Geophysical Research Abstracts
Vol. 19, EGU2017-11067, 2017
EGU General Assembly 2017

Observations of the Growth of an Active Region Filament

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We present observations of the growth of an active region filament caused by magnetic interactions among the filament and its adjacent superpenumbral filament (SF) and dark thread-like structures (T). Multistep reconnections are identified during the whole growing process. Magnetic flux convergence and cancellation occurring at the positive footpoint region of the filament is the first step reconnection, which resulted in the filament bifurcating into two sets of intertwined threads. One set anchored in situ, while the other set moved toward and interacted with the SF and part of T. This indicates the second step reconnection, which gave rise to the disappearance of the SF and the formation of a long thread-like structure that connects the far ends of the filament and T. The long thread-like structure further interacted with the T and then separated into two parts, representing the third step reconnection. Finally, another similar long thread-like structure, which intertwined with the fixed filament threads, appeared. H_{α}observations show that this twisted structure is a longer sinistral filament. Based on the observed photospheric vector magnetograms, we performed a non-linear force-free field extrapolation to reconstruct the magnetic fields above the photosphere and found that the coronal magnetic field lines associated with the filament consists of two twisted flux ropes winding around each other. These results suggest that magnetic interactions among filaments and their adjacent SFs and T could lead to the growth of the filaments, and the filament is probably supported in a flux rope.