

University of New Hampshire

## University of New Hampshire Scholars' Repository

---

Media Relations

UNH Publications and Documents

---

4-14-2009

### STEREO Spacecraft Provide Unprecedented Insight Into Solar Storms

David Sims

*UNH Institute for the Study of Earth, Oceans and Space*

Follow this and additional works at: <https://scholars.unh.edu/news>

---

#### Recommended Citation

Sims, David, "STEREO Spacecraft Provide Unprecedented Insight Into Solar Storms" (2009). *UNH Today*. 81.

<https://scholars.unh.edu/news/81>

This News Article is brought to you for free and open access by the UNH Publications and Documents at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Media Relations by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact [Scholarly.Communication@unh.edu](mailto:Scholarly.Communication@unh.edu).



## STEREO Spacecraft Provide Unprecedented Insight Into Solar Storms

Media Contact: [David Sims](#)  
603-862-5369  
Science Writer  
Institute for the Study of Earth, Oceans, and Space

April 14, 2009

---

DURHAM, N.H. -- At a press conference held today at National Aeronautics and Space Administration (NASA) headquarters in Washington, D.C., officials and mission scientists, including a principal investigator from the University of New Hampshire, provided details on how observations and particle measurements from NASA's twin Solar Terrestrial Relations Observatory (STEREO) spacecraft have opened a new window on the workings of our sun.

STEREO, which launched in October 2006, has allowed scientists to reveal for the first time the speed, trajectory, three-dimensional shape, and structure of solar explosions known as coronal mass ejections or CMEs. STEREO's instruments follow the CMEs from the moment they lift off the Sun to their arrival at Earth's orbit. These powerful eruptions of plasma and magnetic energy from the Sun's outer atmosphere can have both breathtakingly beautiful and potentially damaging effects when directed toward Earth.

Using a combination of STEREO's remote images and "in situ" measurements, solar physicists can examine a CME's structure, velocity, mass, and direction in interplanetary space. Such measurements can help determine when a CME will reach Earth, at what speed, and how much energy it will deliver to Earth's magnetosphere.

Complementing the remote images provided by the Sun-Earth Connection Coronal and Heliospheric Investigation (SECCHI) onboard STEREO are in situ measurements of the particles and magnetic fields that make up a CME as it streams through space at thousands of miles per hour.

These data are measured by a suite of experiments, including the UNH-built Plasma and Suprathermal Ion Composition (PLASTIC) instrument. UNH scientist Antoinette "Toni" Galvin, of the Institute for the Study of Earth, Oceans, and Space (EOS) and Department of Physics, is the principal investigator for PLASTIC.

"The in situ measurements from STEREO and other near-Earth spacecraft, coupled with corresponding solar observations, link the physical properties of the escaping CME to the remote observations. This helps us to understand both how the internal structure of the CME was formed as well as predict its impact on Earth," says Galvin.

In particular, the direct measurement of the magnetic field within the CME is a critical piece of diagnostic information in predicting the potential severity of its impact on Earth.

"In a way," Galvin adds, "the STEREO remote imagers provide us the full body scan that detects the presence and progress of the CME in space, while the in situ complement performs the biopsy allowing us to predict just how disruptive a particular CME will be when it actually hits the Earth."

Additional spacecraft, including NASA's WIND and Advanced Composition Explorer (ACE) satellites, which also carry UNH-built instruments, are critical in aiding STEREO develop a big-picture understanding of the Sun by providing other, nearby perspectives on a CME.

"In our quest to understand CMEs and their effects at Earth, the in situ measurements by STEREO, WIND, and ACE provide the physical quantities from which the severity of the disturbances in Earth's environment can be calculated and predicted," says Charles Farrugia of EOS and a mission scientist on both STEREO and WIND.

Farrugia notes that CMEs are often considered to be gigantic magnetic flux ropes containing coiled magnetic field lines. Relating observations of key physical parameters at one astronomical unit (about 90 million miles, or Earth's orbit) to those on the Sun addresses the basic issue of how these flux tubes are formed in the first place - a long-standing scientific puzzle.

"Do these flux tubes result from a violent re-ordering of the Sun's magnetic field by reconnection before expulsion or, rather, were they already existing before a loss of equilibrium unleashed them into space?" Farrugia says.

The STEREO mission is bringing scientists closer to the goal of understanding the full extent of the Sun-Earth connection - a link that consists of initiation at the Sun, propagation through interplanetary space, and effects in Earth's geophysical environment. To achieve this goal, the STEREO imagers and the in situ measurements by PLASTIC must work in unison.

For more information about NASA's STEREO mission, visit <http://www.nasa.gov/stereo>.

For more information about the PLASTIC investigation, mission visit <http://stereo.sr.unh.edu>.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea and space-grant university, UNH is the state's flagship public institution, enrolling 11,800 undergraduate and 2,400 graduate students.

-30-

For multimedia related to NASA's STEREO briefing, visit the following sites:

[http://www.nasa.gov/mission\\_pages/stereo/news/solarstorm3D.html](http://www.nasa.gov/mission_pages/stereo/news/solarstorm3D.html).

Photo available to download: [http://www.eos.unh.edu/newsimage/stereo\\_a\\_print\\_lg.jpg](http://www.eos.unh.edu/newsimage/stereo_a_print_lg.jpg)

Photo caption: This print-resolution image depicts STEREO-A spacecraft viewing a coronal mass ejection leaving the sun. The explosive event occurred December 12-13, 2008. STEREO's twin vantage points provide a unique, three-dimensional insight into the inner workings of a CME from the time it leaves the sun until its effects are felt at Earth.

 [email this page!](#)

 BOOKMARK 