[구SE-11] Low ionization state plasma in CMEs

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The Ultraviolet Coronagraph Spectrometer on board the Solar and Heliospheric Observatory (SOHO) observes low ionization state coronal mass ejection plasma at ultraviolet wavelengths. The CME plasmas are often detected in O VI ($3x10^5$K), C III ($8x10^4$K), Lyα, and Lyβ. Earlier in situ observations by the Solar Wind Ion Composition Spectrometer (SWICS) on board Advanced Composition Explorer (ACE) have shown mostly high ionization state plasmas in interplanetary coronal mass ejections (ICME) events, which implies that most CME plasma is strongly heated during its expansion in solar corona. In this analysis, we investigate whether the low ionization state CME plasmas observed by UVCS occupy small enough fractions of the CME volume to be consistent with the small fraction of ICMEs measured by ACE that show low ionization plasma, or whether the CME must be further ionized after passing the UVCS slit. To do this, we determine the covering factors of low ionization state plasma for 10 CME events. We find that the low ionization state plasmas in CMEs observed by UVCS show small covering factors. This result shows that the high ionization state ICME plasmas observed by the ACE results from a small filling factor of cool plasma. We also find that the low ionization state plasma volumes in faster CMEs are smaller than in slower CMEs. Most slow CMEs in this analysis are associated with a prominence eruption, while the faster CMEs are associated with X-class flares.

[초SE-12] Observation of long-term disappearance and reappearance of the outer radiation belt

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In this study we have used the data of various instruments onboard the THEMIS spacecraft to study the characteristics of the outer radiation belt during the ascending phase of solar cycle 24. The most astonishing result is that we discovered four long-term (a month or so) periods during which the belt has nearly disappeared. The first disappearance started late 2008, followed by reappearance in ~a month, and three more similar events repeated until early 2010 when the belt has reappeared. This is well revealed at 719 keV electrons, which is the currently available uppermost energy channel from the THEMIS SST observation, but also seen at even lower energies. Overall consistent features were confirmed using the NOAA-POES observations. The vanished belt periods are associated with extremely weak solar wind conditions, low geomagnetic disturbances (in terms of Kp and AE/AL), greatly suppressed wave (ULF and chorus) activities, greatly reduced storm and substorm activities (little source particle supply), and expanded plasmapause locations. The direct observations of such events shed light on the fundamental question of the origin of the radiation belt, which is the main focus of our presentation.