Education and Outreach at the National Center for Atmospheric Research

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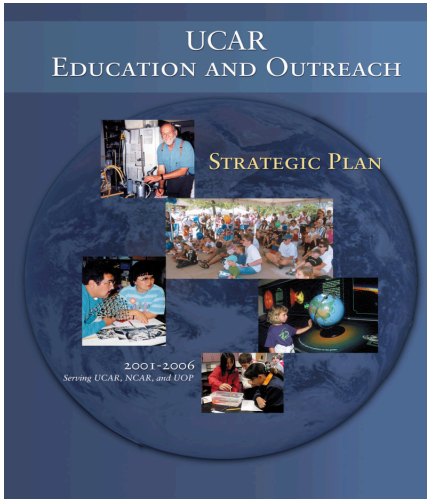
University Corporation for Atmospheric Research

UCAR Education and Outreach Mission

Mission: In partnership with the university community, UCAR promotes science literacy and advances all levels of education and training in subjects related to Earth's atmosphere.



Goals:

- Support Students and Professionals: From Pre-K through Post Graduate

- Foster an informed public through science literacy

- Promote the involvement of diverse and historically under-represented populations in the geosciences

UCAR Education and Outreach Programs

Formal Education

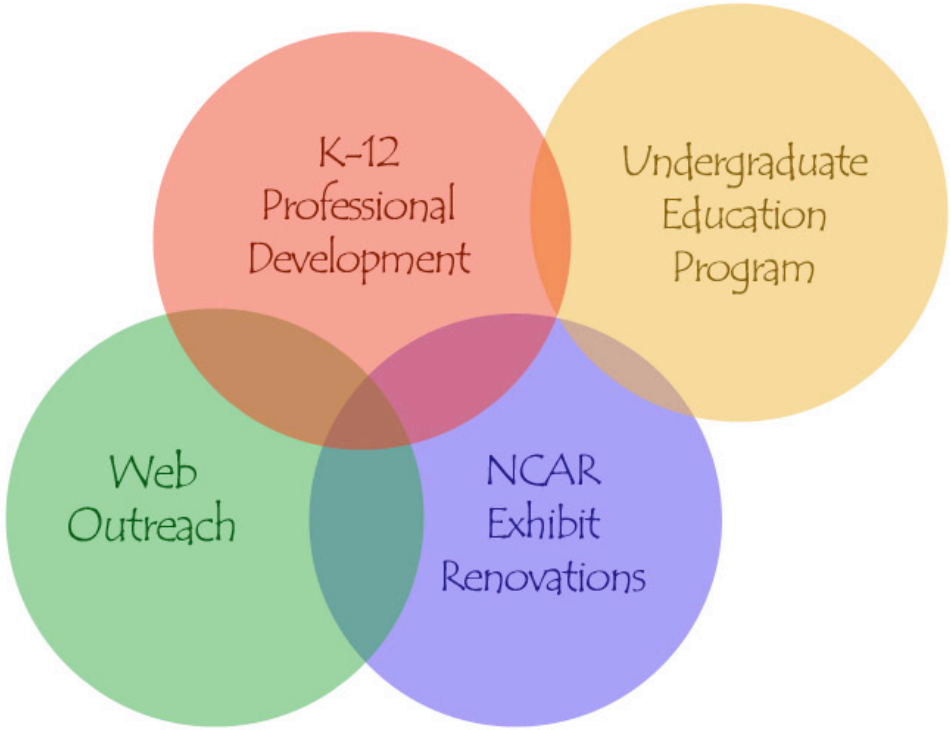
- K-12 Students
  - Mesa Lab Classroom Tours
- K-12 Teachers
  - Climate and Global Change Workshop
  - Modeling in the Geosciences Workshop
  - Curriculum Development
  - Distance Learning
  - GLOBE
- Undergraduate
  - SOARS
  - Unidata
  - COMET
  - Undergraduate Leadership Workshop
  - Internships
- Graduate/Postgraduate Study
  - ASP, VSP, Graduate Fellowships, COMET, SOARS, Early Career Faculty
- Digital Libraries
  - DLESE, NSDL

Informal Science Education

- Events
  - Super Science Saturday, Public Lectures, Conferences
- Tours ~ 15,000 people/yr
  - Customized Visits, Guided and Self-guided (Audio Tour)
- Exhibits ~ 90,000 visits/yr
  - Mesa Lab Lobby, Teacher's Guide
- Web-Based Resources
  - Windows to the Universe
  - Web Weather for Kids
  - NCAR EO web site
  - Divisional EO web sites
  - Roberts' Forum
  - Skymath, LEARN
- Outreach Resources
  - Scientist Outreach, Science Now

Our strategies for bringing geoscience to diverse learning communities

- Focus on strengths and collaborate
- Focus activities on science/content knowledge and technology-based solutions, where appropriate
- Focus on building community
- Focus on developing resources and venues that can be multi-purposed:
  - Websites that support informal and formal education, multilevel, multilingual
  - Multi-purposed graphics, activities, interactives
  - Professional development - in person and distance learning

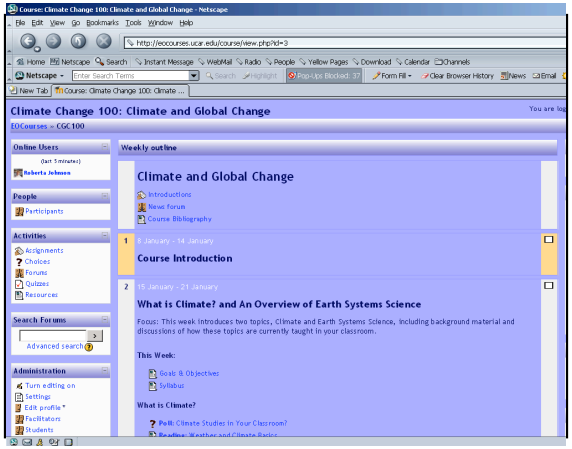


K-12 Professional Development

- **Climate and Global Change for Geoscience Educators**: Science content, activities, field work, standards, technology, and training support

2002-04, 450 applicants, 99 teachers trained

- **Modeling in the Geoscience Workshop**: Funded by NASA through ESMF - Focus on the use of models in geoscience education (e.g. STELLA, ArcView)
    - **Online courses in development**



- **GLOBE**: Creating the next generation of environmental leaders and scientists by teaching children in 107 countries how to take environmental measurements, report them via the Internet, and address challenging environmental problems

Online Climate and Global Change Professional Development Experiences for Educators from UCAR Education and Outreach

- A Primer of Global Change
  - The introductory course in the Climate and Global Change series. Participants are introduced to basic concepts that are critical to understanding climate and global change and look at methods for incorporating climate into the classroom. (7 weeks)

- Music of the Spheres
  - Participants explore the interactions between the various components of the Earth System and how they influence climate. Climate serves as a model for the teaching of Earth System Science in middle and high school classrooms. (7 weeks)

- Climate Change Today
  - A capstone course in the Climate and Global Change series, participants explore the impacts of climate and global change, the challenges faced when modeling and predicting climate, and methodologies for exploring these topics with students. (7 weeks)

- Courses will be offered for graduate credit, in collaboration with university Teacher preparation programs

Web-Based Outreach and Distance Learning

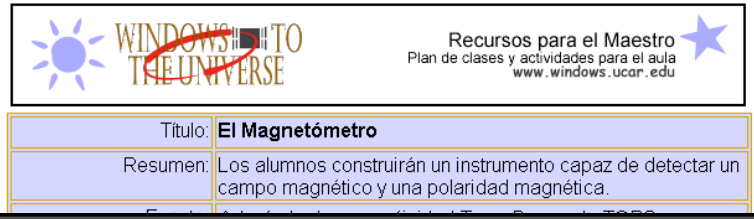
Educational resources supporting formal and informal education for students, teachers, and science professionals around the world

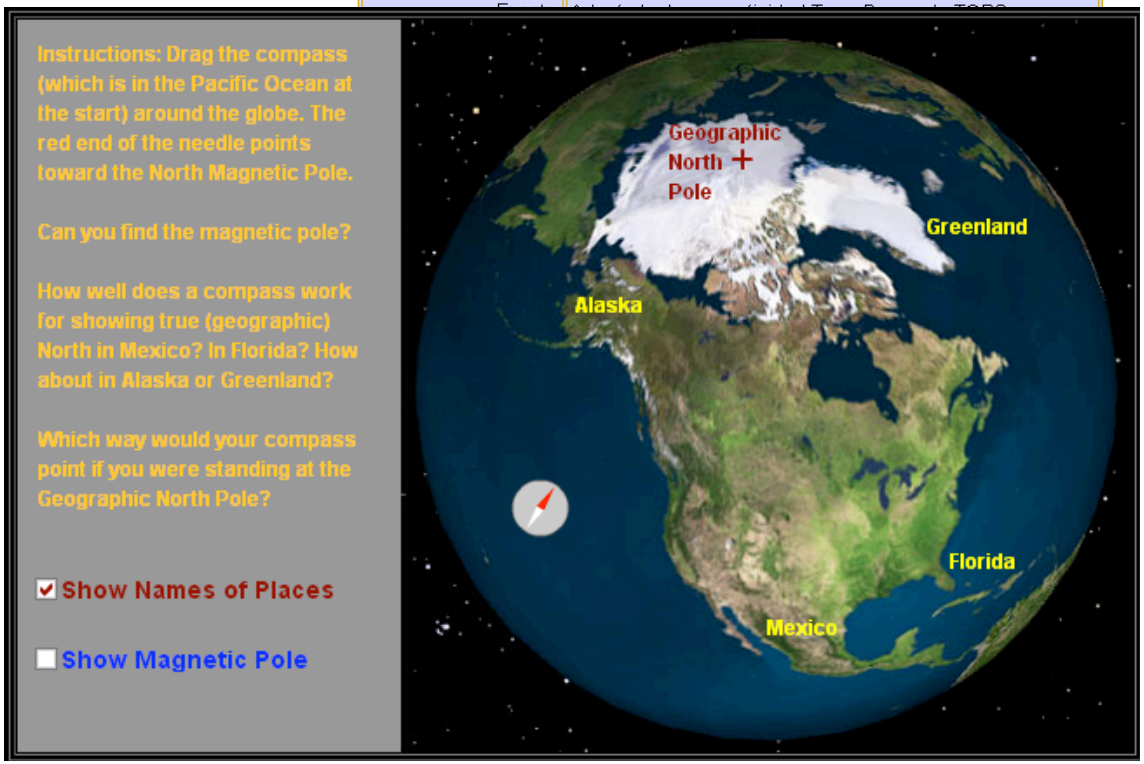
- Windows to the Universe
- Web Weather for Kids
- NCAR EO websites
- Online Climate and Global Change and Modeling in the Geosciences Distance Learning
- GLOBE Distance Learning
- COMET Training Modules

Professional development program trains ~1600 teachers/year

Curriculum, Interactives, and Games Development

- UCAR EO develops resources for educators to use in the classroom as well as interactives and games for the public through numerous projects focused on topics such as:
  - Space Weather
  - Planetary science
  - Earth system science
  - Climate/Global Change
  - Bio-complexity
  - Weather
  - Modeling





Windows to the Universe Website
www.windows.ucar.edu

Comprehensive geoscience education website and professional development program; >12 million users per year

- Formal and informal
- Science in interdisciplinary context, links to humanities
- 3 levels of content
- Bilingual, toggle allows users to switch on the fly (language acquisition)
- Classroom activities, interactives, journal, games
- Professional development workshops reach ~1400 educators per year
- Global community of ~3400 educators
- Coordinated with NCAR education program and other initiatives
- Scientific community education and outreach program

- Some Metrics:
  - ~65% of users are K-12 students
  - 46% once per week or more
  - 2-5000 visits to *Teacher Resources* per day during work week
  - ~55,000 users per day, including ~15-20,000 to Spanish website


Windows to the Universe - Netscape
File Edit View Go Bookmarks Tools Window Help
New Tab
Windows to the Universe
Recursos para Maestros
Patrocinio
Acerca del Portal
WINDOWS TO THE UNIVERSE
Inglés
Mitología
Historia y Personas
Geología
La Vida
Nuestro Planeta
El Sistema Solar
Mitología
Actividades...
Lee las Noticias
Juegos
Encabezados:
¡Educadores! - Asistan a la Séptima Conferencia Internacional acerca de escuelas y metereología popular y educación oceanográfica (EWOC 2006) en Boulder, Colorado!
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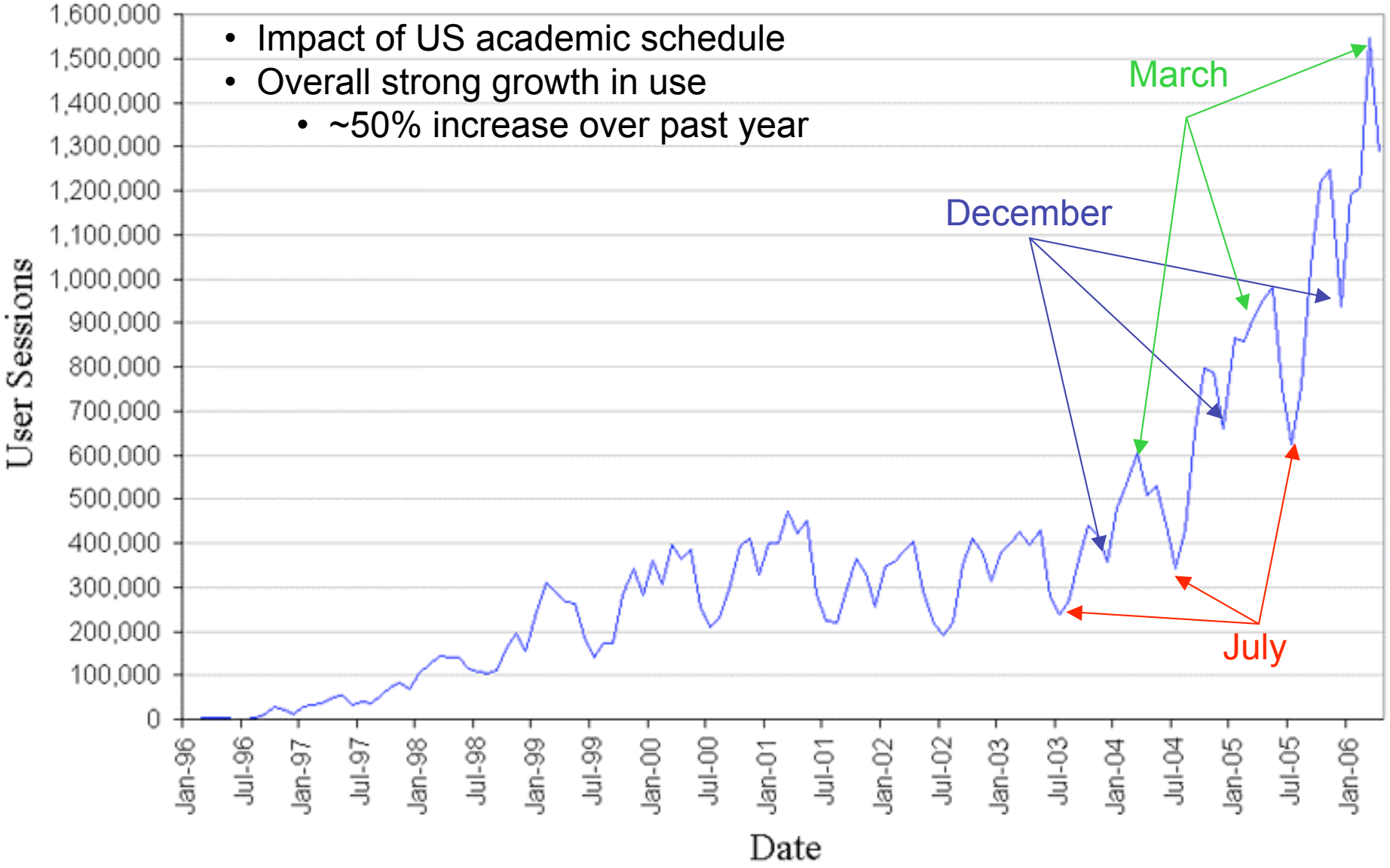
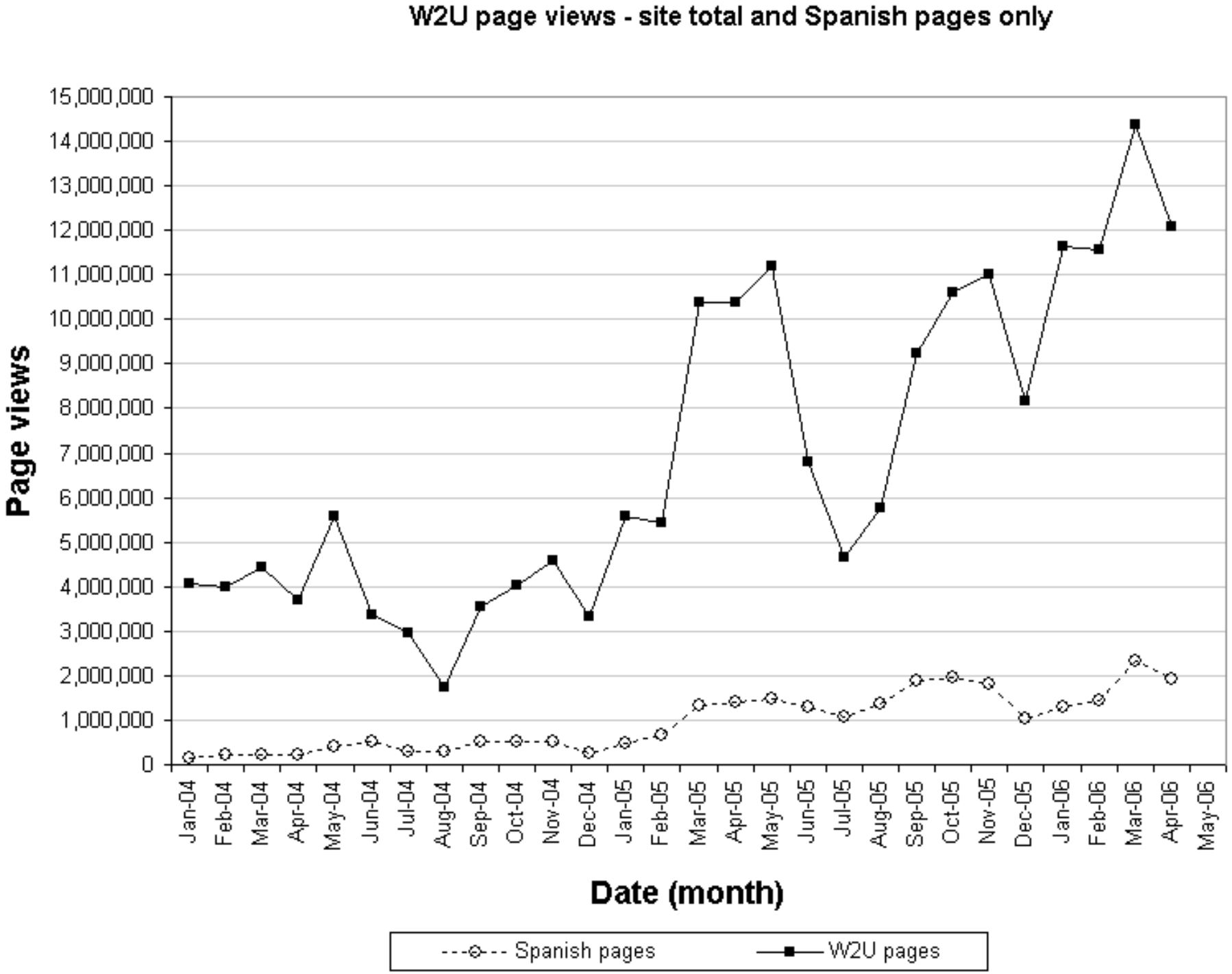
NCAR
National Center for Atmospheric Research
CSEM
CISM
Waiting for www.windows.ucar.edu...

W2U Monthly User Sessions




W2U page views - site total and Spanish pages only
Page views
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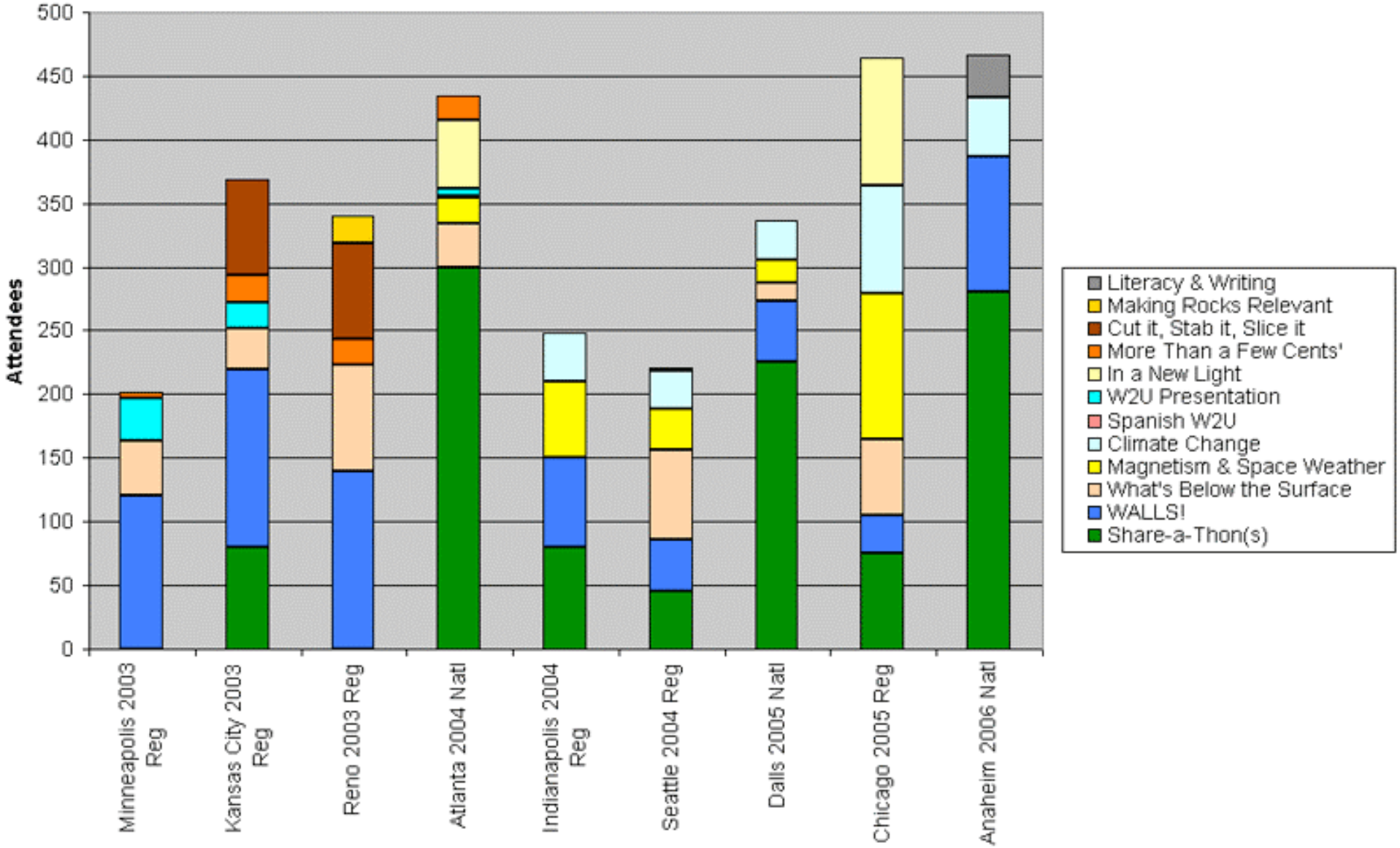
W2U pages

Attendance at W2U sessions at NSTAs



Earth - Netscape

File Edit View Go Bookmarks Tools Window Help

New Tab | Earth

Windows to the Universe

Beginner | Intermediate | Advanced

Spanish English

EARTH

Earth, our home planet, is a beautiful blue and white ball when seen from space. The third planet from the Sun, it is the largest of the inner planets. Earth is the only planet known to support life and to have liquid water at the surface.

- Interior and Surface
- Atmosphere
- Magnetosphere
- Moon
- Climate and Global Change
- Water (*The Hydrosphere!*)
- Life and Ecology (*The Biosphere!*)
- Geology (*The Geosphere!*)
- Planetary Facts
- Myth & Culture
- Space Missions
- Earth News
- Image Archives
- Earth's Web

http://www.windows.ucar.edu/tour/link=/earth/climate/climate.html

Earth's Climate and Global Change - Netscape

File Edit View Go Bookmarks Tools Window Help

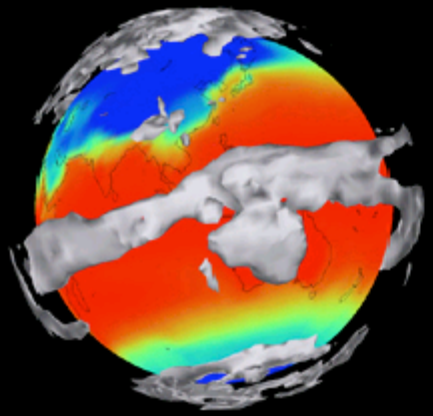
http://www.windows.ucar.edu/cgi-bin/tourdev/link=/zzz/dev/earth-climate-climate.html

Go Search

Windows to the Universe

Beginner Intermediate Advanced

CLIMATE AND GLOBAL CHANGE



Warm near that equator and cold at the poles, our planet is able to support a variety of ecosystems because of its diverse climates. Earth's climates have changed incredibly during its 4.6 billion year history. Today, the changes are happening more quickly as natural processes are combined with the affects of human actions.

Teacher Resources - Netscape

New Tab | Teacher Resources

Windows to the Universe

Beginner | Intermediate | Advanced

TEACHER RESOURCES

- Classroom Activities
- Windows to the Universe Journal
- Tools
- Teachers' Registration
- Educational Links
- Teachers' Share-A-Thon

We are continually updating this page, and welcome your suggestions of topics and resources you'd like to see included. We are pleased to announce that *Windows to the Universe* and its educational resources have been reviewed by NASA's Office of Space Sciences, receiving *exemplary status*, and the Earth Science Enterprise (ESE).

NASA

ESE

Office of Space Science, Information Systems

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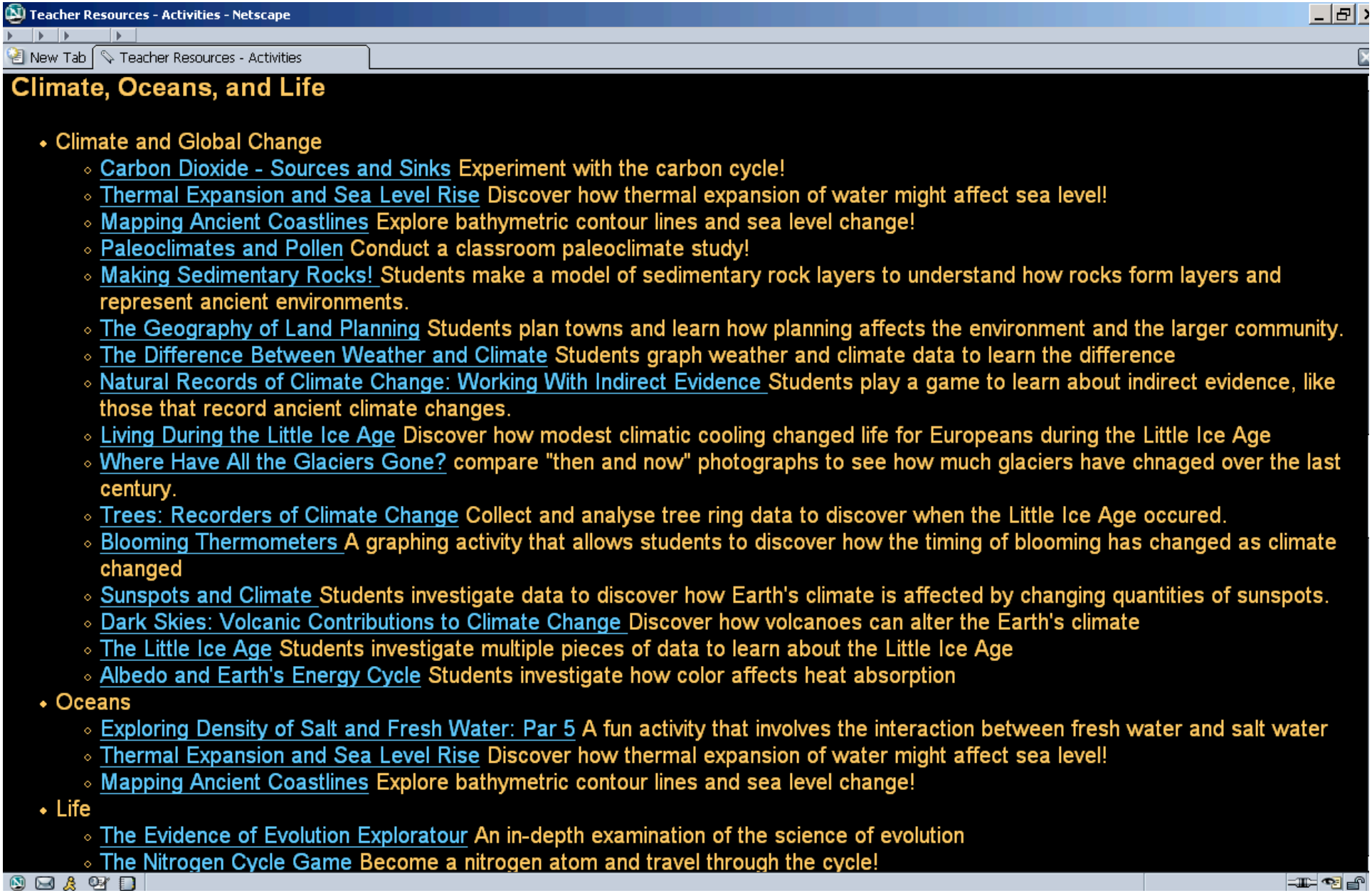
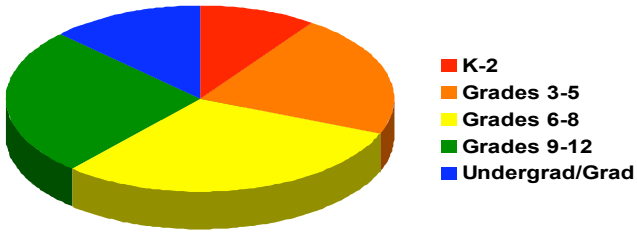
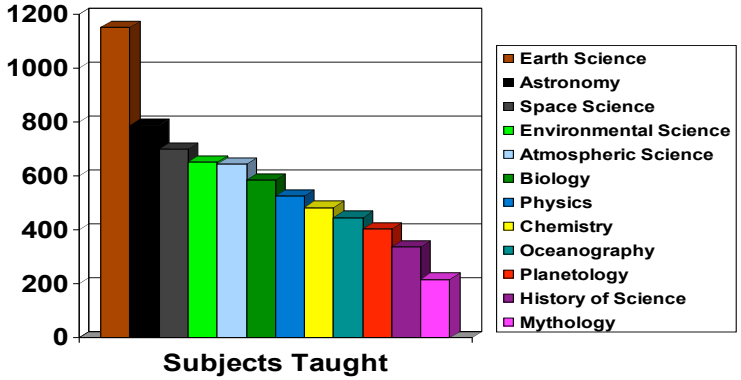
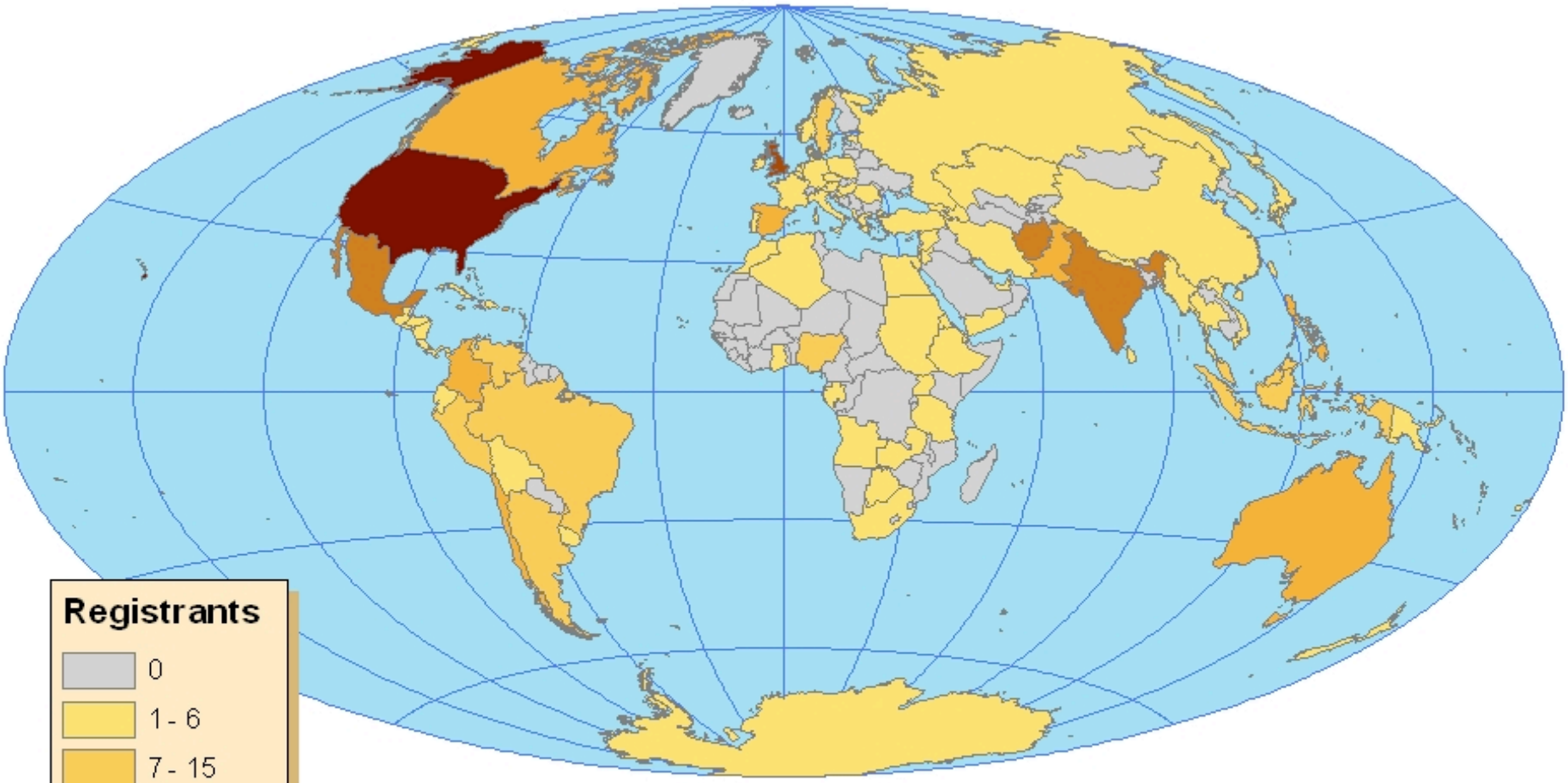

Teacher Resources - Activities - Netscape
New Tab
Teacher Resources - Activities
Climate, Oceans, and Life
Climate and Global Change
Carbon Dioxide - Sources and Sinks Experiment with the carbon cycle!
Thermal Expansion and Sea Level Rise Discover how thermal expansion of water might affect sea level!
Mapping Ancient Coastlines Explore bathymetric contour lines and sea level change!
Paleoclimates and Pollen Conduct a classroom paleoclimate study!
Making Sedimentary Rocks! Students make a model of sedimentary rock layers to understand how rocks form layers and represent ancient environments.
The Geography of Land Planning Students plan towns and learn how planning affects the environment and the larger community.
The Difference Between Weather and Climate Students graph weather and climate data to learn the difference
Natural Records of Climate Change: Working With Indirect Evidence Students play a game to learn about indirect evidence, like those that record ancient climate changes.
Living During the Little Ice Age Discover how modest climatic cooling changed life for Europeans during the Little Ice Age
Where Have All the Glaciers Gone? compare "then and now" photographs to see how much glaciers have chnaged over the last century.
Trees: Recorders of Climate Change Collect and analyse tree ring data to discover when the Little Ice Age occured.
Blooming Thermometers A graphing activity that allows students to discover how the timing of blooming has changed as climate changed
Sunspots and Climate Students investigate data to discover how Earth's climate is affected by changing quantities of sunspots.
Dark Skies: Volcanic Contributions to Climate Change Discover how volcanoes can alter the Earth's climate
The Little Ice Age Students investigate multiple pieces of data to learn about the Little Ice Age
Albedo and Earth's Energy Cycle Students investigate how color affects heat absorption
Oceans
Exploring Density of Salt and Fresh Water: Par 5 A fun activity that involves the interaction between fresh water and salt water
Thermal Expansion and Sea Level Rise Discover how thermal expansion of water might affect sea level!
Mapping Ancient Coastlines Explore bathymetric contour lines and sea level change!
Life
The Evidence of Evolution Exploratour An in-depth examination of the science of evolution
The Nitrogen Cycle Game Become a nitrogen atom and travel through the cycle!

A Snapshot of our Educator Community

- ~3350 members to date from 116 countries
  - ~2350 in US
- ~evenly distributed across K-12 grade levels
- Includes Educators teaching a wide range of subjects
- ~ 550 educators are teaching bilingual classes, in Spanish, or another language

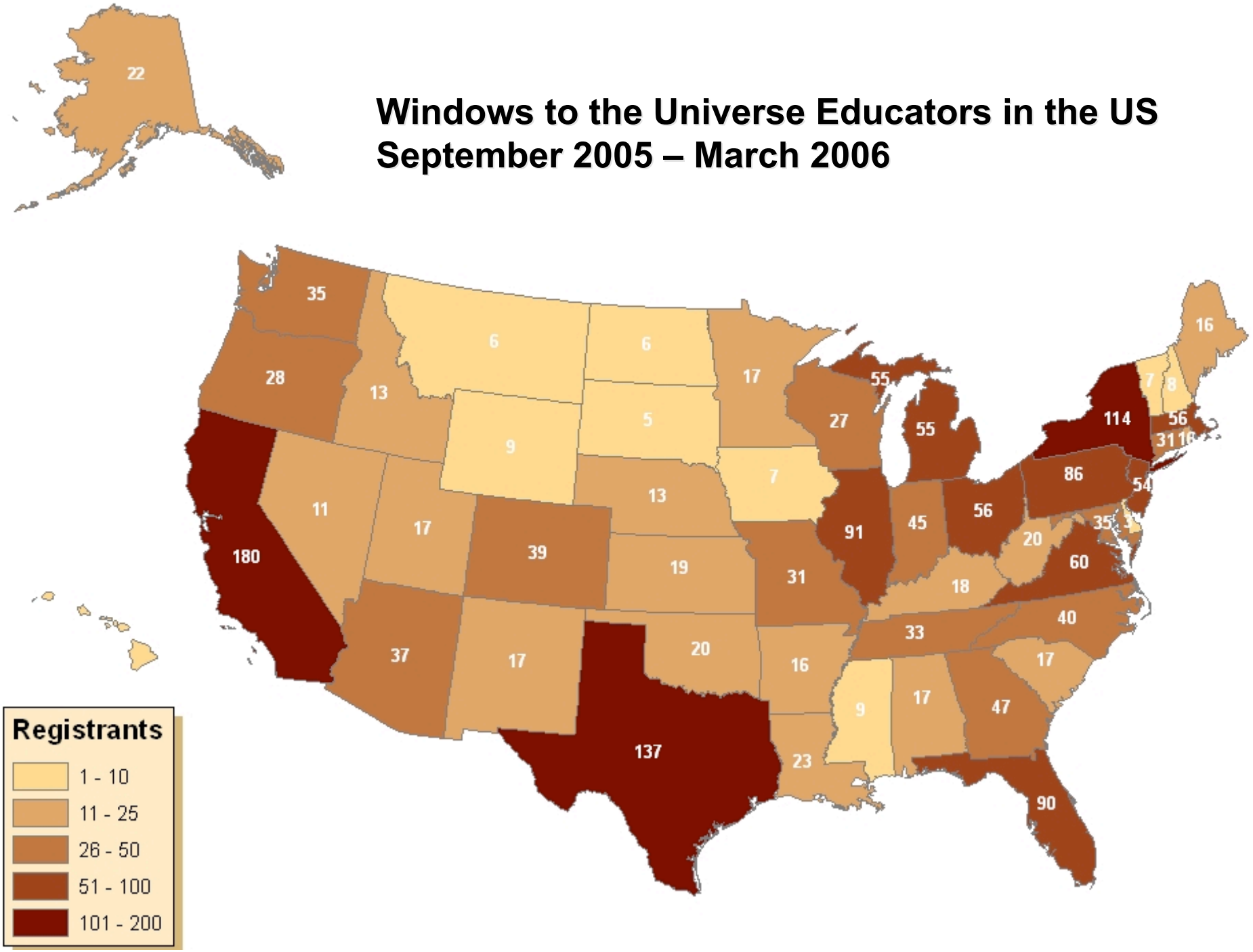






Windows to the Universe Educators Around the World
September 2005 – March 2006

Windows to the Universe Educators in the US
September 2005 – March 2006

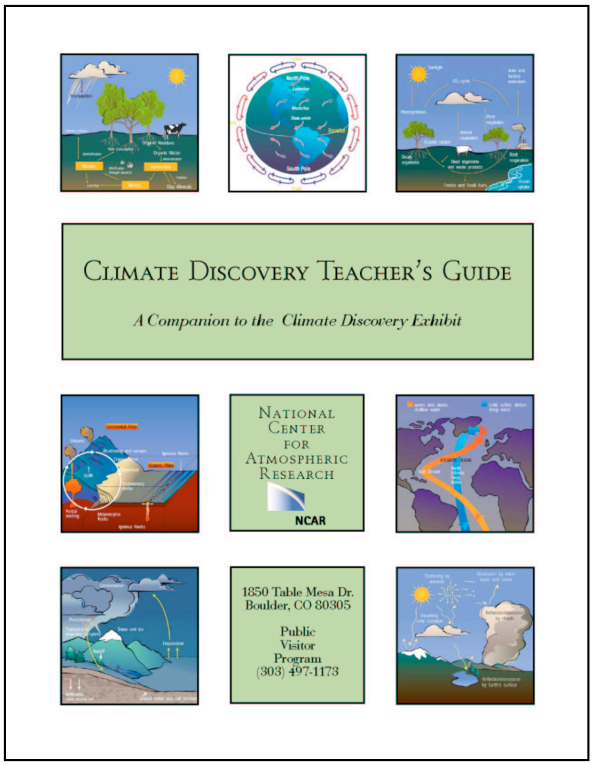


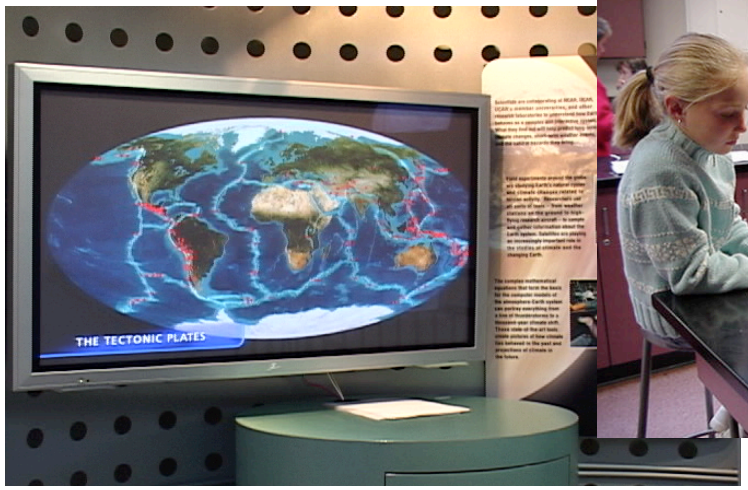
Tours and Events

- **Mesa Lab Visitors Center ~90,000 visitors/yr**
  - Theater, Interactive exhibits, Weather Trail, Science Store,
- **Tour Program**
  - Tours 7 days/week serve ~15,000 visitors/year
  - Customized to interests of public, students, scientists
  - Science inquiry experiences
  - Bilingual Audiotour
- **Super Science Saturday**
  - ~4000 children and parents
- **Supporting Science Fairs**
  - Student exhibits and awards

Mesa Lab Exhibits

- Guided by NCAR scientists
- Climate Discovery Exhibit just completed
- First floor Weather Gallery upgrade planned in 2006-2008
- Increasing use of video media, interactives, and games
- Building collaborations with museums and broadcasters
- Interest in promoting CURRENT RESEARCH
- Exhibits relate to other EO resources – e.g., teachers' guide





The Climate Discovery Teacher's Guide

Designed for use in middle school classrooms

Multi-lesson instructional units include:

- Sun-Earth Connection
- Investigating Climate Present: Cycles of the Earth System
- Investigating Climate Future (Coming soon!)
- Investigating Climate Past: The Little Ice Age Case Study

l classroom activities are available online:

tp://eo.ucar.edu/educators/ClimateDiscovery/

Summary

- Integrated strategy to reach diverse formal and informal audiences through events, exhibits, tours, websites, professional development, research-based education seems to work.
- Emphasis on
  - science/content knowledge and technology-based solutions, where appropriate
  - building community
- Resources that can be multi-purposed:
  - Websites that support informal and formal education, multilevel, multilingual
  - Multi-purposed graphics, activities, interactives
  - Professional development - in person and distance learning
- Collaboration with Scientists in development and implementation