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Estimative of the ring-current decay time for geomagnetic storms caused by magnetic clouds

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Starting from the energy rate balance equation for describing the temporal evolution of the magnetospheric storm-ring current, with appropriate assumptions for some of the involved parameters, a model is developed in order to find the probable values of the ring-current decay time, τ , for the case of geomagnetic storms caused by magnetic clouds. The model is applied to intense geomagnetic storms observed during the last solar cycle, that were clearly produced by the presence of geomagnetic clouds. In a first step, the input function for the energization of the ring current is assumed to have a sinusoidal shape, following the behavior of the south magnetic field observed during the passage of the magnetic cloud, which allows to obtain an approximate value for τ . Then, a more precise value is obtained by means of a numerical integration of the input function, obtained from satellite data. At this stage, a distinction between the values of τ for the main phase and for the recovery phase can even be done.

Keywords: **magnetic clouds, ring current , geomagnetic storms**

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