

USSP2019 Final Presentation

Characterizing the solar radio bursts associated with eruptive events

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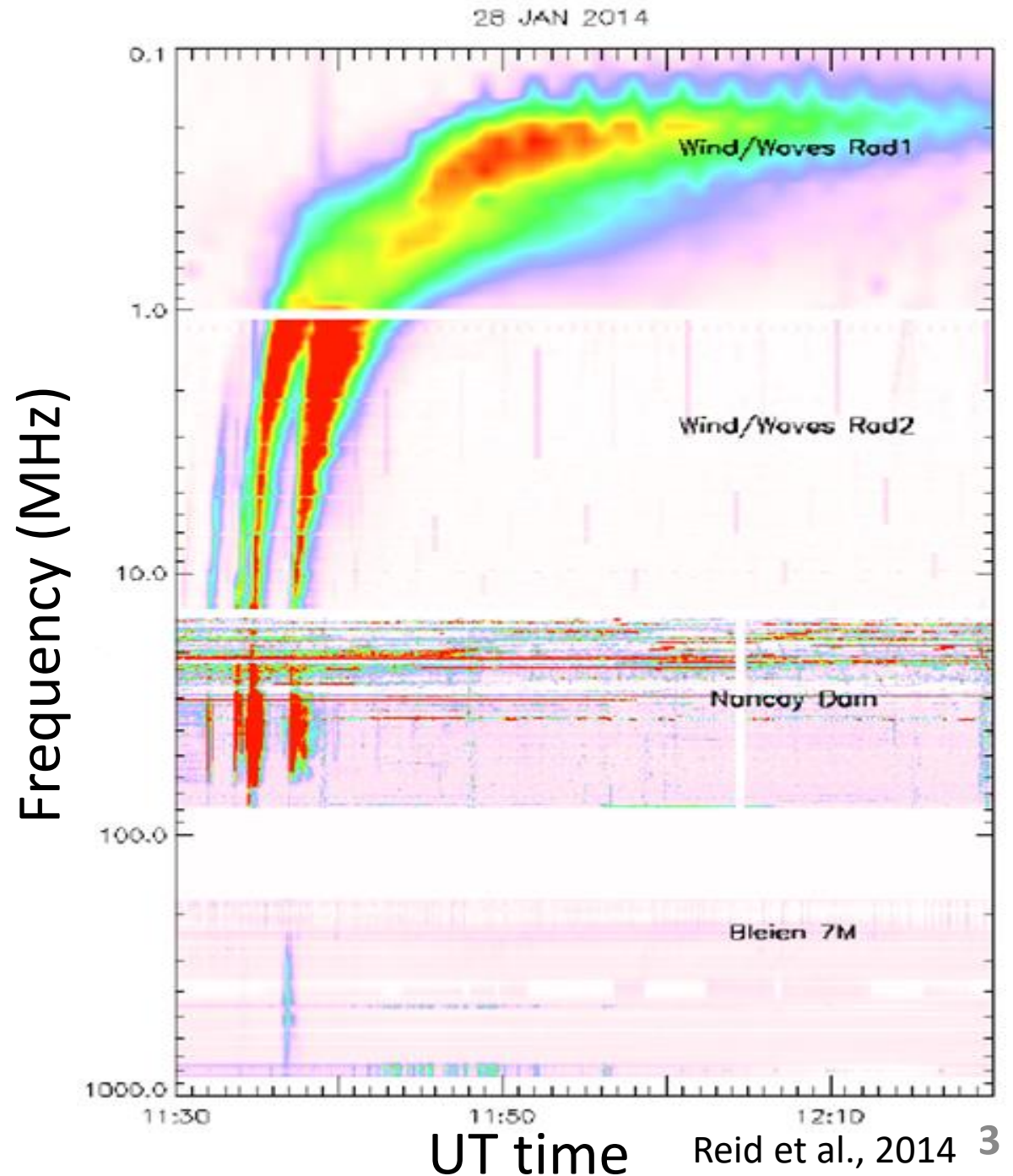
Outline

- **Introduction** → Type III Radio Burst (2.6-3.8 GHz)
- **Analysis** → Spectral Parameter: Bandwidth
Duration
Drift rate
Polarization
Impulsive/Gradual phase
→ type III Radio Burst on 2011-03-07
- **Result** → Type III Radio Burst Study Table
- **Conclusion**

Introduction

-Type III Radio Burst (2.6-3.8 GHz)

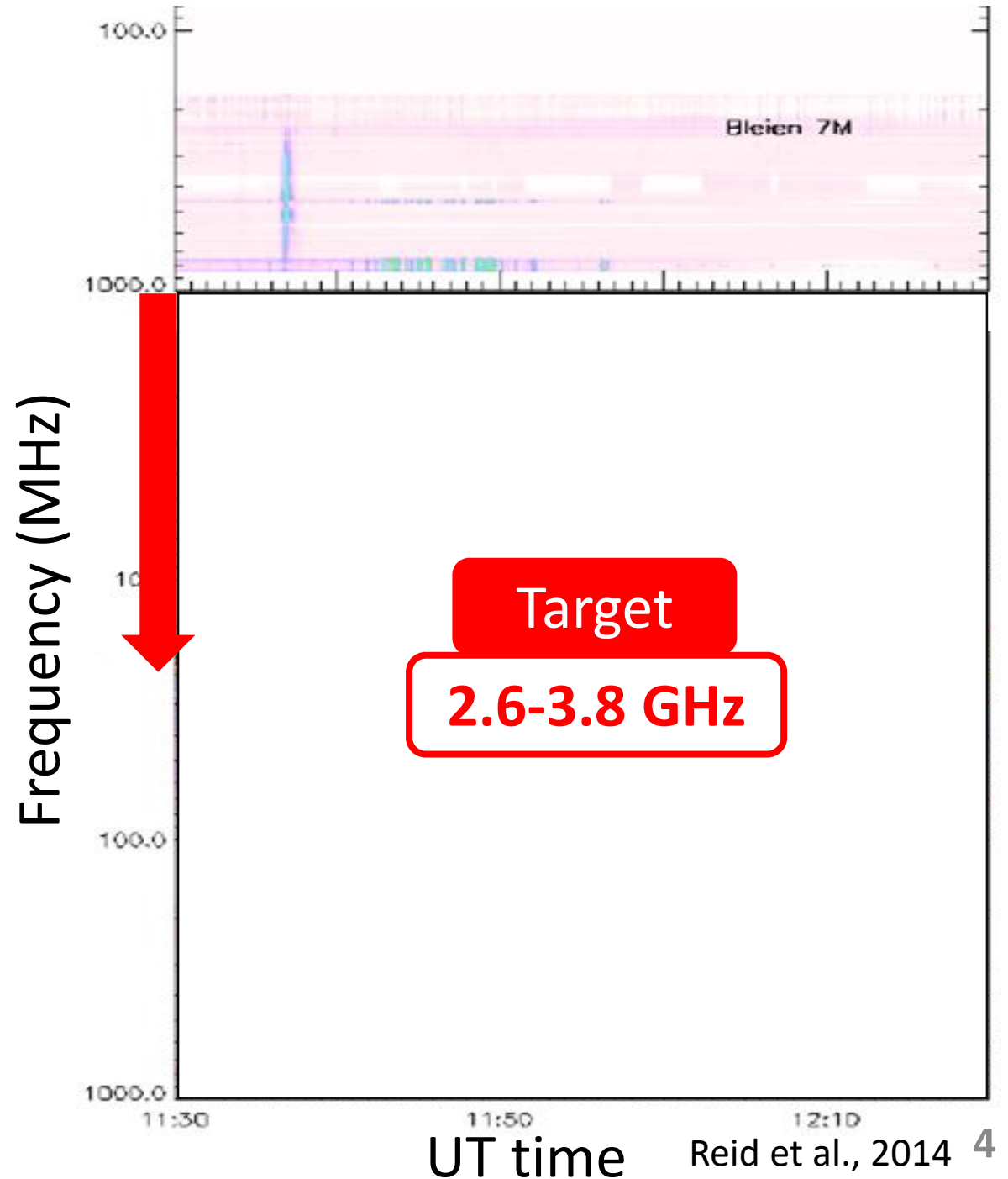
- Duration:
few seconds
- Bandwidth:
GHz scale
- Drift rate:
approach a vertical line



Introduction

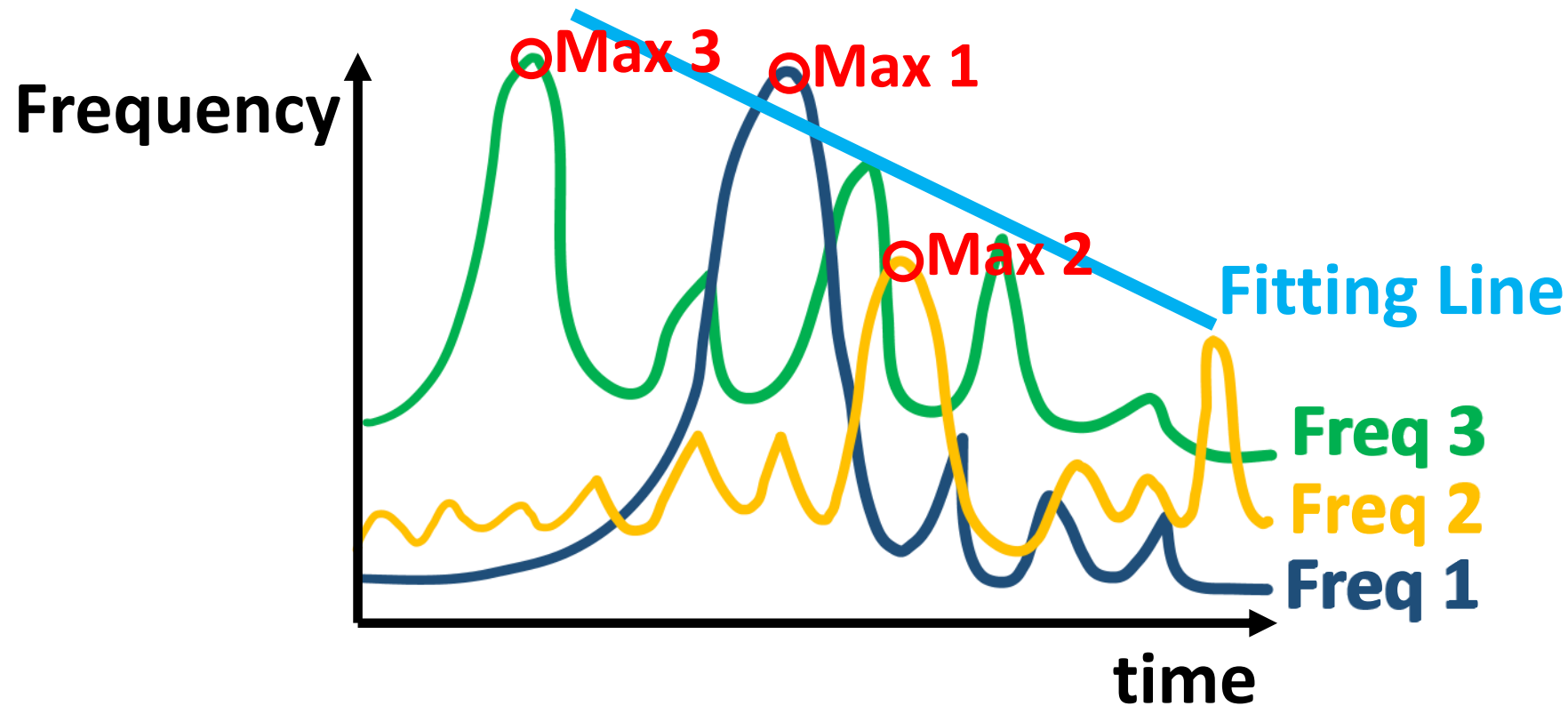
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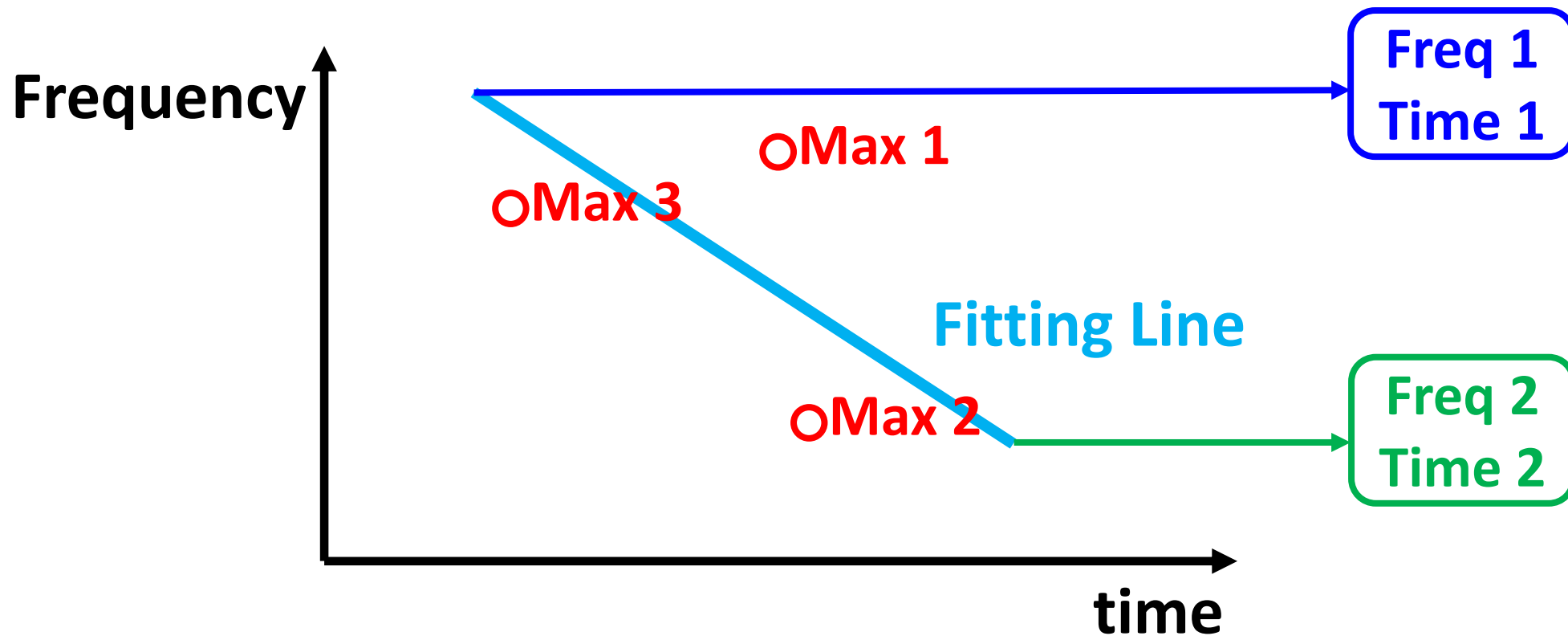
Analysis-Spectral Parameter

- *Frequency Drift Rate* : $\frac{df}{dt} = \frac{\text{Freq 2} - \text{Freq 1}}{\text{Time 2} - \text{Time 1}}$



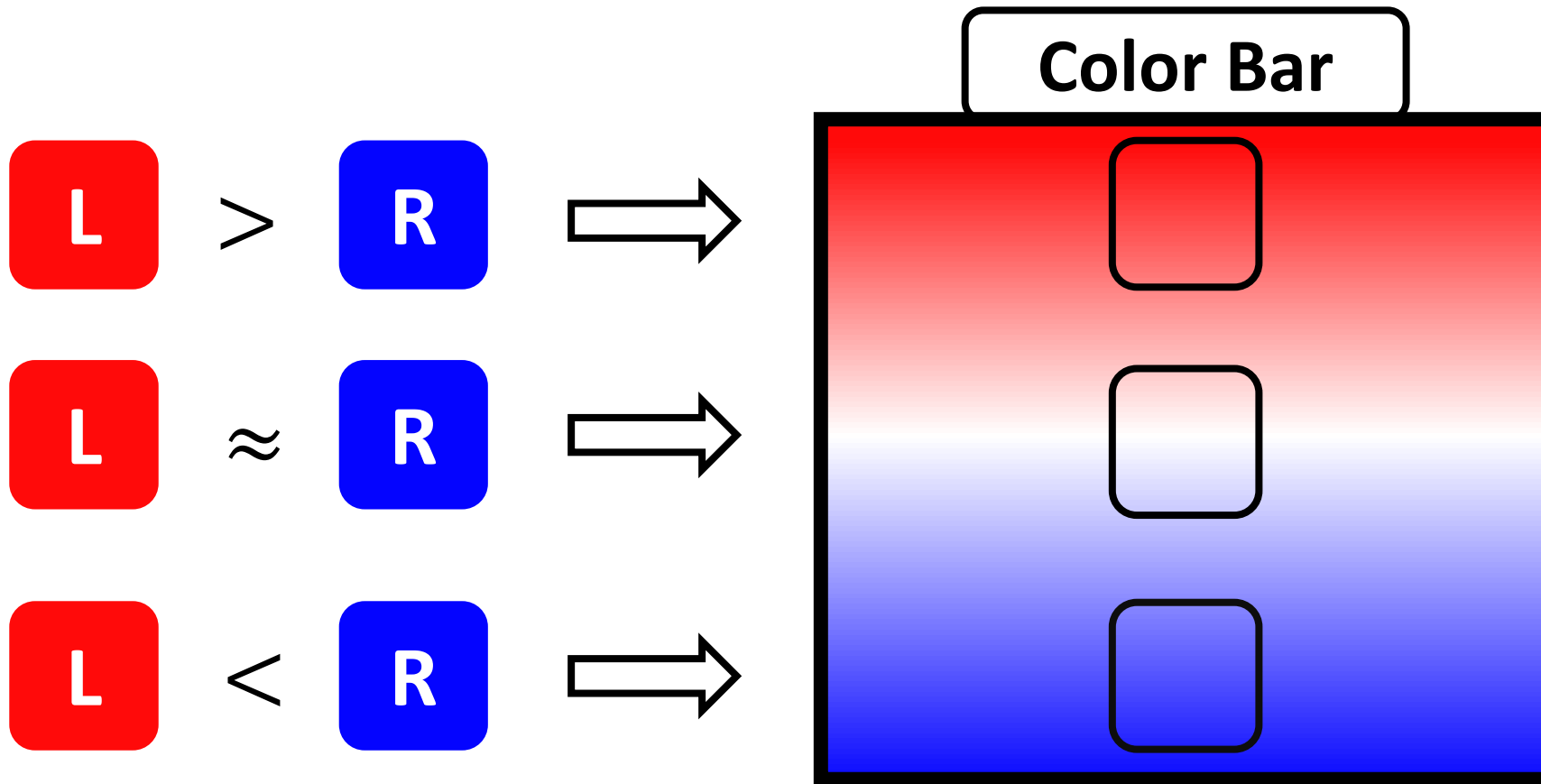
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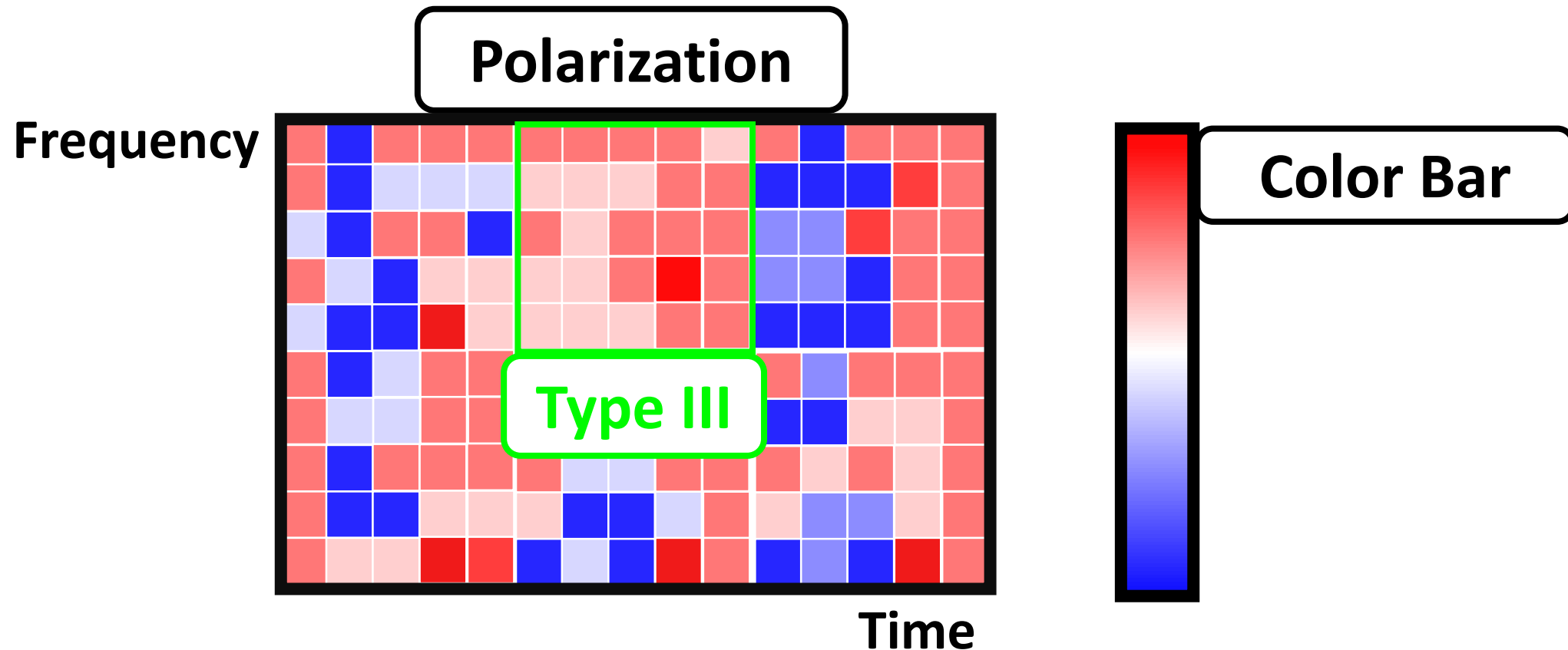
Analysis-Spectral Parameter

- *Polarization*: $\frac{\text{Left polarization} - \text{Right polarization}}{\text{Left polarization} + \text{Right polarization}}$



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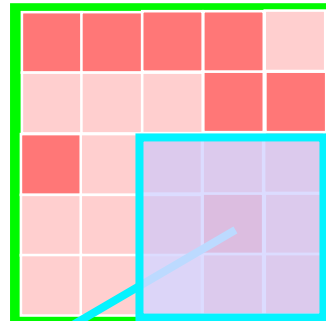


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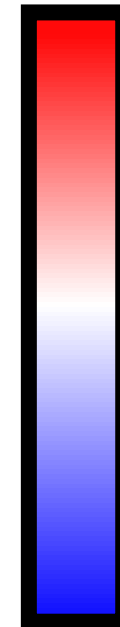
Polarization

Frequency



Maximum

Colorbar

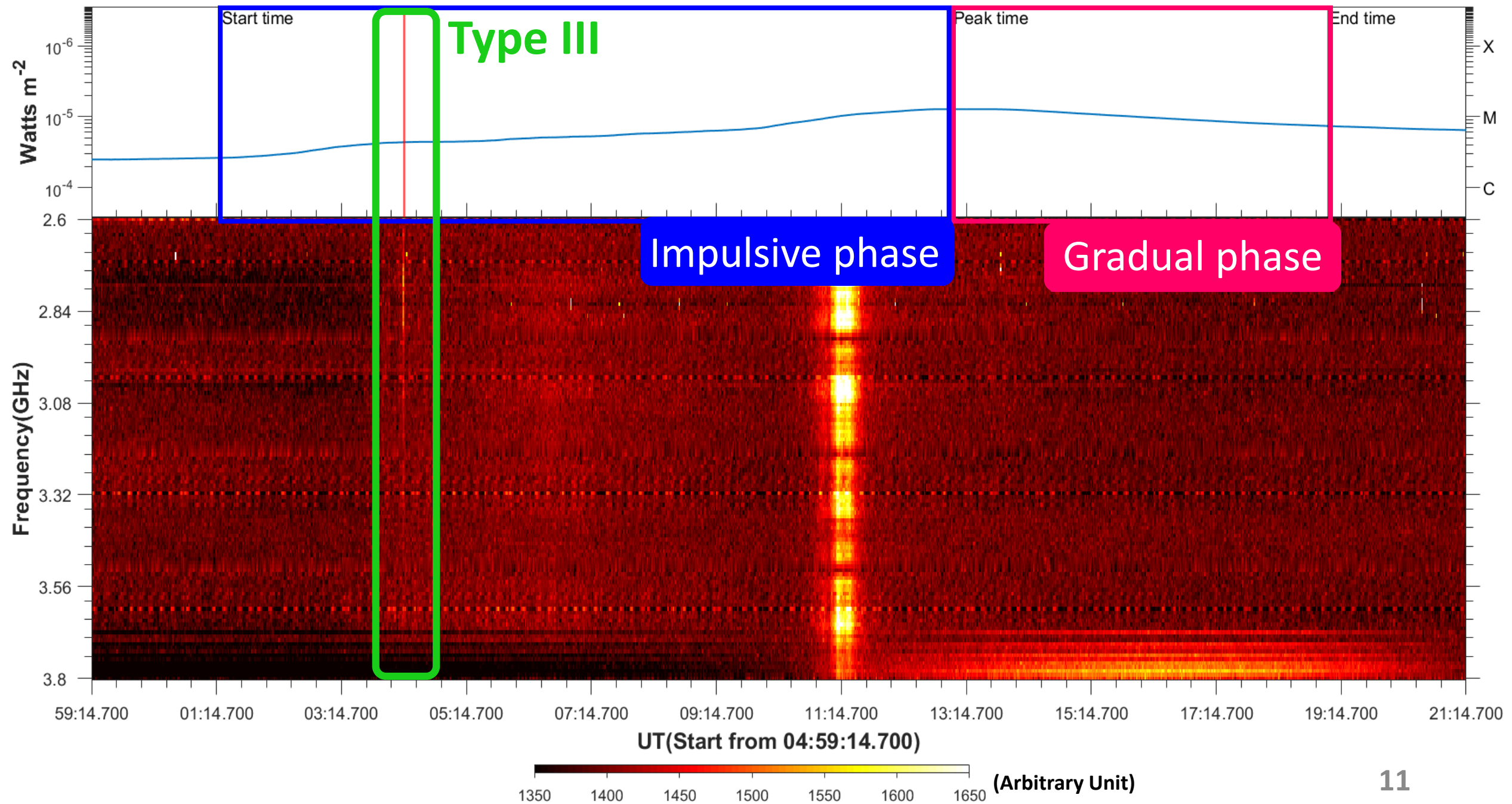


Time

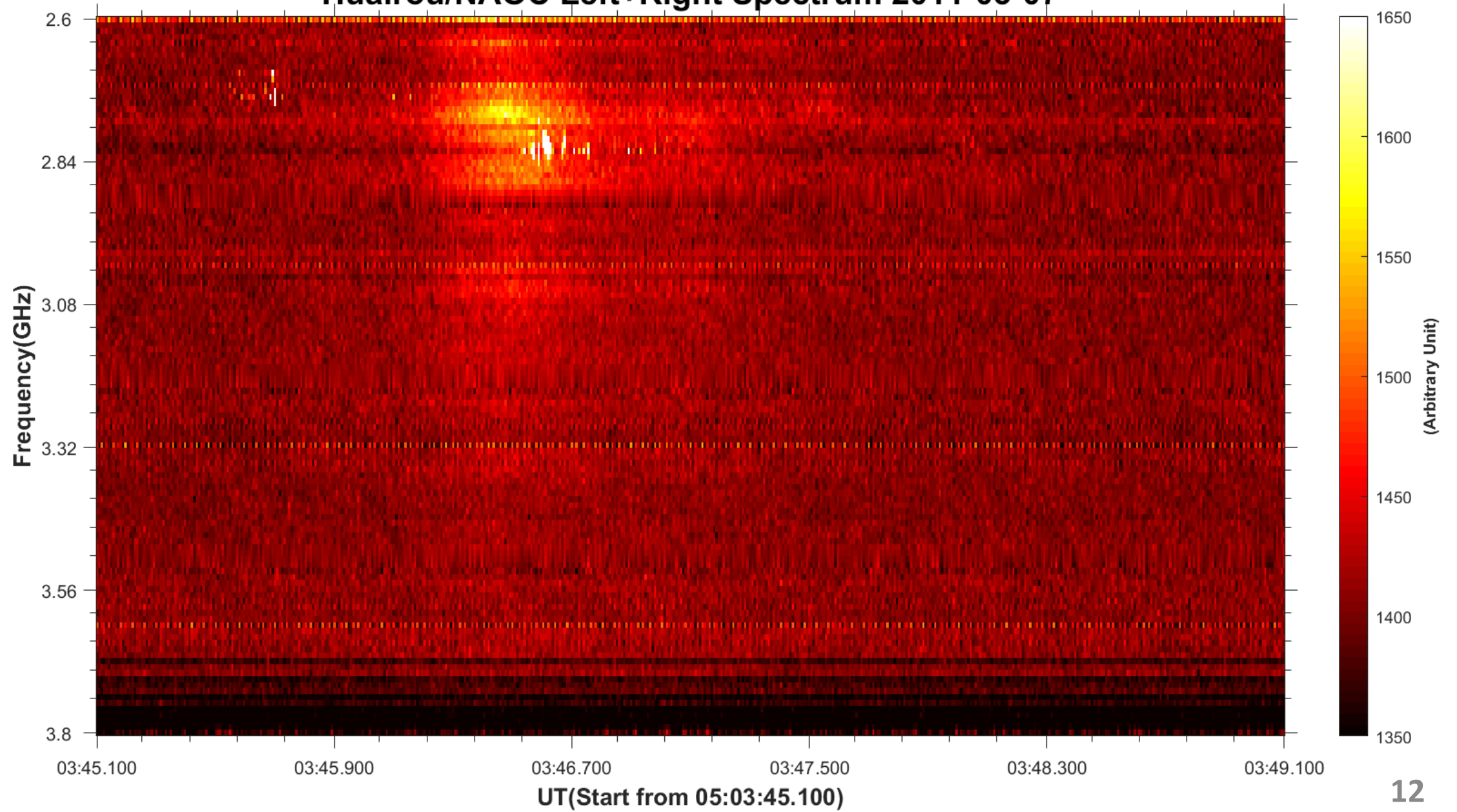
Analysis-Type III Radio Burst on 2011-03-07

Solar flare event		Type III Radio Burst				
Date	Class	Bandwidth (GHz)	Duration (s)	Drift Rate (MHz/s)	Polarization (10^{-2})	Impulsive/Gradual phase
2011-03-07	M1.2	2.65-3.20	0.03	-15827.33	16.22	Impulsive phase

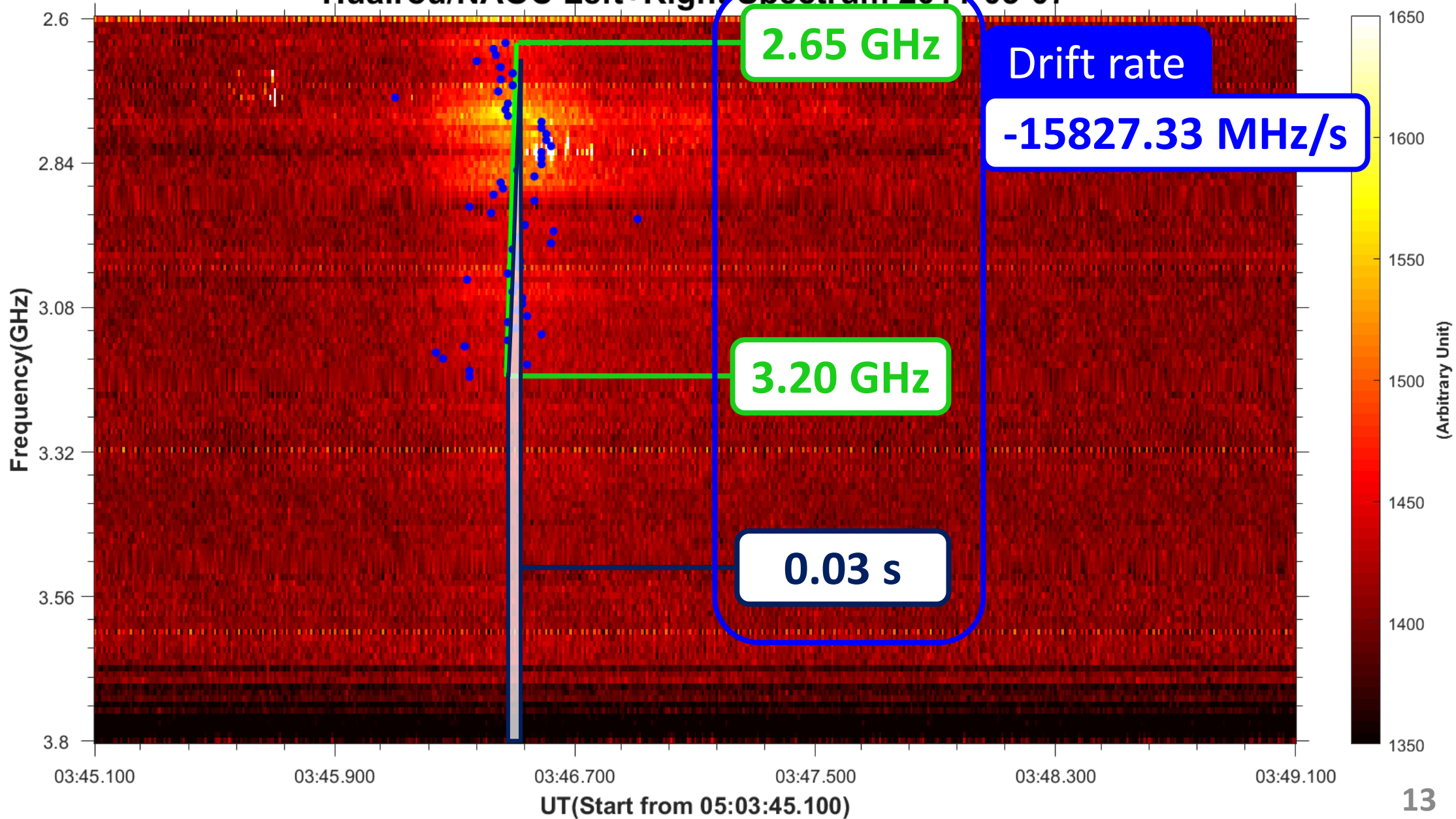
2011-03-07



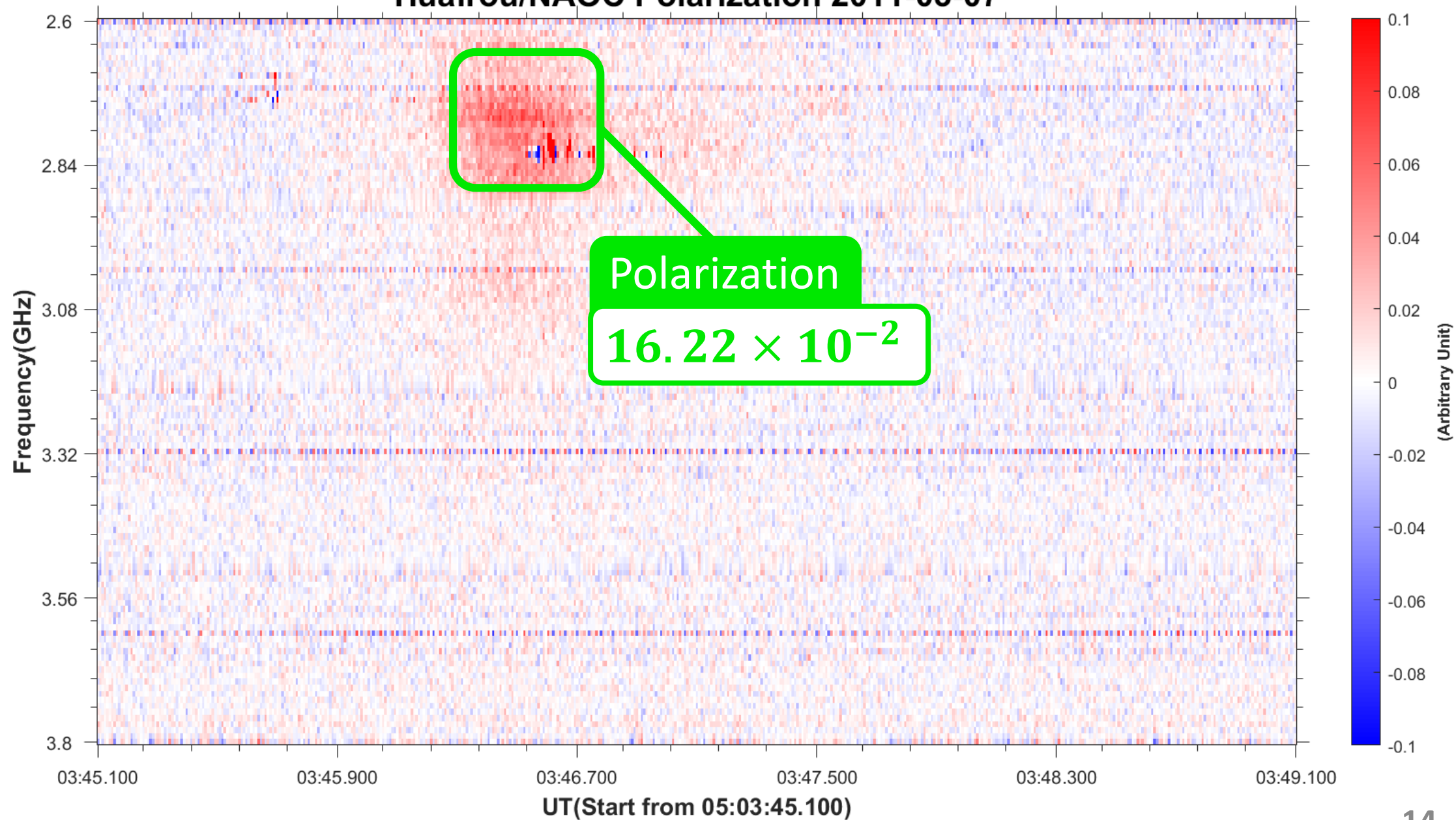
Huairou/NAOC Left+Right Spectrum 2011-03-07



Huairou/NAOC Left+Right Spectrum 2011-03-07



Huairou/NAOC Polarization 2011-03-07



Result-Type III Radio Burst Study Table

Solar flare event		Type III Radio Burst				
Date	Class	Bandwidth (GHz)	Duration (s)	Drift Rate (MHz/s)	Polarization (10^{-2})	Impulsive/Gradual phase
2011-02-24	M3.5	2.75-3.11	0.52	-696.49	2.19	Gradual phase
		3.12-3.44	0.69	-465.08	2.85	Gradual phase
		3.16-3.44	1.08	-259.91	3.24	Gradual phase
		3.32-3.61	4.31	-67.32	3.24	Gradual phase
2011-03-07	M1.2	2.65-3.20	0.03	-15827.33	16.22	Impulsive phase
	M1.4	3.05-3.80	0.36	2112.08	0.34	Impulsive phase
2011-08-03	M1.7	3.48-3.80	0.12	-2677.82	6.05	Impulsive phase
		3.50-3.80	0.05	5667.07	2.11	Impulsive phase
		3.65-3.80	0.14	-1095.69	0.94	Impulsive phase
		3.58-3.89	0.08	2633.44	1.49	Impulsive phase ₁₆

Conclusion

- The duration of most type III is less than 1 second for frequency range in GHz.
- The drift rate of GHz scale is faster than MHz scale.
- From the analytical result, we need to study more type III events to find the relation of each parameter.

Thanks for your attention.