CME-CME INTERACTION NEAR THE EARTH

Rok-Soon Kim\textsuperscript{1,2}, Soojeong Jang\textsuperscript{1}, Ryunyoung Kwon\textsuperscript{1}, Jae-Ok Lee\textsuperscript{1}

\textsuperscript{1}Korea Astronomy and Space Science Institute, Daedeokdae-ro 776, Yuseong-gu Daejeon 34055, Republic of Korea
\textsuperscript{2}University of Science and Technology, Republic of Korea

In coronagraph images, it is often observed that two successive CMEs merge into one another and form complex structures. This phenomenon, so called CME cannibalism caused by the differences in ejecting times and propagating velocities, can significantly degrade forecast capability of space weather. This phenomenon can occur anywhere in the interplanetary space as well as near the Sun. Regarding this, we attempt to analyze the cases expecting to merge around 1 AU based on CME arrival times. For this, we select 13 CME-CME pairs detected by ACE, Wind and/or STEREO-A/B. Among them, 5 pairs clearly show magnetic holes between two respective shock structures, which mean before the merging. The other events show only one shock structure. Based on detailed investigation for each pair and statistical analysis for all events, we can get clues for following questions: 1) How does the solar wind structure change when they are merging? 2) Are there any systematic characteristics of merging processes according to the CME properties? 3) Is the merging process associated with the occurrence of energetic storm particles? 4) What causes errors in calculating CME arrival times? Our results and discussions can be helpful to understand energetic phenomena not only close to the Sun but also near the Earth.