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Variations of energetic radiation belt electron precipitation observed by Demeter before strong earthquakes

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A correlation of radiation belt energetic electron precipitation activity in the inner boundary of magnetosphere and in the ionosphere with the occurrence of strong Earthquakes (EQs) has been already reported in some papers. In this study we present new spatial and temporal correlation results of energetic (70 – 2500 keV) electron bursts (EBs) detected by the IDP instrument onboard DEMETER spacecraft around times (-30, +10 days) of some great (M > 7) EQs occurring at middle latitudes. In particular, (1) we present results from an elaboration on the type of the flux-time profile, time duration, energy spectrum (shape, energy extent, L-shell dependence), association with VLF activity and other characteristics of the EBs probably related with great EQs, (2) the statistical analysis of EBs of this type suggests a strong correlation between the number of EBs (NEBs) in a region of longitudes near (+/- 250 from) the EQ epicenter and the NEBs all over the globe, (3) the temporal distribution of the daily NEBs follows a certain pattern, with an increasing at the first phase, which starts ∼2-4 weeks before the occurrence time of an EQ (OTEQ), and a decreasing in the second phase, that reaches a local minimum around the OTEQ, both locally and globally, (4) the NEBs minimum lasted ∼1 day around the OTEQs examined, (5) none of EB (NEBs = 0) was identified during the NEBs minimum, in some cases (Japan, August 2005). Other sources of EBs, as for instance, man-made transmitters, thunderstorms and magnetospheric activity, are also discussed in the paper.