[구SE-09] An Ellerman bomb-associated surge observed by the FISS/NST

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We observed a surge associated with an Ellerman bomb using the Fast Imaging Solar Spectrograph(FISS) of the New Solar Telescope at Big Bear Solar Observatory. The surge was seen in absorption and varied rapidly both in H alpha and Ca II 8542 line. It originated from the Ellerman bomb, and was impulsively accelerated to 20km/s of the blueshift(upward) motion. Then the gradual change from blueshift of 20km/s to redshift of 40km/s occurred in 20 minutes. Based on the measured line-of-sight velocities, we estimated the material reached up to about 5,000km height. We inferred physical parameters of the surge by adopting the cloud model, and found that the temperature of the surge material was about 25,000K and the non-thermal velocity was about 10km/s. Our results suggest that the surge might be heated intensely after it was ejected from the Ellerman bomb.

[구SE-10] Solar Flare Occurrence Rate and Probability Depending on Sunspot Classification with Active Region Area and Its Change

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We investigate solar flare occurrence rate and daily flare probability depending on McIntosh sunspot classification, its area, and its area change. For this we use the NOAA active region and GOES solar flare data for 15 years (from January 1996 to December 2010). We consider the most flare-productive 10 sunspot classification: 'Dko', 'Dai', 'Eai', 'Fai', 'Dki', 'Dkc', 'Eki', 'Ekc', 'Fki', and 'Fkc'. Sunspot area and its change can be a proxy of magnetic flux and its emergence/cancellation, respectively. we classify each sunspot group into two sub-groups: 'Large' and 'Small'. In addition, for each group, we classify it into three sub-groups according to sunspot group area change: 'Decrease', 'Steady', and 'Increase'. As a result, in the case of compact groups, their flare occurrence rates and daily flare probabilities noticeably increase with sunspot group area. We also find that the flare occurrence rates and daily flare probabilities for the 'Increase' sub-groups are noticeably higher than those for the other sub-groups. In case of the (M+X)-class flares of 'Dkc' group, the flare occurrence rate of the 'Increase' sub-group is three times higher than that of the 'Steady' sub-group. Mean flare occurrence rates and flare probabilities for all sunspot regions increase with the following order: 'Steady', 'Decrease', and 'Increase'. Our results statistically demonstrate that magnetic flux and its emergence enhance major solar flare occurrence. We are going to forecast solar flares based on these results and NOAA scale.