

国台学术报告 NAOC COLLOQUIUM

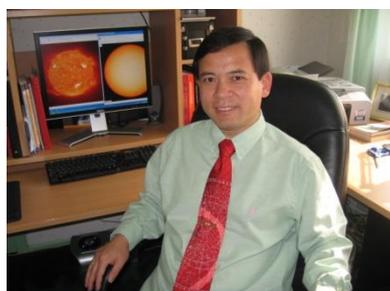
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Response of the Photospheric magnetic field to flares

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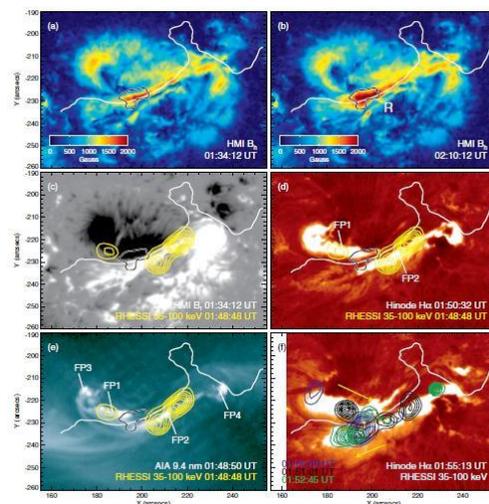


Professor Wang obtained his PhD degree in 1988 from California Institute of Technology. Since 1997 he is associate Director of Big Bear Solar Observatory. Now he is Director of Space Weather Research Laboratory, New Jersey Institute of Technology (NJIT).

Abstract

In this talk, I will first summarize the study of photospheric magnetic field evolution associated with flare. Then I will present detailed study of a near disk-center, GOES-class X2.2 flare, which occurred in NOAA AR 11158 on 2011 February 15. Using the magnetic field measurements made by SDO/HMI, we obtained the first solid evidence of a rapid (in about 30 minutes) and irreversible enhancement in the horizontal magnetic field at the flaring magnetic polarity inversion line (PIL) by a magnitude of 30%. It is also shown that the photospheric field becomes more sheared and more inclined. This field evolution is unequivocally associated with the flare occurrence in this sigmoidal active region, with the enhancement area located in between the two chromospheric flare ribbons and the initial conjugate hard X-ray footpoints. These results strongly corroborate our previous conjecture that the photospheric magnetic field near the PIL must become more horizontal after eruptions, which could be related to the newly formed low-lying fields resulting from the tether-cutting reconnection. The sudden increase of downward Lorentz force was detected. The M6.6 flare on February 13 in the same active region shows similar pattern. Further investigation of 20 HMI events clearly demonstrates the correlation between downward Lorentz force and flare magnitude. This can be used to estimate CME speed based on principle of conservation of momentum.

All are welcome! Tea, coffee, biscuits will be served at 9:15 A.M.



You are welcome to nominate speakers to Shude Mao (shude.mao@gmail.com), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn).