COMA LBA OBSERVATION

BASIC INFORMATION

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GOAL

Testing the demixing algorithm for sources *close* to the phase center (VirA is at 15 °)
and analyze recent observations of COMA LBA

DETAILS

Data and software

The SB available on the CEP1 cluster are
L25886_SAP003_SB114_uv.MS.dppp 57.7 MHz
L25886_SAP003_SB115_uv.MS.dppp 57.9 MHz
L25886_SAP003_SB116_uv.MS.dppp 58.1 MHz
L25886_SAP003_SB117_uv.MS.dppp 58.3 MHz
on lce049
We used the nodes lce060-lce061-lce062-lce063-lce064
to process the data. The LofIm build used was the release ImagingBW
during the Busy week, while the days after we used the most recent release available.

Pre-Processing

Data were already pre-processed with ndppp (RFI option)
with no averaging neither in time nor in frequency.
Observations are 6h long.
Before the calibration we did not perform any other additional flagging since the quality of the data looked reasonably good.

The following international stations were included in the observations:
DE602LBA, FR606LBA, UK608LBA
they were flagged before starting the calibration since we realized they were corrupting the demixing solutions.

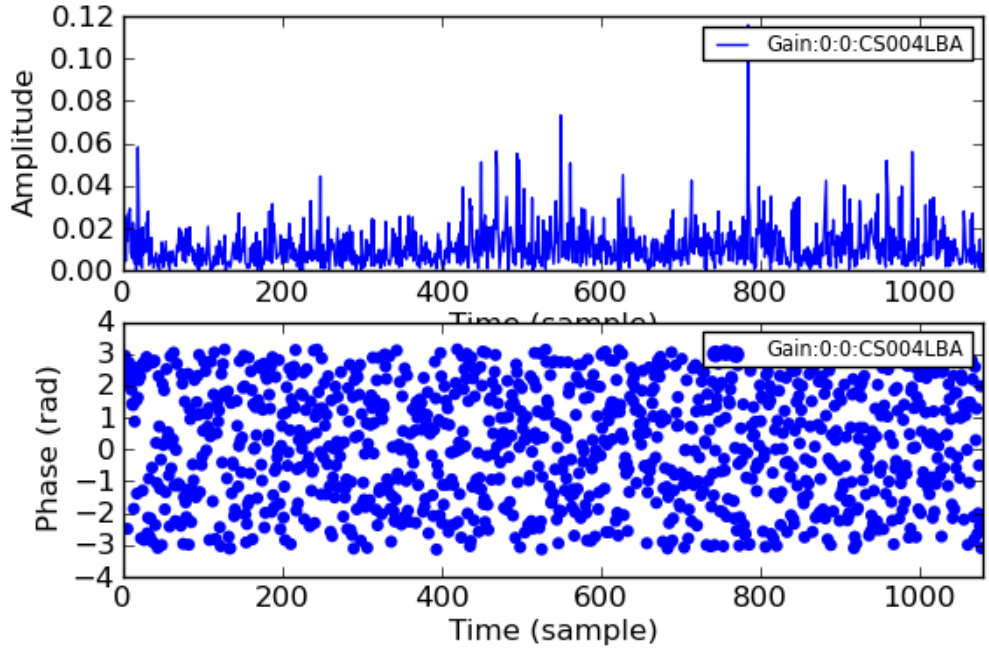
Calibration

We preformed the demixing to subtract CasA and CygA, that are at 90 and 82 deg from the phase center respectively. VirA is at 17°. Since the demixing method works well for source far away from the phase center, we investigated whether including VirA gives good results

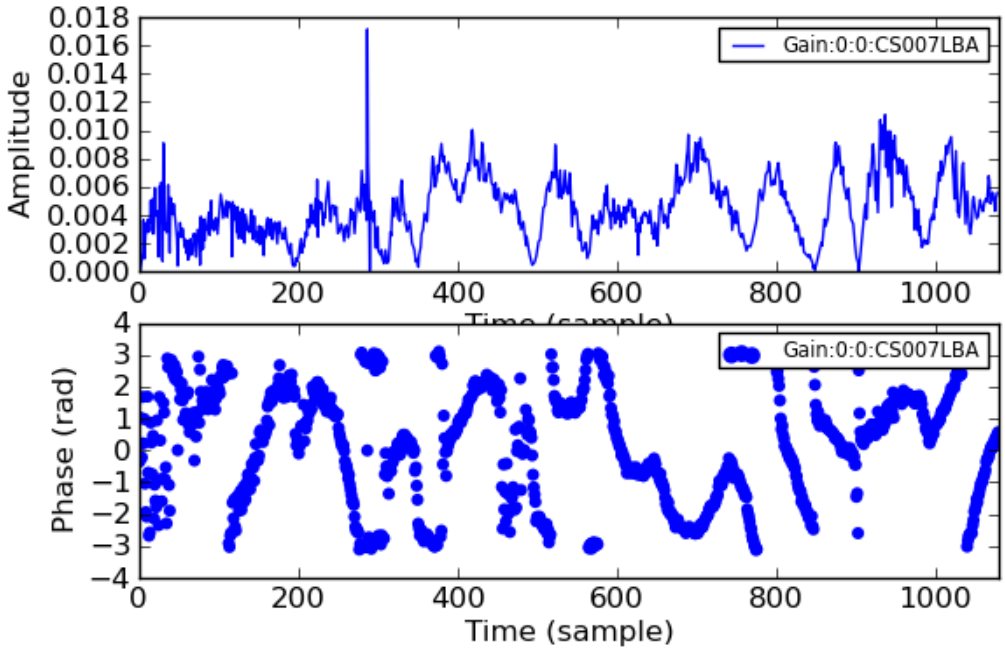
1) Demixing VirA, CasA and CygA

The solutions for both CygA and CasA are quite good, although some spikes

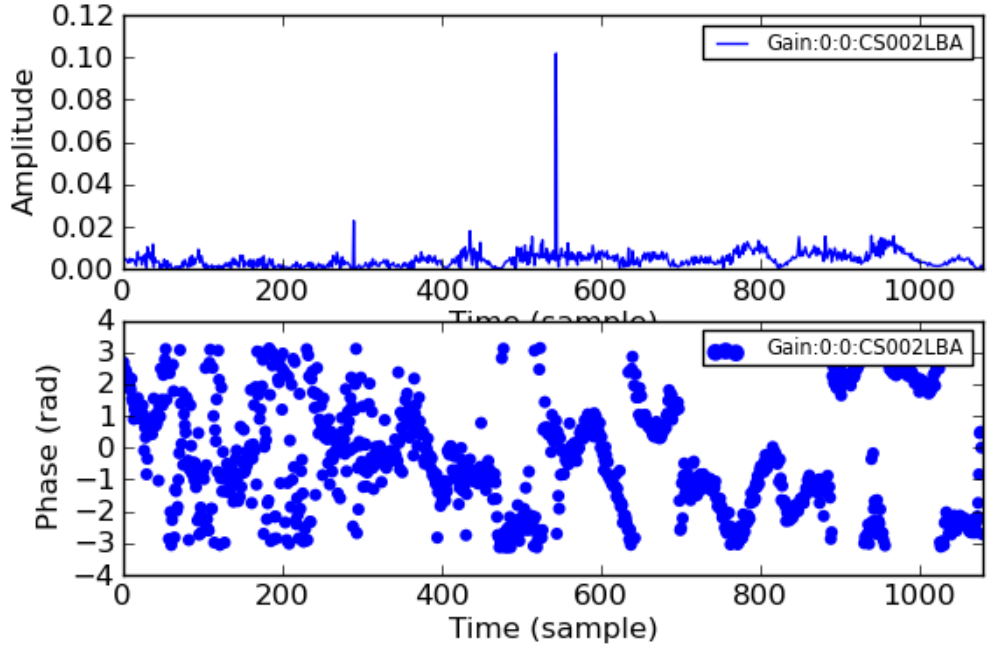
in the amplitude gains are present in CasA solutions
The solutions for VirA look instead pretty noisy



Above: VirA solutions for CS004

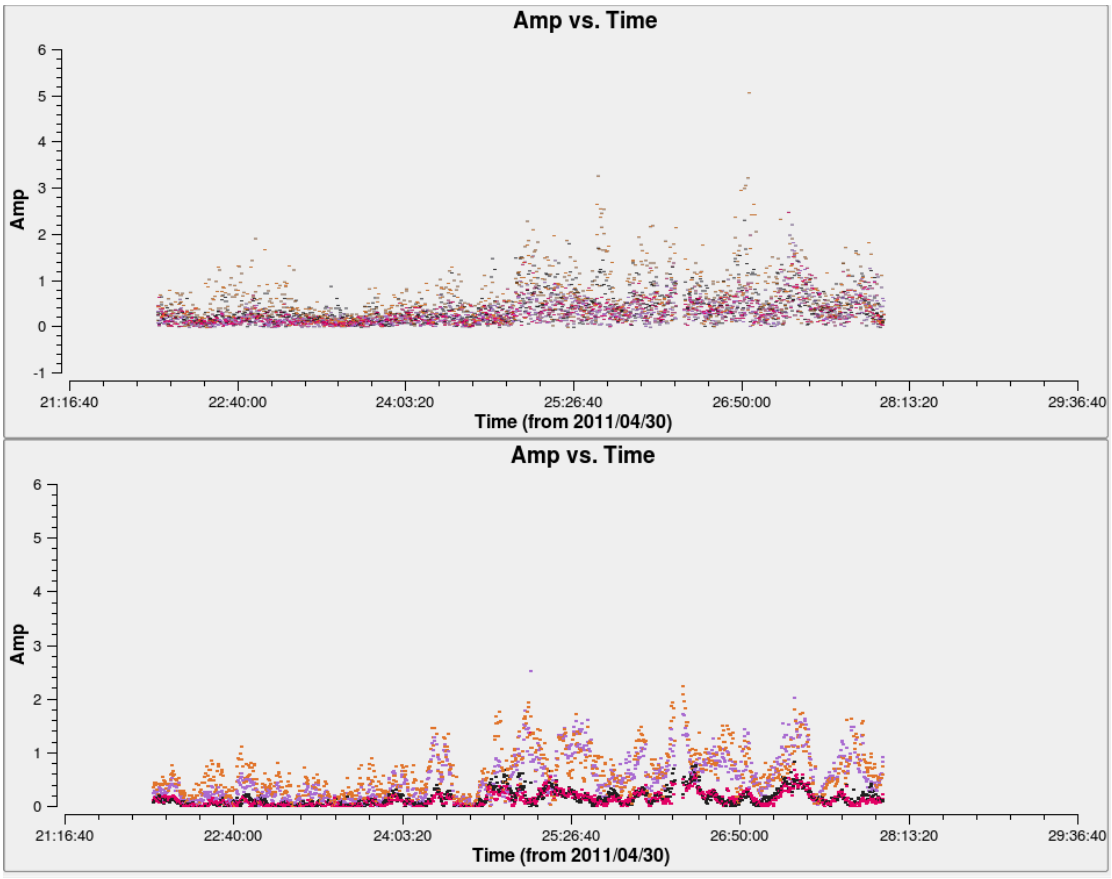


Above: CygA solutios for CS007



Above: CasA solutions for CS002

The subtraction of VirA after the demixing does not work very well. Below, the amplitude for the baseline 1&0 is reported before (bottom) and after the demixing (top). The contribution, likely coming from VirA, is not properly removed, although part of that is clearly subtracted



The calibration was performed with BBS using the skymodel derived from vlss (74 MHz) and using Pybdsm to create a source catalog. The field extracted from vlss is 13X13 degrees and it is located in /home/bonafede/Models/vlss_coma_13deg.pybdsm.gaul.sky.
It includes patches. The calibration was perfomed with

Strategy.ChunkSize = 100
Strategy.Steps = [solve, correct]
Step.solve.Solve.CellSize.Time = 1 meaning 10 sec after the demixing
Step.solve.Solve.Parms = ["Gain:0:0:*","Gain:1:1:*"]
Beam.Enable = True

The solutions obtained are completely noisy.

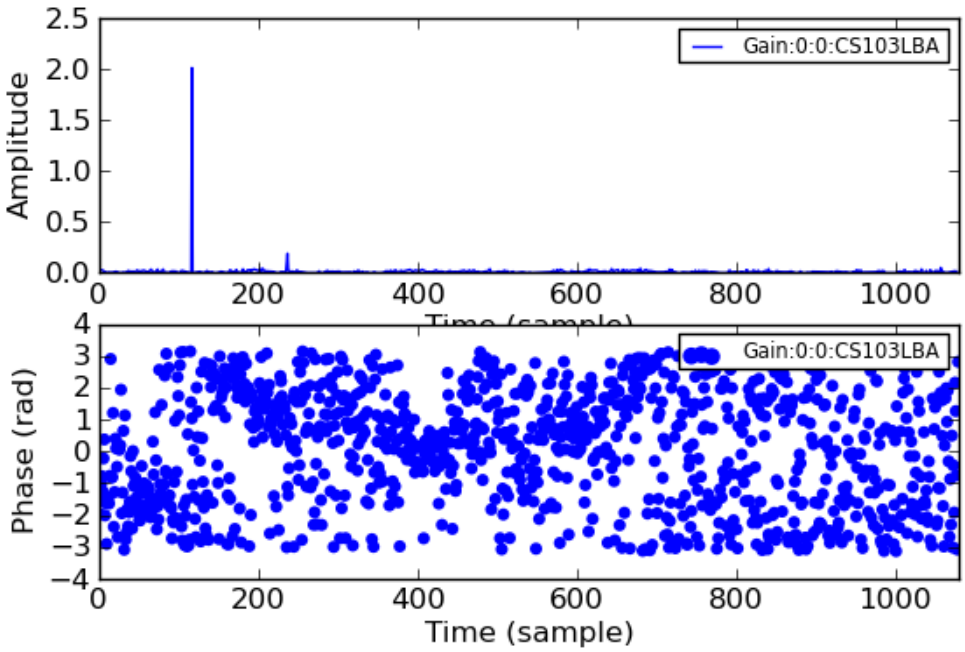
We realized that the demixing of VirA introduces additional noise that screws up the calibration on the target field, even with the smoothing of the calibration solutions.

2) Demixing CasA and CygA ONLY

We repeated the demixing including only CasA and CygA. We tried/are trying different approaches to deal with VirA

1) ignoring the presence of VirA and calibrate only for the target field using a global solver with the 4SB together
2) average the data into 2 freq channels after the demixing and then calibrating for Coma and VirA – done only for 1 SB at the moment, using the skymodel in /home/bonafede/Models/coma13deg_VirA.skymodel

Solutions, reported below, look still noisy in both cases. When VirA is included in the skymodel, amplitude solutions are worse.



Clipping the data after calibrations was necessary.

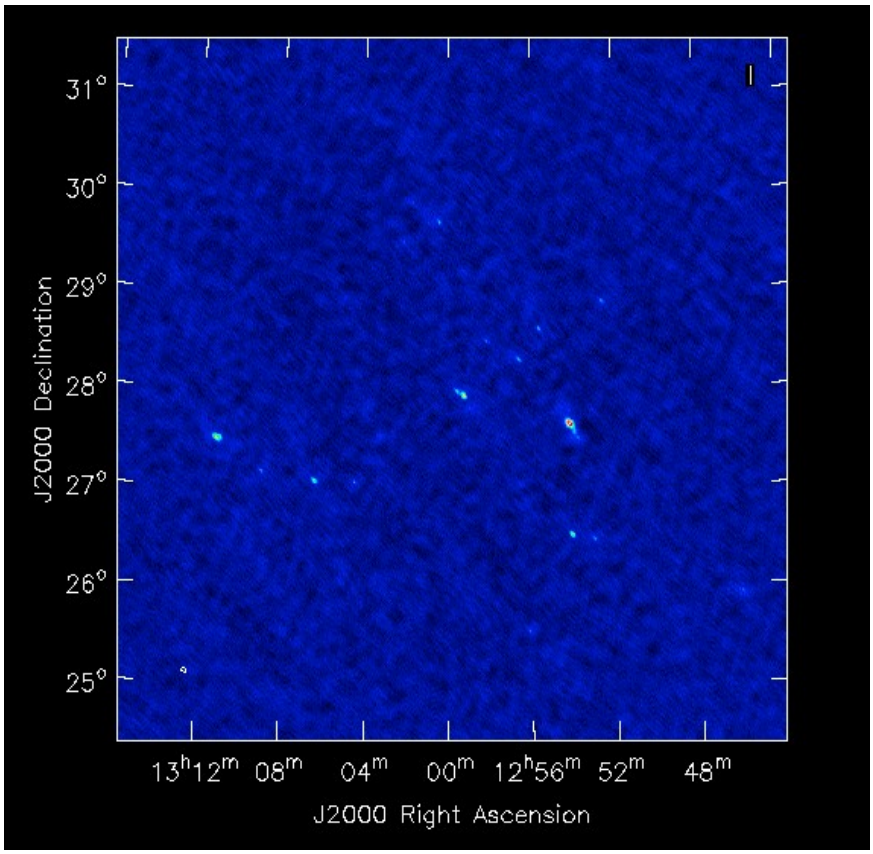
Imaging

The images were done with Casa, using the task 'clean' with
gridmode = "widefield"
wprojplanes = 196
psfmode = "clark"
imagermode = "csclean"
imsize = [1500, 1500]
cell = "30arcsec"
weighting = "briggs"
robust = 0.5

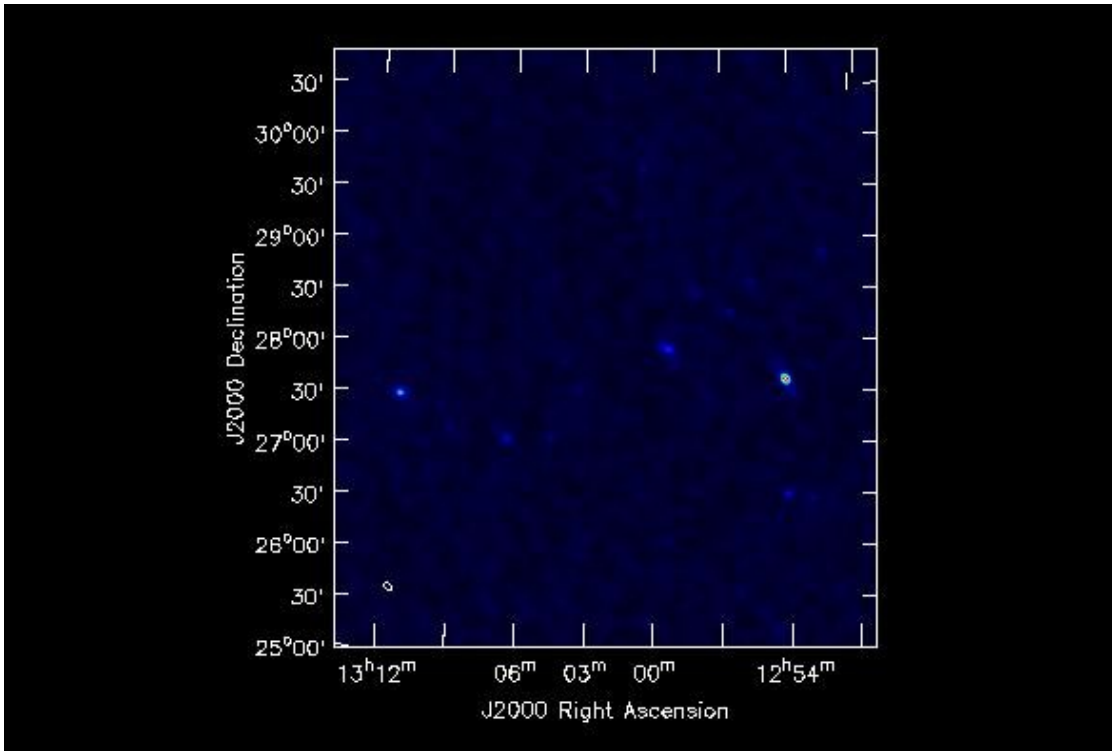
The image resulting from global calibration is reported below.
Only sources are visible, due to the noise introduced by the presence of VirA in the data

RESULTS AND IMAGES

Coma SB116 from calibration with Global Solver, VirA “ignored”



Coma, SB116 from calibration of Coma and VirA in the Model



CONCLUSION

The important thing we have found is that VirA at 10°- 20° from the phase center must not be demixed, since it compromises the solutions for the target field.
Another startegy for taking its contribution into accout has to be found.
Solutions do not improve when VirA is included in the skymodel after the demixing. Probably the averaging down to 2 freq channels is not adequate. We are still working on that.