

CARMA Observing Scripts

(for 10-m and 6-m antennas only)

<http://cedarflat.mmarray.org/observing/scripts>

Script Writer

- Purpose
 - Selects phase calibrator
 - Write script that performs all calibration observations
 - Handles most observing cases (e.g. single sources, mosaicking)

- Web program

<http://cedarflat.mmarray.org/observing/scripts>

- FAQ page

http://cedarflat.mmarray.org/observing/scripts/script_faq.html

CARMA Observing Scripts

- Scripts contain the observing commands
 - tune receivers
 - configure correlator
 - pointing
 - flux calibration
 - passband
 - phase calibrator
 - source observations
- ASCII files written in python
 - CARMA script writer produces template
 - script writer **STRONGLY** recommended

Required Parameters

1. Source name (8 characters or less)
2. Right ascension (e.g. 06:12:54.0 in J2000)
3. Declination (e.g. +17:59:23.1 in J2000)
4. Project (e.g. cs040)
5. Obsblock (e.g. 1E_115S255)
6. Source catalog (e.g. carp.cat)
7. P.I. Name
8. Email address
9. 3mm or 1mm
10. Continuum/spectral line

Output from Script Writer

- Observing script template
 - Save and edit
- Adopted phase calibrator
- Table of nearby phase calibrators
 - may wish to choose a “better” calibrator

Choosing a Phase Calibrator

- Flux limit (signal to noise for phase, amplitude)
> 1.0 Jansky
- Separation (slew time, baseline errors)
 - < 20 degrees (3mm)
 - < 10-15 degrees (1mm)

Editing Observing Scripts

- Parameters you must edit
 - Rest Frequency
 - Correlator configuration (for spectral line)
- Other “dictionaries” in the script
 - mosaic
 - pointing
 - passband
 - fluxcal

Tuning

```
tuning = {  
    # 'restfreq' : linefreq('12CO(1-0)'),  
    'restfreq'   : 95.0, # [GHz] Line rest frequency  
    'sideband'   : USB, # Sideband (LSB or USB)  
    'IFfreq'     : 2.75, # [GHz] IF frequency  
}
```

Tips:

- USB for lines near 115 GHz
- LSB for lines near 85 GHz
- Line catalog

<http://cedarflat.mmarray.org/observing/doc/SpectralLine.cat>

Correlator

```
# Correlator configuration for science target  
configband(1, BW500, tuning['restfreq'])  
configband(2, BW8, tuning['restfreq'])  
configband(3, BW500, tuning['restfreq']+0.5)
```

Tips:

- `configband(bandNo, bandwidth, frequency)`
- BW2, BW8, BW31, BW62, and BW500
- Have at least one 500 MHz band
- Check correlator configuration

<http://cedarflat.mmarray.org/observing/tools>

Hybrid Mode

Correlator configuration for calibrators

```
correlator = {  
    'reconfig'    : None,  
    'hybrid'      : None,  
    'tintHybrid' : 5.0,  
}
```

Tips:

- Do NOT use hybrid mode!!!
- Data reduction is a LOT more complicated

Source and phase calibrator

```
sources = {  
    'target'      : 'S255',  
    'phaseCal'   : '0530+135',  
    'tintTarget' : 15.00, # [minutes] per pointing  
    'tintPhaseCal' : 3.00, # [minutes]  
    'callist'    : None,  
}
```

Tips:

- You can specify multiple science targets
- You can specify multiple phase calibrators

Mosaics

```
mosaic = {  
    'doMosaic'      : False, # If True, make a mosaic  
    'startpos'     : 1,  
    'nphase'       : 0,  
    'arcminUnits': True,  
    'offsetFile'   : None,  
    'offsets'      : None,  
}
```

To make a mosaic:

- doMosaic = True
- Specify pointing offsets
- Integration time is *** per pointing ***

Pointing

```
pointing = {  
  'doPointNight' : True,  
  'doPointDay'   : True,  
  'doOptPoint'   : True,  
  'intervalNight' : 4.0, # [hours]  
  'intervalDay'   : 2.0, # [hours]  
  'intervalOpt'   : 1.0, # [hours]  
  'minflux'       : 2.0, # [Jy]  
}
```

Tips:

- Optical pointing useful for daytime/1mm tracks

Passband

```
passband = {  
    'doPassband' : True,  
    'doPoint'    : False,  
    'tint'       : 15.00, # [minutes]  
    'minflux'    : 4.00 , # [Jy]  
    'preferred'  : None,  
}
```

Tips:

- Tint can be decreased for continuum projects
- Phase calibrator can be used for passband

Flux Calibration

```
fluxcal = {  
  'doPrimary'      : True,  
  'doSecondary'    : True,  
  'doBoth'         : False,  
  'doPoint'        : True,  
  'tint'           : 5.00,  
}
```

Tips:

- Defaults are ok

Other Tips

- Directories
 - Scripts : `/home/obs/scripts/currentConfig`
 - Catalogs: `/array/rt/catalogs`
 - Mosaics : `/array/rt/mosaics`
- Editing dictionaries
 - place comma at end of lines!!
 - character strings must be in quotes
- Correlator configuration
 - Use web tool to check

Source Catalog

- Need:
 - Source name (8 characters or less)
 - Right Ascension (J2000)
 - Declination (J2000)
 - VLSR (km/s)
- See `/array/rt/catalogs` for templates

Controlling CARMA

- Starting “Subarray Control” window (sac)

`sci1`

- Open real time display (rtd)

`rtd`

Running Observing Scripts

- Start a script
 - `run('myscript', endtrack='18:30')`
- Restart script
 - `restartScript()`
- Change ending LST time
 - `endtrack('19:30')`

What to look for when starting track

- Did all receivers tune?
 - `refreq(antenna_number)`
- Do all antennas have “fringes”?
 - Check RTD windows or CDV on bright quasar
 - `refreq(antenna_number)` sometimes helps

Alarms, alarms, and more alarms

- Script ends naturally
 - `alarmoff()`
- Script crashes
 - `scriptClear()`
- “Something” else goes wrong
 - Check rtd window (“root faults” page)