# ASTRON

Netherlands Institute for Radio Astronomy

# Overview of Survey KSP meeting Leiden March 2010

George Heald
LSM 20100317

# Topics

- Leiden meeting: motivation & program

- BBS tutorial/practice sessions

- Commissioning discussion sessions

- Ongoing Imaging Pipeline commissioning issues

# The Leiden meeting

- Initial motivation was to work on early science results from ongoing observations

- Meeting was set up long ago, before the timeline evolved

- More recently it was restructured

    - science talks / synergy (esp. w/ other KSPs, and SKA precursors)

    - addressed MSSS issues (input to field selection, commissioning)

    - teaching SKSP members to use pipeline software (i.e. BBS)

# The Leiden meeting

- Initial motivation was to work on early science results from ongoing observations

- Meeting was set up long ago, before the timeline evolved

- More recently it was restructured

  - science talks / synergy (esp. w/ other KSPs, and SKA precursors)

  - addressed MSSS issues (input to field selection, commissioning)

  - teaching SKSP members to use pipeline software (i.e. BBS)

- Several black-belt astronomers were present, and a series of discussion sessions took place

  - What are the key tasks that need to happen for a successful MSSS?

  - How can the SKSP TWG members participate - *identifying tasks not expected to be immediately addressed by ASTRON*

# BBS tutorials / practice sessions

- Many participants wanted to learn how to use the LOFAR software

- We overloaded the cluster .... sorry Pulsar Group .... :)

- Mainly this was an exercise in working through the cookbook; little emphasis on to-do list items

- However, we took the opportunity to make some progress with ongoing commissioning tasks ...
  - Work began on the "David Rafferty Point Source Field"
  - Model dependence on BBS solutions [Cygnus HBA]
  - Imager tests

**ASTRON**

- Station calibration

- Clock offsets

- The imager(s) ..... affects several other issues:

    - Beam model

    - MFS tuning

- BBS

    - algorithm development primary, but quick testing needed!

    - options: uvrange, loop control (SAS/MAC?)

    - starting model verification

    - A-team in sidelobes

- solution-based flagging: better integration in pipeline, also flag low G

- Separation of clock / ionosphere contributions

- Fringe-finding script as part of online system health info?

- .... and some other issues detailed in coming slides .....
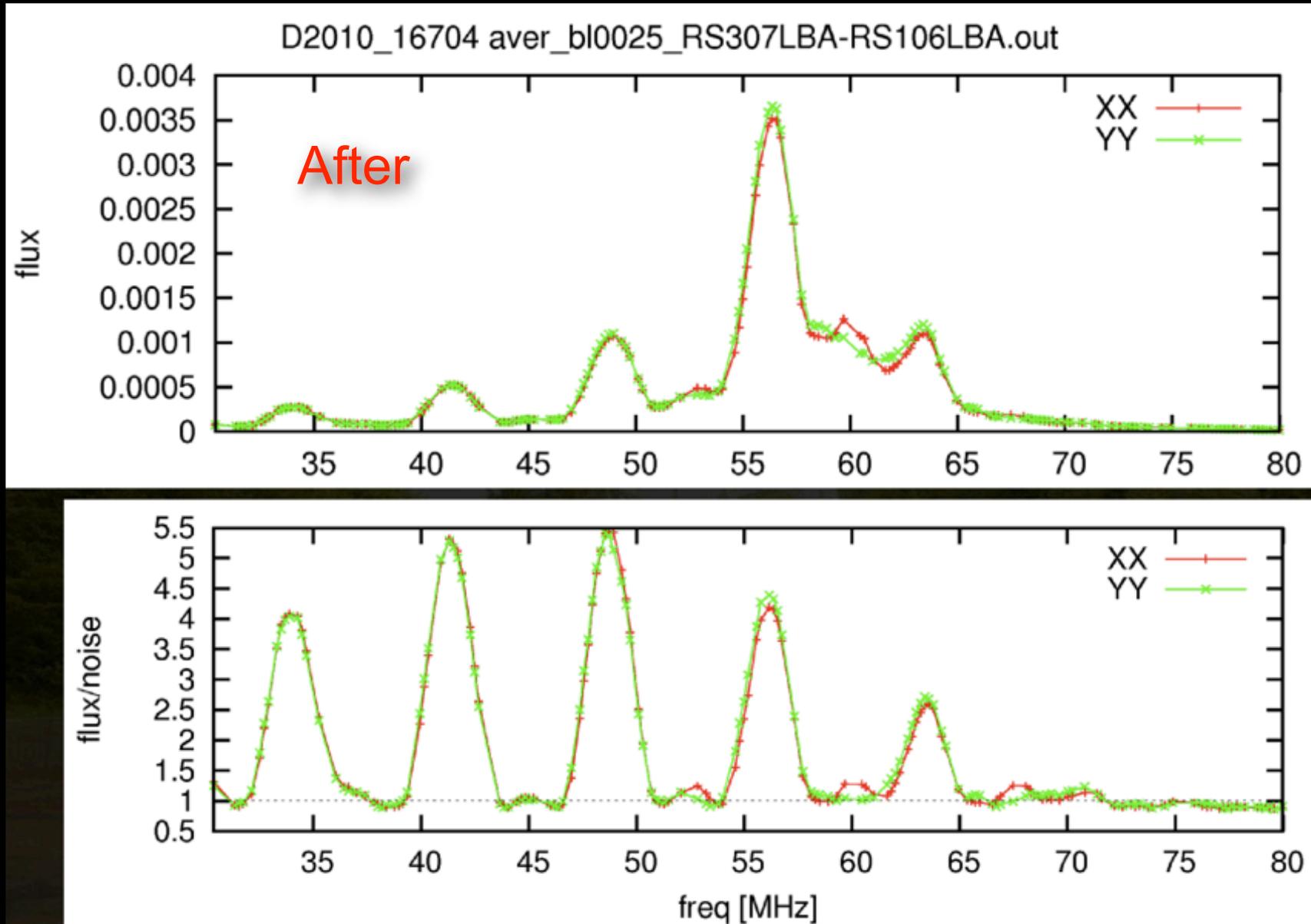
# Commissioning fun …

- Some interesting system bugs have appeared thanks mainly to Olaf Wucknitz's careful analysis of the German baseline data.

  - Amplitude ripples with a 4 MHz period (found via fringe finding)
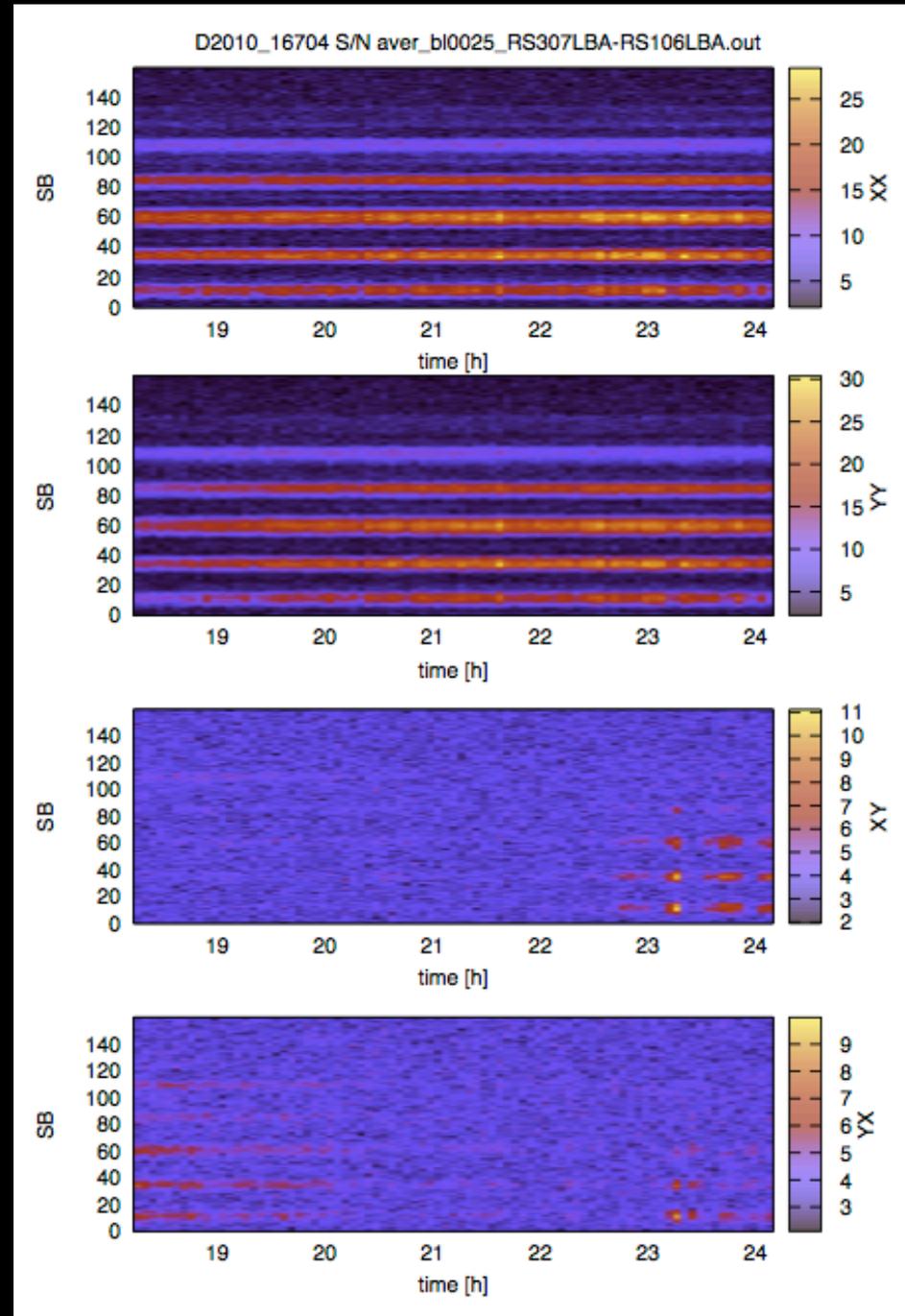
# Amplitude ripple

L2009_14319 aver_bl0006_RS106LBA-RS307LBA.out

Before

*courtesy O. Wucknitz*
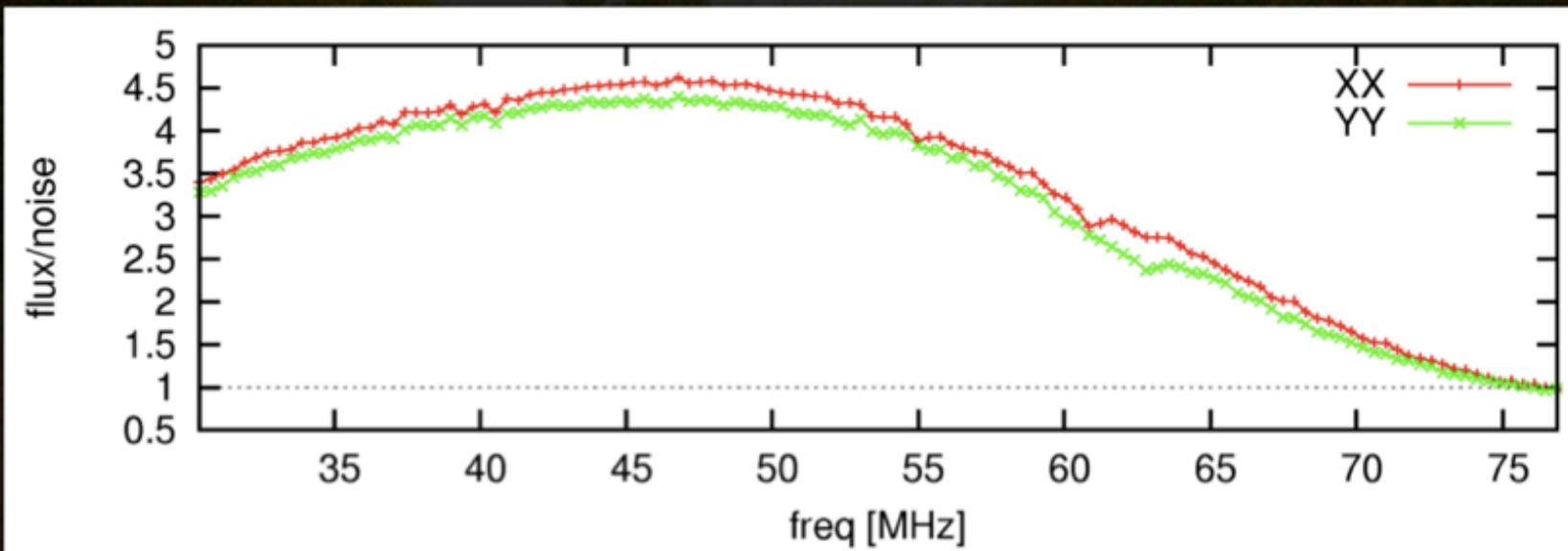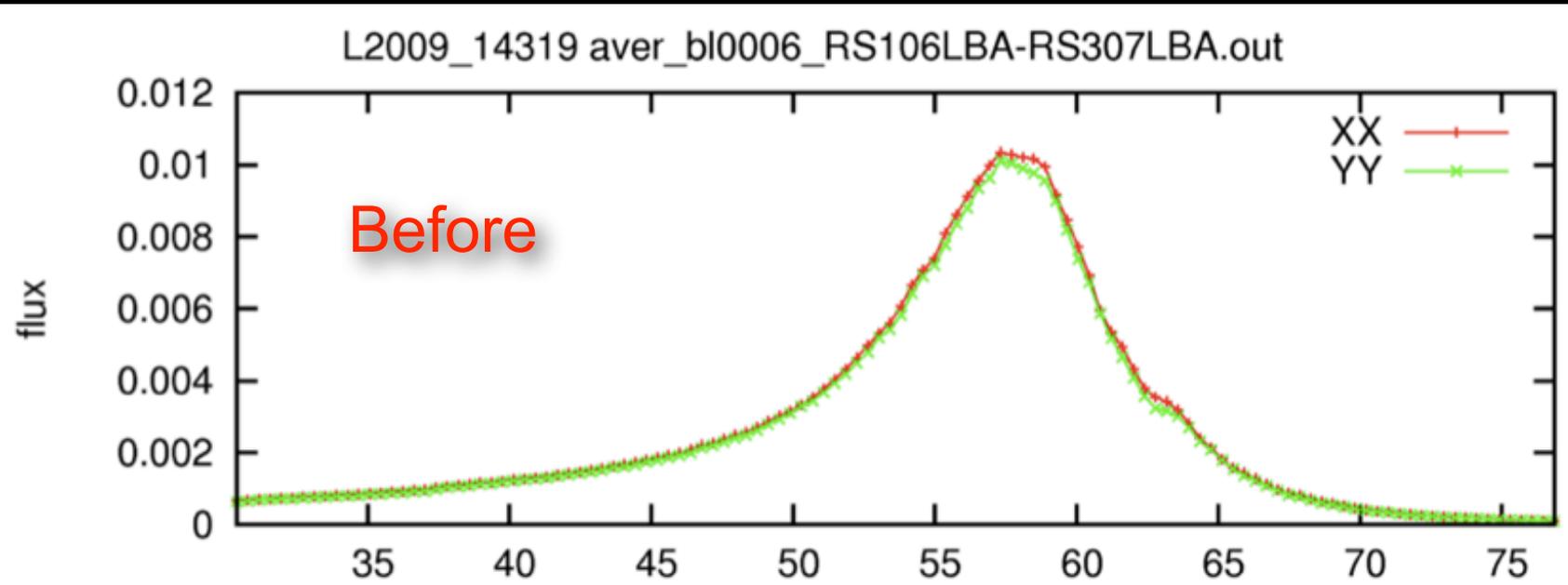
# Amplitude ripple



courtesy O. Wucknitz

# Amplitude ripple vs time

- ~constant with time

- periodic in *frequency*, not SB number

- beamformer?

- correlator?

# Commissioning fun …

- Some interesting system bugs have appeared thanks mainly to Olaf Wucknitz's careful analysis of the German baseline data.

    - Amplitude ripples with a 4 MHz period (found via fringe finding)

    - Clock offsets [Tautenberg thought it was in NL]

# Commissioning fun ...

- Some interesting system bugs have appeared thanks mainly to Olaf Wucknitz's careful analysis of the German baseline data.
    - Amplitude ripples with a 4 MHz period (found via fringe finding)
    - Clock offsets [Tautenberg thought it was in NL]

- Note that we still have the differential Faraday rotation issue
    - rotates unpolarized emission into XY,YX
    - for calibration this must be solved!
    - Joris working on shortening the 'BTU': a Faraday rotation Jones matrix is now implemented in BBS and is being tested

# Long Baselines: A league of their own

"... there's no crying in LOFAR!"

**ASTRON**

- Station layout,
  Tautenberg test observation
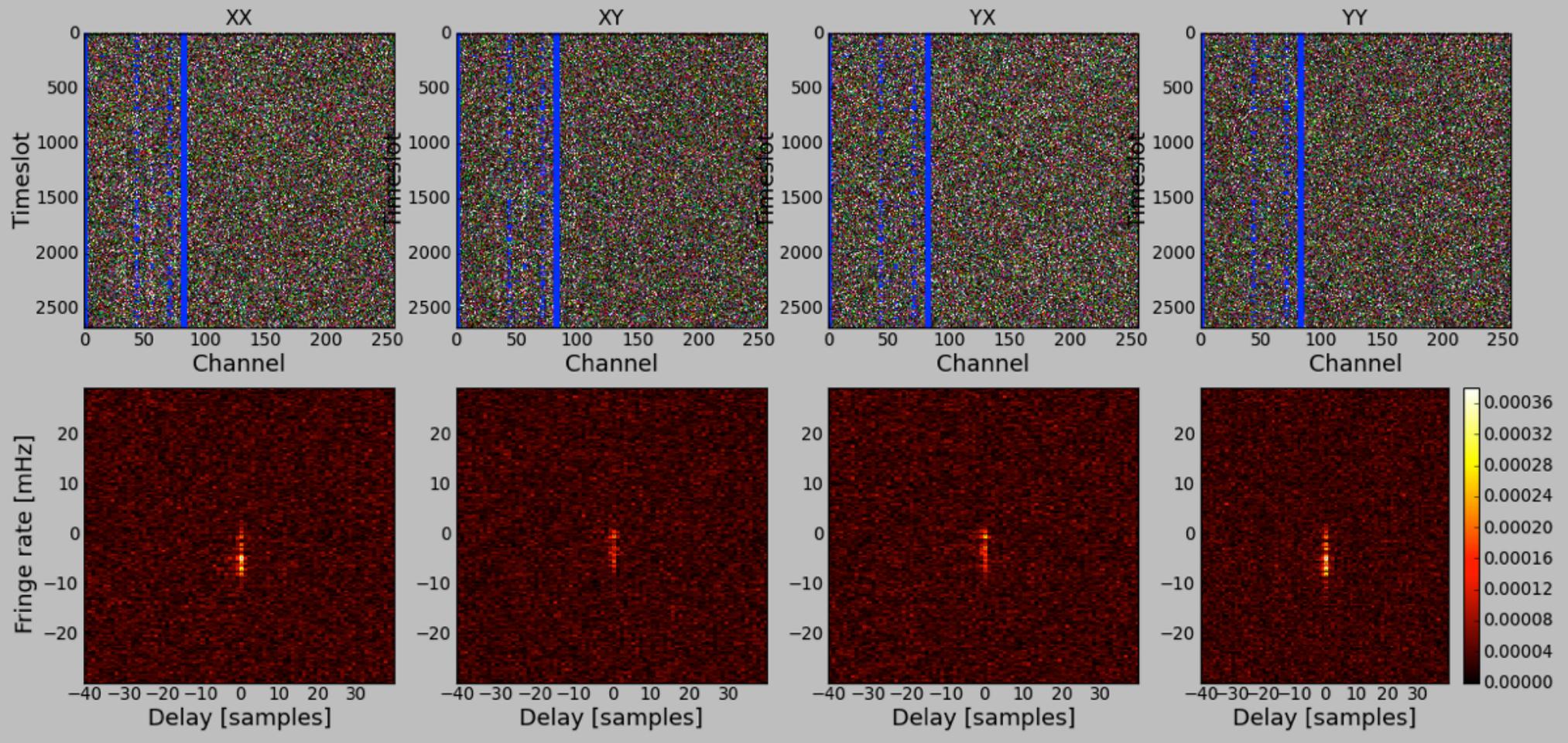  3C196



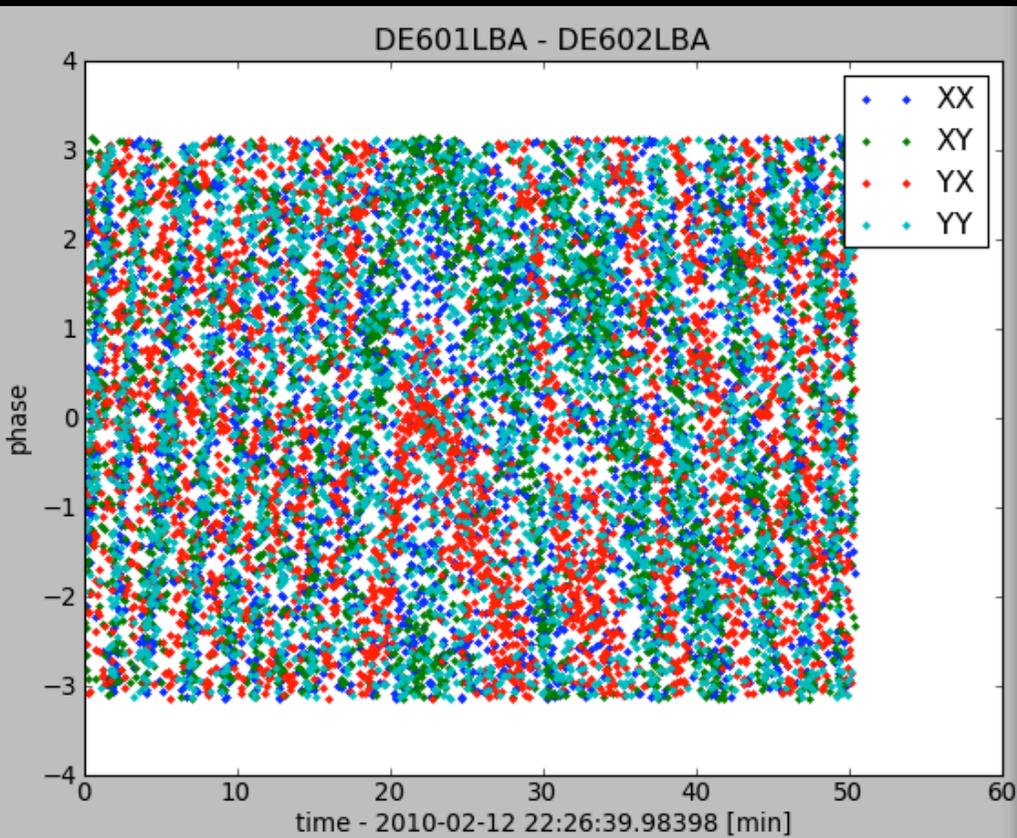Here thar be uv coverage

Tautenberg

Effelsberg

Munich

CS005
RS306
RS106
RS307

# Differential Faraday rotation
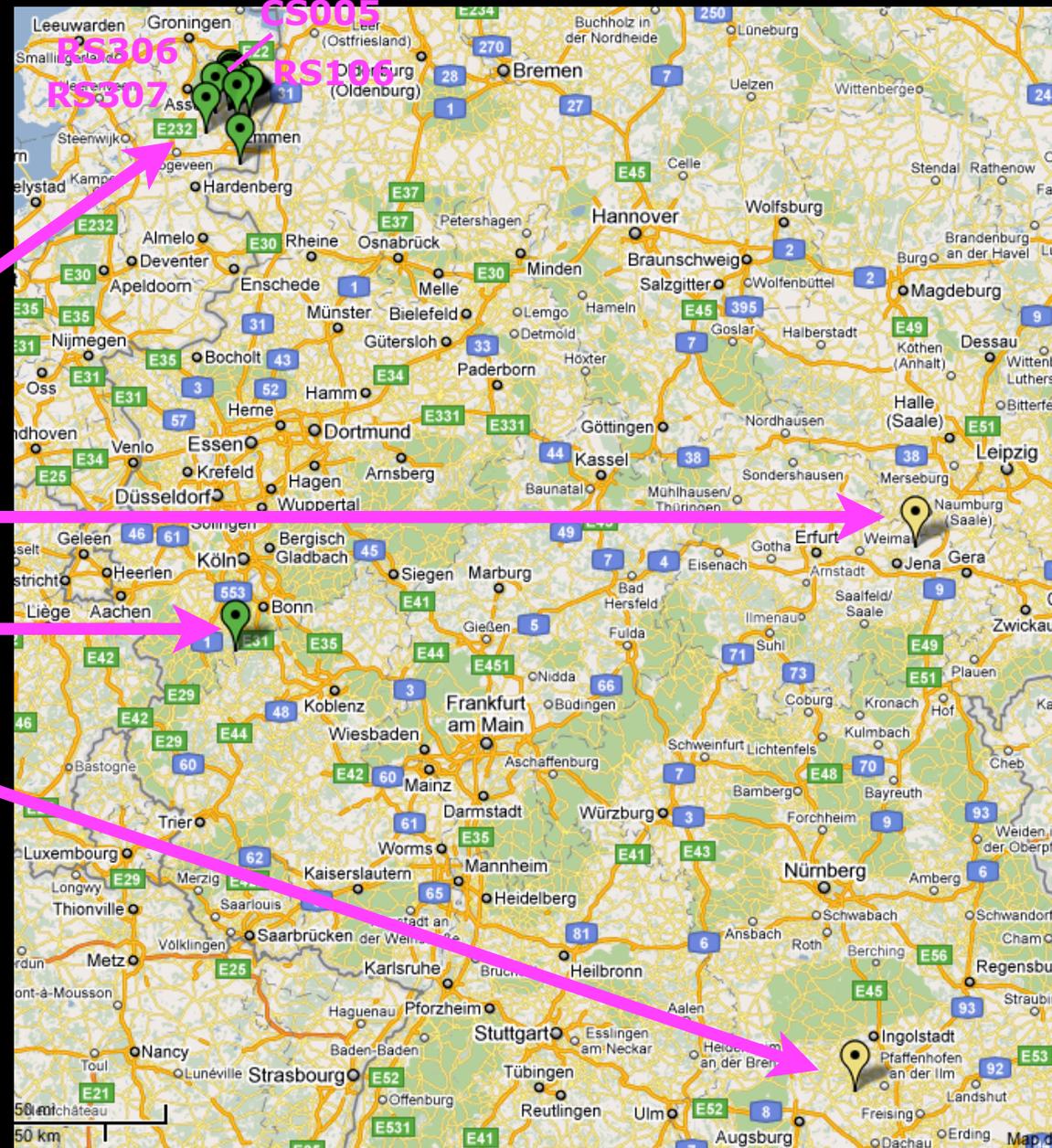
- DE601 (Effelsberg) - DE602 (Garching)



*pyautoplot (Brentjens)*

# Solving blindly for off-diagonal G

**ASTRON**

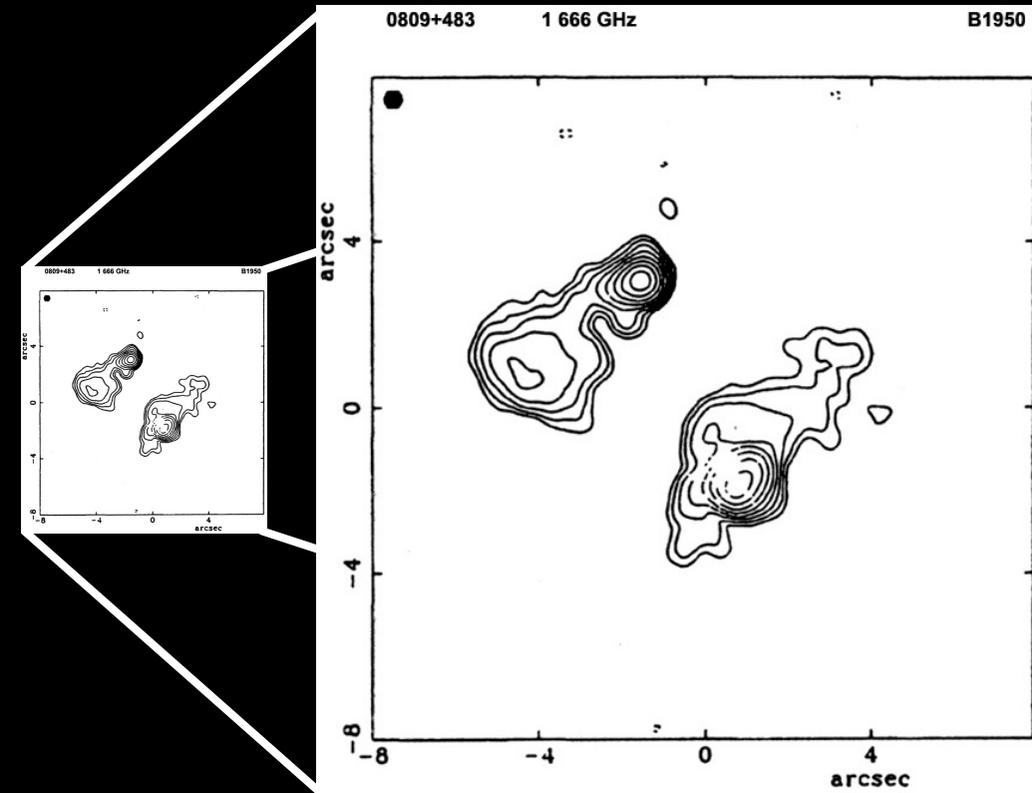- Solutions look ok, and flux moves to XX,YY: but is it physical???
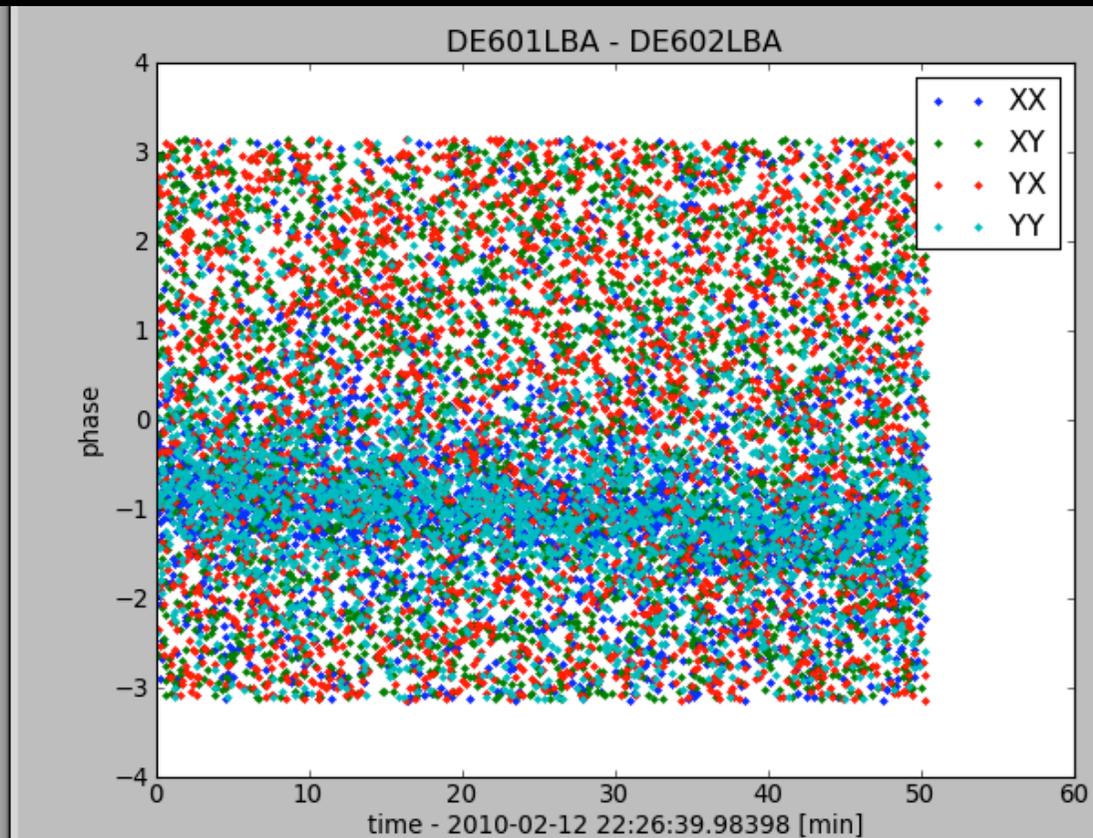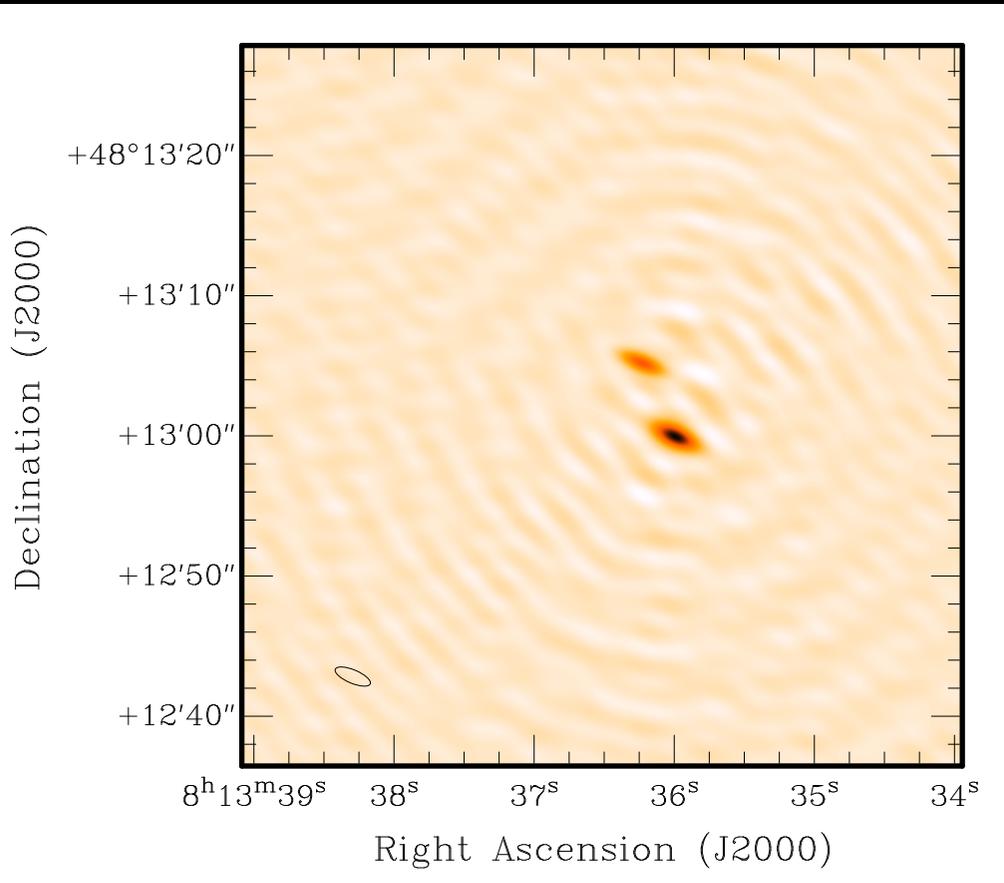


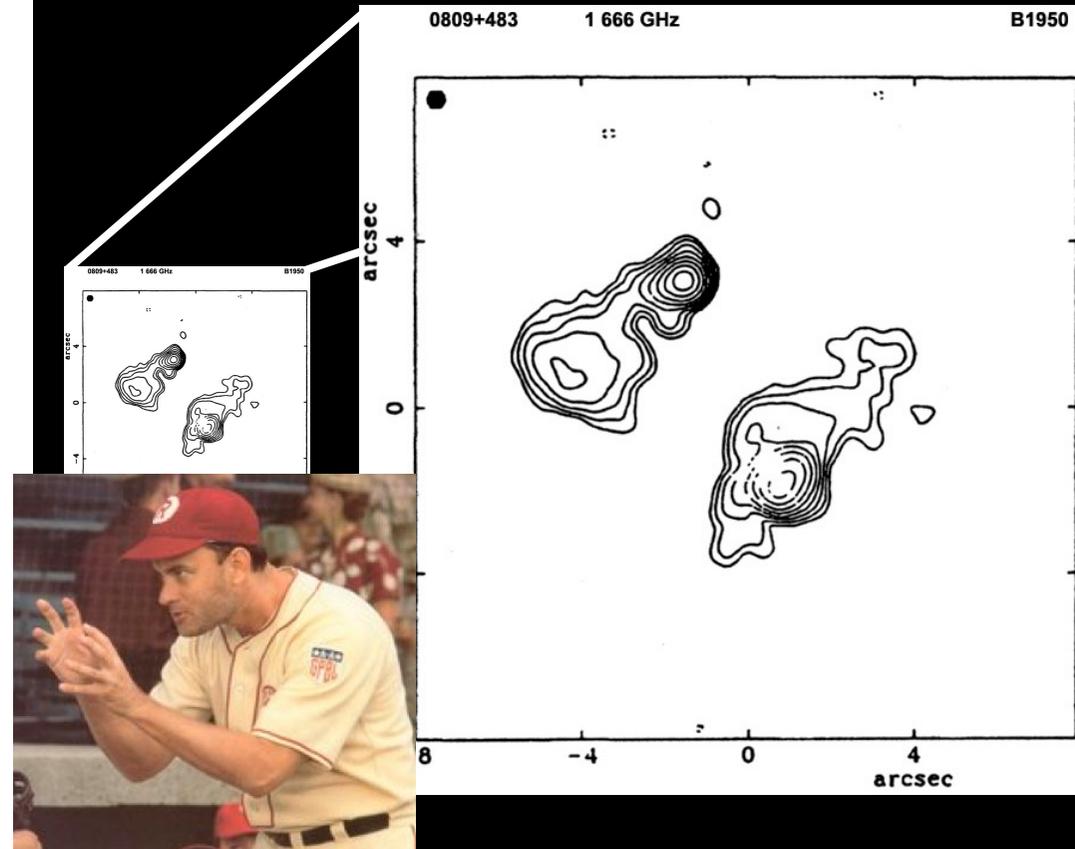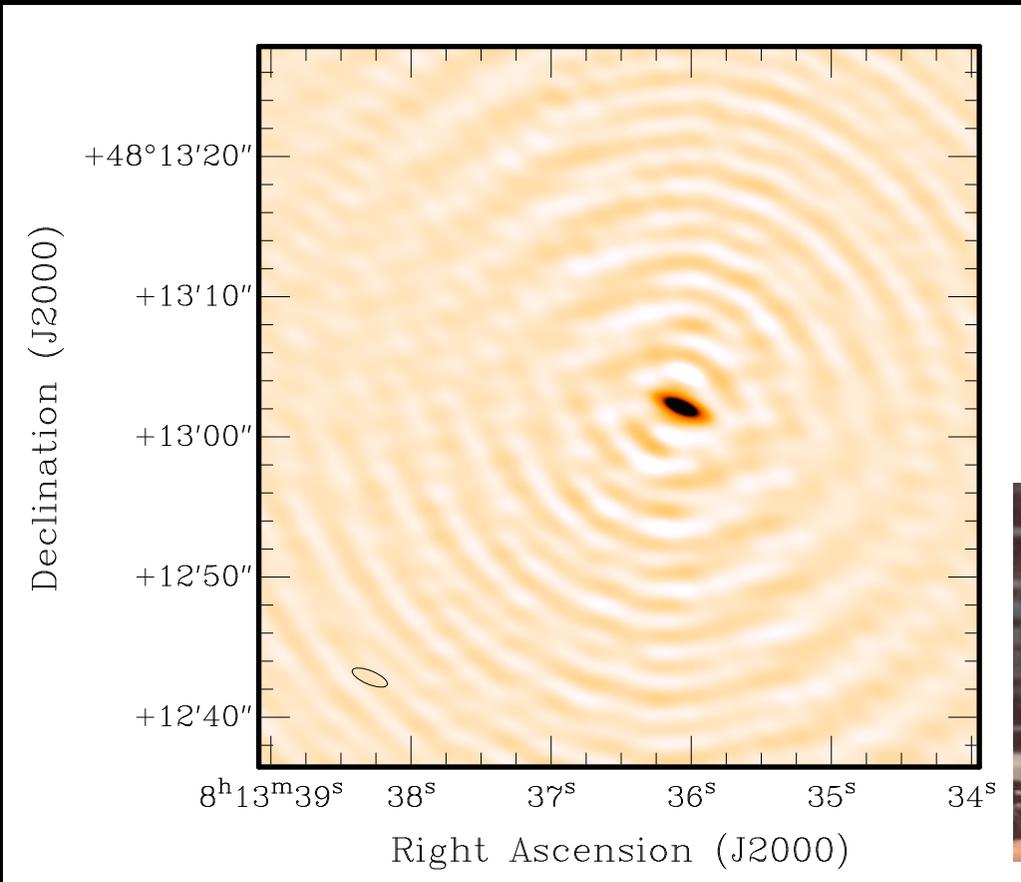DATA                    CORRECTED_DATA

# Image using long baselines

- Beam = 2.7" x 0.96", at 50 MHz = 6m !



**_Note caveats to this image!_**
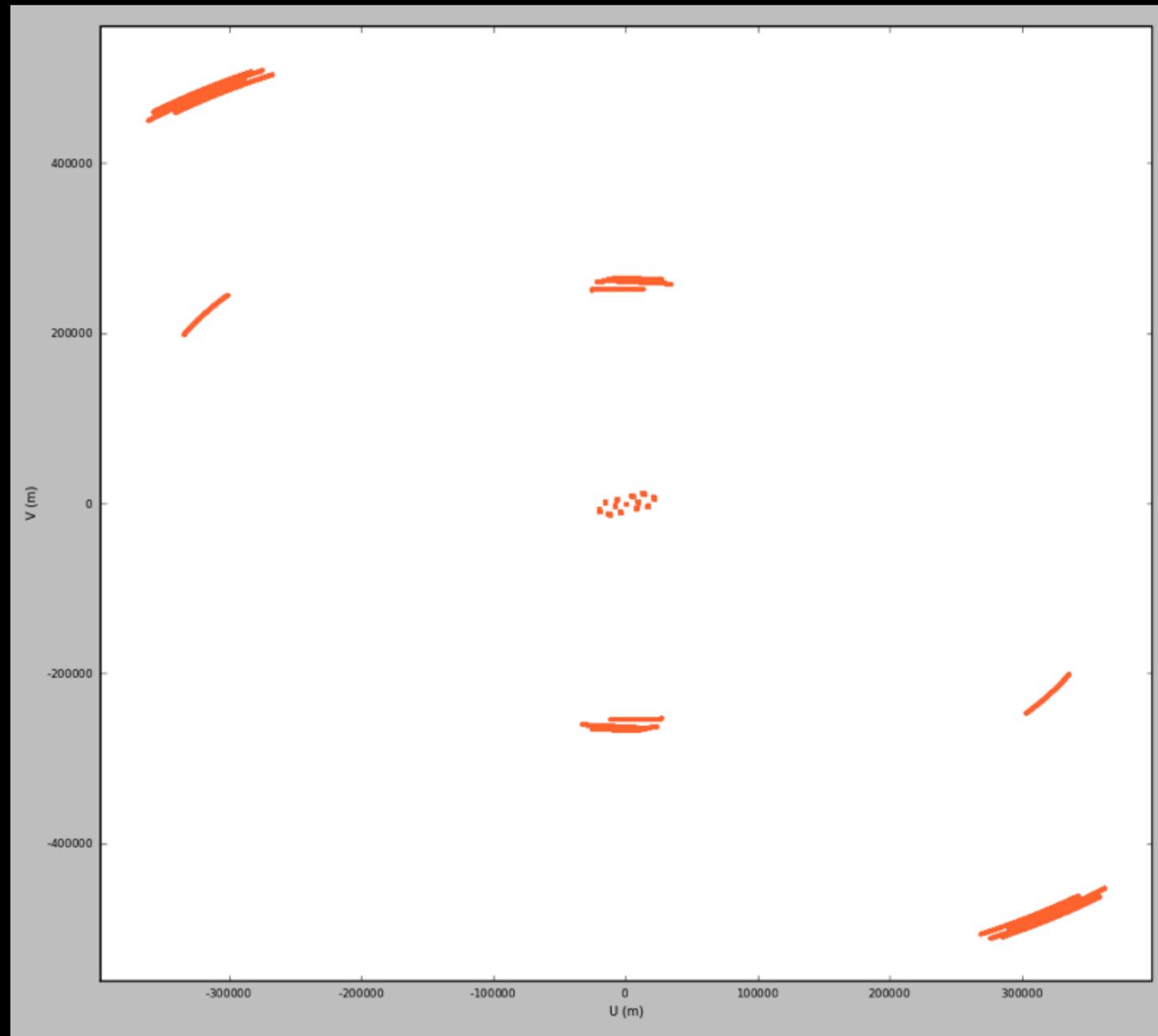
# Image using long baselines

- Beam = 2.7" x 0.96", at 50 MHz = 6m !



***Note caveats to this image!***

# uv coverage

- Tautenberg and RS503 flagged:

# Doing it the right way

- We're currently testing the use of BBS's global solver to obtain a single (ionospheric) RM for each station, using several subbands

- Complications: Amplitude ripples, and the global bandpass

- 3C196 passes through zenith, so beam uncertainties are minimal