Title: Relating Geoeffective Interplanetary Coronal Mass Ejections to the Global Solar Field

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Abstract:

The evolution of ICMEs from their origin to their final orientation at Earth is currently not well understood. To examine how ICME orientation is affected by different solar structures, we analyze a sample of 218 magnetic clouds over solar cycles 23 and 24 with dates ranging from August 1996 to March 2018. Solar wind plasma and field data were obtained from the NASA Omni Database. Each magnetic cloud was modeled using the 1950 Lundquist solution to the equation describing force-free magnetic fields, using the downhill simplex method to determine best fit parameters: helicity, axial field strength, impact parameter, and orientation angles. Examining how the orientation angles of magnetic clouds vary over the two solar cycles in relation to the helmet streamer belt, active regions, and high-latitude interactions, we conclude that at solar minimum, the global field has the greatest influence on the orientation of a magnetic cloud while during the more active phase of the solar cycle, the magnetic structure and local context of active regions complicate the orientations of magnetic clouds. A minority of magnetic cloud orientations seem to be due to high-latitude filaments.