

# Reference gridding test visibility data with random power law sky models

## Simulation Configuration

- **Sky model**
  - OSKAR random power law generator.
    - Min flux: 10 Jy
    - Max flux: 1e-4 Jy
    - Exponent of power law: -2 (oskar setting)
    - 4276 sources within 1.5 degrees radius of observation pointing centre. (generated as 25e6 sources over the entire sphere with sources > 1.5 degrees from the phase centre removed.)
- **Telescope model**
  - SKA1-mid + Meerkat July 2015 revision.
  - 197 Antennas
  - Longitude: 21.4429090 deg.
  - Latitude: -30.7394750 deg.
  - Simple circular Gaussian beam primary beam with 1.64 FWHM @ 700MHz
- **Observation parameters**
  - Frequency: 700MHz (SKA mid band-1)
  - Channel Bandwidth: 10.6811523438 kHz (700MHz / 65536 channels)
  - Time average seconds: 0.1
  - Phase centre:
    - RA: -153.2311957268
    - Dec: -23.4642108160
  - 10 'snapshot' observations each of 200 0.1 second correlator dumps spaced 20 minutes apart along an observation track with its highest elevation at snapshot 9 with MJD 59579.2381944. The MJD of each snapshot followed the formula:
    - $59579.2381944 - 3.0 / 24.0 + s * 20.0 / (60.0 * 24.0)$
    - where s = snapshot id in the range 0 to 9
- **Output files:**
  - Both CASA Measurement set format and OSKAR visibility binary format v2 (OSKAR 2.6.x+ compatible) have been produced.
  - File / folder names of visibility data files follow convention:
    - p00\_s<xx>.{ms|vis}
    - where xx is the snapshot id in the range 0, 9 and p00 is an identifier for the pointing which may be used for future simulations.

## Output CASA images.

### Generated with:

- 4.5 degree field-of-view
- 4096 by 4096 pixels (Note: this is probably slightly too low resolution for the FoV)
- w-projection with 256 w-planes
- Clark CLEAN with 40000 iterations of 0.1 gain (Note: I've no idea if this is a good set of clean parameters to use)
- Both natural and uniform weighting.
- Naming convention:
  - p00\_s<xx>\_<size>\_<fov>\_w<no. w planes>\_<weighting>.<type>.img.fits
  - where:
    - <xx> = snapshot id (0 to 9)
    - <size> = dimension of the image in pixels (4096)
    - <fov> = image field of view in degrees (4.5)
    - <no. w planes> = number of planes in w projection (256)
    - <weighting> = grid weighting scheme – natural or uniform
    - <type> = image type
      - dirty = raw or dirty image.
      - cc = clean components
      - psf = image of the point spread function at the phase centre.
      - residual = residual image after CLEAN
      - restored = restored CLEAN image
- **Note: Current only snapshot 0 and 9 have been imaged.**