## [구SE-01] The study on source regions of solar energetic particles detected by widely separated multiple spacecraft

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We studied the source regions of 12 solar energetic particle (SEP) events seen between 2010 August and 2012 January at STEREO-A, B and ACE, when the two STEREO spacecraft were separated by about 180°. All events were associated with strong flares (C1 - X6) and fast coronal mass ejections (CMEs) accompanied by type II radio bursts. We have determined the arrival times of the SEP events at the three spacecraft. EUV waves observed in 195Å and 193Å channels of STEREO and SDO/AIA are tracked across the Sun and the arrival time of the EUV wave at the photospheric source of open field lines extending to the spacecraft connection points at 2.5 Rsun estimated. We found 7 events with flux enhancements in all spacecraft and 4 in two spacecraft. Most events came from a single source. The results show that magnetic field connections between source regions and the spacecraft play an important role in abrupt flux enhancements. In the most cases, EUV waves at the Sun are associated with a wide longitudinal spread of the SEPs.

## [구SE-02] Height Dependence of Plasma Properties in a Solar Limb Active Region Observed by Hinode/EIS

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We investigate a cool loop and a dark lane over a limb active region on 2007 March 14 by the Hinode/EUV Imaging Spectrometer (EIS). The cool loop is clearly seen in the EIS spectral lines formed at the transition region temperature (log T = 5.8). The dark lane is characterized by an elongated faint structure in coronal spectral lines (log T = 5.8 − 6.1) and rooted on a bright point. We examine their electron densities, Doppler velocities, and non-thermal velocities as a function of distance from the limb using the spectral lines formed at different temperatures (log T = 5.4 − 6.4). The electron densities of the cool loop and the dark lane are derived from the density sensitive line pairs of Mg VII, Fe XII, and Fe XIV spectra. Under the hydrostatic equilibrium and isothermal assumption, we determine their temperatures from the density scale height. Comparing the scale height temperatures to the peak formation temperatures of the spectral lines, we note that the scale height temperature of the cool loop is consistent with a peak formation temperature of the Mg VII (log T = 5.8) and the scale height temperature of the dark lane is close to a peak formation temperature of the Fe XII and Fe XIII (log T = 6.1 − 6.2). It is interesting to note that the structures of the cool loop and the dark lane are most visible in these temperature lines. While the non-thermal velocity in the cool loop slightly decreases (less than 7 km s−1) along the loop, that in the dark lane sharply falls off with height. The variation of non-thermal velocity with height in the cool loop and the dark lane is contrast to that in off-limb polar coronal holes which are considered as source of the fast solar wind. Such a decrease in the non-thermal velocity may be explained by wave damping near the solar surface or turbulence due to magnetic reconnection near the bright point.