Observations of a Solar Flare in Association with a Quiescent Filament Eruption

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We present an analysis of multi-waveband observations of the eruption of a quiescent solar filament over a 2-day time span, from 2013 September 29 to 2013 September 30. The instruments used include the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI), the Solar Dynamics Observatory (SDO), and the Fermi Gamma-ray Space Telescope. The GOES class of the event was C1. The GOES light curve for this event includes a small impulsive-phase peak beginning September 29 at 22:00 UT that lasts almost 10 minutes. A more gradual peak follows, lasting for 3 hours between September 29 22:30 UT and September 30 1:30 UT. RHESSI detected X-ray emission between 3-12 keV, but was in spacecraft nighttime during the impulsive phase of the flare. Sodium iodide detectors on the Fermi Gamma-ray Burst Monitor (GBM) show a small peak in the 10-14 keV channels during the impulsive phase. SDO Atmospheric Imaging Assembly (AIA) movies during the time span show that the filament lies outside any active region on the sun, and spans a length on the order of 600 arcseconds. Spatially resolved RHESSI emission during the gradual phase is found to come from an area along the post-eruption arcade, close to the westward expanding ribbon but confined to a length of only 150 arcseconds. We infer the strength and geometry of the magnetic field during the eruption with the SDO Helioseismic and Magnetic Imager (HMI) and find a small (~ 100 arcseconds long) dipolar element within the filament channel that appears to correlate spatially with the RHESSI emission. The dipolar element is observed to also expand apart, similar to the ribbons of the arcade, with magnetic field strengths as high as 1000 Gauss before the eruption. We conclude that a flare can occur outside an active region in association with a quiescent filament eruption if sufficiently high magnetic flux is present in the vicinity of the filament.