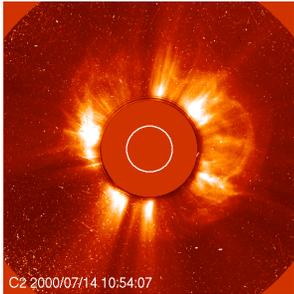
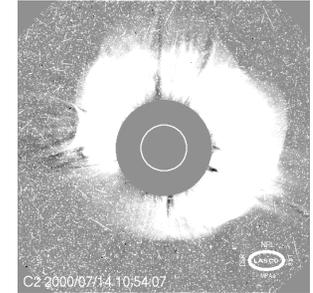


# OVERVIEW OF SHINE CAMPAIGN EVENTS

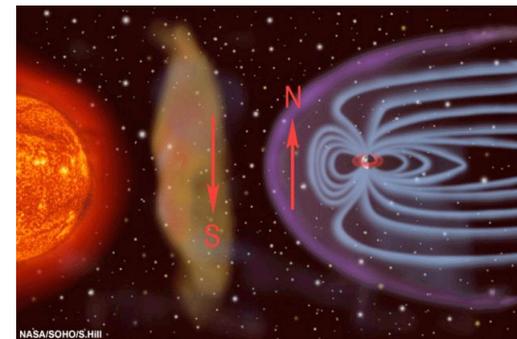


*David Webb*

**SHINE Campaign Events Coordinator**



- **SHINE Campaigns initiated in 2003**
- **Address questions focused on CMEs**
- **Currently 5 Campaign events or periods, each with 1-2 leaders**
- **Two CE splinter sessions on Wednesday morning**
- **Posters addressing CEs**
- **WG invited talks addressing CEs**



- **SHINE encourages studies of selected events to advance research focused on connection between Solar events & related solar wind structures & in situ measurements.**
- **In 2003 SHINE initiated Campaigns to focus effort on four CME events or periods and related science topics.**
  - **CMEs → primary cause of largest IP disturbances & geomagnetic storms, & drive shocks that accelerate particles.**
- **Specific questions:**
  - **How are CMEs initiated?**
  - **How do CMEs evolve or propagate?**
  - **How are CME-related SEPs accelerated & transported?**
- **Campaigns address these questions by:**
  - **Confronting CME models with observations & simulations**
  - **Forcing comparisons among existing models**
  - **Guiding development & improvement of new models & simulations**
- **Choice of Campaign events also driven by:**
  - **Reasonably complete data sets of solar source regions & heliospheric propagation of CMEs.**
  - **CEs be Earth-directed for study of in-situ & geoeffective characteristics.**

- **Each event has a leader(s) who:**
  - **Reviews work already done on event (selection criteria)**
  - **Initiates/encourages studies of event & tracks progress during year**
  - **How to incorporate event studies into next workshop**
- **CE Coordinator and event leaders facilitate communication among researchers working on particular event.**
- **Website established at <http://www.shinegroup.org/> “Campaign Events”**
  - **Direct link: [http://cdaw.gsfc.nasa.gov/CME\\_list/SHINE2003/index.html](http://cdaw.gsfc.nasa.gov/CME_list/SHINE2003/index.html)**
  - **General discussion, meeting summaries, latest updates**
  - **Links to individual event pages**
    - Each page has an Introduction & Data, Presentations, Publications, & Links subpages.**
- **Each leader maintains e-mail address list for e-mail communication with members of his Event study group.**
- **To become involved with event studies, contact appropriate Event leader.**

## **Selected Events and Leader(s)**

***May 12, 1997***      **Nick Arge & Dave Webb**

***May 1-2, 1998***      **Brian Welsch**  
**(includes late April and early May event series)**

***April 21, 2002***      **Allan Tylka & David Alexander**  
**(includes earlier activity from same active region)**

***August 24, 2002***      **Allan Tylka & David Alexander**  
**(includes earlier activity from same active region)**

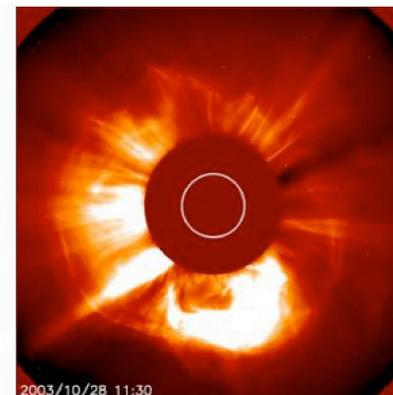
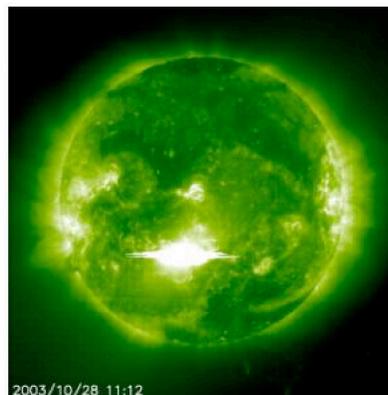
***NEW*** ***October 28-November 4, 2003***  
**Simon Plunkett & Bernie Jackson**  
**(includes earlier activity during period)**

## Why Were These Particular Events Selected?

- **May 1997 event already well studied;**
  - Pre-event and event solar and heliospheric background conditions relatively simple, therefore good for modeling.
  - Event is focus of SHINE-GEM-CEDAR Campaign, MURI and CISM.
- **May 1998 event also a MURI event**
  - Has good vector magnetic field data (on AR 8210).
- **Both May events drove shocks and caused major storms at Earth.**
  - Focus is on CME initiation and transport and why geoeffective.
- **April & August 2002 events focus on a specific problem in current SEP research, the origin of variability at high energies.**
  - Because the events were far west, the high-energy particle production reflects conditions near the Sun.
  - But the SEPs  $>10$  MeV/nuc in the two events have very different spectral & elemental compositions,
  - Though the associated CMEs and flares were rather similar.
  - The ARs that spawned these events also produced other flares & CMEs in the preceding ~10 days:
    - Comparative studies of these earlier events may help understanding of differences in west-limb events.
    - Earlier events also important because they were geoeffective, esp. April 15-19.

## Why Were These Particular Events Selected? – cont.

- **The Halloween events of 2003**



- **New SHINE CE introduced in CE Session on Wednesday.**
  - **Focus primarily on the solar events of October 28 and 29, and November 4, 2003, and response of heliosphere to these events.**
  - **Oct. 28 and 29 events occurred when AR near disk center**  
**Provides view of evolution of source region.**  
**Both resulted in extreme geoactivity and intense SEP events.**
  - **Nov. 4 event occurred when same AR near West limb.**  
**Largest ever X-ray flare (X28) with energetic, fast CME and shock and moderate SEP at Earth.**
  - **Focus of special sessions at Fall 2003 and Spring 2004 AGU meetings.**
  - **Special publs. in JGR, GRL and Space Weather journals (in press).**
- **All the Campaign Events were also selected to address the key science topics or themes.**

# ***SHINE Campaign Events Sessions: Wed. morning, July 13***

## **Progress and Challenges Towards Driving Solar Models With Observations From the SHINE Campaign Event Periods**

**Chairs: *Nick Arge and Bill Abbett***

- One of main goals of SHINE CEs is to drive solar/heliospheric models with observational data to reproduce structure of corona and heliosphere.
- A very challenging task:
  - Key inputs often missing for ingest into the models,
  - Models often too idealized & need, e.g., data smoothing to assure model stability.
- Goal of session is to have open discussion of successes & difficulties driving models with observations,
  - Possible new approaches for making further progress.
  - Discussion of observations themselves (e.g., coverage, quality, availability etc.).
  - A talk on a promising new technique for obtaining 3D coronal quantities.

### **Speakers:**

***I. Roussev*** - Progress and Challenges; Data-Driven Numerical Models of Solar Eruptions

***Z. Mikic*** - Progress and challenges in modeling the May 12, 1997 CME

***R. Frazin*** - Driving models with 3D tomographic reconstructions from white-light, EUV and magnetogram data

***D. Odstrcil*** - Heliospheric Simulations of SHINE Events Using CME Cone Models

# 2003 Halloween Storms Campaign Event Session

Chairs: *Simon Plunkett and Bernie Jackson*

- Spectacular series of Solar eruptions during Oct. & Nov. 2003
  - Most powerful X-ray flare ever & very energetic CMEs.
- 3 ARs produced CMEs, flares, SEPs and IP shocks of unprecedented intensity over 2-week period.
- Events were observed in detail and tracked from Sun to Earth:
  - SOHO, TRACE, ACE, WIND, and SMEI. Spacecraft >1 AU, including Ulysses, Cassini and the Voyagers, also detected the shocks.
- 2 CMEs on Oct. 28 & 29 arrived at Earth in less than a day:
  - Huge geomagnetic storms, radio blackouts, and intense aurora.
- Importance of these eruptions for understanding:
  - Origins of extreme solar activity,
  - Response of Earth's magnetosphere and upper atmosphere,
  - impact on technological systems on the ground and in space.
- Earth and Mars were closely aligned
  - Some obs. obtained at Mars; ties study of events to NASA "Space Exploration".
- Other events during this 2-week period are considered part of campaign.

## Speakers:

*N. Gopalswamy* - Overview of the October-November 2003 Solar Eruptions

*J. Krall* - Modeling the 2003 October 28-30 CME/ICME Event

*B. Jackson* - Extent, Mass, and Energy of the October-November CME Events in IPM

*T. Zurbuchen* - October-November 2003 Events: Plasma and Composition

*R. Mewaldt* - SEP Observations During the Large SEP Events of October, November 2003

# Posters Involving Campaign Events

- 1) **Arge, C.N., G. de Toma, and D. Odstrcil** – Investigation of the Stream Structure and Coronal Sources of the Solar Wind Using Improved Mount Wilson Photospheric Field Synoptic Maps: The April 7<sup>th</sup> and May 12<sup>th</sup>, 1997 Halo CME Events
- 2) **Cohen, C.M.S., Mason, G.M., Stone, E.C., Mewaldt, R.A., Leske, R.A., Desai, M.I., Cummings, A.C., von Rosenvinge, T.T., Wiedenbeck, M.E.** - Heavy Ion Spectra and Composition of the Halloween 2003 SEP Events
- 3) **Komm, R., Howe, R., Hill, F.** - Sub-surface evolution of AR 0486, AR 0069, and AR 9906
- 4) **Bharti, L., R. Jain, C. Joshi, and S.N.A. Jaaffrey** – Flare and Associated Phenomena on May 12, 1997
- 5) **Titov, V.S., Z. Mikic, J.A. Linker, R. Lionello, and P. Riley** - The Magnetic Field Structure in the May 12, 1997 CME Event

## Other CE-related posters:

- 15) **Daou, A. and D. Alexander** – Hard X-ray Substructure in the Halloween Flares of 2003
- 33) **Ledvina, S.A., J.G. Luhmann, Y. Li, W.P. Abbett and N. Arge** – The Global Magnetic Topology of the Solar Corona Preceding CME Eruptions (Halloween 2003, May 1998, May 1997)

## CE Posters cont.

- 46) *Nightingale, R.W., T.R. Metcalf, Z.A. Frank, and C.A. Kang* – TRACE Observations of X-ray Flares and Rotating Sunspots (Halloween 2003)**
- 68) *Jackson, B.V., Y. Yu, P.P. Hick, and A. Buffington* – Interactive Visualization of Solar Mass Ejection Imager (SMEI) and Interplanetary Scintillation (IPS) Volumetric Data (Halloween 2003)**
- 74) *Kuwabara, T. and T., K. Munakata* – Geometry of the Interplanetary CME & Shock Deduced from the Network Observation of the Cosmic Ray Anisotropy (Halloween 2003)**
- 75) *Lal, M.* – Geomagnetic Storm Induced Gravity Waves (Halloween 2003)**
- 98) *Bieber, J. et al.* – Observation of Neutron and Gamma Ray Emission from the October 28, 2003 Solar Flare**
- 109) *Tylka, A.J. and M.A. Lee* – A Model for SEP Spectral and Compositional Variability at High Energies (April and August 2002)**

## Invited Sessions Talks:

Monday afternoon, WG1: **J. Zhao** – *Sub-surface Dynamics and Structures of AR 8210* (May 1998)

Tuesday morning, WG1: **J. Linker** – *CME Initiation in a ‘Simple’ Active Region* (May 1997)

Thursday afternoon, WG3: **J. Richardson** – *The Solar Wind in the Outer Heliosphere* (Halloween 2003)

## Other items:

- Dave Webb retiring as SHINE Campaign Events Coordinator
  - New leader TBD at this meeting?
- Thursday lunch, 12:30 pm:
  - Campaign Event leaders and anyone else interested
  - The SHINE Campaign Events: Where Do We Go From Here?