
Solar Near-relativistic Electron Release History on 1998 April 20

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Abstract

We present the analysis of a large solar near-relativistic (NR; > 50 keV) electron event observed by the Electron, Proton and Alpha Monitor (EPAM) on board the ACE spacecraft on 1998 April 20. The particle event showed a rapid rise phase with onset at about 10:30 UT. It was preceded by a prominence eruption which was observed at the southwest limb of the Sun, where an M1.4 X-ray flare was also reported at 10:00 UT. A fast (1863 km/s) CME was first seen above 3 solar radii at 10:07 UT. Distinct radio emission episodes were observed. Those included a moving type IV burst between 9:40 and 10:00 UT, followed by a series of DH type III bursts observed below 2 MHz and a type II burst at 5-10 MHz. Several hours after these emissions a series of bursts was observed above the western limb at 164 MHz.

We use a particle transport model to infer the propagation conditions in the interplanetary medium and the injection history of the NR electrons observed in-situ. The simulation results reveal an extended and sparse release of particles. The first release occurs at 10:20 UT, during the brightest group of type III bursts. Other later sporadic release episodes are obtained. A later release episode appears after 13:00 UT, at about the time when bursty emission above the west solar limb becomes visible at 164 MHz.

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Keywords: solar energetic particles, solar flares, radio emission, prominences, CMEs

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