A statistical study of the association of coronal mass ejections with filament disappearances using H-alpha full disk images observed with the Solar Magnetic Activity Research Telescope (SMART)

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Forecasting space weather comes to be important because humans' space exploration is rapidly increasing recently. Coronal mass ejections (CMEs) strongly affect the space weather. In order to forecast CMEs, studies of filament disappearances are important. An erupted filament is sometimes observed as a core of a CME. Filament disappearances are closely connected with CMEs. Accordingly, filament disappearances were studied using the H-alpha full disk images of the Solar Magnetic Activity Research Telescope (SMART), Hida Observatory. 1276 filament disappearance events were found in about 10 years (from 1-April-2005 to 9-October-2014). The number of filament disappearance events were correlated with the relative sunspot number. SMART observes not only the H-alpha center images but also the H-alpha wing images (+/-0.5A, +/-0.8A, +/-1.2A, +3.5A). 274 out of 1276 events were observed with SMART during their disappearances. We classified the 274 filament disappearance events into eruption type and non-eruption type, using -0.5A images. If disappearing filaments can be observed in -0.5A images, the events were regarded as eruption type filament disappearance. On the contrary, if there were no signals in -0.5A images during filaent disappearances, we think of the events as non-eruption type filament disappearances. We found large (more than 200,000 km) and eruption type filaments are easy to be associated with CMEs. In addition, we investigated the precursors of filament disappearances.

Keywords: Space weather, the Solar Magnetic Activity Research Telescope (SMART), Filament disappearance