TBB busy week

Status and plans

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

Topics

- VHECR
  - LORA triggered
    - Analysis pipeline
  - Self triggered
- UHEP
  - Investigate transient noise (HBA)
- FRATS
  - Online trigger
  - Offline analysis/reduction software
- System tests:
  - Data writing
  - Piggyback load tests
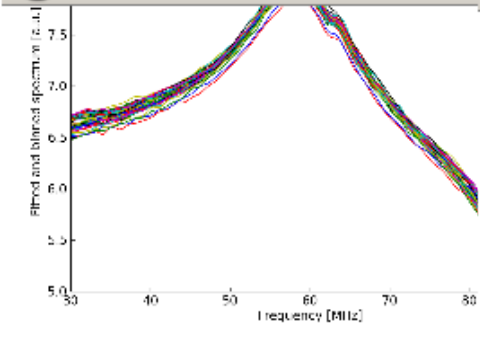 - …

VHECR LORA pipeline

- Standalone and piggy backing mode observations running (almost) automatically

    Data stored in Nijmegen
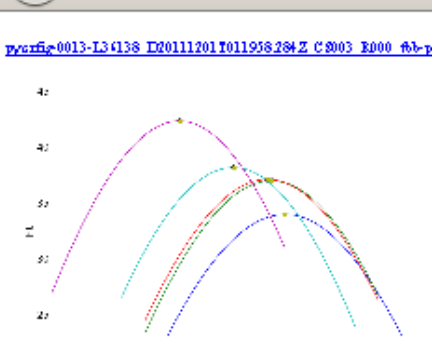
- First semi-automatic analysis pipeline running

<div style="border:1px solid black; background:#f5f0c0;">

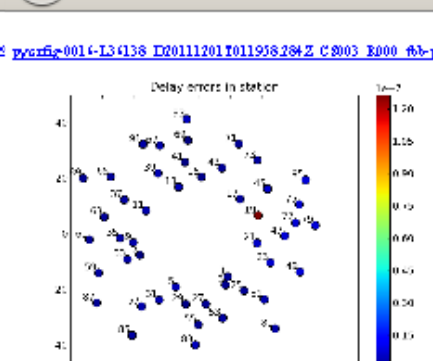Every station and polarisation is treated separately at the moment
- Check data (trigger in time, antenna set)
- FFT-> fit frequency spectrum of all data excluding region of expected pulse
- Use fitted spectrum to flatten the antenna response
            (assuming galactic noise only)
    - Removes RFI lines
- Find maximum pulse in timeseries of all antennas – within 25 μs time window defined by LORA
- Fit direction + cable delays (will be fixed at some point) starting from LORA direction
- Form beam in fitted direction
- Check S/N of beamformed pulse : assign quality flag to event
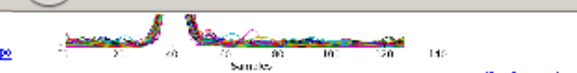- Produce website with summary plots

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altair.astro.ru.nl/private/data/VHE... altair.astro.ru.nl/private/dat... altair.astro.ru.nl/private/da... altair.astro.ru.nl/private/data/LORA

pycrfig-0004-L36138_D20111201T011958.284Z_CS0...

Log of Fitted spectra divided by average of (log of) all...

pycrfig-0005-L36138_D20111201T011958.284Z_CS0...

http://altair.astro.ru.nl/private/data/VHECR/LORAtrigg...

pycrfig-0013-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...

Position of Beams during Direction Fitting (Spherical C...

pycrfig-0015-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...

Fitted cable delays

pycrfig-0016-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...

Delay errors in station
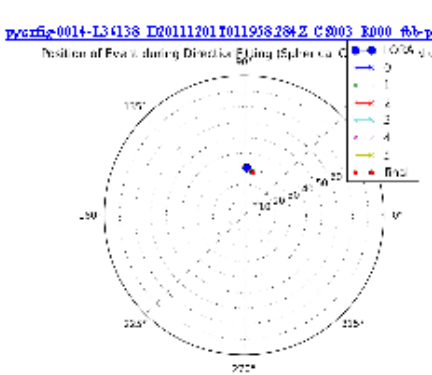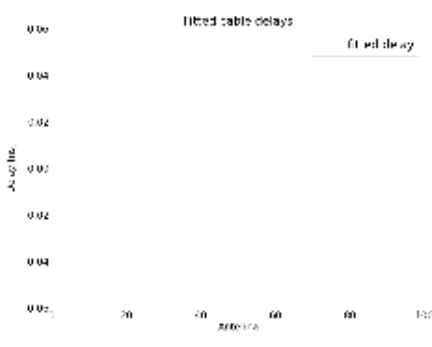
pycrfig-0014-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...

Delay errors in station

pycrfig-0017-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...

Shifted Time Series in Direction of Main Beam

pycrfig-0018-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...
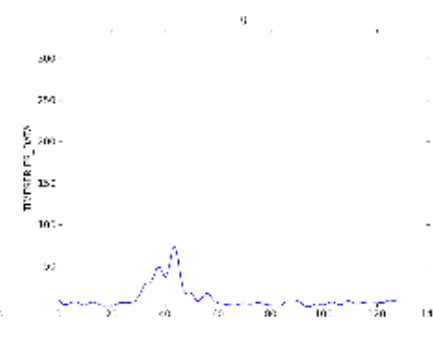
pycrfig-0019-L36138_D20111201T011958.284Z_CS003_R000_fbb-po...

absEField corrected for delays in beam direction per antenna

pycrfig-0020-L36138_D20111201T011958.284Z_CS003_R000_fbb-poll-puls-beamform...

Beamformed Time Series

(back to top)
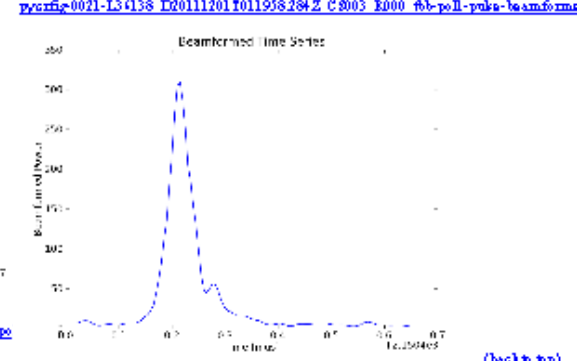
pycrfig-0021-L36138_D20111201T011958.284Z_CS003_R000_fbb-poll-puls-beamform...

Beamformed Time Series

(back to top)
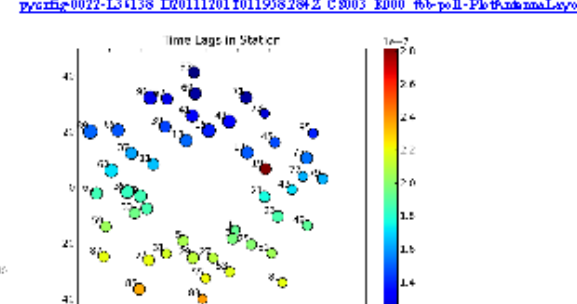
pycrfig-0022-L36138_D20111201T011958.284Z_CS003_R000_fbb-poll-PlotAntennaLayo...

Time Lags in Station

(back to top)

VHECR LORA triggered data

All current events have been analysed
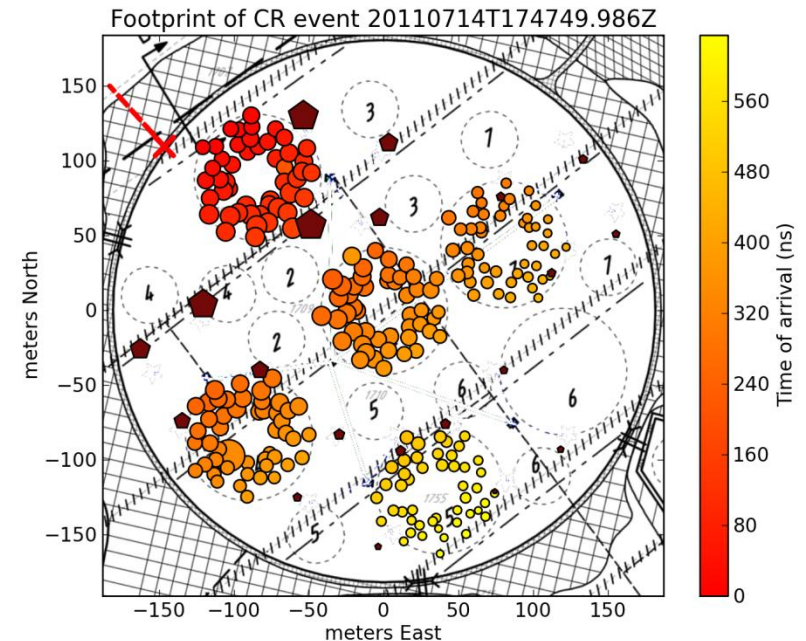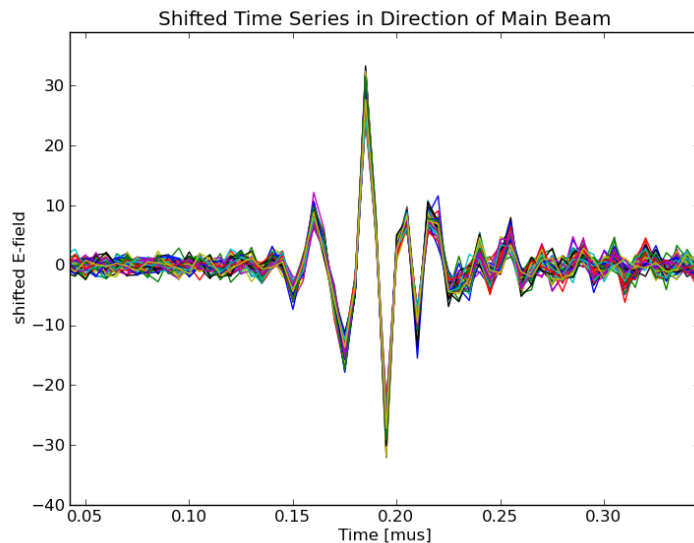
40 "good" events:

    Visible pulse in timeseries data of antennas of at least 2 stations

Best event:

    Good LORA information

    "nice" angle: same direction for all superterp stations

   Visible in all available (5) superterp stations

Shifted Time Series in Direction of Main Beam


Footprint of CR event 20110714T174749.986Z

VHECR Plans

- LORA Triggered data:
  - create database that contains all events + information from pipeline processing + links to plots
  - Cable delay fitting (see talk by Arthur)
  - dipole beam implementation (needs both polarisations analysed together)
  - Full event plots (combining information of all stations/polarisations) : LDF + footprints
- Self trigger:
  - Test different parameters of self trigger algorithm
    - Suppress noise triggers
 - Define set of default templates

UHEP mode

- Investigate background pulses in raw HBA beamformed data
  - Many noise pulses from single station
- Check HBA tile data from LORA events
  - First events observed in CS002 HBA0-HBA1
    - NOT in CS004 ??
  - Very noisy raw data after removing pager signal
- PLAN: investigate noise of single tiles
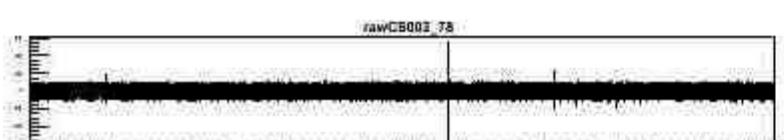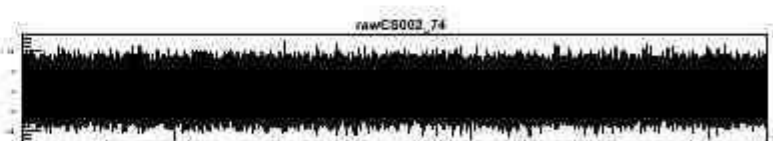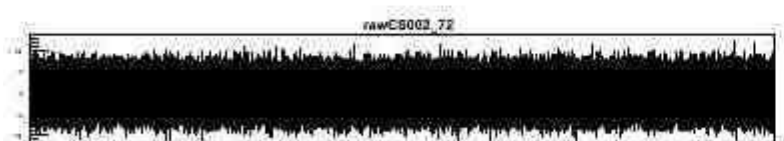- Find pulses in TAM
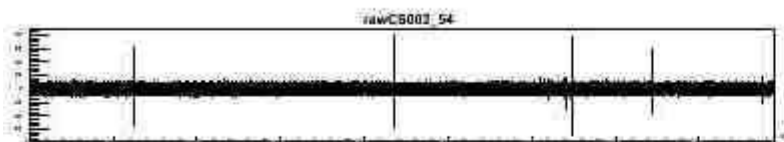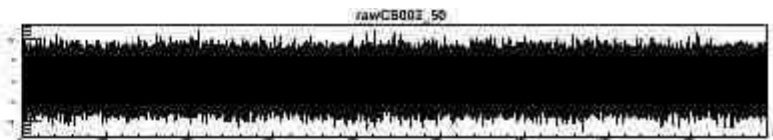- Determine noise level for trigger
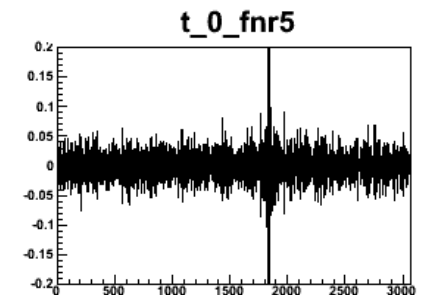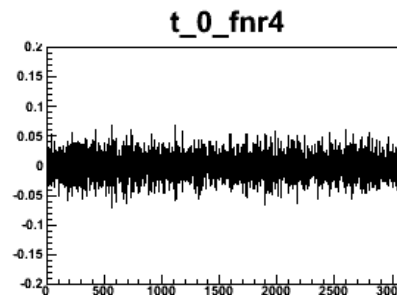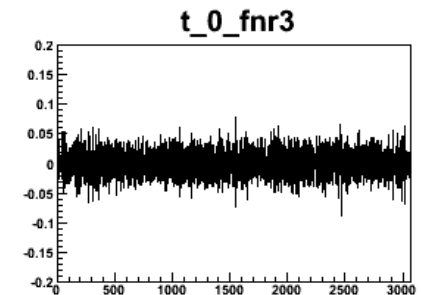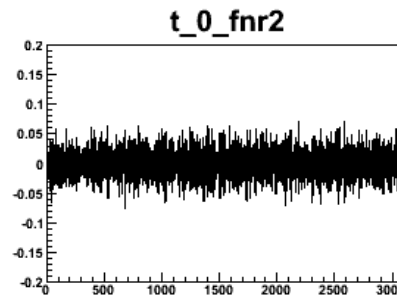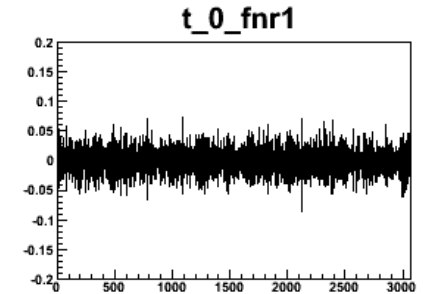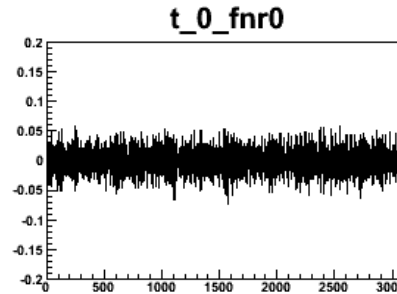
Timeseries of 6 supterterp stations (HBA0)

LORA triggered event, direction of cosmic ray within 30 degrees of tile beam direction

Timeseries of HBA data of CS002 RCU 0-20 (even)
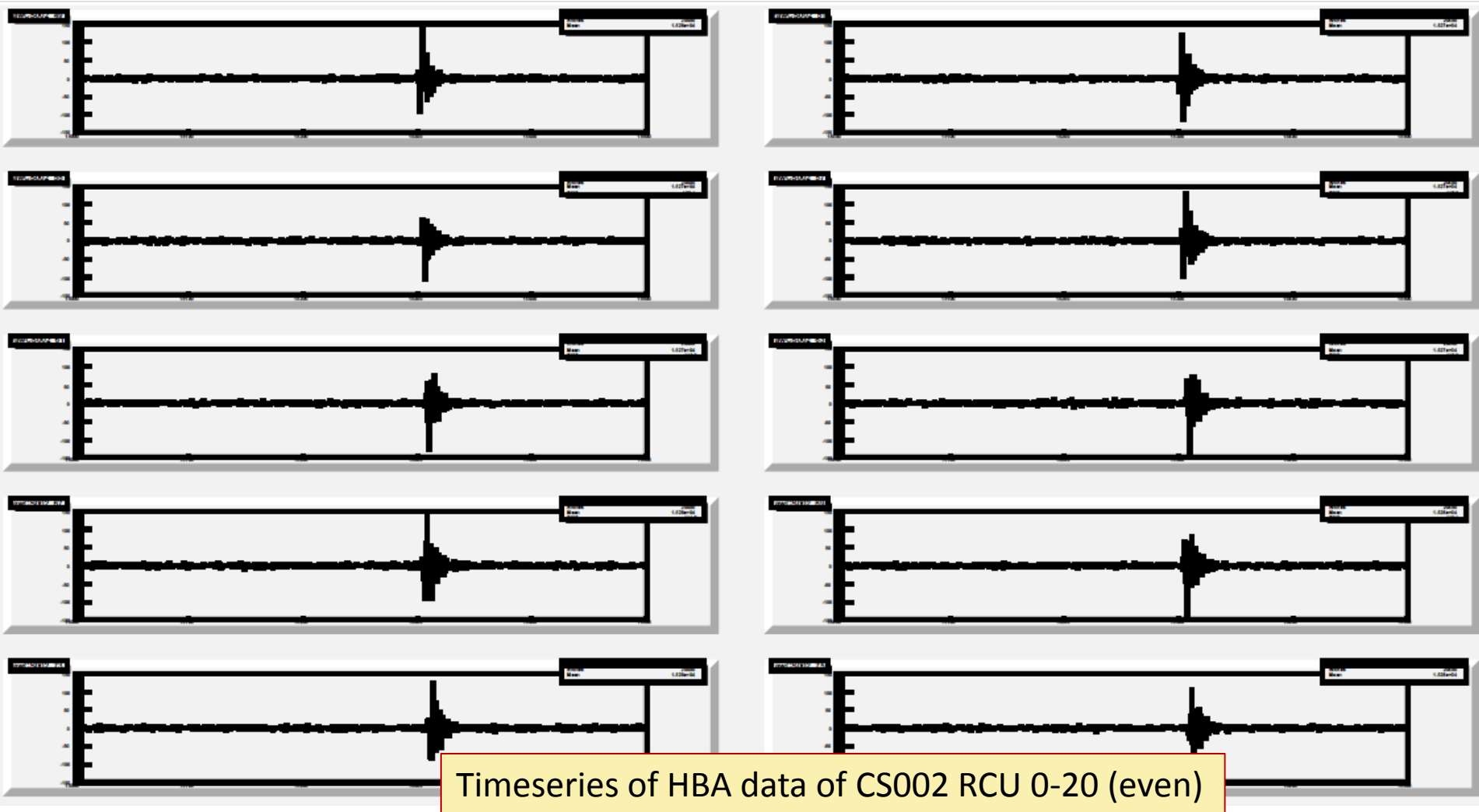
NOT visible in CS004 ??

Raw timeseries of HBA1 CS002 (~5ms)
Strong RFI lines removed (via PPF-FFT)

FRATS

- JD implemented transposed incoherent Stokes data (i.e. freq/time axis swapped, all subbands to one file)
  - First test with 1 beam succesful
- Test incoherent beam next to MSSS observation
  -> no data loss observed

Datasize for MSSS (+ FRATS in green) observations
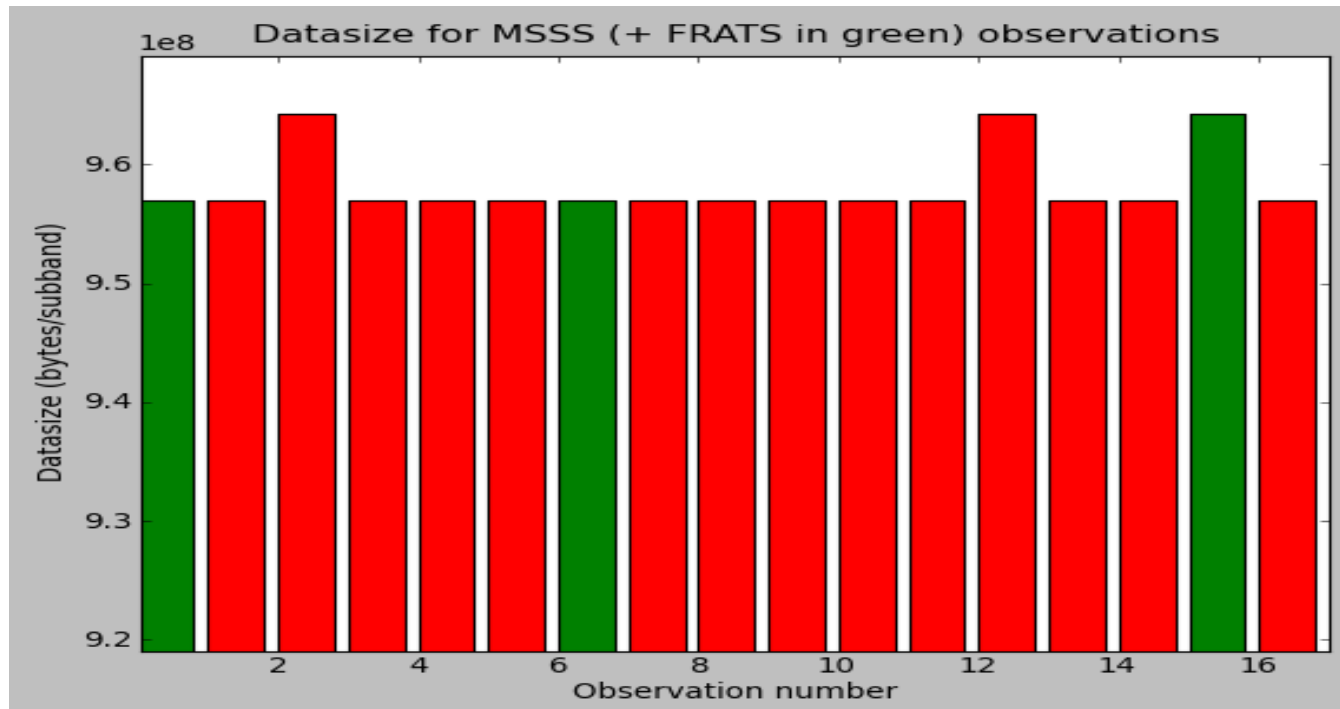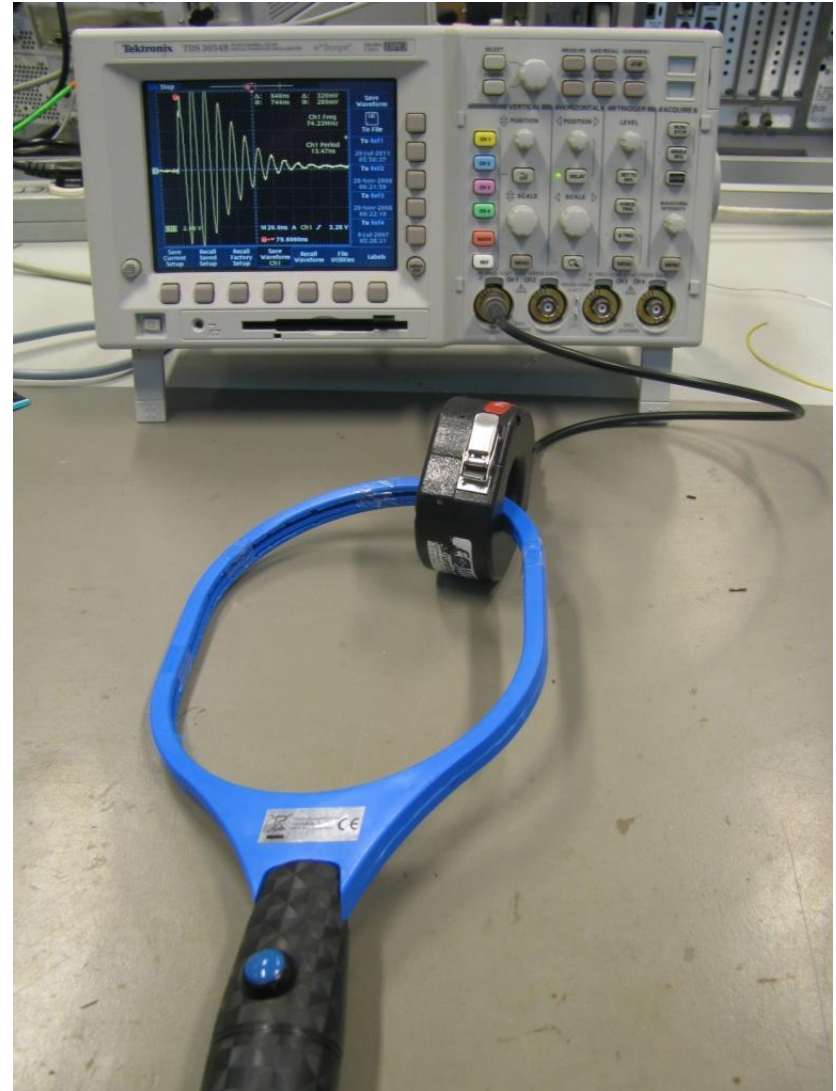
FRATS

- PLANS:
  - Offline:
    - Make pipeline for reduction to station beams from TBB data
    - Work on data imaging
  - Online:
    - Adjust trigger software
    - Test dumping
    - Collect data on pulsars

System test

- test artificial pulse
  (M. Norden)
  self- trigger
- test new TBB firmware
- test multipath TBB dumps
- get raw beamformed data of LBAs (5 min)
- test MSSS data loss when dumping large files
- Ship data via LTA

Result in two weeks
Stay Tuned!