# Joint SolO/RPW & PSP/FIELDS workshop

## 26-29 February 2024

## Hotel Dupanloup Orléans, France



*The Poor Villager science*




$$\mathcal{E} = -N\frac{d\phi}{dt} = -NS\frac{dB}{dt}$$



- First lead CoI for SCM on RPW
- 3D-Plus pre-amp developements
- RPW proposal in 2007-2008
- Support for the new FIELDS flight model

# Joint SolO/RPW & PSP/FIELDS workshop

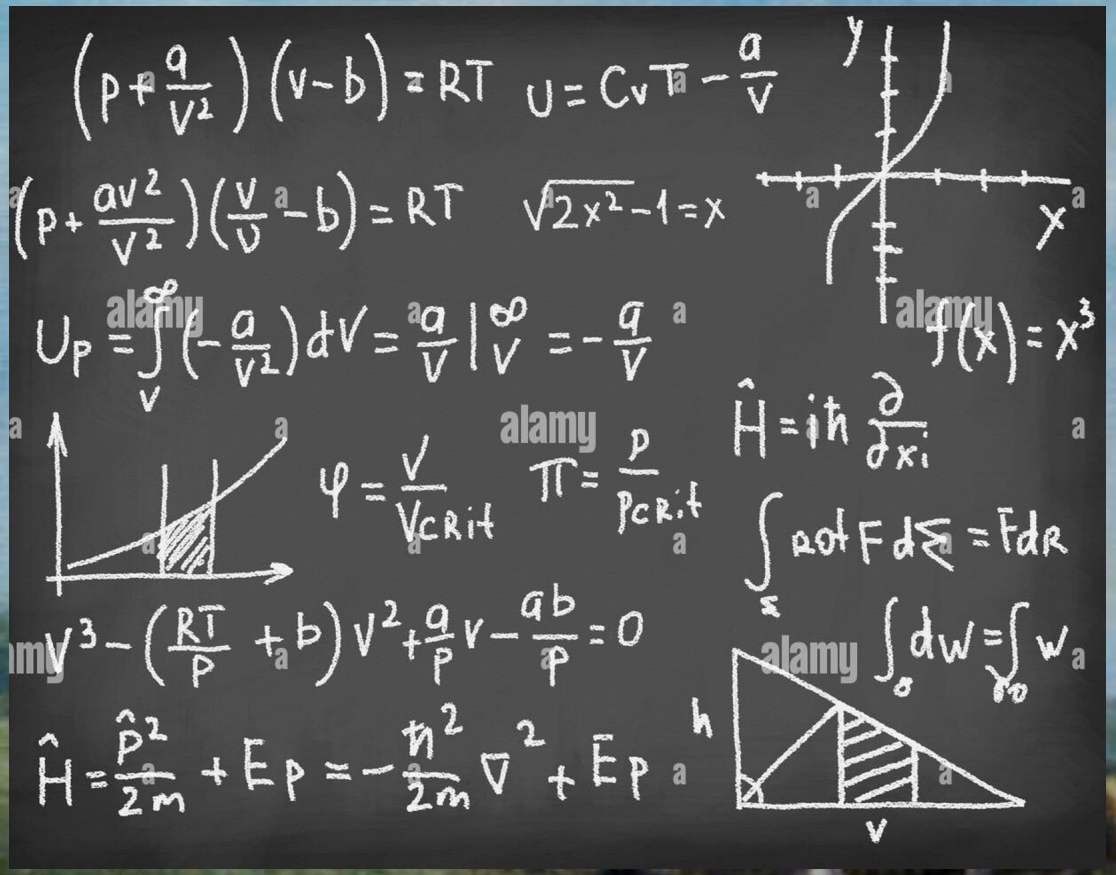
## 26-29 February 2024

## Hotel Dupanloup Orléans, France

**Type III Solar Radio Bursts at Long Wavelengths : Observed properties and open questions : a personnal view**



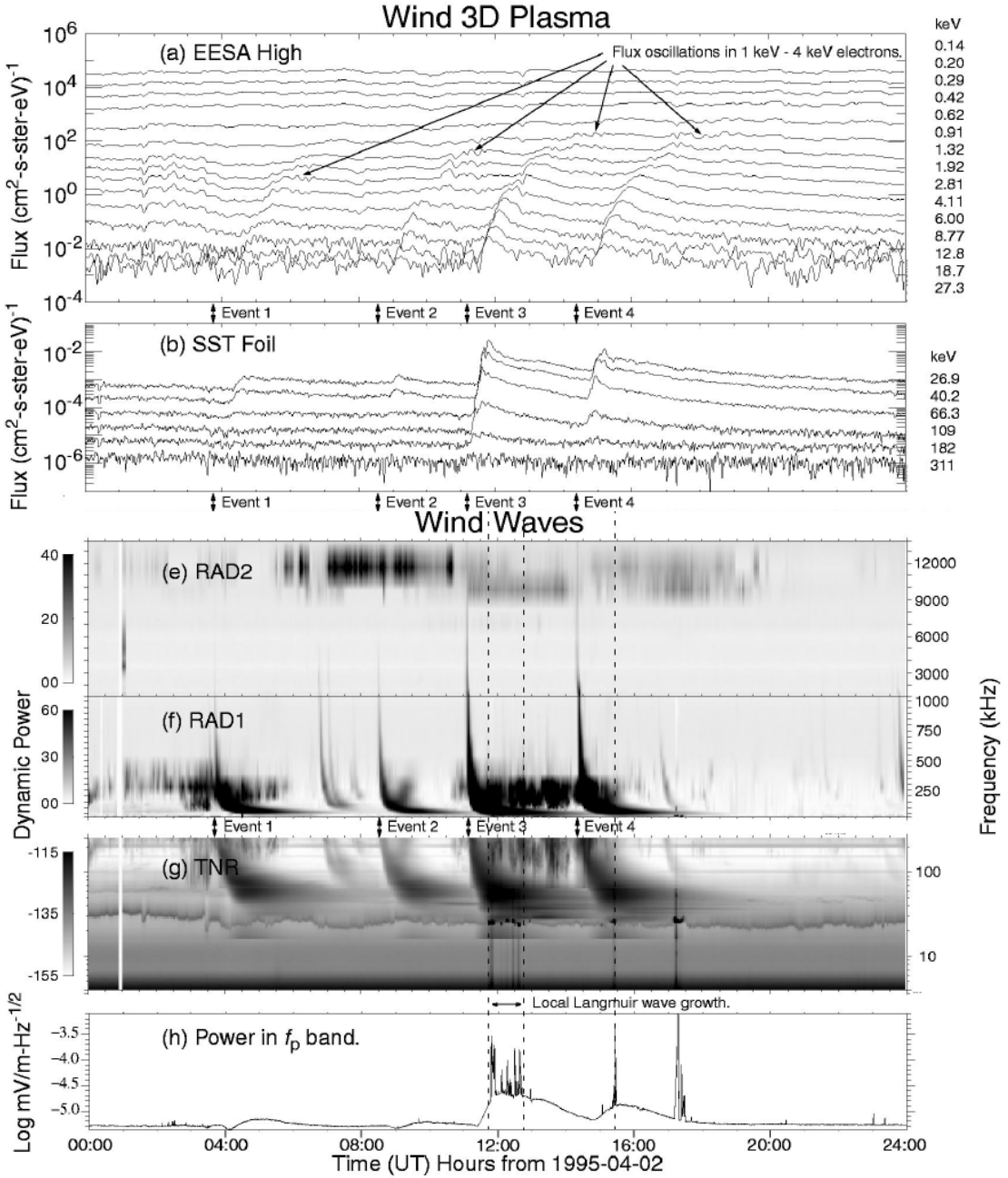
*The Poor Villager science*



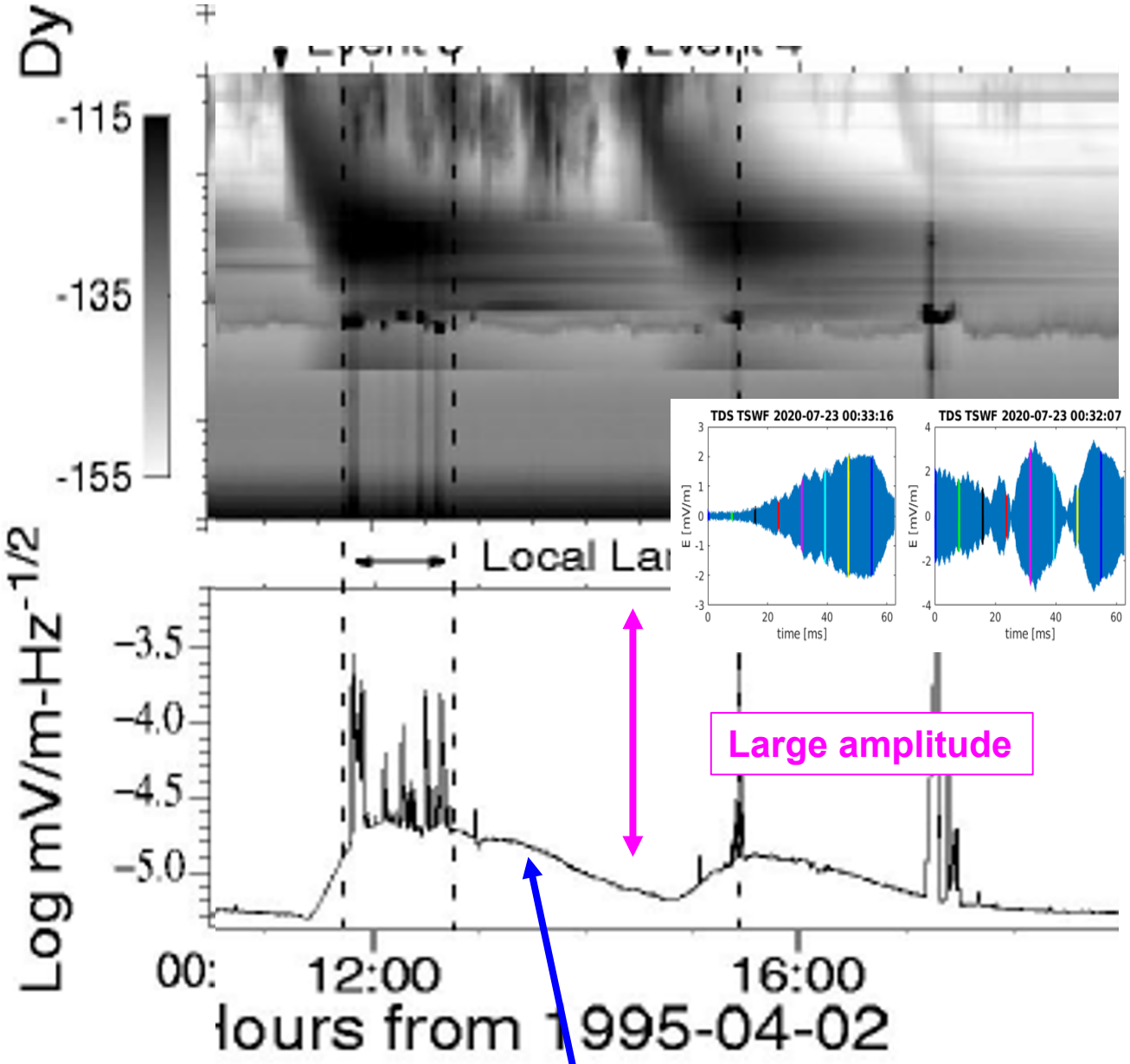
# Many major contribution to the topic

- Distribution of LW energy, or no Stochastic Growth theory ?? *with K. Musatenko, S. Lobzin …*
- Electron beam/LW/$\frac{\partial n}{n}$ coupling *with S. Volokitin, K. Krafft, A. Voshchepynets*
- Generation of EM waves from LW scattering on $\frac{\partial n}{n}$ with A. Tkachenko, *A. Voshchepynets*
- F-H type III pairs *with E. Jebaraj*

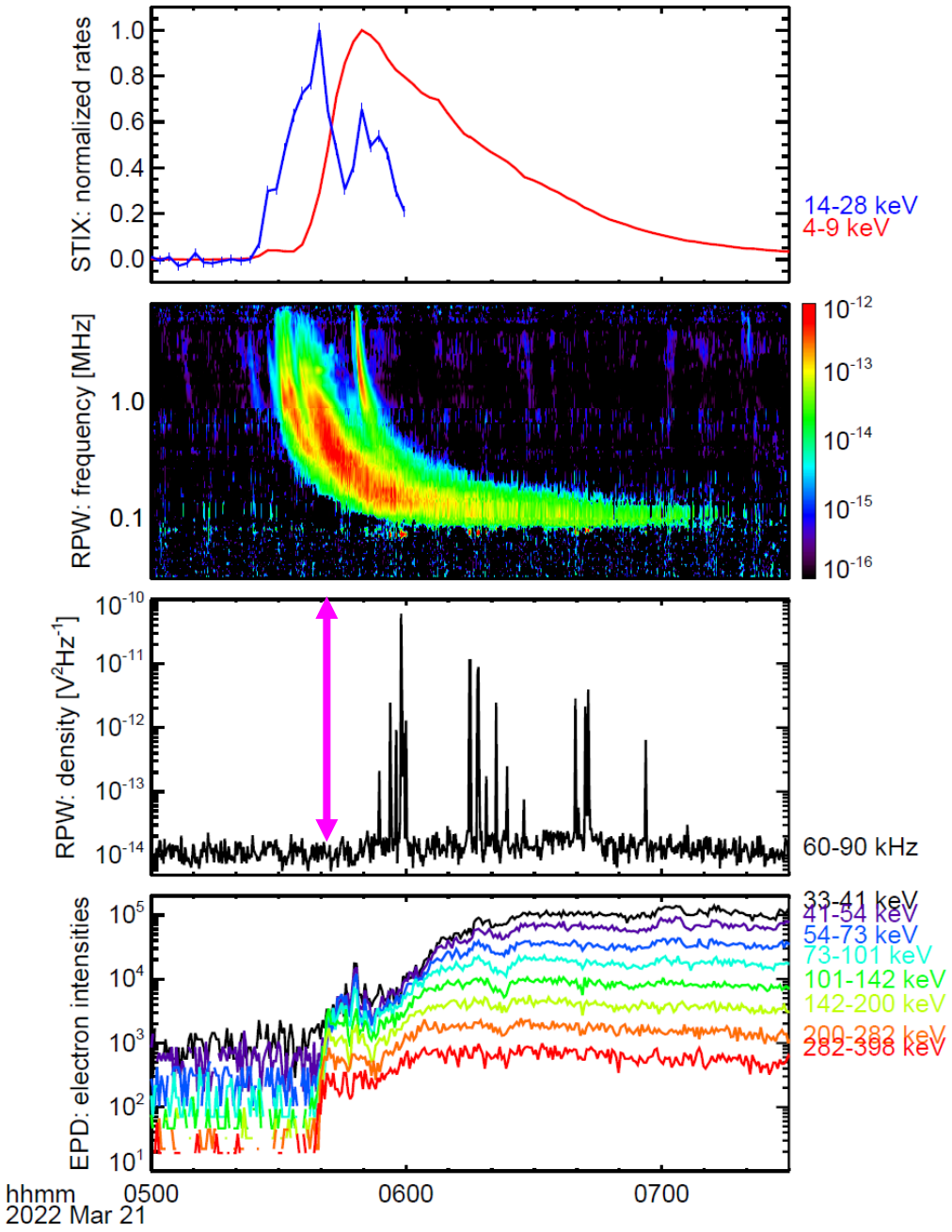


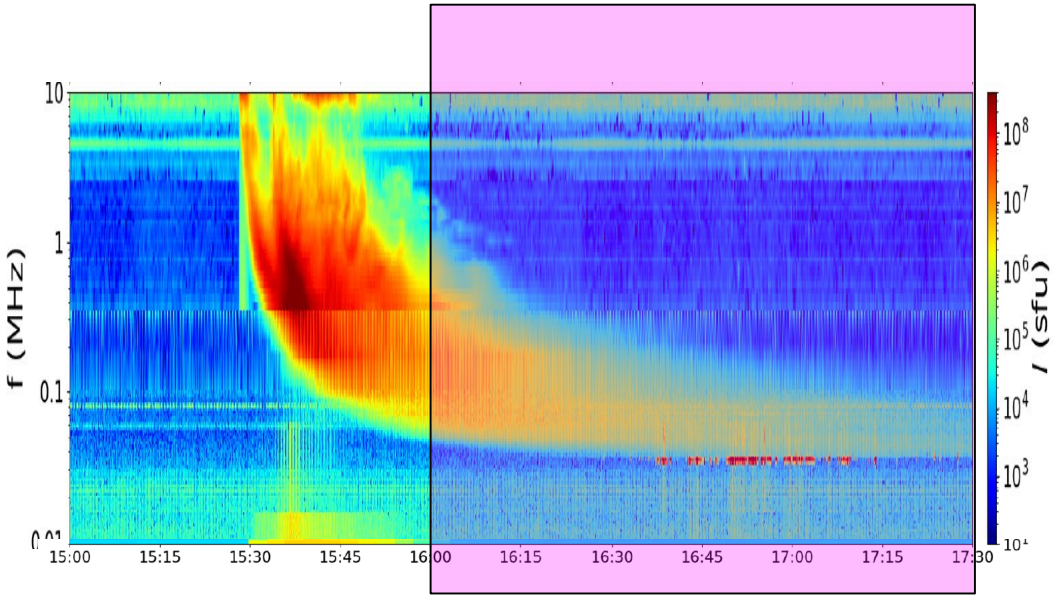



Adapted from [Ergun et al., 1998]

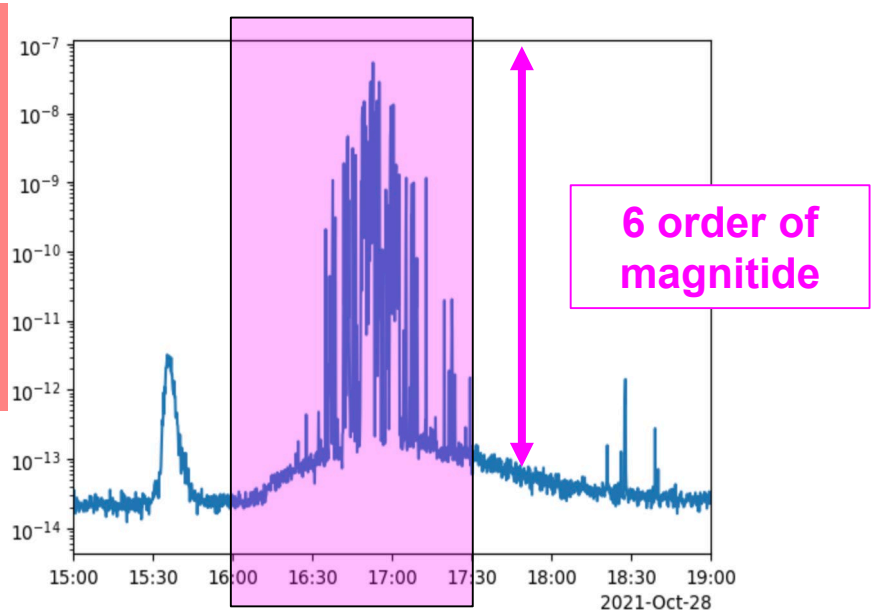



**Background : receiver noise + QTN + Galaxy**



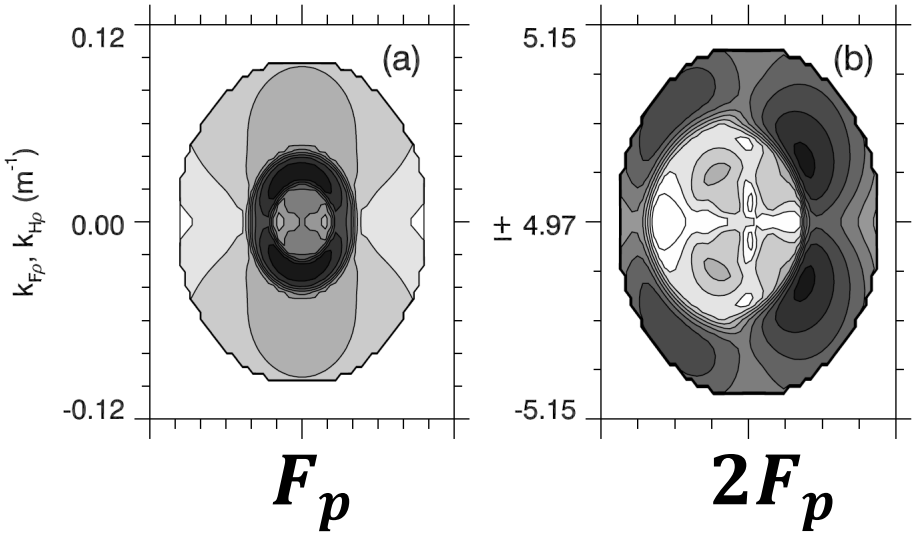




**Q : Why only a very small fraction of the LW power is going into radio ?**

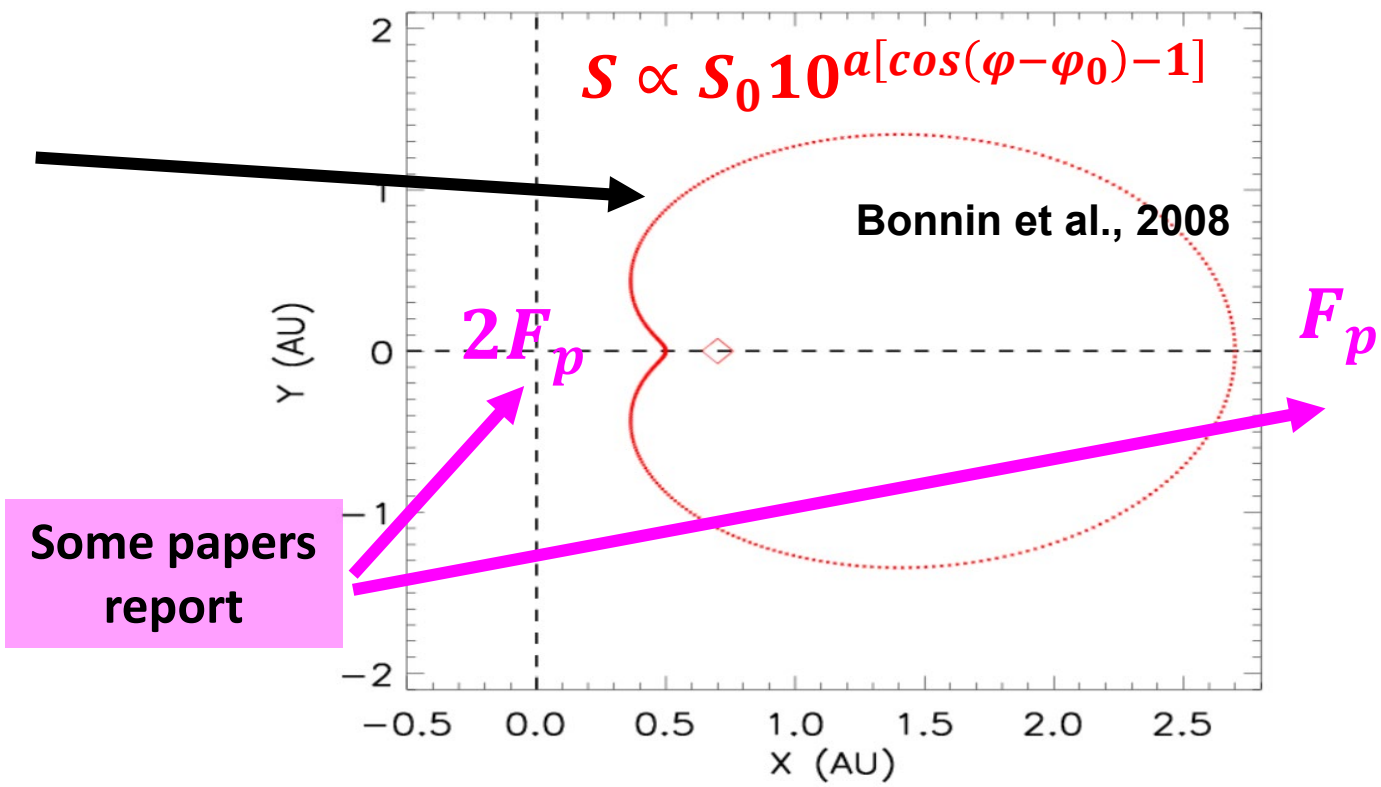


**Q : Radio emission @ $F_p$ or $2F_p$ or both or changing with distance ?**

| Frequency range kHz | $a$ | $\varphi_0$ in° |
|---|---|---|
| 940 - 740 | 0.92 | 23 |
| 540 – 388 | 0.87 | 27 |
| 272 – 196 | 0.78 | 29 |
| 148 – 124 | 0.77 | 35 |
| 104 – 80 | 0.50 | 55 |

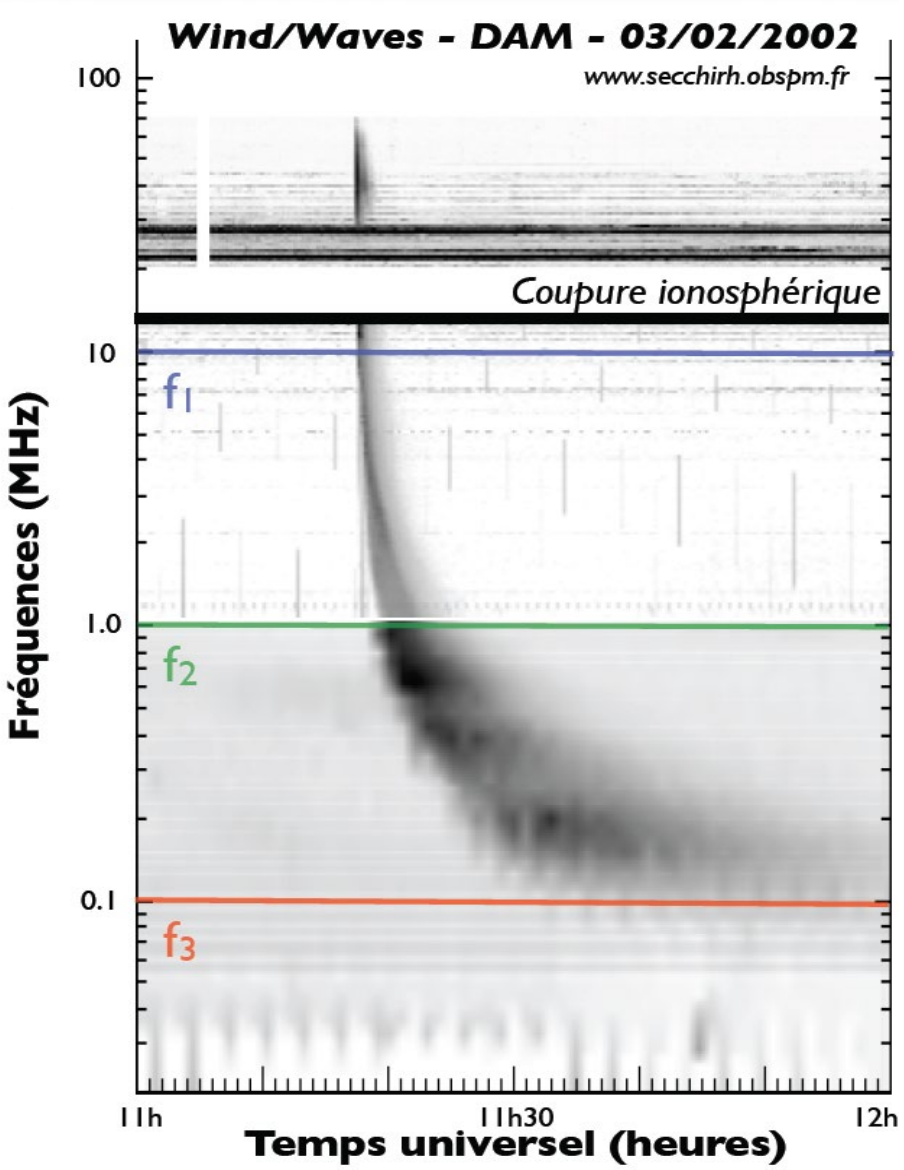


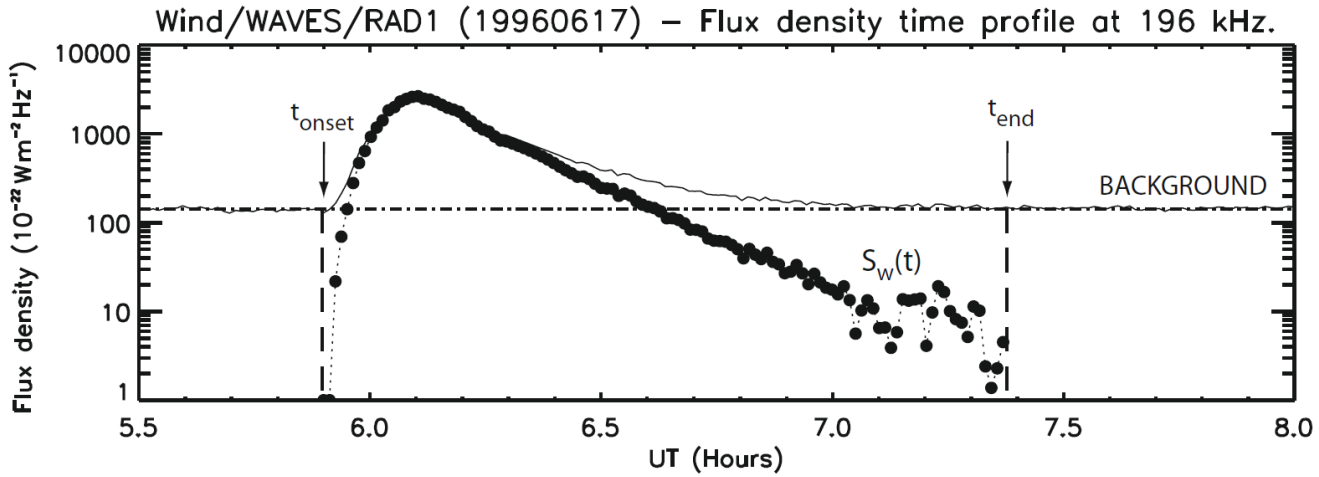

**Source radio beam**

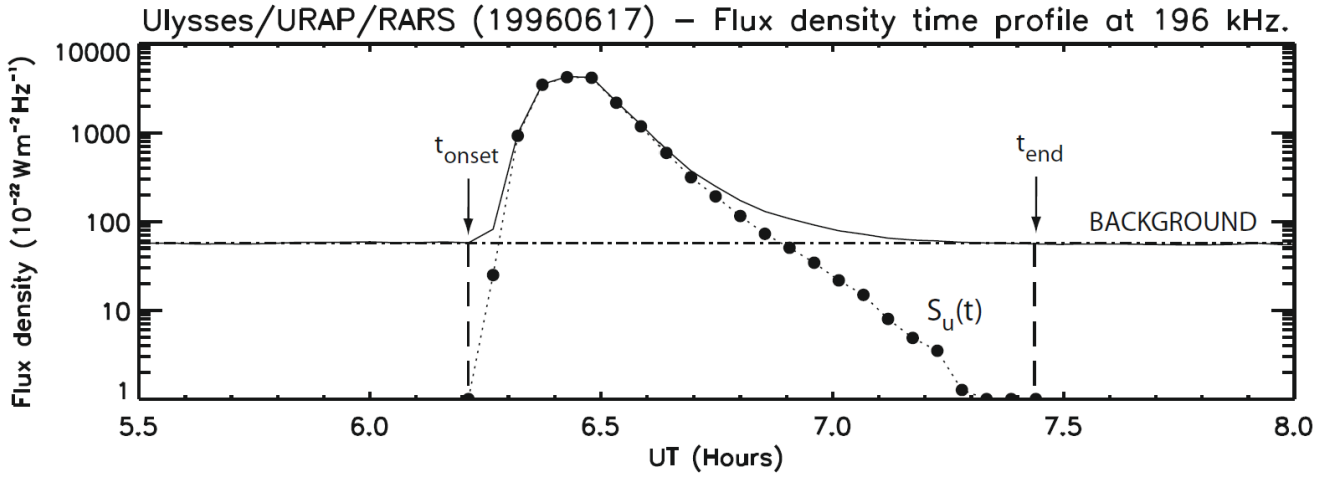



**Some papers report**

# On the decay and rise times



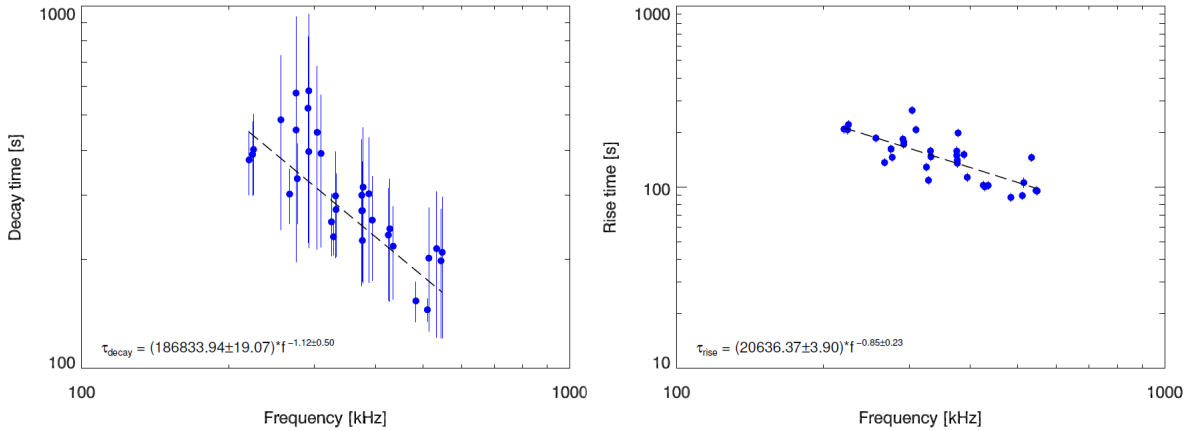

**Time resolution typical ~30 sec**

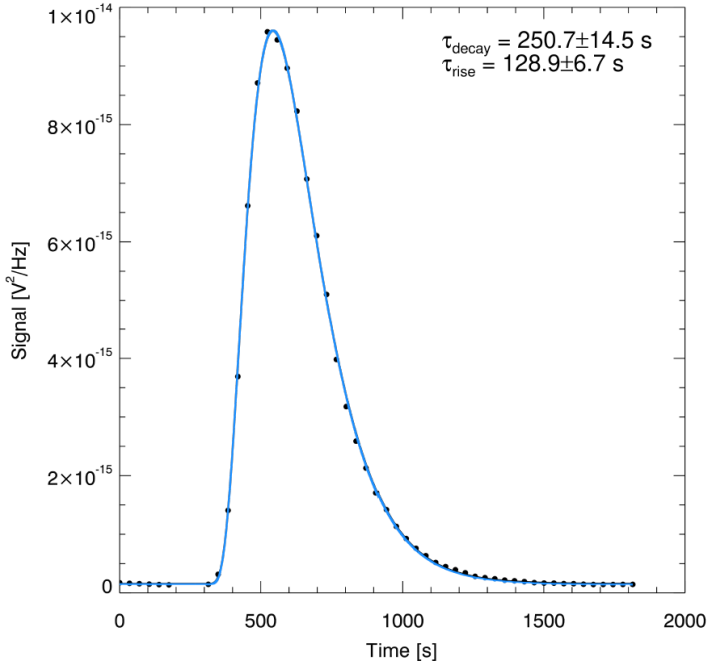
***Bonnin et al. 2008***

**The decay is very exponential and seems to be strongly related to scattering**

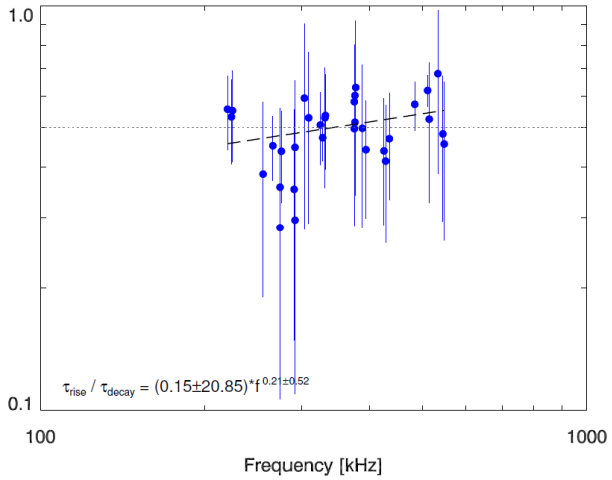
# Q : To what is the rise time related ?

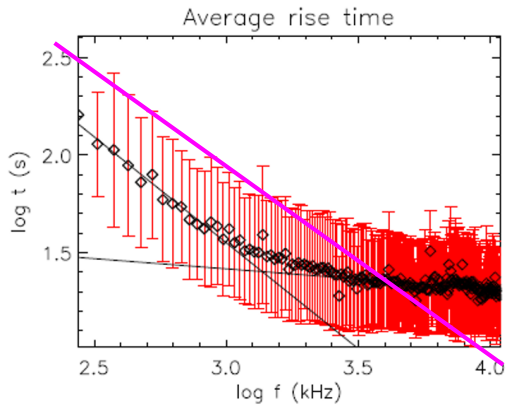
***Chrysaphi in prep.***

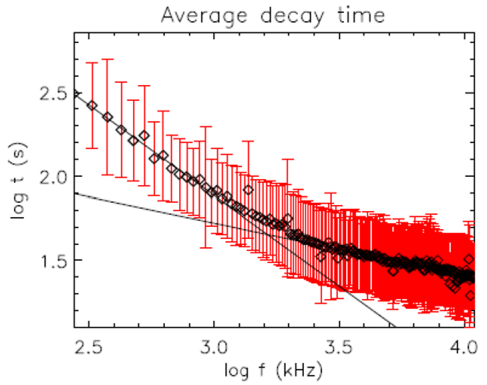



$$\frac{\tau_{rise}}{\tau_{decay}} \sim 0.5$$



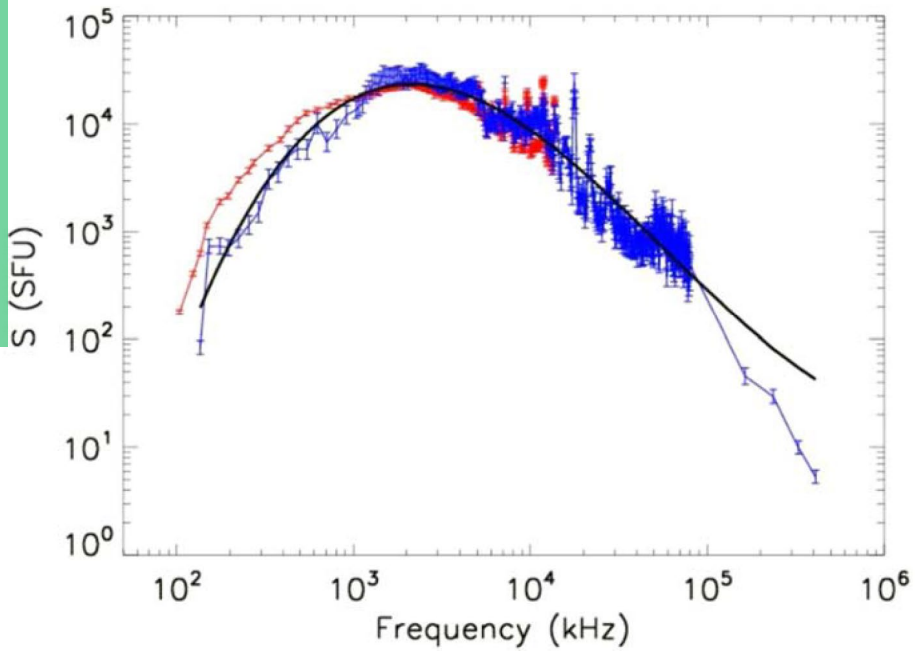




$$\frac{\tau_{rise}}{\tau_{decay}} \sim 0.7$$

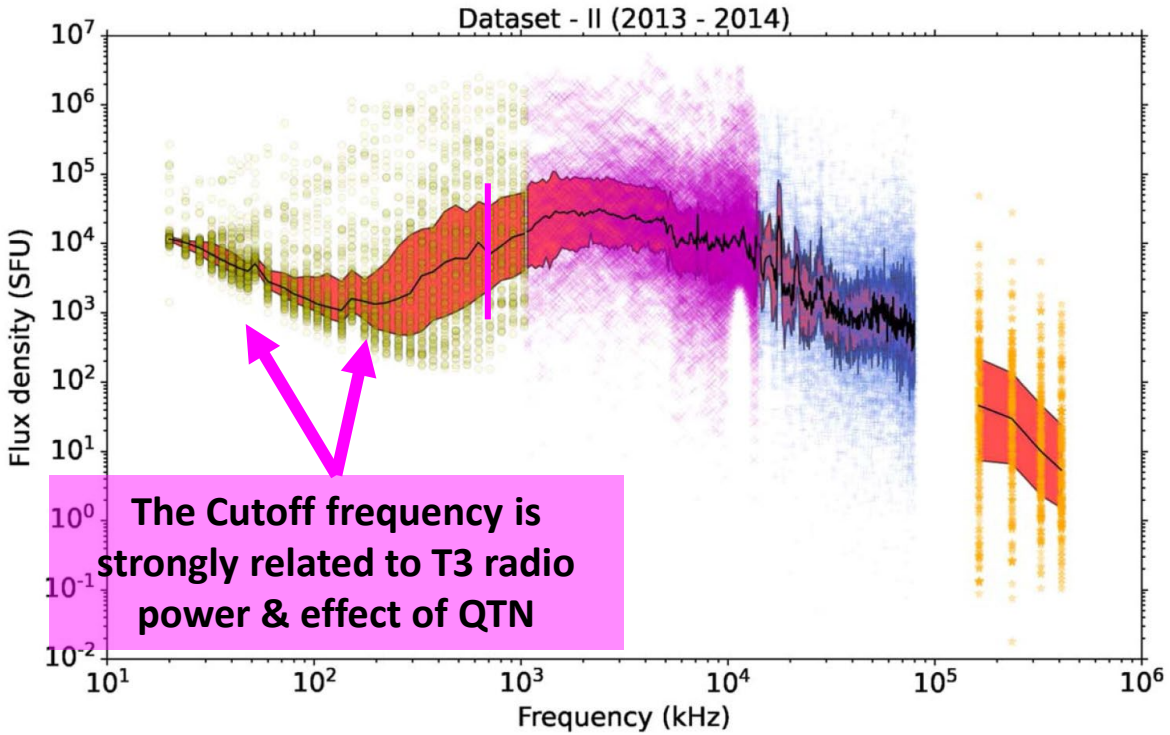
$$S(t) = \left[A \exp\left(-\frac{\tau_1}{t - t_{off}} - \frac{t - t_{off}}{\tau_2}\right) + C\right] \times H(t, t_{off})$$

**Q: Why do the Type IIIs radio power is statistically maximum at 4-10 $R_\odot$ ?**

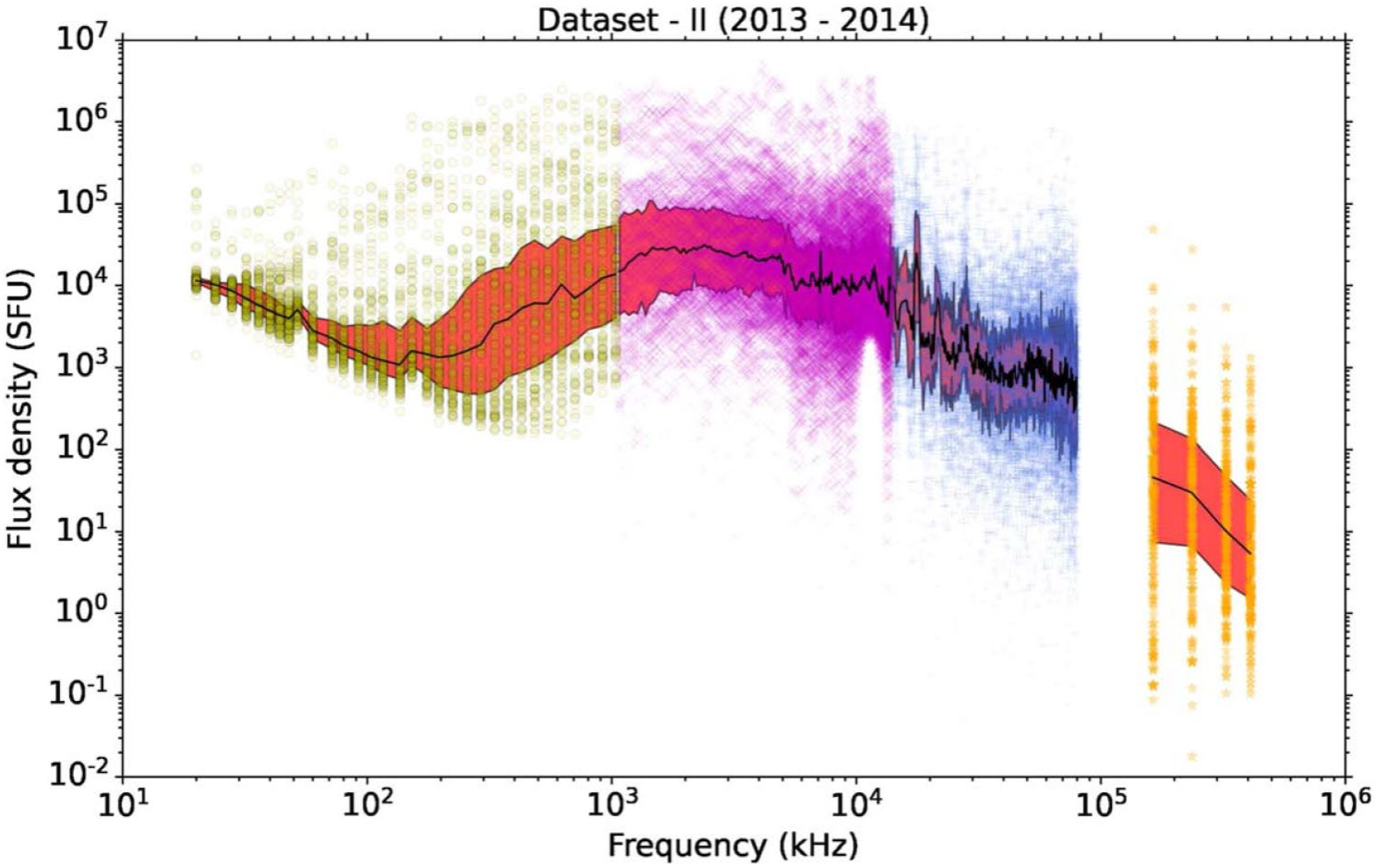
- Low density fluctuations which would cause high level of LW?
- High density fluctuations ?
- Change of $\partial N/\partial r$ ?
- Change of $N_{bean}/N$ ?

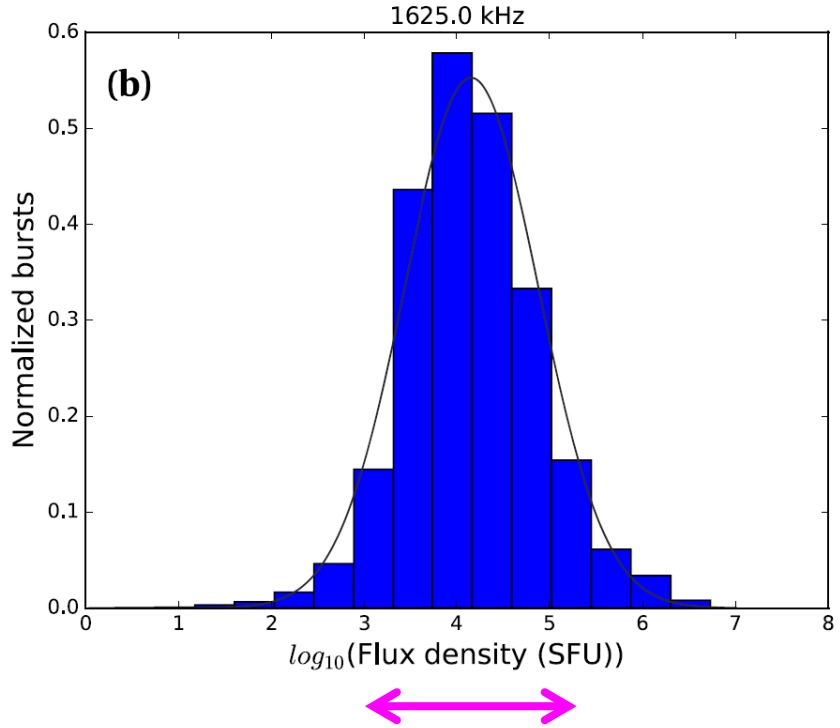



***Raja et al., 2021***




**Interesting preliminary results by Francesco Azzolini**



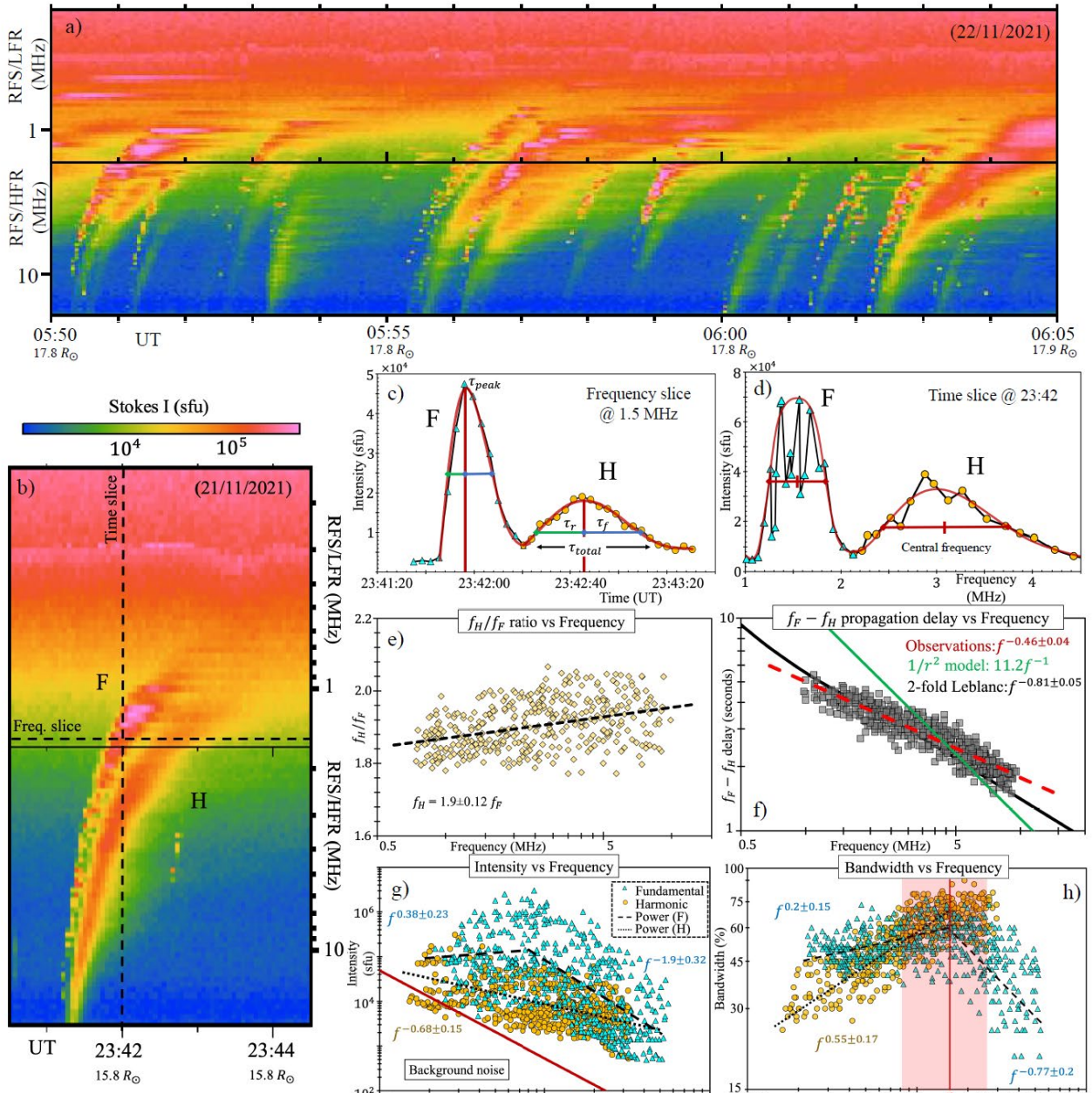

3 orders of magnitude

**Q: what is the actual distribution of TIII radio powers**

$$Log_{10}(S) \propto a[cos(\varphi - \varphi_0) - 1]$$

**1.82 orders of mag. @ 940 – 740 kHz**

# Q: F? H? or both ?

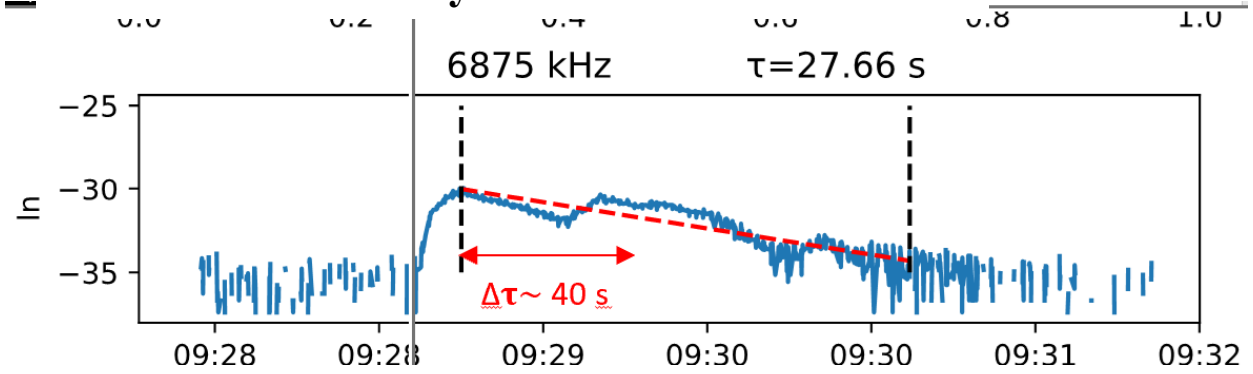


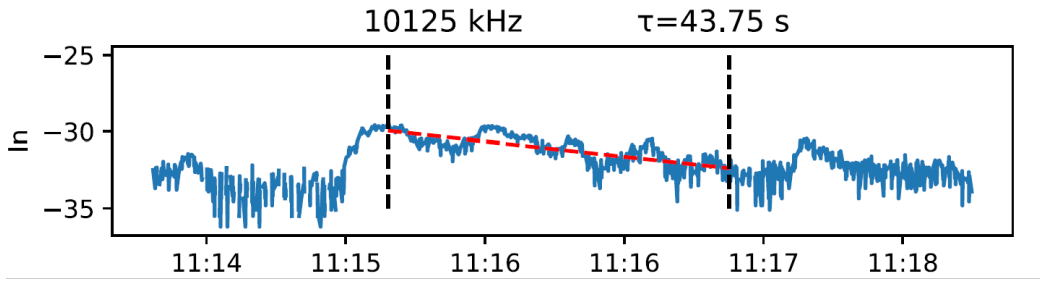

Jebaraj et al., 2023

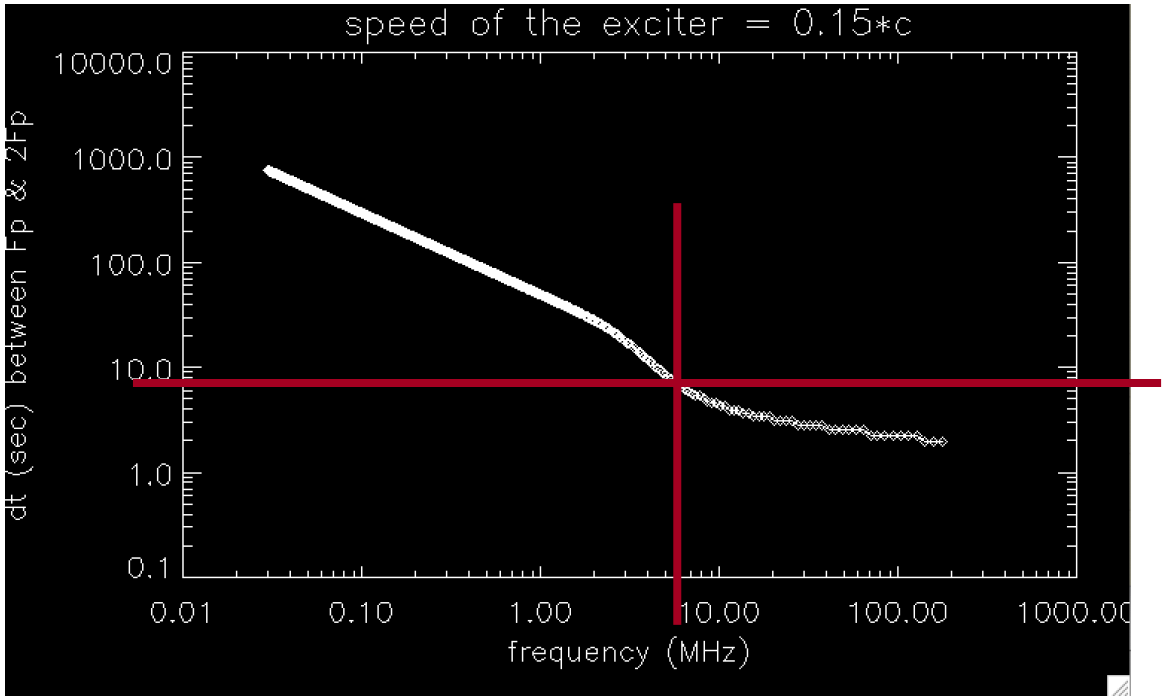
## Calculating the expected deltat between F and H components:

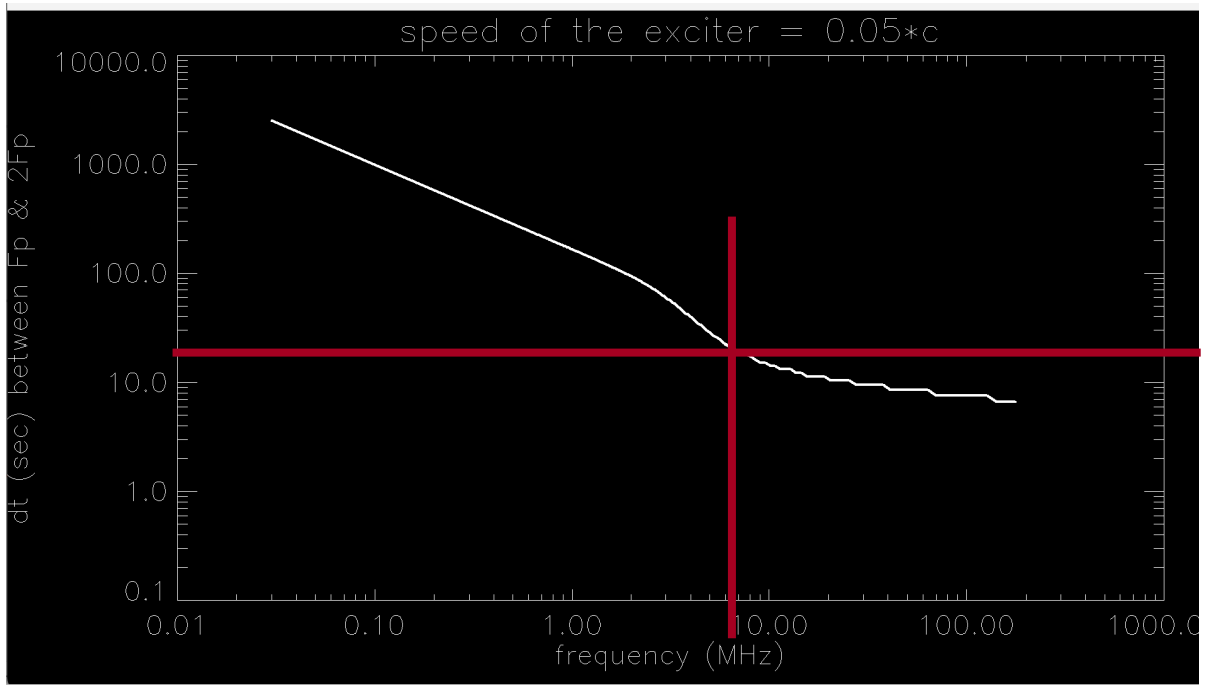
- Estimate the speed of the exciter from the type III dynamic spectrum
- Using a radial model for the density (e.g. Leblanc et al.,1998) to derive the heliocentric radial distances

04/02/2023 Courtesy A. Vecchio

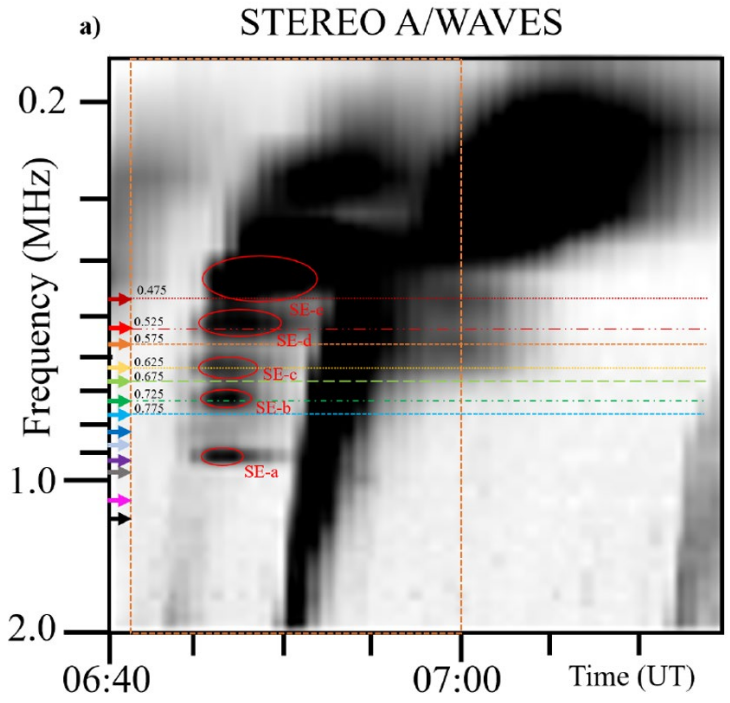


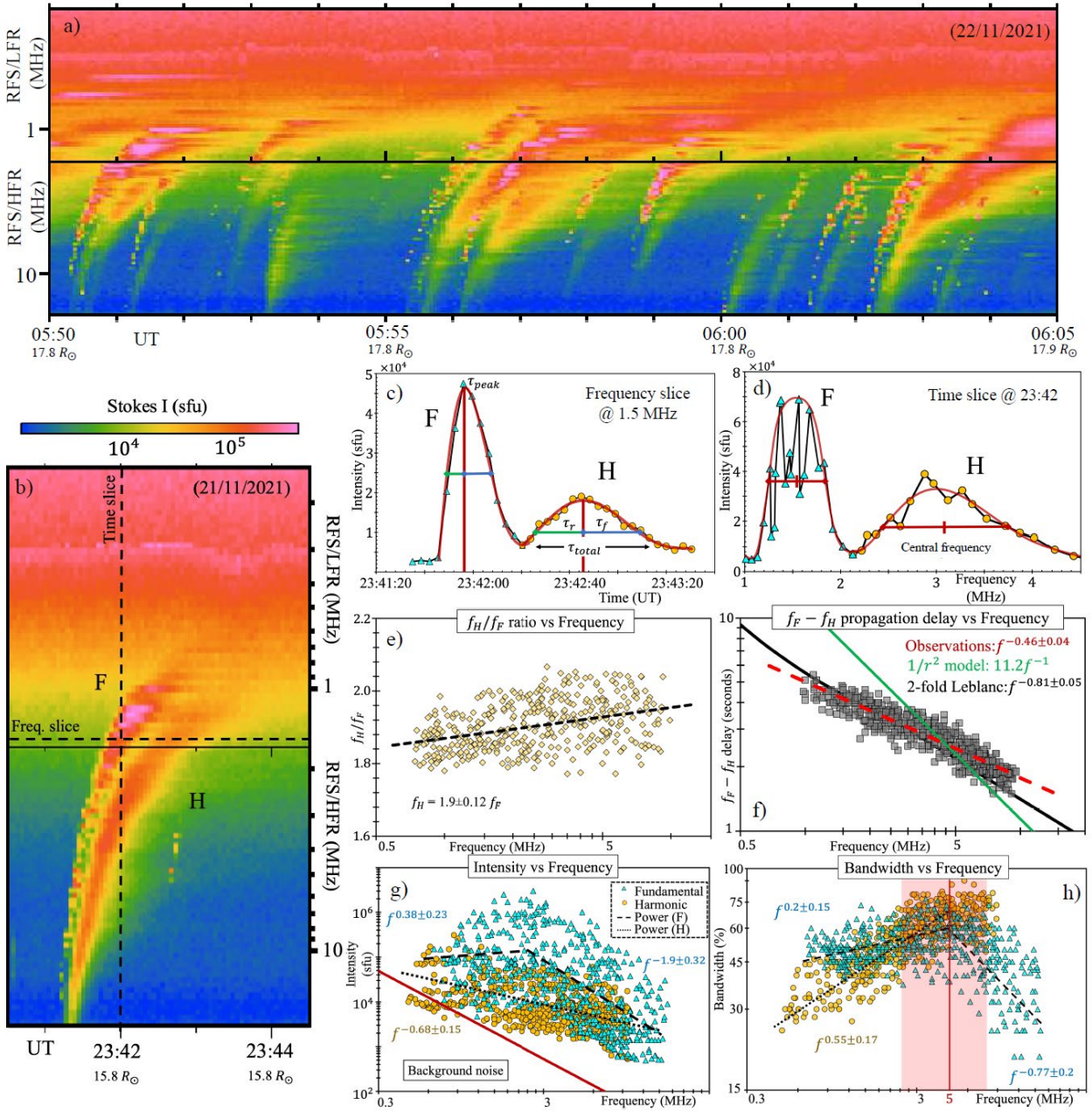



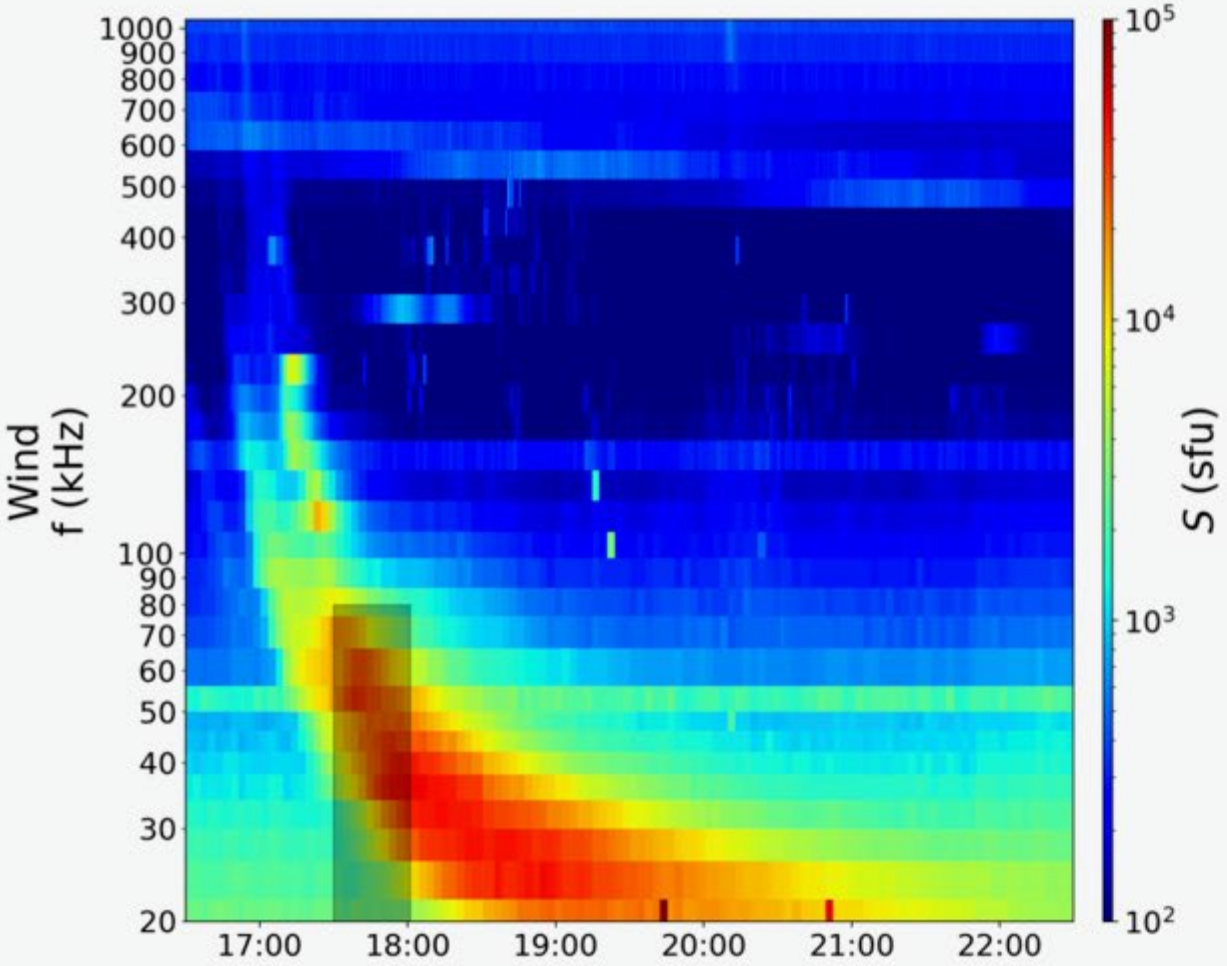



# Q: Striated Type III : when? Where? Why?

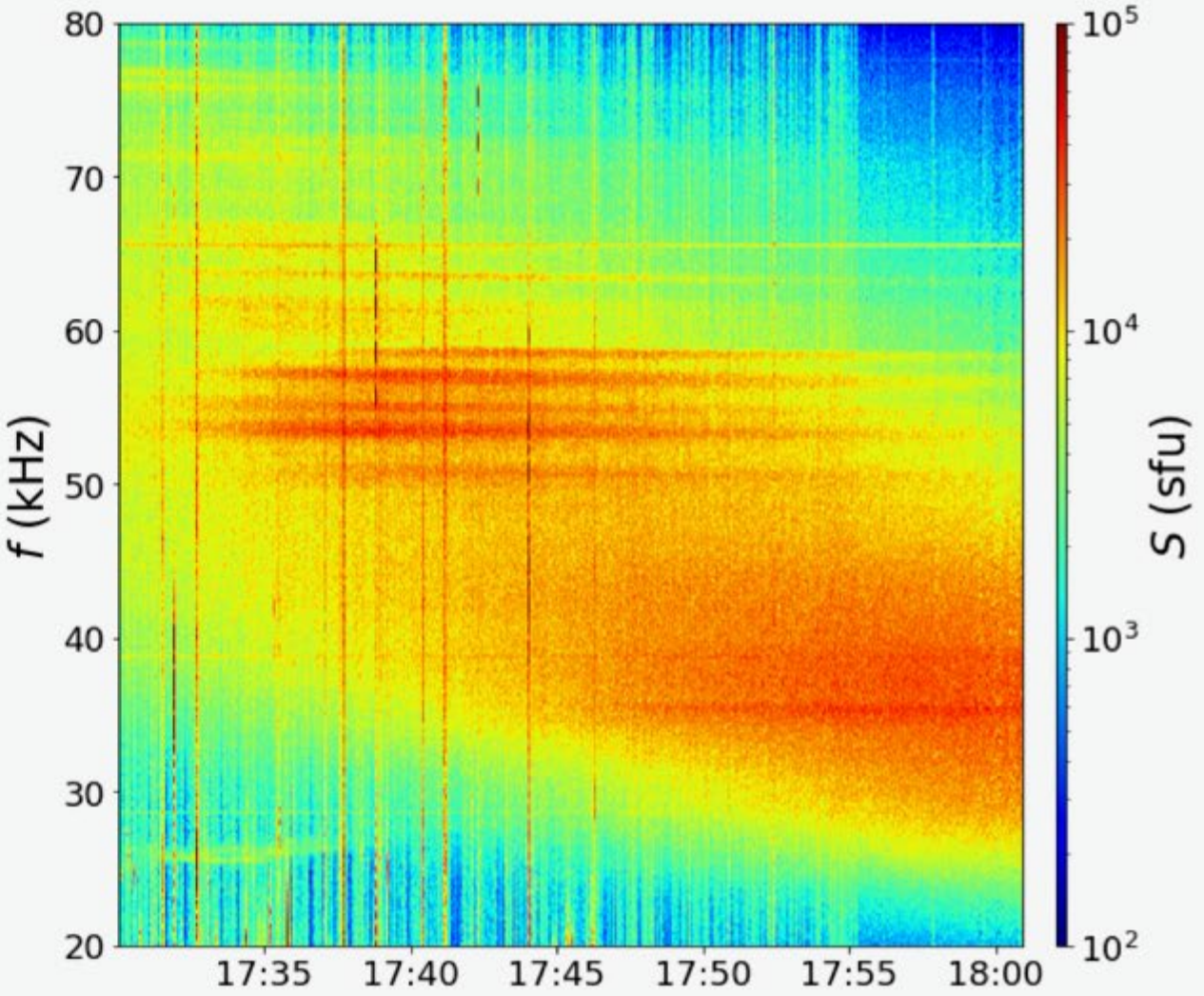


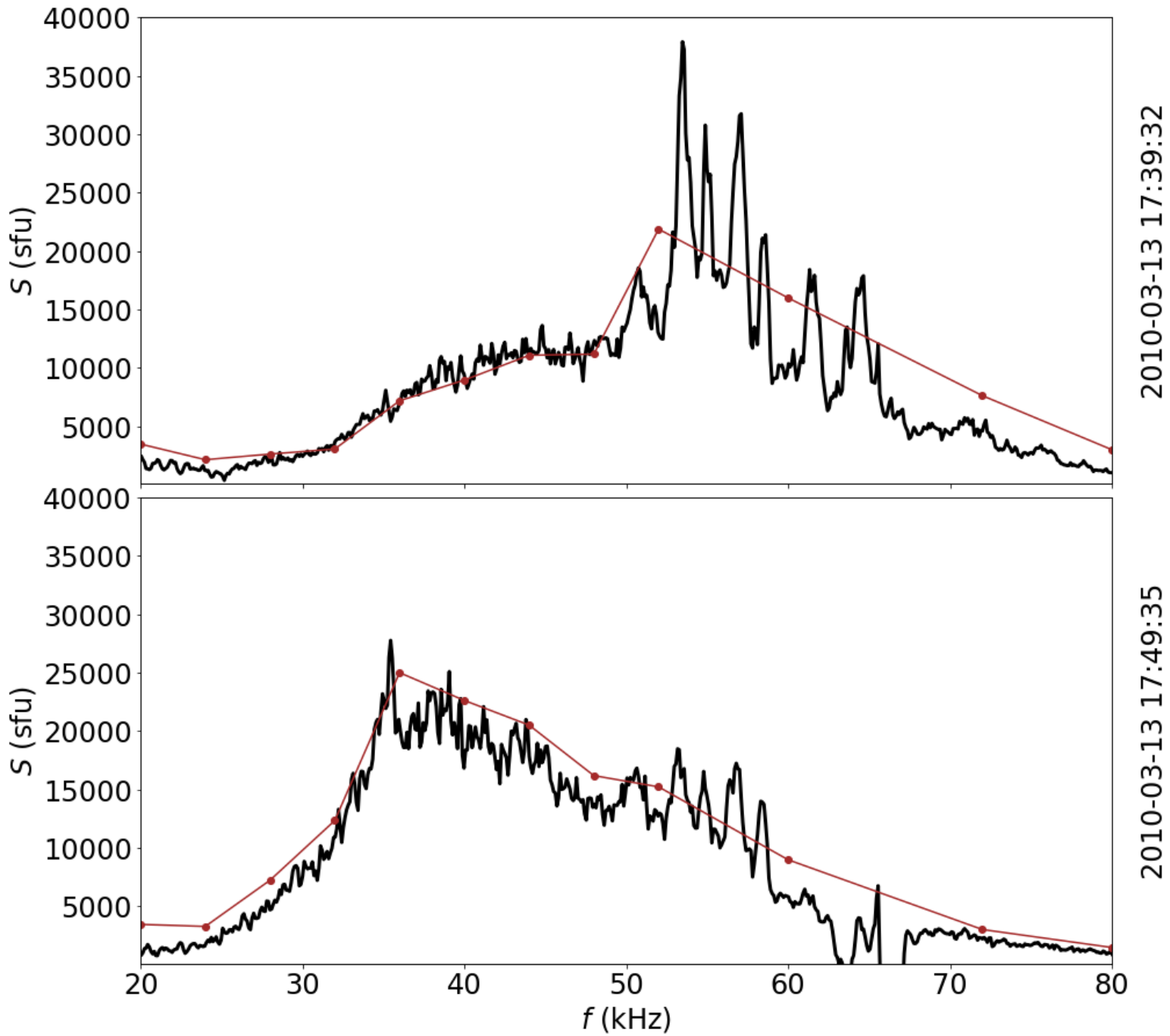



**WIND**




**CLUSTER (courtesy V. Krupar)**




40000
35000
30000
25000
20000
15000
10000
5000
S (sfu)
2010-03-13 17:39:32
40000
35000
30000
25000
20000
15000
10000
5000
S (sfu)
2010-03-13 17:49:35
20
30
40
50
60
70
80
f (kHz)

# Thank you Volodya !

