 1% percentile: -1.1570728683471678
- 99% percentile: 1.0003003501892096



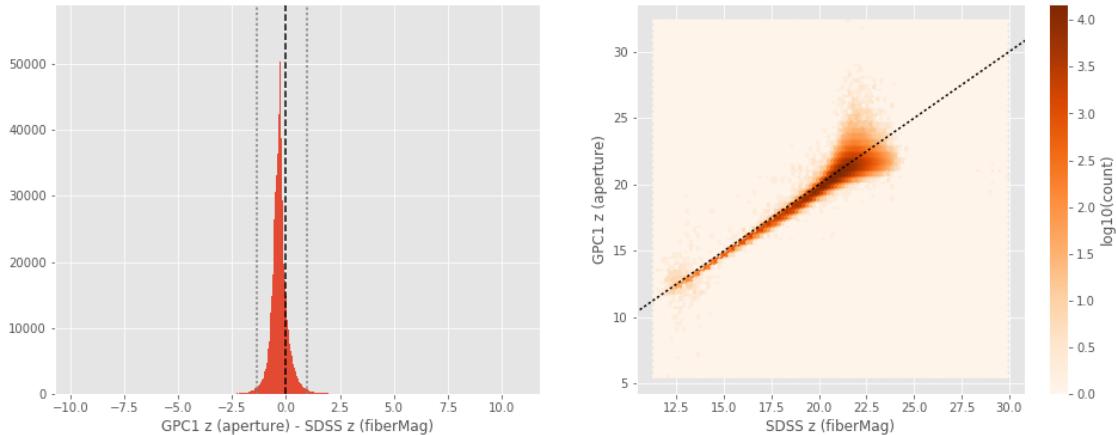
SUPRIME z (total) - SDSS z (petroMag):

- Median: -0.17
- Median Absolute Deviation: 0.19
- 1% percentile: -1.1570728683471678
- 99% percentile: 1.0003003501892096



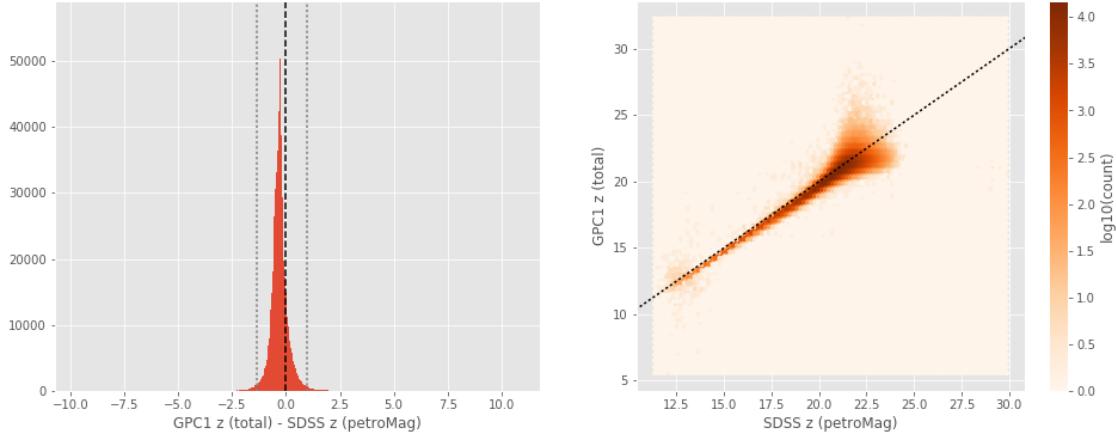
GPC1 z (aperture) - SDSS z (fiberMag):

- Median: -0.31
- Median Absolute Deviation: 0.18
- 1% percentile: -1.3754301261901856
- 99% percentile: 0.9457995605468756



GPC1 z (total) - SDSS z (petroMag):

- Median: -0.31
- Median Absolute Deviation: 0.18
- 1% percentile: -1.3754301261901856
- 99% percentile: 0.9457995605468756



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

The catalogue is cross-matched to 2MASS-PSC within 0.2 arcsecond. We compare the UKIDSS 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](#):

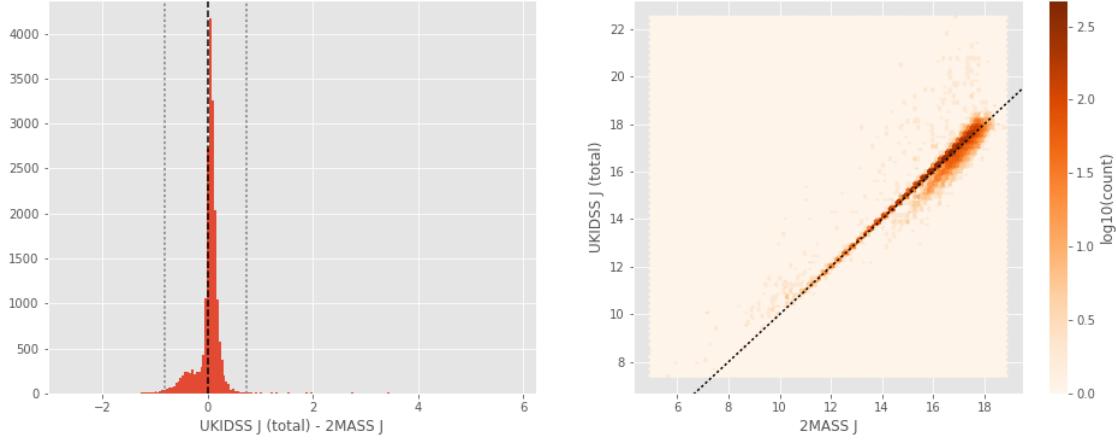
Band	F - 0 mag (Jy)
J	1594
H	1024
Ks	666.7

In addition, UKIDSS uses a K band whereas 2MASS uses a Ks (“short”) band, [this page](#) give a correction to convert the K band to a Ks band with the formula:

$$K_{s(2MASS)} = K_{UKIRT} + 0.003 + 0.004 * (JK)_{UKIRT}$$

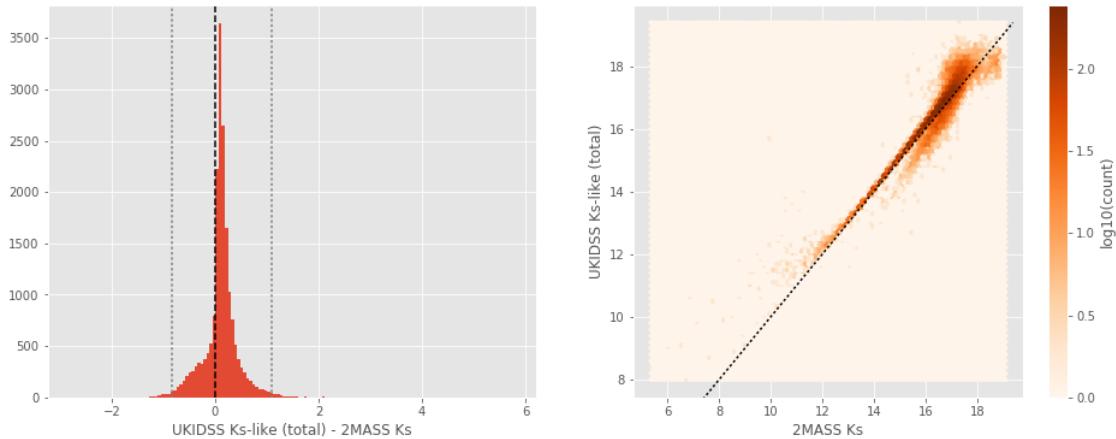
UKIDSS J (total) - 2MASS J:

- Median: 0.06
- Median Absolute Deviation: 0.06
- 1% percentile: -0.82272788390177
- 99% percentile: 0.7281288665865127



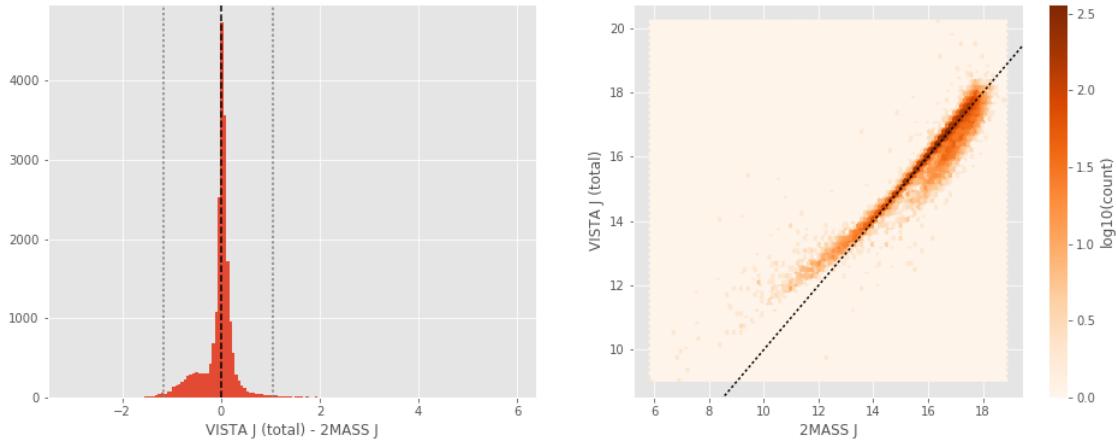
UKIDSS Ks-like (total) - 2MASS Ks:

- Median: 0.11
- Median Absolute Deviation: 0.10
- 1% percentile: -0.8383912190111664
- 99% percentile: 1.1027035285321665



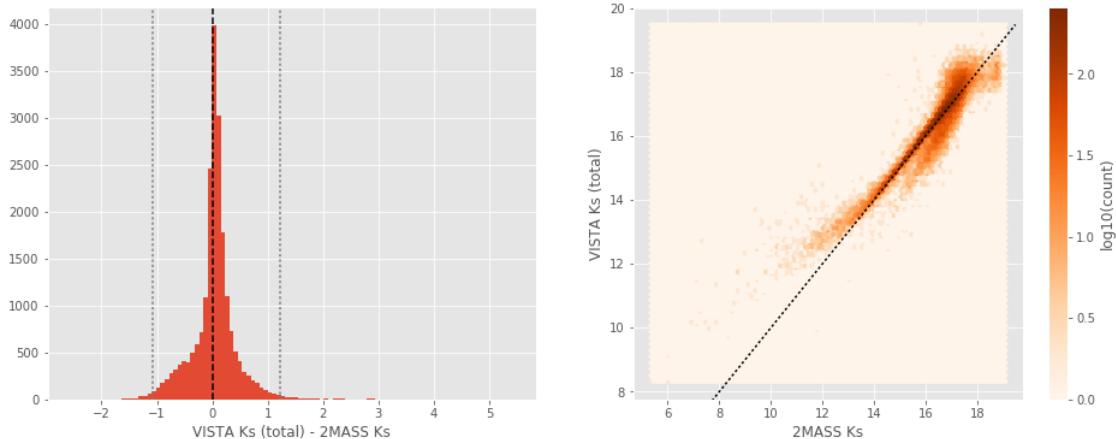
VISTA J (total) - 2MASS J:

- Median: 0.02
- Median Absolute Deviation: 0.08
- 1% percentile: -1.160277298498327
- 99% percentile: 1.0473052539156118



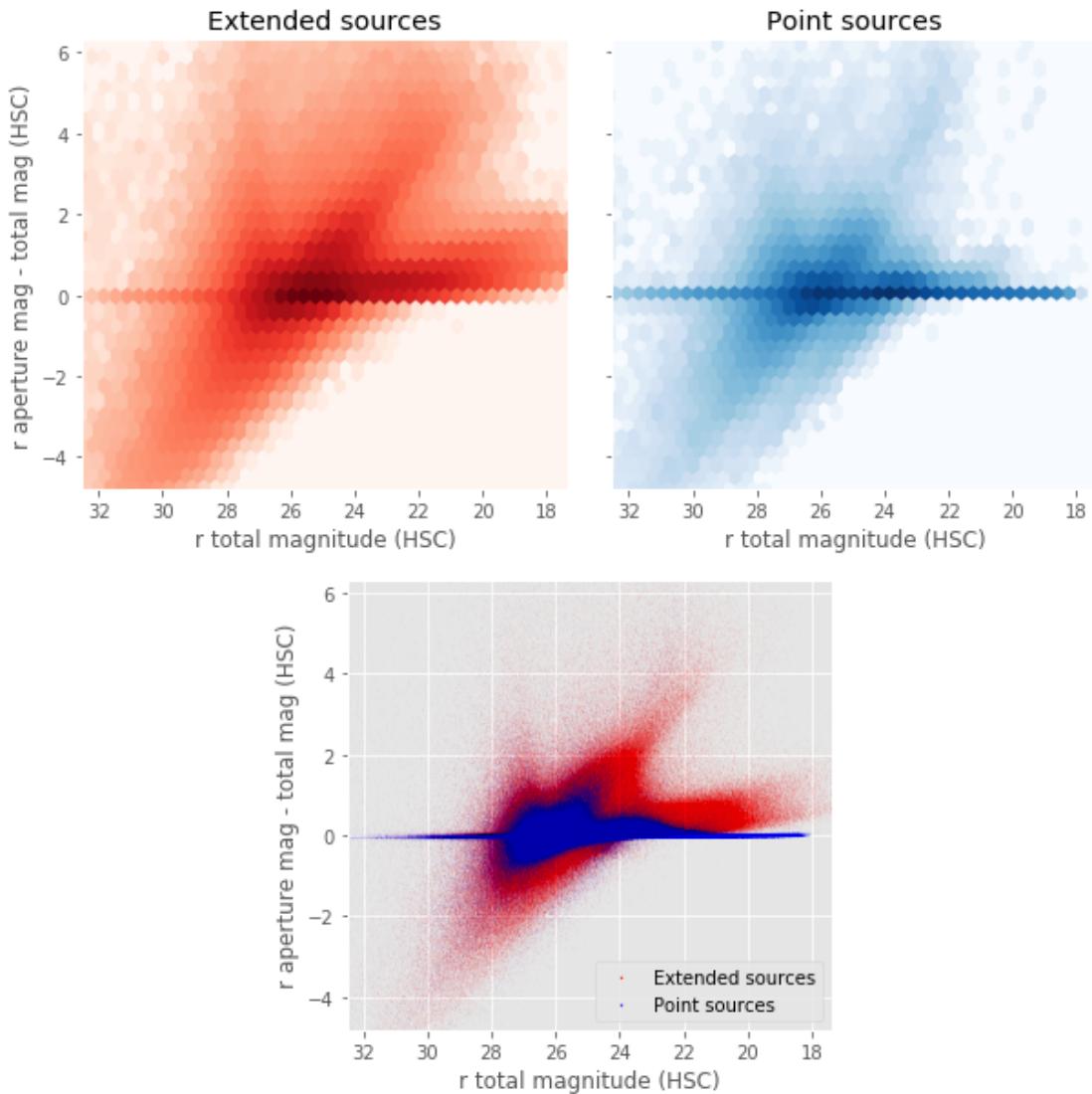
VISTA Ks (total) - 2MASS Ks:

- Median: 0.05
- Median Absolute Deviation: 0.14
- 1% percentile: -1.0731860493334318
- 99% percentile: 1.219176158231873



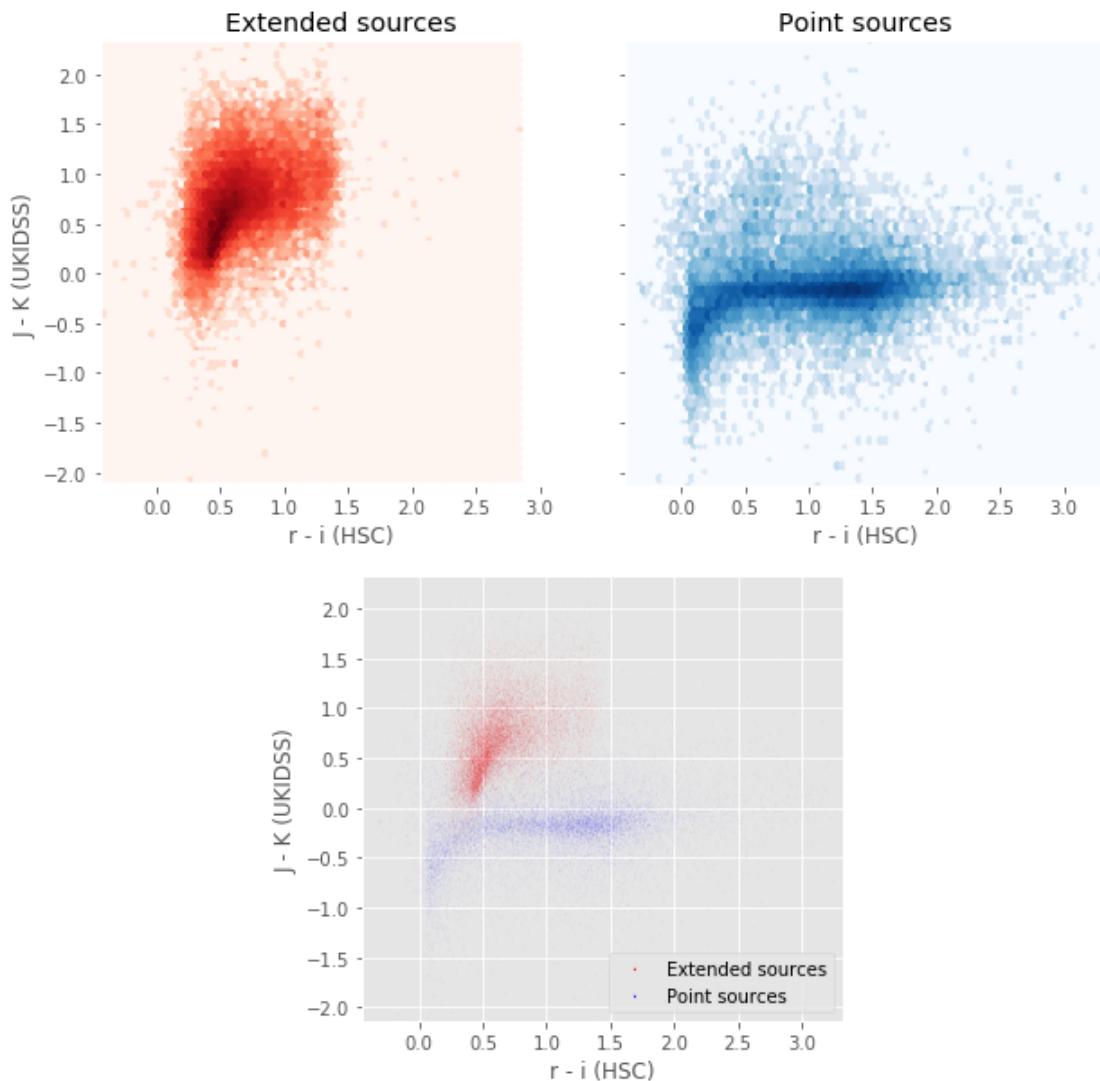
0.5 IV - Comparing aperture magnitudes to total ones.

Number of source used: 4366603 / 12369415 (35.30%)

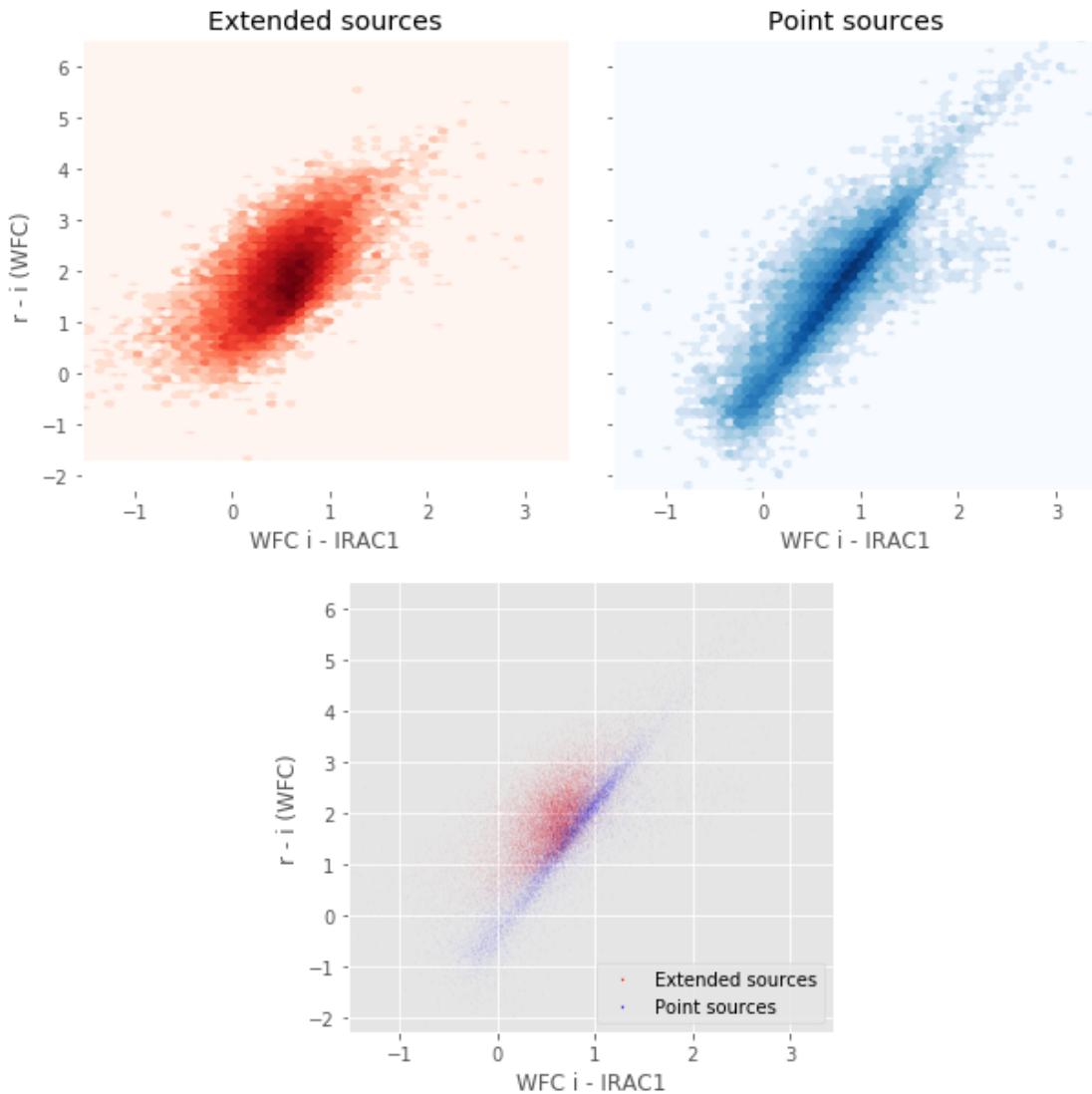


0.6 V - Color-color and magnitude-color plots

Number of source used: 37754 / 12369415 (0.31%)



Number of source used: 37754 / 12369415 (0.31%)



Number of source used: 37757 / 12369415 (0.31%)

