Testing the new beam server

We have compared the observations taken with new and old beam server on the source 3C196. We took two SB for the comparison: 134.18 and 135.35 MHz, corresponding to:

- SB120 and SB127 for the old beam server obs (obs L2010_20184)
- and SB98 and SB104 for the new beam server obs (obs L2010_20852)

It was not possible to match the elevation of the source in the old datasets, so we choose the last 10 minutes, when the source was at lower elevation.

0.1 3C196: 134.18 MHz observations (SB 98 and 120)

0.1.1 New beam server

3C196 - 6h observation. After calibration, 10 min have been selected for imaging from 09:30:00 09:40:00, corresponding to elevation going from 61.7 to 60.2
Image done with CASA clean task:
****
gridmode = 'widefield'
wprojplanes = 256
gain = 0.1
psfmode = 'clark'
imsize = 2048
cell = '10arcsec'
weighting = 'natural'
****

Beam used in restration: 93 x 84 arcsec PA=171 deg.
Maximum:7.704807e+01
Minimum:-1.875090e+00
Noise: rms 5.138305e-01 Jy/beam.
The image is in Fig. 1. Other sources are visible in the field, already without self cal.

0.1.2 Old beam server

Snapshot od 10 min on 3C196 Elevation going from 40.97 to 39.65 Data flagged with rficonsole:
$> rficonsole -j 7\ SB120.MS$
data averaged with NDPPP and calibrated following the scripts reported in the next pages (the same used for the long observation performed with the new beam server).
Image with clean() in CASA (same parameters as above).

Beam used in restration: 88 x 69 arcsec PA=-9.4 deg Maximum:6.995663e+01
Minimum:-4.078290e+00
Noise: rms 9.407045e-01 Jy/beam.

The image is in Fig. 2. No other sources are visible in the field.

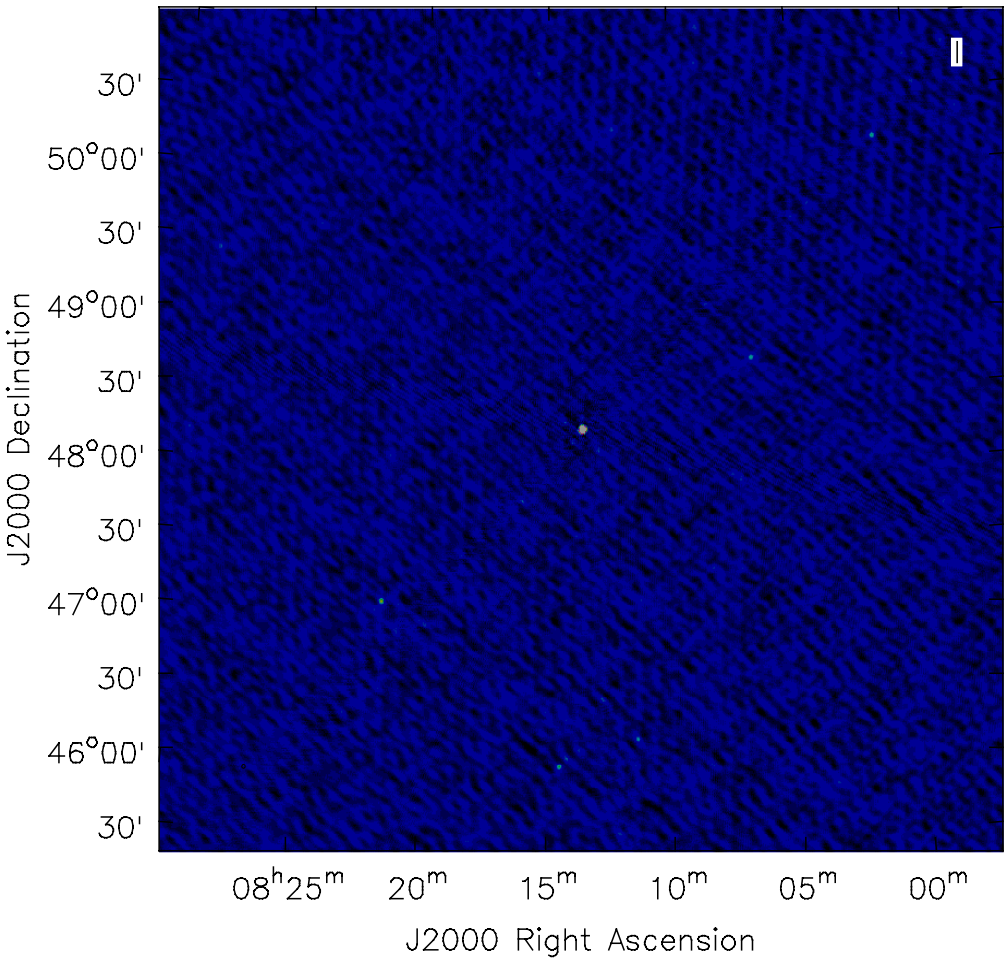

Figure 1: 134.18 MHz 3C196: Image of the 10 min snapshot from new beam server observations.

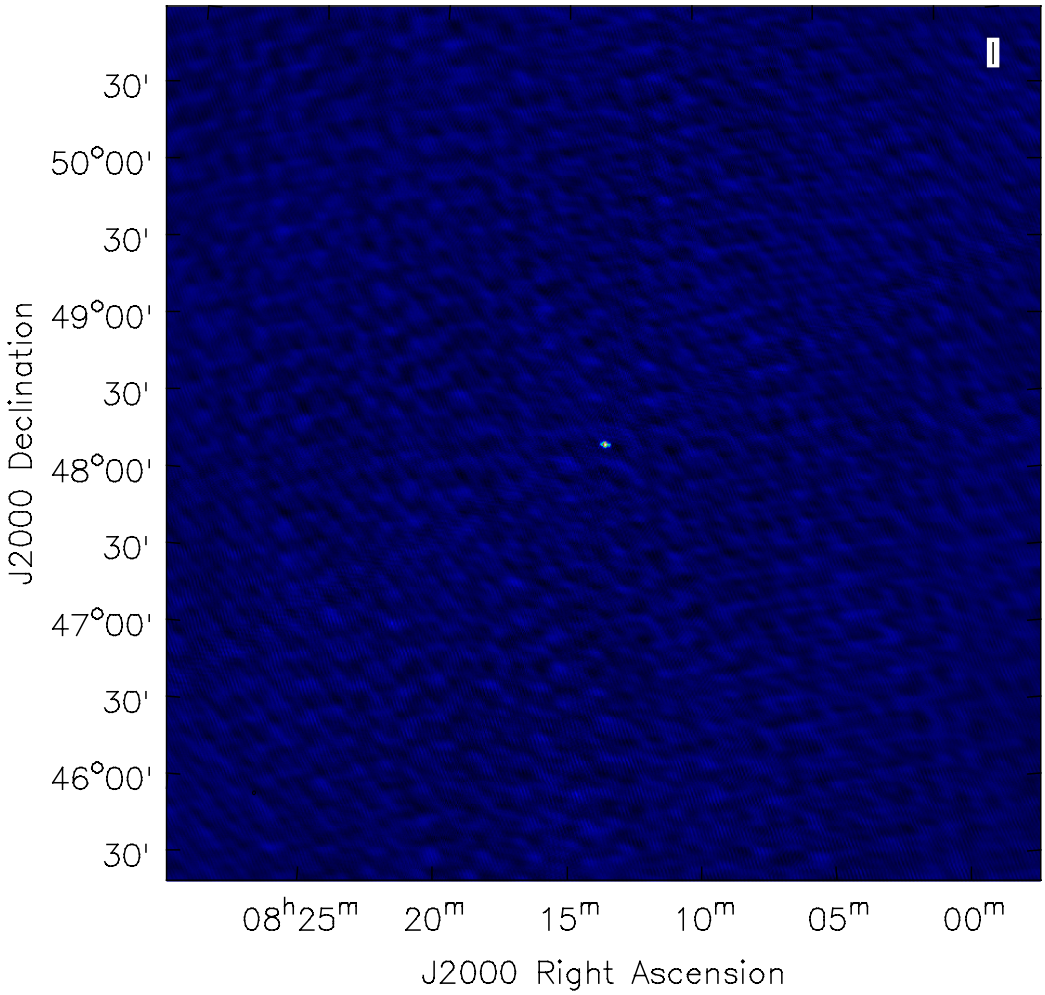

Figure 2: 134.18 MHz 3C196: Image of the 10 min snapshot from old beam server observations.

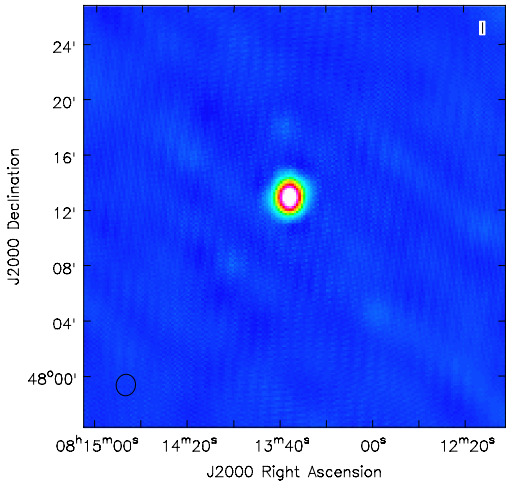

Figure 3: 134.18 MHz 3C196: Image of the 10 min snapshot from new beam server observations. Zoom on 3C196.

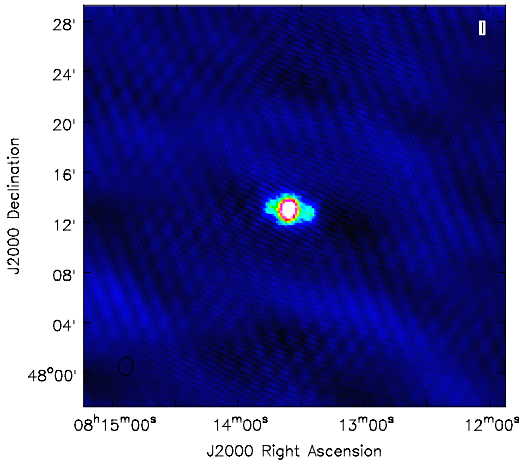

Figure 4: 134.18 MHz 3C196: Image of the 10 min snapshot from old beam server observations. Zoom on 3C196.

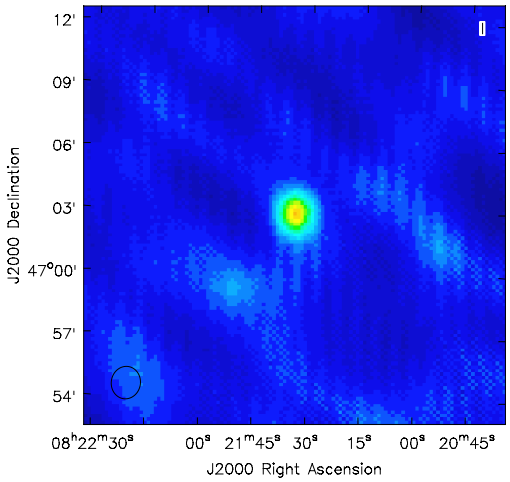

Figure 5: 134.18 MHz Image of the 10 min snapshot from new beam server observations. Zoom on source SE

0.2 3C196: 135.35 MHz observations (SB 98 and 120)

0.2.1 New beam server

10 min have been extracted from the 6h observation. Data have been calibrated using a 2 components model (see below).
The image was done with widefield task in CASA, using the following parameters:
****
ftmachine = 'wproject'
wprojplanes = 256
gain = 0.1
psfmode = clark
imsize=1024
cell=30
weighting=natural
****

Beam used in restoration: 296 x 172 arcsec.
3 run of autocalibration with BBS:
heald/bin/casapy2bbs L20184_SB127_bbs1 L20184_SB127_bbs1.catalog
heald-modelclip.py L20184_SB127_bbs1.catalog 90

The last line is to clip the model to the components recovering the 90% of the flux.

6 components have been found in the first autocalibration run and the last model, after 3 iterations of self cal, is made of 22 components. See image 6.

0.2.2 Old Beam server

Calibration done as above.
Images with widefield in CASA.
1 run of autocalibration with BBS does not improve the image. No new point-sources detectable. See Fig. 7

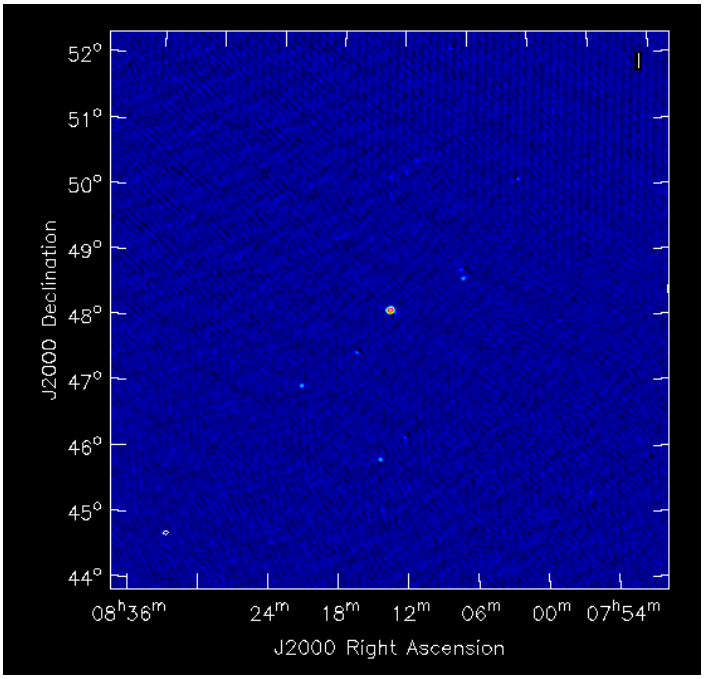

Figure 6: 135.35 MHz. 3C196: Image of the 10 min snapshot from new beam server observations after 3 self-cal runs.

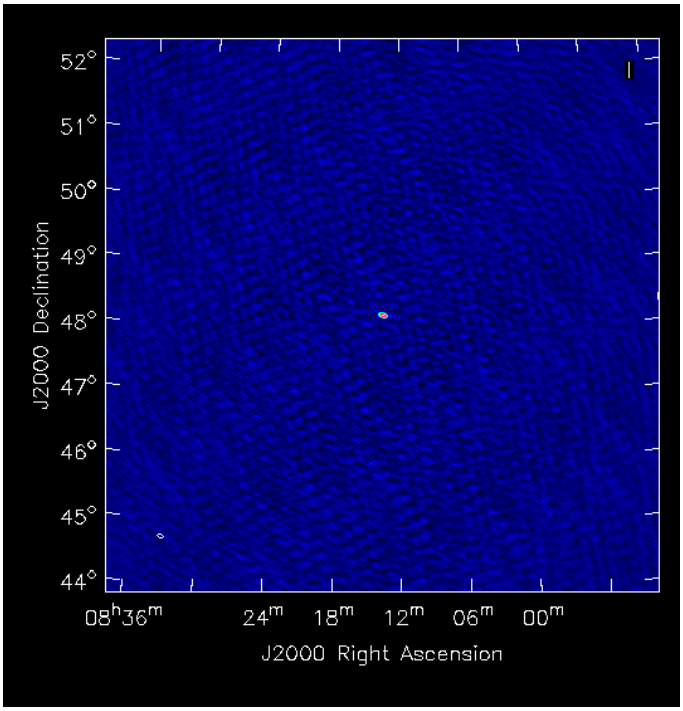

Figure 7: 135.35 MHz. 3C196: Image of the 10 min snapshot from old beam server observations after 1 self-cal runs.

NDPPP parset

```
**********************************
msin =”SB120.MS”
msin.datacolumn = DATA
msin.startchan = 8
msin.nchan = 240
msout = ”SB120.MS.ndppp”
msout.datacolumn = DATA
steps = [preflag, flagA, avg]
preflag.type=preflagger
preflag.corrtype=auto
flagA.type = preflagger
flagA.baseline = [[*HBA1]]
avg.type=squash
avg.freqstep = 256
avg.timestep = 1
**********************************
```

BBS parset:

```
**********************************
Strategy.Stations = []
Strategy.InputColumn = DATA
Strategy.TimeWindow = []
Strategy.ChunkSize = 2500
Strategy.UseSolver = F
Strategy.Correlation.Selection = CROSS
Strategy.Correlation.Type = []
Strategy.Steps = [solve,correct]

Step.solve.Baselines.Station1 = []
Step.solve.Baselines.Station2 = []
Step.solve.Model.Sources = []
Step.solve.Model.Gain.Enable = T
Step.solve.Model.ExperimentalCaching.Enable = T
Step.solve.Correlation.Selection = CROSS
Step.solve.Correlation.Type = []
Step.solve.Operation = SOLVE
Step.solve.Output.Column =
Step.solve.Solve.Parms = [”Gain:0:0:*”, ”Gain:1:1:*”]
Step.solve.Solve.ExclParms = []
Step.solve.Solve.CalibrationGroups = []
Step.solve.Solve.CellSize.Freq = 0

Step.solve.Solve.CellSize.Time = 1
Step.solve.Solve.CellChunkSize = 25
Step.solve.Solve.PropagateSolutions = F
```

Step.solve.Solve.Options.MaxIter = 20
Step.solve.Solve.Options.EpsValue = 1e-9
Step.solve.Solve.Options.EpsDerivative = 1e-9
Step.solve.Solve.Options.ColFactor = 1e-9
Step.solve.Solve.Options.LMFactor = 1.0
Step.solve.Solve.Options.BalancedEqs = F
Step.solve.Solve.Options.UseSVD = T
Step.correct.Baselines.Station1 = []
Step.correct.Baselines.Station2 = []
Step.correct.Model.Sources = []
Step.correct.Model.Gain.Enable = T
Step.correct.Correlation.Selection = CROSS
Step.correct.Correlation.Type = []
Step.correct.Operation = CORRECT
Step.correct.Output.Column = CORRECTED_DATA
****

skymodels
sigle component:
****
Model generated for source 3C196
(Name, Type, Ra, Dec, I, Q, U, V, ReferenceFrequency='60e6',SpectralIndexDegree='0',
SpectralIndex:0='0.0') = format
Src0, POINT, 08:13:36.0, 48.13.03.0, 74.3, 0.0, 0.0, 0.0, 178.0e6, 1, -0.8

Two components:
****
(Name, Type, Ra, Dec, I, Q, U, V, ReferenceFrequency='60e6', SpectralIndexDegree='0', SpectralIndex:0='0.0', MajorAxis, MinorAxis, Orientation) = form
at # The above line defines the field order and is required.

3C196A, POINT, 08:13:36.15, +48.13.04.7, 7.1, 0.0, 0.0, 0.0, 408e6, 0, -0.72
3C196B, POINT, 08:13:35.64, +48.12.59.6, 15.2, 0.0, 0.0, 0.0, 408e6, 0, -0.5