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THE ROLE OF SOLAR CORONAL CATASTROPHIC COOLING ON THE GEOMAGNETIC RESPONSE

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Recent numerical calculations of the condensation of plasma in coronal loops, working as a basic component of the solar transition region, suggest the presence of nonlinear runaway cooling process due to strong radiative losses whose spatio-temporal evolution exhibits a chromospheric consensation-evaporation-condensation cyclic pattern [Muller et al. A&A 411,p.605, 2003]. This theoretical approach is supported by typical TRACE observations showing frequent catastrophic cooling (CC) and evacuation of quiescent solar coronal loops over active regions [Schriver, Sol. Phys. 198,p.325, 2001]. From these observations, they estimate that loop bundles in the interior of an active region undergo catastrophic cooling on average once every 2 days, while in a decayed bipolar region that time interval is approximately a week. Firstly, in this paper, we generalized the process of CC for a complex loop system. We show that the scaling and physical properties of the June 06 2000 NOAA9096 active region are compatible with a loop system CC process. Secondly, using a combination of EIT-SOHO and 3 GHz Ondrejov Radio Burst for this event we derive the Minimum Sagdeev Potential rate related to the conversion of magnetic energy into the nonlinear plasma flows showing that at least 30% of the total energy involved is released to the environmental plasma. Thirdly, we show correlated geomagnetic response (Dst) to this June 06 2000 event and discuss a possible phenomenological monitoring of space weather dynamics taking into account the solar coronal heating variability.