Geophysical Research Abstracts, Vol. 7, 10023, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10023

Eit Wave and Dimming Detector for SECCHI/STEREO mission

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Studies of earth-directed CME are based on solar disk observations where CME structures are extremely difficult to resolve because of the diversity and transient character of these objects. Essential reorganisation of magnetic fields in connection with such CME are most brightly shown as dimmings and coronal waves. Among them, the mechanism for EIT waves is still unclear. Such waves are considered as MHD perturbations or as a consequence of plasma compression on the extending border of dimming.

We develop numerical algorithms based on the combination of several methods such as the evaluation of higher order moments and adaptive filtering. Our goal is to detect automatically EIT waves and dimmings in the STEREO/SECCHI mission. The EIT/SOHO data catalogs are used for testing.

At the current stage of work, the method can unambiguously detect dimmings and shorter life time EIT waves on a typical case event. Moreover, we propose a way to extract these events from the data, and determine such parameters as life time, depth, surface and volume of dimmings for future catalogs. For EIT waves we unumbigously define, in near solar minimum conditions, the eruption center, the front of EIT wave and its propagation velocity.

Some of new observed features are: a) geometrical form of dimmings in the connection with the EIT wave front properties, b) interaction of such structures with the coronal holes, c) angular rotation of EIT waves, together with the radial expansion of front forming spiral-like motion. We explain such properties by the connection with initial preflaring magnetic configuration, orientation of magnetic field neutral line and the direction of magnetic flux expansion during EIT wave.