

# A Type I Noise Storm and the Bastille Day CME

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**Abstract.** Based on Nançay Radioheliograph (NRH) observations, we have identified 3 Type I noise storm continua sources associated with the Bastille Day flare/CME event. Two of them were stable and closed to active regions. Their outskirts covered AR9077 and 9082, respectively. One source was over the south-west limb and in the middle corona, it was stable for hours. All the Type I storm sources weren't observed simultaneously before 10:20 UT at the onset of the global CME, which indicated the intrinsic association of Type I noise storm and CME initiation. The wide span of the Type I storm sources and burst sources clearly implied that the Bastille Day flare/CME involves large or even global magnetic interaction.

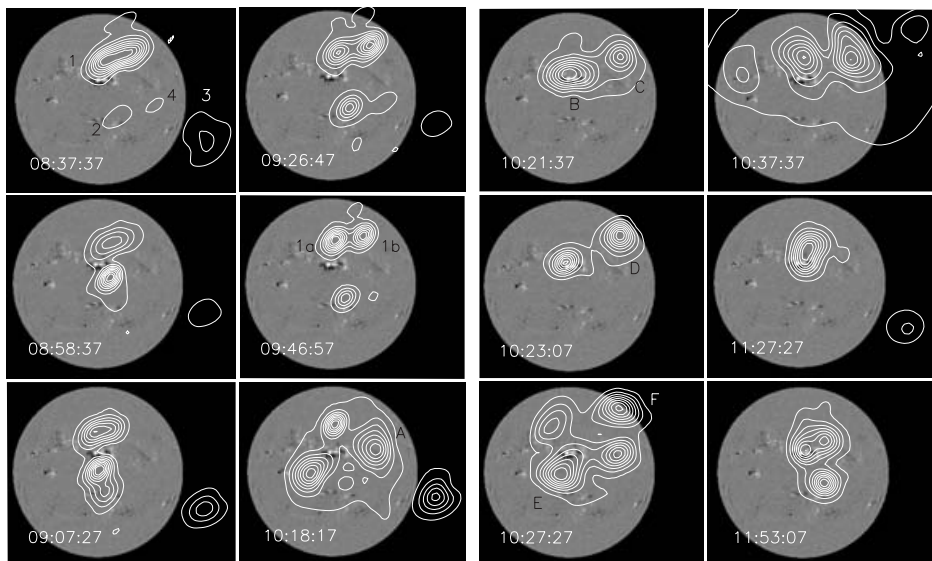
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## 1. Introduction and observation

In this paper, we analyze the relationship between the sources of the Type I noise storm and the Bastille Day CME. The type III noise storm can't be observed by NRH. The radio burst sources after the X5.7 flare are also discussed.

In the Bastille Day event of 2000, besides NOAA AR9077, there are several smaller active regions relating to the event, such as AR9073, AR9081, AR9082 and so on (see Solar-Geophysical Data). NOAA AR9077 rotated to the east limb of the Sun on about 7 July 2000. Noise storm activity was detected in the Nançay data, well before the eruption. Most of the active regions that can be identified on the sun on 14 July 2000, have weak noise storms associated with them (Maia *et al.*, 2001). Figure 1 shows the development of the sources of the Type I noise storms and radio bursts. The sources marked by numbers (1, 2, 3) are storm sources, while marked by letters (A, B, ..., F) are burst sources. 1a and 1b mean that two positions are seen close to the position 1, so we call them 1a and 1b. At 10:18:17 UT, storm source and radio burst source 'A' are observed on the disk. It suggests that the flux intensity starts to rise and the structure of the radio emission regions become increasing complex. After 10:18:17 UT, we can see that the storm source 1, 2, and 3 were not observed, they may in fact disappear but more likely are simply masked by the much brighter outburst. While the burst sources were moving. At about 10:27:27 UT, four sources appear on the solar disk, they cover nearly all the visible range. Their moving features show that a large-scale halo CME is ejecting to all directions. At about 10:40 UT, the source region 1a appears the new burst source. After 11:00 UT, Sources 1 and 2 do in fact disappear. A new source appears at an intermediate position. Noise storm 3 seems to survive although slightly shifted. The features of storm sources and burst sources are indicated in table 1.



**Figure 1.** The intensity contours of the storm sources(left) and the radio burst sources(right) at 164MHz of the NRH superposed on the MDI magnetograms at the closest time.

**Table 1.** The features of the storm sources and burst sources

Source	Position	Interval	Remark
1	N0.53E0.06	08:27-09:25	stable, offset to AR9077
1a	N0.47E-0.13	08:27-10:20	stable, offset to AR9077
1b	N0.53E0.27	08:37-09:46	instable
2	N-0.33E-0.02	08:26-10:19	stable, offset to AR9082
3	N-0.5E1.25	08:26-10:21	stable, in middle corona
A	N0.17E0.38	10:16-10:19	moving toward north west
B	N0.28E0.25	10:21-10:23	moving slowly
C	N0.31E0.31	10:19-10:22	moving toward north west
E	N-0.14E-0.34	10:27-10:28	lasting for a very short time

## 2. Discussion and conclusion

In this study, we have showed that the development of the Type I noise storm sources before the Bastille Day flare/CME. Some sources are relative to the active regions, but only their outskirts cover the active regions. All the Type I noise storm sources were not observed before the event at the onset of the global CME, it indicated the intrinsic association of Type I noise storm and CME initiation. At the same time, it clearly implied that the Bastille Day flare/CME involves large or even global magnetic interaction.

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### References

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