TRACING THE CONNECTIVITY OF MAGNETIC FLUX ROPES TO SOLAR SURFACE WITH ≥100 KEV ELECTRONS ASSOCIATED WITH CME ON JULY 14, 2000

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It is known that about 1/3 of all coronal mass ejections (CMEs) at 1 AU exhibit the large and coherent internal field rotations characteristic of magnetic flux ropes (magnetic clouds). But there are still unsolved questions; do CMEs eventually disconnect completely from the Sun?; how long does it take for such complete disconnection to occur? We contribute to the solutions of these questions from the analysis of CMEs observed by the Nozomi spacecraft. On July 12, 2000, a magnetic flux rope was ejected from solar surface associated with a CME and an X1.9 class flare which occurred in solar active region AR 9077. Two days after, on July 14, another large solar flare (X5.7 class) occurred on the same region AR 9077 (Bastille event). On the same day, Electron and Ion Spectrometer (EIS) onboard the Nozomi spacecraft observed unidirectional field-aligned ≥100 keV electrons whose flux level is more than 10 particles/[keV sec cm^2sr] at the peak and the Magnetic Field Measurement (MGF) instrument on the spacecraft observed magnetic flux rope, when the spacecraft was about 1 AU distant from the Sun but 1 AU far from the Earth. From its high level of flux it is considered that the second flare near the solar surface accelerated these electrons. From a pitch-angle distribution of the electrons and the active region where these flares occurred, it seems that the electrons propagated along the magnetic flux rope that was ejected on July 12, and reached the Nozomi spacecraft. These considerations suggest that at least one of the footpoints of the magnetic flux rope has been connected to solar surface for two days at least.