

Study on Correlation Artefacts Generated by the Station Power Supply System

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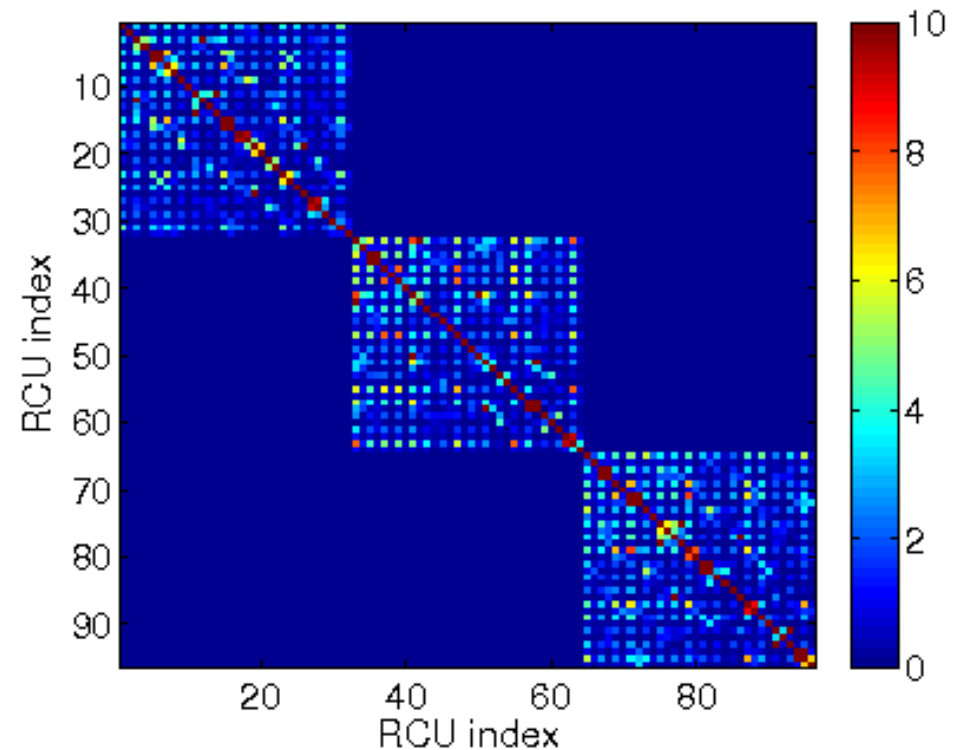
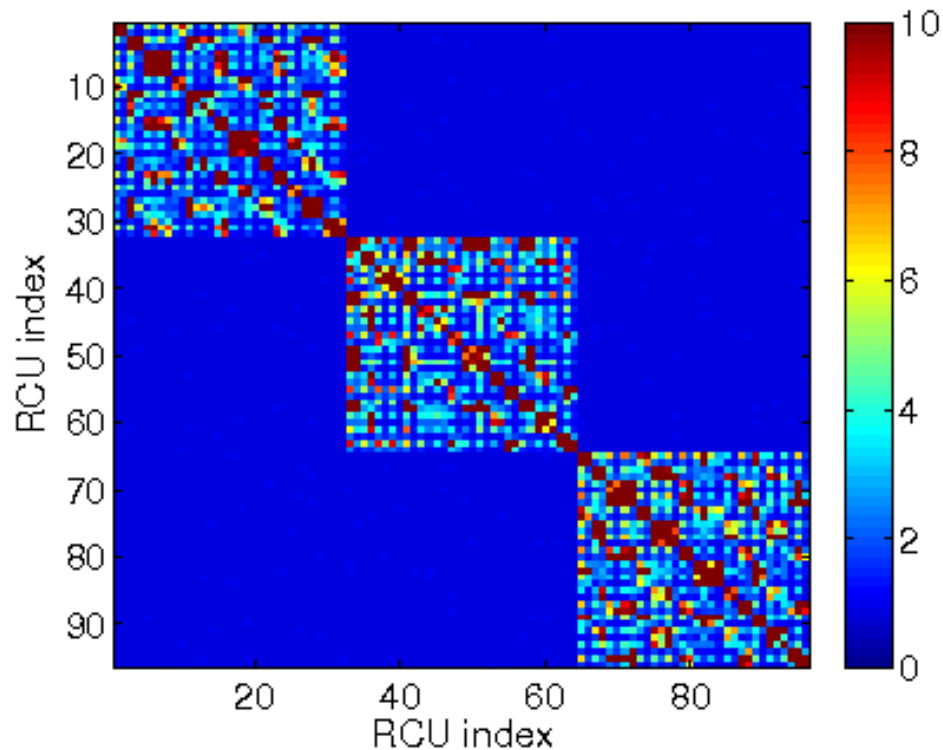
LOFAR Status Meeting
Dwingeloo, 19 August 2009

PM: HBA crosstalk measurements (1)

Stefan J. Wijnholds, LSM, 8 July 2009

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single frequency sweep, 64 s integration per subband
average absolute value (l) and absolute average value (r)



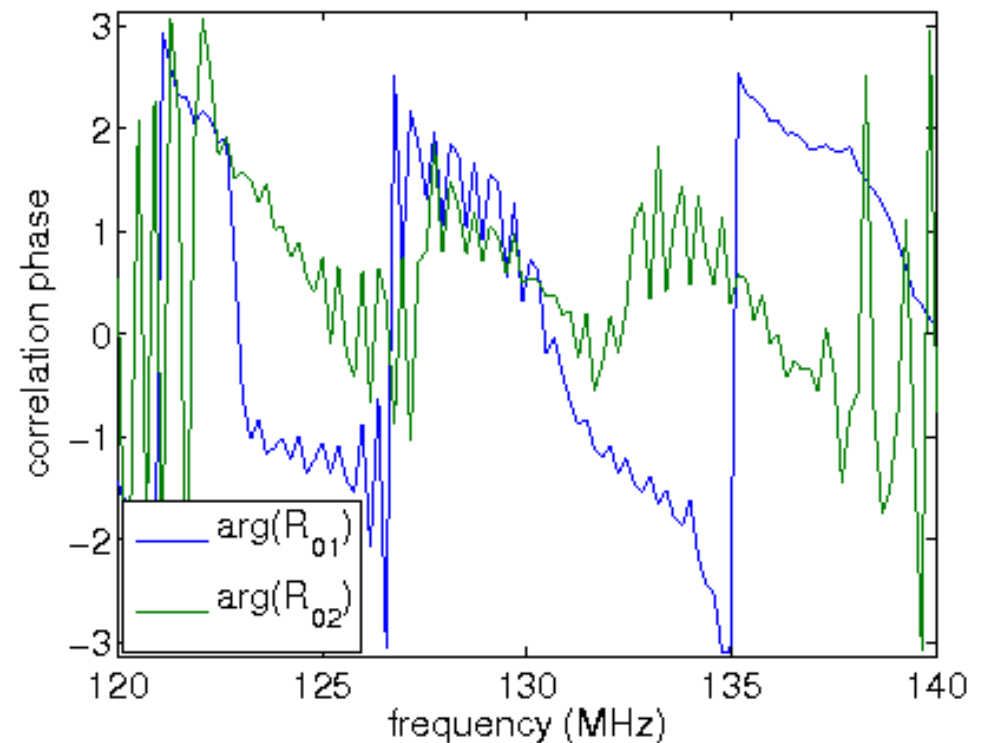
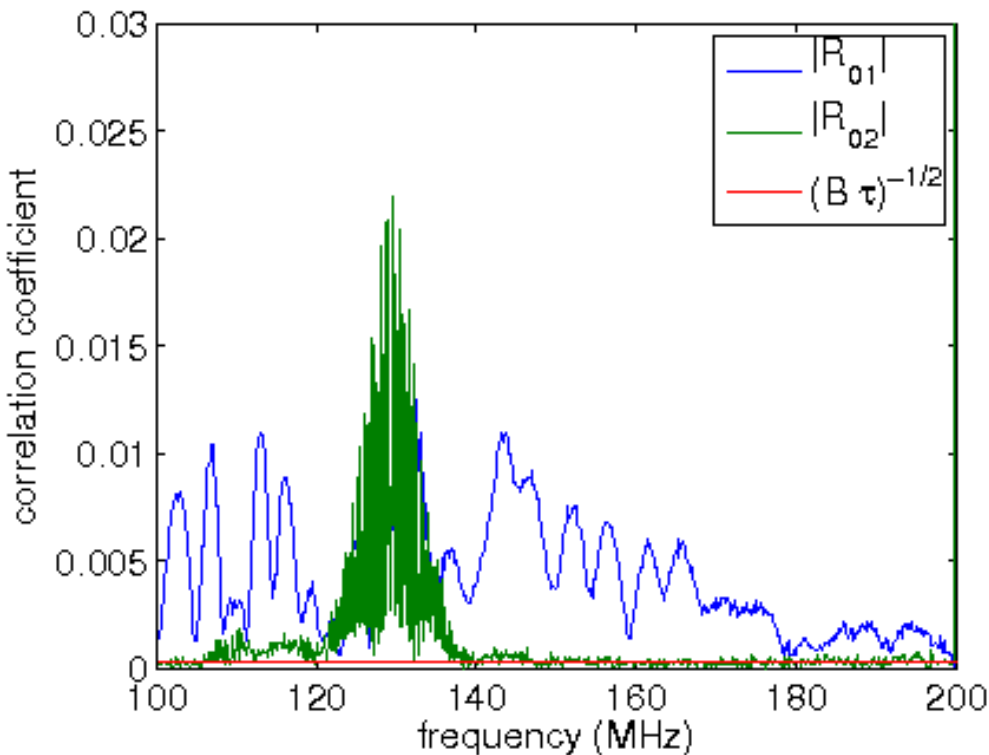
PM: HBA crosstalk measurements (2)

Stefan J. Wijnholds, LSM, 8 July 2009

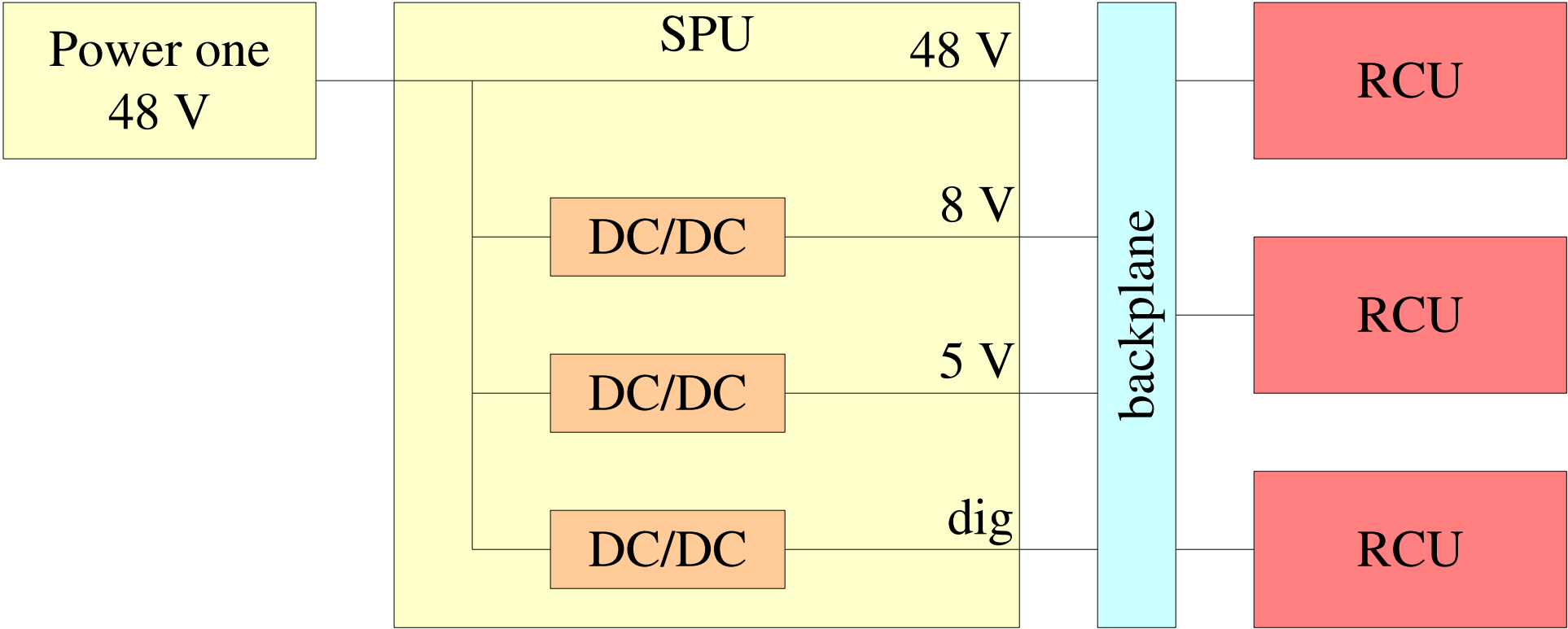
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crosscorrelation amplitude (left) and phase (right)

Power supply has serious impact



Station power distribution



Only crosstalk within subrack -> Power One ok!

Goal: find the cause of the correlation artefacts

DE604C

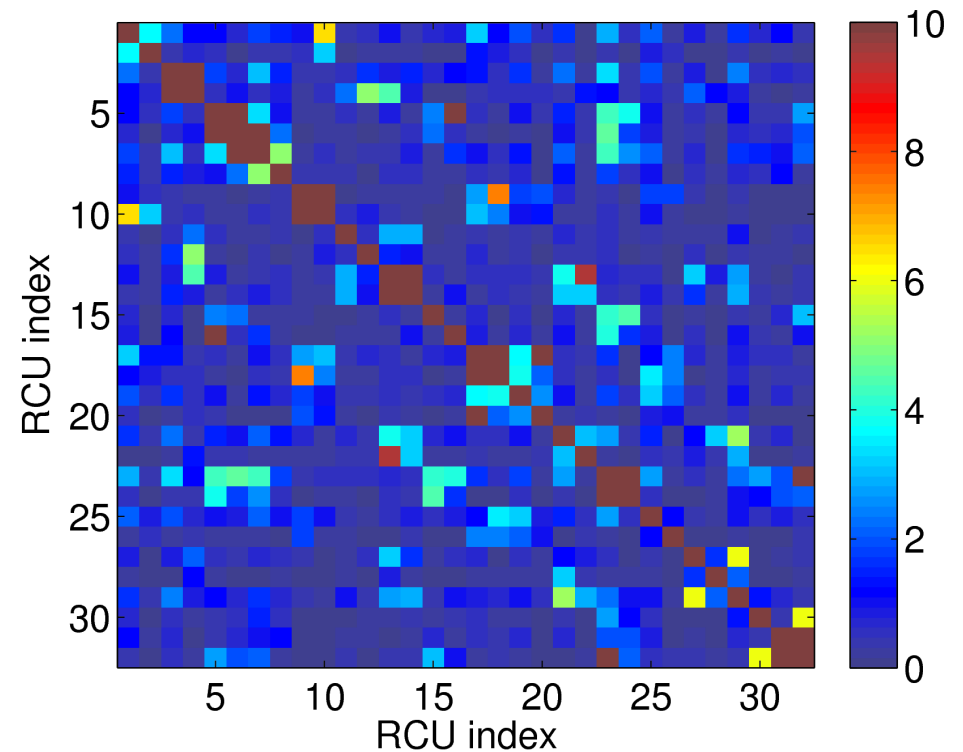
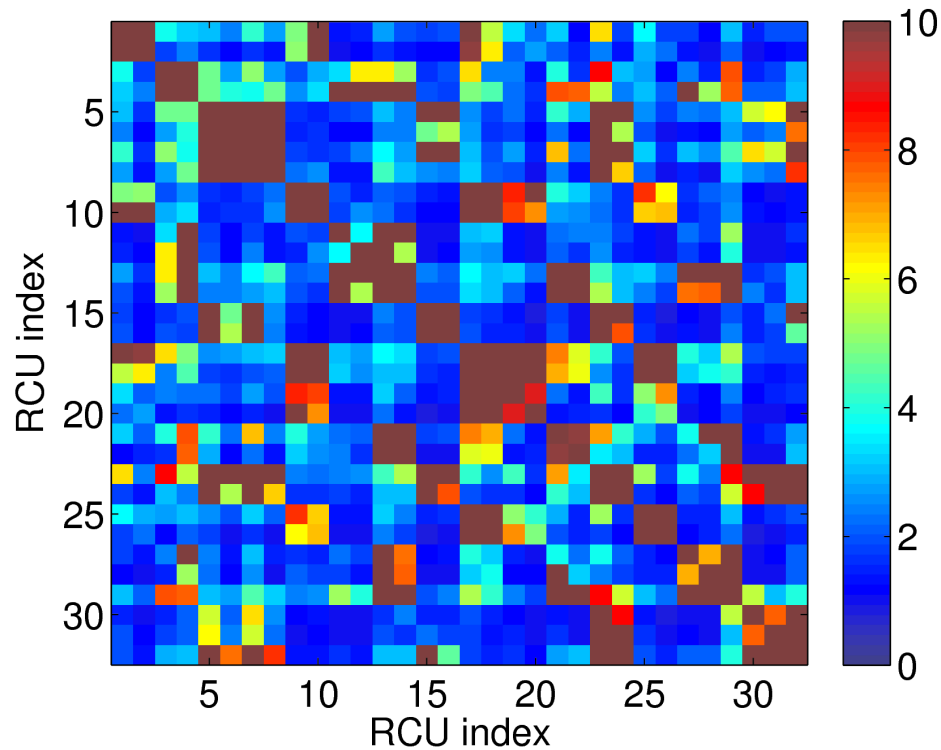
- single subrack in lab
- loads on all inputs
- crosstalk measurements do reproduce
- frequency sweeps with 64 s integration per subband

Test 1: short circuited 48 V SPU output

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average absolute value (l) and absolute average value (r)

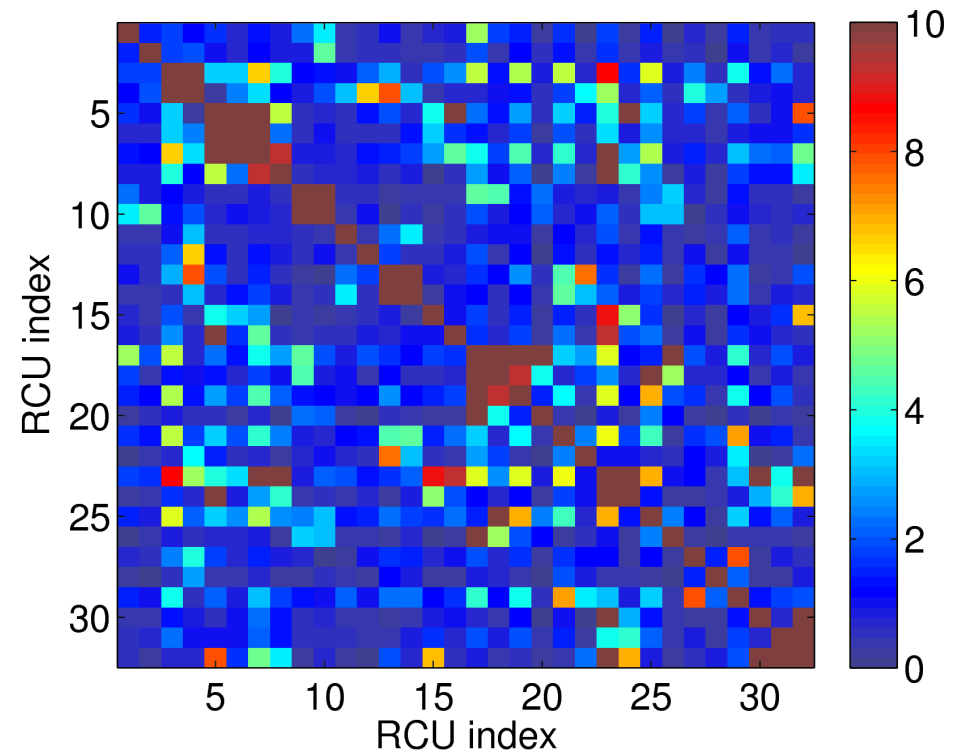
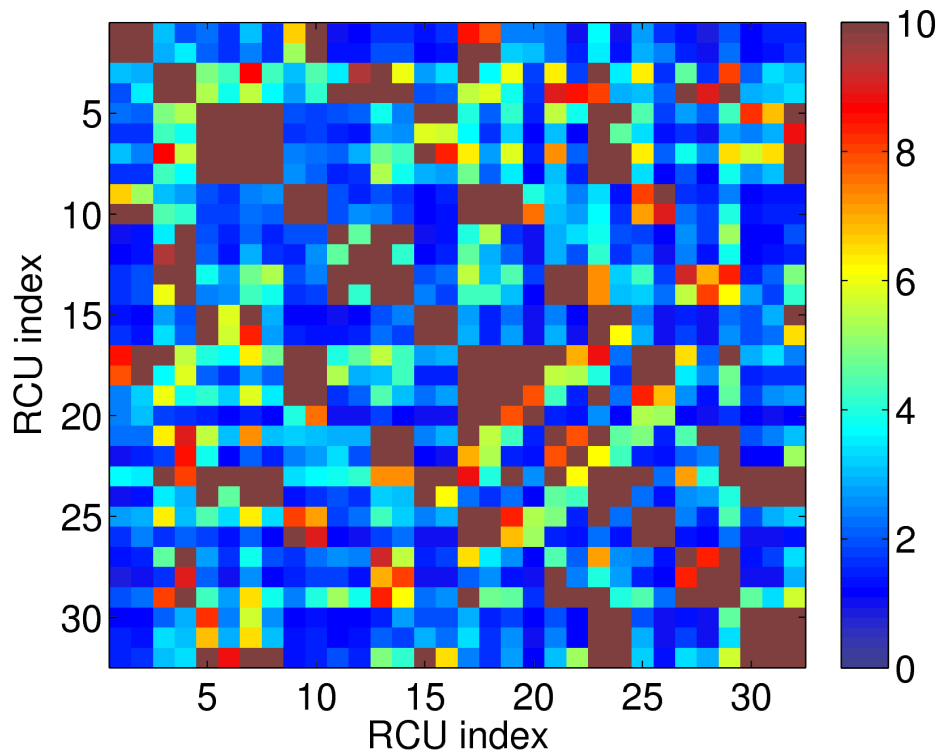
Conclusion: 48 V SPU output clean



Test 2: short circuited 48 V RCU input

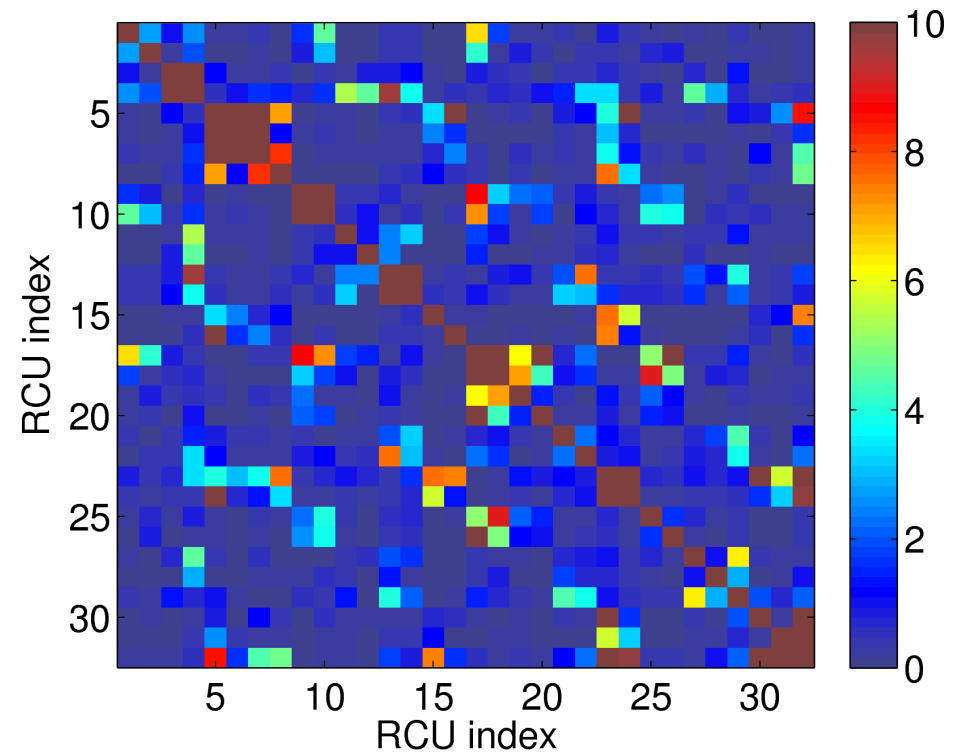
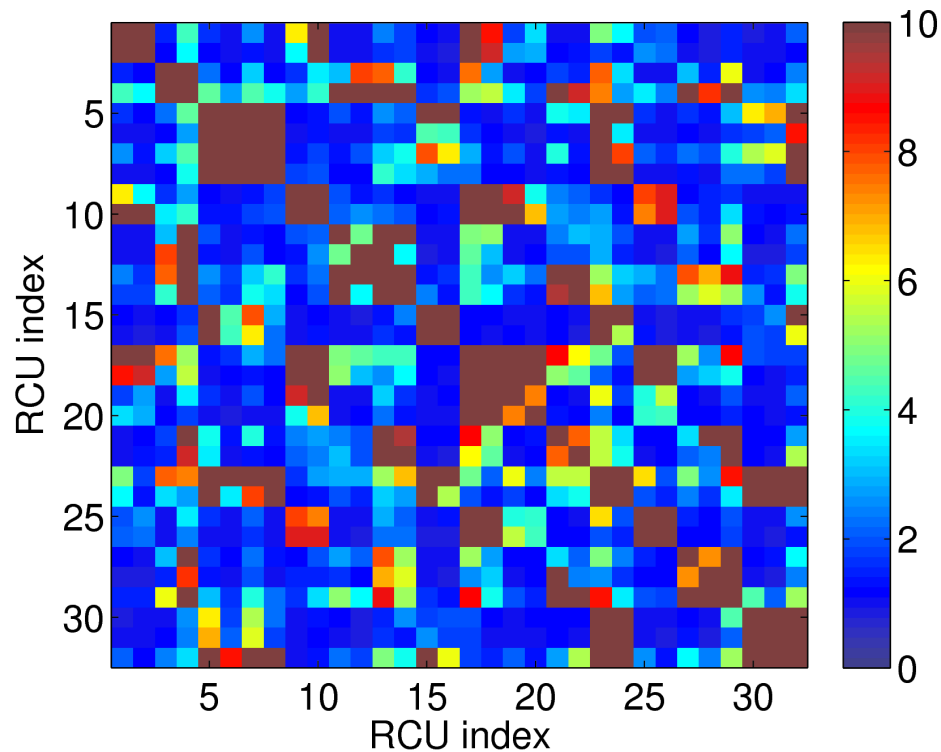
scan over subbands 300 – 450 (112.5 – 141.8 MHz)

Conclusion: signal induced between SPU and RCU



Test 3: 8 V SPU out from battery pack

Conclusion: DC/DC couplers 8 V supply generate dirty signal that couples to 48 V lines on backplane



Three problems

1. DC/DC for 8 V produces dirty signal
2. crosstalk on backplane from 8 V to 48 V power lines
3. DC-filter on 48 V RCU input insufficient

Solutions

- new backplane series: not a real solution:
 - old ones still there
 - dirty power lines still there
- replace SPUs of core stations