[포SS-20] Statistical Analysis of Supersonic Downflows in Sunspot Penumbrae.

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Sunspot penumbrae show supersonic downflow patches along the periphery. These patches are believed to be the return channels of the Evershed flow. There was previous study to investigate their structure in detail using Hinode SOT/SP observations (M. van Noort et al. 2013) but their data sample was only two sunspots. To make general description it needs to check more sunspot sample.

We selected 242 downflow patches of 17 sunspots using Hinode SOT/SP observations from 2006 to 2012. Height-dependent maps of atmospheric parameters of these downflows was produced by using HeLix which was height dependent LTE inversion code of Stokes profiles. The inversion code at high resolution allows for the accurate determination of small scale structures.

The recovered atmospheric structure of three layers indicates that regions with very high downflow velocities contain very strong magnetic fields reaching up to 7kG. The higher downflow velocity patches have bigger patch size. Magnetic fields of downflow patches are more vertical while penumbra shows horizontal field and neighbor of downflow patches have opposite polarity. Temperature of downflow patches at highest layer have more strong value than penumbra at deepest layer. The direction of velocity of downflow patches at highest layer have two branches. These result shows that we can expect some heating precess in the middle of layer.

[포SS-21] Comparison of daily solar flare peak flux forecast models based on regressive and neural network methods

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We have developed a set of daily solar flare peak flux forecast models using the multiple linear regression (MLR), the auto regression (AR), and artificial neural network (ANN) methods. We consider input parameters as solar activity data from January 1996 to December 2013 such as sunspot area, X-ray flare peak flux, weighted total flux $T_F = 1 \times F_C + 10 \times F_M + 100 \times F_X$ of previous day, mean flare rates of a given McIntosh sunspot group (Zpc), and a Mount Wilson magnetic classification.

We compute the hitting rate that is defined as the fraction of the events whose absolute differences between the observed and predicted flare fluxes in a logarithm scale are ≤ 0.5. The best three parameters related to the observed flare peak flux are as follows: weighted total flare flux of previous day (r=0.5), Mount Wilson magnetic classification (r=0.33), and McIntosh sunspot group (r=0.3). The hitting rates of flares stronger than the M5 class, which is regarded to be significant for space weather forecast, are as follows: 30% for the auto regression method and 69% for the neural network method.