



A Short Update on Station Validation

Stefan J. Wijnholds
e-mail: wijnholds@astron.nl

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Dwingeloo, 26 June 2007

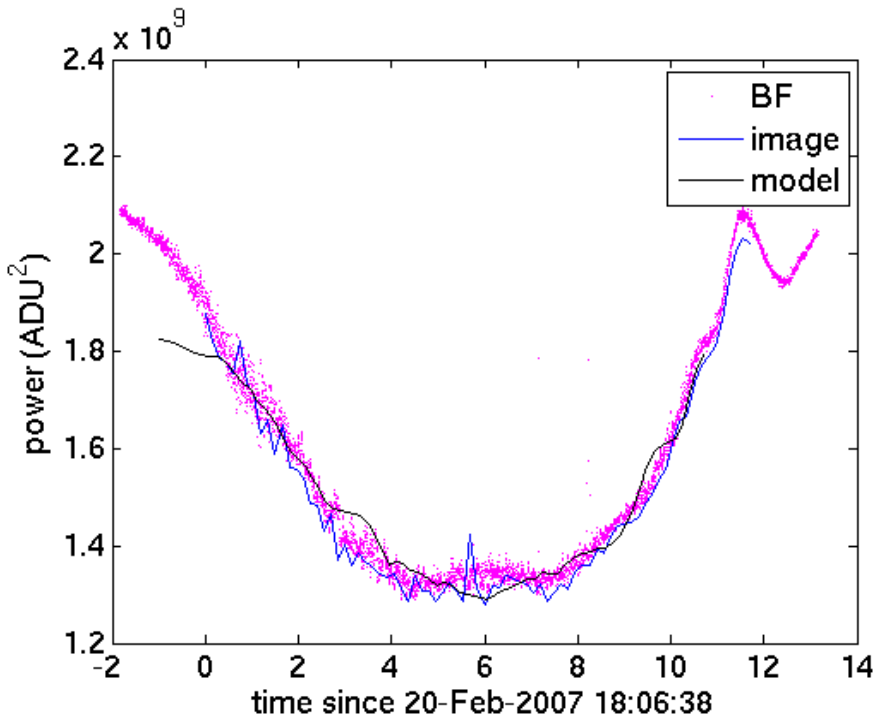


Tracking experiments

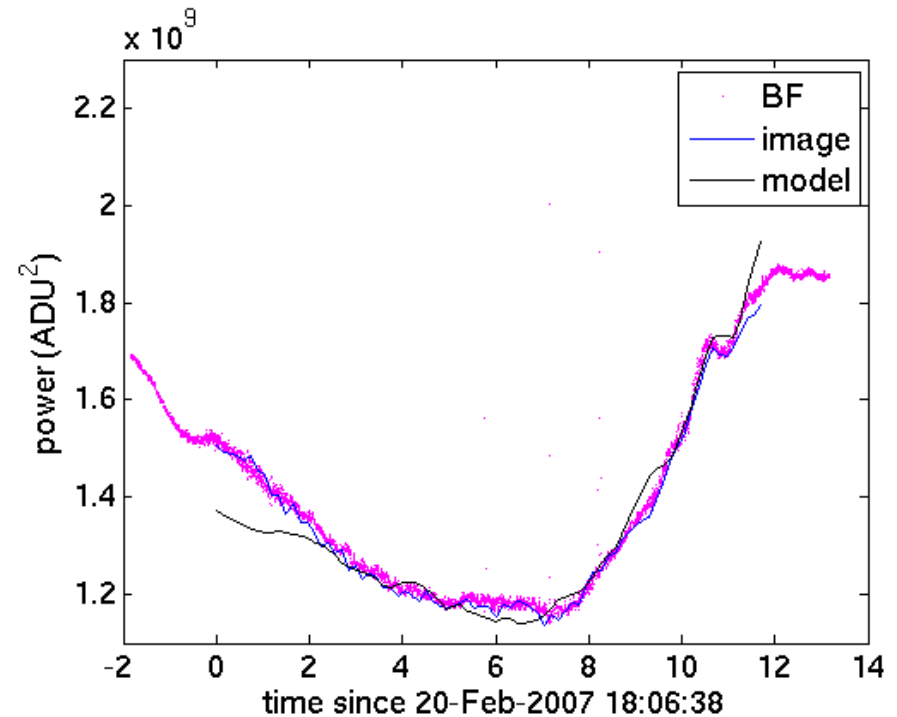


Model, BF and power in image at 59.2 MHz

array of x-dipoles



array of y-dipoles



Significant differences require explanation...

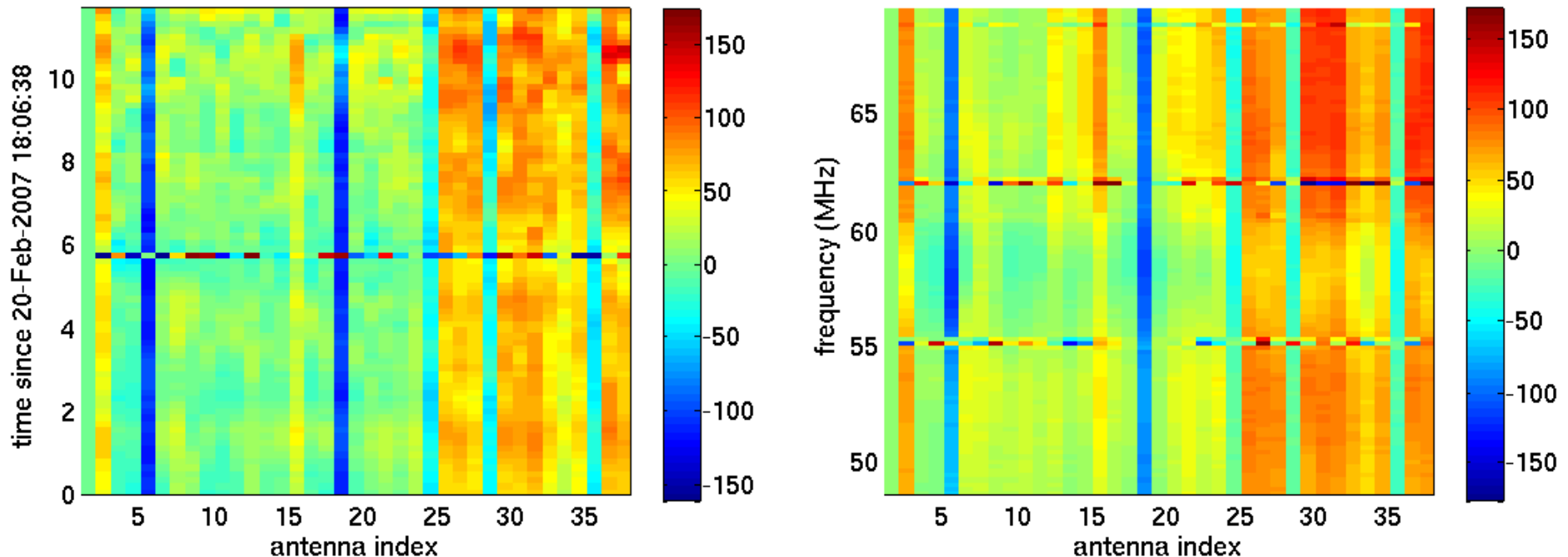


First LBA calibration results



Gain calibration ITS style

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



This means work!

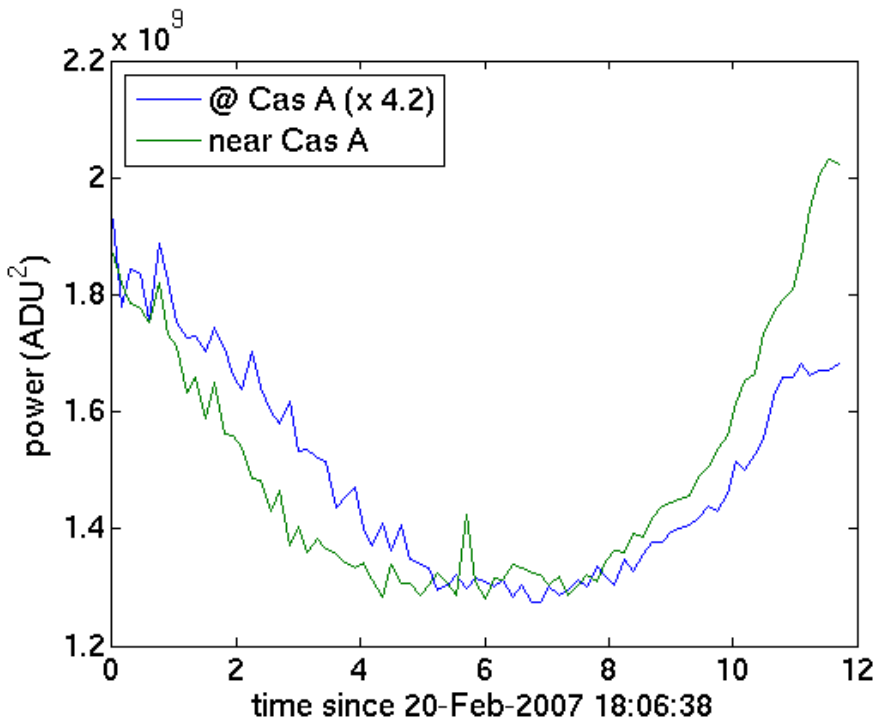


Worklist (1): coordinate and pointing errors

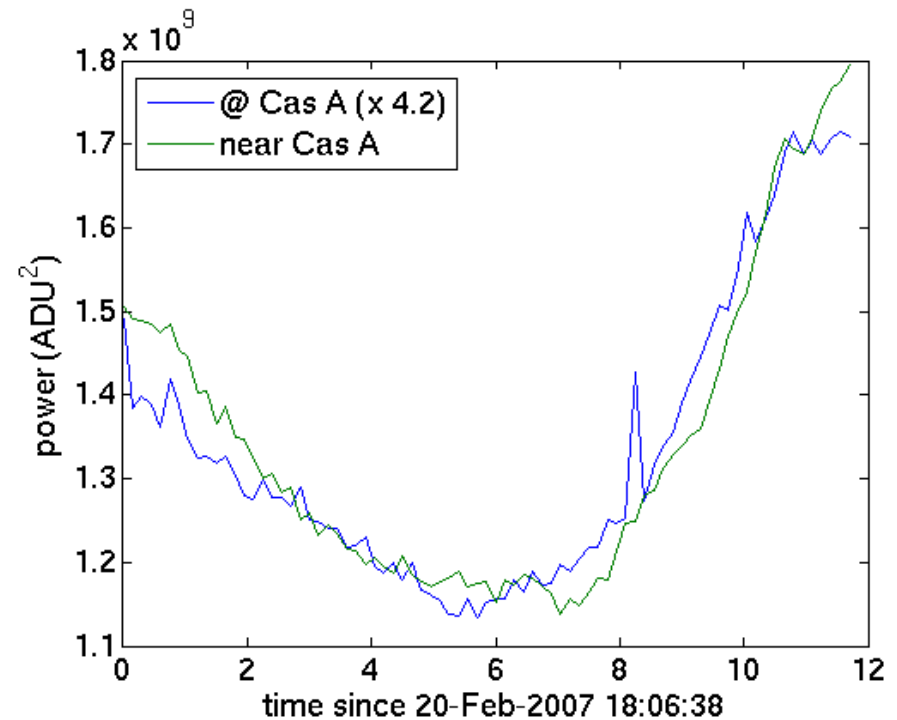


Nearby maximum vs. expected position

array of x-dipoles



array of y-dipoles



Geographical location corrected

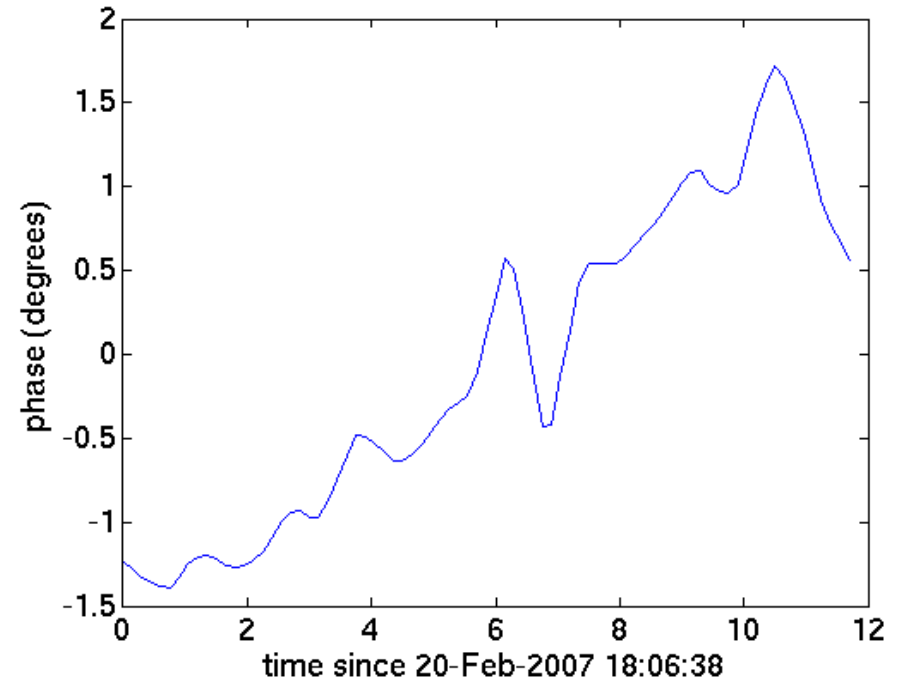
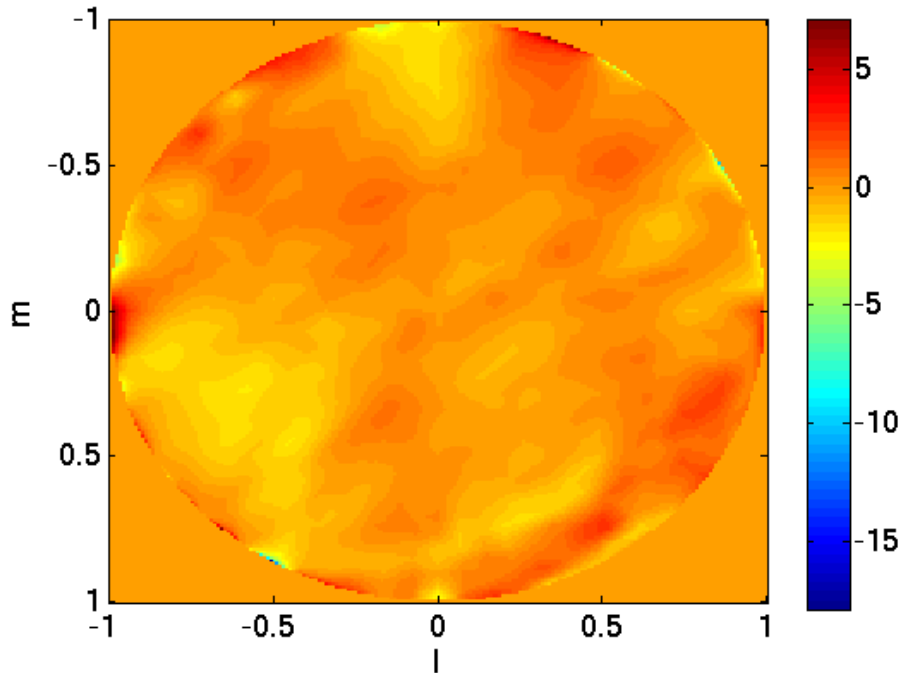


Worklist (2): coupling



Complex response differs per element

Example: Cas A on baseline between 0 and 1



Small effect, high computational cost, ignored



Worklist (3): etc.



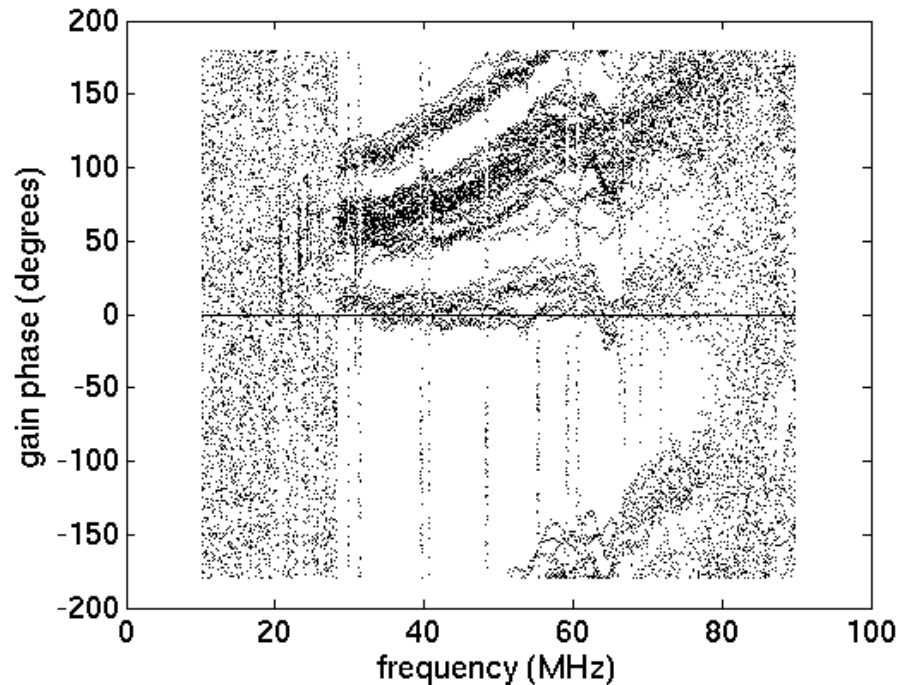
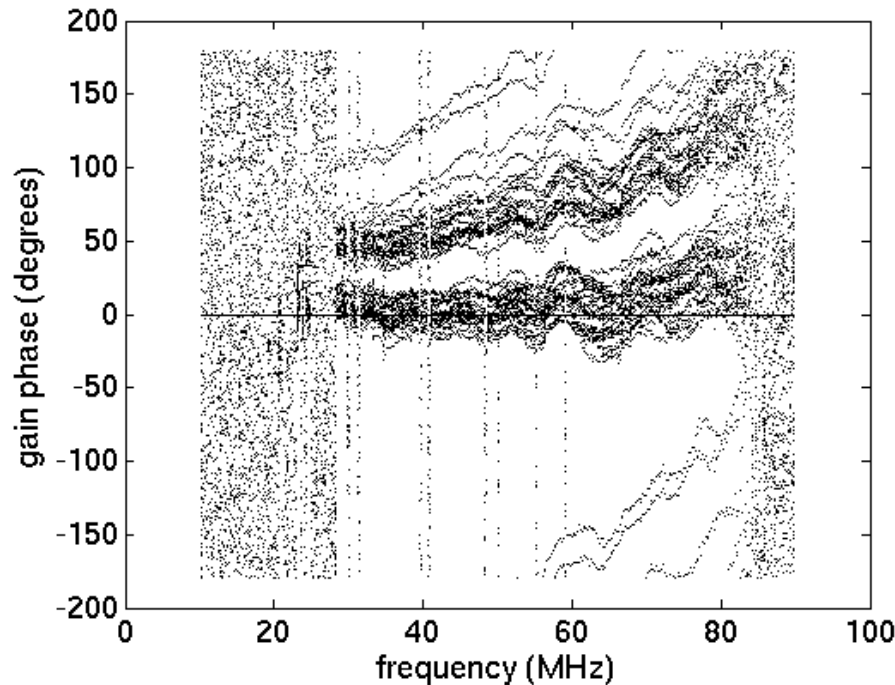
- Ionospheric variations **station selfcal**
- Errors in antenna positions **not validated**
- Cross talk neglected **to be implemented**
- Station correlator hick-ups **new firmware**
- Swaps x- and y-dipoles **solved**
- ill antenna respons **solved**
- anything else? **time will tell...**



Current LBA calibration results



phase solutions for x- (left) and y-dipoles (right)



expected: cable lengths, filters, etc.

unexpected: random but stable sample delays



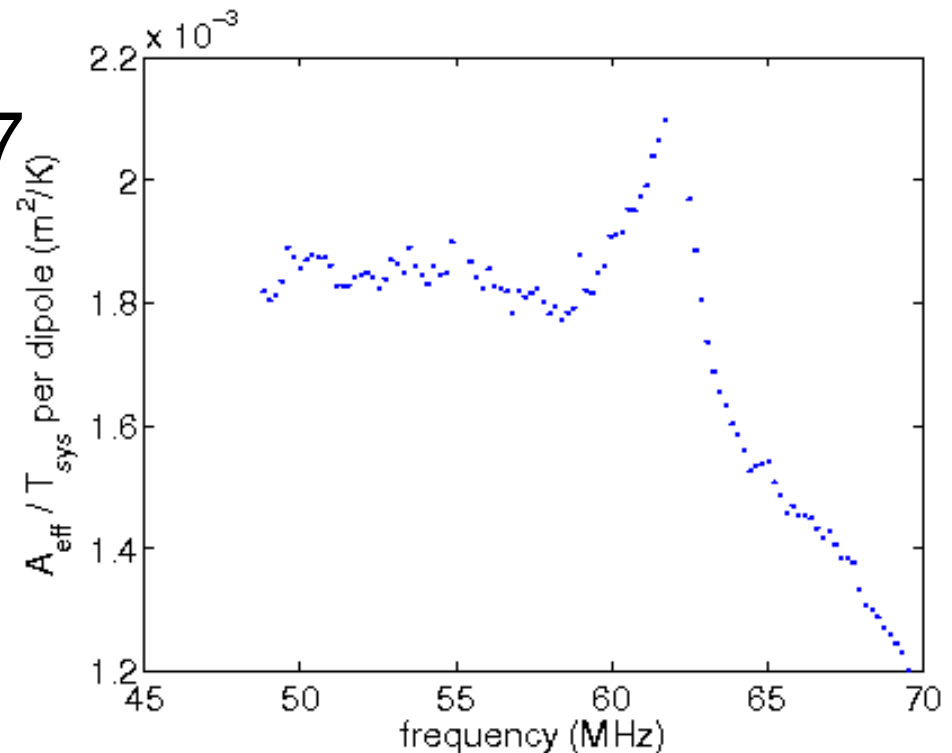


Measurement

- sweep subband 250-357
- 48.8 - 69.7 Mhz
- 5 s integration
- 12 hours duration

Conclusions

- $A_{\text{eff}}/T_{\text{sys}}$ constant over 49-60 Mhz
- unexpected resonance at 62 MHz

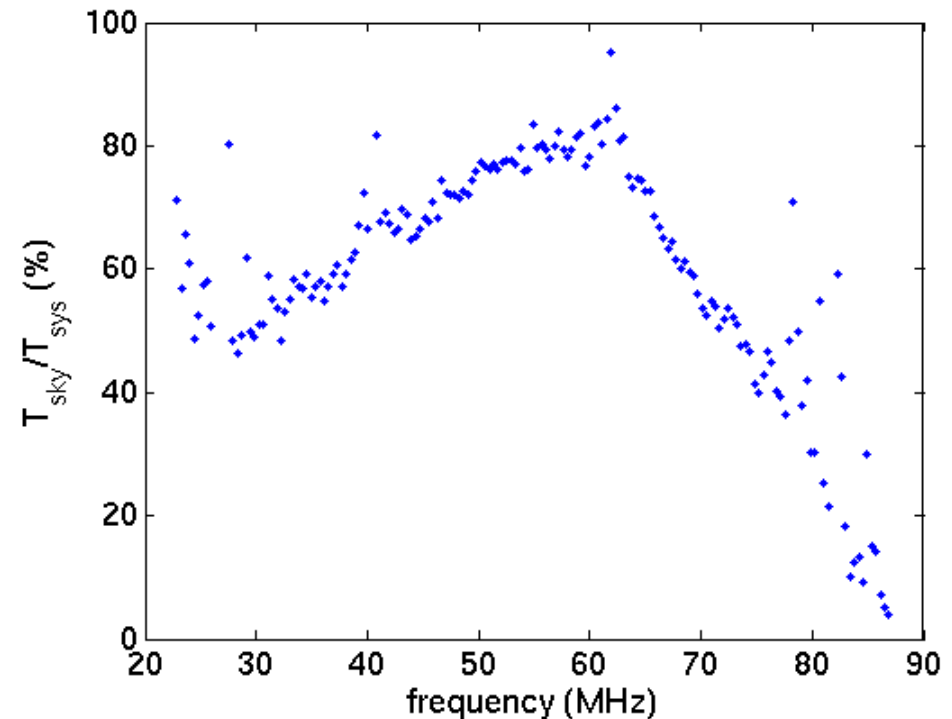


$$T_{\text{sky}}/T_{\text{sys}}$$



Measurement April 4, 2007

- 200 MHz
- 59 sweeps (17.2 h)
- 7.8 – 89.5 MHz
- 4 s integration
- reduced: April 16, 2007



$T_{\text{sky}}/T_{\text{sys}} > 50\%$ over 30 – 75 MHz

Quantization noise



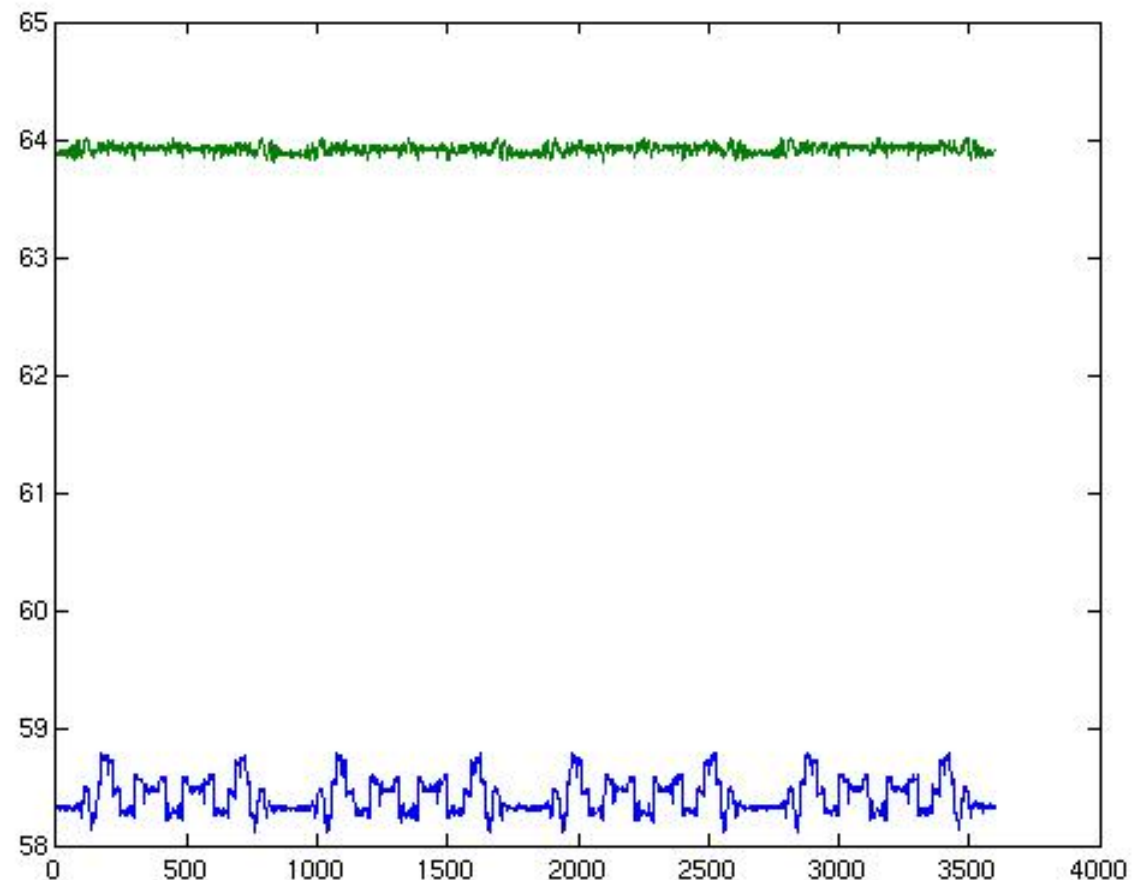
Measurement

- single RCU
- phase sweep
- $\Delta\varphi = 0.1$ degrees
- load at input

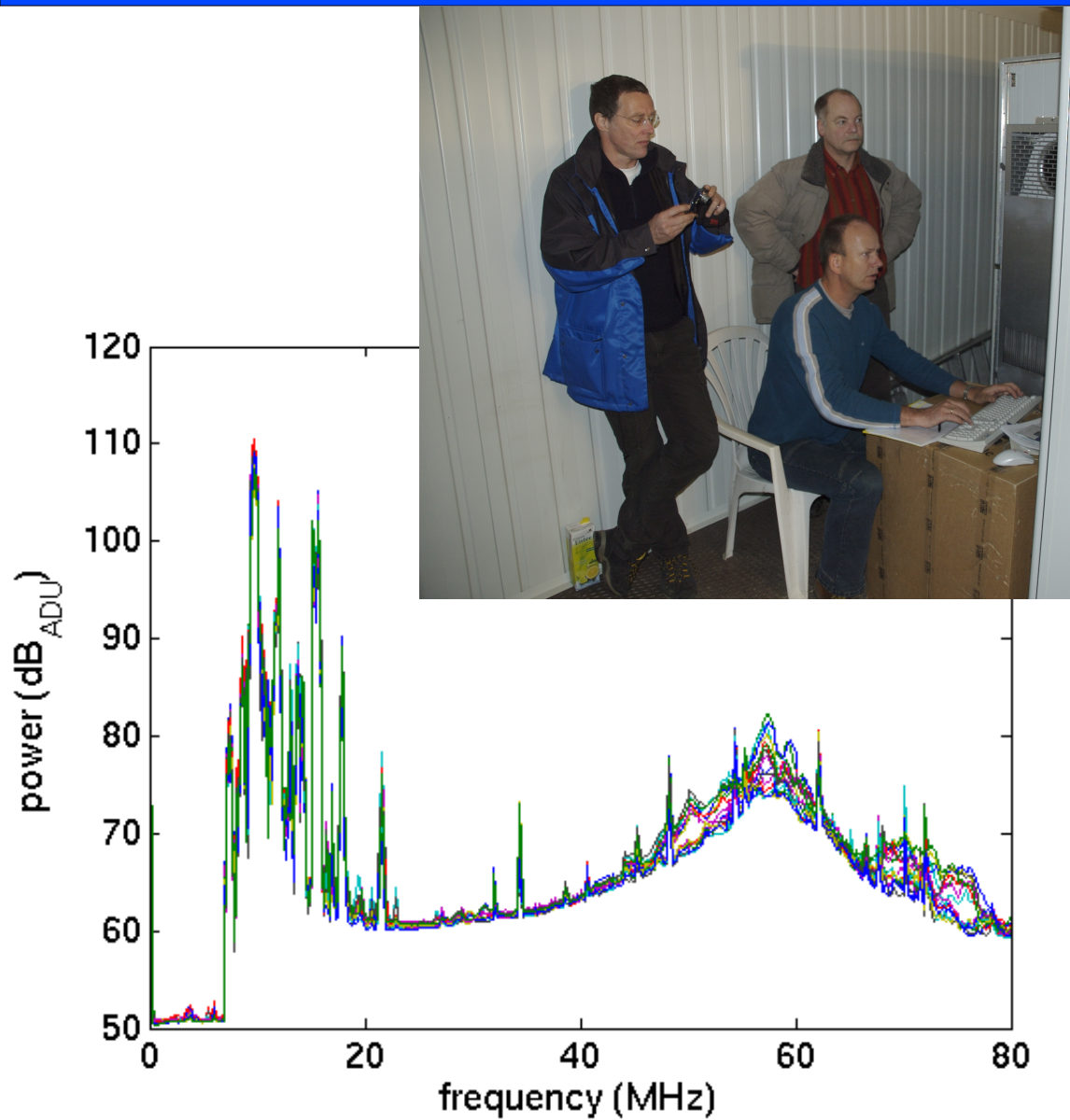
Conclusion

- quantization noise

solution: ensure sufficient input power



21 March 2007: first light in Effelsberg

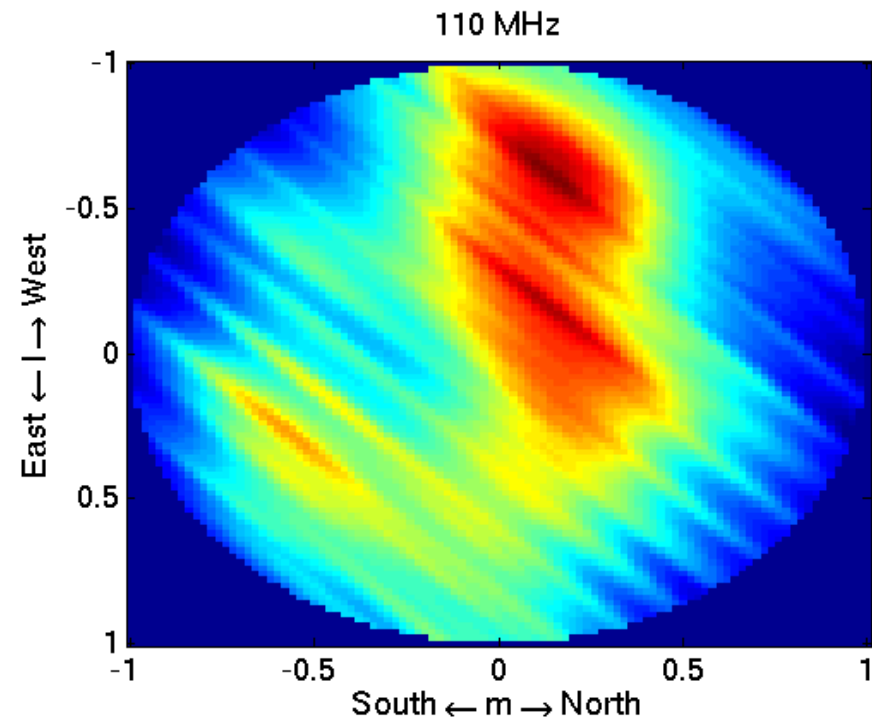
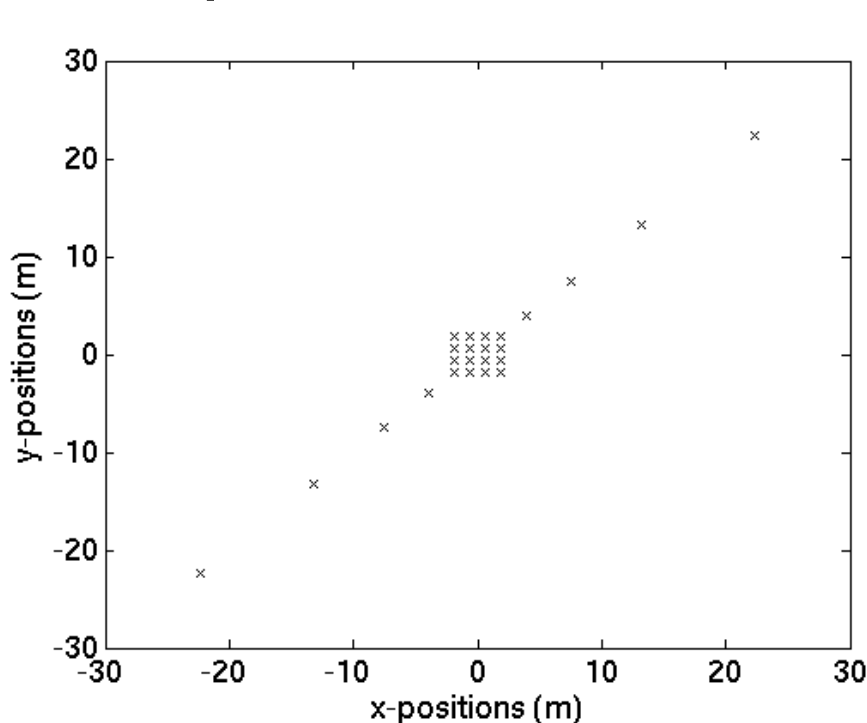


11 April 2007: first HBA full-sky images



16 elements in “tile”, 8 elements in 2 arms

sweep with station correlator over 3 HBA bands



Bands connect well, sun strongest source



Next steps



In random order:

- Sample delays at 200 Mhz
- Quantization
- HBA station configuration
- Cables: calibratability of differences
- Validation of dipole beam model
- Monitoring campaign
- Station validation scripts

