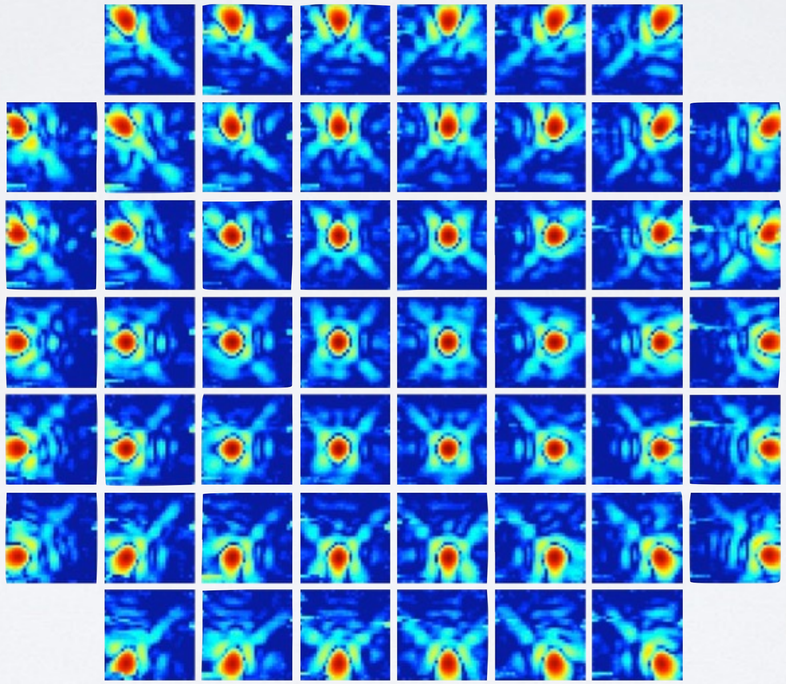
UPDATE ON APERTIF

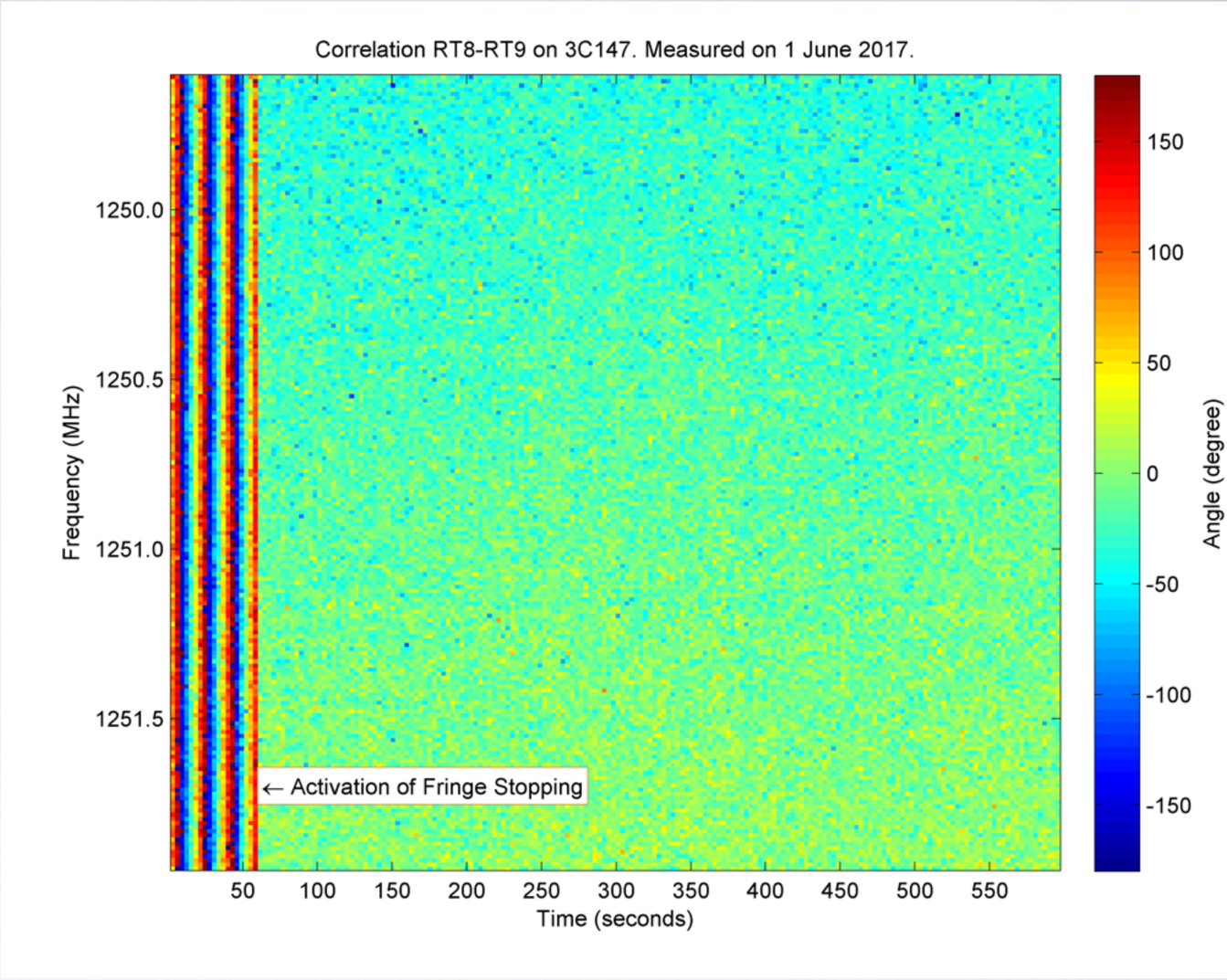


Status:

- technical commissioning ongoing
  - latest progress: fringe stopping

- several issues to be completed still
  - dual pol
  - real-time calibration
  - channel filter
  - from 200 to 300 MHz
  - …
  - should be done by November

Early science can start after this

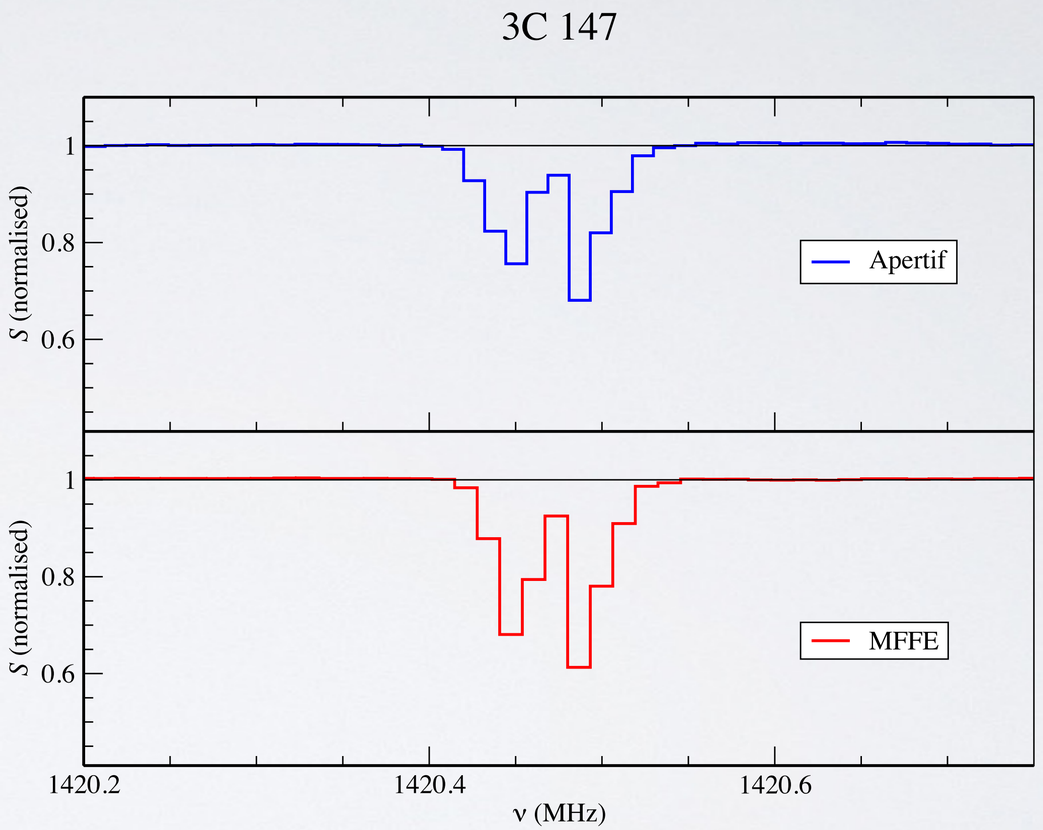


Main issue: current system has 200 MHz bandwidth.
300 MHz not available until mid 2018
So we start with shallow surveys, deeper surveys to follow

Science commissioning:

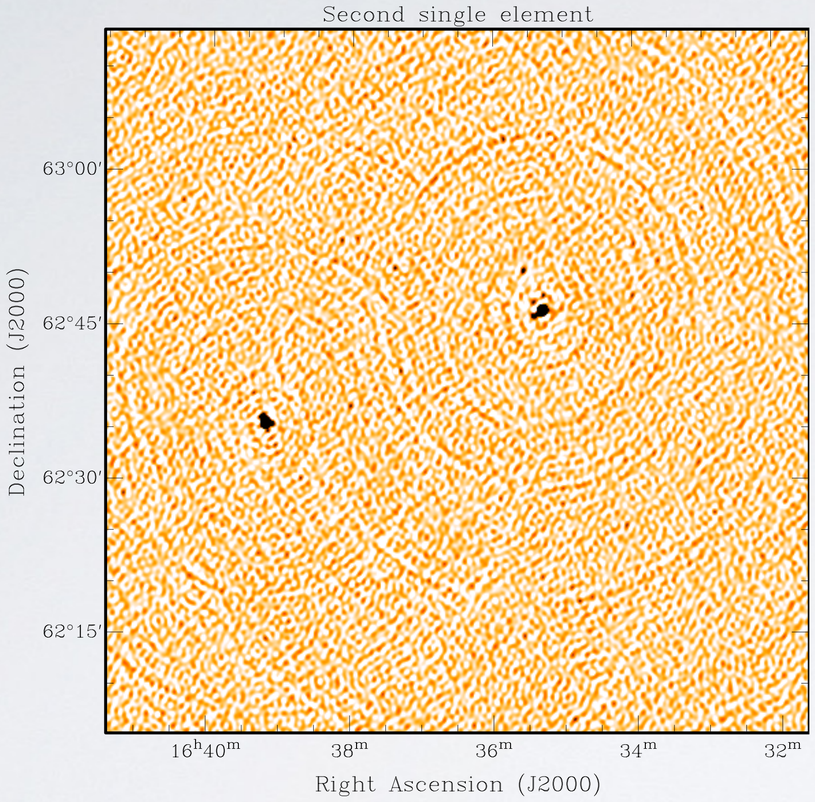
- Since end 2016, we are taking data to look at from an astronomer's point of view

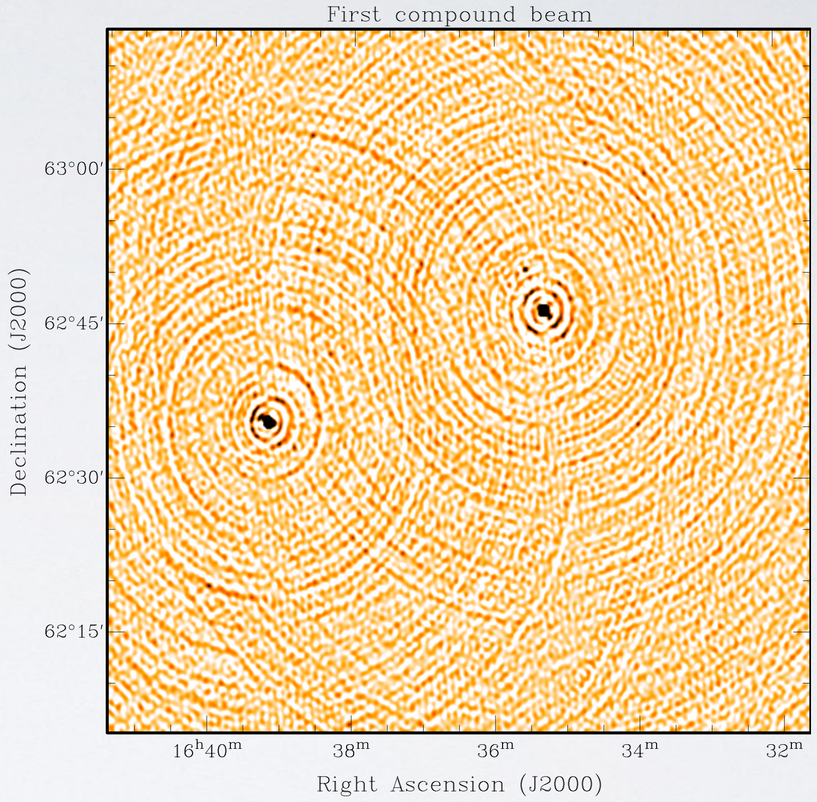
first spectrum:



- first images made
  - first batch beginning this year

first images without and with beam forming

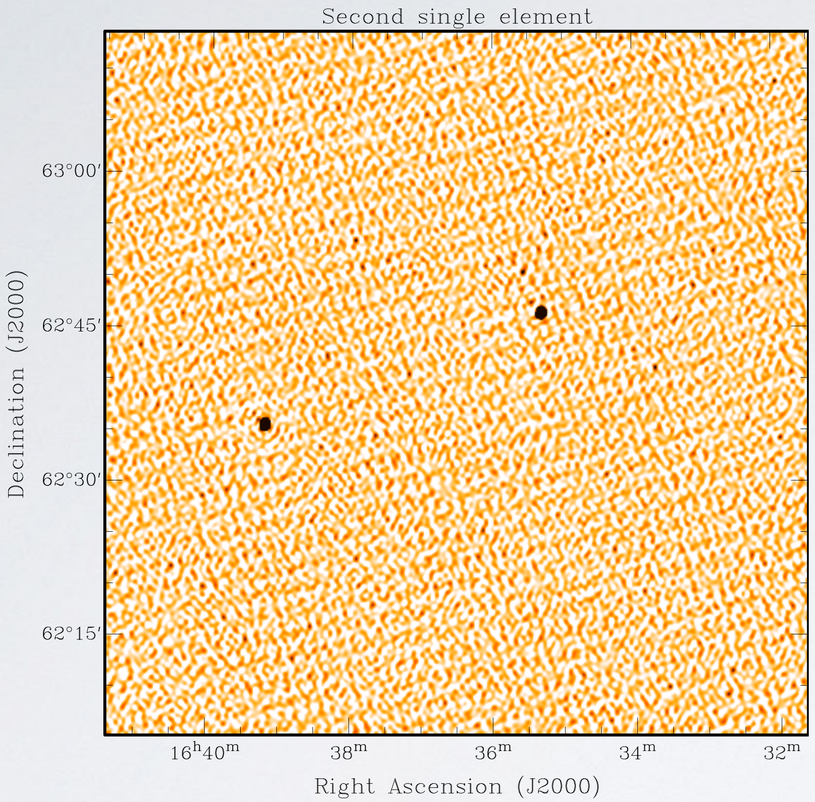


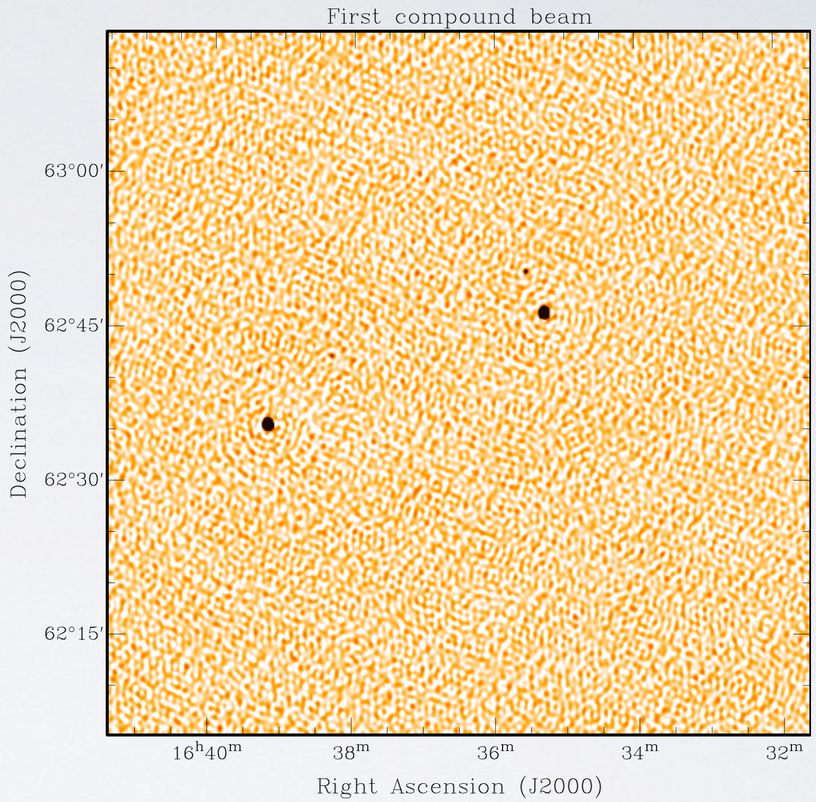


single element

central beam

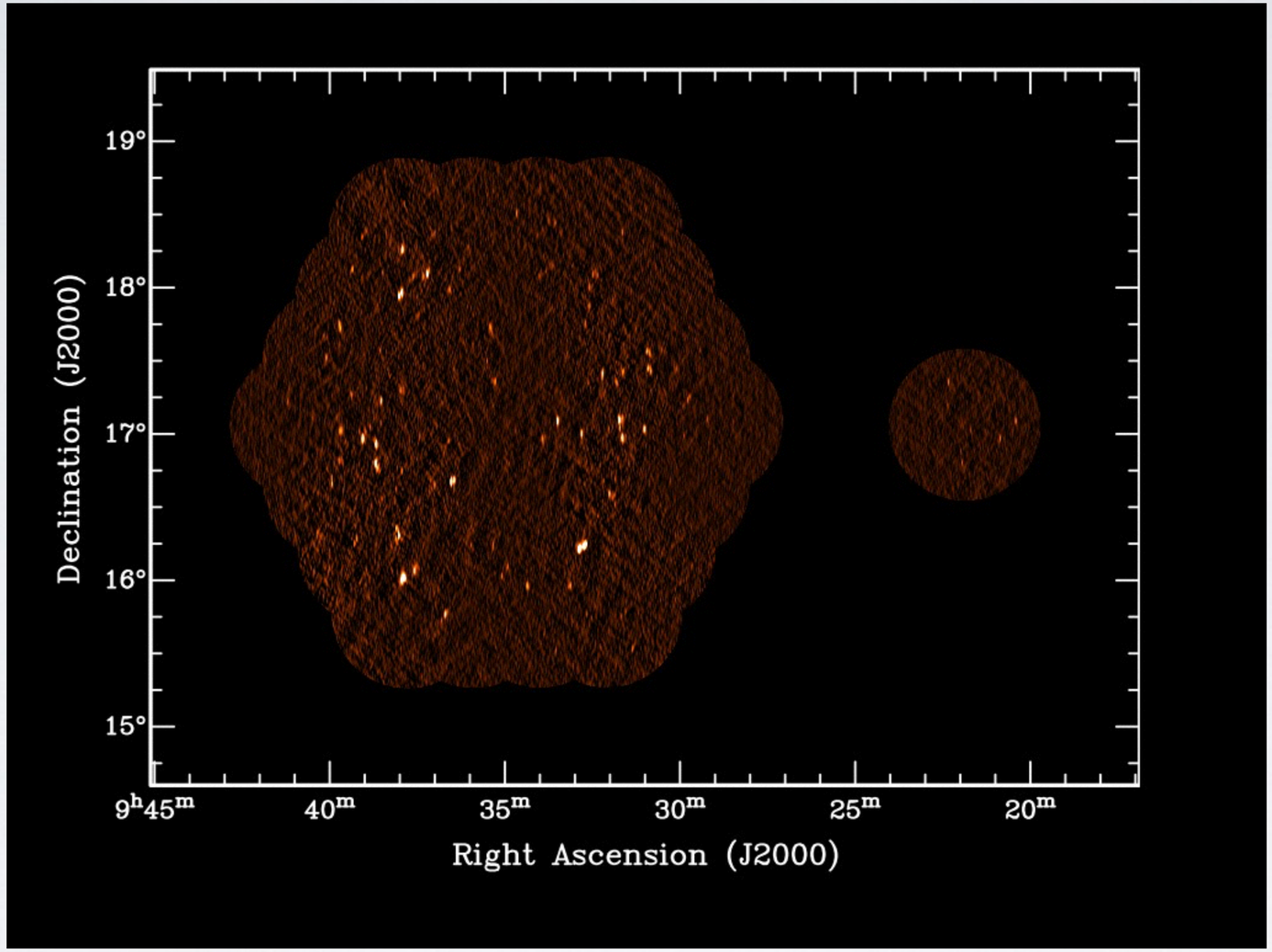
No active control of beam, so beam is ‘floppy’





After peeling.
Artefacts can be understood as beam drifts & pointing errors

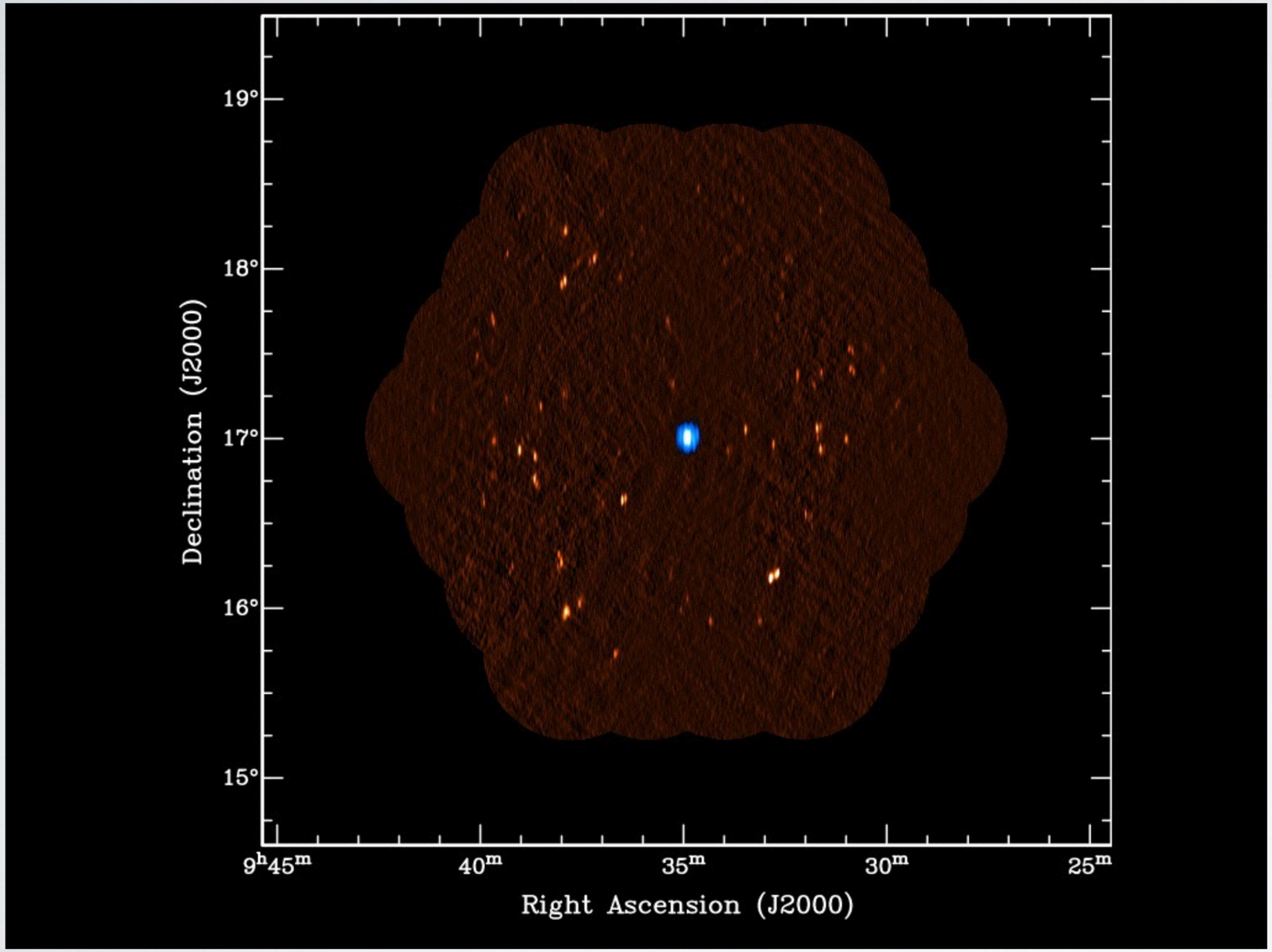
First mosaic using 37 beams

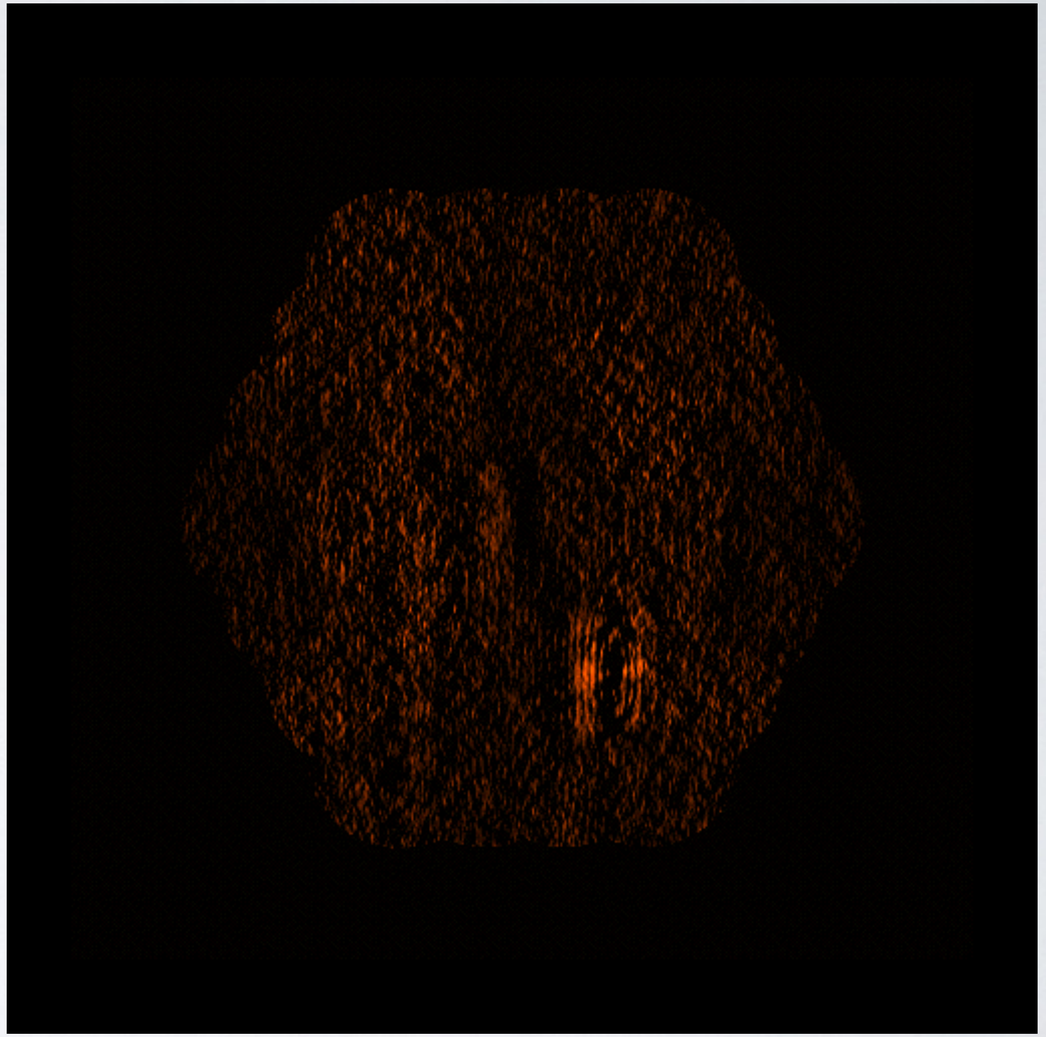


Calibrated against NVSS sky model

Phases have wrong sign (each image rotated 180 degrees….)
uv coordinates wrong, no fringestopping….

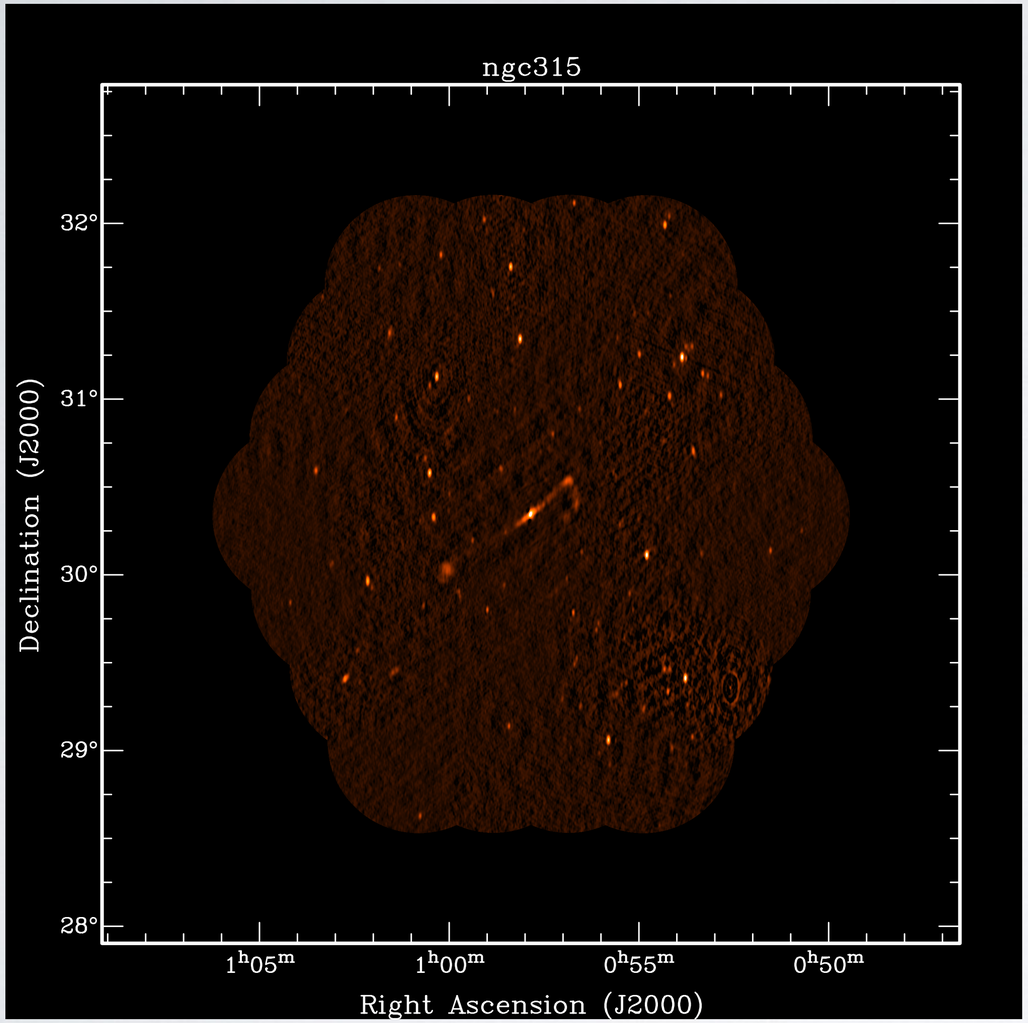
Leo T detected in HI

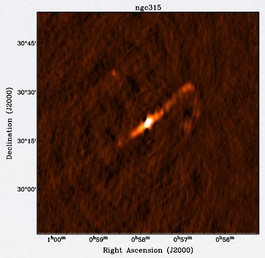


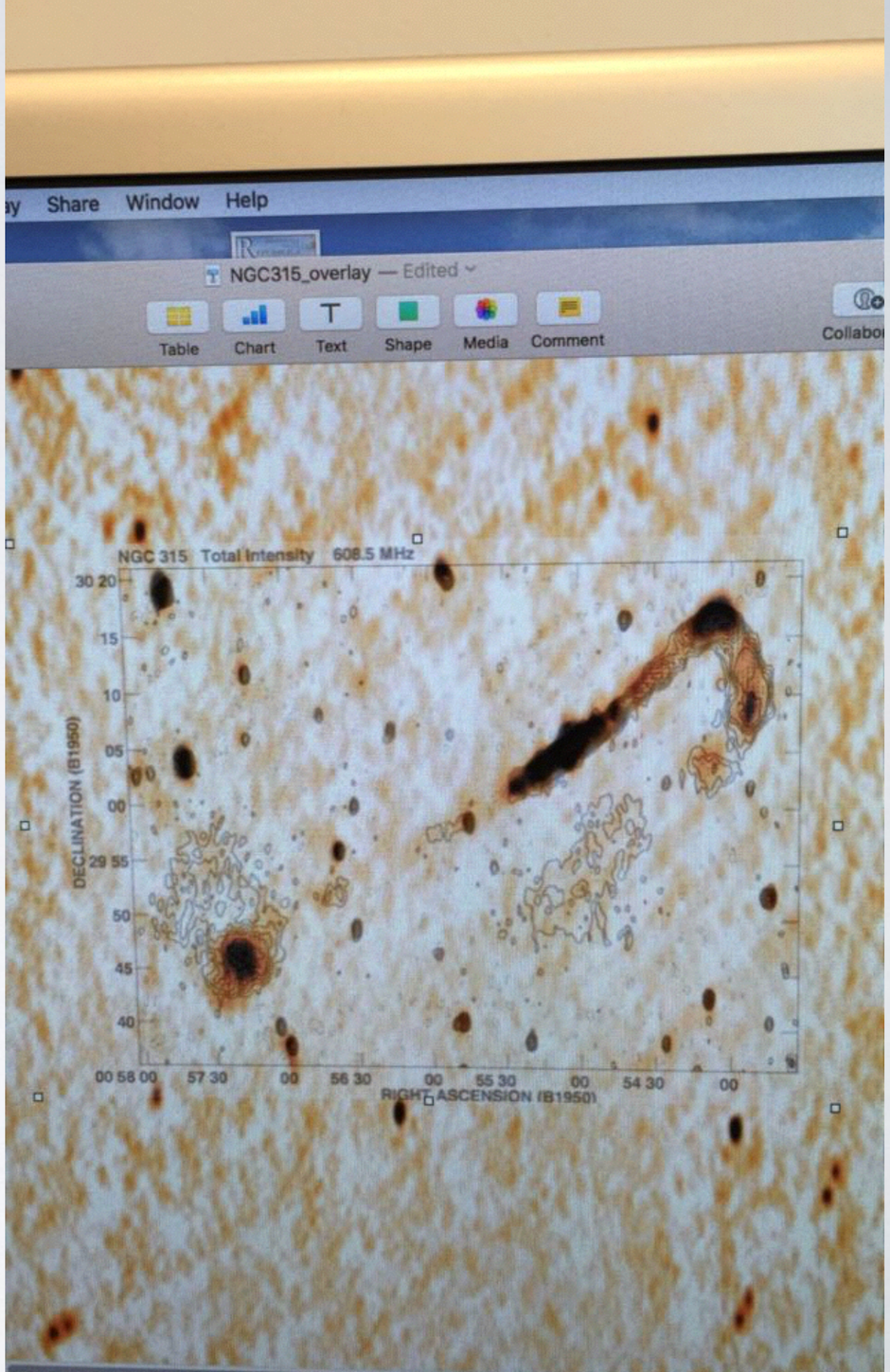


Important demonstrator for capabilities of Apertif

Second mosaic: NGC 315



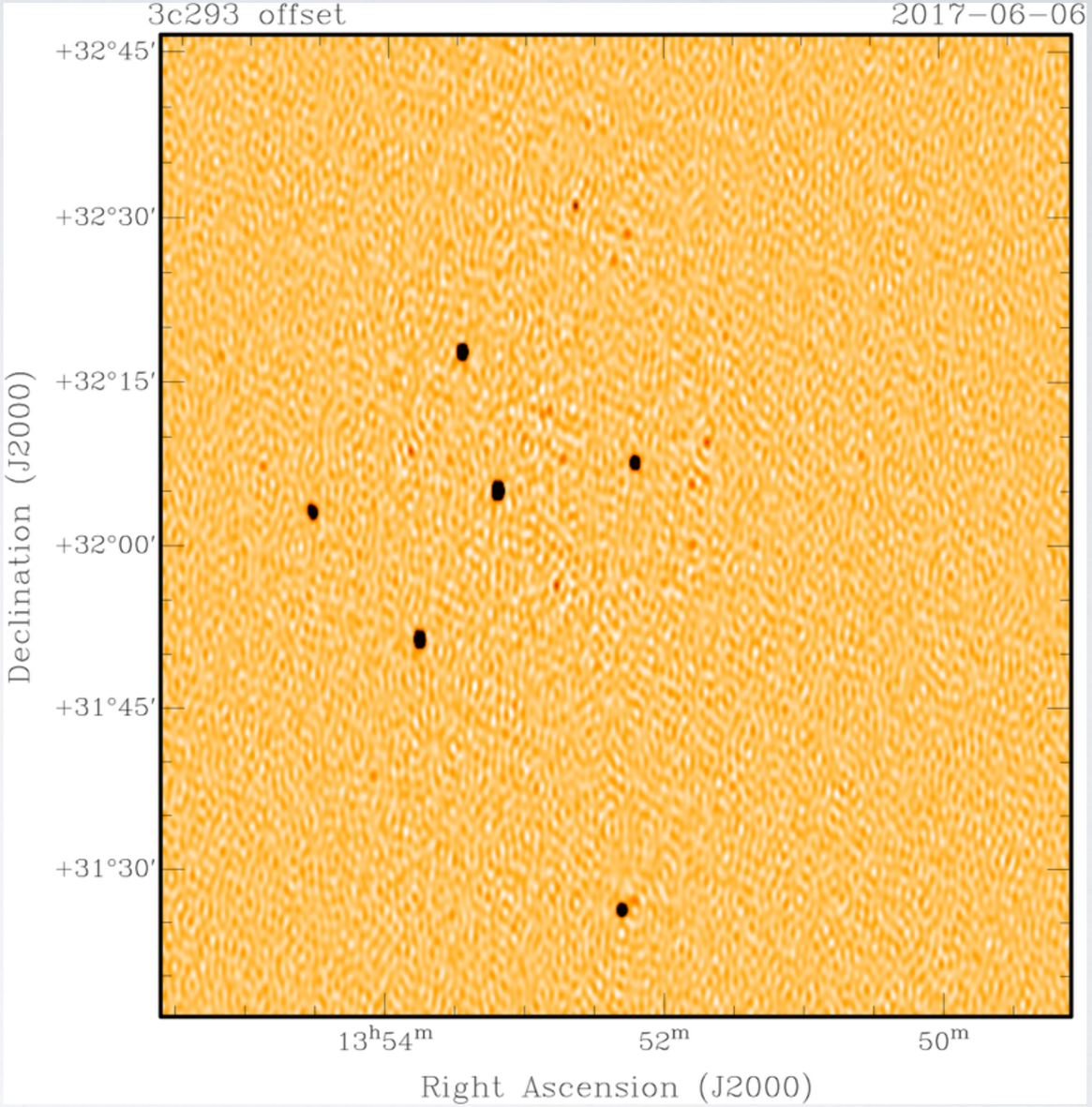




More recent images:

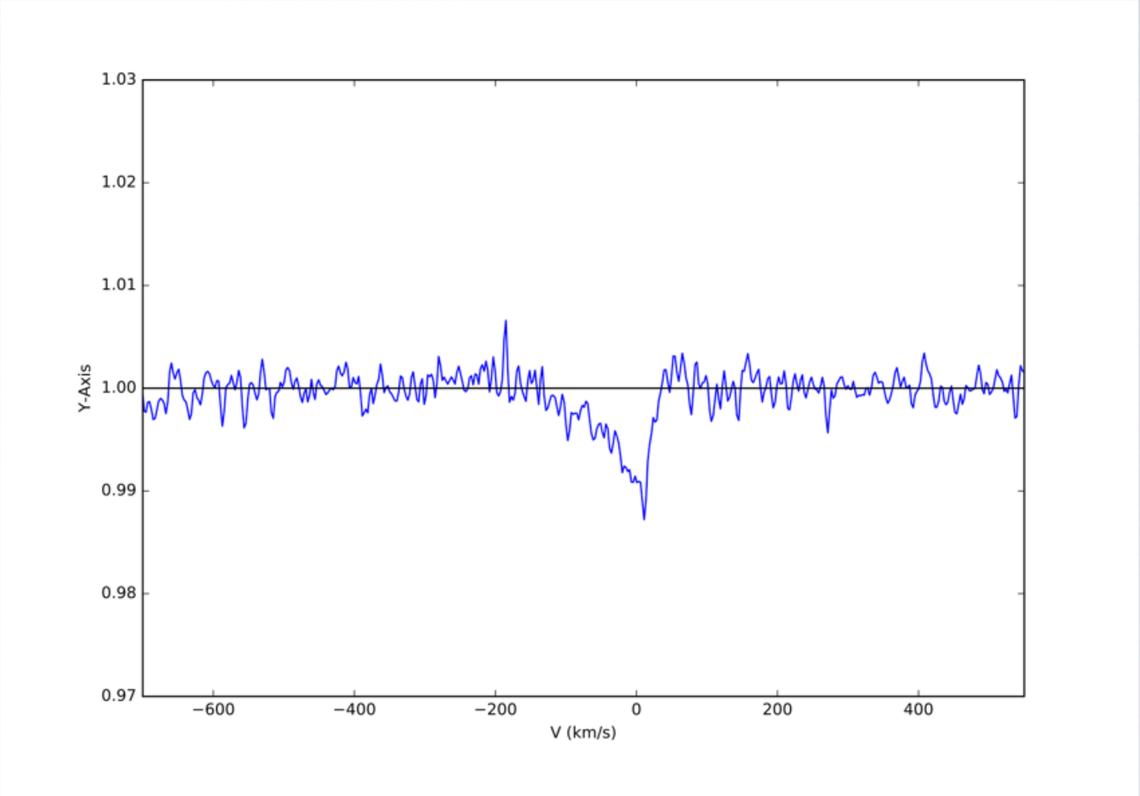
single-element, single pol image,
8 dishes image of 3C 293
(but taken at the wrong position…)

about as deep as the NVSS

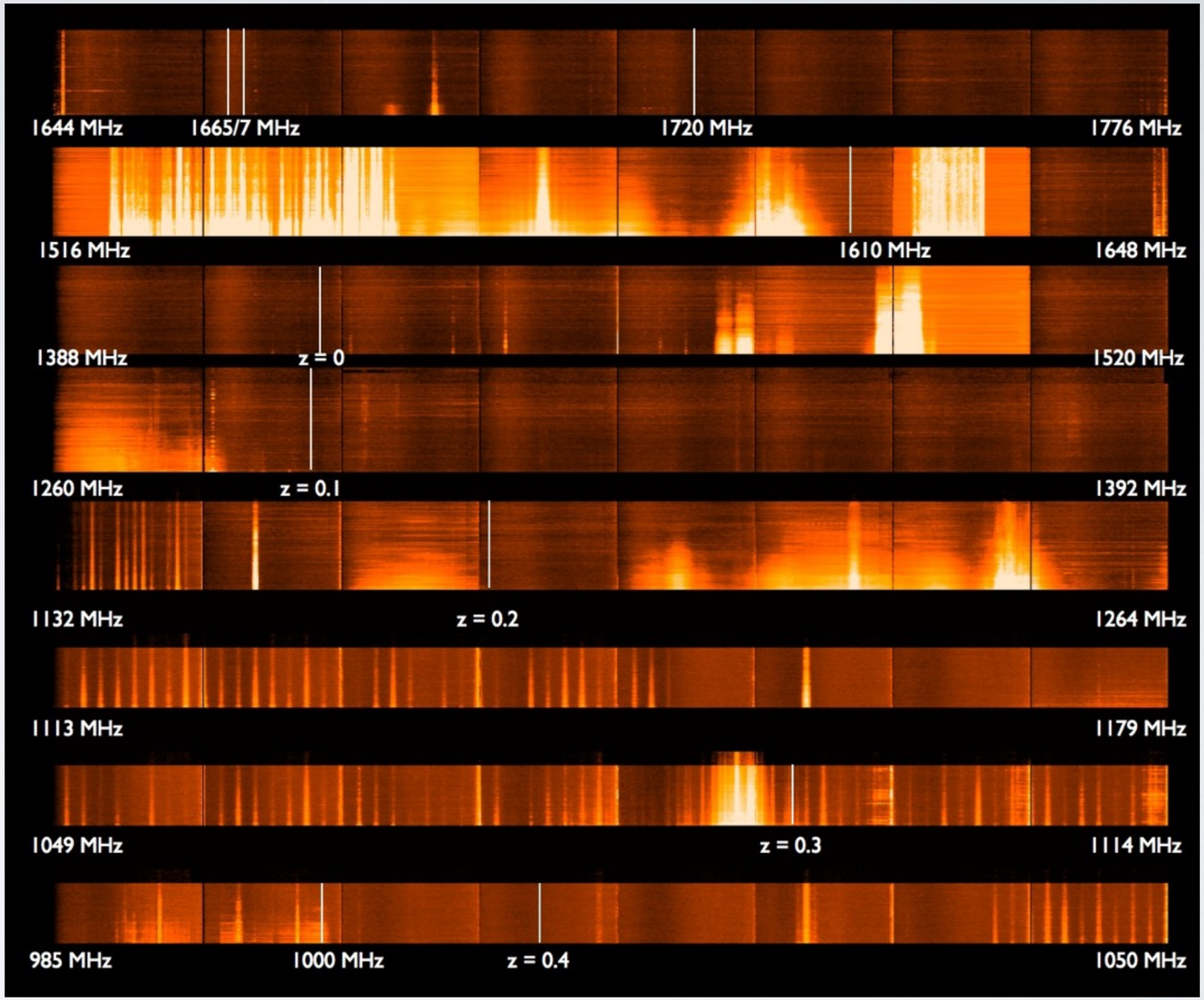


the absorption in 3C293

(noisy but is single pol, no beam forming,
no proper calibration, 8 dishes, ….)



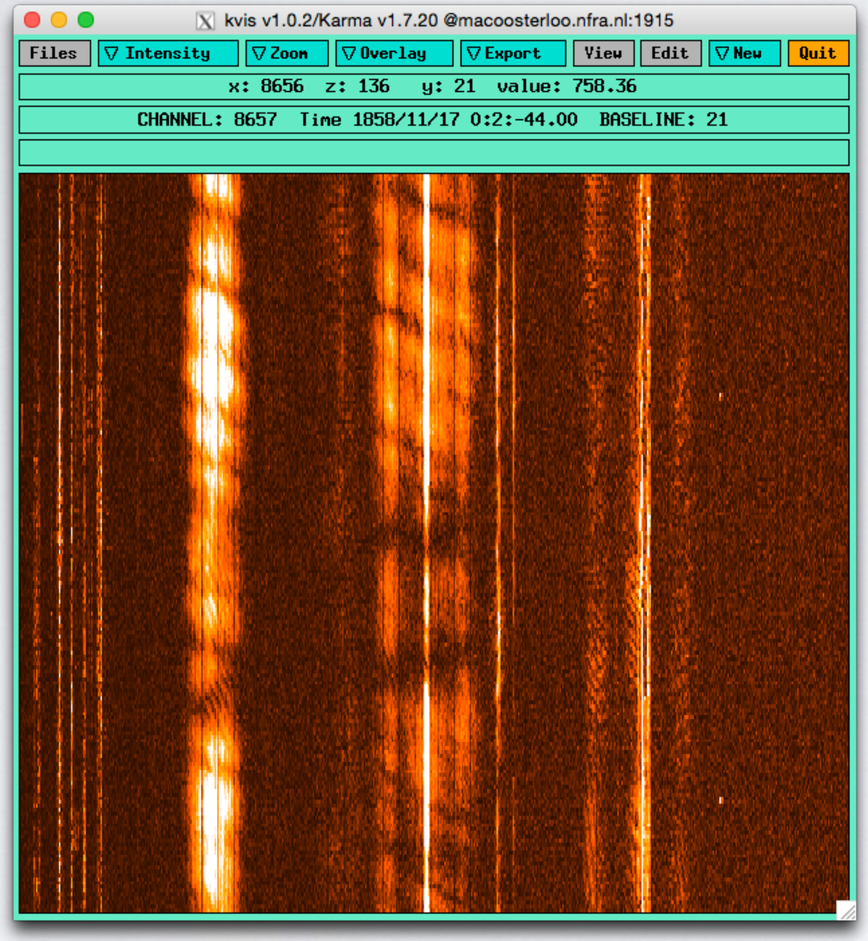
Impact of RFI



Summary of RFI survey done with old WSRT, a few years ago

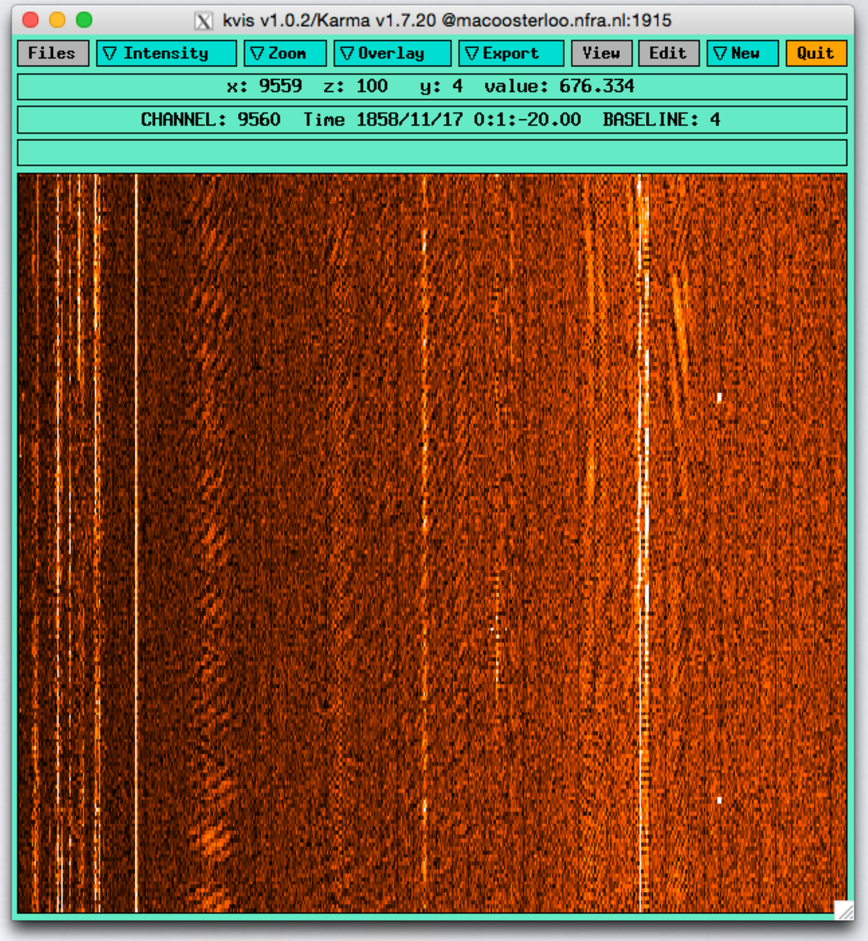
Starting to look in impact of RFI, using Apertif

short baseline



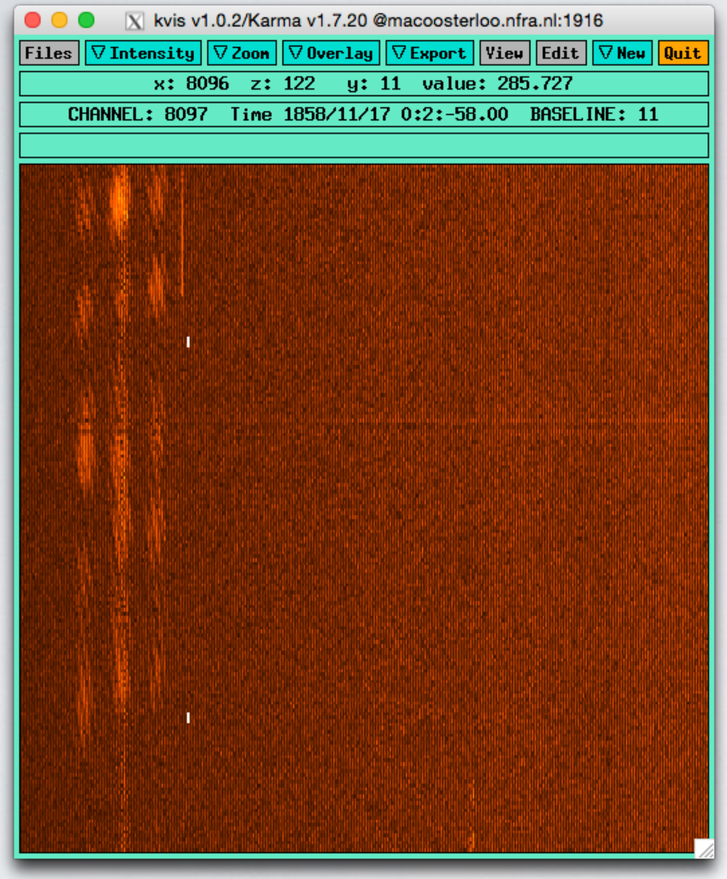
1130 MHz 1330 MHz

1 km baseline



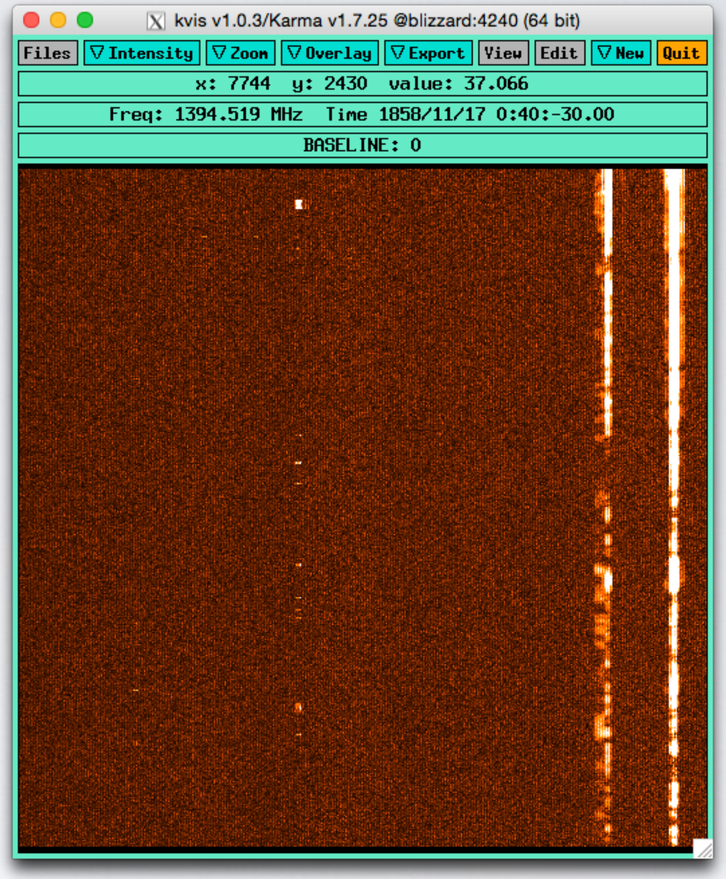
1130 MHz 1330 MHz

So far, looks very similar to a few years ago, but need more data to really know



1230 MHz

1430 MHz



1330 MHz

1530 MHz

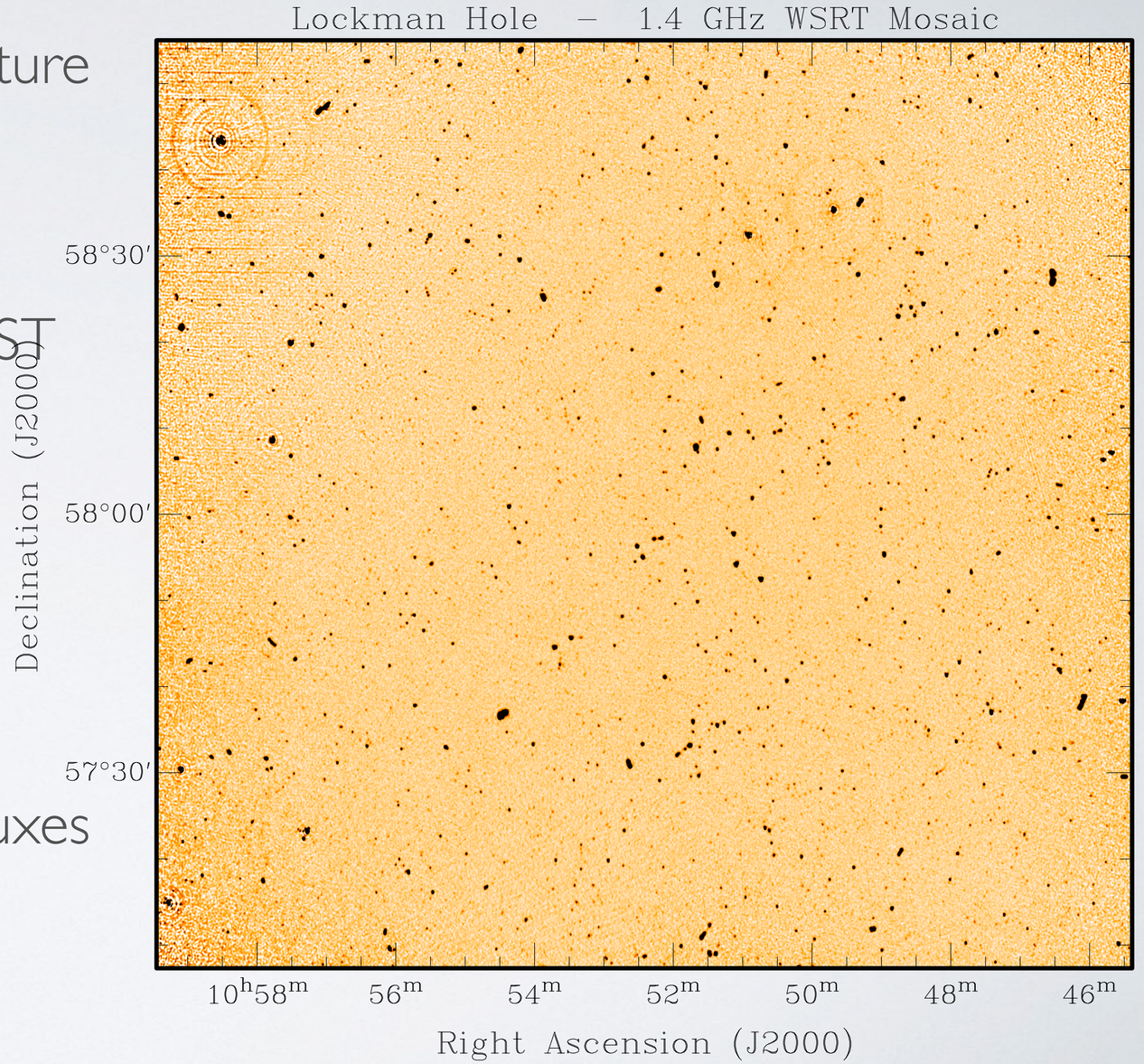
Pipeline commissioning (Adebahr, Lucero, vd Hulst, Verstappen,…)

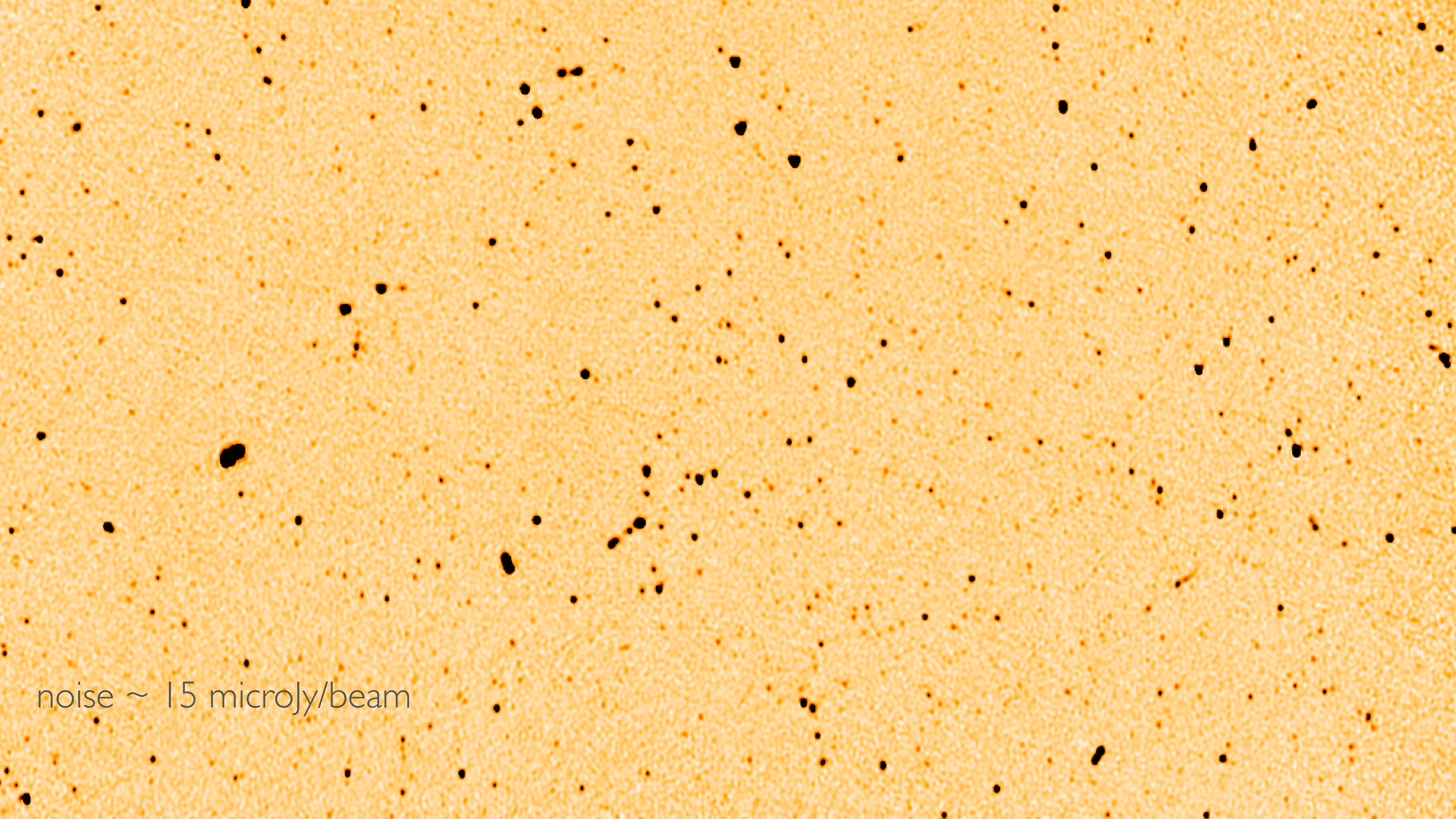
Data will be calibrated using

- python notebooks/scripts providing infrastructure
- miriad based
- basically the same way WSRT was calibrated
  i.e. line data is calibrated on continuum
- using sky model based on NVSS, WENSS, FIRST

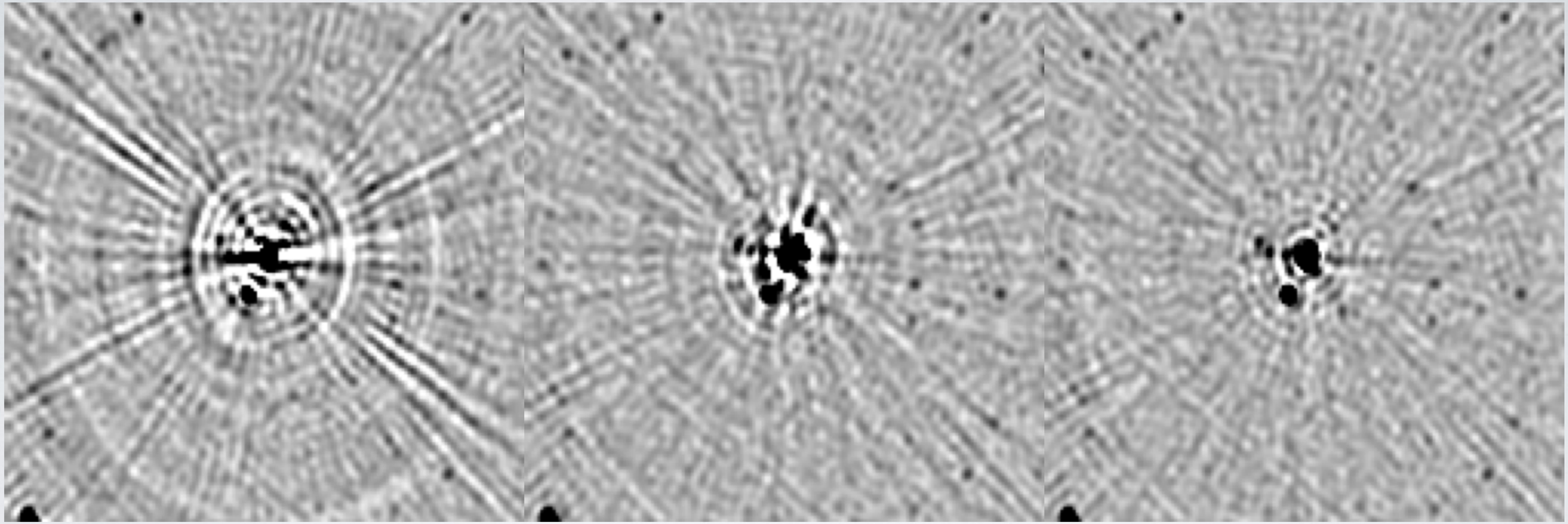
Have had a few busyweeks/days
to run pipeline on WSRT data

first results look very good.
validation in progress, e.g. effects of selfcal on fluxes




noise ~ 15 microJy/beam

Pipeline uses sky model to get calibration going



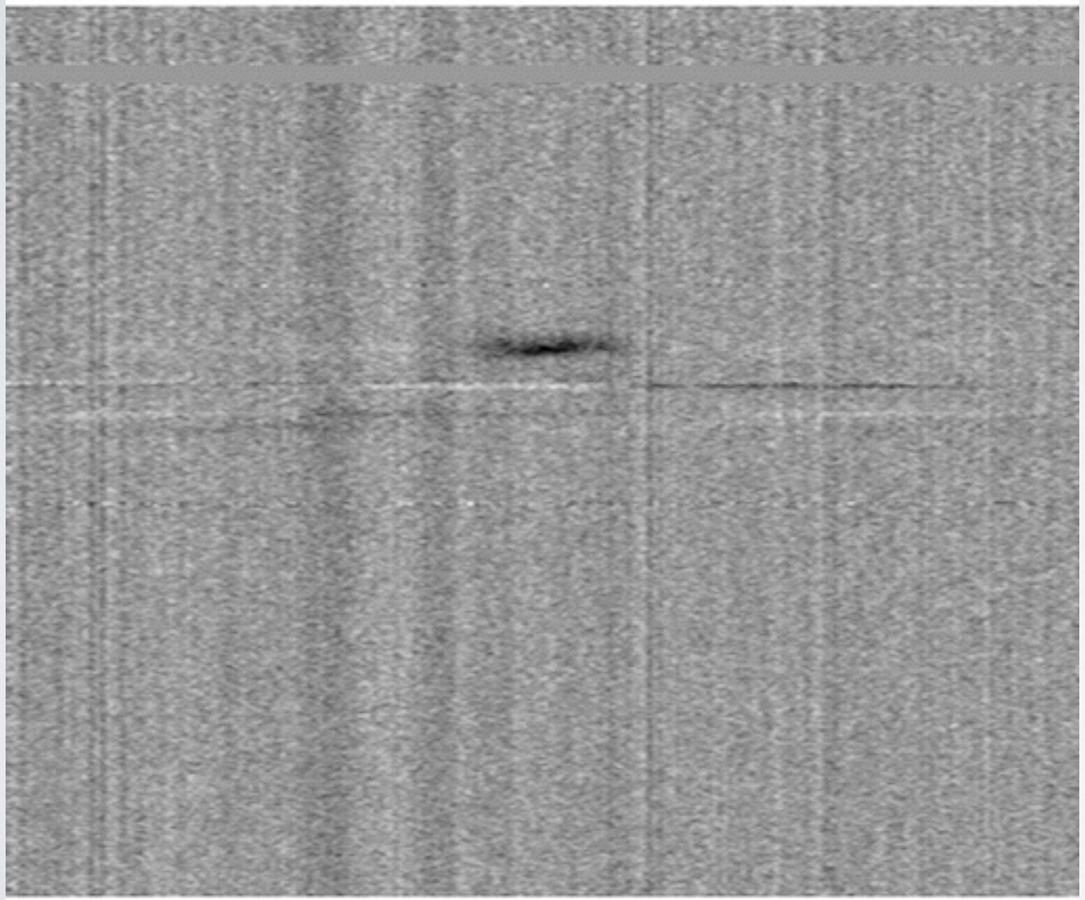
Xcal only

NVSS

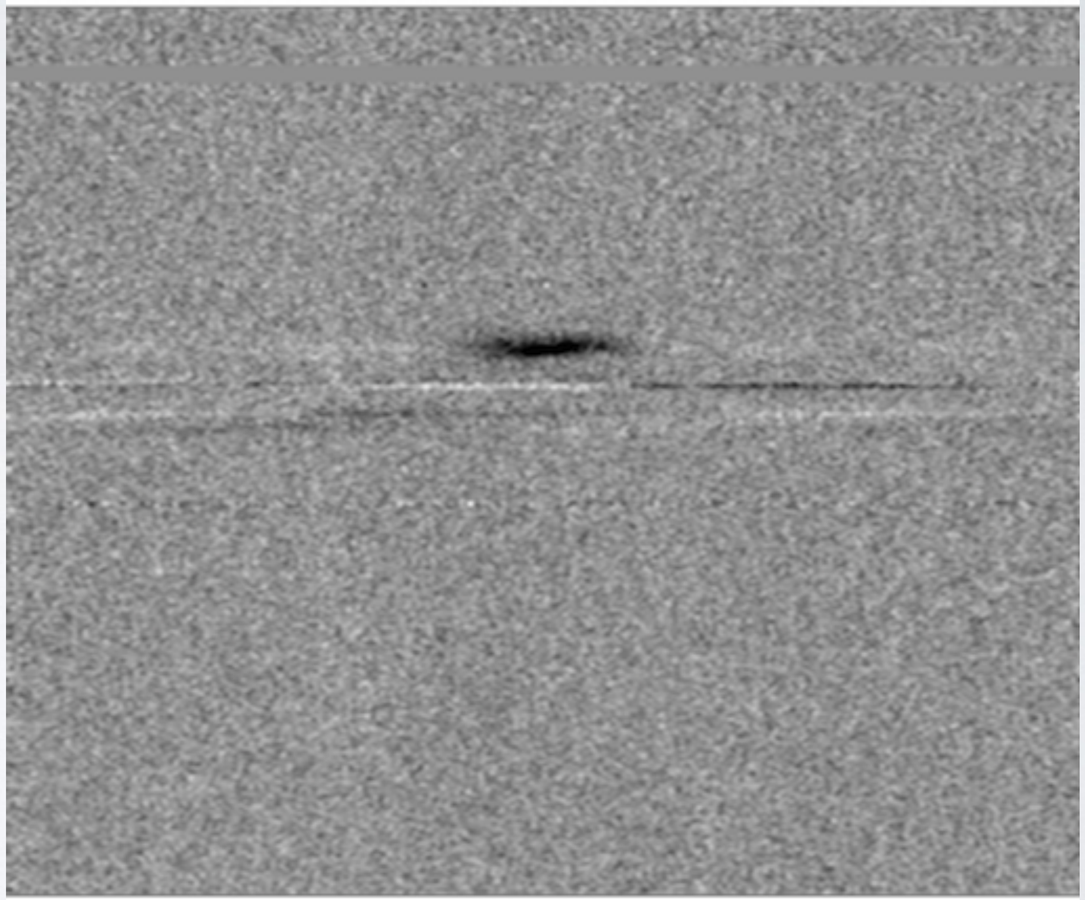
FIRST

Provides better start for selfcal.
avoids position jitter between beams and pointings

Continuum subtracted using model generated by selfcal



Before



After

Output from calibration pipeline:

- calibrated uv data for continuum (low spectral resolution, full pol)
- calibrated continuum subtracted line uv data (high spectral resolution, no pol)
- calibrated and cleaned continuum images and cubes (full pol)
- calibrated and cleaned data cubes, resolution 2.4 km/s (and worse).
- combined images & cubes in the form of mosaics on fixed grid
  size few degrees x few degrees (some subtle details here…)
    - all at various resolutions (15”. 30”, 60”)

All these will be accessible through ALTA (Apertif Long-Term Archive) after some time.

Work on ALTA is proceeding well.
Have good interaction with software engineers on what we would like ALTA to look like.
Later this year first version with basic interfaces. More fancy version in 2018