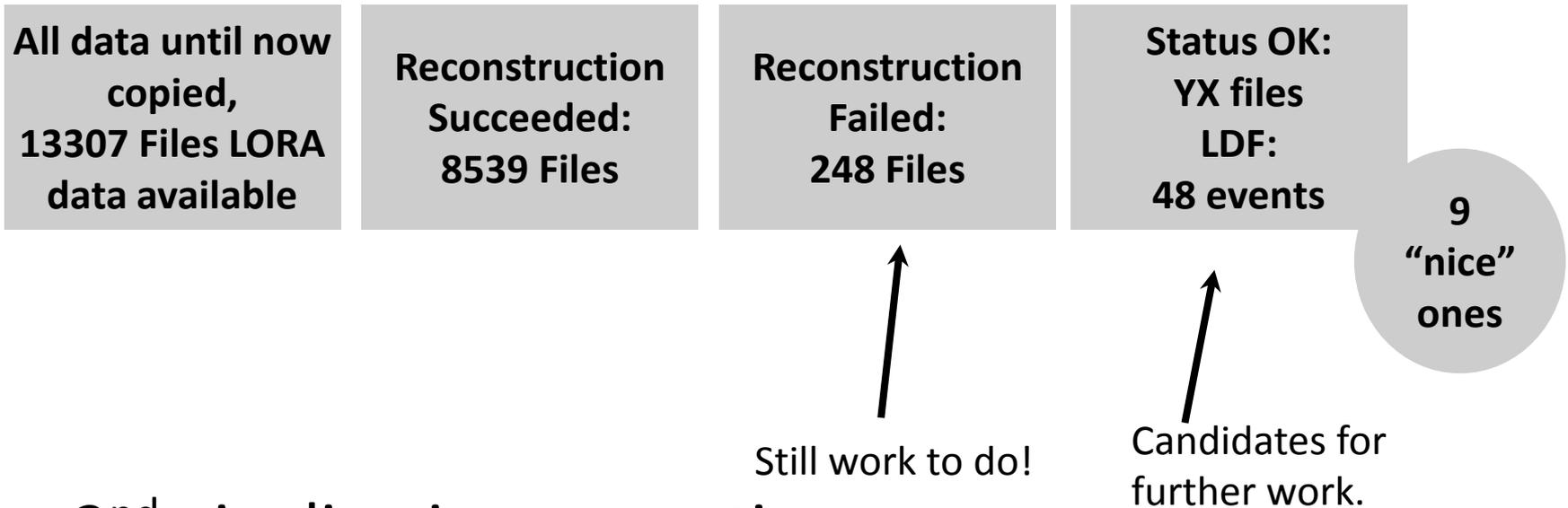


TBB busy week results

M. van den Akker, A. Corstanje, E. Enriquez,
W. Frieswijk, M. Mevius, A. Nelles, P. Schellart, S.ter Veen
+ support from P. Donker, M. Norden, A. v. Amesfoort, J.D.
Mol, A. de Jong, N. Vermaas, H. Holties en many others

VHECR

- Pipeline updated:
 - Include calibration tables



- 2nd pipeline in preparation:
 - Combines data of different polarizations
 - Include beam model
- Successfully copied data via LTA

Cable delay fitting

- Use RFI signals (planes) in TBB data
 - Pulse arrival times are used to infer direction
 - After best-fitting direction has been found, residual delays remain (calibration + 'noise')
- Use cross-correlations to get accurate time differences
- Find direction of source (plane wave)

- (Remove delay outliers, iterate...)
- Time delays per antenna can be *defined* as:

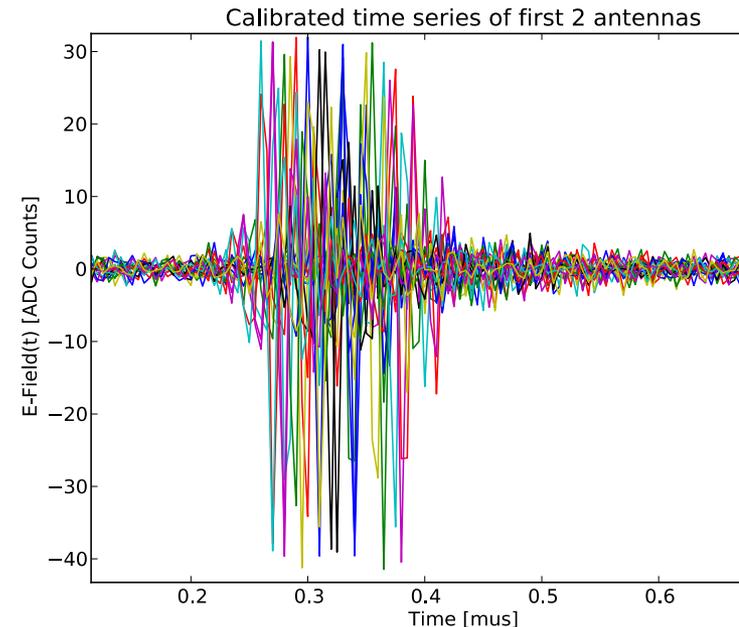
$$t_i = Ax_i + By_i + n_i + C_i$$

(A, B) = direction; n = noise; C = calibration delay

Plane-wave fit gives:

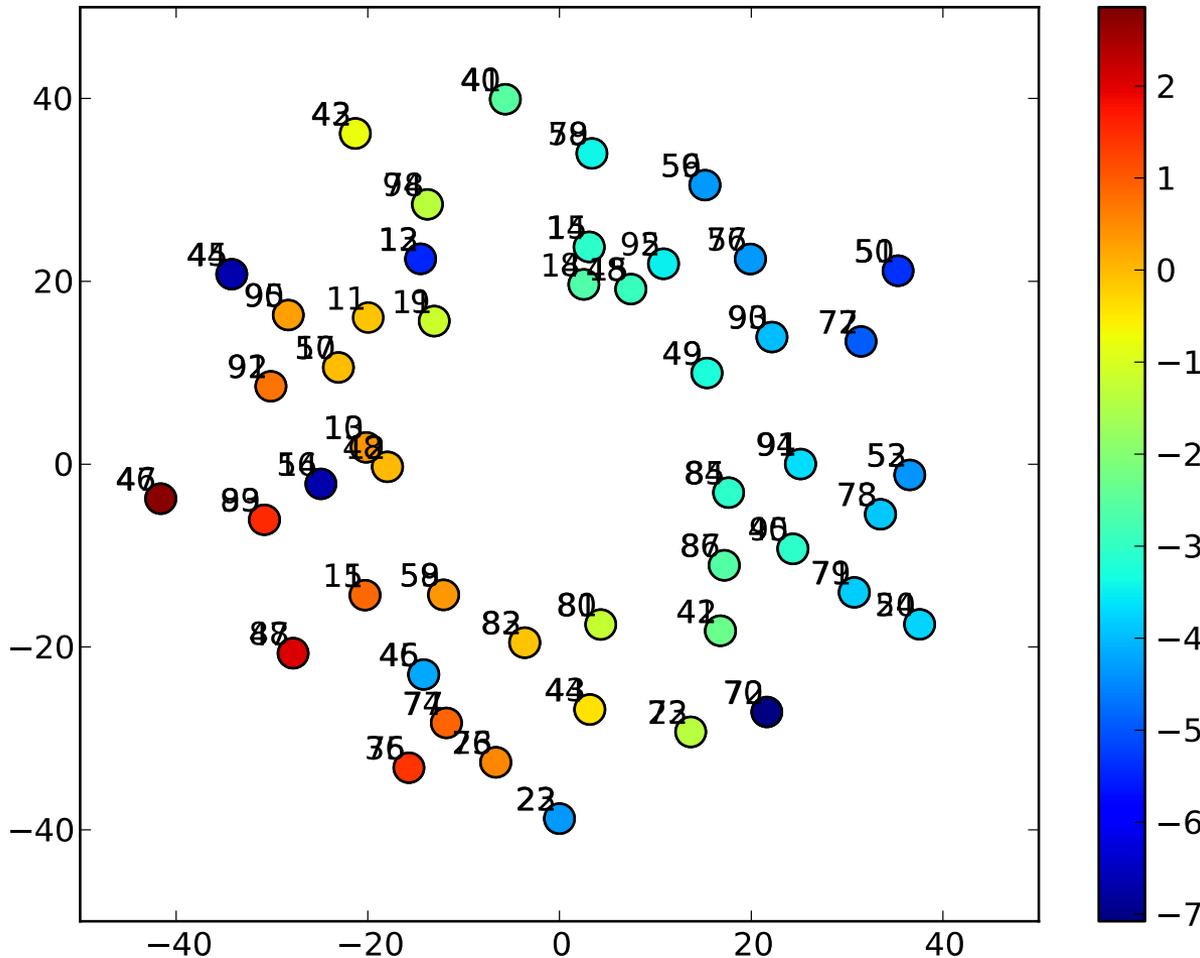
$$t_i = \hat{A}x_i + \hat{B}y_i + R_i$$

- Pulse from zenith: (A, B) = 0 → **systematic direction offset!**
- Residuals give C_i up to a plane-wave component
 - **Degeneracy** between delay calibration and direction finding



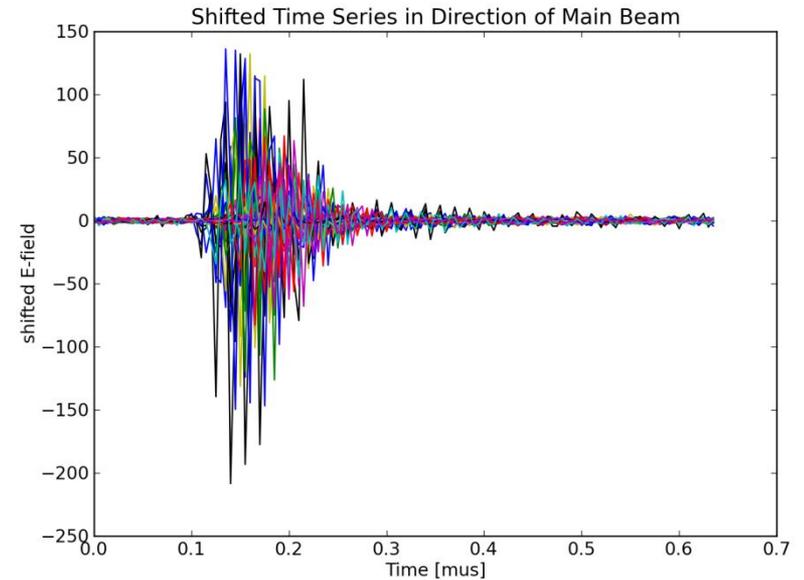
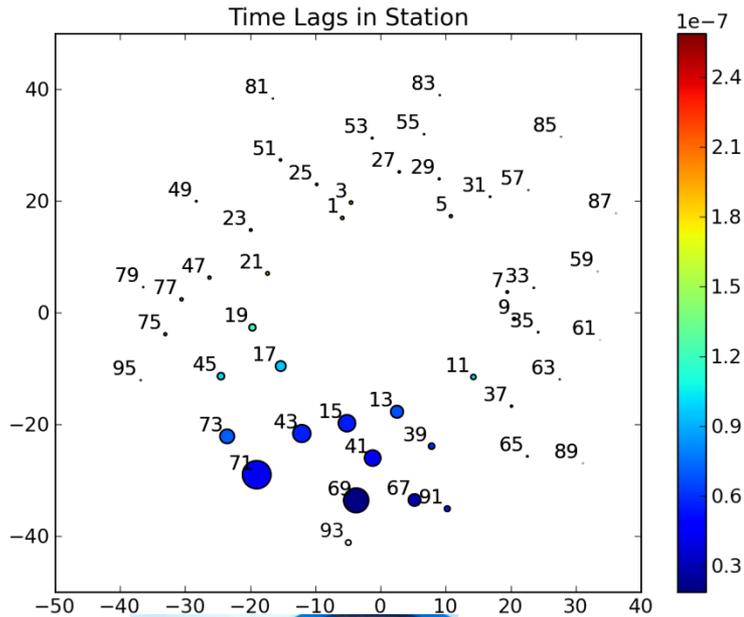
CS002: systematic differences

Difference between fitted delays and LOFAR Caltables
Station CS002



- Linear trend visible
- Plane-wave component
- Requires known source to fix direction!

Self Trigger



Triggered on artificial pulse by Menno
Adjusted default templates (can be set by observer)
Collected 15000 self triggered events (still being analyzed)
used for:
cable delay fitting
improving self trigger algorithm
(reject pulses from planes)

FRATS

- Updated trigger algorithm:

Works with new data format, coherent and incoherent beams.

Should also work with LBA data, but no pulse detected so far

Working on:

Speed (more DMs, record 225 over full bandwidth without triggers.)

RFI mitigation

Able to obtain TBB data. But need to merge script with VHECR script.

Parallel data taking:

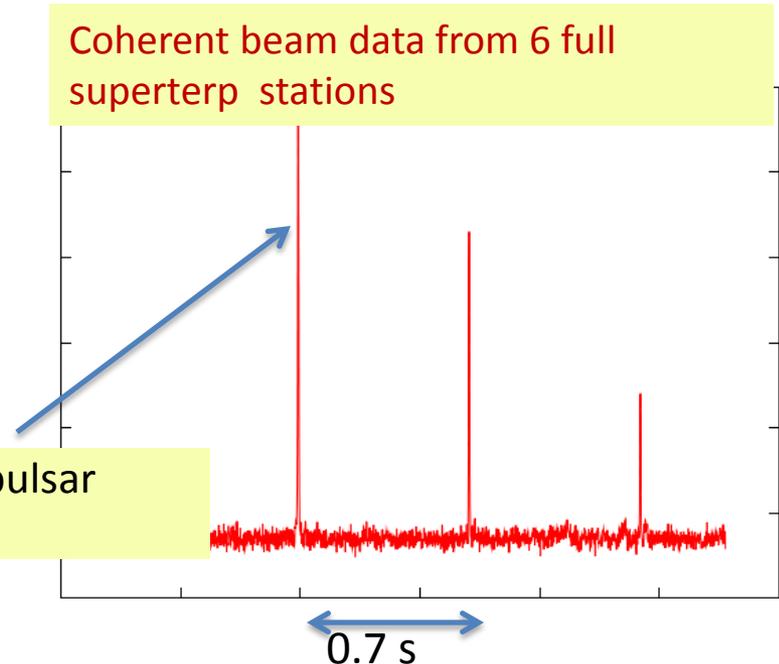
Needs 1 dedicated locus node per beam (i.e. 3 nodes for MSSS observations) to run the trigger algorithm

Tests:

MSSS + BF showed no data loss

MSSS + BF + Large TBB dumps, to be tested

2 dumps from pulsar
B0329+54

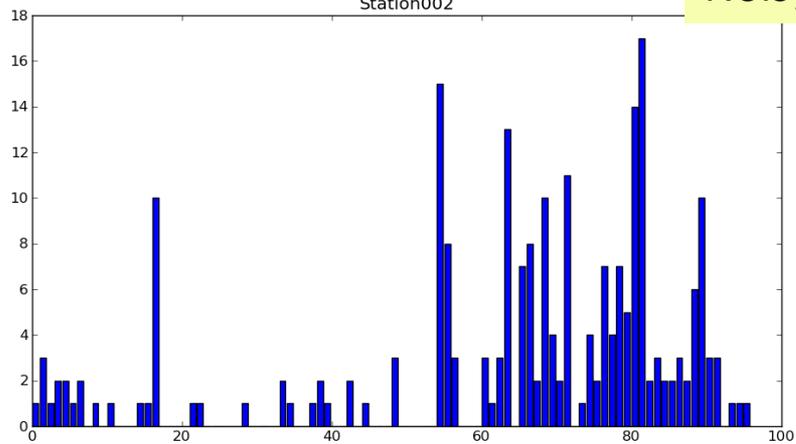


TBB timeseries HBA

Check if noise pulses always visible in data from same RCU

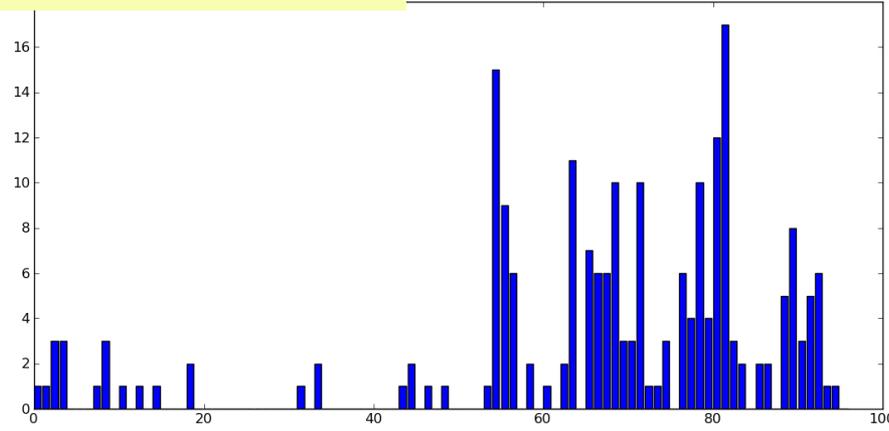
Noisy RCUs, 20 events, CS002

Station002



1st half (no LORA)

Station002



2nd half (after LORA trigger)