Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

MHD Simulations of the Eruption of Coronal Flux Ropes[1]
YUHONG FAN, National Center for Atmospheric Research — I present MHD simulations of the eruption of coronal flux ropes and the initiation of coronal mass ejections (CMEs). It is found that the eruption of the flux rope in the corona is triggered when the flux rope rises to a critical height where the corresponding potential field declines with height at a sufficiently steep rate, a mechanism consistent with the onset of the torus instability. The simulations show that S (or inverse S) shaped current sheets develop along topological structures identified as Quasi Separatrix Layers (QSLs), during the quasi-static phase before the eruption. Reconnections in the current sheets effectively add twisted flux to the flux rope, allowing it to rise quasi-statically to the critical height and then the dynamic eruption ensues. It is found that the resulting coronal magnetic field evolution can explain some of the commonly observed features associated CMEs and their pre-cursor structures. Finally I also show an MHD simulation that models qualitatively the magnetic field evolution of the eruptive flare occurred on December 13, 2006 in the emerging δ sunspot region NOAA 10930 observed by the Hinode satellite.

[1]NCAR is sponsored by the NSF. This work is supported in part by NASA LWS grant NNX09AJ89G to NCAR.

Yuhong Fan
National Center for Atmospheric Research

Date submitted: 13 Jul 2012 Electronic form version 1.4