

SECCHI team obtains images of the solar wind at Earth

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Using the Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) instruments on board NASA's Solar Terrestrial Relations Observatory (STEREO) spacecraft, a consortium of scientists has seen, for the first time, large waves of solar material sweeping past Earth.

The SECCHI team has obtained images of the density enhancements whose prior existence was known only from point measurements by in situ spacecraft. The team's results will be discussed during an invited talk by Dr. Neil Sheeley of the Naval Research Laboratory (NRL) at the fall meeting of the American Geophysical Union in San Francisco, CA, in December. The scientific paper is scheduled for publication in the March 1, 2008 issue of the *Astrophysical Journal*.

During relatively quiet solar conditions throughout the spring and summer of 2007, the SECCHI Heliospheric Imager HI-2 telescope on the STEREO B solar-orbiting spacecraft observed a succession of wavefronts sweeping past Earth. The scientists have compared these white-light images with in situ plasma and magnetic field measurements obtained by near-Earth spacecraft, and found a perfect association between the occurrence of these waves and the arrival of high-density regions that rotate with the Sun. These compression regions are believed to form as high-speed wind from dark areas of the solar corona known as coronal holes run into the low-speed wind in front of it.

Currently, the researchers are tracking HI-2 waves backward toward the Sun to see exactly how they originate. Preliminary results suggest that

the waves begin as blobs of material that are shed continuously from coronal streamers.

The STEREO twin spacecraft were launched on October 25, 2006 with the objective of obtaining stereoscopic observations of the Sun from a near-Earth orbit. After some initial maneuvers, which included a gravitational assist from the moon, the two spacecraft achieved their orbits with one spacecraft (A) located slightly closer to the Sun and gradually moving ahead of Earth and the other spacecraft (B) located slightly farther from the Sun and gradually falling behind. The angular distance between the A and B spacecraft increases at a rate of approximately 45 degrees per year and was about 26 degrees in early September 2007.

Each spacecraft is equipped with a suite of Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) instruments. In addition to an extreme ultraviolet imager (EUVI), there are two coronagraphs (COR1 and COR2) and two heliospheric imagers (HI-1 and HI-2) pointing 13 degrees and 53 degrees off to the side.

Source: Naval Research Laboratory

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