M30a Basic Principles and Examples of the Large Solar Flare Modeling

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We review and demonstrate the fundamental ideas which are under current use to model the solar flares, CMEs and other non-stationary phenomena in the solar atmosphere. We apply the so-called 'rainbow reconnection' model to the recent observations of flares with the Hard X-ray Telescope (HXT) on board *Yohkoh*, the Michelson Doppler Imager (MDI) instrument on the SoHO satellite, and the Solar Magnetic Field Telescope (SMFT) of the Beijing Astronomical Observatory. This allows us to improve a theory of large solar-type flares (Somov, Kosugi, Sakao, 1998, ApJ 497, 958), which can be applied to many astrophysical phenomena accompanied by fast plasma ejection, powerful fluxes of heat and radiation, impulsive acceleration of electrons and ions to high energies. In particular, we study the large solar flare with the X-ray importance of X5.7 launched near the disk center in the active region NOAA 9077 on 14 July 2000 near 10:10 UT. This well-observed flare was the greatest solar event since October 1989 and it is known as the Bastille day flare. We suggest an interpretation of the flare mechanism; we show that the main large-scale structure and dynamics of the Bastille flare, as it was seen in HXR, can be explained in terms of the collisionless three-dimensional reconnection model.