CS-1 problems 20080123

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Bug list (solved)

Imaging with LBA dipoles on CS010

- No good images between ≈ 20 and 80 MHz ("The Bug" This talk)

RSP ring on

- Strange oscillations in autocorrelations (understood, being solved)
- Zero phases in all intra-station baselines (understood, being solved)

Coordinates

- Beamformer: stations located at 50 m from earth centre: fixed, not yet rolled out

Bug list (open)

Waveform generator test on CS010

- Somewhat irregular phases
- Sometimes a blocked structure in cross correlation matrix (no idea yet, but we will monitor stations closely in order to catch it when it returns)
- Sometimes CRC errors on RSP ring
- Sometimes signal paths do not start synchronously, resulting in phase differences of $n \times \nu_{\mathrm{clk}}^{-1}$. Can now be detected easily by observers. Workaround: reset RSP board until all is fine.

Bug list (open)

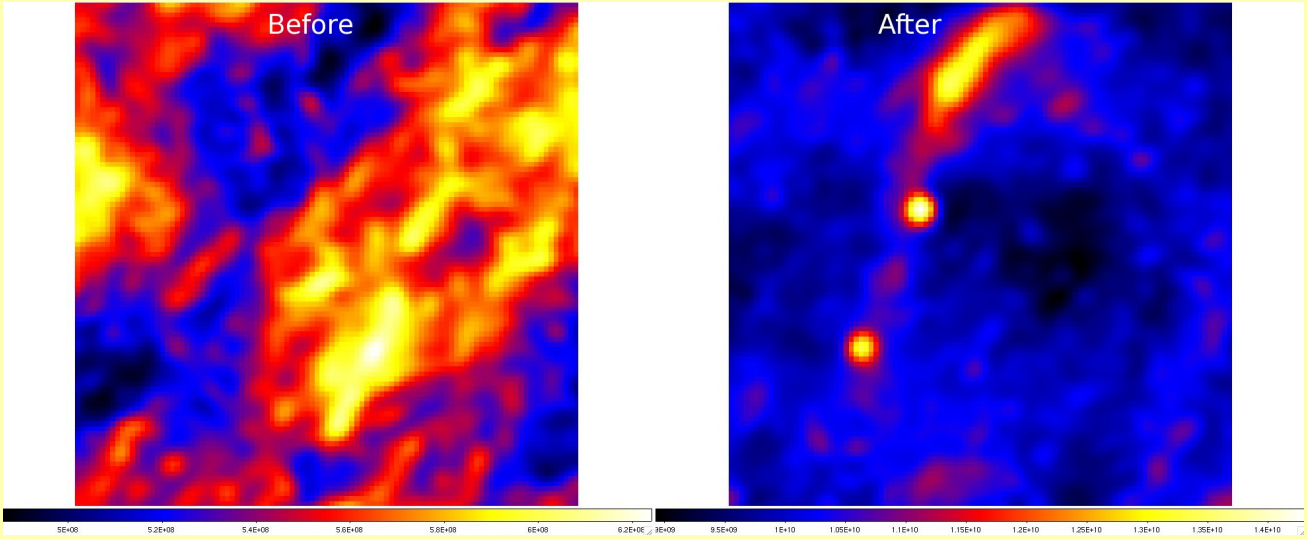
Coordinates

- Stations think that antenna position offsets are in local system with x $\rightarrow$ east and y $\rightarrow$ north, while in reality offsets are in RD (Hans v.d. Marel)

Other

- HBA tracking experiment L2007_04783 not understood
- No pulsar detections with HBA tiles
- No LBA fringes between Exloo and Dwingeloo

SOLVED!


Before
After
5E+08
5.2E+08
5.4E+08
5.6E+08
5.8E+08
6E+08
6.2E+08
9E+09
9.5E+09
1E+10
1.05E+10
1.1E+10
1.15E+10
1.2E+10
1.25E+10
1.3E+10
1.35E+10
1.4E+10

How...

- Menno Norden to field last wednesday
- Power cycled station hardware
- Replaced RCU firmware on all stations
- Spotted electric fences
- First dataset was recorded one hour after that [MOVIE]

Remaining questions

- when was suspect RCU firmware upgrade in 2007?
- what was precise reason of failure?

Next...

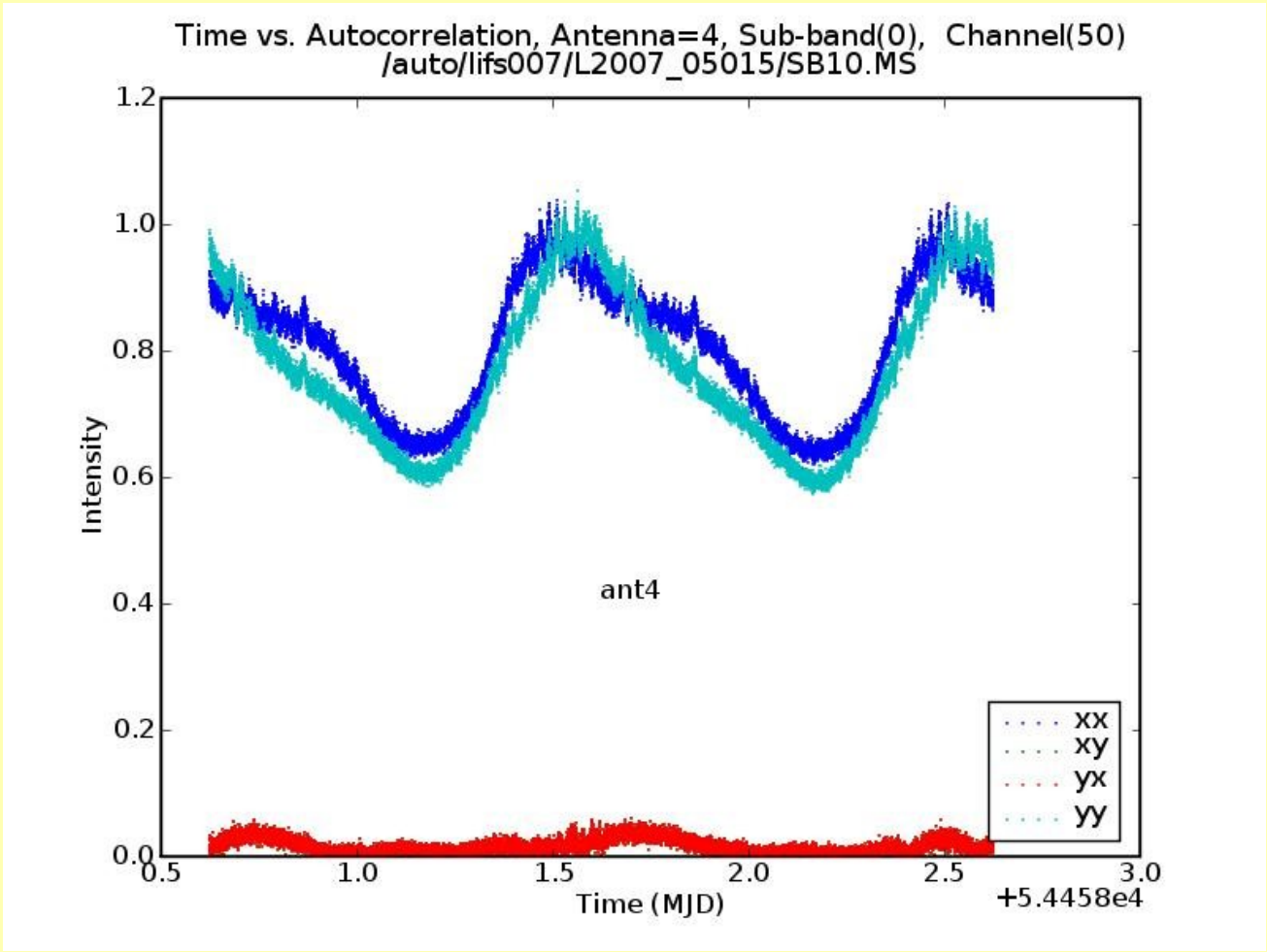
L2007_05015 when ring is ON (CS001, CS008, CS010

- small fringes on top of autocorrelations
- zero phases on baselines within station
- cross correlation amps look like autocorrelations

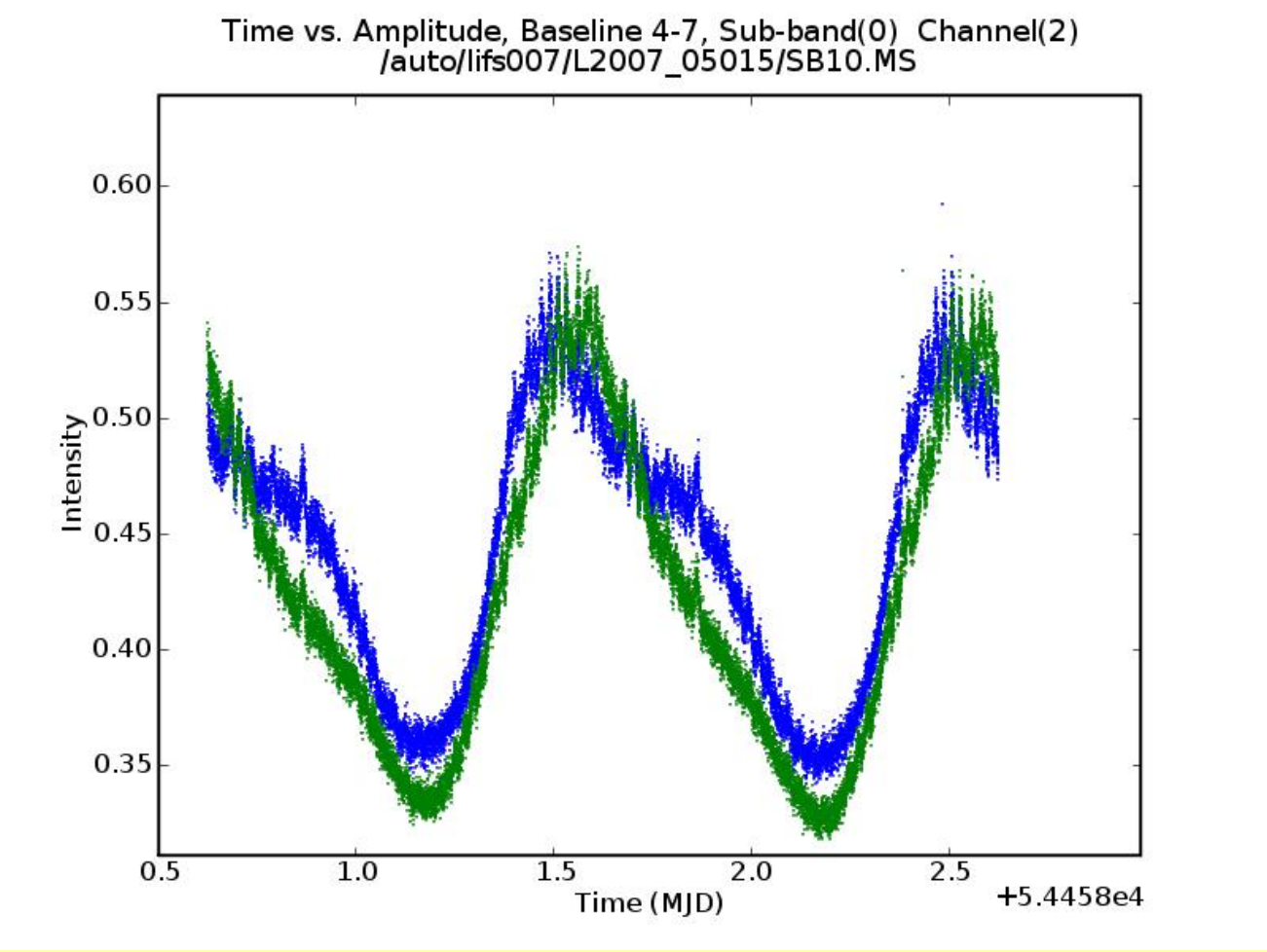
L2007_05015 when ring is OFF (CS016)

- no apparent problems

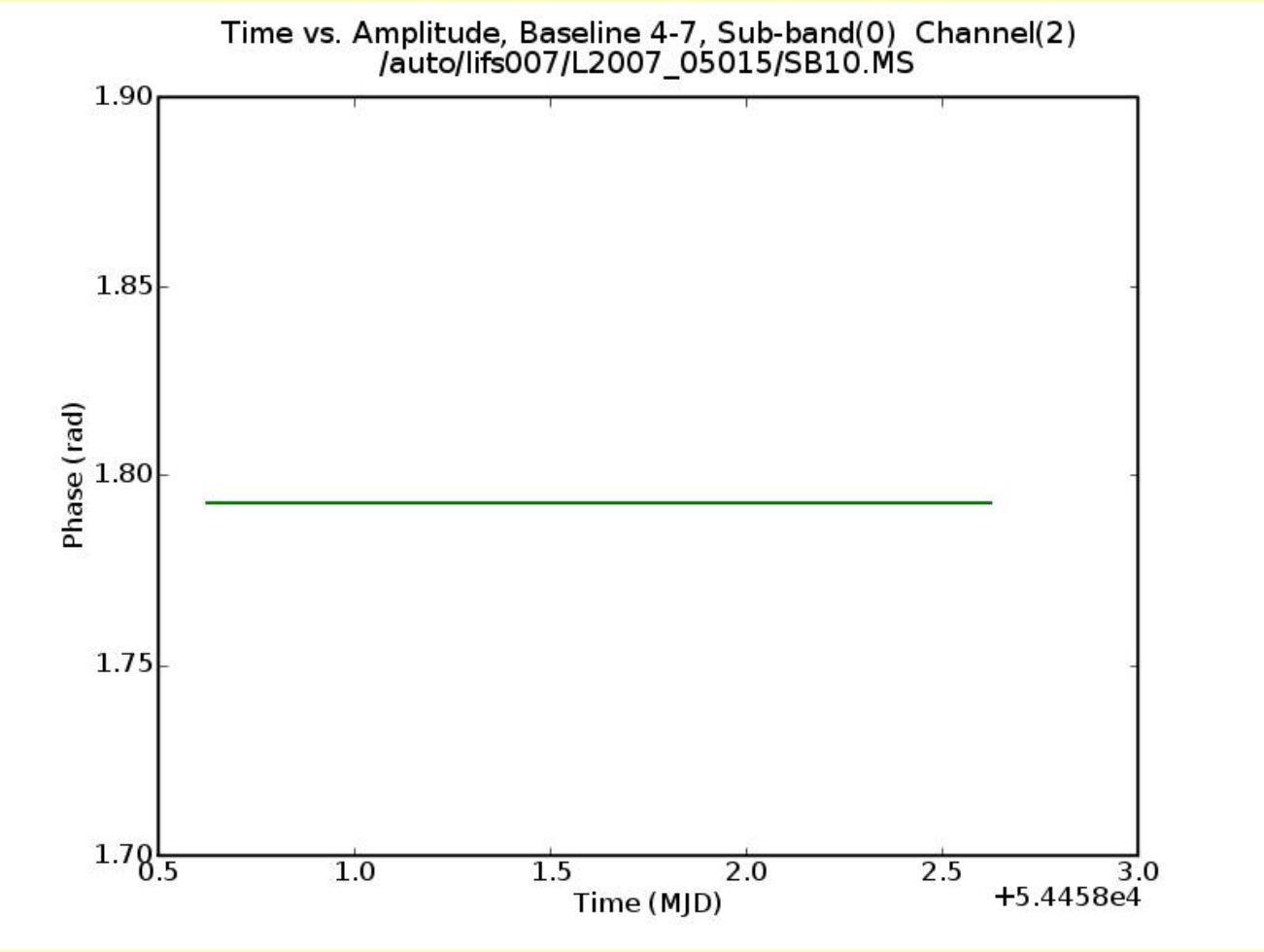
Autocorrelations CS001:0



Visibility amp CS001:0–12



Visibility phase CS001:0–12



Cause (found by Eric Kooistra)

- Beamforming weights are not changed when calling beamctl –rcus=4:5 –beamlets=0:10 –subbands=300:310 –array=LBA –direction=0,0,LOFAR_LMN
- When ring on: each RSP board sees all antennae ⇒ all antennae are summed
- Consequence: all four micro-stations have IDENTICAL output, consisting of sum of all dipoles on the station.
- When ring off AND only four HBAs are used: only one available signal per RSP board ⇒ all is fine

How to proceed

- Workaround: set weights explicitly: being implemented by Pieter Donker
- Once workaround is implemented: resume commissioning observations
- Final solution in tracing transfer of beamctl options to BeamServer, and RSPDriver (Pieter Donker)
- Roll out all fixes to stations

Feature request

- Let GNUPlot windows from rspctl include hostname in caption of plot.

Next bug

- HBA tracking