

Fine Structure of Solar Microwave Radio Bursts

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Now a network of radio observations with high temporal resolution (ms - 10ms) has been established in China. The aim is to observe flare radio bursts in different frequencies simultaneously with high temporal resolution. This is of importance for the identification and the study of the spikes and fine structures in flare radio bursts.

The observatories including in the network and the wavelengths they used are as follows:

Observatories	Wavelengths of Observations
Beijing	6 cm, 10.6 cm
Yunnan	7.5 cm, 10.6 cm, 15 cm, 21.1 cm
Nanjing University	3.2 cm
Beijing Normal University	2.0 cm
Purple Mountain	3.2 cm, 6 cm, 8 mm (in pre.)

2. Preliminary Results

Since 1980s it has been discovered that

At dm and m wavebands : Spikes

Δt : ms ~ tens ms

$\Delta S/S$: $10^1 \sim 10^2$

At mm waveband : Spikes and Quasi-periodic Osc.

Δt : ~ 100 ms

$\Delta S/S$: $(5 \sim 20) \times 10^{-2}$

At cm waveband :

?

$\Delta t \sim 1 \sim 2$ s

$\Delta S/S \sim 10 \sim 20$

Our recent observations have shown that there are

Fast Fine Structures (FFSs) in the centimeter waveband

List of 3 cm FFSs Observed by Nanjing University

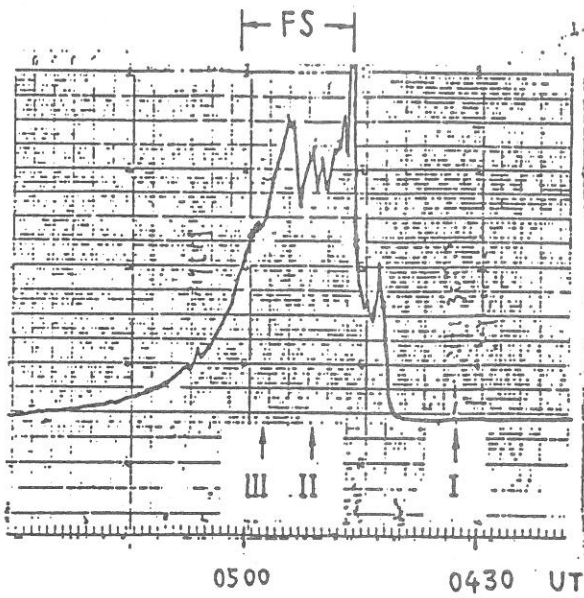
Date	Time (UT) start end	Amp. ΔS	Associated R.B. Start Max End	Opt. Event Max.(UT) Imp
89.3.11	0517~0521	46~115	0511 0521 0557	0509 SF/M2.3
89.3.12	0029~0031	18~35	0019 0030 0050	0029 2B/M7.3
89.3.12	0838~0844	71~123	0805 0839 0902	0839 1N/M6.7
89.3.13	0313~0315	26~58	0255 0317 0351	0320 3N/?
89.3.15	0647~0650	62~147	0621 0648 0720	0320 1F/M4.8
89.3.17	0658~0659	56~74	0702 0717 0743	0650 2B/M6.8
90.3.19	0441~0424	102~186	0438 0444 0614	0719 2B/X2.5
90.5.23	0414~0424	25~96	0403 0421 0440	0508 1B/M8.7
90.7.30	0656~0830	50~110	0656 0734 0830	0736 2B/M4.2

Example: 1990.3.19 Flare

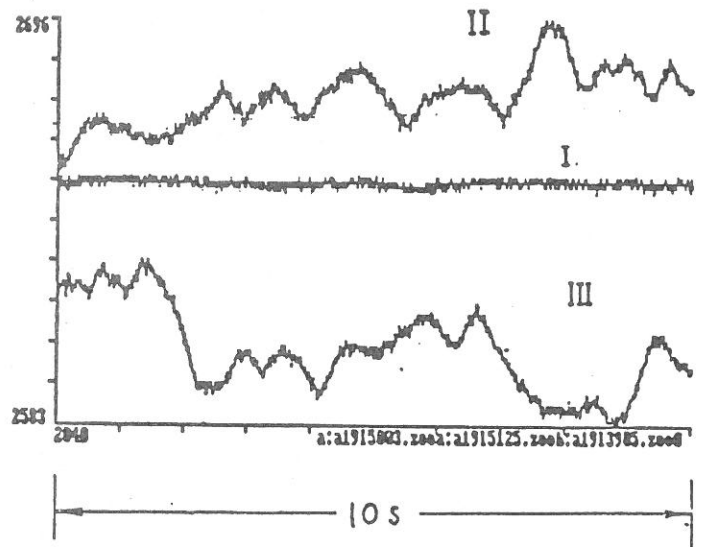
1990.5.23 Flare

1990.7.30 Flare

May 19, 1990 FLARE

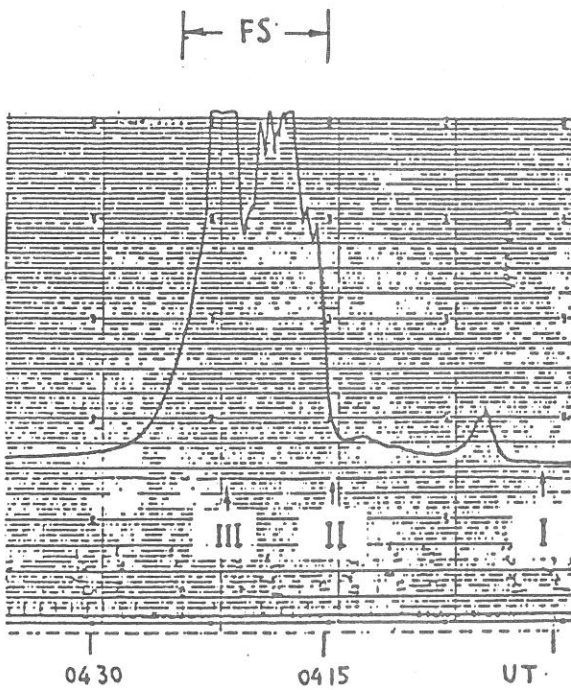


(a)

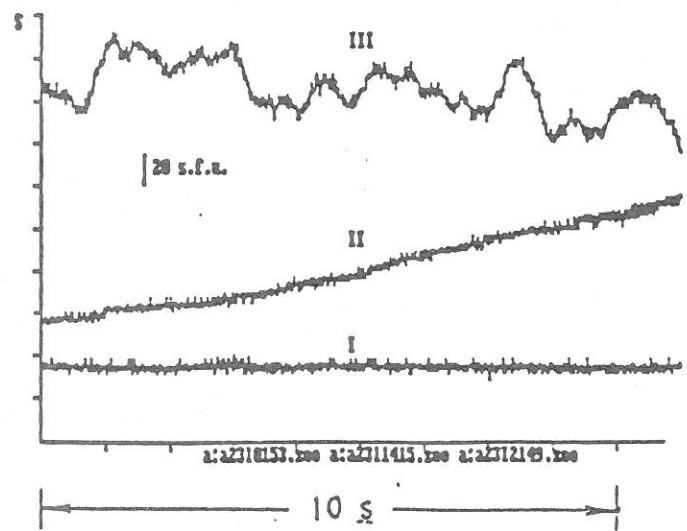


(b)

May 23, 1990 FLARE



(a)

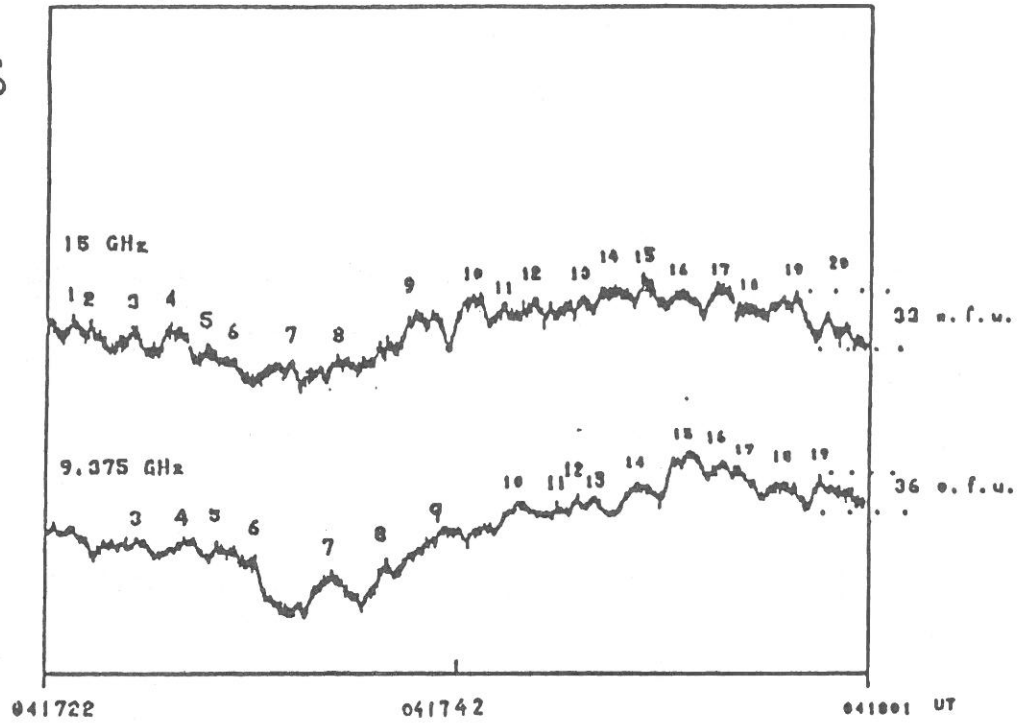


(b)

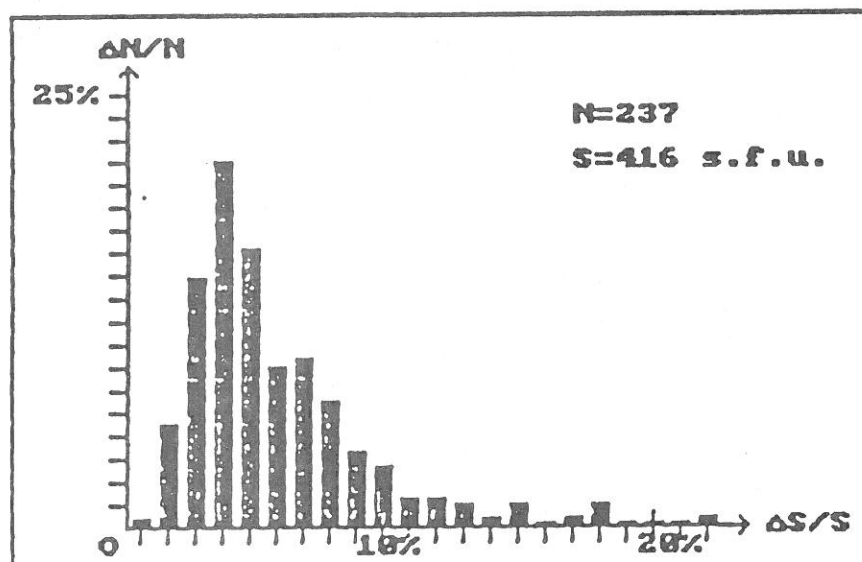
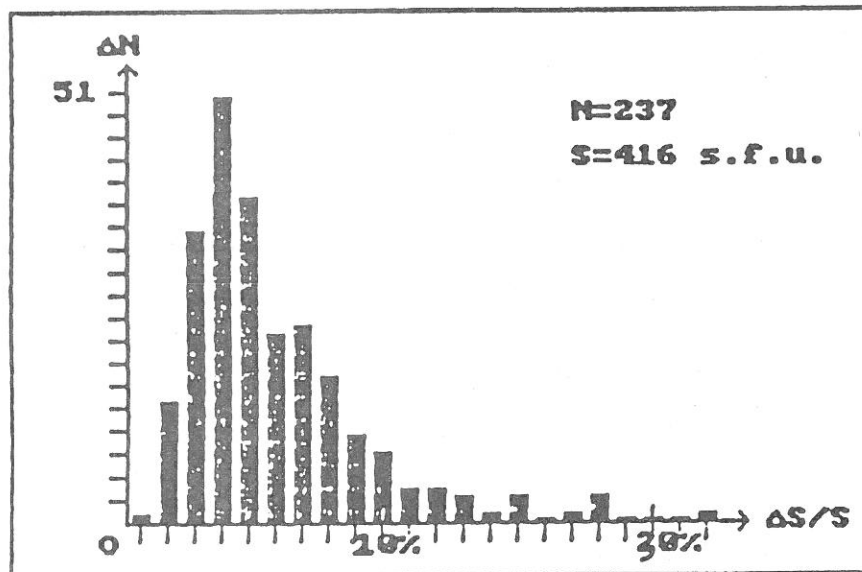
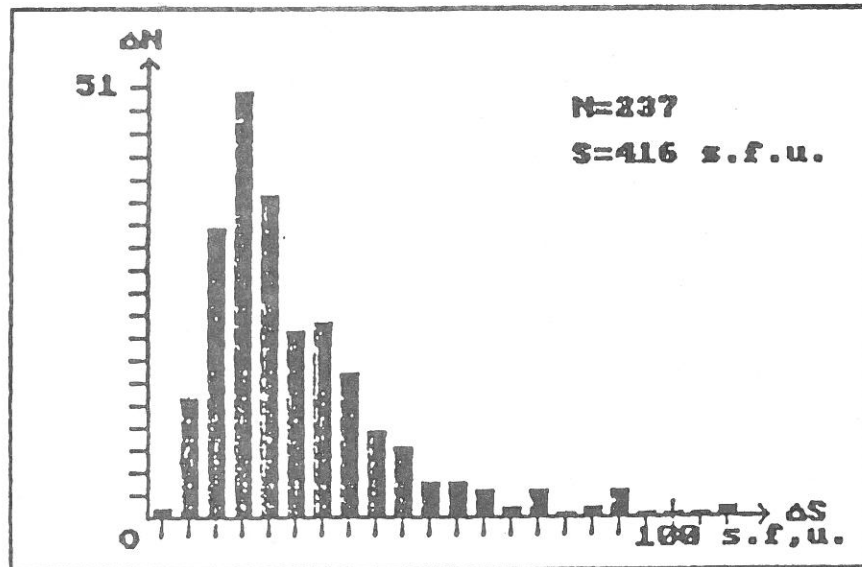
FFS

May 23, 1990

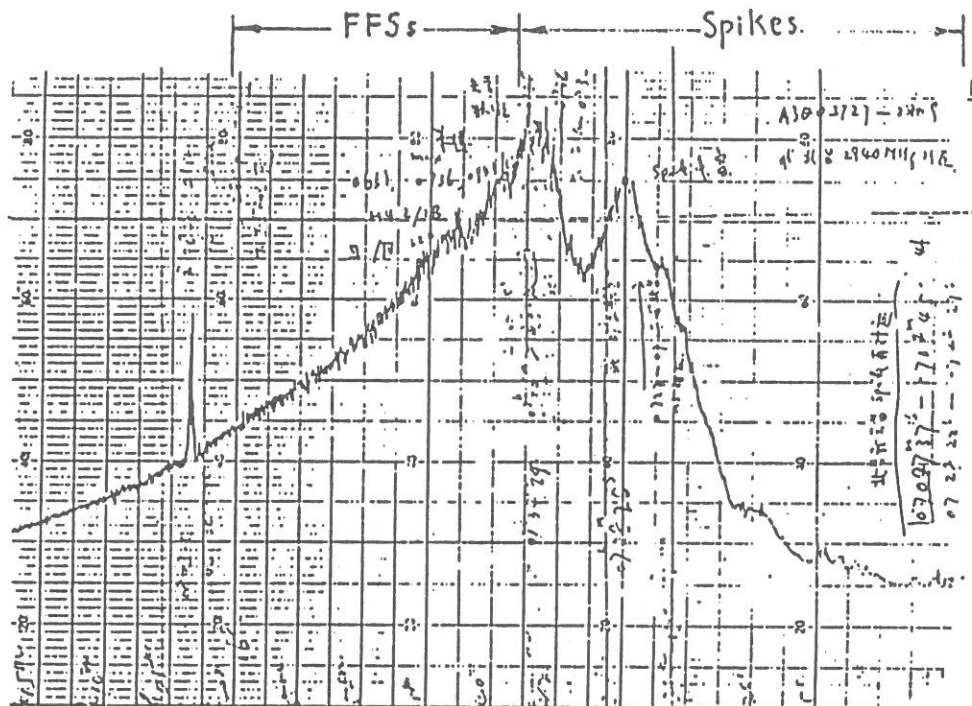
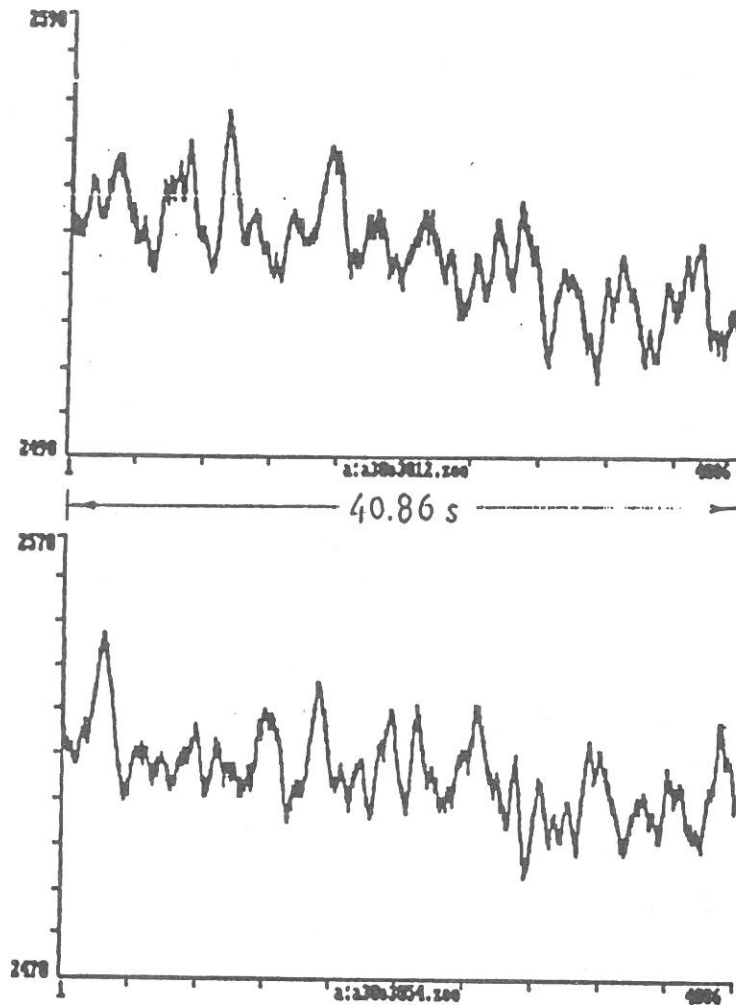
S



May 23, 1990

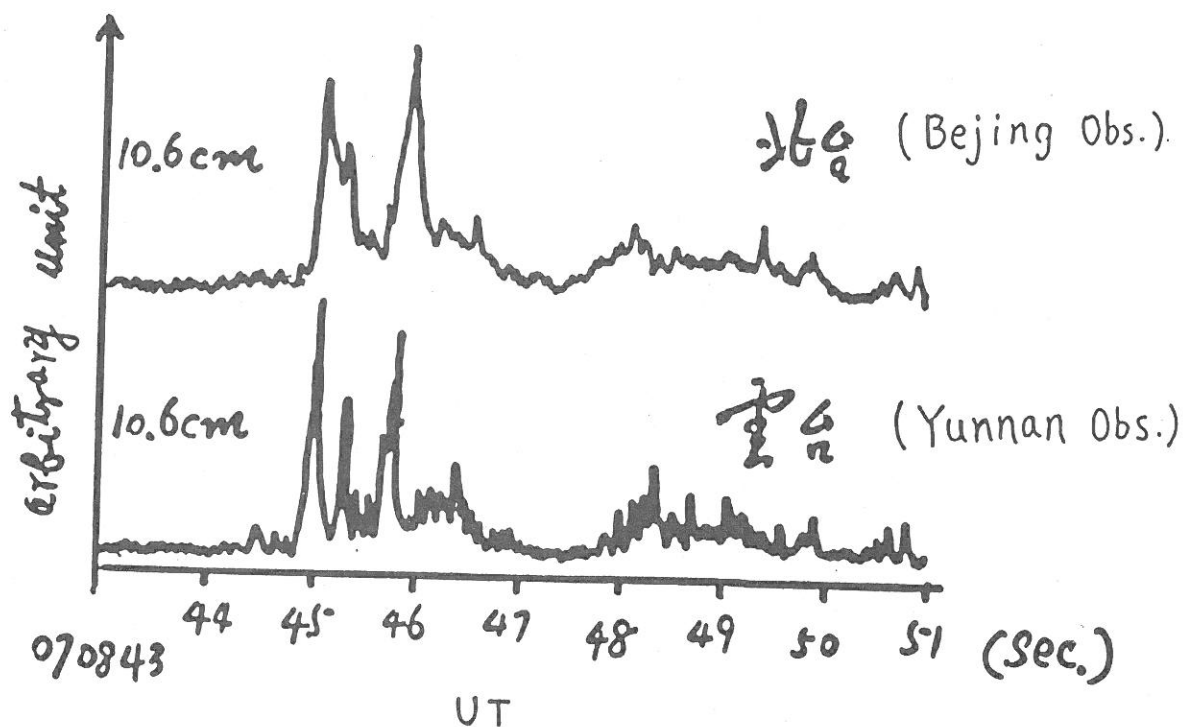
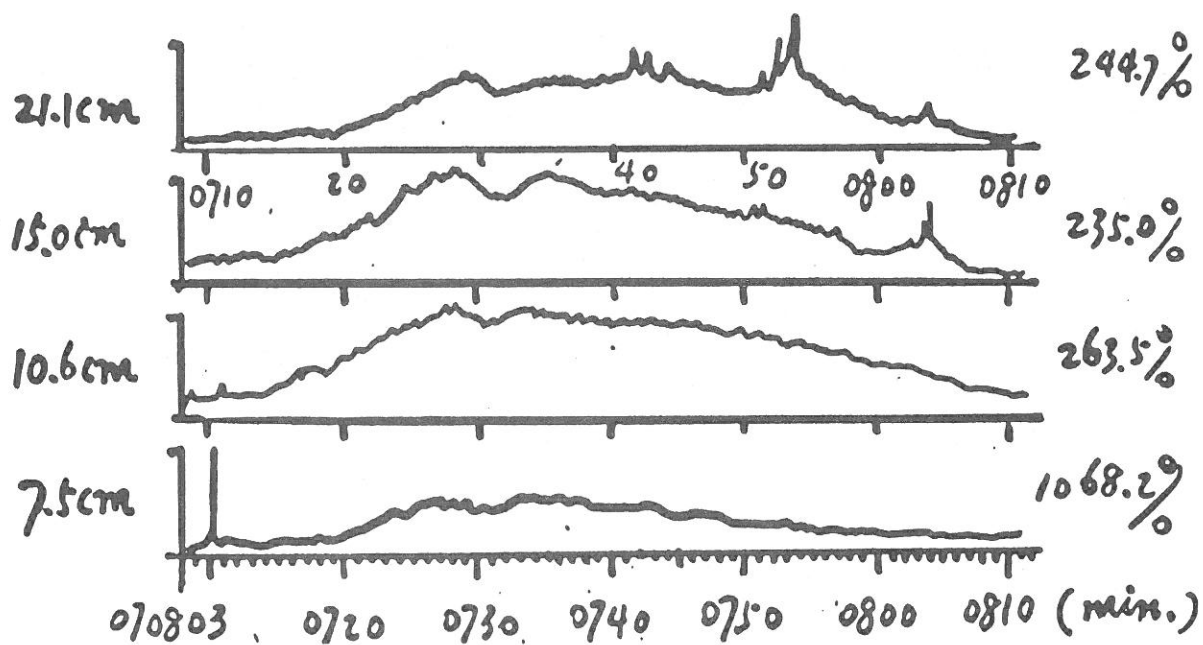


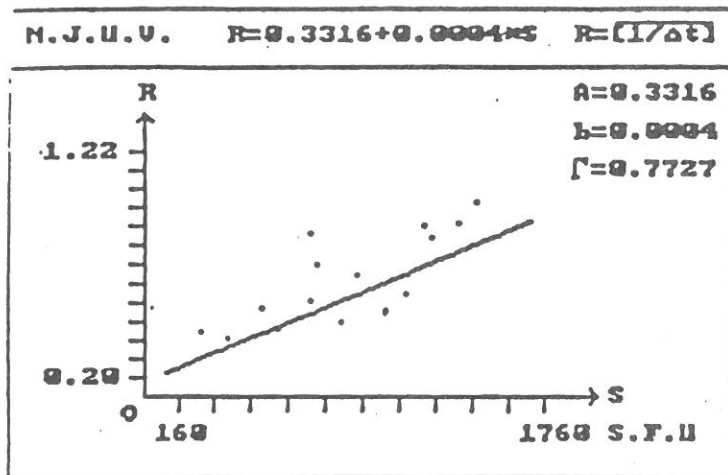
July 30, 1990



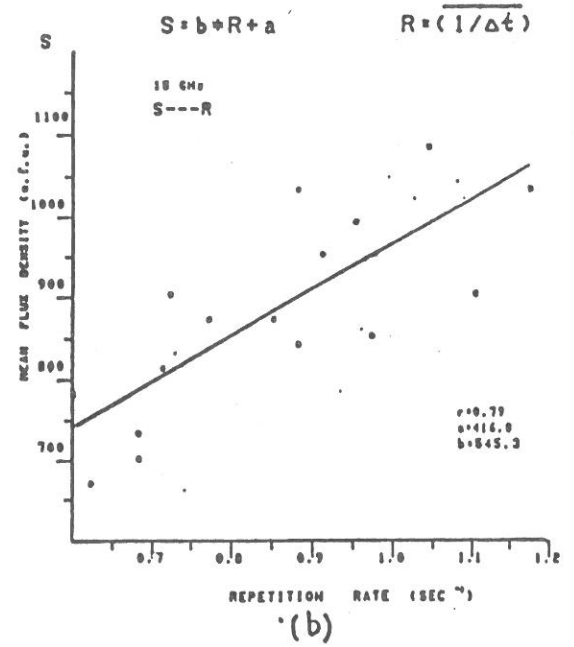
July 30, 1990 FLARE

$$\frac{\Delta S}{S}$$

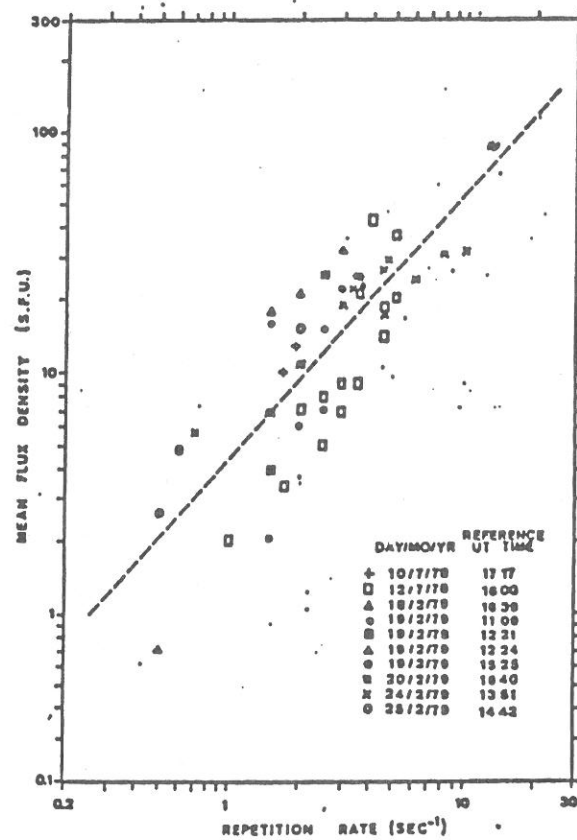




(a)



(b)



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 (1980, A.Ap. 87, 58)

Fig. 7. Diagram for flux levels (S) vs. associated repetition rates (R) of superimposed spikes for 10 different burst (43 data points) observed at 23.2 GHz .