

Solar Microwave Drifting Pulsation Structures

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Abstract

This work statistically investigated the characteristic of DPS from the observation. The results showed that: (1) DPSs happened more frequently at decimeter (0.8-2 GHz) than centimeter (2-5 GHz). (2) The special DPSs are all associated with SXR flares; about 80 percent of them are associated with CME. While the isolated or simple DPS are poorly associated with CME. (3) Some DPSs have harmonic structure.

1. Introduction

Microwave drifting pulsation structures (DPSs) is groups of pulsations with global drifting. It is frequently observed at the initial phase of solar eruptive flares. It may be caused by quasi-periodic particle acceleration episode that resulted from a dynamic phase of magnetic reconnection on a large-scale current sheet [1]. Previous work [2] showed that: (1) 83% DPSs are associated with CMEs (62%) or ejection events; (2) The DPSs usually (88% cases) happened at the initial phase of the flare. However, some events were exclude because the sensibility and interference in this work. The second work [3] showed that 20% microwave bursts are associated with type II, or type IV or CME (16% with type II or CME). This work will study the statistical characteristic of DPS from the observation, especially theirs relationship with CME or eruptive events.

2. Data and Classification

Three set of data were investigated in this work. First is radio observation of Ondrejov radio spectrograph. More weak and simple events were investigated with criterion. Second are SXR flares, optical flares, and radio bursts from NGDC event list and figure. Third are CMEs from Lasco /SOHO Catalog. The criterions of the associated CME are: (1) The first C2 image is after the beginning of the flare. The time window is < 2 hours. (2) Source region of the flare is consistent with CME. (3) Selected the only CME, or the Closet CME. DPSs can be classified as two sets: (1) Special DPSs are associated with microwave continuum, negative drifting, long duration, wide band, and strong intensity. (2) Isolated or simple DPSs are isolated or short duration, or narrow band, or weak.

3. Results

The primary results are: (1) 101 DPS events were found during 2010-2013. Among them, 91 events happened at frequency of 0.8-2.0 GHz, while the other 10 events happened at frequency of 2.0-5.0 GHz. Thus DPSs happened more frequently at decimeter (0.8-2 GHz) than centimeter (2-5 GHz). (2) Only 29 events are classified as special DPS, while others are all classified as isolated or simple DPS. The special DPSs are all associated with SXR flares; about 80 percent of them are associated with CME. The isolated or simple DPS are poorly associated with CME. (3) Some DPSs have harmonic structure.

3. References

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