Investigation of station BF behavior

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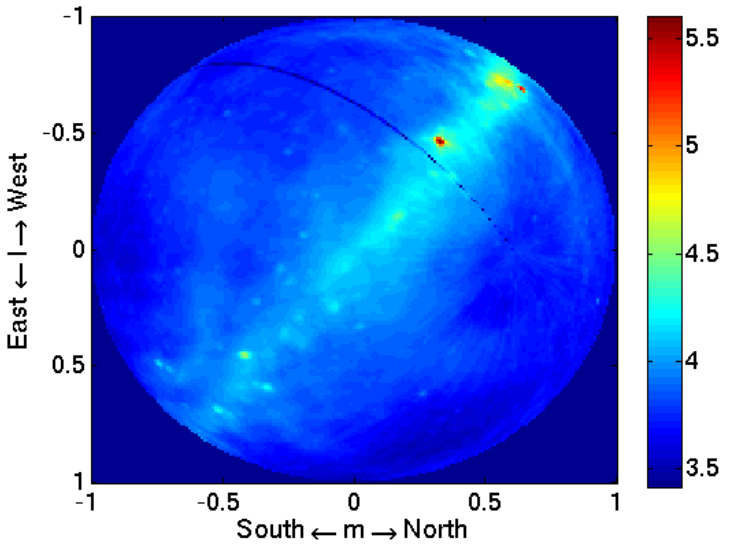
CS1 meeting
Dwingeloo, 15 March 2007

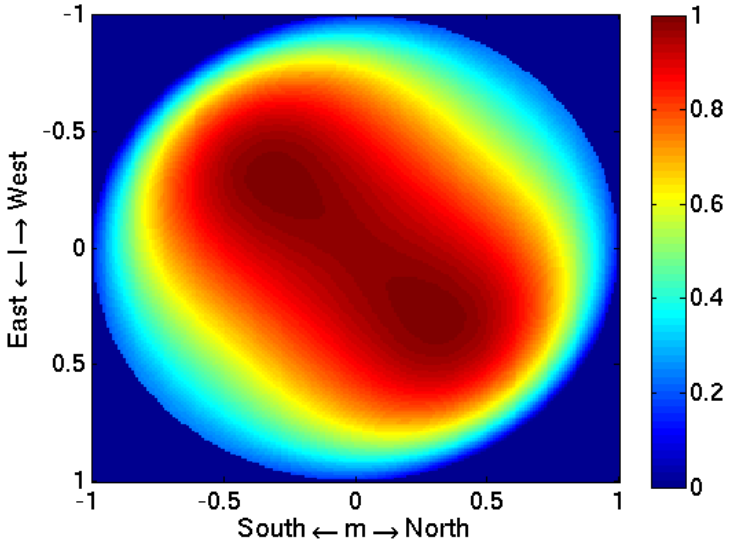
The experiment on 20 February 2007

- CS10 at 200 MHz
- Simultaneous recording of:
  - beamlet statistics
    - full station on Cas A, subbands 250-357
    - microstation on Cas A, subbands 250-357
  - subband statistics: 10 s integration
  - crosslet statistics
    - scan over subband 250-357, 4s integration

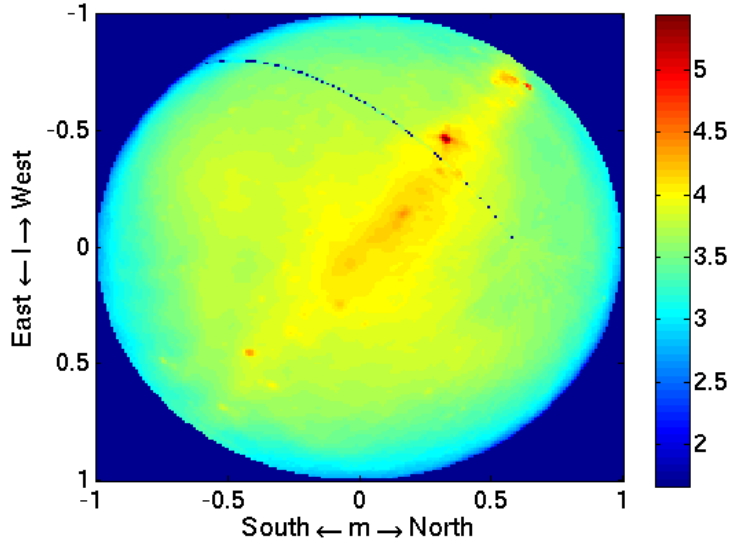
Modeling the BF output



source model



element pattern

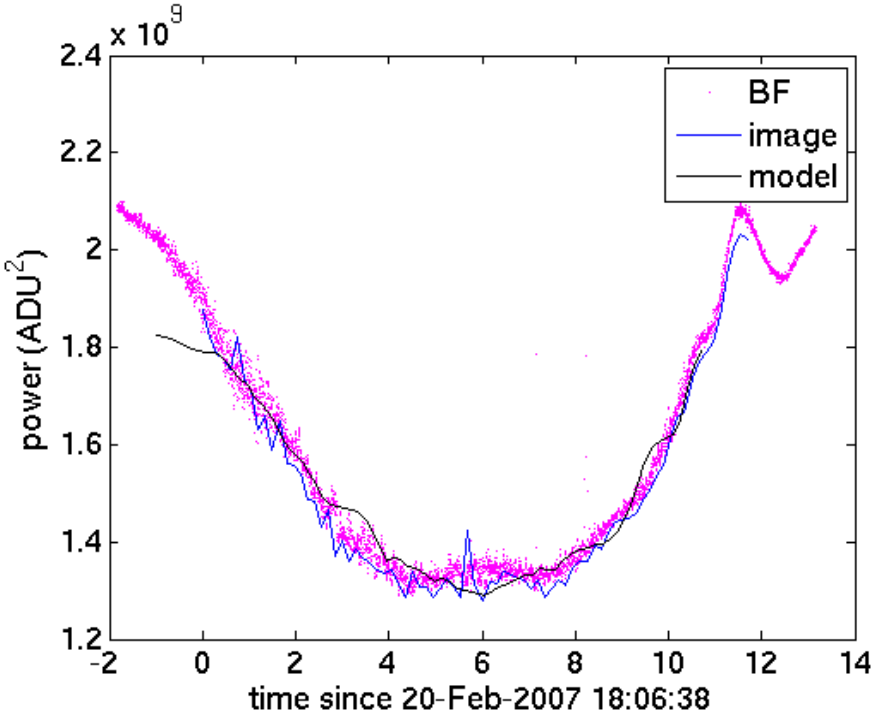


sky seen by antenna

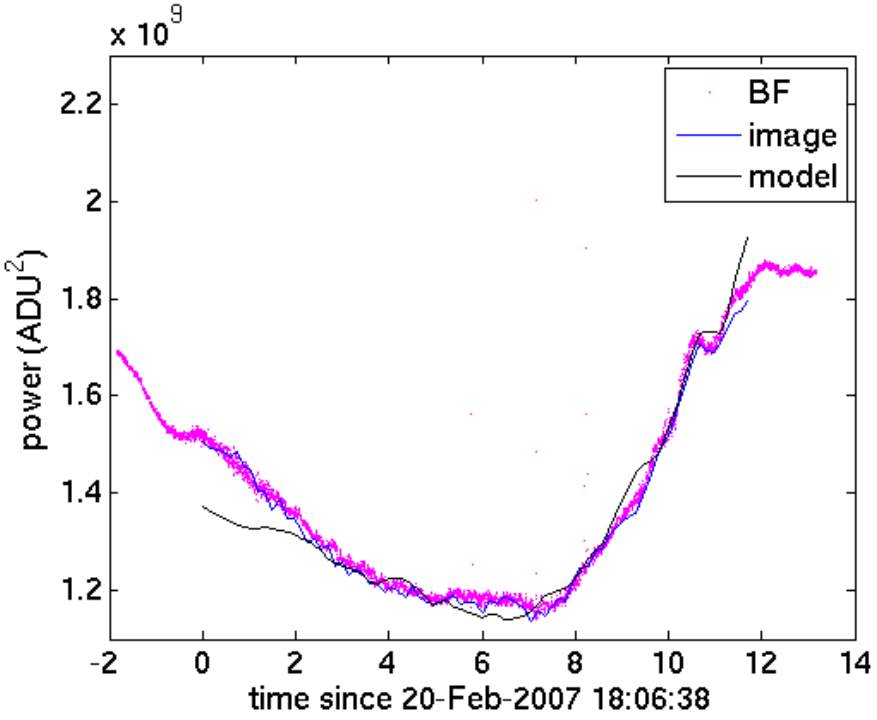
Comparison

Model, BF and power in image at 59.2 MHz

array of x-dipoles



array of y-dipoles

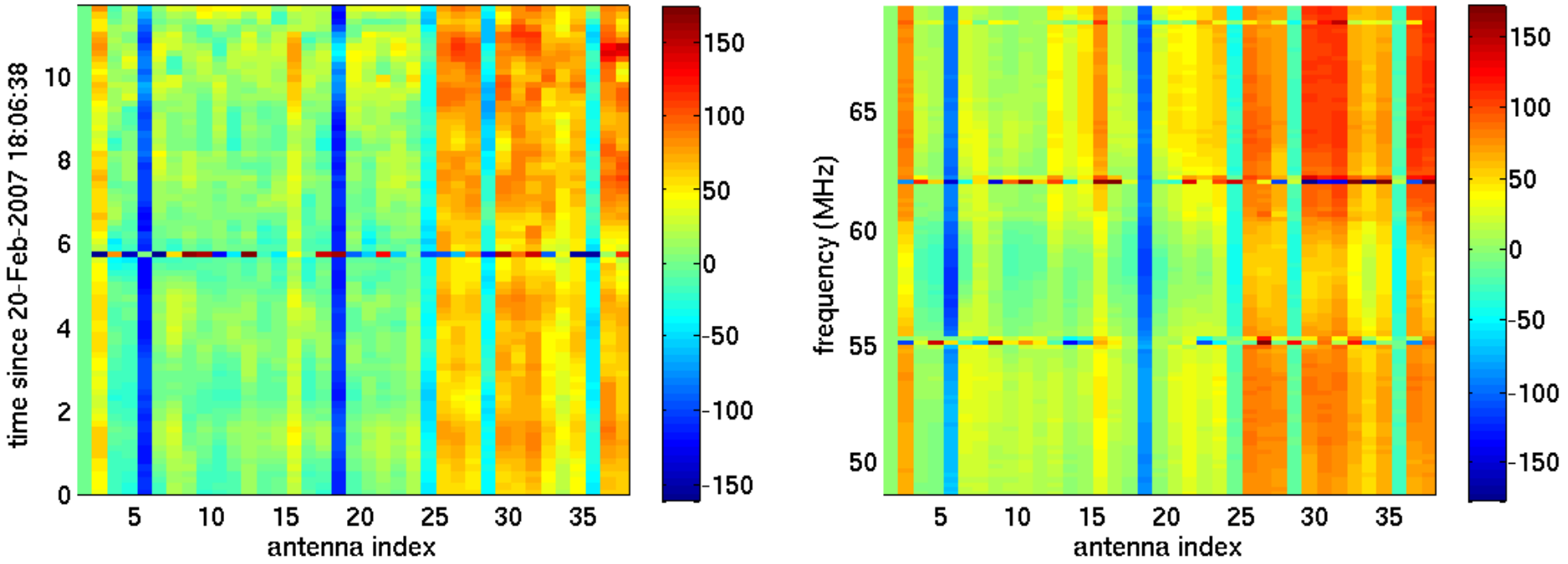


Significant differences waiting for explanation...

Another look at the data

Gain calibration ITS style

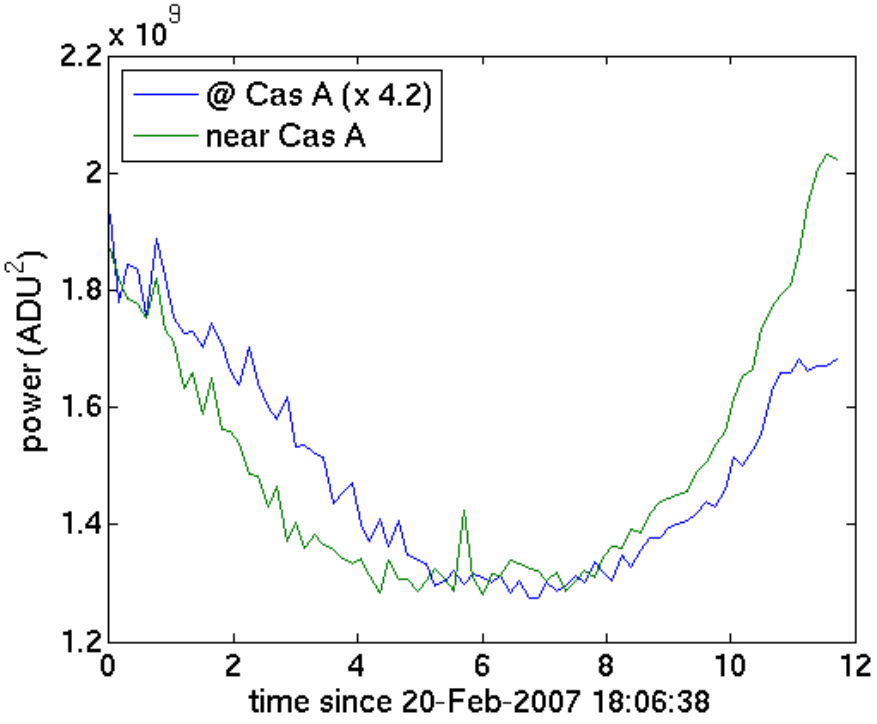
Behavior over time (left,59.2 MHz) and freq. (right)



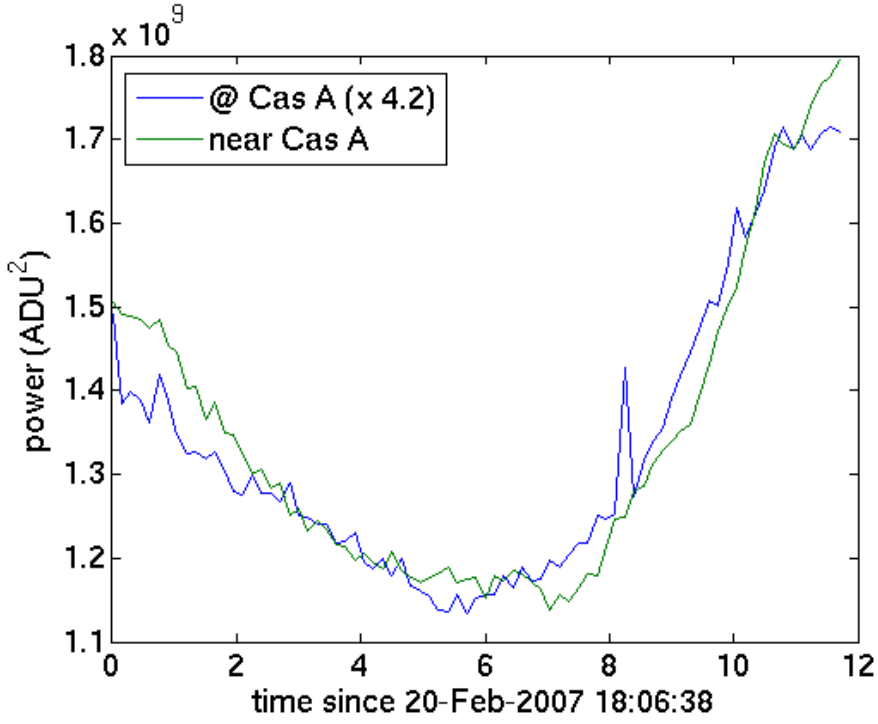
Effect 1: coordinate and pointing errors

Nearby maximum vs. expected position

array of x-dipoles



array of y-dipoles

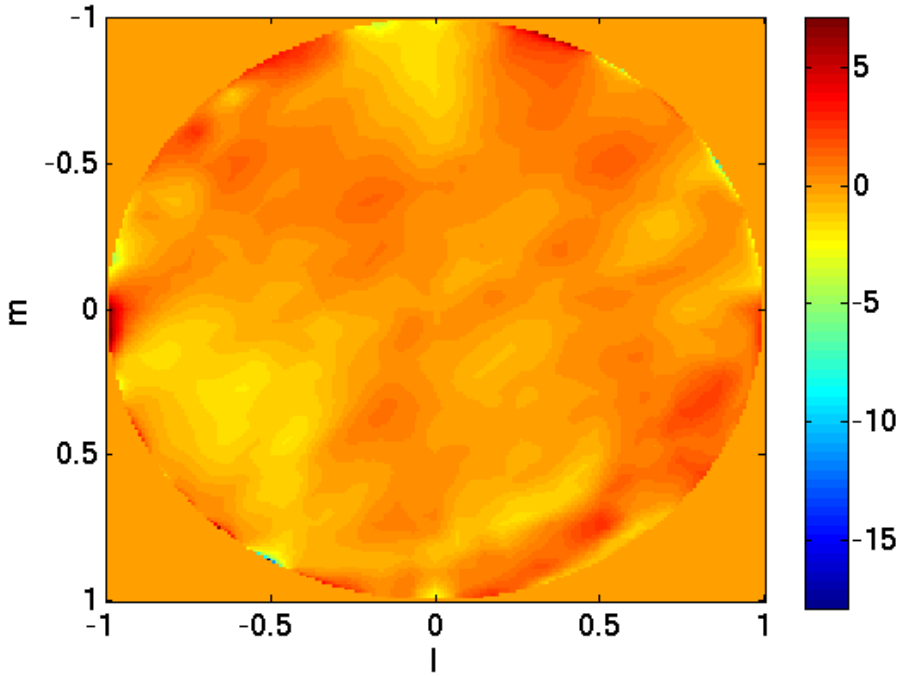


Effect 2: coupling

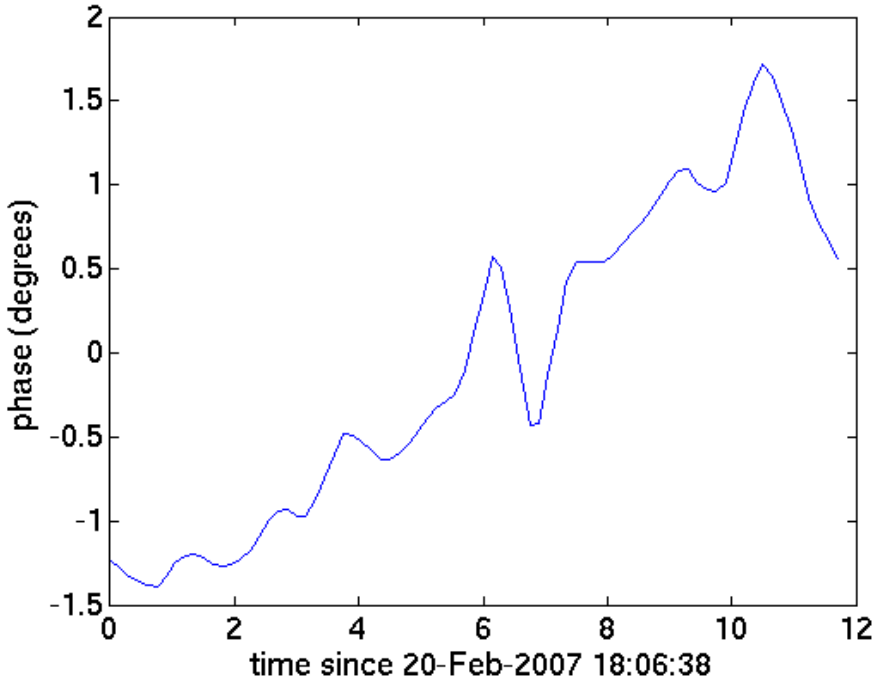
Complex response differs per element

Example: Cas A on baseline between 0 and 1

phase over the sky

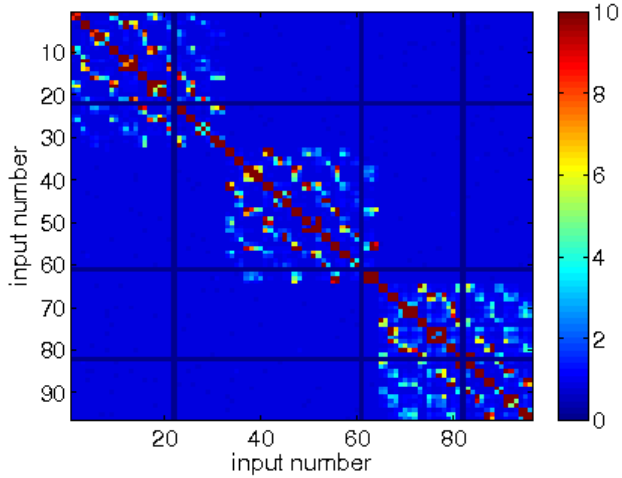


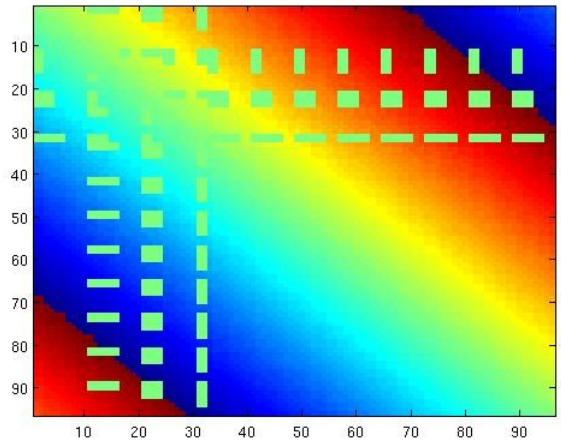
phase Cas A track



Effect N

- Ionospheric variations
- Errors in antenna positions
- Cross talk neglected
- Station correlator hick-ups
- Swaps between x- and y-dipoles
- ill antenna respons
- etc.





Actions

- coordinate errors
- coupling
- ionosphere
- ant. pos. errors
- cross talk
- correlator hick-ups
- hardware errors
- update conversions
- use WvC's model
- dir. dep. calibration
- measure real pos.
- flagging
- fix (already in bugzilla)
- identify and repair