Observing Plasma Clouds in the Heliosphere

Student: Bronwen Cohn-Cort
Mentor: Craig DeForest
Location: Southwest Research Institute
Home Institution: American University

There is an interplanetary magnetic field paradox: field lines from the sun are continually being opened by CME's, yet the interplanetary magnetic field's strength remains fairly constant and is not infinitely strong. This dilemma has been called the magnetic flux catastrophe. Magnetic disconnection events have been thought to be responsible for closing open field lines, thereby keeping the balance of the interplanetary magnetic field. Spacecraft have observed in-situ changes in the magnetic flux but they are limited by a selection effect due to observing in only the ecliptic plane. Scientists have observed magnetic disconnection events before, but not in such detail. I processed STEREO images of the heliosphere and solar corona and assembled them into frames. Once converted to a movie file, it is easier to see patterns and I tracked several dozen small features. I then created a speed profile for each. I will report on the results of this work. From the speed profile and mass obtained by pixel brightness, we can infer the strength of the magnetic field acting on the disconnection events. We hope this will lead to more conclusive evidence that they balance the magnetic flux.