

Effect of the heliospheric current sheet on the solar energetic particle transport

Yuki Kubo[1]

[1] NICT

Solar energetic particles are accelerated at two regions; solar flares and interplanetary shock waves. The solar flare accelerated particle is considered to be one of the origins of impulsive phase of large gradual events, which shows rapid increase of energetic particle flux. This rapid increase of energetic particle flux can be serious radiation hazard to manned space mission and artificial satellites. Since the accelerated particles propagate along interplanetary magnetic field lines, the increase of energetic particle flux should be rapid only when an accompanied flare is located at the western hemisphere of the Sun. However, a few events show rapid increase of energetic particle flux in spite of eastern hemisphere event. If these energetic particles are flare accelerated ones, a process which the energetic particles can quickly cross the interplanetary magnetic field is required.

In this work, we consider a heliospheric current sheet as a possible mechanism of the quick crossing of interplanetary magnetic fields. We model the interplanetary magnetic fields as Parker magnetic field and turbulent magnetic field. The energetic particles are traced from the Sun to the Earth by Buneman-Boris method. The result is that energetic particles can quickly cross the interplanetary magnetic fields and reach the Earth from the eastern hemisphere of the Sun if a flare occurred near the heliospheric current sheet.

For the result, energetic particle transport is affected by solar wind structure. Determining the realistic solar wind structure is important to assess the risk of radiation hazard.