

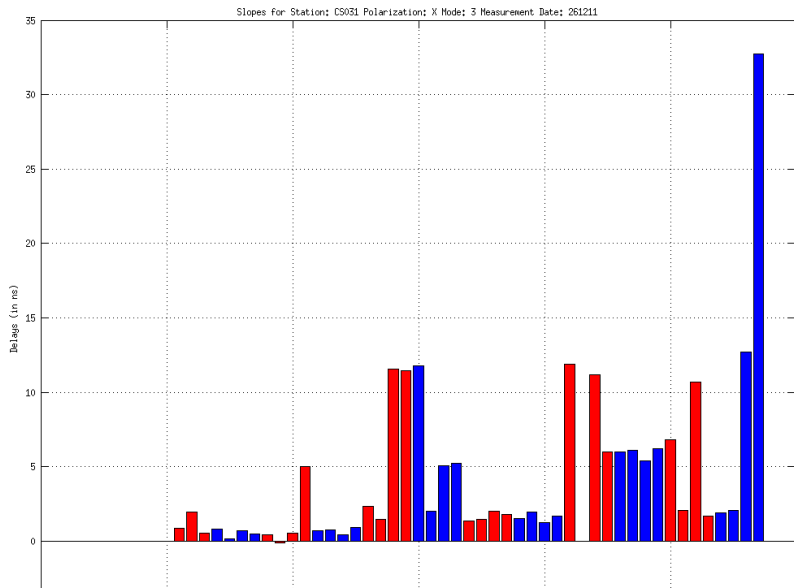
# LOFAR's 5 ns offsets

Michiel Brentjens

Radio Observatory  
ASTRON, Dwingeloo, The Netherlands

April 4, 2012

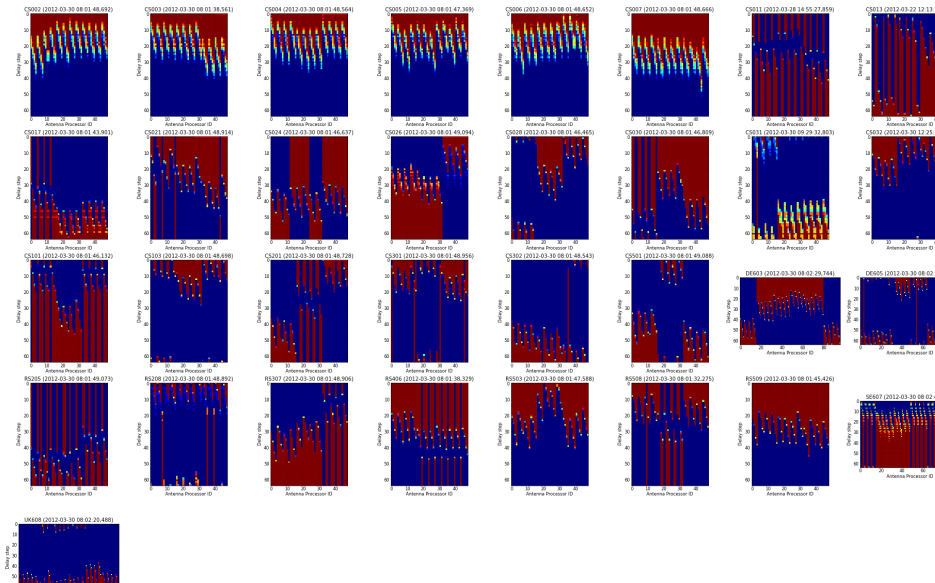
- 1 5 ns offsets
- 2 PPS delays
- 3 What's next

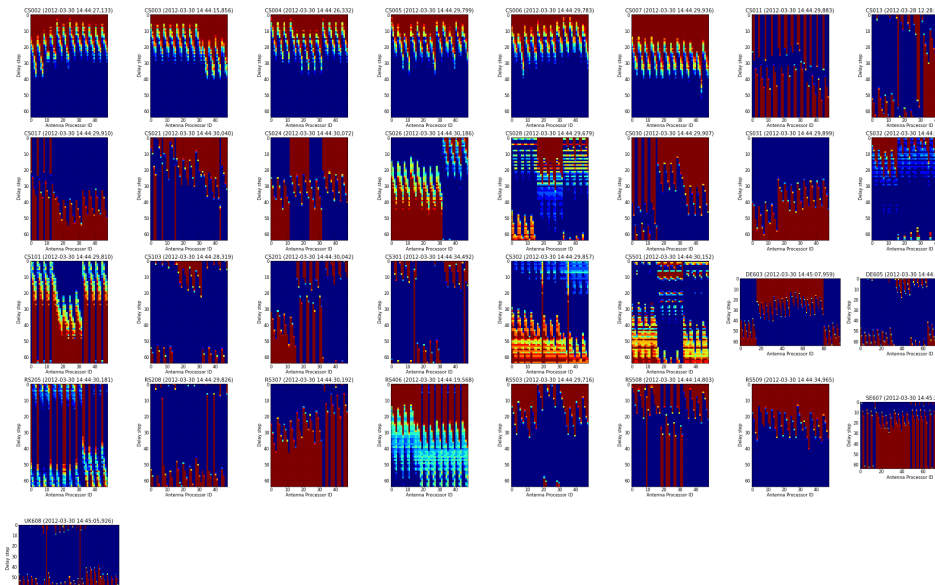


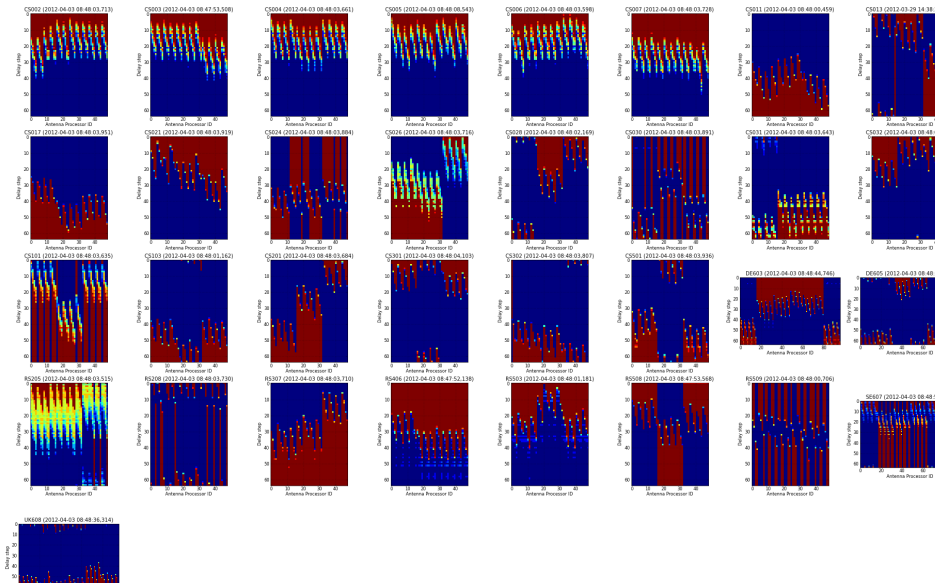
1 5 ns offsets

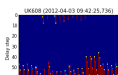
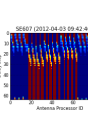
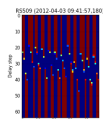
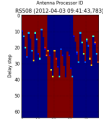
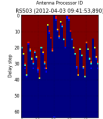
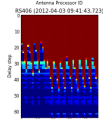
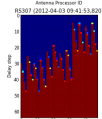
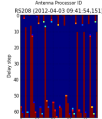
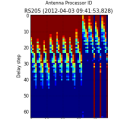
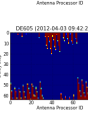
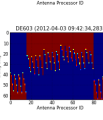
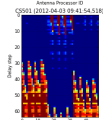
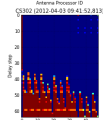
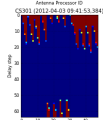
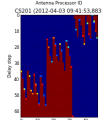
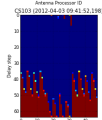
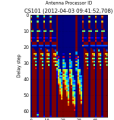
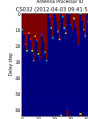
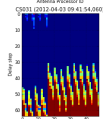
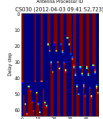
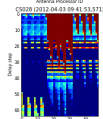
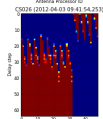
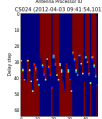
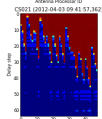
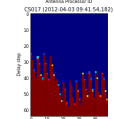
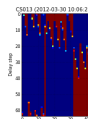
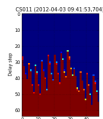
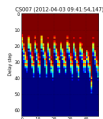
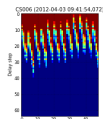
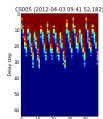
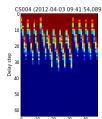
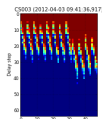
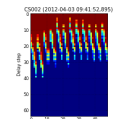
2 PPS delays

3 What's next

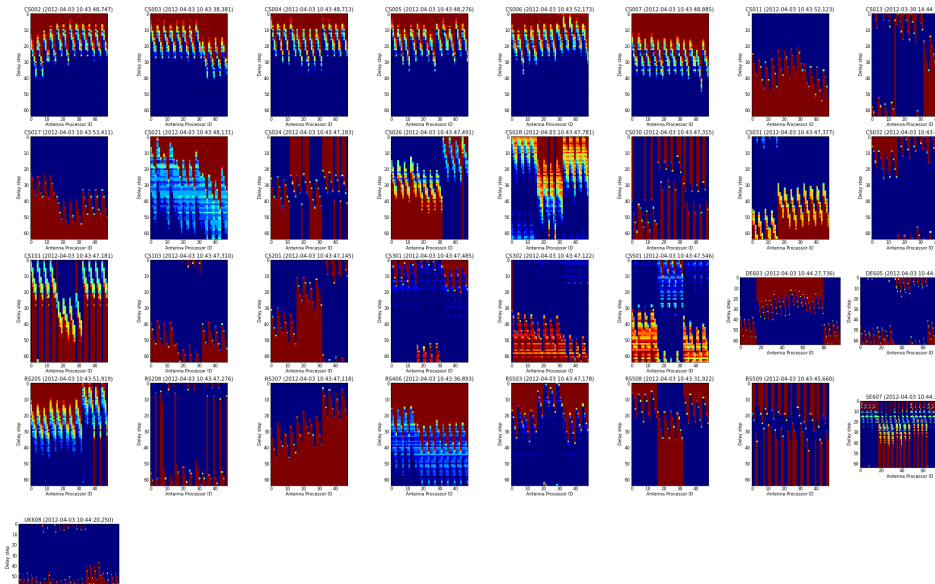


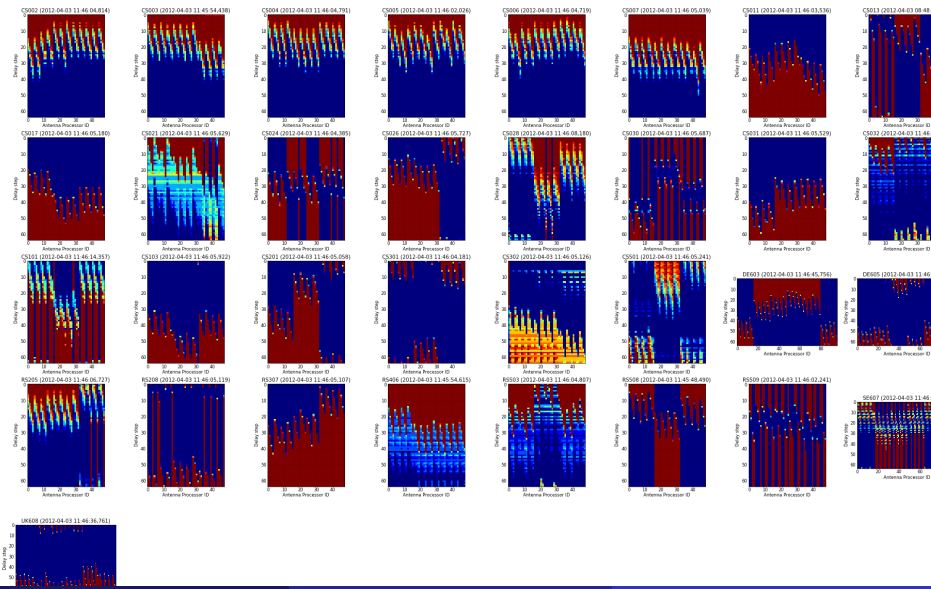


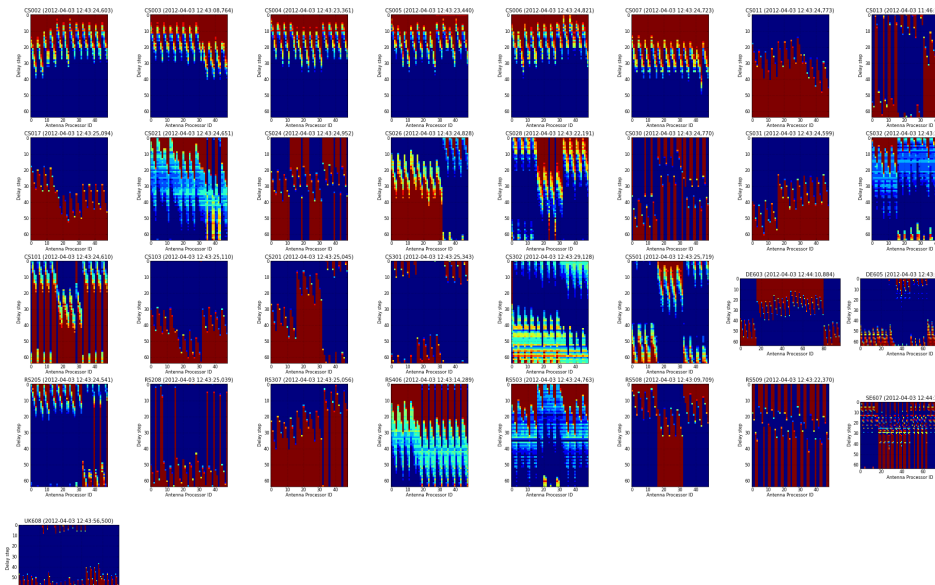












- 1 5 ns offsets
- 2 PPS delays
- 3 What's next**

## Issues

### Problem

Cables too tight / bent  
Drifting 10 MHz

Offsets in rubidium/cable combi  
Constant delays between APs

### Potential solution

release / replace cables  
use 3-way splitter on “good” port  
replace Rubidium  
switch all of LOFAR to single clock. . .  
Add small lengths of tuning cable  
Redesign of RSP boards

## TODO

- Analyze entire clock distribution chain in climate chamber (Gijs Schoonderbeek)
- Regularly measure and re-tune PPS delays (Michiel Brentjens / observers)
- Investigate possible solution in field (Menno Norden / Michiel Brentjens)
- Roll out solutions LOFAR wide (Radio Observatory)