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WASAVIES のためのフレア-CME 認知システムの開発
Development of Automated Flare-CME Event Recognition System for WASAVIES

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Solar Energetic Particles (SEPs) are accelerated by interplanetary shocks driven by coronal mass ejections (CMEs). The intensity of the SEP events is closely related to the CME speed, width, and source location. SEPs pose significant radiation hazard to space systems and aviation, so it is important to predict the SEP events. The WArning System of AVIation Exposure to SEPs (WASAVIES) is a new initiative to forcast the expected exposure to SEP events at the latitude of commercial aircraft. The aim of this work is to obtain the CME parameters in real-time for better prediction of SEP events. The work involves the identification of CME source regions using soft X-ray flares and CME kinematics using automatic recognition of CMEs.

Solar flares are a good indicator of the source location of the CMEs, since the two phenomena are closely related in time and space. X-ray intensity from the Sun routinely monitored in the 0.1?0.8 nm wavelength band by GOES is used to determine the flare onsets, peak intensities, and durations. Normally the GOES data become available within a few minutes. Flare locations are determined by the Atmospheric Imaging Assembly (AIA) on the Solar Dynamic Observatory (SDO). Fe XVIII (9.4 nm) images are used because they have a good response to high temperature plasmas (˜7 MK). AIA observes the Sun with 0.6 arcsec (4k x 4k pixels) spatial resolution and 12 second cadence, but we use the synoptic data (1k x 1k, 2.4 arcsec pixels and 3 min, cadence) to minimize the network traffic. Since January 2011, the flare module has operated without problems. Typical latency to correct the required flare information is 1-3 hours.

Automated CME recognition system has been investigated by several researchers. The well-maintained programs are CACTus (Berghmans et al.) and SEEDS (Olmedo et al.) Both systems attempt to identify CMEs as human eyes do. They work well except for identifications of fast CMEs. This is because only a few images are taken for those CMEs. We are planning to optimize these programs for detecting fast CMEs or develop our own software if necessary. The preliminary result will be presented in the meeting.

キーワード: WASAVIES, プロトン現象, コロナ質量放出, フレア
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