Autonomous CME Detection for STEREO Heliospheric Imagers

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We report on progress of the development of CME Leading Edge Detection for Heliospheric Imagers (CLEDHI), an IDL program with the intent to autonomously detect the leading edge of coronal mass ejections in the STEREO HI-2A field of view. CLEDHI's methods are based off a similar CME detection technique, AICMED[a], used for data from the Solar Mass Ejection Imager (SMEI). AICMED implements a Hough Transform on elongation-time maps (J-maps) to extract straight lines, which are signatures of CMEs. Unfortunately, the data from SMEI were very noisy, resulting in a number of false positives. The data from the Heliospheric Imagers onboard STEREO are much cleaner; therefore CLEDHI can more easily extract coordinates of the leading edge along the line of sight, which can be used to create a 3D reconstruction of the CME by means of the Tappin-Howard (TH) Model (Tappin & Howard, 2009). Using simple geometry, the TH Model derives the CME's kinematic information to estimate the arrival time of the CME at 1AU, thus, assisting in the advancement of space weather prediction.

[a] Automatic Coronal Mass Ejection (CME) Detection tool (Tappin et al. 2012)

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References

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