STEREO E/PO

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STEREO E/PO - Outline

E/PO Requirements

E/PO vs. Marketing and News Media Support

Evaluation Criteria

INSTRUMENT Education & Public Outreach Programs (E/PO)

PROJECT OFFICE	**M. Kaiser, T. Kucera, L. Cusick, Emilie Drobnes, C. Chrissotimos**
PLASTIC	**T. Galvin, J. Gerulskis**
SECCHI	**R. Howard, D. J. Michels**
S/WAVES	**J. L. Bougeret, S. Bale, R. MacDowall**
JHU/APL	**Kerri Beisser, K. Marren**
IMPACT	**J. G. Luhmann, N. Craig, L. M. Peticolas**

Science Mission Directorate E/PO Requirements

- **Customer Focus:** Programs have been designed to respond to a need identified by the education community, a customer, or a customer group
- **Content:** Programs make direct use of NASA content, people or facilities to involve educators, students, and/or the public in NASA science, technology, engineering, and mathematics
- **Pipeline:** Programs make a demonstrable contribution to attracting diverse populations to careers in science, technology, engineering, and mathematics (STEM)
- **Diversity:** Programs reach identified targeted group
- **Evaluation:** Programs implement an appropriate evaluation plan to document outcomes and demonstrate progress toward achieving objectives
- **Partnership/Sustainability (leverage):** Programs achieve high leverage and/or sustainability through intrinsic design or the involvement of appropriate local, regional, and/or national partners in their design, development, and dissemination.
- **Quality and Feasibility:** Proposals/Plans/Summaries have clear goals and objectives that are aligned with the education goals, objectives (outcomes) in the NASA Strategic Plan and NASA Education Strategy
- **Resources Utilization:** Programs demonstrate an effective use of funds through the adequacy, appropriateness, and realism of the budget

NASA E/PO Evaluation Criteria

Pre-2004

- Quality, Scope, Realism and tie to science
- Budget Realism
- Capability and Commitment of the Team
- Evaluation
- Application of Education Standards
- Contribution to engagement of underserved/underutilized
- Potential for Programmatic Impact

Applicable for 2004

Intrinsic Merit

- Quality, Scope, Realism and tie to science
- Customer Needs Focus (Office of Education Emphasis)
- Partnerships/Leverage/Sustainability
- Evaluation

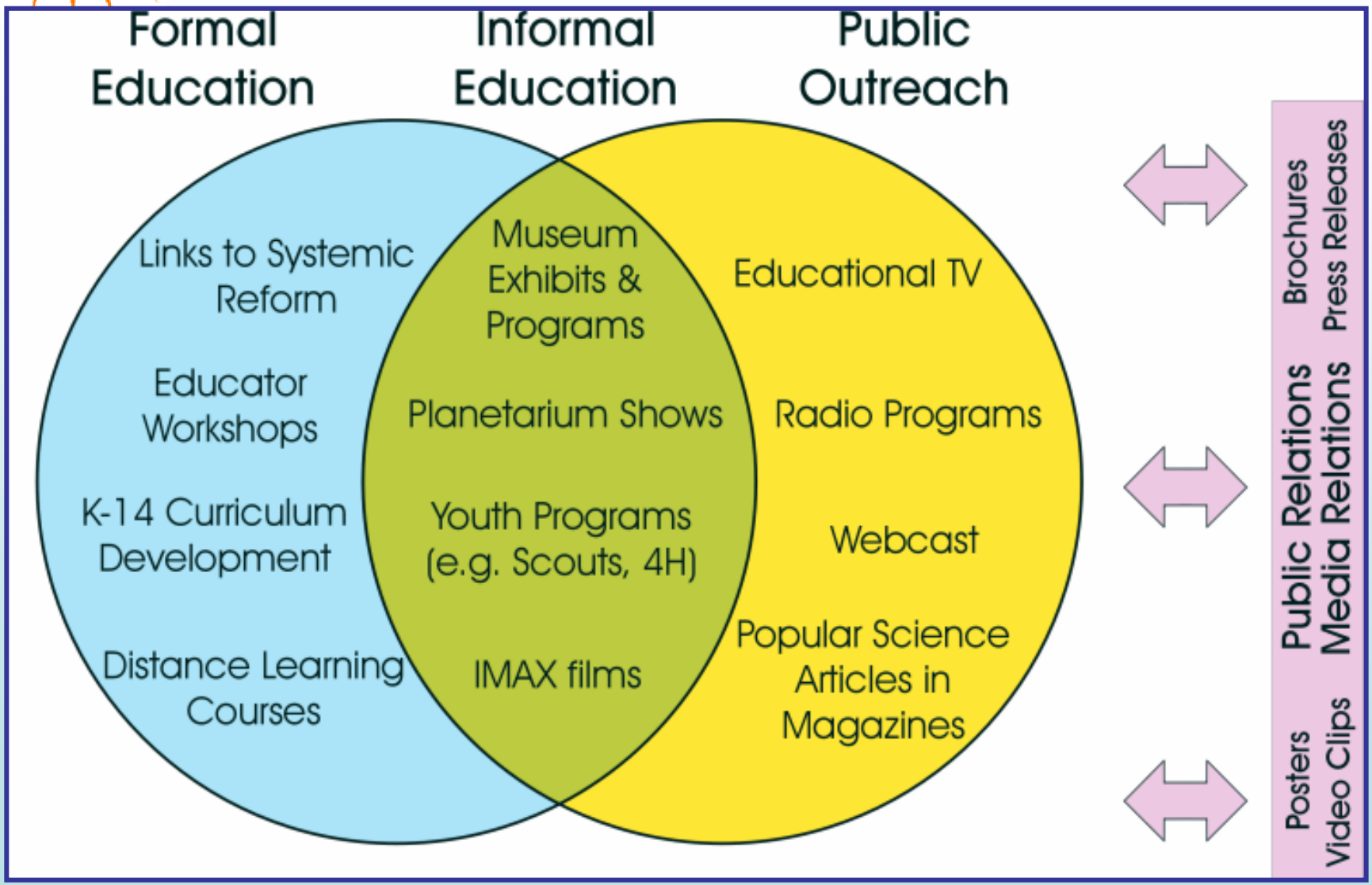
Relevance to NASA Objectives

- Content
- Pipeline **(Office of Education Emphasis)**
- Diversity

Cost

- Budget Realism

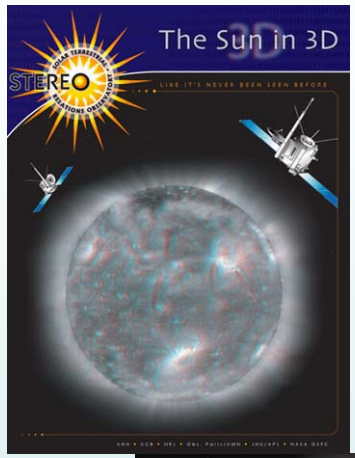
Education and Public Outreach *not* Public Relations

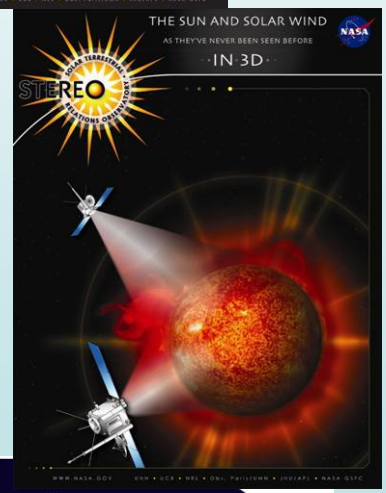


Courtesy of Dr. Cheri Morrow, SSI

Project Office EPO Activities

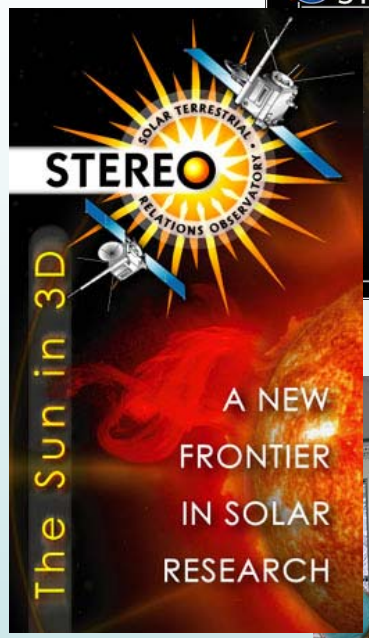
- Developed two new STEREO posters that are presently in the NASA approval process.
  - One for exclusively EPO with activities/lesson plans.
  - One on the technical aspects of the mission.
  - 3-D glasses have also been redesigned to go with these products.
- STEREO models in the process of being built.
- Hosting one high school student intern this summer from the SEC EPO organization to work with our system engineers.
- Hosting one college student intern this summer from the NASA University Programs Summer Internship Program to work with mechanical engineers.





Project Office EPO Activities (continued)

- Products that have been developed and are available for distribution to schools, conferences, workshops, etc.:
  - Mission Information Booklet
  - Bookmarks
  - Pins
  - Pens
  - Decals
- Scientists and engineers classroom visits.



A CD/DVD of the STEREO mission

- CD/DVD explains the STEREO Mission and its science to students and the general public.
- The CD will contain text, documents, pictures, animations, video, interviews, and/or the actual media, documents that are available from the STEREO Mission and its partners.

PLASTIC Informal Education

Young pilot-to-be checking out the controls of a Blackhawk helicopter

a Wright Flyer simulator experiment

Super Saturdays is a space science and aviation festival for the general public as part of the national celebration of Astronomy Day.

STEREO sponsorship brings many special speakers for the day as well as ASL interpreter for the key programs.

PLASTIC-
Christa McAuliffe Planetarium

Dr. Toni Galvin, explaining STEREO to a sponsor of the Alex Higgins Space Camp Scholarship Award

“Dr. Flush” (Donald Rethke), the engineer who designed the toilet for ISS explaining his work

Dr. Toni Galvin, awarding a scholarship to U.S. Space Camp to one of three winners.

SSF are the Planetarium’s Friday night series of space science and aviation workshops, lectures and activities for teems and families.

SECCHI E/PO

Key Activities:
- Museum-quality display / kiosk
- Enhanced 7660 web site
- Printed materials, CDs
- **“A Classroom Teacher’s Guide to the Sun”**

TOPS! … Top Teachers of Physical Science

➔ ***undergraduate,***

➔ ***pre-service,***

➔ ***K-8 teachers***

… centered around the physics of the

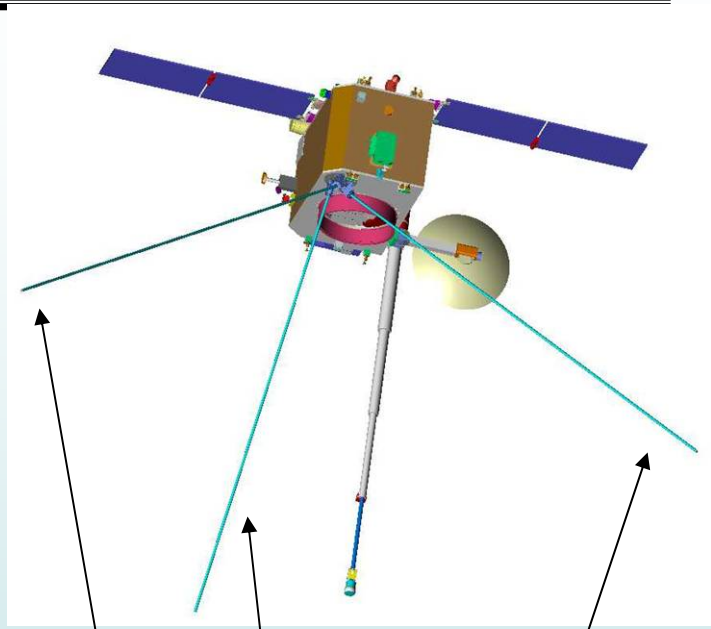
Sun-Earth Connection

SECCHI Formal Education

An experimental, university *physical science* curriculum

- Physics 240 Sun and Earth
- One semester, 4 credits
- Introductory physics and astronomy for (K-8) teachers
  - Each topic is related to its expression in the physics of Sun and Earth, and their complex connections, and the excitement of forefront research. SOHO and STEREO researchers interact with students through classroom visits, lab visits, mentoring.

S/WAVES E/PO Informal Education



S/WAVES monopole antennas

- Radio wave sonification, using software provided by the STEREO IMPACT team
  - –Initially, key radio events will be sonified and highlighted on S/WAVES web page
  - –Goal is for all S/WAVES data to be available as audio with the capability for users to modify the sonification characteristics

S/WAVES E/PO Formal Education Activities

- S/WAVES E/PO web-based classroom and outreach activities; developed with master teacher support
- Development of radio-tracking spacecraft models for classroom use
  - Two boxes with radio receivers serve as STEREO spacecraft, one transmitter serves as solar burst
  - Students will learn basics of triangulation and tracking
  - Will also be used for geometry-based lessons and for space weather “games”

APL Space Academy Informal Education

- Students put on clean-room suits and toured the Lab's space facilities, including the space environment simulation lab, the vibration test lab, and the satellite communications facility.

- Event participants - *Madhulika Guhathakurta, Andy Driesman, Ron Denissen*

- Comcast Local Edition filming (PSA) in studio – *Ed Reynolds*

APL Space Academy Public Outreach Event

October 21, 2004 Space Academy

- The STEREO E/PO team at APL teamed up with Comcast, Cable in the Classroom, and the Discovery Channel.
- The students were moved from behind their desks to behind the scenes of a mission at the Applied Physics Lab during Comcast-Discovery Space Academy: STEREO.
  - Giving middle school students a true outer space experience focusing on the STEREO observatories.

The students heard a briefing on the mission and the observatory development and took part in a special student press conference with STEREO team members.

APL Formal Education and Web Site

Lesson Plan titles:

- The STEREO Mission: Space Academy Student Activity
- Make your Own Stereograms
- Instructions for Constructing a Stereoscope
- Fact Finding, Discussion and Analysis

http://www.spaceacademy.jhuapl.edu/

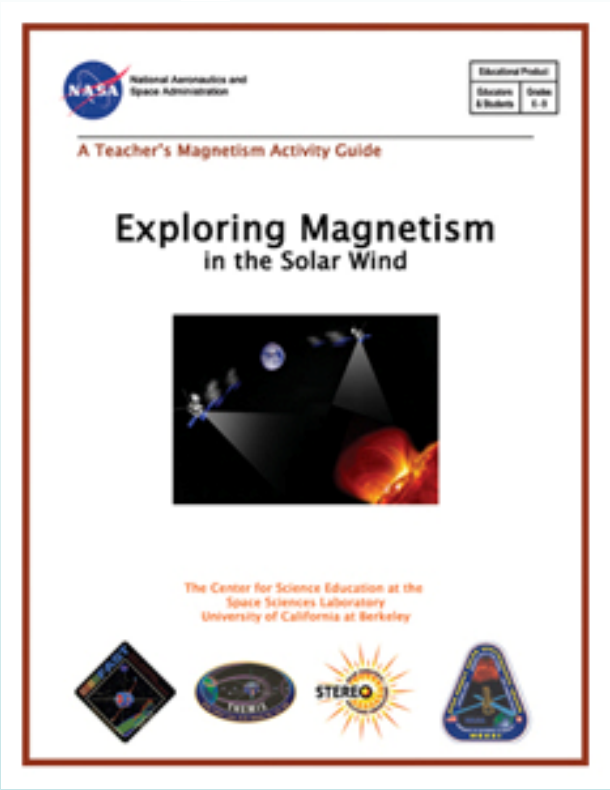
http://stereo.jhuapl.edu/education/activities/activities.html

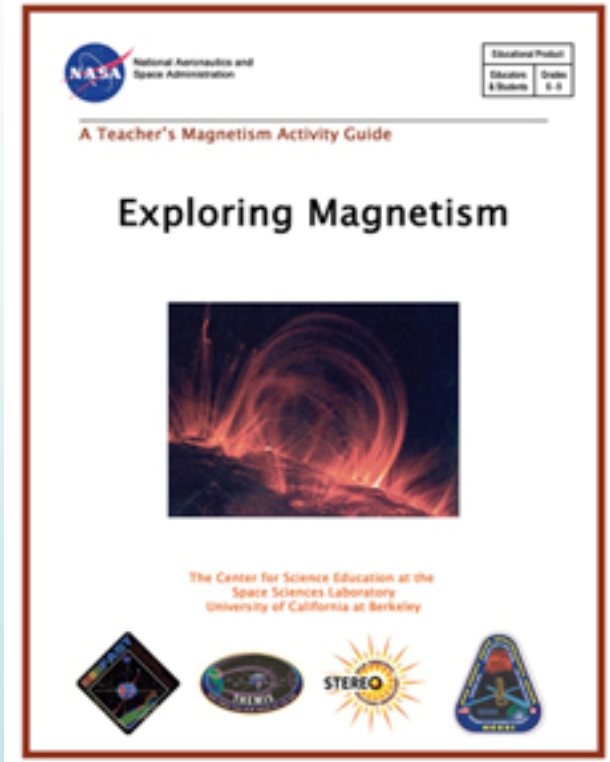
Available on the STEREO Web Site

- Fact Sheet
- Animation Stills
- Cut Out Model

IMPACT Formal Education

Products Developed, Reviewed and Printed





Backward design is a design philosophy in which

1) one begins with determining what is worth teaching,

2) Next determines how to asses whether the students have understood what they were taught, and

3) one develops a curriculum using the content and assessment.

As part of this process, it is important to start with **design considerations** and then apply **filters (or design criteria)** during each stage.

http://cse.ssl.berkeley.edu/exploringmagnetism

We provide workshops for teacher professional development

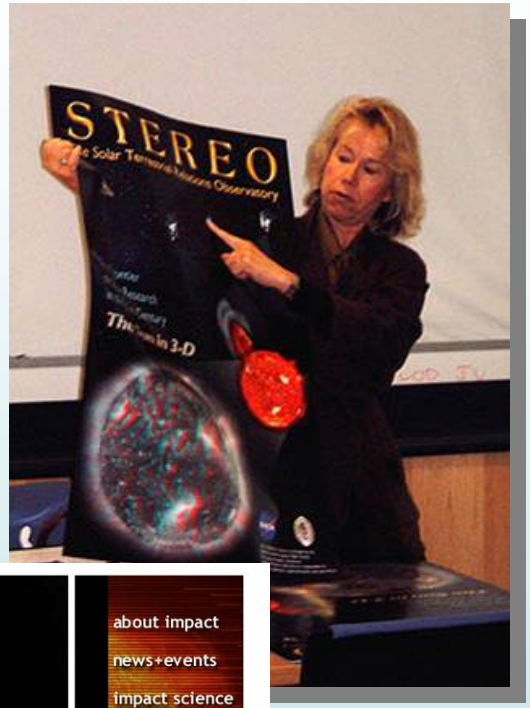
At national conferences (SACNAS and NSTA)

And with the LHS GEMS program at UC Berkeley

Reaching 192 teachers directly, 88 students per teacher = 16896 students

IMPACT Public Outreach Activities

Scientist Involvement



CLASSROOM

Participating in public events is part of the general outreach effort, as is our E/PO website.

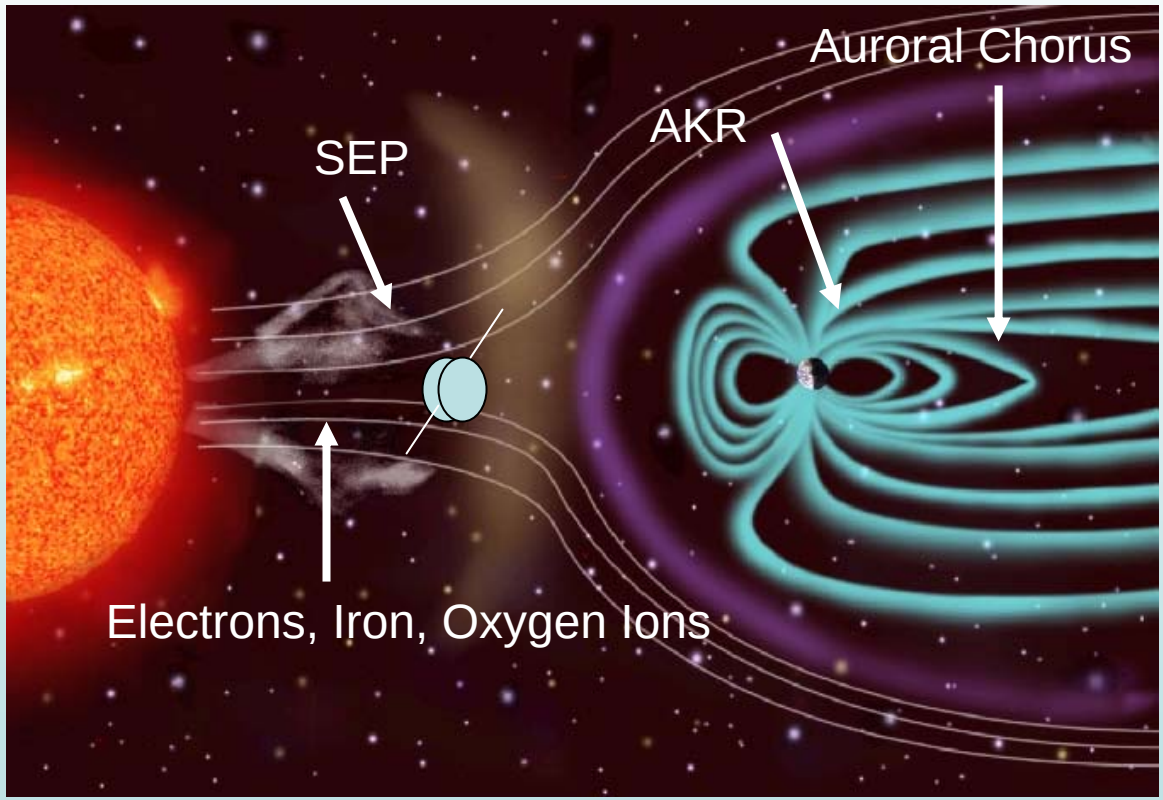
Public Events

http://cse.ssl.berkeley.edu/impact

IMPACT Eclipse '01
STEREO Scientists Participation

IMPACT Informal Education- Sonification and Web Site

Scientists have translated Sun-Earth Connection data into sound from regions marked on the figure. This data can be mapped to sounds in the audible range. This may mean lowering a wave frequency or associating a data quantity with an audible frequency. We call this *mapping data to sounds*, or ***sonification*.**



Sounds of Space: http://cse.ssl.berkeley.edu/impact/vos/welcome.html
Center for New Music and Audio Technologies: http://cnmat.berkeley.edu/

Aims of the Project

Science: create sonic representations of data and find new approaches to displaying multi-channel, multi-source data (like STEREO)

Education: create new methods of introducing and interacting with key concepts in science and music

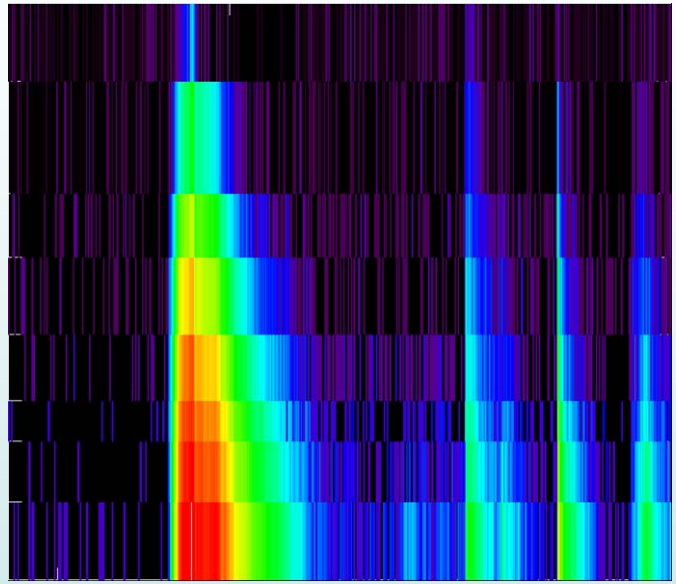
Music: create tools for creative exploration of sound using solar data as a rich generative material

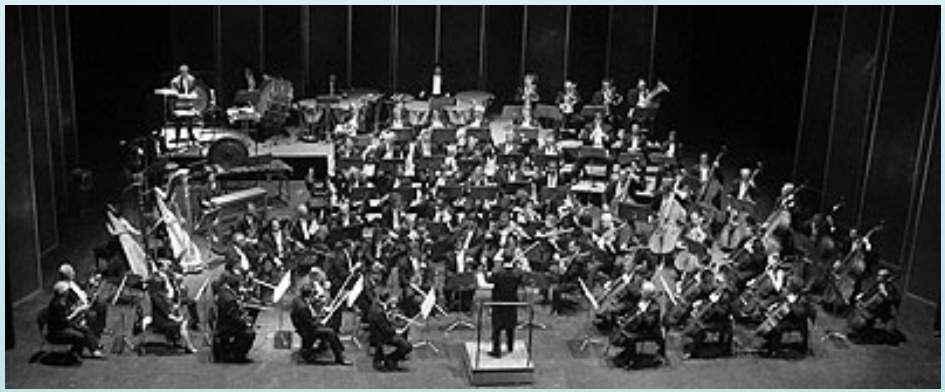
Stereo Incandescence: A new collaboration with SWAVES and Center for New Music & Audio Technologies of UCB

Sonification Software Developed

Examples

Science: A computer realization of carbon flux





Music: An excerpt from Roberto Morales' orchestral composition "Turning Point" incorporating scaled Helios data

ALL-STEREO E/PO WISH

- Museum-quality display / kiosk
- To be developed in collaboration with all the STEREO Experimenter groups
- To feature panels explaining each instrument and its role in the science of the 3D heliosphere
- A centerpiece to highlight 3 Dimensional aspect of STEREO imagery