

# **Consequence of a shock propagating in a preceding magnetic cloud in aspect of SEP flux**

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Five definite cases of a shock propagating in an interplanetary magnetic cloud (MC) are reported to study possible consequences/signatures of such phenomena in aspect of the SEP flux based on the magnetic field and solar wind plasma data from the ACE spacecraft and the integral high energy proton flux data from the GOES spacecraft. Enhancement of SEP fluxes starting at the MC front boundary and ending at the MC rear boundary is found in two of the five cases, the Nov. 5-6 2001 event and Nov. 7-8 1998 event. This is very different from the observations of isolated MCs, in which the energetic particle fluxes are usually depressed. The increments of the magnetic field strength and the solar wind speed at the shocks suggest that the shocks embedded in these two SEP-rich MCs are stronger than the shocks embedded in the other three MCs. All these results imply that a shock propagating into an MC might make the SEP flux increase in the MC, and the significance of such a SEP enhancement depends on the strength of the embedded shock. This is consistent with the traditional view of point that MCs are a kind of independent and relatively closed magnetic structure in the interplanetary space, the particles inside MCs are difficult to escape, and vice versa.