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Complex ejecta causing intense magnetic storms around solar cycle 23 maximum (1998-2003)

Echer, E.¹, Gonzalez, W. D.¹, Alves, M. V.¹, Clua de Gonzalez, A. L.¹, Vieira, L. E. A.¹, Dal Lago, A.¹, Guarnieri, F. L.¹, Santos, J. C.¹, Schuch, N. J.²

¹*Instituto Nacional de Pesquisas Espaciais (INPE) - Av. dos Astronautas, 1758 - Caixa Postal:515 - Cep.:12227-010 São José dos Campos - S.P. - Brasil,*

²*Centro Regional Sul de Pesquisas Espaciais*

Complex ejecta are usually observed in the interplanetary space near Earth around solar cycle maxima. They are the interplanetary remnants of multiple coronal mass ejections, solar events that occur within 1-2 days. Sometimes, the first interplanetary eject is engulfed by a second one, creating an interaction region between the two ejecta where plasma and magnetic fields are compressed. A large number of complex ejecta has been observed during the ascending and maximum phases of the solar cycle 23 (1998-2003) and at least 11 events were followed by intense geomagnetic storms (Dstpeak -100 nT). A detailed analysis of these events is presented in this work. Different physical mechanisms responsible to cause intense and southward interplanetary magnetic fields are discussed. The role of southward interplanetary magnetic fields generated or enhanced by the two ejecta interactions is evaluated and compared to other sources of geoeffective magnetic fields (sheath and magnetic cloud fields).

Keywords: **solar wind, magnetosphere, geomagnetic storms, coronal mass ejections**

Corresponding author's e-mail: ezequiel@dge.inpe.br