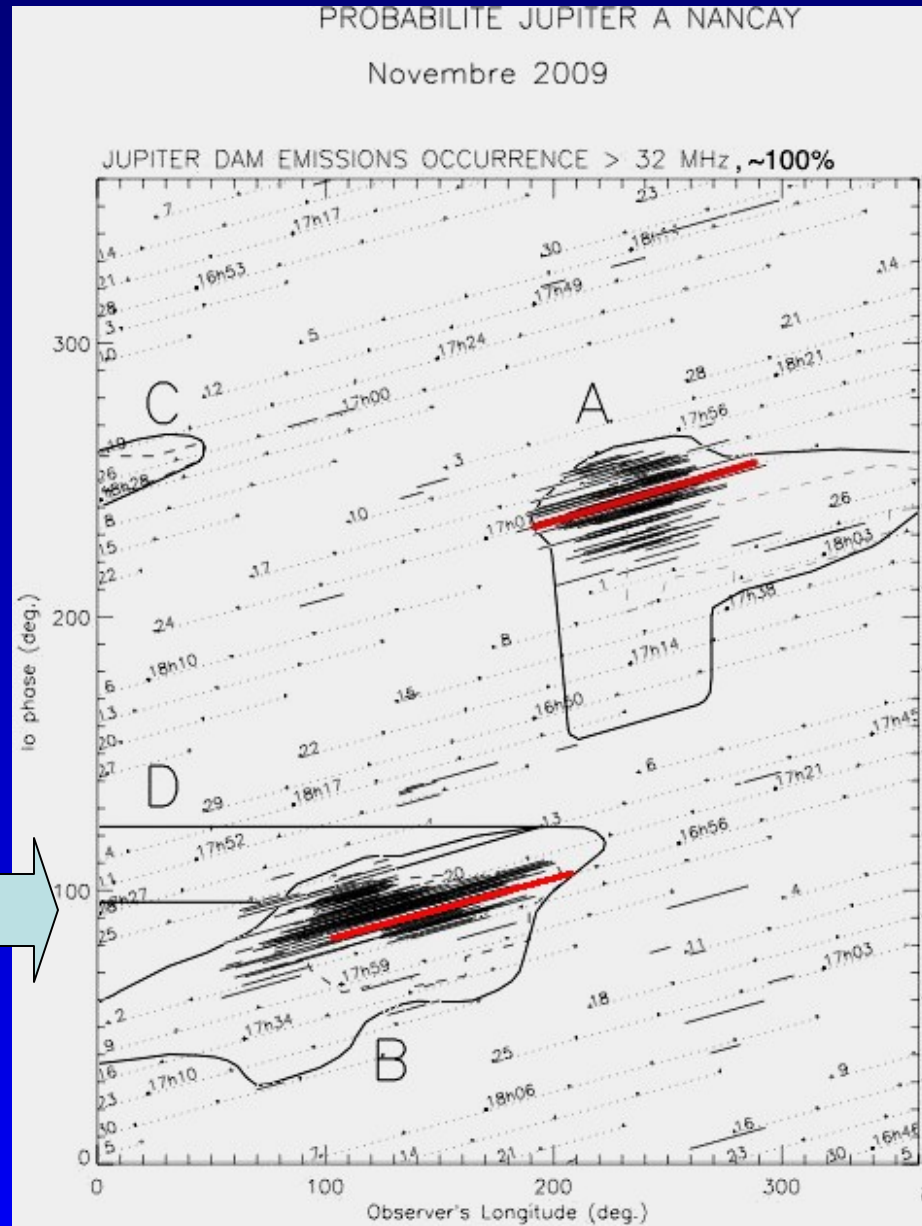




**Preliminary results of the
TKP/Planets Working Group
(Planet/pulsar busy week 12/2009 &
transients busy week 04/2010)**

J.-M. Grießmeier, J. Girard, W. Majid, P. Zarka

Observations of Jupiter at time of highly probable burst of emission: 2009/11/27 ~13:00 - 15:00 UT

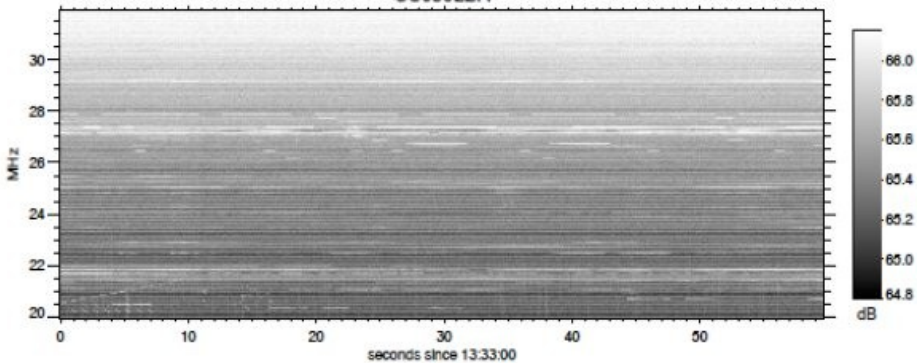


5 stations x 128 subbands [20-40 MHz] x 2 complex polars [4 Stokes] (= 5 Tb / hour on disk)

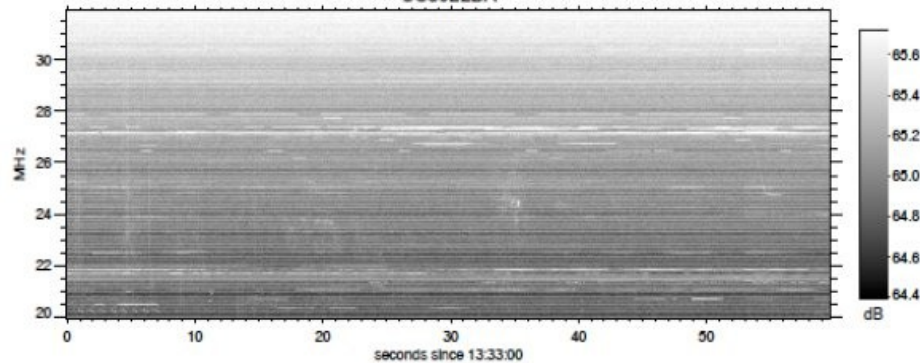
Simultaneous observation in Nançay

Interval of interest defined from Nançay data:
13:33 - 14:28, 20-32 MHz (SB 00-76)

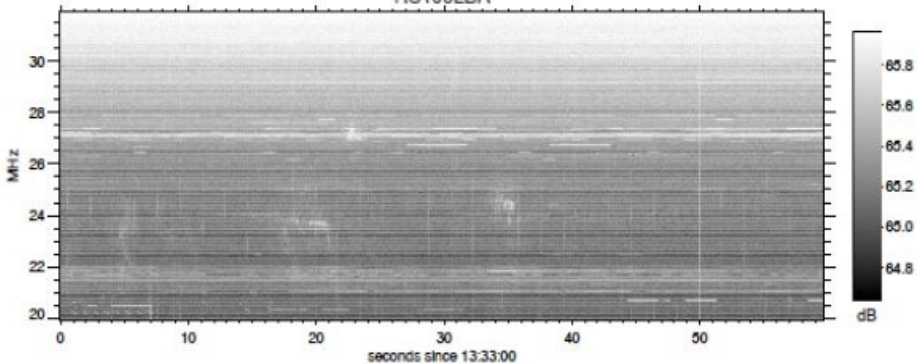
CS030LBA



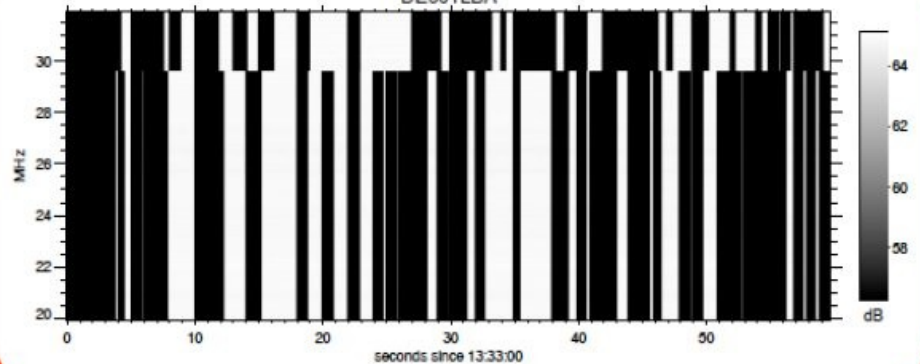
CS302LBA



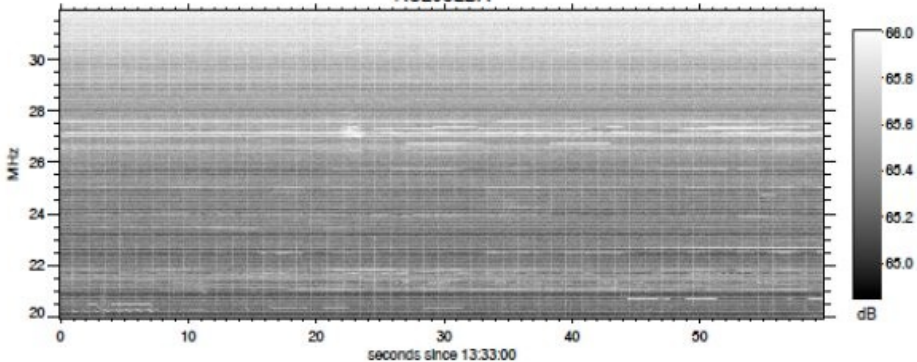
RS106LBA



DE601LBA

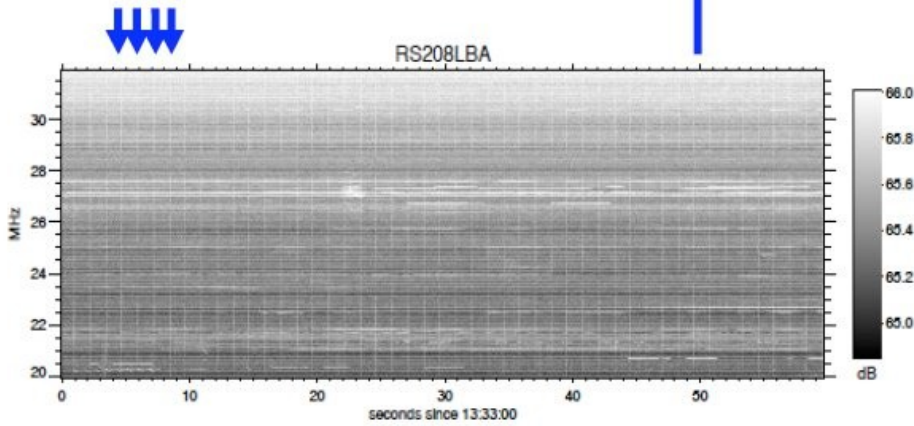
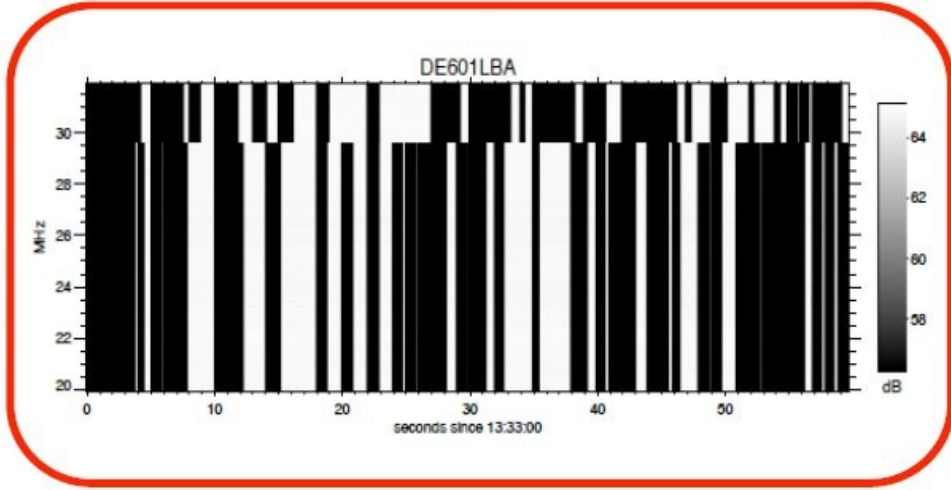
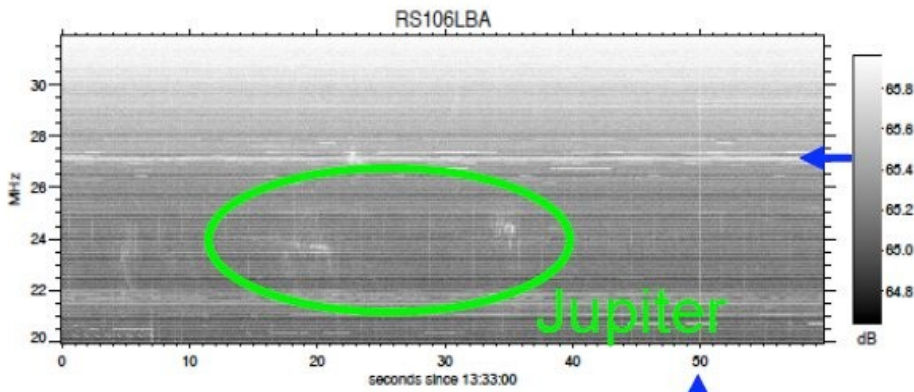
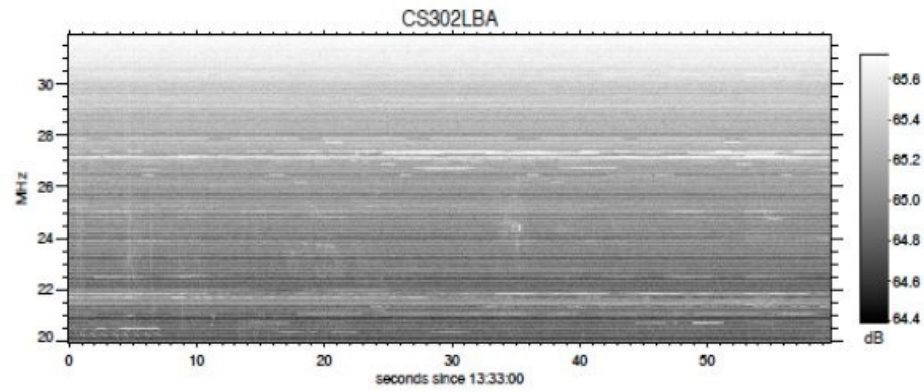
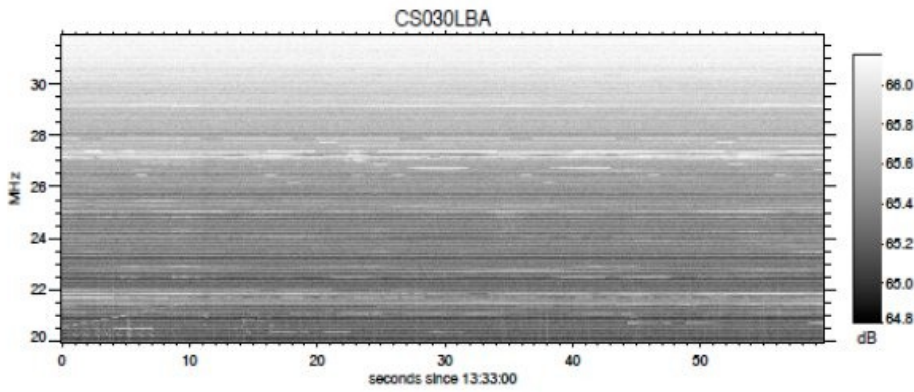


RS208LBA



Raw data

~50% gaps in DE 601
(Effelsberg) data

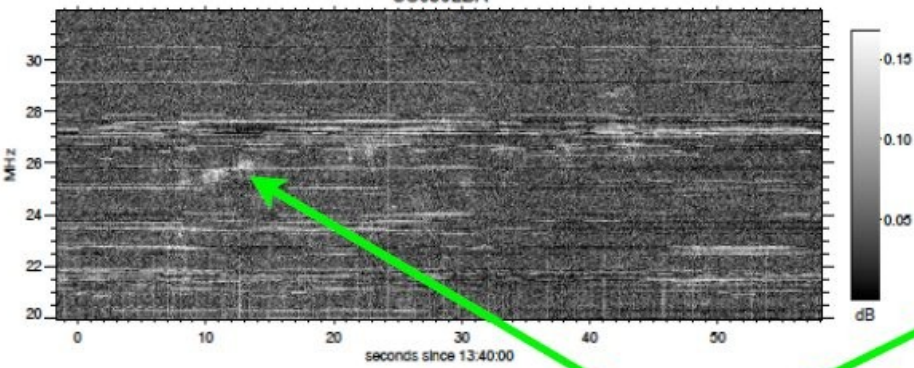


Raw data

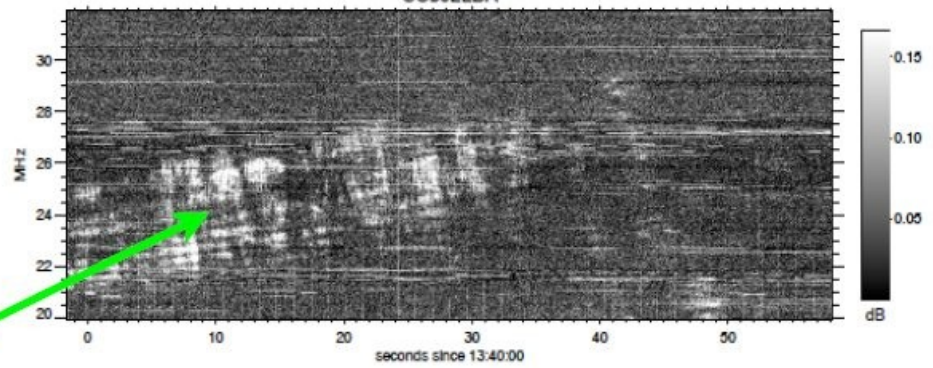
~50% gaps in DE 601 (Effelsberg) data

Lots of interference

CS030LBA

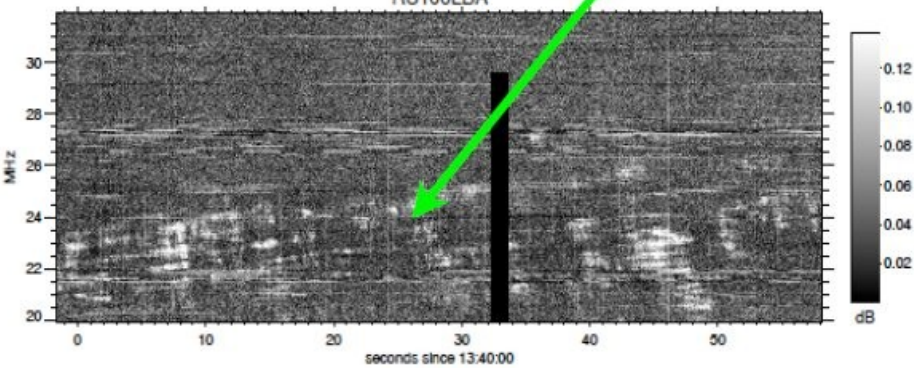


CS302LBA

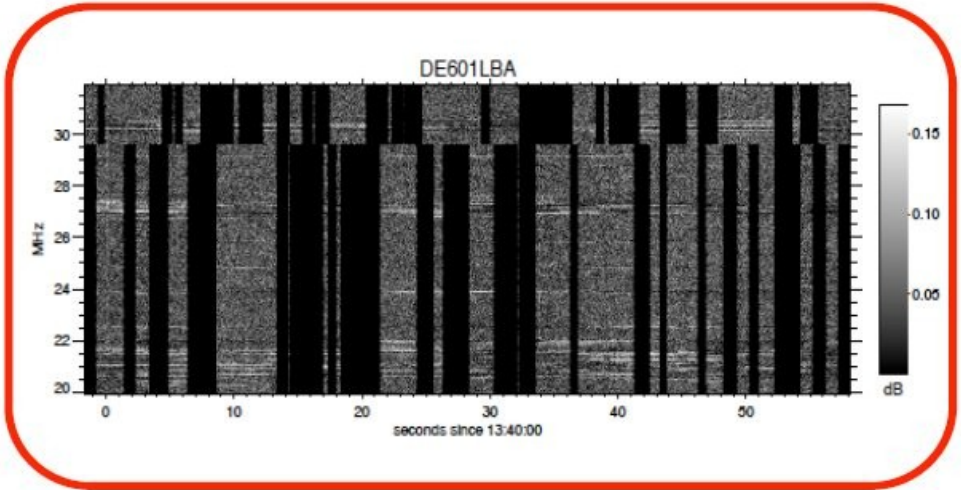


Jupiter

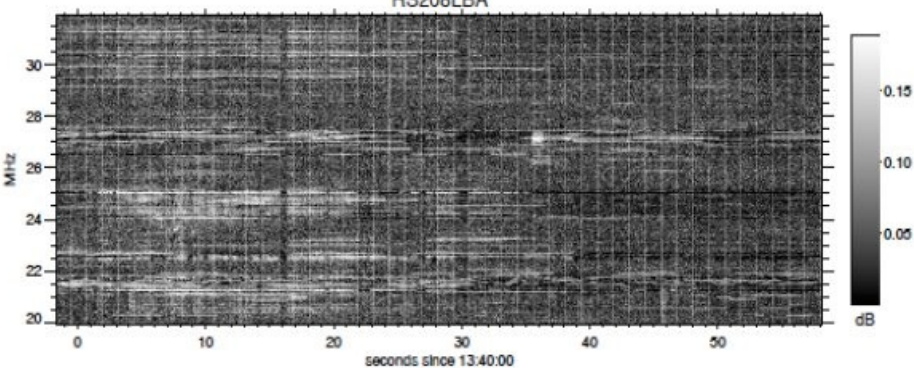
RS106LBA



DE601LBA



RS208LBA



Background subtracted

DE 601 (Effelsberg) did never see Jupiter during the whole observation

Jupiter detected by CS030, RS106, RS208, CS302, with very variable level (different stations see more intense emissions at different times) ; with a flux $> 10^6$ Jy, should be detected at all stations \Rightarrow pointing ? (LF filtering ?)

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Detected emission generally has a different t-f morphology as seen by the 4 above stations \rightarrow most likely due to strong ionospheric propagation effects (refraction/focussing) making different parts of emission visible at different t & f on 4 sites

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Detected emission is very weak : 0.1-0.3 dB above the background, versus 4-6 dB in Nançay

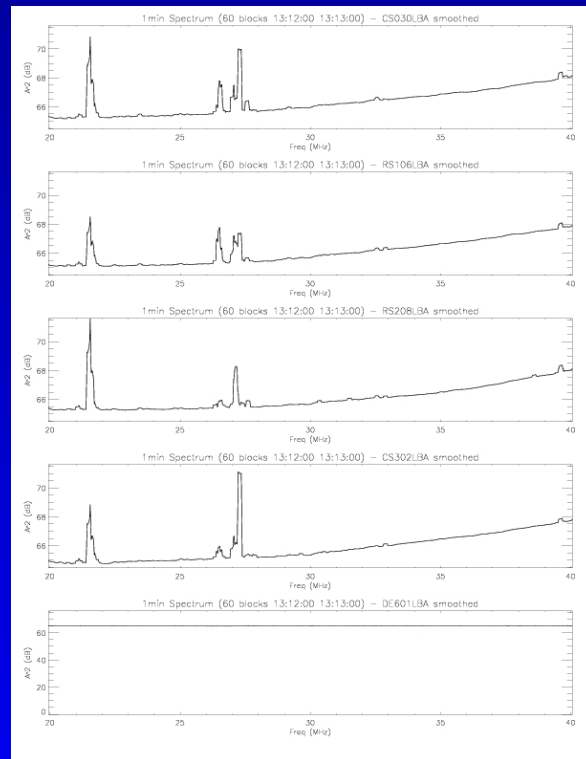
$$A_{\text{Nançay}} \sim 72/3 = 24 \lambda^2 \text{ per circ. polar.}$$

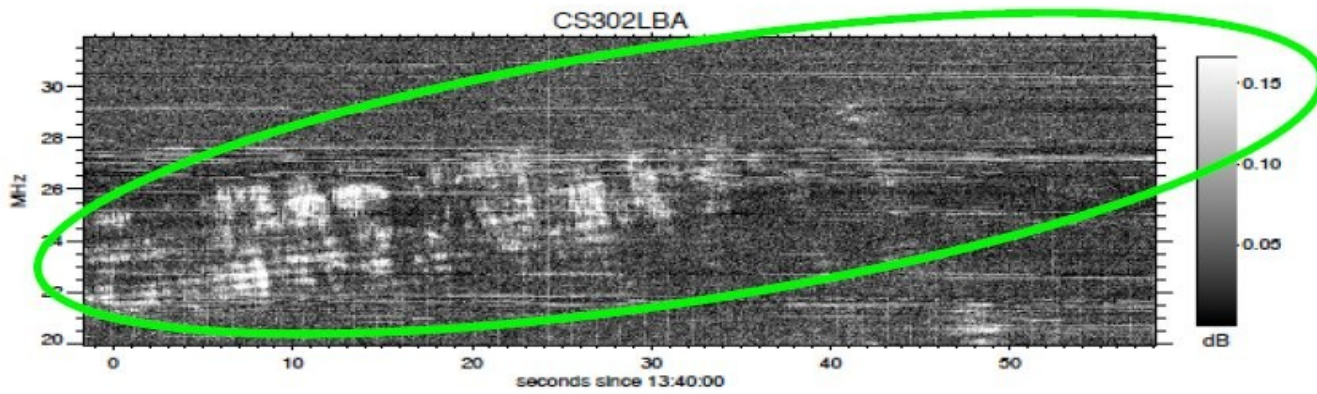
$$A_{\text{LOFAR}} \sim 2 \times 48 \lambda^2 / 4 = 24 \lambda^2$$

\Rightarrow much smaller difference expected

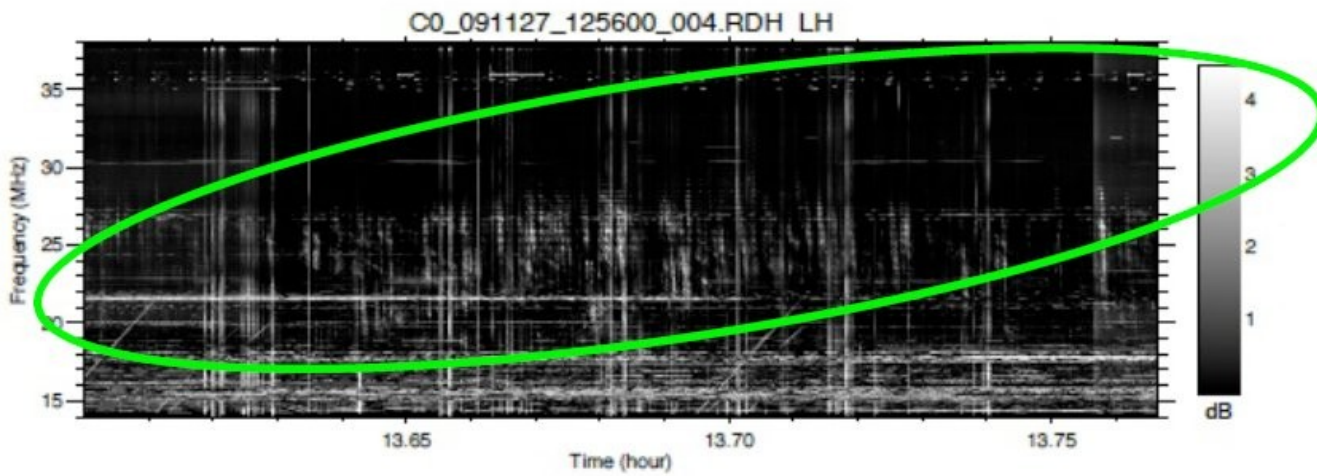
Spectrum / filter check

- no cutoff at 30 MHz
- no signal from Effelsberg (flat spectrum!)

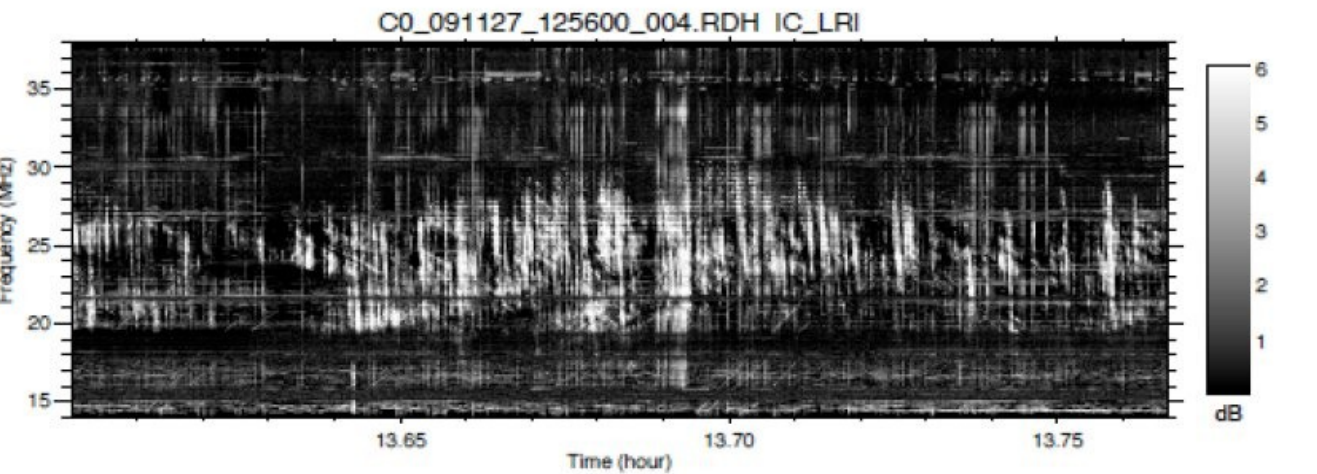




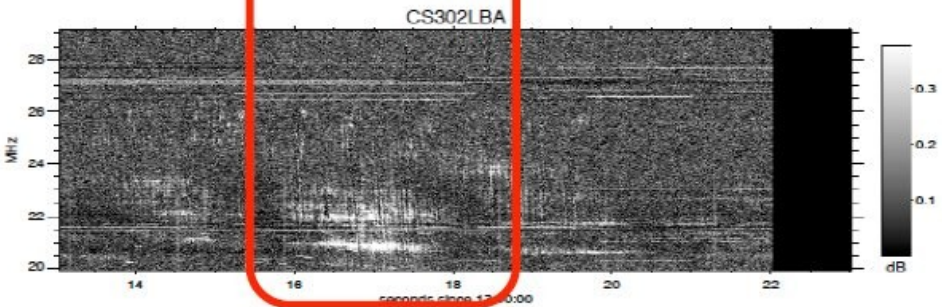
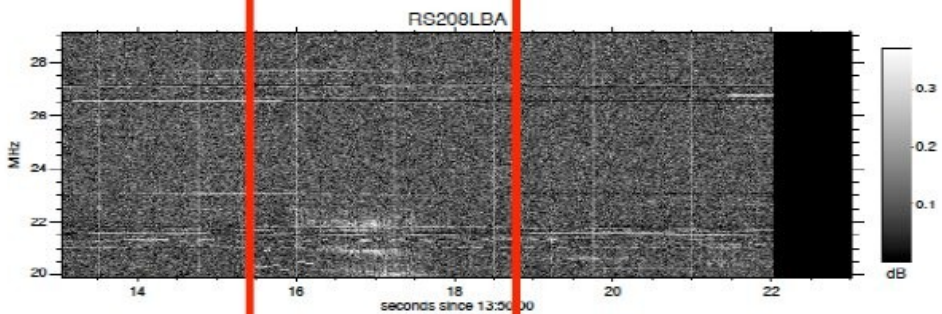
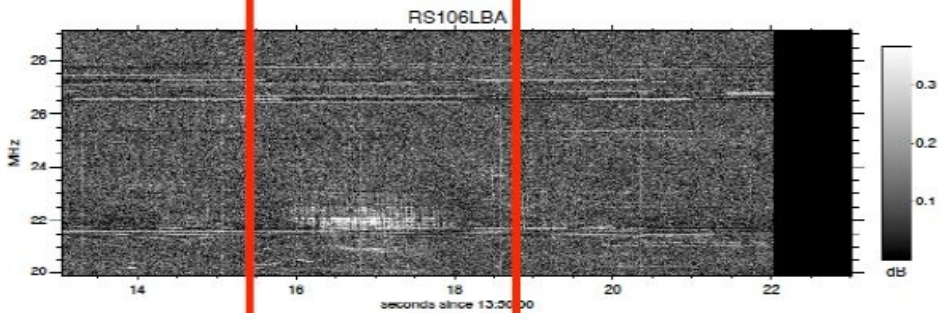
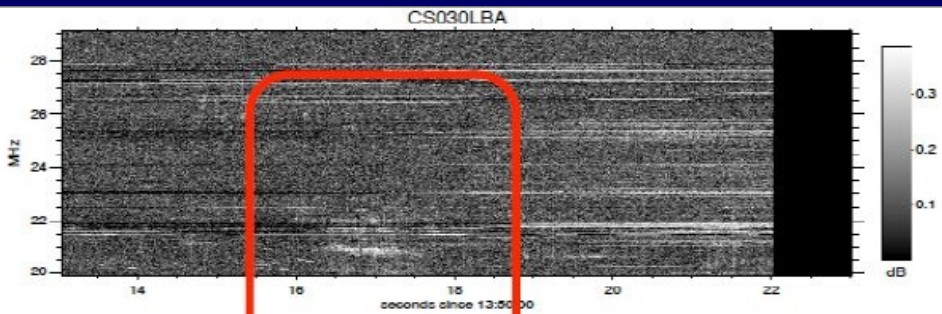
LOFAR
(Stokes I)



Nançay
(I_{LHC})



Nançay
($I_{LHC} \times I_{RHC}$)



4 instances of a few sec. each with similar emission detected (one such instance shown here)

TBD next :

Cross-correlate station data at 4 above instances to determine ionospheric delays function of time & station separation, and synthesize offline coherent TAB formation

Calibrate/measure polarization (& compare with Nançay observations)

Characterize LOFAR response below 30 MHz

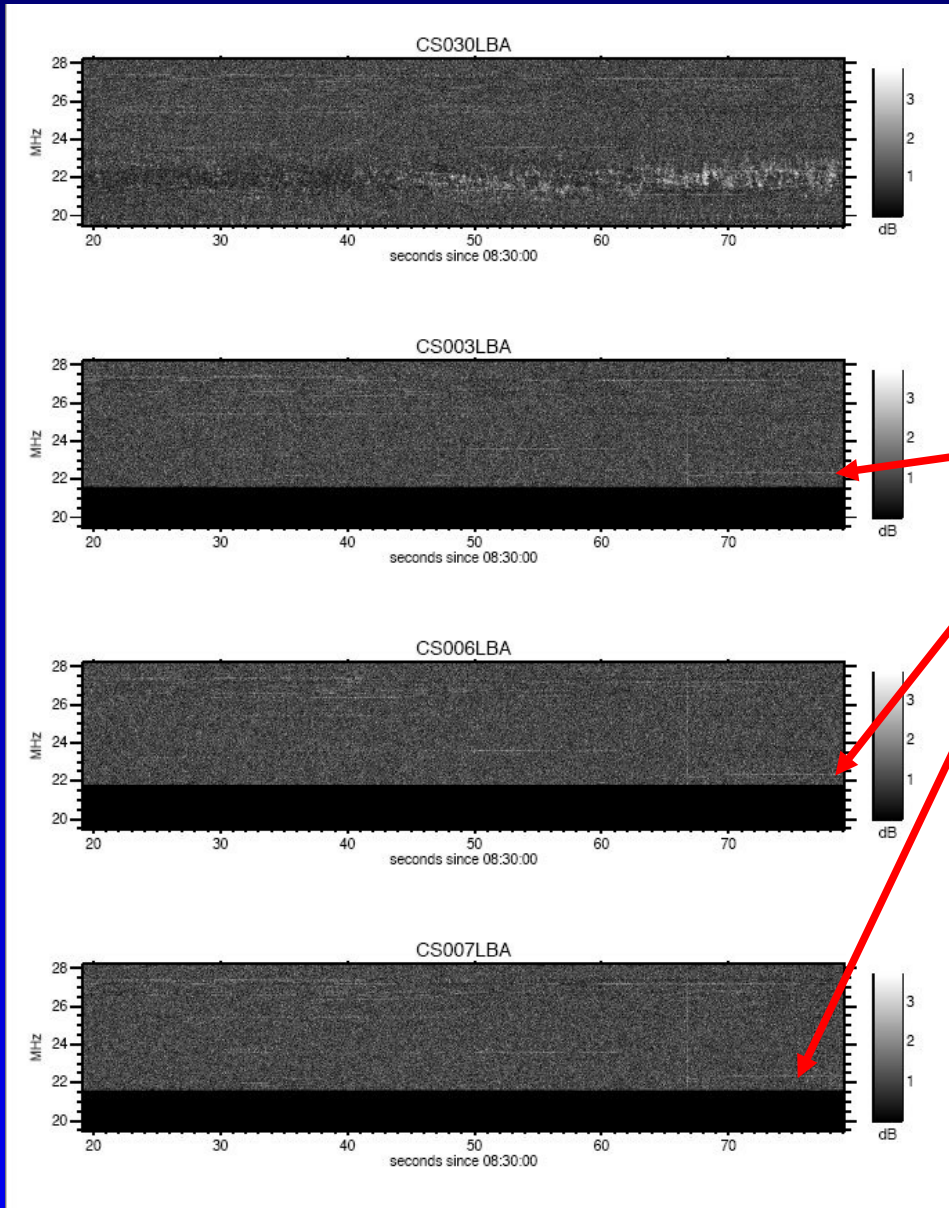
⇒ more observations needed

2010 planet observations

Observations:

- Jupiter
 - 4 stations
 - station data: complex voltages, full resolution
 - 20-39 MHz
 - 20 minutes
 - magnetospheric emission
 - 1.5 TB
- Saturn
 - 10 stations (incoherent sum)
 - Stokes I, full resolution
 - 30-78 MHz
 - 3h (well chosen!)
 - lightning (known <1-40+ MHz)
 - 1.9 TB

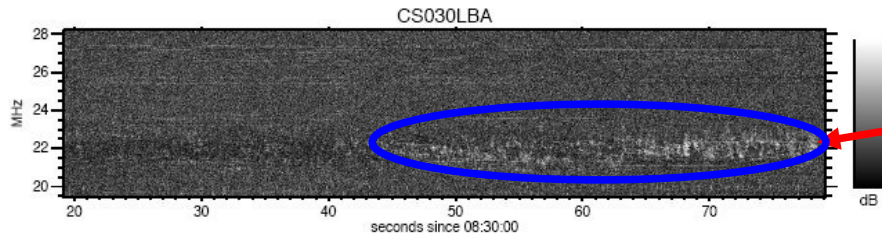
Jupiter observation



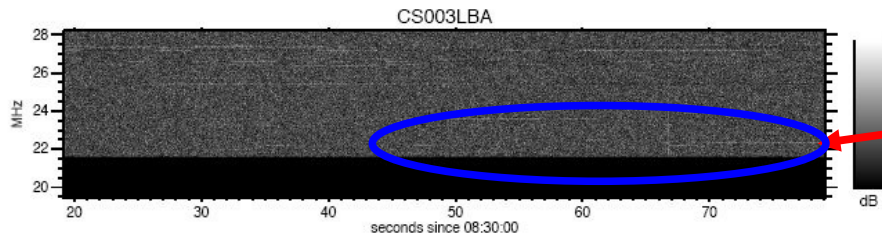
subbands filled with zero

- 4 stations
- 20 minutes
- 20-39 MHz
- magnetospheric emission

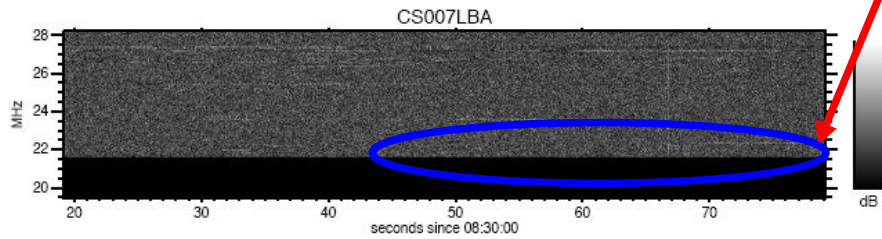
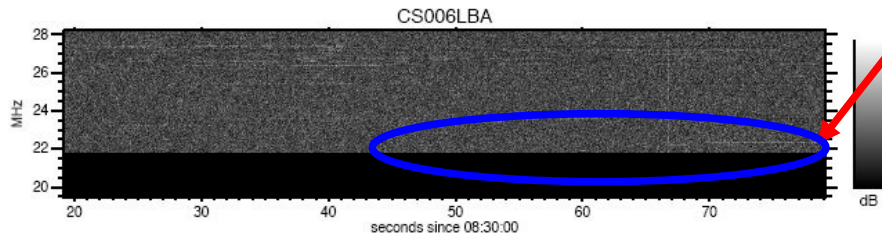
Jupiter observation



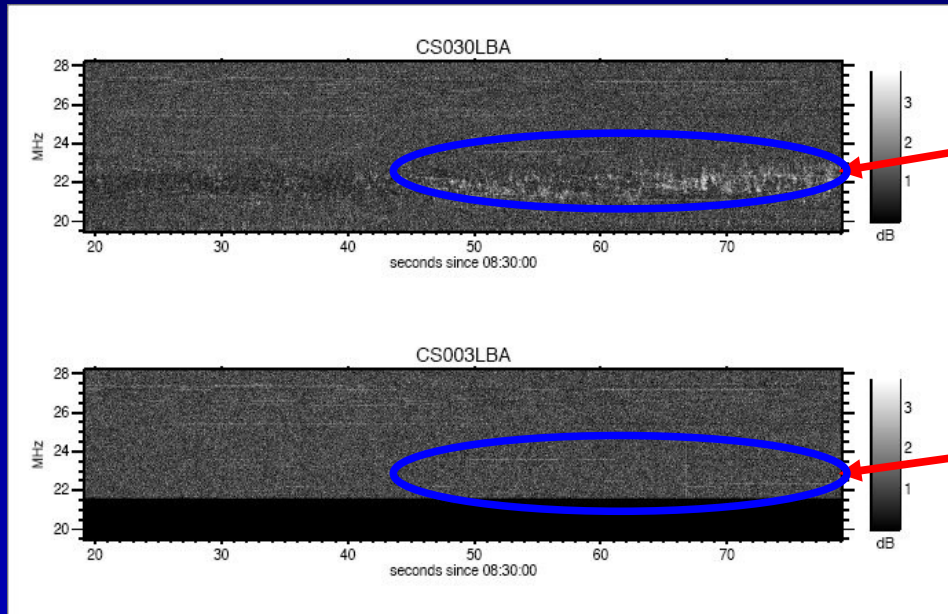
Jupiter



no Jupiter

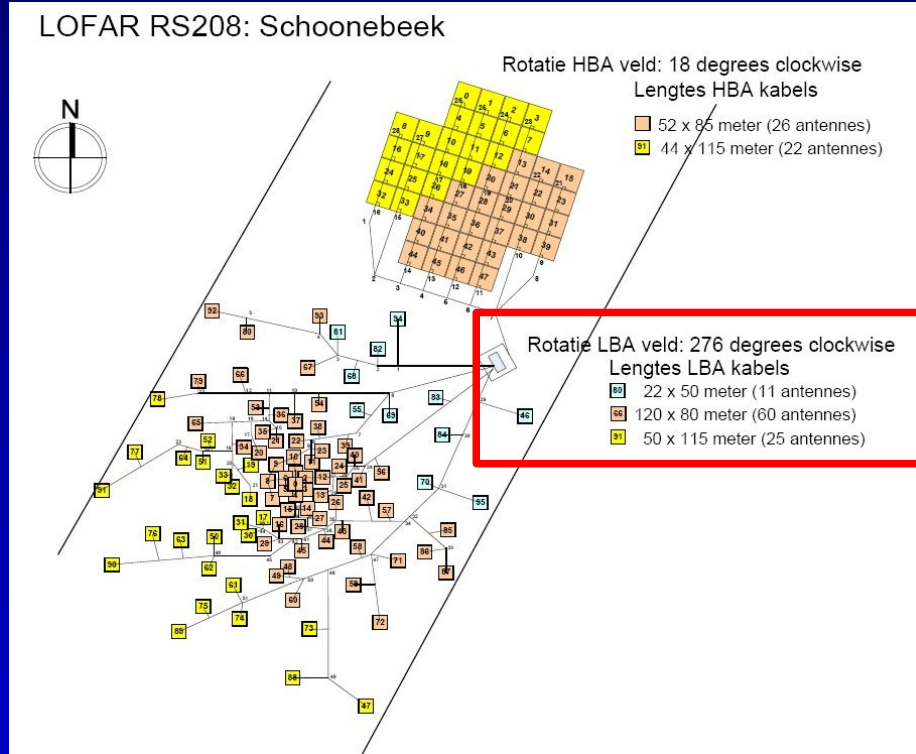


Jupiter observation



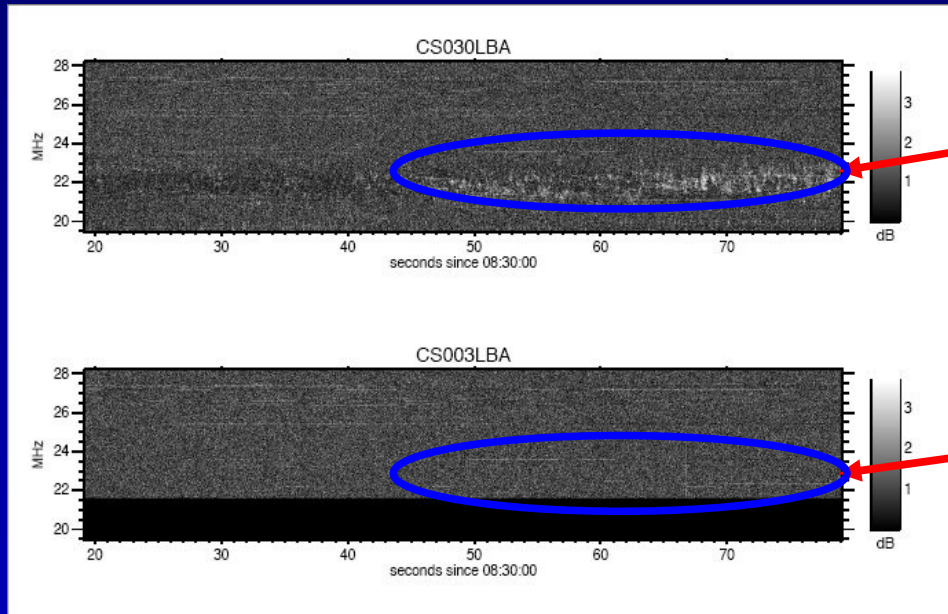
- Jupiter very bright ($>10^6$ Jy)
⇒ should be detectable by all stations
- in 11/2009 data, Jupiter was seen by 4 stations
- is this a pointing problem?
- cable length compensation OFF since 19/01/2010

Cable length compensation



- 3 different cable length
- cable length compensation OFF since 19/01/2010

Jupiter observation



- does anyone else use spectra/station data?
- influence on pulsar observation (incoherent sum only)?
- intensity consistent will all stations working?
- how to check?
- other possible causes?
- \Rightarrow systematic monitoring (all stations!)

Jupiter observation

- \Rightarrow systematic monitoring (all stations!)
- Jupiter: intense, predictable, but a few occasions/month
- sun: intense, unpredictable, daytime
- pulsar (too weak?)
- Cas-A: intense, permanent (except for scintillation), circumpolar (always observable) (transit + tracking?)
- ... ?