A MODEL FOR THE DEVELOPMENT OF A SOLAR OUTBURST
BASED ON OBSERVATIONS WITH THE
CULGOORA RADIO SPECTROGRAPH AND HELIOGRAPH

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Abstract. The 80 and 160 MHz radioheliograph observations of a flare-associated outburst in June 1973 reveal three distinctive type IV continuum sources: a flare continuum, an isolated moving continuum and a storm continuum, in that time sequence. The observed characteristics of the three sources and their relations in space and time are described. The observed characteristics and the interrelations between the three continuum sources are explained in terms of energetic electrons trapped and accelerated in, and ejecta moving through, an arch-like magnetic field. It is also suggested that the isolated moving source – in the present event and in similar ones – is probably quite independent of the MHD shock wave which is responsible for the preceding type II burst.

1. Introduction

Observations with the Culgoora radioheliograph have shown the sources of moving type IV bursts usually in complex association with sources of other types of burst (see e.g. Wild, 1970; Wild and Smerd, 1972). Moving type IV bursts are often preceded by either an early, stationary continuum or a type II burst, and the sources of such events seem to be particularly important for the understanding of the dynamics of moving type IV sources.

We present here the observations of a flare-associated outburst recorded on 1973 June 26 with both the radio spectrograph (Sheridan, 1967) and the 80 and 160 MHz radioheliograph (Sheridan et al., 1973) at the Culgoora solar observatory. The event consists of complex type II-IV bursts showing three distinctive type IV continuum phases: a flare continuum, an isolated moving source and a storm continuum. The present event seems to be one of the clearest examples showing the space-time relations between the sources of a type II burst, a flare continuum and a moving type IV burst. It is the purpose of this paper to describe the different types of burst in the event and to investigate a comprehensive model in terms of which the observed relations can be consistently explained.

2. Observation and Analysis

2.1. Hα-FLARE

A Hα-flare (1N) was reported in Solar-Geophysical Data (1973). The starting and maximum times were ~01•35m and 01•42m UT, respectively. The flare was located at 9°S and 27°W within the MacMath plage region No. 12397.

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