

Magnetic clouds, interplanetary shocks and Forbush decreases

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Abstract. Magnetic clouds, thought to be interplanetary manifestations of coronal mass ejections, have been identified from plasma and field data. Effects of these clouds, as well as those of associated shocks and post-shock turbulent regions, on cosmic ray density depressions have been studied. It is observed that abrupt onset of decrease in intensity starts upon the arrival of certain shocks and decrease continues till the passage of post-shock turbulent sheath. Moreover, all the shock disturbances do not produce appreciable depressions in cosmic ray intensity. An analysis of several shock disturbances and critical examination of their effects on intensity, it has been demonstrated that magnetically turbulent shocks

are much more effective in producing Forbush decreases than the non-turbulent shocks. The results are consistent with the suggestion that it is mainly the turbulent post-shock plasma which depress cosmic ray density downstream of the shock due to increased particle scattering. Results presented in this analysis provide more specific information about structure responsible for Forbush decreases, physical processes mainly responsible for this phenomenon and the possibility of predicting the likely occurrence of Forbush decreases from space observations.