

THE SOLAR “PLASMA” DYNAMICS OBSERVATORY

W. D. Pesnell¹

¹*NASA Goddard Space Flight Center, Greenbelt, Maryland, USA*

NASA’s Solar Dynamics Observatory (SDO) provides continual data on the plasma dynamics occurring on the Sun. Two of these phenomena will be discussed. First is the brightening of material falling back onto the solar surface after a filament eruption. The other is the motion and brightening of cometary detritus from sungrazing comets. SDO has seen two sungrazing comets [C/2011 N3 (SOHO) and C/2011 W3 (Lovejoy)] in the extreme ultraviolet channels of the Atmospheric Imaging Assembly (AIA). We explained this EUV emission through the evolution of the cometary debris as it interacts with the ambient solar atmosphere. Molecules are rapidly sublimated off the comet by the intense blackbody radiation field as it approaches the Sun. They are then photodissociated by the solar radiation field to create atomic species. Subsequent ionization of these atoms produces a higher abundance of ions than normally present in the corona and results in EUV emission in the wavelength ranges of the AIA telescope passbands. Much of this emission is in oxygen lines that are cooler than the iron lines normally observed in the AIA passbands. The filament material falling back onto the surface has similar features. In this talk we will discuss a number of the factors that contribute to the EUV emission from these ephemeral phenomena, including the role of the magnetic field, and some thoughts on how to use them for plasma diagnostics.