[초SE-01] Properties of transient horizontal magnetic fields and their implication to the origin of quiet-Sun magnetism

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Recent spectropolarimetric observations with high spatial resolution and high polarization sensitivity have provided us with new insight to better understand the quiet-Sun magnetism. This talk is concerned with the ubiquitous transient horizontal magnetic fields in the quiet-Sun, as revealed by the Solar Optical Telescope (SOT) on board Hinode satellite. Exploiting the SOT data with careful treatment of photon noise, we reveal the enigmatic properties of these horizontal magnetic fields such as lifetime, size, position in terms of granular structure, occurrence rate, three-dimensional structure, total magnetic flux, field strength distribution, relationship with the meso- and super-granulations and so on. Based on these observational consequences, we conjecture that the local dynamo process, which takes place in a relatively shallow layer with the granular size, produces these transient horizontal magnetic fields and that these horizontal magnetic fields contribute to the considerable amount of quiet-Sun magnetic fields. We also estimate the magnetic energy flux carried by these horizontal magnetic fields based on the statistical data, and find that the total magnetic energy is comparable to the total chromospheric and coronal energy loss, implying their important role for the chromospheric heating and dynamism.

[구SE-02] HOW MUCH DOES A MAGNETIC FLUX TUBE EMERGE INTO THE SOLAR ATMOSPHERE?

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We studied the controlling parameters of flux emergence with a focus on the relation between the configuration of coronal magnetic field and the pre-emeged state of subsurface magnetic field. We performed a series of magnetohydrodynamic simulations (dynamic model) and find an interesting result on the twist of coronal magnetic field, that is, the coronal magnetic field formed via flux emergence actually contains less amount of twist (relative magnetic helicity normalized by magnetic flux) than what is expected in kinematic models for global-scale solar eruptions. Based on this result, we propose another possible mechanism for producing these global-scale solar eruptions.