A TYPE IV BURST ASSOCIATED WITH A CORONAL STREAMER DISRUPTION EVENT*

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Abstract. A type IV burst was observed on February 17, 1985 with the Clark Lake Radio Observatory multifrequency radioheliograph operating in the frequency range 20–125 MHz. This burst was associated with a coronal streamer disruption event. From two-dimensional images produced at 50 MHz, we show evidence of a type II burst and a slow moving type IV burst. The observations of the moving type IV burst suggests that a plasmoid containing energetic electrons can result from the disruption of a coronal streamer.

1. Introduction

Type IV bursts are observed over the entire wavelength range, centimeter to meter-decameter wavelengths (Boischot, 1957; Kundu, 1961; Pick, 1961). They can be both moving and stationary (e.g., Kundu, 1965), and are usually associated with flares. The association of type II bursts with disappearing filaments has been reported; however, no type IV burst has ever been reported in association with filament activity alone. Similarly, there has been no report of a type II or type IV burst activity in association with a coronal streamer disruption. Indeed, type IV bursts are not known to be entirely of coronal origin. They are usually associated with and preceded by microwave type IV which occurs in the upper chromosphere or lower corona. In this paper we describe a type IV burst at decameter wavelengths which is associated with only a coronal streamer disruption event.

The observations were made with the Clark Lake Radio Observatory multi-frequency radiopheliograph in the frequency range 20–125 MHz. The instrument is in the form of a ‘Tee’ 3.0 km (E–W) and 1.8 km (N–S), and is composed of 720 conical spiral antennas. Its use as a radiopheliograph has been described by Kundu et al. (1983).

The radiopheliograph produces 64 × 64 pixel images (of 0.5 HPBW × 0.5 HPBW per pixel) within the frequency range 20–125 MHz. The field of view and the angular resolution of the telescope are both frequency-dependent. The field of view is approximately 2°3 × 1°9 at 80 MHz, when observing at the zenith. It scales inversely with frequency (in both dimensions), and is larger because of foreshortening when observing away from the zenith. The angular resolution ranges from 2.7 arc min at 125 MHz to 17 arc min at 20 MHz. The telescope is electronically steered for pointing in different sky directions, and is continuously tunable across the entire frequency range. In practice, one is restricted to observe within the interference-free bands. A number of such bands are available, those most commonly used are centered on 25.6, 30.9, 38.5, 57.5, 73.8, 

and 110.6 MHz. Several instantaneous bandwidths are available to the observer, ranging from 0.15 to 3.0 MHz. The sensitivity of the system is about 1 Jy ($10^{-4}$ solar flux units) at all frequencies. The images obtained at present are calibrated by observing sidereal sources along with the Sun in close succession.

2. Results

At 20:06 UT, 17 February, 1985, the GOES satellite recorded a very small X-ray flare (B1.2). Since no Hz flaring was reported (which is not surprising, in view of the weakness of the X-rays) in association with this event, the location of the X-ray source is unknown. However, it should be noted that two days later, an active region appeared on the east limb, so it is not possible to rule out the possibility that a flare or sub-flare occurred behind the limb. The Sagamore Hill Observatory reported two type II bursts associated with this event, the first starting at 20:07:18 UT and lasting until

Fig. 1. Snapshot (0.6 s) maps of the Sun at 50 MHz, showing the evolution of the type II–type IV event associated with a coronal streamer disruption event.