MULTI-WAVELENGTH INVESTIGATIONS OF SOLAR ERUPTIVE PHENOMENA

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Abstract

"Solar eruptive phenomena" correspond to various kinds of transient magnetic activities occurring in the solar atmosphere in the form of flares, eruptive prominences and coronal mass ejections (CMEs). The energy released during the eruption is stored in the corona prior to the event in the form of stressed or non-potential magnetic fields. The magnetic field and plasma ejected during such events cause non recurrent disturbances in the interplanetary medium.

In this project we will make efforts to understand the physical processes which occur during a solar flare utilizing multi-wavelength observations. During solar flares, huge amount of energy is released (~10^{32} ergs) over short time scales. In a single burst, energy is released in different forms, such as the electro-magnetic radiation (from radio waves through the visible spectrum to γ rays and X-rays), energetic particles (in the form of protons and electrons), and hot plasma eruptions. Multi-wavelength observations are thus crucial to probe the energy release phenomena across different layers of the solar atmosphere. To investigate high energy processes occurring during the flare, we examine X-ray light curves and images taken by satellites which monitor the Sun at X-ray wavelength such as Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI) and Geostationary Operational Environmental Satellite (GOES). The X-ray measurements will be compared with EUV, UV, and optical observations taken by Solar Dynamics Observatory (SDO) to understand the link between the energetic phenomena from coronal layers down to photosphere. In this work, we will perform a case study of a solar flare which occurred near the limb of the Sun. From the study of a near-limb event, we get an opportunity to understand the physical processes which take place near the primary energy release site in the corona, such as, magnetic reconnection and acceleration of particles.

Keywords: solar flares, magnetic reconnection, solar atmosphere, X-ray emission.

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