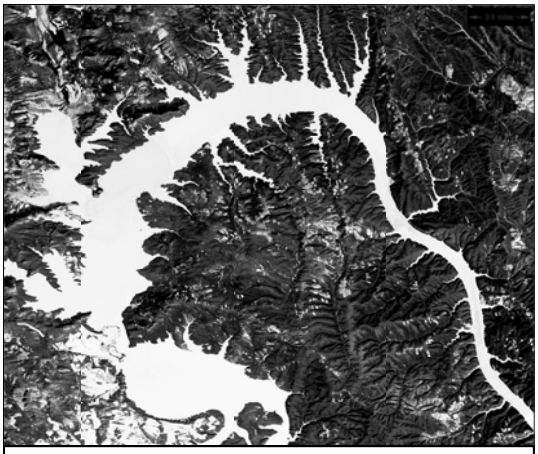
Landsat Resources for Educators (March 2011)



ria, in winter

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HOME PAGES

Landsat at NASA
http://www.nasa.gov/landsat
Features Landsat 7 data characteristics, science and education applications, technical documentation, program policy, and history

Landsat Education
http://landsat.gsfc.nasa.gov/education
Rich array of resources for education in formal and informal contexts

Landsat on Facebook
http://www.facebook.com/NASA.Landsat

Landsat at USGS (U.S. Geological Survey)
http://landsat.usgs.gov/
Features information on the technical aspects of Landsat operations, links to the Landsat 7 data archive, and to Landsat 7 sample images.

BACKGROUND RESOURCES

Climate Change for Educators - Resources from Landsat and NASA (Live Binder)
http://www.livebinders.com/play/play_shared_binder?id=131281

Earth Observatory: http://earthobservatory.nasa.gov
Freely-accessible satellite imagery, scientific information, and data about our home planet

EarthSky Interviews with Remote Sensing Scientists

> *Monitoring Water Use from Space: Martha Anderson:*
http://landsat.gsfc.nasa.gov/news/news-archive/sci_0034.html

> *First ever image mosaic of entire Antarctica detail : Robert Bindschadler*
http://landsat.gsfc.nasa.gov/news/news-archive/sci_0032.html

> Carbon Agreement: Doug Morton
http://landsat.gsfc.nasa.gov/news/news-archive/news_0319.html

> Forest Monitoring: Curtis Woodcock
http://landsat.gsfc.nasa.gov/news/news-archive/news_0306.html

Our Ever-Changing Earth – Overview by NASA Chief Scientist
Hour-long webcast from Oct. 12, 2011, featuring NASA's Chief Scientist, Dr. Waleed Abdalati. Covers topics such as sea ice, hurricanes, ozone, water, and more.

Landsat for Museums (Live Binder)
http://www.livebinders.com/play/play_shared_binder?id=178851

Electromagnetic Spectrum - Tour
http://missionscience.nasa.gov/nasascience/ems_full_video.html
Video series including chapters on radio, micro-, infrared, visible, ultraviolet waves; X-Rays; and gamma rays

ACTIVITIES FOR STUDENT LEARNING

Amelia the Pigeon (Elementary) and **Echo the Bat** (Middle)
http://imagers.gsfc.nasa.gov/
IMAGERS (Interactive Multimedia Adventures for Grade-school Education using Remote Sensing) project, developed upon a framework that allows for the incorporation of new content, geographic location, and story line using satellite imagery as the foundation

Annotating Change in Satellite Images
http://serc.carleton.edu/eet/measure_sat/index.html
Explanation of a technique for documenting change in before-and-after sets of satellite images. Useful for any set of images that show the same area at the same scale at different times.

Climate Change, Wildlife and Wildlands Toolkit for Formal and Informal Educators
UC Global Change Research Program
http://www.globalchange.gov/resources/educators/toolkit
Designed for middle school through a collaboration among seven federal agencies, on how climate change is affecting our nation's wildlife and public lands, and how everyone can become "climate stewards."

Exploring the Environment (Middle & High School)
http://www.cotf.edu/ete/modules/modules.html
Set of remote sensing activities on the Exploring the Environment (ETE) Program, part of NASA's Classroom of the Future

Eyes in the Sky II
http://serc.carleton.edu/eyesinthesky2/index.html
Professional development program created and administered by TERC, Inc. through funding from the NASA K-12 Competitive Grants Program. Provides an introduction to remote sensing and includes tutorials on the use of ImageJ free software through the "GIT Web Course" linked from the homepage.

Integrated Geospatial Education and Technology Training – Learning Unit Exercises
http://igett.delmar.edu/TR_LearningUnits.html
Introductory, intermediate, and advanced exercises created by two-year college instructors of Geographic Information Systems (GSI), through which students download, analyze, and integrate remote sensing data with GIS to solve practical problem

Landsat Image Mosaic Of Antarctica (LIMA): http://lima.nasa.gov
http://lima.usgs.gov/
The first-ever true-color high-resolution satellite view of the Antarctic continent enabling everyone to see Antarctica as it appears in real life.

Mission Geography: http://missiongeography.org/
Curriculum materials that link the content, skills, and perspectives of Geography for Life: The National Geography Standards with the missions, research, and science of NASA, developed by the Geography Education National Implementation Project (GENIP) at Texas A&M University (K-12)

Quantifying Changes in the Land Over Time
http://landsat.gsfc.nasa.gov/education/resources/Landsat_QuantifyChanges.pdf
Gr. 7-10 students analyze land cover change over time in order to help them grasp the extent, significance, and consequences of change in their regions.

IMAGES / MOVIES

Earth as Art
http://eros.usgs.gov/imagegallery/
High resolution images selected for aesthetic qualities only, available to download at no cost

EarthNow! Landsat Image Viewer
http://earthnow.usgs.gov
Near real-time views of Earth from Landsat

Images at Landsat
http://landsat.gsfc.nasa.gov/images
Collection of Landsat images from many sources. Data and applications from Landsat 4, 5 and 7 are presented, as well as photographs of the construction and testing of Landsat 7. Links provide useful background information and visualizations of Landsat data.

Landsat 7 Data Subsets
http://landsat.gsfc.nasa.gov/education/l7downloads/index.html
Landsat 7 images and scene subsets intended for use with Purdue University's MultiSpec™ software

USGS Landsat Image Gallery
http://landsat.usgs.gov/gallery/index.php
Array of images including Earth features such as volcanoes, floods, and cities

World of Change
http://earthobservatory.nasa.gov/Features/WorldOfChange/
Pairs of images useful for analyzing change over time

A Landsat Flyby
http://svs/gsfc/nasa.gov/goto?10513
This short video highlights Landsat's many benefits to society.

Scientific Visualization Studio at NASA Goddard Space Flight Center
http://svs.gsfc.nasa.gov
Movies, zooms, animations

LDCM Spacecraft Animations and Still Images
Two animations of the spacecraft in orbit, flying over the Eastern U.S., plus an animation of the spacecraft rotating to show all sides
http://svs.gsfc.nasa.gov/vis/a010000/a010800/a010812/index.html

-Yellowstone Burn Scars (http://svs.gsfc.nasa.gov/vis/a010000/a010800/a010864/index.html)
-Las Vegas (http://svs.gsfc.nasa.gov/vis/a010000/a010700/a010715/index.html)
-Mississippi flooding, Spring 2011 (http://svs.gsfc.nasa.gov/vis/a010000/a010700/a010773/index.html)
-Mt. St. Helens (http://svs.gsfc.nasa.gov/vis/a010000/a010500/a010550/index.html)
-Landsat promo (http://svs.gsfc.nasa.gov/vis/a010000/a010500/a010513/index.html)

-TIRS instrument coming out of TVAC1
http://svs.gsfc.nasa.gov/vis/a010000/a010800/a010859/index.html

-OLI instrument pre-ship inspection
http://svs.gsfc.nasa.gov/vis/a010000/a010700/a010761/index.html

LANDSAT AND ART

Earth as Art
http://eros.usgs.gov/imagegallery/
High resolution images selected for aesthetic qualities only, available to download at no cost

Scene Changes
http://www.scenechanges.org/
Landscapes featured in literary works, with discussions on how they have changed and why.

REMOTE SENSING DATA

AmericaView
http://www.americaview.org/
Nationwide program that focuses on satellite remote sensing data and technologies in support of applied research, K-16 education, workforce development, and technology transfer

Landsat 7 Data Subsets
http://landsat.gsfc.nasa.gov/education/l7downloads/index.html
Landsat 7 images and scene subsets intended for use with Purdue University's MultiSpec software

USGS Global Visualzation Viewer (GloVIS)
http://glovis.usgs.gov/
One of two sites to query and order no-cost Landsat data. (The other is Earth Explorer.)

USGS Earth Explorer
http://earthexplorer.usgs.gov
One of two sites to query and order no-cost Landsat data. (The other is GloVIS.)

SOFTWARE and TUTORIALS

Fundamentals of Remote Sensing
http://www.ccrs.nrcan.gc.ca/ccrs/learn/tutorials/fundam/fundam_e.html
The Canada Centre for Remote Sensing offers this tutorial on remote sensing technology and its applications, for senior high school or early university level and touches on physics, environmental sciences, mathematics, computer sciences and geography.

The Globe Program, Land Cover/Biology Chapter of Teacher's Guide
http://classic.globe.gov/tctg/tgchapter.jsp?sectionId=201&lang=EN
Global Learning and Observations to Benefit the Environment (GLOBE) is a hands-on international environmental science and education program.

ImageJ
http://rsbweb.nih.gov/ij/
Free public domain image processing software developed at the National Institutes of Health. Use *ImageJ* to display, annotate, edit, calibrate, measure, analyze, process, print, and save **raster** (row and column) image data.
ImageJ User Guide:
http://rsbweb.nih.gov/ij/docs/user-guide.pdf

Introduction to Remote Sensing (PPT)
http://landsat.gsfc.nasa.gov/education/l7downloads/howto.html
Scroll down to "Introduction to Remote Sensing Presentations" and select the file of desired size.

Landsat Image Compositer
http://landsat.gsfc.nasa.gov/education/compositor/
How Landsat images are made