Space Weather Professional Development for Educators
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Objectives

• Provide space weather resources & professional development for teachers of grades 6-14
• Integrate CISM research and education
• Leverage off Center concept and engage CISM scientists with the educational program
• Respond to diversity needs
• Enhance CISM coherence — interconnection with multiple partners & varied programs

CISM Interconnections

Physical space

• High School → community college/university

Web-based Training Resources, developed in conjunction with CISM scientists and professional
in the CISM educational program

• Respond to diversity needs
• Enhance CISM coherence — interconnection with multiple partners & varied programs

Intended Outcomes

• Over 100 monitors placed in underserved high schools and community colleges
• Teachers trained in Standards-based, hands-on, inquiry-driven use of monitors in the classroom to study space weather
• CISM scientists, as partners to the schools, become engaged with teachers, students, and the CISM educational program
• Potential space weather students become actively involved early in their careers
• Data from the monitors is returned to scientists for further research

The United Nations and organizers of the International Heliophysical Year, 2007, have designated these Space Weather Monitors as official IHY instruments, to be placed in 191 countries around the world.

Web-based Training Resources

• Exploratorium — Space Weather Research Explorer
  http://www.exploratorium.edu/spaceweather/
  – Produced in conjunction with CISM partners @ UC Berkeley & Stanford
  – Includes CISM imagery, interviews with CISM scientists, pointers to “live” CISM data
• NCAR’s Windows to the Universe — Space Weather
  http://www.windows.ucar.edu/ liaison/space_weather/space_weather.html
• Stanford Solar Center – Space Weather Monitors
  http://solar-center.stanford.edu/awz

NCAR will be incorporating the monitor project into their professional development program for middle–high school educators and Rice University will be incorporating it into their Ham Radio Course for teachers -- thus using professional development opportunities to improve educators’ understandings of space weather concepts and providing them and their students with a hands-on tool to track this phenomena. Stanford will be providing a central data repository and blog/chat facility for teachers and students using the monitors. Alabama A&M will be experimenting with incorporating the monitors into a university space weather program.

Space Weather Professional Development in Teacher Workshops at NCAR

Over the past 3 years, NCAR has provided professional development to a total of ~100 educators from across the country through workshops on Climate and Global Change and Modeling in the Geosciences, directly addressing National Science Education Standards in Earth and space science as well as Unifying Concepts and Processes standards. Within these workshops, they have provided background context lectures on Space Weather and the Sun’s impact on Earth, as well as inquiry-based modeling activities that allow students to observe the impact of the Sun on Earth using both box-model and GIS approaches (with support from ESRI and IEE systems).

In the current year, NCAR is developing an on-line version of their professional development program that will make it possible for a larger number of educators from around the world to participate in this program. In the course of this development, they are implementing the Space Weather Monitor module as well as a module on ham-radio within the on-line program, leveraging the CISM-supported efforts at Stanford and Rice University. NCAR plans to pilot the on-line professional development course in Fall 2005.

Incorporating the Space Weather Monitor into Teacher Coursework

Rice University supports formal training courses for teachers. Their Physics of Ham Radio course covers electromagnetic waves, basic electronics, antennas, the ionosphere, ionospheric propagation, the Sun and CMEs, and the magnetosphere. The Space Weather Monitors will be incorporated into the course and students/teachers will be taught how to directly monitor and exchange data about the solar influences on their radio transmission.

Extending the Space Weather Monitors into the University Environment

Professor Marius Schamschula of Alabama A&M will experiment with incorporating both monitors into their undergraduate space science programs. To what extent can these be useful in training future space scientists? Are they effective as teaching aids or as tools to spark an interest in space science? Do they help encourage a diversity of fields? How will their functions need to be extended to work effectively for undergraduate space science majors? To what extent does the use of an AWESOME for space science undergrads differ from the use of a SID as an enthusiasm-builder for a more general student population?