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Landsat Education and Outreach

LDCM Science Team Meeting, Rochester NY
June 2009

NASA
Education
Outcomes

Landsat: Improving and expanding an unparalleled record of Earth's changing landscapes...for the benefit of all

2A.
Building
Elementary
& Secondary
Teachers
Skills
IB.
Research
Experiences
for
Students
Under-
represented
in Earth
and Space
Science
Elementary
and
Secondary
Resources

Landsat Teacher Training Kit target completion Fall 2009

Salish Kootenai College faculty development and student internships (unsolicited grant proposal under review)

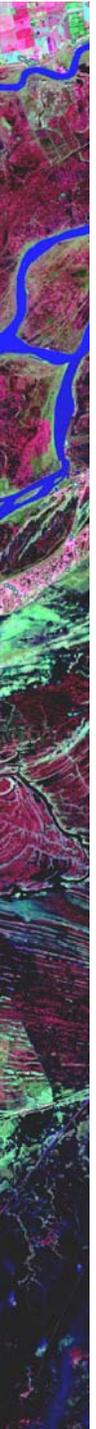
Bureau of Indian Education high school teachers workshop (July 2009)

Climate Change, Wildlife, and Wildlands: A Toolkit for Formal and Informal Educators

<http://www.globalchange.gov/resources/educators/toolkit>

Landsat Image Mosaic of Antarctica <http://lima.nasa.gov>

landsat.nasa.gov over 208 news briefs and 60 feature articles





EARTH *to* SKY

an innovative partnership

QuickTime™ and a decompressor are needed to see this picture.



Purpose

Actively foster collaborative work between the science and interpretation/education communities of NPS, USFWS and NASA. Ultimately enrich the experiences of millions of park and refuge visitors.

Audience

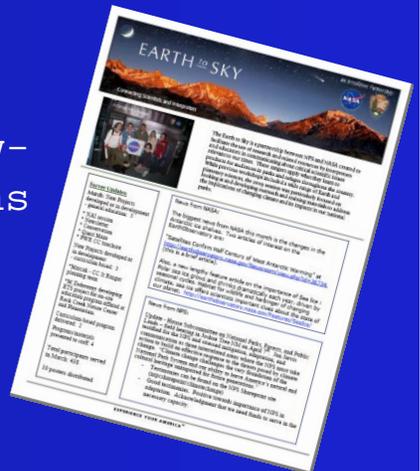
Interpreters, Education specialists and environmental educators in National Parks, Wildlife Refuges and similar organizations, whose audiences in turn include the public and classroom educators.

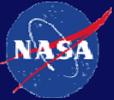
Distribution Mechanisms

Series of professional development workshops, project website, distance learning events, follow-up telecons, monthly newsletter, and presentations at professional conferences.

Project Category

3A. Earth & Space Science: Informal Education Resources 3B. Earth & Space Science: Building Informal Educator Skills





Earth to Sky III: Interpreting Climate Change

January 2009

National Park Service's Mather Training Center and NASA Goddard Space Flight Center

Results

29 Participants (NPS, USFWS, CA State Parks, Cleveland Metro Park Zoo)

9 NPS facilitators, 26 NASA presenters (19 scientists, 7 E/PO)

22 Parks, 3 USFWS Sites 2 NPS Regional Offices, USFWS & NPS National Level Training Leadership

Over 179 informal educators trained by participants, based on ETS^{III} content
Live presentations: over 1,433 visitors

Indications of developing community of practice with NASA and John Morris (NPS lead on ETS) in center of hub

Data from evaluation team's monthly feedback, and analysis of community of practice through mid April

Selected Action Plans:

- Use of the Landsat 30-year record in western parks for public programs, a site bulletin, and a podcast
- Climate change "traveling trunk" for

Major projects under development:

- Podcast series (lead by Glacier NP)
- Jr. Ranger project (Biscayne and others)

Building Climate Literacy for Informal Educators: Expanding the Earth to Sky Partnership

(NASA ROSES funded)

PI Anita Davis, SSAI, Landsat E/PO; Co-Investigator John Morris is NPS leader on climate change training, and an alumnus of all ETS efforts

Returning leadership and facilitators from previous ETS efforts
USFWS and NPS training leadership

Lead evaluator Dr. TNASA Science advisors: Dr. Peter Hildebrand and Dr. Peter Griffith

Theresa Coble, Stephen F. Austin University



Year One: One week workshop
Mather Training Center
(February 2010)

Year Two: Distance learning

Year Three: Develop and run
course at USFWS National
Conservation Training Center
(September 2012)





NSF DUE-0703185

Integrated Geospatial Education and Technology Training (iGETT)



1D.

*Earth and
Space
Science
Resources
for
Higher
Education*

Program/Purpose: 3 years of professional development to enable integration of remote sensing with existing GIS programs, for model program development to serve specific workforce needs

Audience: 40 Two-year college faculty from nationwide pool

Content: federal remote sensing data for agriculture, disaster management, and environmental sciences

Dissemination: nationwide through presentations at conferences, and on-line for other colleges interested in following iGETT models and lessons learned (<http://igettdelmar.edu>)

Evaluation: South Carolina Advanced Technical Education (SCATE)

Partners

:

NCGE;
Del Mar
College;
ESRI;
USGS;
SSAI

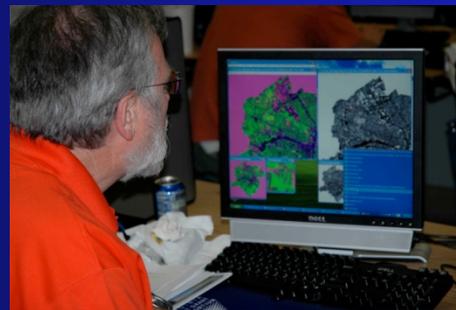




iGETT participants --



- ✧ take part in two consecutive Summer Institutes at Del Mar College in Corpus Christi, TX to learn remote sensing, GIS, and other geospatial technologies; workforce applications; and program development
- ✧ develop their own strategic plans to meet the specific needs of their institutions and communities
- ✧ receive further enrichment, mentoring, and communications during the academic years, developing a community of practice
- ✧ develop their own Learning Units that integrate remote sensing, GPS, GIS, and other technologies, to cover at least two weeks of class time, publicly available -- as are all Institute training resources
- ✧ disseminate model programs and lessons learned at regional and national conferences





Partners

- National Council for Geographic Education, Osa Brand, Education Outreach Lead, PI
- Del Mar College, Phil Davis, Faculty, Co-PI
- Environmental Systems Research Institute (ESRI), Ann Johnson, Higher Education Lead, Co-PI
- Science Systems and Applications, Inc. at NASA GSFC, Jeannie Allen, Co-PI
- U.S. Geological Survey Land Remote Sensing Program, Rachel Headley, Co-PI



Osa Brand, PI

Contributors

- ITT Visual Information Solutions: Software and training
- American Society for Photogrammetry and Remote Sensing (ASPRS): Membership to review faculty strategic plans for their success in addressing workforce needs



ASPRS Executive Director Jim Plasker →



Proposal to NSF, Oct 2010

Integrated Geospatial Education and Technology Training (iGETT)-2



Program Activities:

- ◇ Development of **4 occupational analyses**, back-mapped from workforce tasks in agriculture, disaster management, environmental sciences, and urban planning through well-tested “DACUM” process, and from them —
- ◇ Development of **Core Competencies for the Remote Sensing Technician** vetted with professionals in industry and government at a national scale
- ◇ **Professional development** for 60 community college faculty and 12 high school teachers using materials developed by iGETT-1. Participants will be better able to help their students meet workforce needs for integration of geospatial technologies, and will learn how to conduct best-practice workshops in geospatial technology for other faculty.



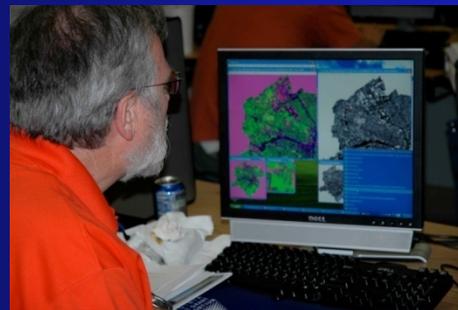


Participants: 72 two-year college faculty and high school teachers from nationwide pool. Core Competency development to involve a wide network of remote sensing professionals in industry and government.

Content: federal remote sensing data for agriculture, disaster management, environmental sciences, and urbanization

Dissemination: nationwide through presentations at conferences, and on-line for other colleges interested in following iGETT models and lessons learned (<http://igettdelmar.edu>)

Evaluation: South Carolina Advanced Technical Education (SCATE)





Project Team

- National Council for Geographic Education, Osa Brand, Education Outreach Lead, PI
- Ridge GeoTech, Christine Lewis, Co-PI
- National Geospatial Technology Center, Ann Johnson, Co-PI
- Science Systems and Applications, Inc. at NASA GSFC, Jeannie Allen, Co-PI
- U.S. Geological Survey Land Remote Sensing Program, Rachel Headley, Co-PI

Contributors

- American Society for Photogrammetry and Remote Sensing (ASPRS)
- ESRI
- ITT Visual Information Solutions
- National Aeronautics and Space Administration (NASA)



Field Work, iGETT-1, 2008



iGETT-1 Staff, 2008

Rough Draft Benefits “Centerfold”

Agriculture

Irrigation Monitoring
 Crop Acreage Monitoring, Managing, and Measuring
 Crop Production Estimates



Soil and Irrigation Conditions
 Soil Condition Determination
 Fighting Crop Insurance Fraud

Climate Change

Carbon Stock Assessment
 Beach Erosion and Flooding Tracking
 Glacier Monitoring



Atmospheric Modeling
 Clear Cutting Impact Assessment
 Snow and Ice Coverage Area Extent Determination

Disasters

Drought Impact Assessment
 Crops, Livestock, Farming Land and Pasture Land Risks



Volcanic Flow Activity Monitoring

Ecosystems and Biodiversity

Ice Sheet Melt Monitoring and Measuring
 Insect Infestation Monitoring and Mapping
 Lake Eutrophication Mapping and Monitoring



Coral Reef Health Assessment and Mapping
 Tropical Rainfall Characterization
 Desertification Monitoring and Measuring

Energy

Fossil Fuel Mining
 Greenhouse Gases Emissions
 Network Grid Planning and Management



Petroleum Resources and Mineral Indicator Identification
 Power Plant Planning

Health

Pathogen Sources
 Exposed Population Vulnerability
 Endemic Disease Dispersal

Cancer Research



Oil Spill Tracking

Urban Planning

Power Transmission and Transportation Route Citation
 Industrial and Waste Disposal Site Planning
 Transportation Network Mapping



Aiding Regional Planning
 Urban Growth Monitoring
 Land Capability Categorizing

Water

Lake Health and Lake Inventory Monitoring
 Dam Construction Monitoring
 Water Pollution Mapping and Monitoring



Watershed Management
 Glacial Feature Change and Extent Monitoring
 Flood Plain Mapping and Managing
 Wetland Monitoring

Landsat's Societal Benefits



Landsat next

Landsat Data Continuity Mission

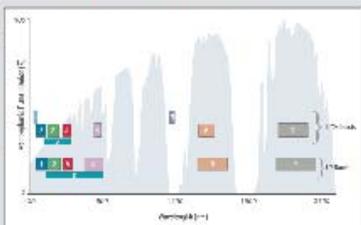
LDCM's Operational Land Imager is based upon the successful EO-1 satellite's Advanced Land Imager, a pushbroom instrument.



New and Improved Spectral Bands

New: The Operational Land Imager (OLI) will collect data for new coastal and cirrus bands and for the heritage multispectral bands.

Improved: Bandwidth has been refined for six bands.



Vastly Improved Radiometry

The OLI will provide improved signal-to-noise radiometric performance allowing 12-bit quantization of its data: *more fidelity, more signal, less noise.*



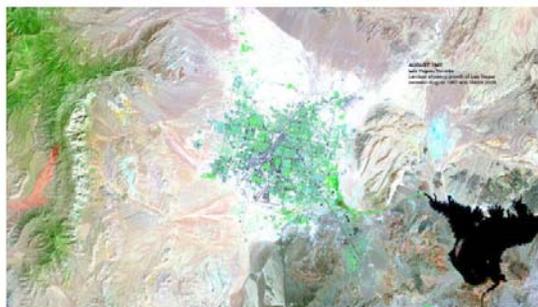
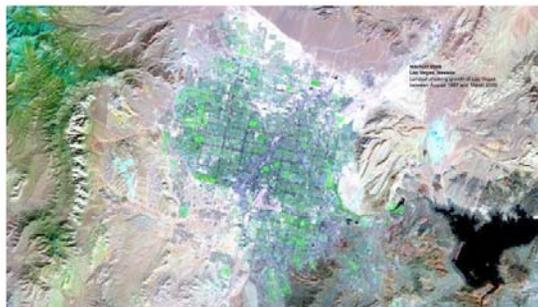
Expanded U.S. Archive

The USGS archive will preserve all 400 scenes collected daily by LDCM.

www.nasa.gov



an unparalleled record



Celebrating Landsat

- The longest-running project for acquisition of moderate resolution imagery of the Earth from space
- Providing an unparalleled 35-year record of Earth's changing landscapes
- Continuously recording the entire global land surface, every season, every year
- Capturing essential images for people who work in agriculture, geology, forestry, regional planning and education

For more on the Landsat Project, visit us at <http://landsat.gsfc.nasa.gov>
www.nasa.gov



a priceless archive

Landsat's quality, consistency, coverage, and value make it possible to conduct detailed analysis of change over time — to follow the life of a pixel.

As of 2009, all Landsat data in the USGS archive available at **no charge**, in standard format

- Orthorectified
- 30 m spatial resampling (60 m for the MSS)
- GeoTIFF
- Universal Transverse Mercator (UTM) projection



Exceptionally high standards of spectral, geometric, and radiometric calibration enable robust comparisons of change over time.



www.nasa.gov

U.S. Space, 1970-2005