

# Astrometry exercises

November 22, 2005

## Find Astrometric Solution

*Question 1:* In a previous exercise, a `ReducedScienceFrame` was created with the `ScienceTask`. Construct a list of these frames.

Instruction: Use information in the [Python database querying HOW-TO](http://portal.astro-wise.org/) at the ASTRO-WISE portal (<http://portal.astro-wise.org/>) to construct a query that contains your and only your `ReducedScienceFrames`.

Answer:

```
awe> date = DateTime.DateTimeFrom('2001-01-01')
awe> q = (ReducedScienceFrame.DATE_OBS == date)
awe> q &= (ReducedScienceFrame.instrument.name == 'WFI')
awe> q &= (ReducedScienceFrame.filter.name == '#877')
awe> q &= (ReducedScienceFrame.OBJECT.like('Science*'))
awe> len(q)
<some number of frames>
awe> for f in q: print f.filename, f.DATE_OBS, f.filter.name, f.OBJECT
.
.
.
```

A more direct way would be to use the `select` method:

Answer:

```
awe> q = ReducedScienceFrame.select(date=<date>, instrument='WFI', filter='#877',
    object='Science*')
awe> len(q)
<some number of frames>
awe> for f in q: print f.filename, f.DATE_OBS, f.filter.name, f.OBJECT
.
.
.
```

*Question 2:* In a previous exercise, `ReducedScienceFrames` were created with the `ScienceTask`. Determine if the astrometric solutions were created for these frames.

Instruction: Use information in the [Astrometry check HOW-TO](http://portal.astro-wise.org/) at the ASTRO-WISE portal (<http://portal.astro-wise.org/>) to query the database for the existence of an `AstrometricParameters` object for one of your `ReducedScienceFrames`.

Answer:

```
awe> apq = AstrometricParameters.reduced == q[0]
awe> len(apq)
1
```

*Question 3:* Create `AstrometricParameters` for `ReducedScienceFrames`.

Instruction: Use information in the [Astrometry check HOW-TO](http://portal.astro-wise.org/) at the ASTRO-WISE portal (<http://portal.astro-wise.org/>) to re-derive the `AstrometricParameters` for your `ReducedScienceFrames`.

Answer:

```
awe> list = [name.filename for name in q]
awe> dpu.run('Astrom', i='WFI', l=list, C=1)
```

*Question 4:* Examine the attributes of an `AstrometricParameters` object.

Instruction: Use the `dir()` method to see the attributes of interest (usually in all capital letters).

Answer:

```
awe> apq = AstrometricParameters.reduced.filename == q[0].filename
awe> dir(apq[0])
['CD1_1', 'CD1_2', 'CD2_1', 'CD2_2', 'CRPIX1', 'CRPIX2', 'CRVAL1', 'CRVAL2',
 'CTYPE1', 'CTYPE2', 'FITERRS', 'FITPARMS', 'Flagged', 'MEAN_DDEC', 'MEAN_DRA',
 'NFITPARAM', 'NREF', . . .]
awe> print ap.CD1_1
-6.613638e-05
awe> print ap.CD1_2
3.554581e-07
.
.
.
```

## Create a RegriddedFrame

*Question 5:* In order to visually inspect an astrometric solution, the `ReducedScienceFrame` must first be converted into a `RegriddedFrame`.

Instruction: Follow the instructions in the [ScienceTask HOW-TO](http://portal.astro-wise.org/) at the ASTRO-WISE portal (<http://portal.astro-wise.org/>) to process your `ReducedScienceFrames` into `RegriddedFrames`.

Answer:

```
awe> dpu.run('Regrid', i='WFI', d='2001-01-01', f='#877', o='Science*', C=1)
```

## Visually Inspect Astrometry

*Question 6:* Inspect the astrometric solution for the regridded frames just created.

Instruction: Follow the instructions in the [ScienceTask HOW-TO](http://portal.astro-wise.org/) at the ASTRO-WISE portal (<http://portal.astro-wise.org/>) to inspect the astrometric solution for one of your regridded frames.

```
awe> rq = RegriddedFrame.reduced == q[0]
awe> os.system('skycat %s' % (rq[0].filename))
```