

2003 Halloween Storms Campaign Event Session

The Sun unleashed a spectacular series of eruptions during October and November 2003, including the most powerful X-ray flare and some of the most energetic coronal mass ejections (CMEs) ever recorded. Three solar active regions produced CMEs, flares, energetic particles, and interplanetary shocks of unprecedented intensity over a two-week period. These events were observed in detail and tracked all the way from the Sun to the Earth and beyond by a fleet of spacecraft, including SOHO, TRACE, ACE, WIND, and SMEI. Spacecraft located beyond 1 AU, including Ulysses, Cassini and the Voyagers, also detected the shocks from these eruptions. CMEs arrived at the Earth in less than a day, resulting in huge geomagnetic storms, radio blackouts, and intense aurora that were observed as far south as Florida on the nights of October 29th and 30th. These eruptions provide an important opportunity to understand the origins of extreme solar activity, the response of the Earth's magnetosphere and upper atmosphere to this activity, and the impact on technological systems on the ground and in space. Fortuitously, Earth and Mars were closely aligned at the time of these events, and some observations were obtained at Mars. This ties the study of these events directly to the NASA Vision for Space Exploration.

These events have been the subject of special sessions at the Fall 2003 and Spring 2004 AGU meetings, and a special publication spanning the Journal of Geophysical Research, Geophysical Research Letters, and Space Weather containing papers on these events is in press. There is a lot of work being done on these events, and SHINE will bring a broad perspective to bear on some of the more focused studies.

The SHINE campaign will focus primarily on the solar events of October 28th and 29th, and November 4th, 2003, and the response of the heliosphere to these events. Other events occurring in the period from October 18th, 2003, when AR 484 first became visible on the east limb of the Sun, to November 4th, 2003, will also be considered part of the campaign. The events of October 28th and 29th originated in AR 486 when it was near disk center, thus providing a detailed view of the evolution of the source region before, during, and after the launch of successive energetic CMEs. Because the source region was located close to disk center, both events directly impacted Earth, and both resulted in extreme levels of geomagnetic activity and intense energetic particle events. The event on November 4th also originated in AR 486 when it was close to the West limb. This was the largest X-ray flare ever recorded, with an estimated magnitude of X28, and it was accompanied by a large, fast CME and a moderate particle storm at Earth.

Speakers (Wednesday, July 13)

The time allocated for each paper includes 5 minutes for discussion.

09:45 – 10:15 Nat Gopalswamy (NASA/GSFC): Overview of the October-November 2003 Solar Eruptions

10:15 – 10:30 Open Discussion

10:30 – 10:45 Coffee Break

10:45 – 11:15 Bernard Jackson (UCSD): The Extent, Mass, and Energy of the October-November CME Events in the Interplanetary Medium

11:15 – 11:45 Thomas Zurbuchen (University of Michigan): October-November 2003 Events: Plasma and Composition

11:45 – 12:15 Richard Mewaldt (California Institute of Technology): Solar Energetic Particle Observations During the Large Solar Particle Events of October, November 2003

12:15 – 12:30 Open Discussion