

Magnetic cloud as a modulator of the cosmic ray intensity

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Forbush decrease is a depression of at least 3% in cosmic ray intensity reaching maximum depression within about a day. Previous studies on the effect of the interplanetary shock and magnetic cloud on the Forbush decrease only revealed the conflicting results. Cane(1993) and some other papers found evidence that magnetic clouds with strong ordered fields can produce the Forbush decrease. On the other hand, Bavassano et al. (1994) and many other reports indicated that most of the Forbush decreases are due to the enhanced magnetic field turbulence in the sheath region between interplanetary shock and the magnetic cloud.

In this study, we have selected and examined the Forbush decrease events in 1998 and 1999 with at least 5% depression. Our results show that both scenarios are right in case studies of the each events but with a strong tendency suggested by Bavassano et al.(1993). However, we noticed that most of the magnetic clouds are not associated with Forbush decreases. Thus, we identified the characteristics of the magnetic clouds responsible for driving the Forbush decreases in two kinds of modulations distinguished from the magnetic clouds unable to drive the Forbush decrease.