

Type III Radio Burst Duration and SEP events

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Long-duration (>15 min), low-frequency (<14 MHz) type III radio bursts have been reported to be indicative of solar energetic particle events. We measured the durations of type III bursts associated with large SEP events of solar cycle 23. The Type III durations are distributed symmetrically at 1 MHz yielding a mean value of ~ 33 min (median = 32 min) for the large SEP events. When the SEP events with ground level enhancement (GLE) are considered, the distribution is essentially unchanged (mean = 32 min; median = 30 min). To test the importance of type III bursts in indicating SEP events, we considered a set of six type III bursts from the same active region (AR 10588) whose durations fit the “long duration” criterion. We analyzed the coronal mass ejections (CMEs), flares, and type II radio bursts associated with the type III bursts. The CMEs were of similar speeds and the flares are also of similar size and duration. All but one of the type III bursts was not associated with a type II burst in the metric or longer wavelength domains. The burst without type II burst also lacked a solar energetic particle (SEP) event at energies >25 MeV. The 1-MHz duration of the type III burst (28 min) is near the median value of type III durations found for gradual SEP events and ground level enhancement (GLE) events. Yet, there was no sign of SEP events. On the other hand, two other type III bursts from the same active region had similar duration but accompanied by WAVES type II bursts; these bursts were also accompanied by SEP events detected by SOHO/ERNE. This study suggests that the type III burst duration may not be a good indicator of an SEP event, consistent with the statistical study of Cliver and Ling (2009, ApJ).

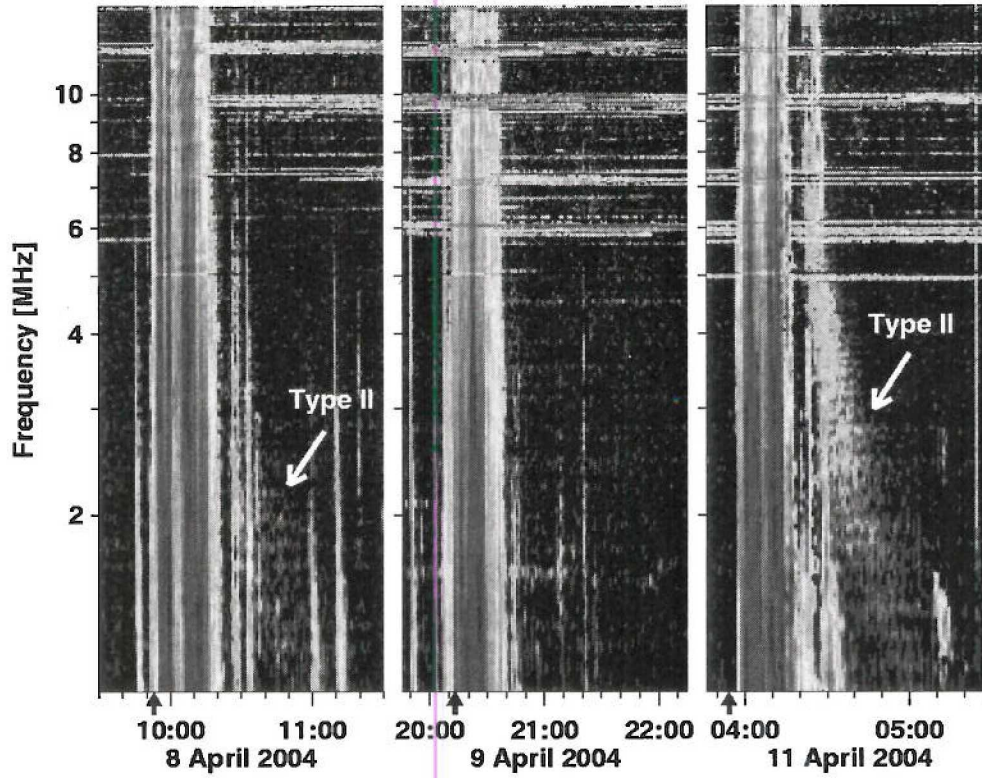


Fig. 1 Three long-duration low-frequency Type III bursts from AR 10588. The middle one had no accompanying type II and no SEP event.