

## The SOHO mission – Promoting Space Weather to the Public

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## The SOHO Mission

ESA's Solar Cornerstone Mission

- **Joint program between the European Space Agency (ESA) and NASA.**
  - An industry team led by Matra Marconi Space built SOHO in Europe. It's instruments were provided by nine European and three U.S. Principle Investigators
  - ESA: responsible for SOHO's procurement, integration, and testing
  - NASA: provided launch and mission operations (at Goddard Space Flight Center)
- **Solar Interior:** What are its structure and dynamics?
- **Corona:** Why does it exist and how is it heated?
- **Solar Wind:** Where is it accelerated and how?

Launch 2 December 1995

93 million miles  
Sun ————— SOHO ————— Earth  
SOHO is positioned a million miles sunward of Earth

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## 1 Year of SOHO (MDI/EIT/LASCO)

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## SOHO Web pages

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## SOHO Web pages – Real time images

- SOHO Real-time display**
  - Used by SEC, public, comet chasers
- SOHO Real-time Screen Saver**
  - (more the 450,000 distinct users)

THE VERY LATEST SOHO IMAGES

Click here to have the images updating, not work only.

REAL TIME MONITOR (Access from) LORUS

119 mill hits

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## SOHO Web pages – Space Weather

Current Space Weather

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## SOHO Web pages – The Best Of

The Best of SOHO: Images

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## SOHO Web pages - Hotshots

- High-light of the week or other interesting science results**
  - Hot Shots from SOHO
  - A Fiery CME
  - Other Hot Shots (Access and post)

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## SOHO Web pages - Pick of the Week

Started as a service to the American Museum of Natural History's Rose Center in New York

- These are displayed on the Astronomical Bulletin area (a 4 m video wall)
- Now added as a feature on the SOHO web pages

SOHO Pick of the Week  
 Provided Content (Video) (2003-01-14)

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## Media coverage

**BBC NEWS** Science & Environment  
 Wednesday, 14 January 2004, 23:06 GMT

**In pictures: Have the aliens landed?**

A series of images which it is claimed prove the existence of aliens is going on show at Leicester's National Space Centre.

They are said to have been taken by a space observatory which is 1,400,000 miles from Earth.

**Wick Murray, a UFO enthusiast who is putting on the show, warned people not to be fooled by the claim as it has been associated with hoaxes.**

**How BBC News Centre research why UFO sightings believe aliens have landed.**

**Go to the story**

**CNN.com SPACE**

Space.com

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## UFO's

2003/01/14 19:19

2003/01/14 19:19

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camera

6:24

Single investigators say shows a UFO.

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### UFO's

**'UFO' on NASA camera**

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE

2001/01/18 16:24

AT FERNI 1. WARD: The image investigation did show a UFO

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### Big Sunspots and a Flare

2003 10 07 14:24

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X17.2 (28 Oct 2003)

X10.0 (29 Oct 2003)

X8.3 (27 Oct 2003)

X2.7 (27 Oct 2003)

X3.9 (27 Oct 2003)

X28 (1 Nov 2003)

X1.1 (19 Oct 2003)

X1.0 (22 Oct 2003)

X5.4 (23 Oct 2003)

X1.1 (23 Oct 2003)

X1.2 (26 Oct 2003)

X1.2 (26 Oct 2003)

The magnetic fields continued to evolve as they rotated across the Sun. The flares produced were some of the highest in recorded history. The associated eruptions were fast and powerful.

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### Effects from the Halloween Storms

Stirling, Scotland

Luceville, Quebec

Stockholm, Sweden

Anchorage

California

Fairbanks

- More than 20 satellites and spacecrafts were affected ( not including classified military instruments), 1 Japanese satellite lost
- Severe HF Radio blackout – affected commercial airlines
- FAA issued a first-ever alert of excessive radiation exposure for air travellers
- Power failure in Sweden
- Climbers in Himalaya experienced problems with satellite phones.
- US Coast Guard to temporarily shut down LORAN navigation system.

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## SOHO Web pages – Media

What happens if the Sun gives us a show!!

- **MEDIA COVERAGE**
- [Rekord-Eruption auf der Sonne](#) (Der Tagesspiegel, November 7, 2003, article in German)
- [Was ist bloss mit unserer Sonne los? Die erste Explosion aller Zeiten](#) (Bild, November 6, 2003, article in German)
- [Sun 'mega flare' was largest on record](#) (CNN, November 6, 2003)
- [Historiens kraftigste solarsplaktion](#) (Aftenbladet, November 5, 2003, article in Norwegian)
- [Largest Sun Flare Put at X28, Strongest on Record](#) (SPACE.com, November 5, 2003)
- [Neue Sonnen-Eruption bricht alle Rekorde](#) (Spiegel, November 5, 2003; article in German)
- [Az „adigi legnagyobb napkitörés](#) (ORIGO, November 5, 2003; article in Hungarian)
- [Sun produces monster solar flare](#) (BBC, November 5, 2003)
- [Sun spews spectacular solar storm](#) (SPACEFLIGHT NOW, November 4, 2003)
- [Sun hurls huge magnetic cloud toward Earth](#) (The Times of India, October 31, 2003)
- [End Year Sun Spot](#) (Newsweek, November 3rd issue, 2003)
- [Sonnsturm: Wüder ist die Sonne nicht explodiert](#) (FAZ, October 31, 2003, article in German)
- [Danda Afectar: A las Comunicaciones](#) (El Mundy October 30, 2003; article in Spanish)
- [Solar Storm Still Wreaking Havoc on Earth](#) (NY Times, October 30, 2003; registration required)
- [Sun hurls solar flare at Earth](#) (USA Today, October 30, 2003)
- [Powerful solar storm strikes Earth](#) (Star Tribune, October 30, 2003)
- [Tempesta solar: la record](#) (La Stampa, October 30, 2003; article in Italian)
- [Solar Flare Again Spawns an Aurora](#) (Sky & Telescope, October 30, 2003)
- [Giant solar flare slams into Earth](#) (New Scientist, October 29, 2003)
- [Most Powerful Geomagnetic Storm in Decades Hits Earth](#) (Washington Post, October 29, 2003)
- [Solar storm slams Earth](#) (CBC News, October 29, 2003)





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## Solar Storms – Media coverage

- **Television:** Reported on by all 3 network news programs (ABC, CBS, NBC), often repeatedly over a few days. By 10/29, our monitoring service picked up over 2,000 television stories that created what Nielson services calls over 200 million "impressions."
  - Our monitoring report calculated the ad equivalency value of this coverage over \$1,000,000. Surprisingly, as sunspot 486 continued to generate flares, the hits kept coming. Our monitoring service picked up another 500 hits through 11/6.
- **Web News Coverage:** By 3 November Yahoo News lists 418 stories from last week and we observed multiple front page stories on the Washington Post, USA today, and almost every paper we could get our hands on. Virtually all of these stories used images from the SOHO spacecraft as well as animation and graphics provided by the Sun-Earth Connection Media Visualization Project.



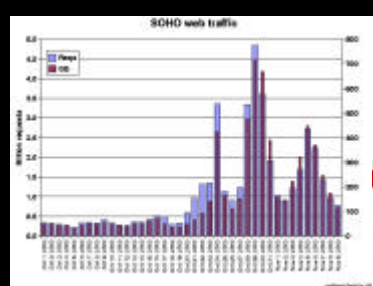


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## Media Coverage

- **SOHO Website Traffic**
  - LARGE data requests



Close correlations to X-Ray flux?





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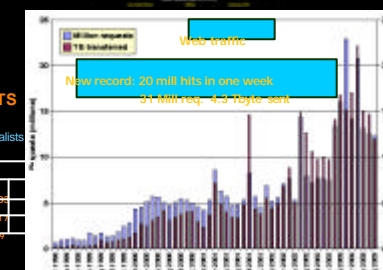
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## SOHO Web Pages

http://soho.nascom.nasa.gov

- **SOHO Real-time display**
  - Used by SEC, public, comet chasers
- **SOHO Real-time Screen Saver**
  - (more the 500,000 distinct users)
- **Press releases and HOTSHOTS**
  - Numerous reports in media
  - Success due to direct contact with journalists

Channel	Coverage of the SOHO mission	Hotshots	Press releases
ABC	1	1	1
CBS	1	1	1
NBC	1	1	1
Other	1	1	1





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## SOHO takes the stage

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## SOHO Images on Commercial Products

- Extensive use of SOHO images on commercial products
  - Books, CD's, puzzles, magazines etc.

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## SOHO Images on Commercial Products

RIDE SNOWBOARDS: NEWS ARCHIVE

Ride Boards Built with NASA Technology!  
March 18, 2002

Okay, so it's not really the technology that's IN the board (although with some of our constructions it very well could be), but rather the graphic ON the board.....

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## SOLARMAX

- Documentary about humans struggle to understand the Sun
- Available on DVD ([www.solarmovie.com](http://www.solarmovie.com))

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### Press collage

Astronomy: Backing in the Sun  
 SCIENTIFIC AMERICAN: SUN BURN  
 GEO: The Sun's Hot CORON  
 Mercury: ESCAPE  
 Science News: The Planet of the Sun's Hot CORON  
 Ciel & Espace: Colères du Soleil

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### Press collage

An image taken by a SOHO instrument is featured on the cover of the July issue of National Geographic magazine. This is the dramatic introduction to a 32-page story on developments in solar science over the last decade called "The Sun: Living with a Stormy Star." The article features numerous images from SOHO and TRACE, and includes a striking, fold-out illustration depicting solar storms and space weather.

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### Another front page

Astronomy  
 TOP 10 space stories of 2004  
 PLUS: Your guide to this month's best sky events  
 The search for the first Sun-like stars

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### Space Weather animation cards

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## SOHO 5 Year Anniversary Sun Earth Day

- 5 Year anniversary
  - 40 different places in 14 European countries
  - 10 events in USA/Canada



- Colouring book, Sticker



SOHO Highlight presentation (PowerPoint) 004

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## Sun-Earth Days

- More than 40 European events. Initiative by Solar Physics Section (SPS)
- Coordinated by P. Brekke, Lyndsay Fletcher, and Mats Carlsson
- Large amount of PR material provided by NASA and ESA

- Web page: <http://soho.nascom.nasa.gov/sunearth2003/>
- Support the US Sun-Earth Days (e.g SOLARMAX in Baltimore)




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## Aurora 2001

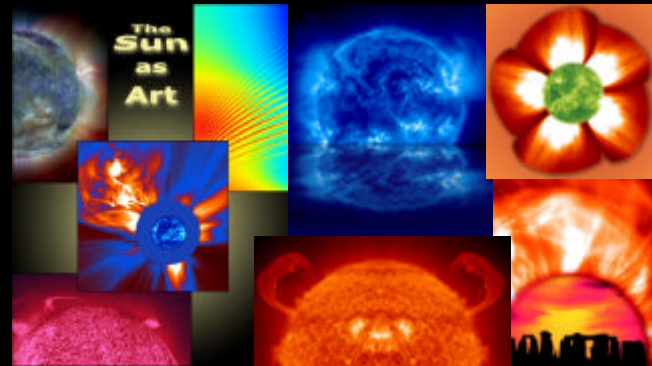
- Aurora 2001 is a dance, music and visual presentation about the aurora
- Produced by Maida Withers (professor of Theatre and Dance – George Washington University)
- SOHO images play a key role in this multimedia performance
- Special screening at the National Air and Space Museum 3 February 2001
- World premier in Tromso, Norway last week
- First official play in US at the Lisner Auditorium (1400 seats), Washington DC on 15 February
- Plan to tour Europe as well
- ESA well mentioned in all promotion of these events



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
## The Sun as Art





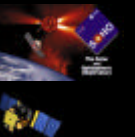
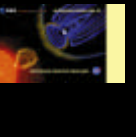
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 PR Material

- SOHO CD-Rom (270.000 copi)
  - Ciel et Espace
  - Astronomy Now
  - Sterne und Weltraum
  - Orione
  - SOHO CD - Museum version
  - SOHO CD - IMAX version
- SOHO posters
- SOHO- CME Lenticulars (3D cards)
- SOHO stickers
- Business Cards
- SOHO paper mode

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 SOHO CD – 2003 Edition



The screenshot shows the SOHO CD-ROM interface. At the top, it says "NEW HIGHLIGHTS FROM SOHO". Below this is a list of featured content with checkboxes:

- Riding through the layers
- A Large Sunspot Group
- Masked, Hurling, Whirlpool?
- The Sun does the Wave
- The pulse of the Sun's dynamo
- Exclusive Views of Comet NEOWISE
- A Spectacular CME, then a Comet
- Paper planets and the Philaees
- CME and Particle Storms of July 14, 2000
- A Fairy CME
- Two Unusual CMEs
- Solar Flares
- Coronal Mass Ejections
- Solar Eruption Dynamics
- Chattering hot ions
- The Solar Decade
- The SWAN Song of Comet LINEAR
- Far Side Imaging Services
- Star as Art

On the right side, there are navigation buttons: [ESA HOMEPAGE](#), [SOHO HOMEPAGE](#), and [GLOSSARY](#). The background features a large image of the Sun's surface.

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