

Decimetric fine structures associated with the 6th June, 2000 solar flare

Francisco C. R. Fernandes[†], José R. Cecatto, Maria C. Andrade, Reinaldo R. Rosa and Hanumant S. Sawant

INPE – National Institute for Space Research, São José dos Campos, SP, Brazil
email: guga@das.inpe.br.

Abstract. We report the temporal evolution of the long lasting solar flare observed on June 6, 2000 (15:00 – 17:00 UT) by the Brazilian Solar Spectrograph (BSS) at INPE. We emphasize the identification of the decimetric fine structures, such as “fiber” and “zebra” emissions, including the unique case of harmonic “zebra” emissions in the decimetric band reported, radio pulsations, type III bursts and variants, recorded during this event in the frequency range of (1.2 – 1.7 GHz). The main characteristics of fine structures recorded are presented.

Keywords. Sun: activity; solar flares; radio radiation; decimetric fine structures

1. Introduction

High resolutions solar observations over a broad range of frequency is the main requirement for the detailed investigation of time evolution of solar flares and the study of the emission mechanisms of fine structures commonly identified above 1 GHz. The BSS (Sawant *et al.*, 2001) belongs to the new generation of solar spectrographs with high resolutions. Since it has put into regular operation, in 1998, BSS have recorded more than 400 solar radio emissions associated with flares, most of them showing temporal and spectral fine structures (see for example Fernandes, 2003).

2. Observations

The June 6, 2000 flare presented two distinct peaks (15:21 UT and 16:42 UT) in decimetric range (figure 1). The event was associated with a type IV burst (14:57 – 21:21 UT). The first peak is correlated with the X2.3 soft X-ray flare recorded by GOES (~ 14:58 – 15:40 UT) with maximum at 15:25 UT, associated with the active region 9026 (N23E15). The Ondřejov Observatory recorded radio emission up to 4.5 GHz. LASCO-C2/SOHO recorded a sequence of solar eruptions, including a full-halo CME (first detection at 15:54 UT). Also, between 15:28 and 15:39 UT a type II burst was observed (www.sec.noaa.gov).

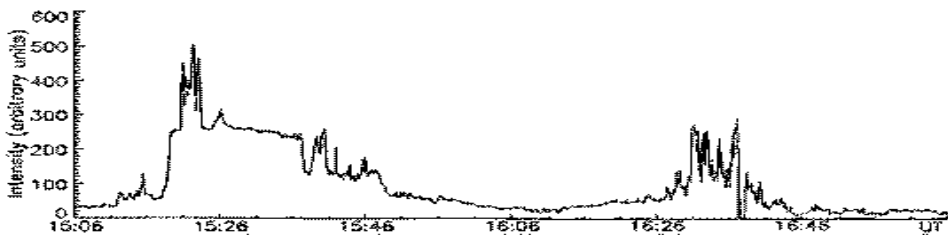


Figure 1. Time profile in 1.5 GHz of the June 6th 2000 solar flare recorded by the BSS.

[†] Present address: INPE/DAS, C.P. 515 12201-970, São José dos Campos, SP, Brazil.

3. Fine structures

Figure 2 shows some examples of different types of fine structures recorded during the flare and classified according the morphological features.

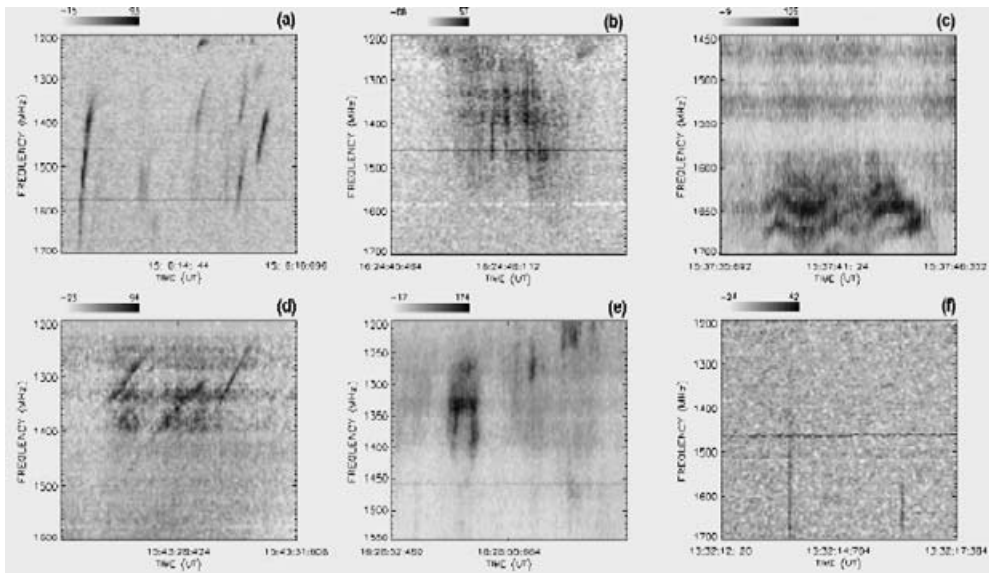


Figure 2. Examples of dynamic spectrum of fine structures recorded in the 1.2 – 1.7 GHz frequency band by BSS with time resolution of 50 ms, during the June 6, 2000 flare: (a) pre-impulsive emissions; (b) radio pulsations lasting less than 100 ms; (c) unique case of harmonically related zebra emission observed with ratio of about 1:2 by BSS (1.21.7 GHz) and Ondřejov (2.0 – 4.5 GHz) (Sawant *et al.*, 2002); (d) fiber-like emissions; (e) pulsation structure showing inverted U-like shape; (f) type III bursts.

4. Summary

We presented the June 6, 2000 solar flare recorded in decimetric wavelength with high resolutions by BSS. This event exhibits a great amount of decimetric fine structures, such as zebra pattern, fiber, type III and type U bursts. They are potentially rich information concerning physical parameters of the radiation sources. Then present observations provide important clues to the investigation of the emission mechanisms of decimetric fine structures and the role of magnetic field during the energy release in solar flares. Detailed analysis of those fine structures will be published elsewhere.

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