AstroDrizzle

Load package

```
import drizzlepac
from drizzlepac import tweakreg
from drizzlepac import astrodrizzle
```

set ref_files

```
F606w:
set
jref='/Users/wuyunjing/Desktop/ALMA/new_work/ref_file/F606W_acs/hst_acs_041
0.imap'
```

```
F814W:
set
jref='/Users/wuyunjing/Desktop/ALMA/new_work/ref_file/F814W_acs/hst_acs_041
0.imap'
```

```
F105W:
set
iref='/Users/wuyunjing/Desktop/ALMA/new_work/ref_file/F105W_wfc3/hst_wfc3_0
423.imap'
```

```
F125W:
set
iref='/Users/wuyunjing/Desktop/ALMA/new_work/ref_file/F125W_wfc3/hst_wfc3_0
423.imap'
```

```
F160W:
set
iref='/Users/wuyunjing/Desktop/ALMA/new_work/ref_file/F160W_wfc3/hst_wfc3_0
423.imap'
```

Update wcs

#Update the WCS keywords using the distortion reference files in the image header, eg. whenever using a new version of DrizzlePac

```
from stwcs import updatewcs
updatewcs.updatewcs('*flt.fits')
```

TweakReg

#TweakReg is a tool to improve the image alignment using matched sources between images.

```
tweakreg.TweakReg('*flt.fits',updatehdr=True,threshold=200,shiftfile=True,outshifts='shift.txt')
```

AstroDrizzle

#AstroDrizzle removes geometric distortion, corrects for sky background variations, flags cosmic-rays, and combines images with optional subsampling.

```
Parameters description:
1.  build:
      In order to do stacking, This parameter must be setted to True.

2.  driz_cr:
      Detected cosmic-ray

3.  driz_cr_corr:
      Create a cosmic-ray cleaned input image

4.  final_scale:
      Select a 'final_scale' value that is ~2x the full width half max to allow for adequate sampling of the PSF

```

```
5.  final_pixfrac:
      Select a 'final_pixfrac' value that is slightly larger than the
'final_scale' to allow for spillover when drizzling

6.  final_rot:
      Remove rotational distortion.
      Set to 0.

7.  final_wcs:
      Obtain the WCS solution from a user-designated reference image

8.  final_refimage:
      Align

9.  driz_sep_bits, final_bits:
      Recommended values: WFC3/IR= '64,512', ACS/WFC & WFC3/UVIS= '32,
64', WFPC2= '8, 1024'. These tell the software which flags to instead
treat as good. (ref: QuickStartGuide)
```

Code

PSF:

The scale is chosen to sample the PSF FWHM by about ~2.0 to 2.5 pixels.

$PSF = 1.22\frac{\lambda}{d} \times \frac{180}{\pi} \times 3600(arcsec), d = 2.4(m)$

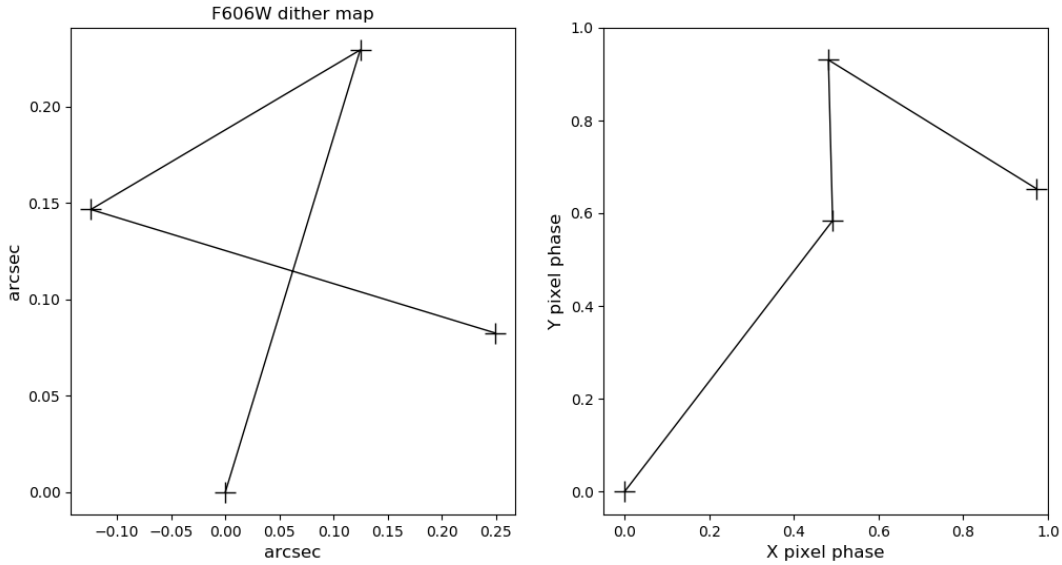
$final\_scale = \frac{PSF}{2}$

Filter_name	Filter_Cent_wave(nm)	PSF(")	final_scale(")
F606W	595.6	0.0624	0.0312
F814W	835.3	0.0876	0.0438
F105W	1050	0.110	0.0550
F125W	1250	0.131	0.0655
F160W	1545	0.162	0.0810

F606W:

Dither information:

Ref: https://spacetelescope.github.io/notebooks/notebooks/DrizzlePac/optimize_image_sampling/optimize_image_sampling.html



no_opt:

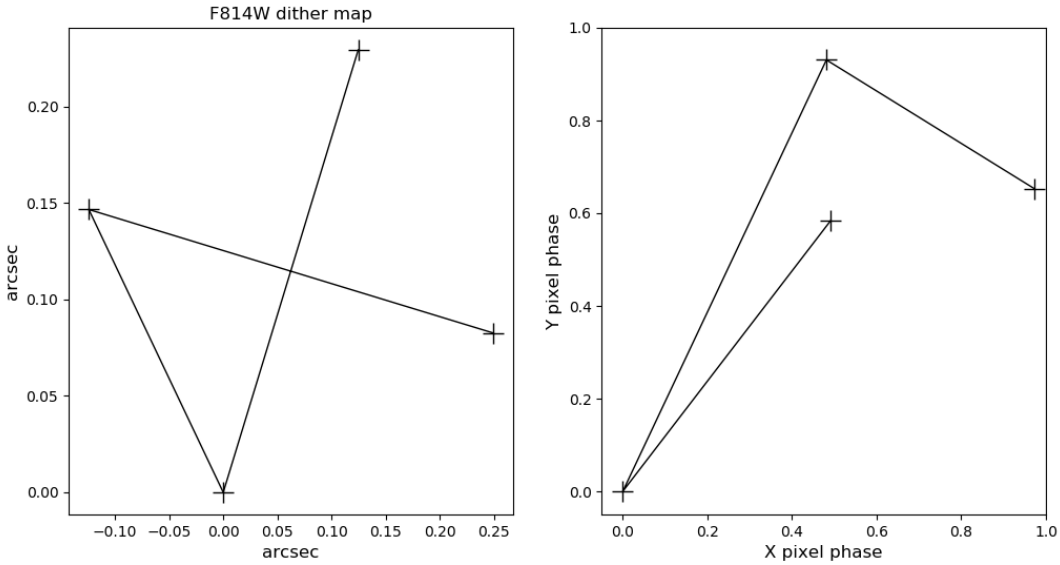
```
astrodrizzle.AstroDrizzle('*flc.fits', output='f606w_noopt',
runfile='astrodrizzle_noopt.log', build=True, clean=True,
driz_sep_bits='32, 64', final_bits='32, 64', final_wcs=True, final_rot=0.,
driz_cr=True, driz_cr_corr=True,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

opt:

```
astrodrizzle.AstroDrizzle('*flc.fits', output='f606w_opt',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='32,
64', final_bits='32, 64', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True,  final_scale=0.03, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

F814W:

Dither information:



no_opt:

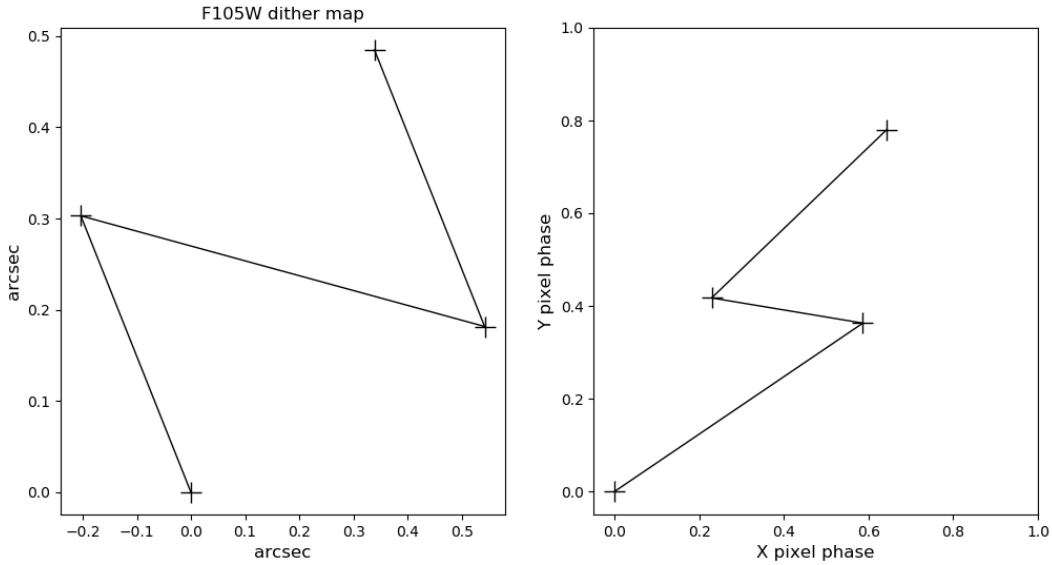
```
astrodrizzle.AstroDrizzle('*flc.fits', output='f814w_noopt',
runfile='astrodrizzle_noopt.log', build=True, clean=True,
driz_sep_bits='32, 64', final_bits='32, 64', final_wcs=True, final_rot=0.,
driz_cr=True, driz_cr_corr=True,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

opt:

```
astrodrizzle.AstroDrizzle('*flc.fits', output='f814w_opt',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='32,
64', final_bits='32, 64', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.04, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

F105W:

Dither information:



no_opt:

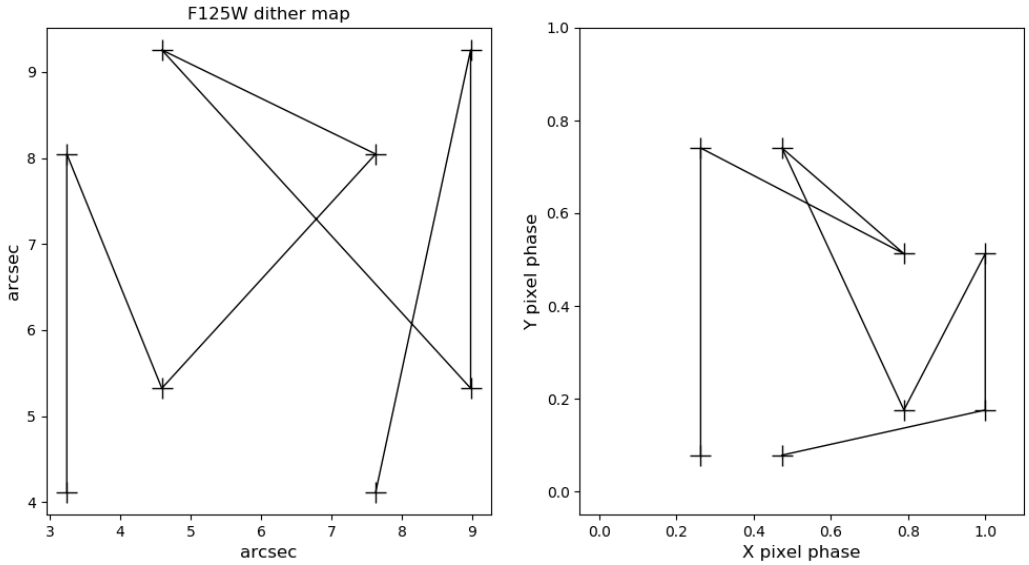
```
astrodrizzle.AstroDrizzle('*flt.fits', output='f105w_noopt',
runfile='astrodrizzle_noopt.log', build=True, clean=True,
driz_sep_bits='64, 512', final_bits='64, 512', final_wcs=True,
final_rot=0., driz_cr=True, driz_cr_corr=True,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

opt:

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f105w_opt',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='64,
512', final_bits='64, 512', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.055, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

F125W:

Dither information:



no_opt:

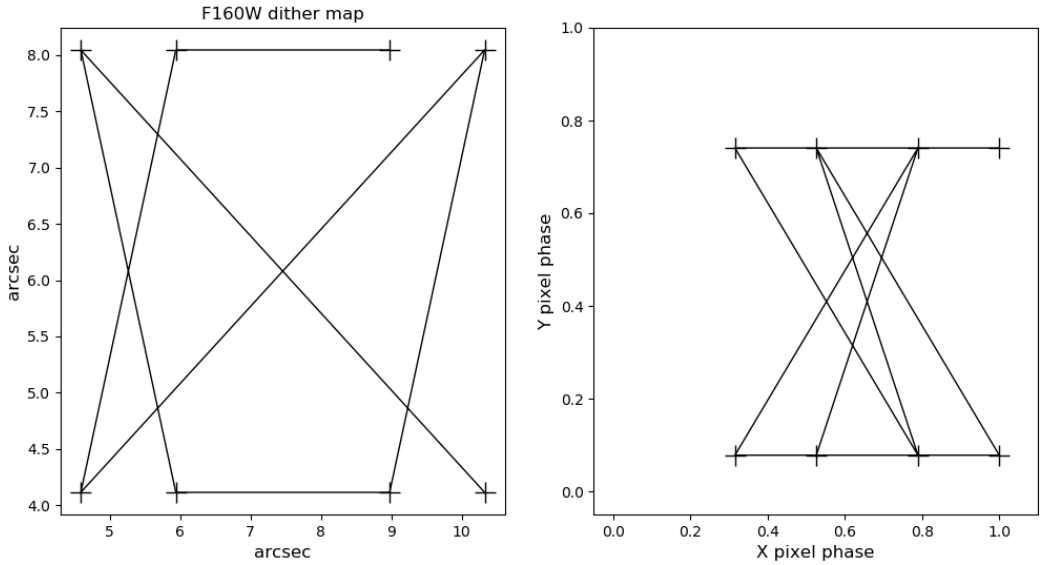
```
astrodrizzle.AstroDrizzle('*flt.fits', output='f125w_noopt',
runfile='astrodrizzle_noopt.log', build=True, clean=True,
driz_sep_bits='64, 512', final_bits='64, 512', final_wcs=True,
final_rot=0., driz_cr=True, driz_cr_corr=True,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

opt:

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f125w_opt',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='64,
512', final_bits='64, 512', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.07, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

F160W:

Dither information:



no_opt:

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f160w_noopt',
runfile='astrodrizzle_noopt.log', build=True, clean=True,
driz_sep_bits='64, 512', final_bits='64, 512', final_wcs=True,
final_rot=0., driz_cr=True, driz_cr_corr=True,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

opt:

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f160w_opt',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='64,
512', final_bits='64, 512', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.08, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.fits')
```

Same final_scale parameter

F606W

```
astrodrizzle.AstroDrizzle('*flc.fits', output='f606w_opt_0.03',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='32,
64', final_bits='32, 64', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True,  final_scale=0.03, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.f
its')
```

F814W

```
astrodrizzle.AstroDrizzle('*flc.fits', output='f814w_opt_0.03',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='32,
64', final_bits='32, 64', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.03, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.f
its')
```

F105W

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f105w_opt_0.03',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='64,
512', final_bits='64, 512', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.03, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.f
its')
```

F125W

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f125w_opt_0.03',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='64,
512', final_bits='64, 512', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.03, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.f
its')
```

F160W

```
astrodrizzle.AstroDrizzle('*flt.fits', output='f160w_opt_0.03',
runfile='astrodrizzle_opt.log', build=True, clean=True, driz_sep_bits='64,
512', final_bits='64, 512', final_wcs=True, final_rot=0., driz_cr=True,
driz_cr_corr=True, final_scale=0.03, final_pixfrac=0.6,
final_refimage='/Users/wuyunjing/Desktop/ALMA/new_work/test/idjb11020_drz.f
its')
```