Preliminary images of Leo Triplet

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Leo Triplet observations are part of

**the Survey of Nearby Galaxies: LCO_043 (PI: Rainer Beck)**

Data reduction is done in collaboration with
the MKSP, in particular:

Emanuela Orrù
Andreas Horneffer
Bjorn Adebhar
David Mulcahy

Ideal target for low frequency studies
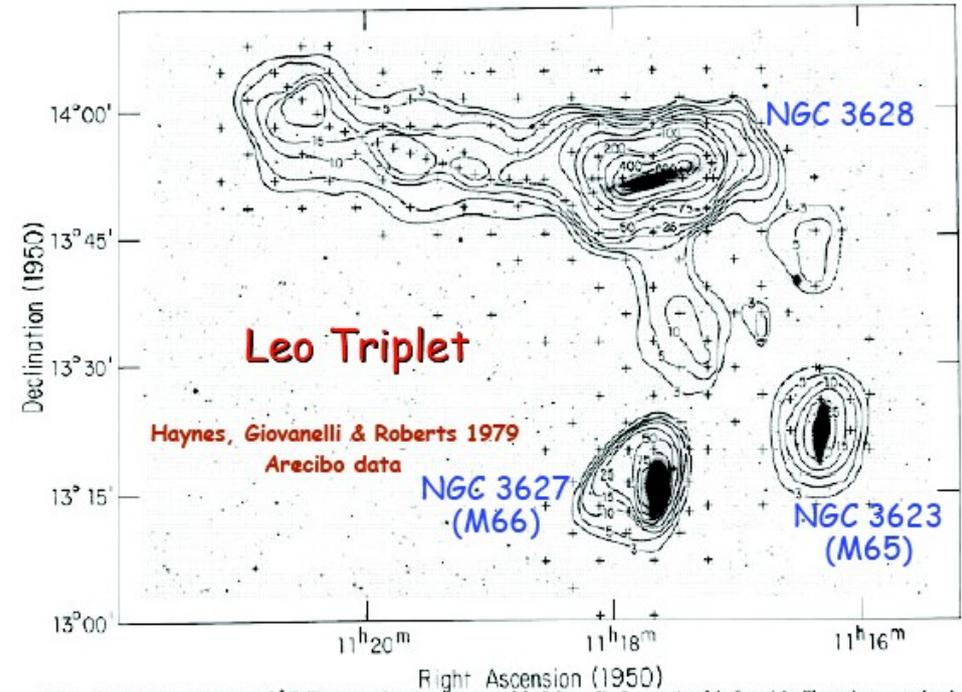
It is nearby (~ 10 Mpc): it allows studies of low surface brightness regions.
NGC3627 a barred spiral
NGC3628 an edge-on
NGC3623 highly inclined spiral

Member galaxies observed at different frequencies: possible interesting comparison with low freq emission

Interesting HI tails detected (Haynes et al 1979, ALFALFA observations Stierwalt et al. 2006)

Leo Triplet at 2.64 GHz
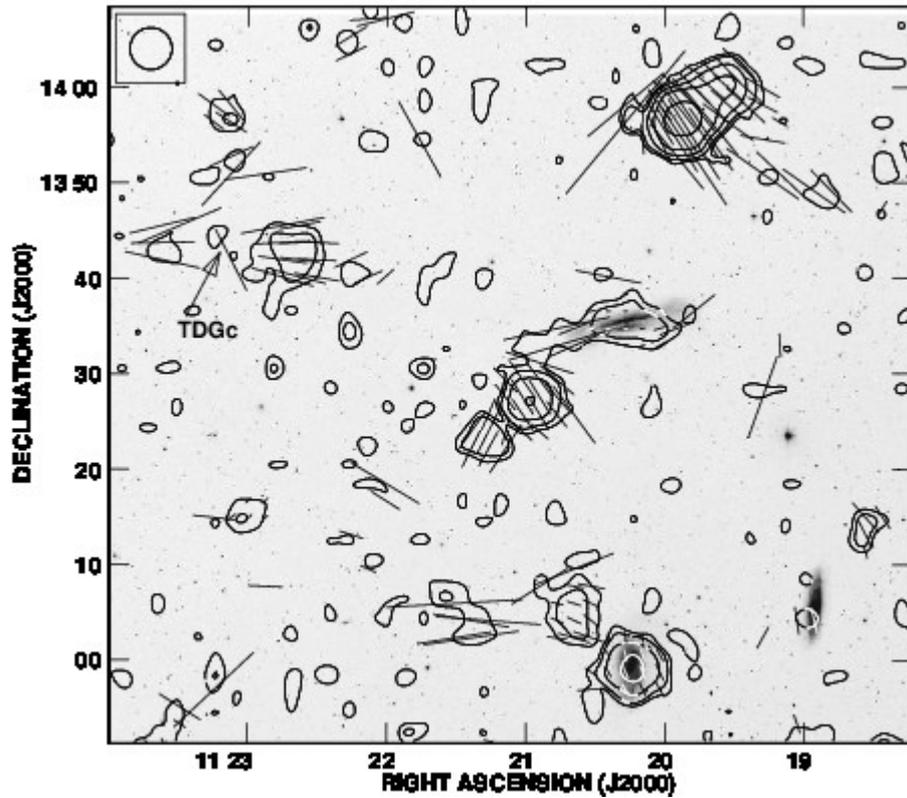
polarized intensity contour

Nikiel-Wroczynski et al, 2013

NGC3627 magnetic field
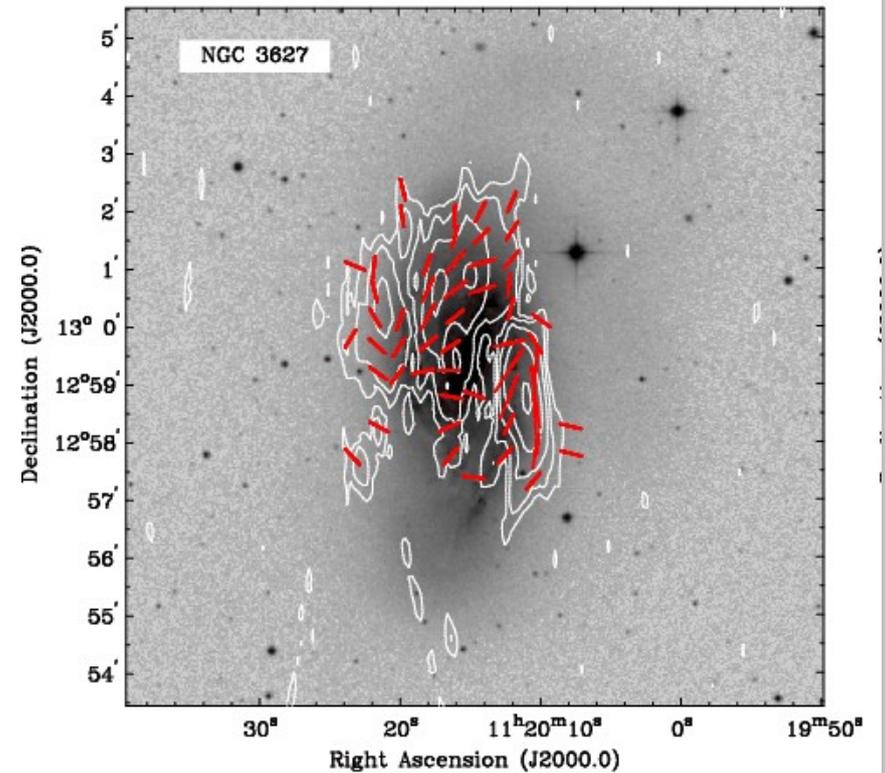
Contours: polarized intensity
Red vectors: magnetic field orientation

Heald et al, 2009

NGC3627 spectral index and SED
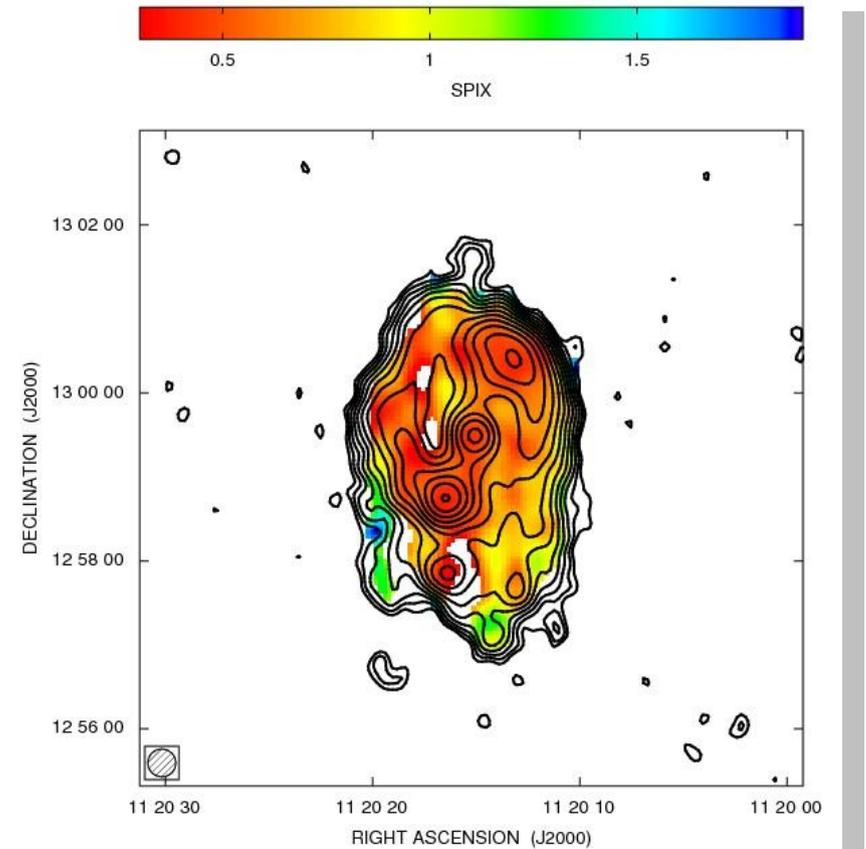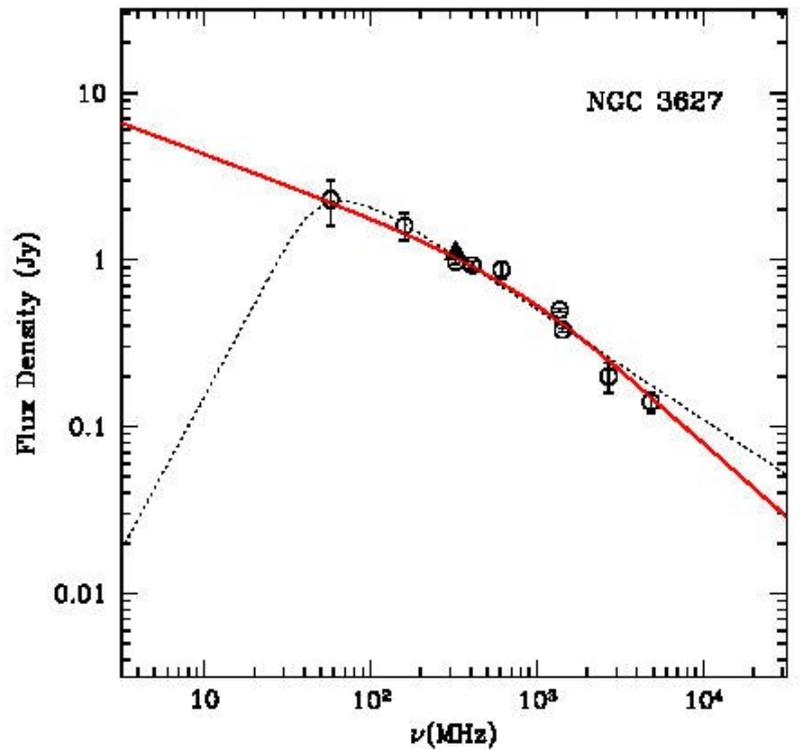
Paladino et al, 2009

Low freq SED of the different members of the group
and comparison of their spectral indices

LOFAR observations

2013-03-19 22:03:00

2013-03-20 06:32:00

17 scan on source 12 min per observation
Total time on source = 6h 48m

Target observations separated by 3C286 observations

HBA observations:
323 SB (8 chans of 24.41 kHz = 195.312 kHz)
total frequency range covered 63 MHz

Preprocessing:
Flag, demix (Cas A & Cig A), compress to 8 chans
Transfer solutions from calibrator

After some Flagging
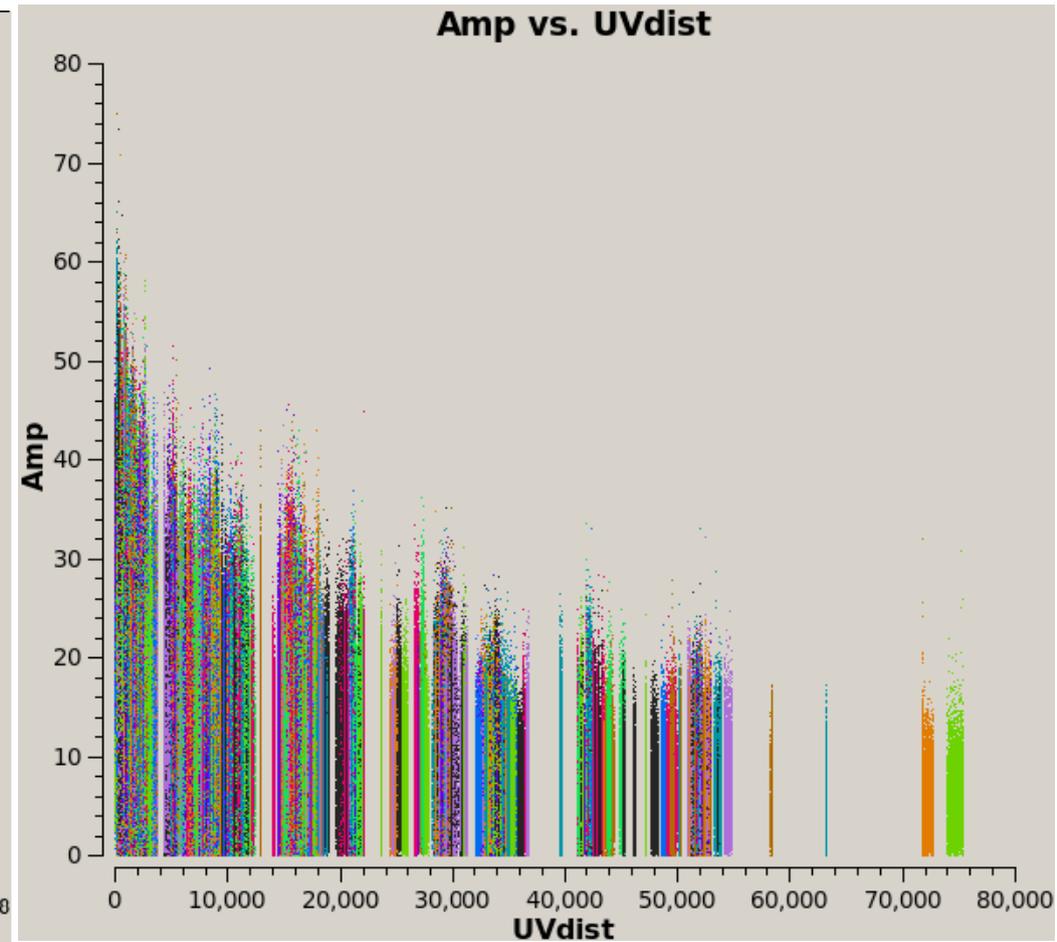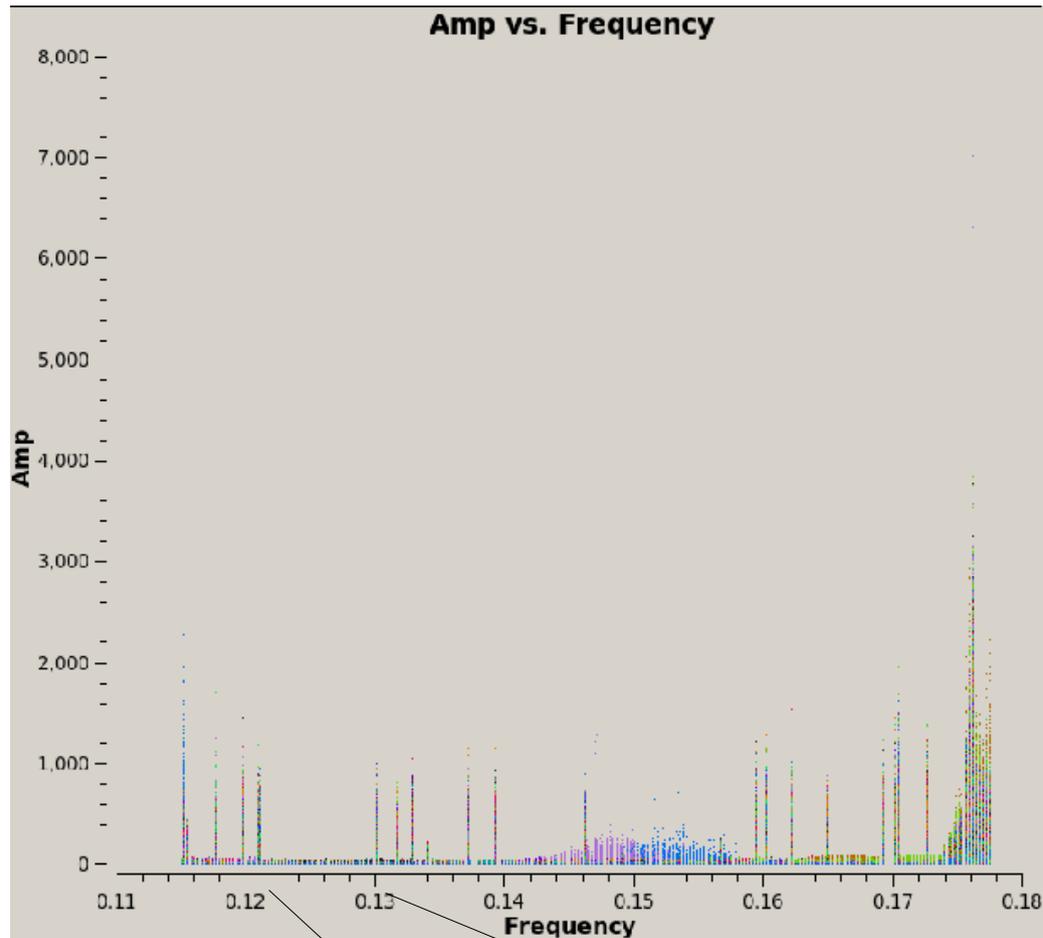
Frequency range: 121.678 – 129.686 MHz
Find a calibration strategy there and then apply it to all SBs

Amp vs UVdist for the combined 40 SBs (from 34 to 75)

Self-calibration cycles

- **Image with awimager**
  wprojectplanes = 16
  uvrange= 0-4 K lambda
- **Model extracted with PyBDSM**
- **Calibrate each timerange**
- **Concatenate calibrated data**
- **Image**

Self-calibration results
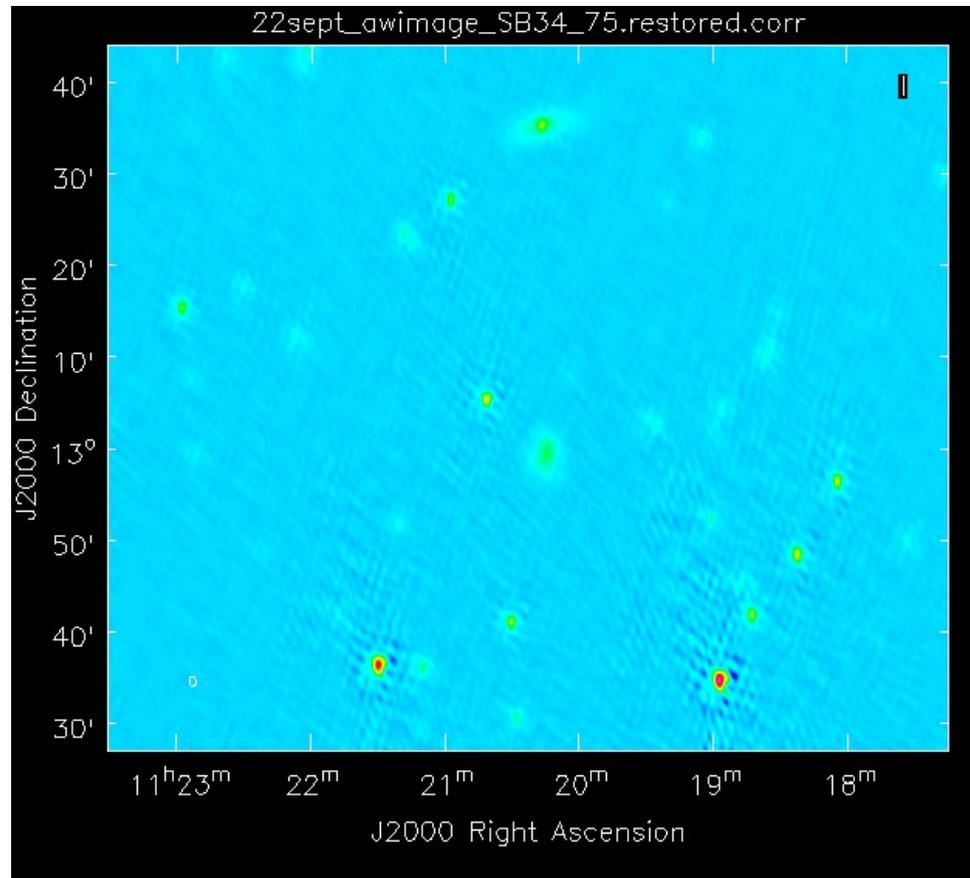
First image: no selfcal
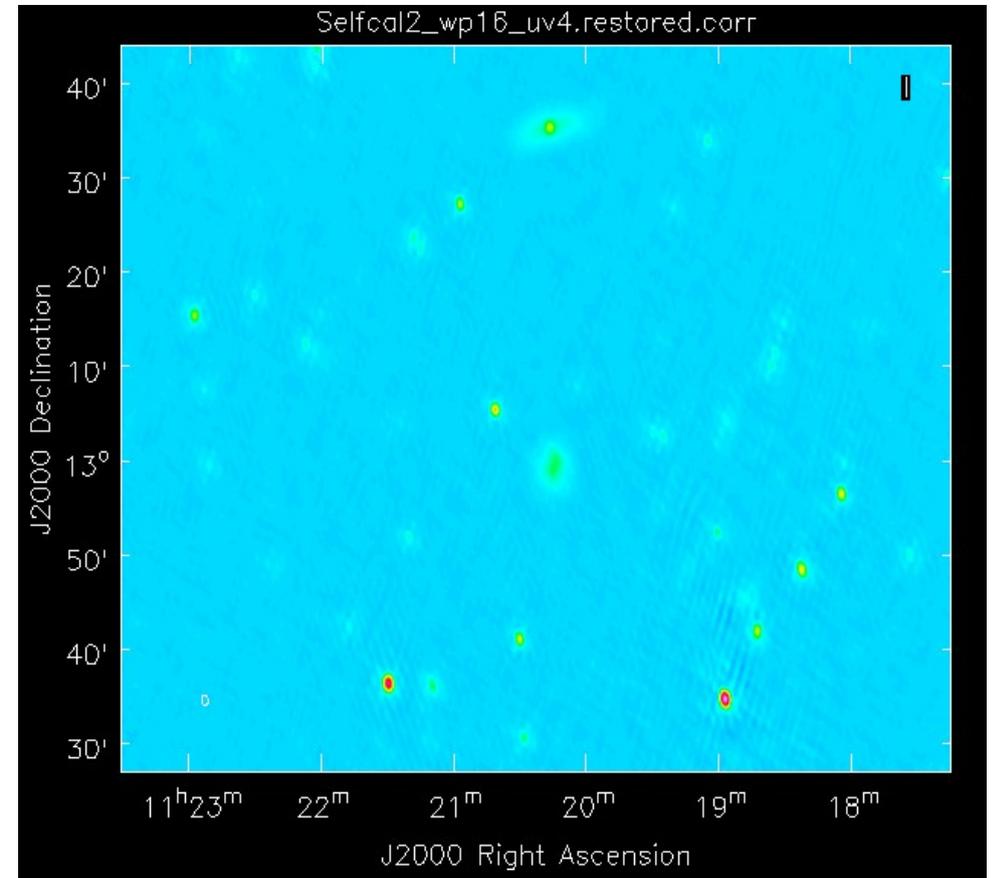
After 2 selfcal cycles

# Self-calibration results
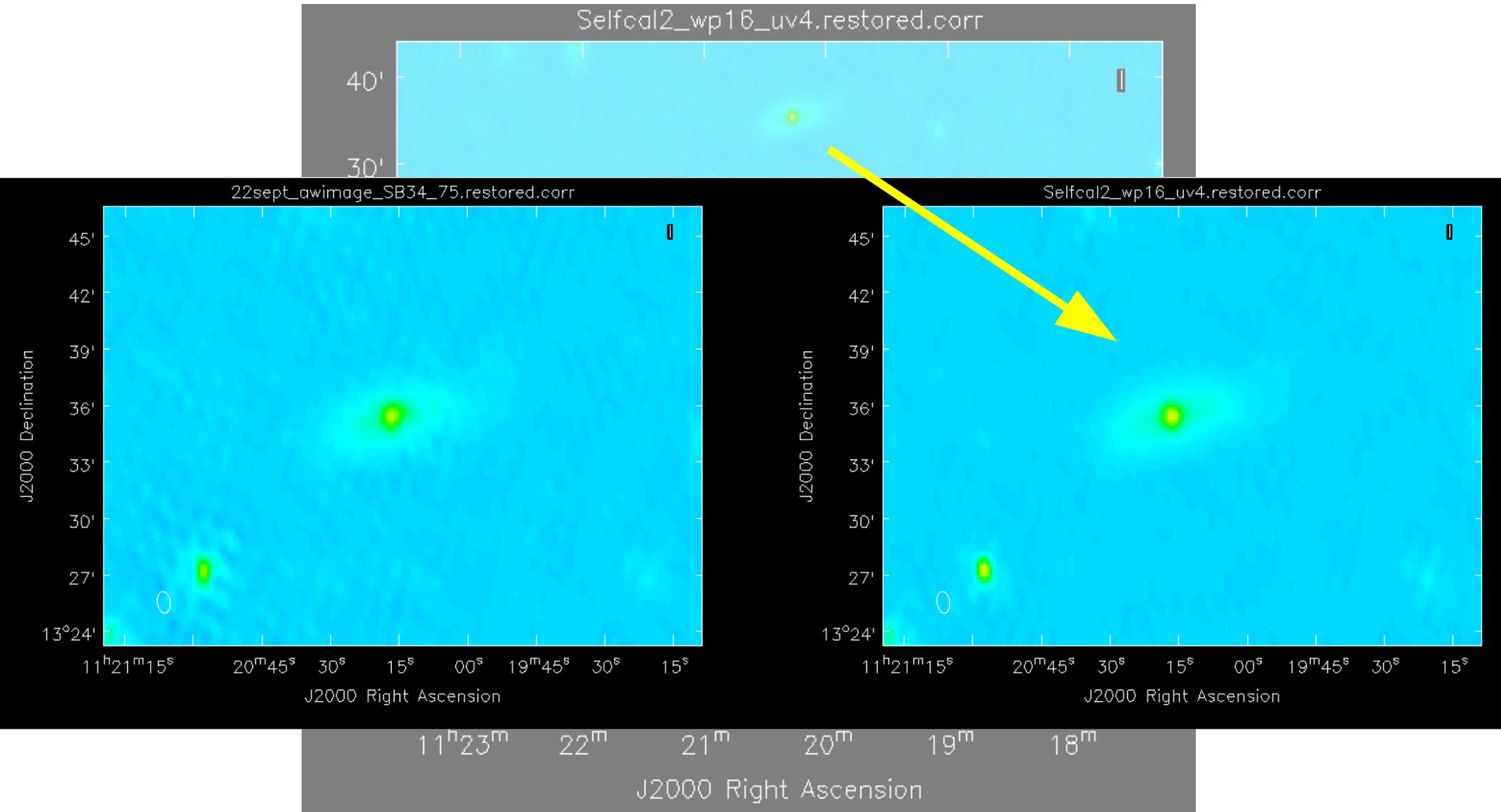
Image after 2 selfcal cycles : slightly improved

Issues found

**Further selfcal cycles did'nt improve the image...**

Emanuela recognized in the background pattern
the presence of residual contribution from an A-team source

We demixed only for CasA and CygA, VirA was the closest source but the simulated
effect on the data appeared to be negligible
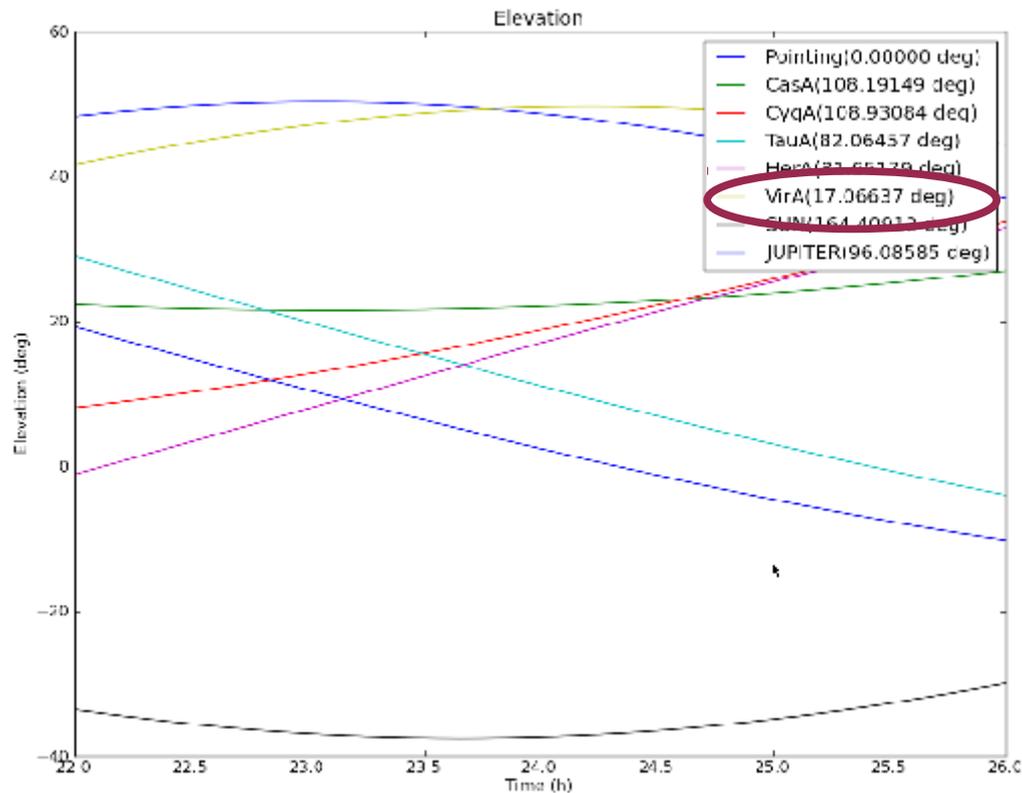
VirA ~ 18 deg

Issues found

Wide field dirty image clearly showing something
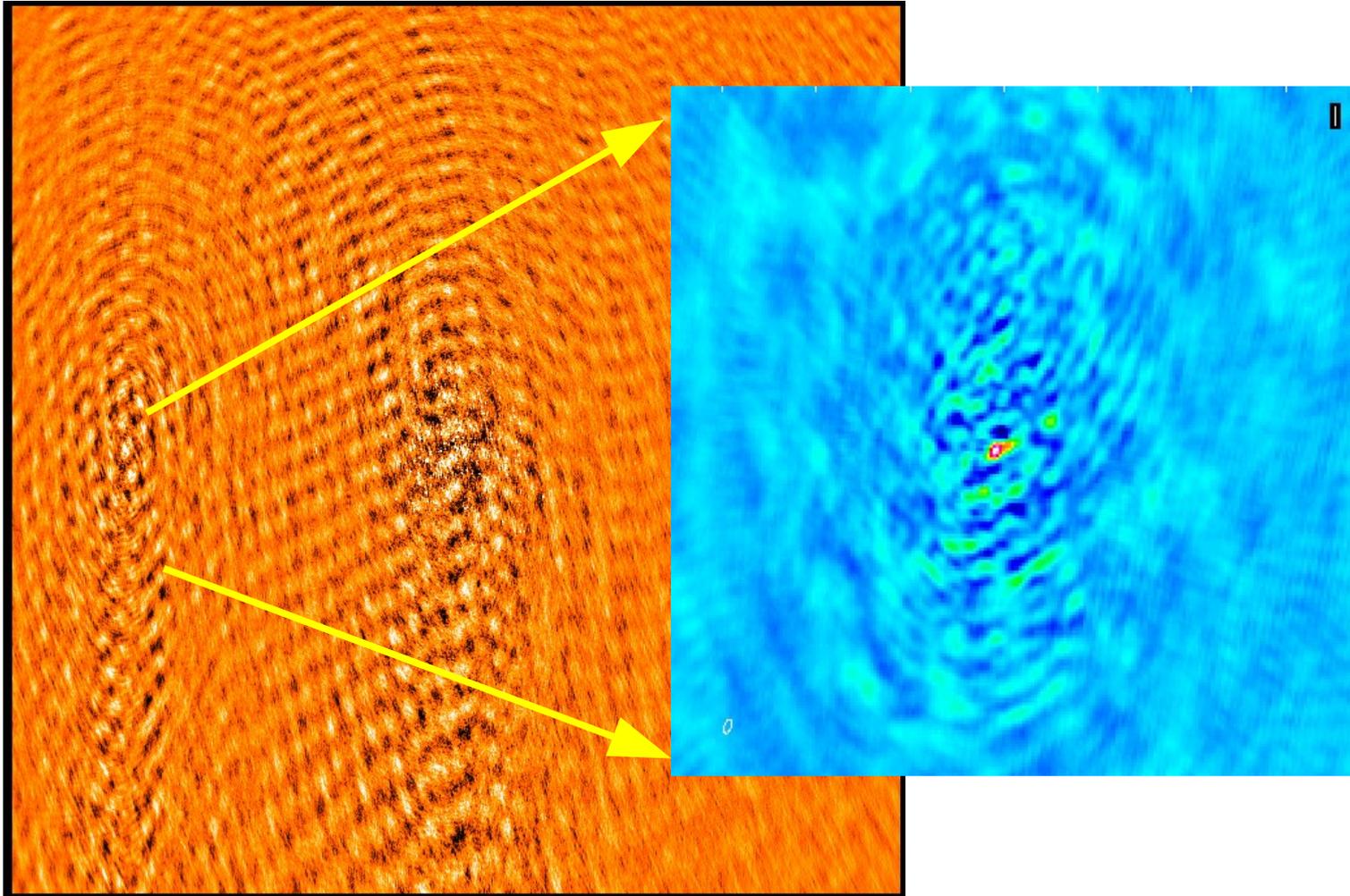
RA: 12:32:05
DEC: +12:22:27

Vir A

An image with phasecenter ~18deg from the center
allow the identification of the disturbing source: **Vir A indeed**

Encouraging solution

**directional dependent calibration and subtraction of Vir A**
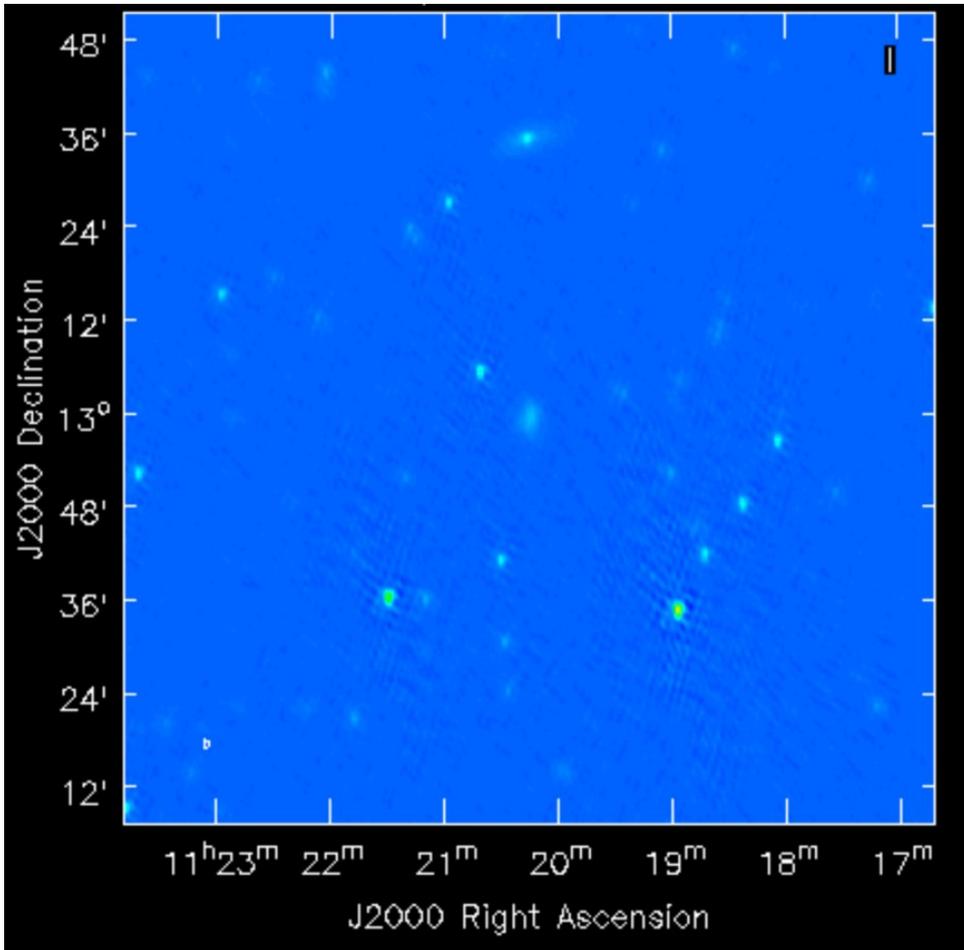
Image after
2 selfcal cycles

rms ~ 10 mJy
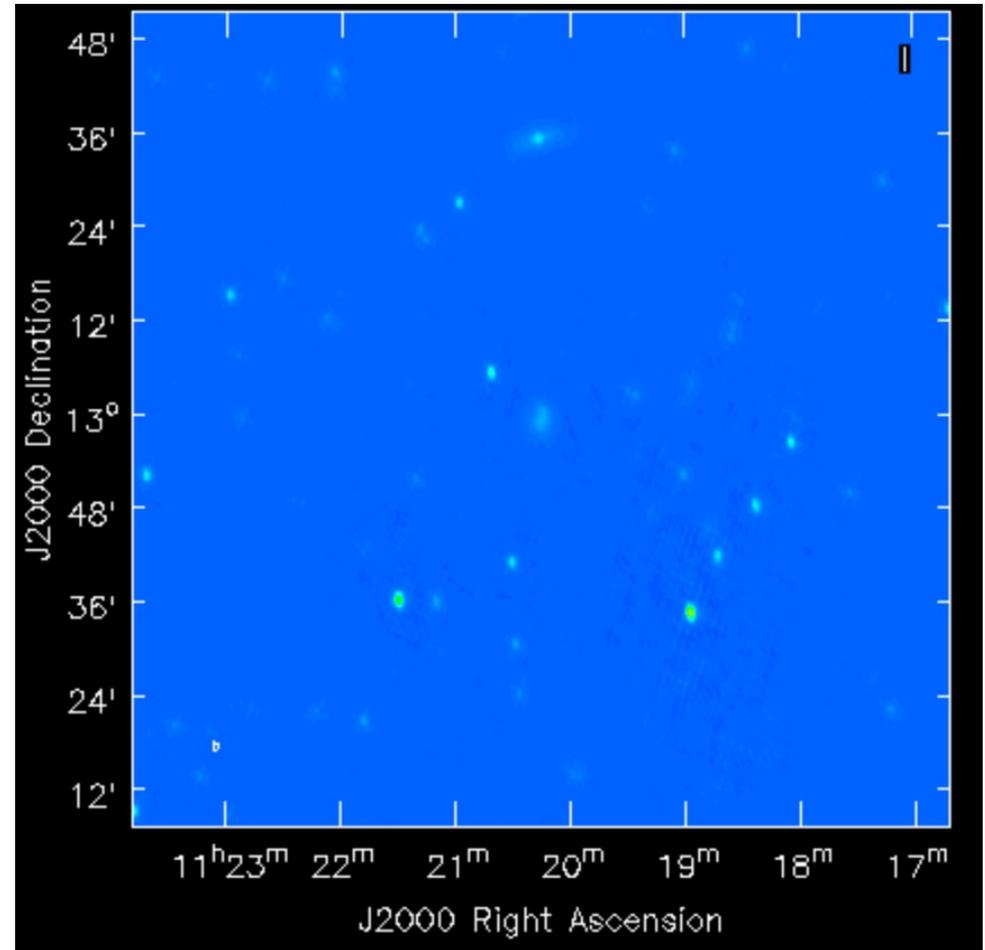
Image after DDE
calibration towards Virgo A

rms ~ 5 mJy
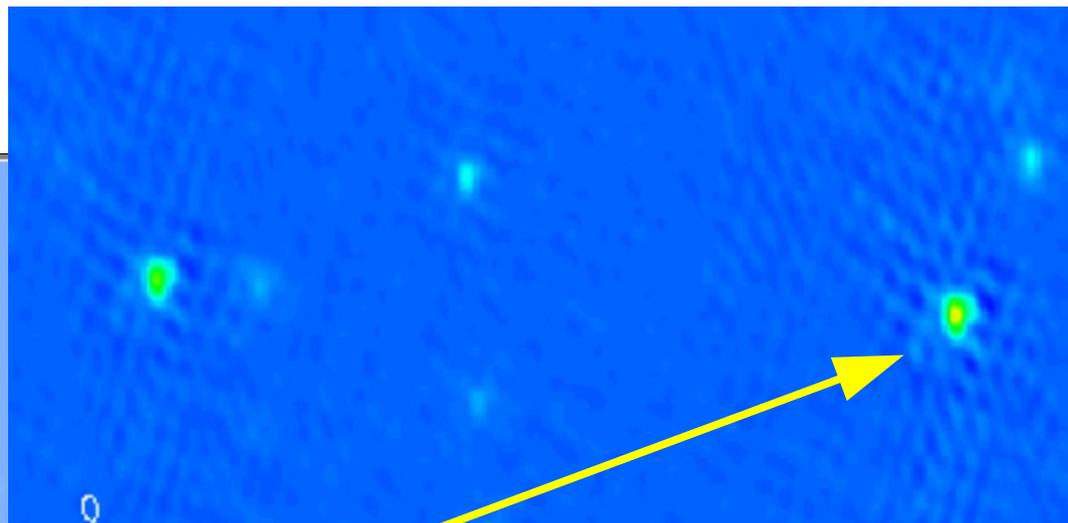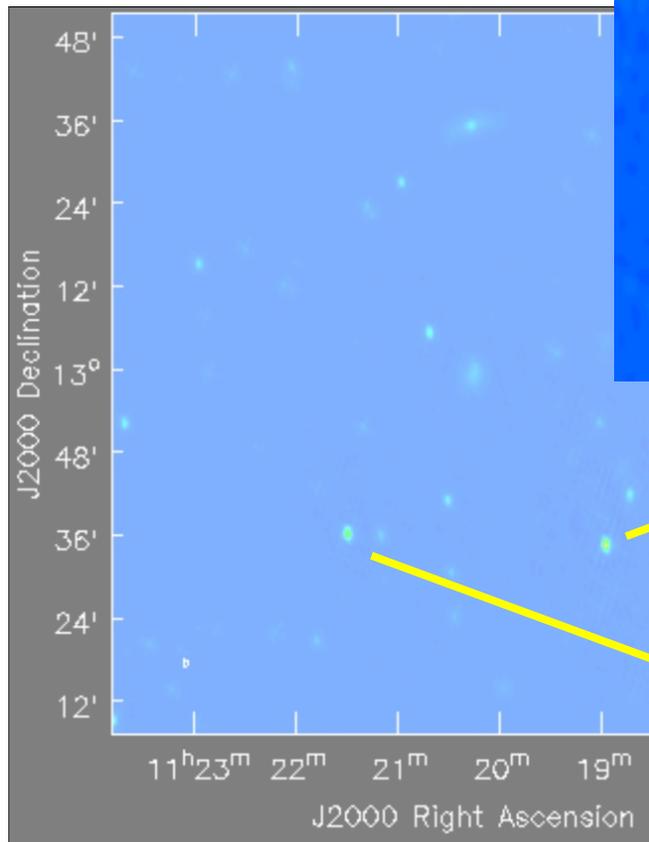
**Image after
2 selfcal cycles**
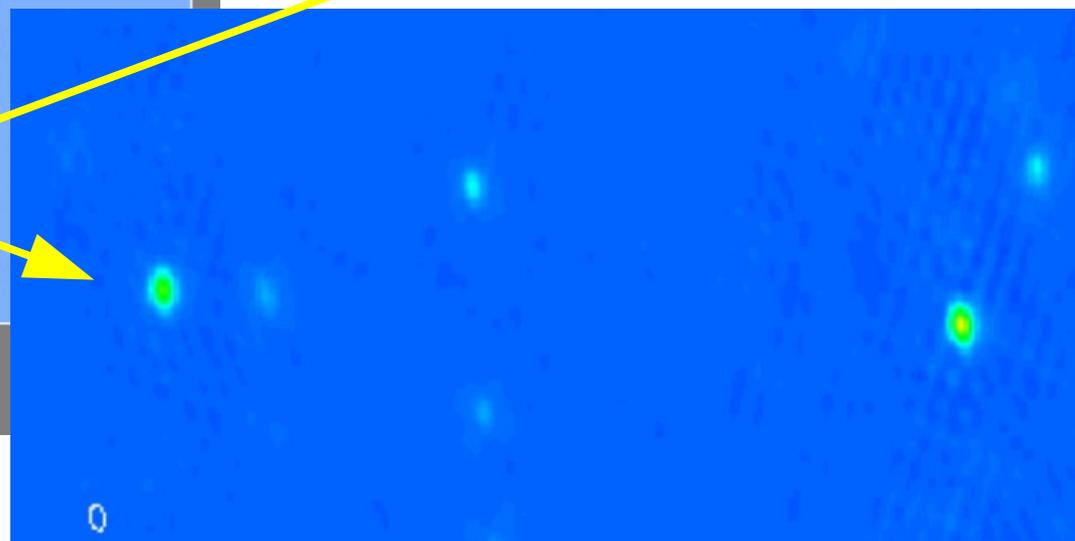
**Image after DDE
Calibration towards
Virgo A**
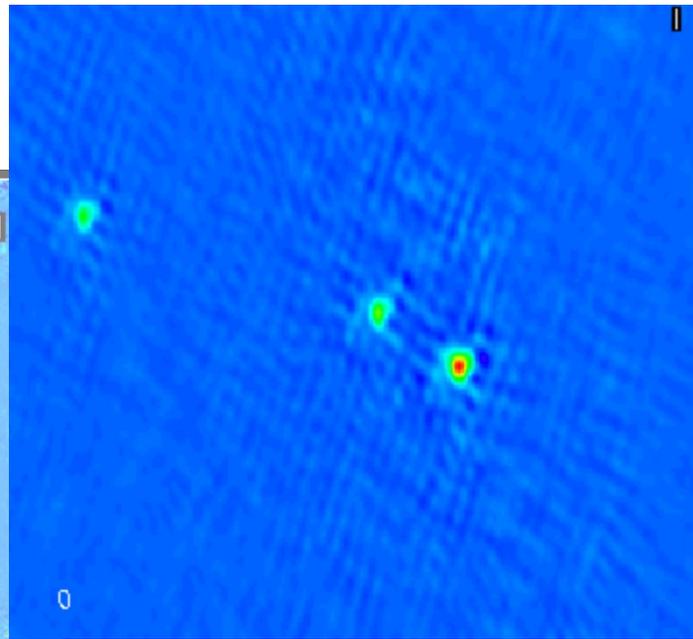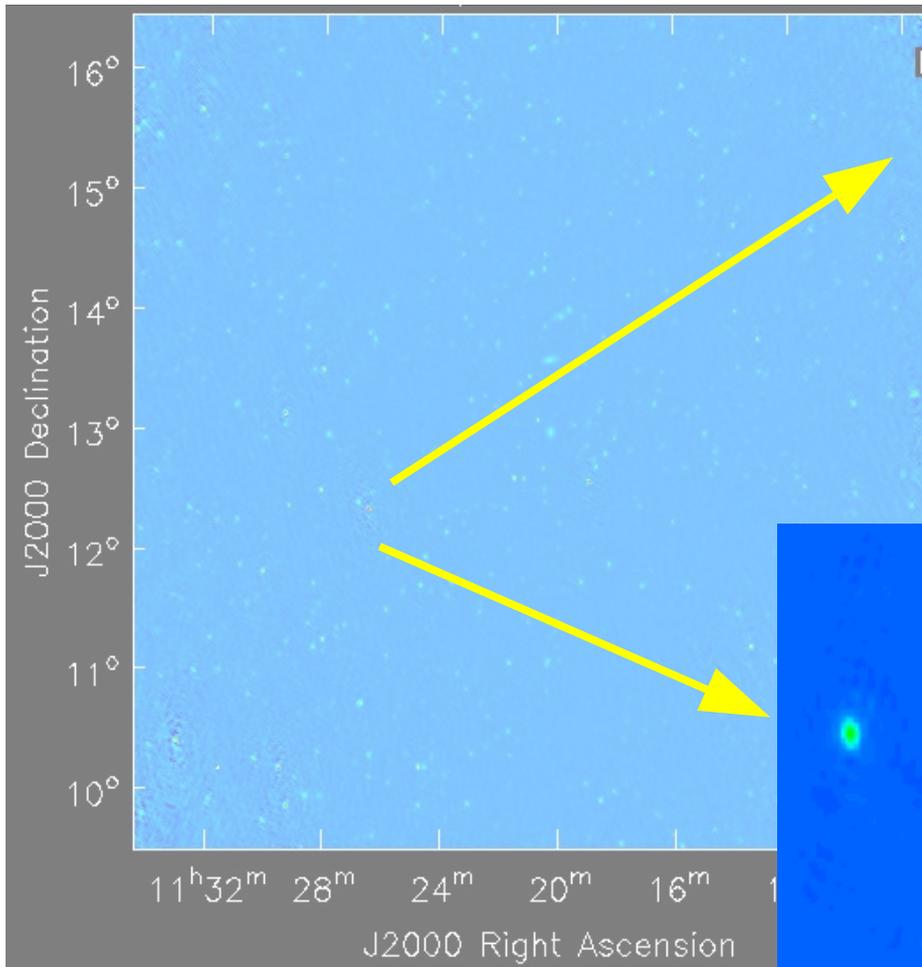
**Image after
2 selfcal cycles**
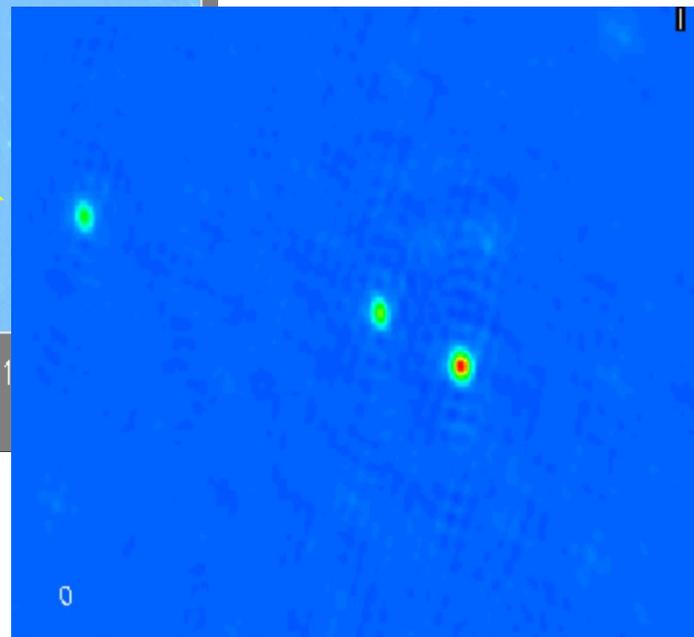
**Image after DDE
Calibration towards
Virgo A**

Nicolas's Selfcal pipeline
on the first 10 SBs of this "VirA free" dataset: 15 cycles in total
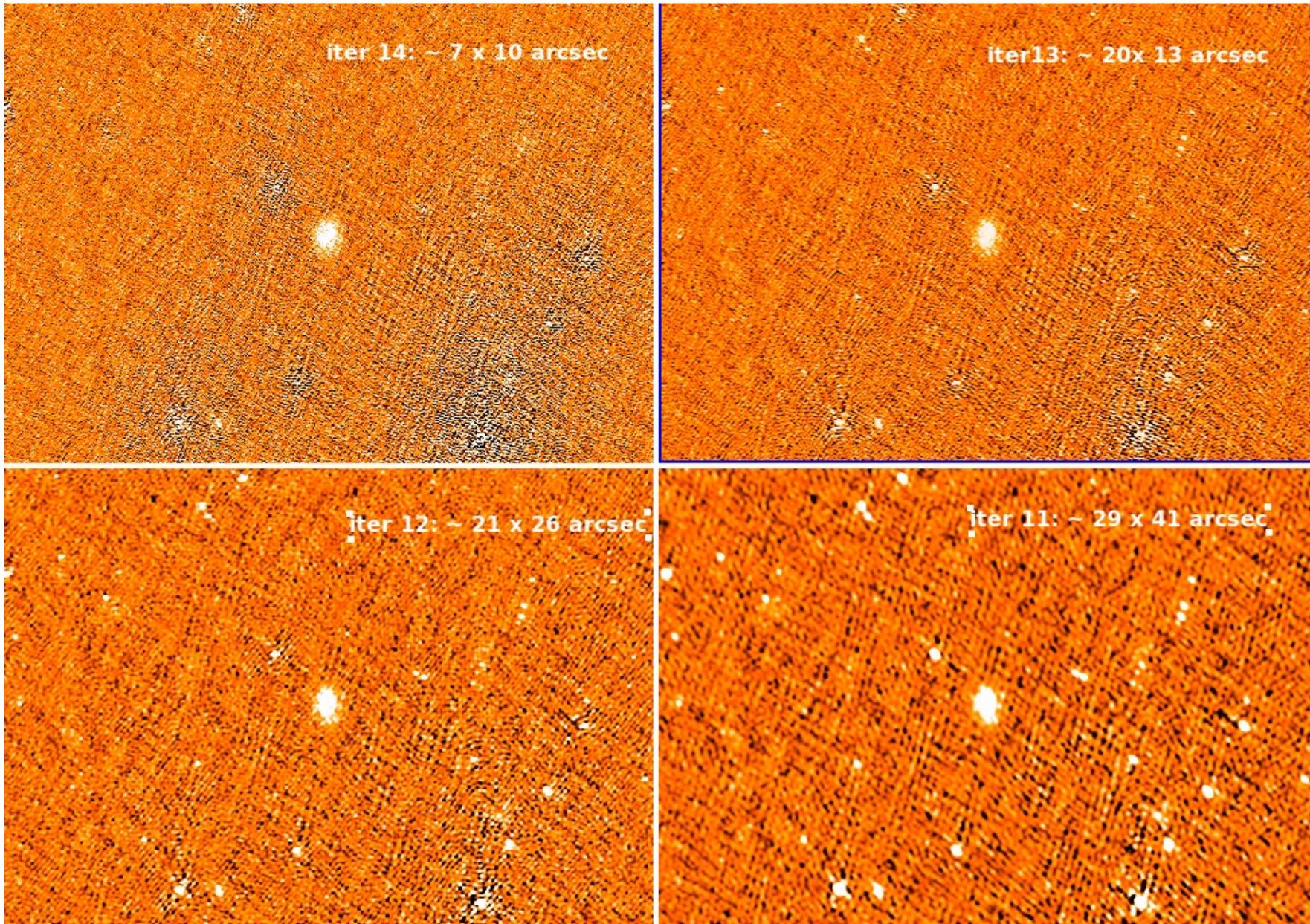
To Do:

Improve the long baseline calibration

Include DDE calibration of the bright sources in the field.
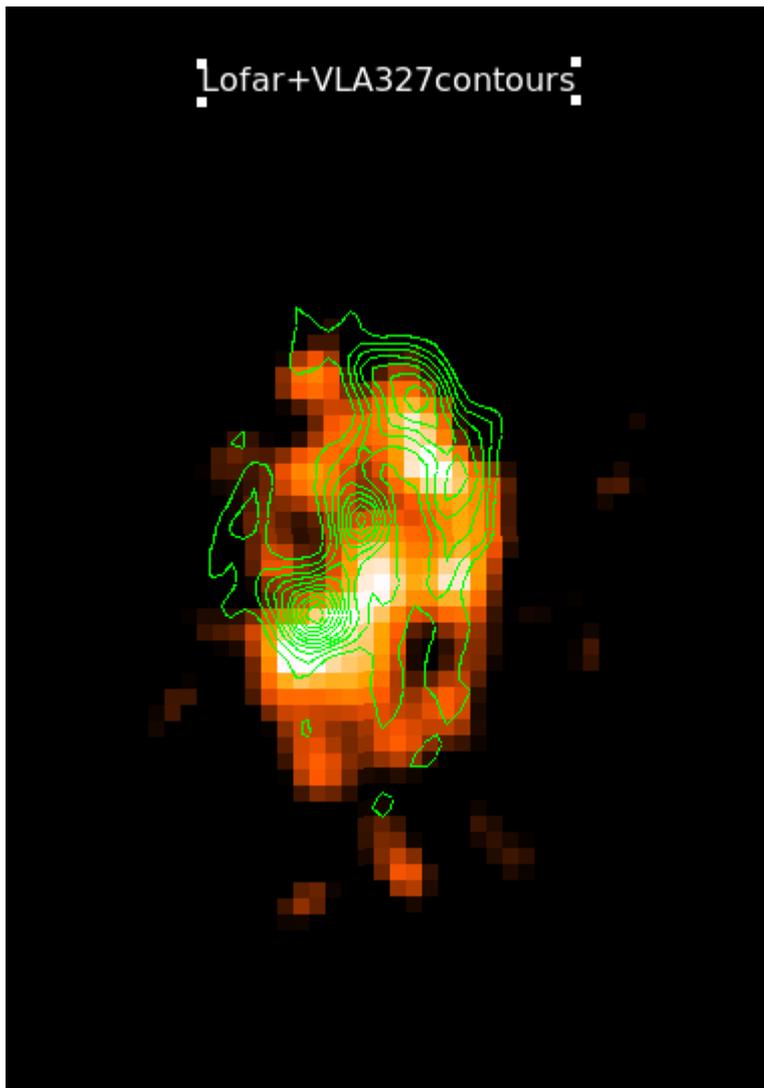
**Obtain a good image at 20 arcsec resolution
to compare the data with
our previous VLA observations
at 327 MHz**

←— **Very rough comparison
Position shift to be investigated!**

Thank you!