[구SS-11] Statistical Study on solar energetic particle acceleration using multi-channel observations

Rok-Soon Kim, Kyung-Suk Cho, and Young-Deuk Park
Korea Astronomy and Space Science Institute

We study the origin and acceleration mechanism of solar energetic particles (SEPs), which are one of the major causes of hazardous impacts in the space weather. By adopting the velocity dispersion to the multi-channel energy band observations from SOHO/ERNE and Wind/3DP, we estimate the onset time for each energy band and investigate coronal structure and CME's dynamics associated with the SEPs. Through this study we will find clues to answer the questions about the origin and acceleration of SEPs as well as their associated with flare and/or CMEs. We will apply our findings to improve the forecasting system of the solar radiation storms.

[구SS-12] Three-dimensional MHD modeling of a CME propagating through a solar wind

Jun-Mo An[1], Satoshi Inoue[1], Tetsuya Magara[1,2], Hwanhee Lee[1], Jihye Kang[1], Kap-Sung Kim[1,2], Keiji Hayashi[3], Takashi Tanaka[4]
[1]School of Space Research, Kyung Hee University, [2]Department of Astronomy and Space Science, Kyung Hee University, [3]W. W. Hansen Experimental Physics Laboratory, Stanford University, Stanford, CA 94305, USA, [4]Department of Earth and Planetary Sciences, Graduated School of Sciences, Kyushu University, Fukuoka, Japan

We developed a three-dimensional (3D) magnetohydrodynamic (MHD) simulation code to reproduce the structure of a solar wind and the propagation of a coronal mass ejection (CME) through it. This code is constructed by a finite volume method based on a total variation diminishing (TVD) scheme using an unstructured grid system (Tanaka 1994). The grid system can avoid the singularity arising in the spherical coordinate system. In this study, we made an improvement of the code focused on the propagation of a CME through a solar wind, which extends a previous work done by Nakamizo et al. (2009). We first reconstructed a solar wind in a steady state from physical values obtained at 50 solar radii away from the Sun via an MHD tomography applied to interplanetary scintillation (IPS) data (Hayashi et al. 2003). We selected CR2057 and inserted a spheromak-type CME (Kataoka et al. 2009) into a reconstructed solar wind. As a result, we found that our simulation well captures the velocity, temperature and density profiles of an observed solar wind. Furthermore, we successfully reproduce the general characteristics of an interplanetary coronal mass ejection (ICME) obtained by the Helios 1/2 spacecraft (R. J. FORSYTH et al. 2006).