A MULTI-SPACECRAFT VIEW OF A GIANT FILAMENT ERUPTION DURING 26/27 SEPTEMBER 2009

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Abstract

We analyze multi-spacecraft observations of a giant filament eruptionthat occurred during 26 and27 September 2009. The filament eruption was associated with arelatively slow coronal mass ejection(CME). The filament consisted of a large and a small part, both partserupted nearly simultaneously.Here we focus on the eruption associated with the larger part of thefilament. The STEREOsatellites were separated by about 117 degree during this event, so weadditionally used SoHO/EIT andCORONAS/TESIS observations as a third eye (Earth view) to aid ourmeasurements. We measurethe plane-of-sky trajectory of the filament as seen from STEREO-A andTESIS view-points. Usinga simple trigonometric relation, we then use these measurements toestimate the true directionof propagation of the filament which allows us to derive the trueR=R-time profile of the filamentapex. Furthermore, we develop a new tomographic method that canpotentially provide a more robustthree-dimensional reconstruction by exploiting multiple simultaneousviews. We apply this methodalso to investigate the 3D evolution of the top part of filament. Weexpect this method to be usefulwhen SDO and STEREO observations are combined. We then analyze thekinematics of the eruptivefilament during its rapid acceleration phase by fitting differentfunctional forms to the height-timedata derived from the two methods. We find that, for both methods, anexponential function fits therise profile of the filament slightly better than parabolic or cubicfunctions. Finally, we confront theseresults with the predictions of theoretical eruption models.

Keywords: filament eruption mechanisms

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