

**Project Title:**

Solar cycle variation and multipoint studies of ICME properties

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The proposed effort directly addresses the objectives of the Living with a Star Program by studying the interplanetary manifestation of coronal mass ejections (ICMEs) at two radial distances from the Sun over a full solar cycle at each location. This study calculates the size, number, flux content, orientation, twistedness, and balance of forces of all rope-like ICME structures through the solar cycle and relates these measurements to the coronal magnetic structure at the source surface and changes in that magnetic flux. In addition the study exploits the availability of measurements from NEAR above the limbs of the Sun as seen by SOHO (quadrature studies) to relate the magnetic structure of ICMEs to the coronal properties of the causative CME. Also it utilizes available multipoint measurements of ICMEs to improve our understanding of the geometry of these structures and in particular their azimuthal elongation. All inversions of the data are performed with a non-force-free model. The inversions using multipoint measurements assume a non-cylindrically-symmetric field structure. Sufficient pilot studies have been undertaken to test the software and show the strong correlation of the resulting magnetic rope properties with the solar magnetic field structure. This effort will directly benefit the operation of the Stereo mission and will provide support for the thesis research of UCLA ESS graduate student Elizabeth Jensen. Finally this effort enables the creation of a website that provides easy access to the PVO and NEAR data used in the study.

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