USGS
science for a changing world

EROS DATA CENTER
Overview

September 8, 2004

U.S. Department of the Interior
U.S. Geological Survey

USGS EROS Data Center (EDC)

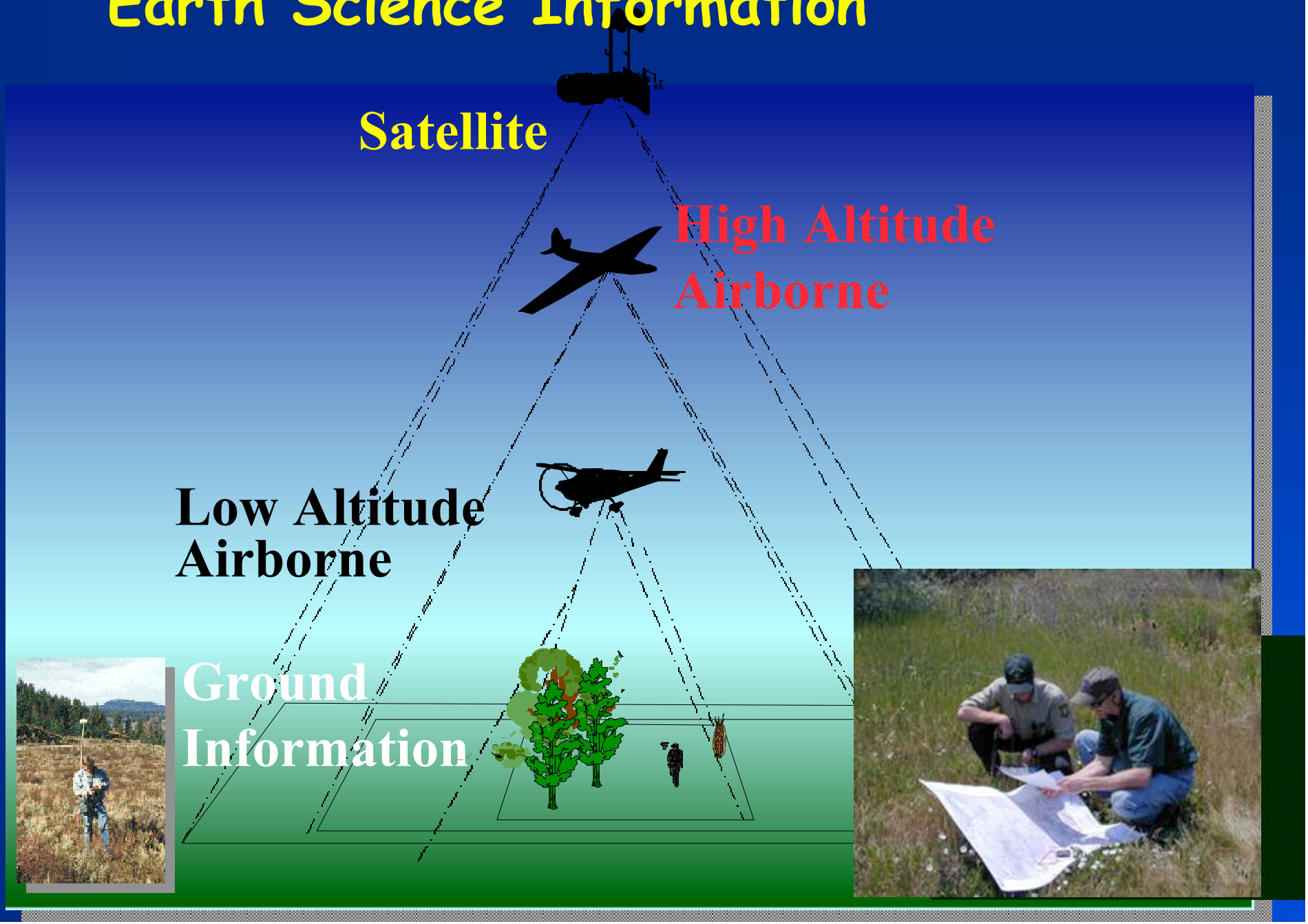
USGS

Mission Statement

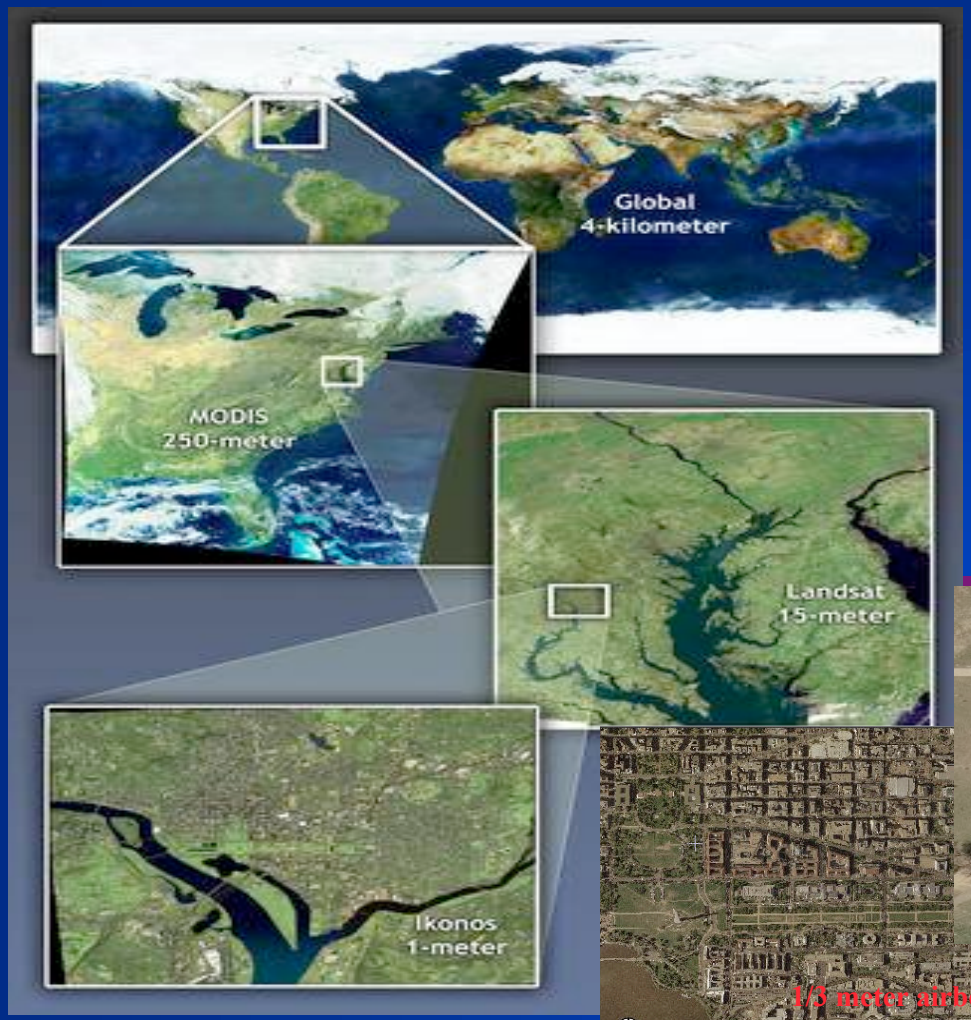
- **Science:** To promote and conduct applications, users, and knowledge of land information to better understand our planet
- **Data Access:** To ensure that scientists, researchers, businesses, decision makers, and the public have ready access to land information
- **Data Archives:** To safeguard and expand the national archive of remotely sensed land data

USGS

Earth Science Information



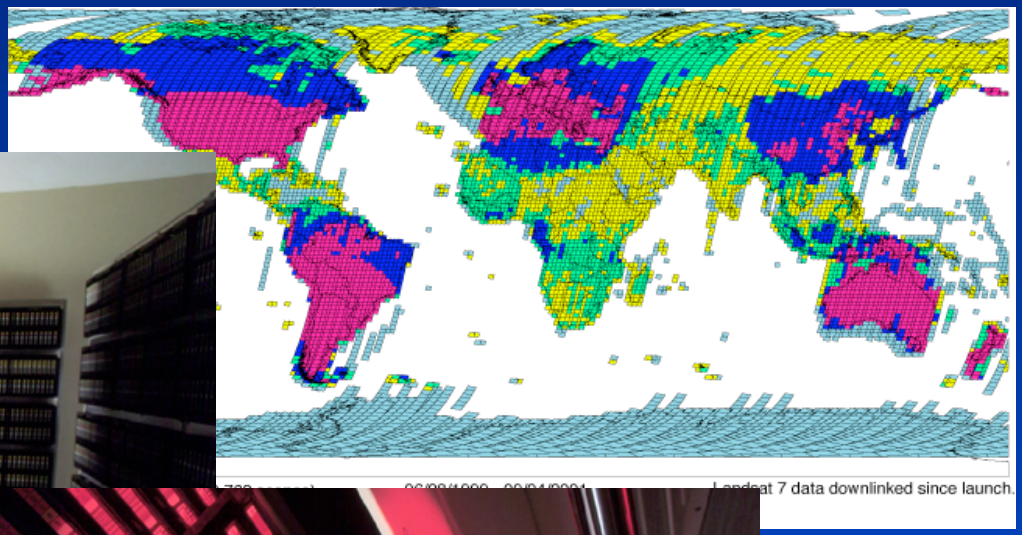
We Image the World, ..

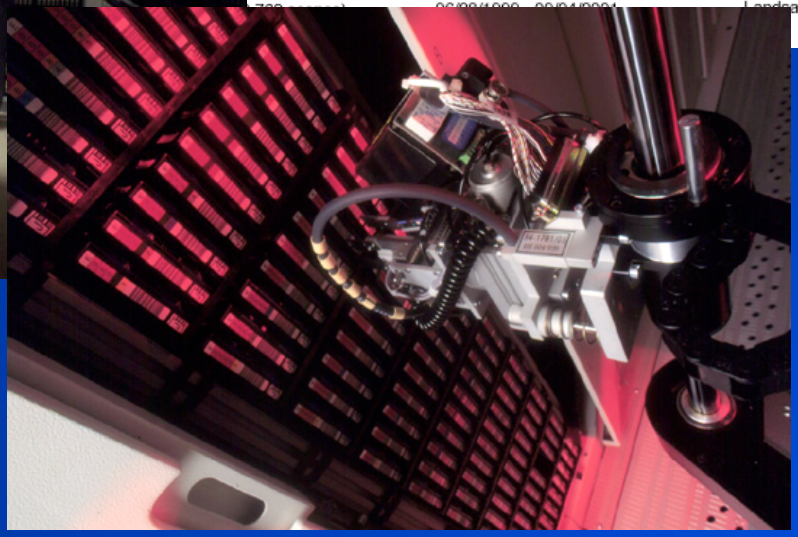


- **Multi-**
  - Temporal
  - Spectral
  - Spatial
  - Sensor

USGS

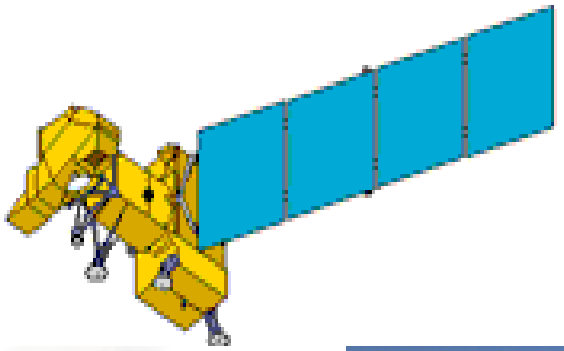
We Archive Earth Images

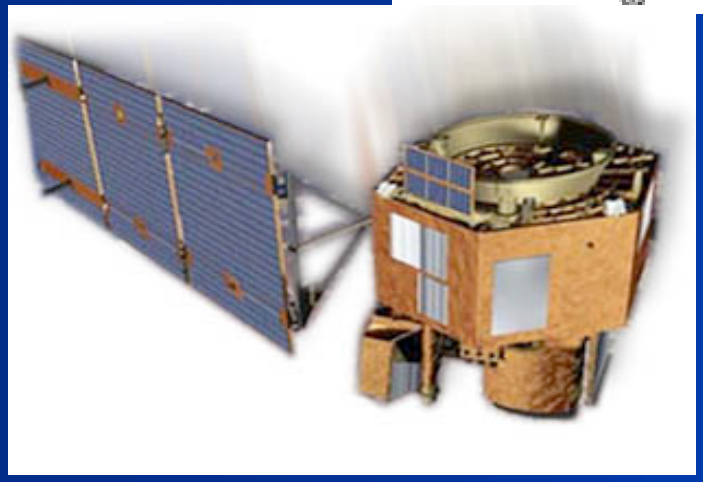




USGS

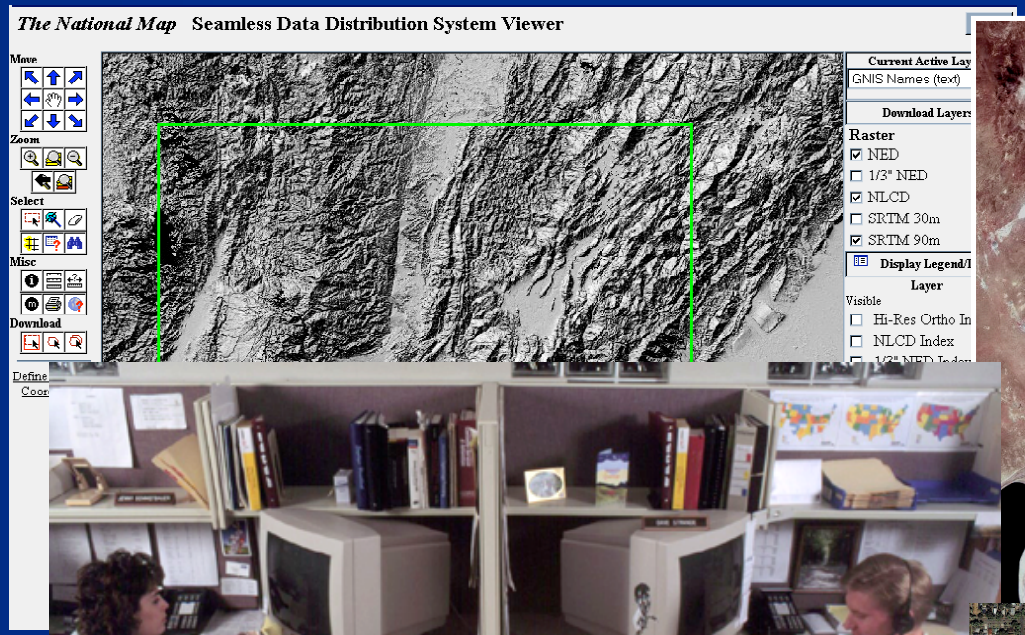
We Fly Satellites

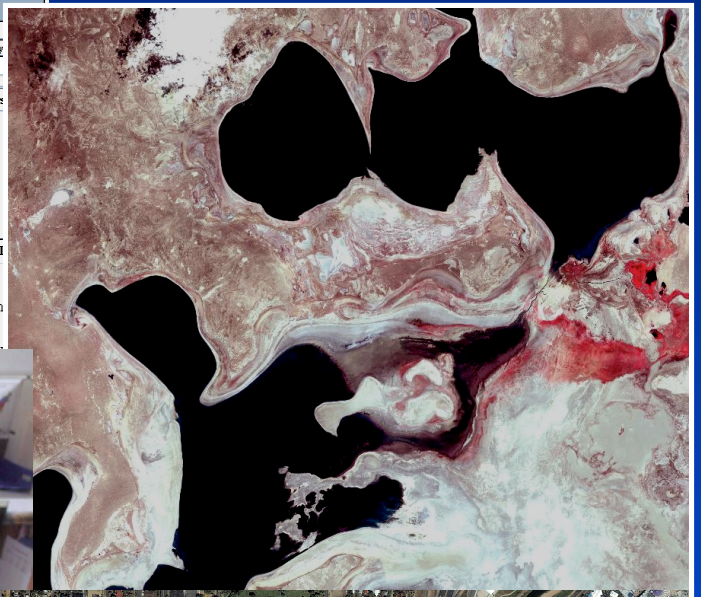


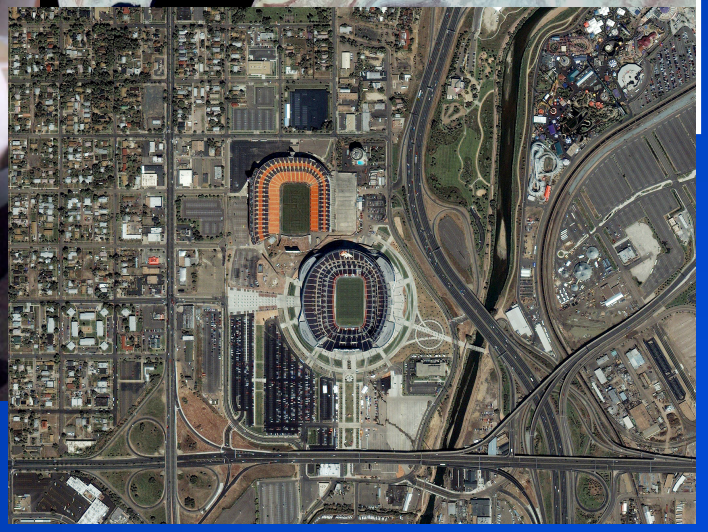


USGS

We Distribute Data Products







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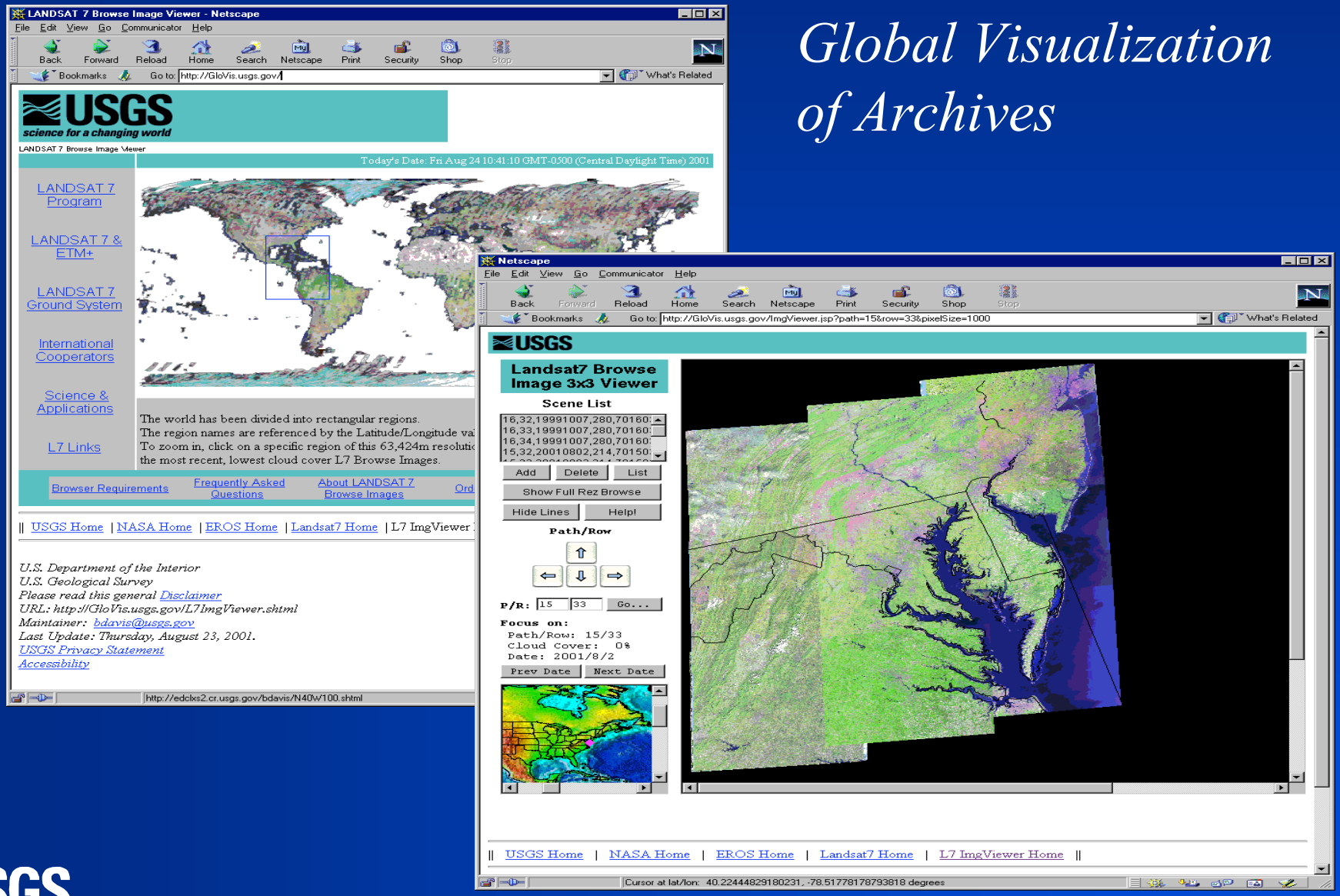
We Develop Techniques for Data Access

Global Visualization of Archives



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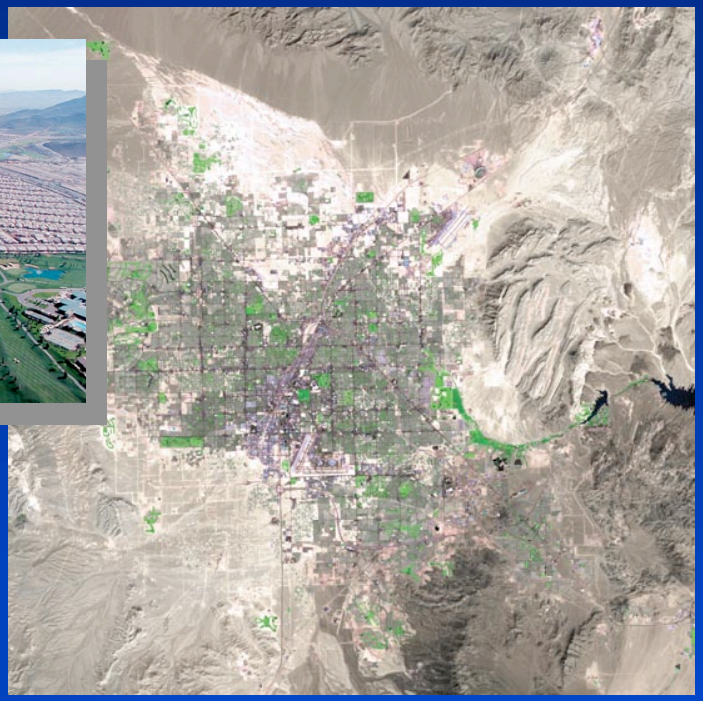
We Study Earth Changes

Urban Sprawl

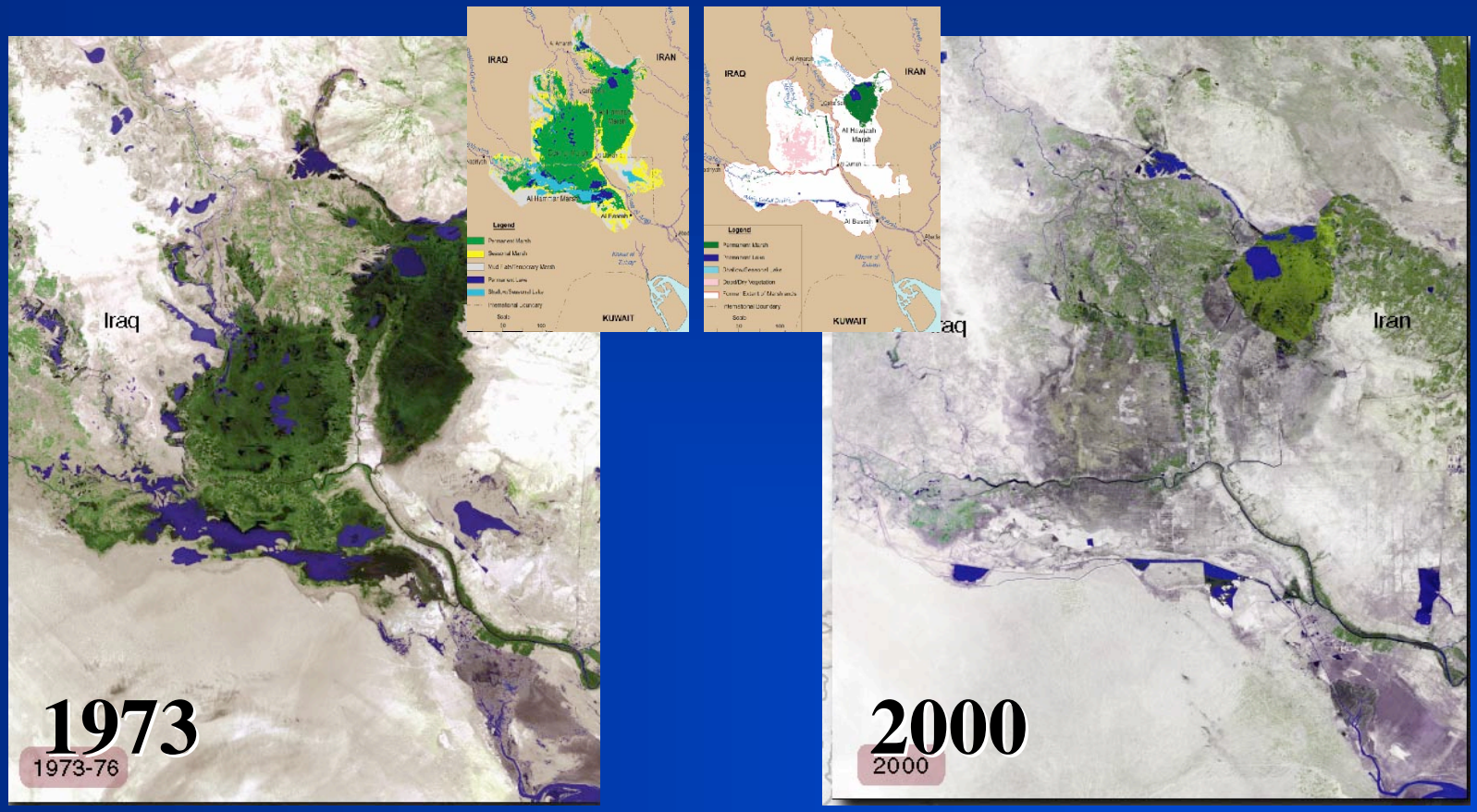


Las Vegas in 1973
(population 358,400)

Las Vegas in 2000
(population 1,563,280)

USGS

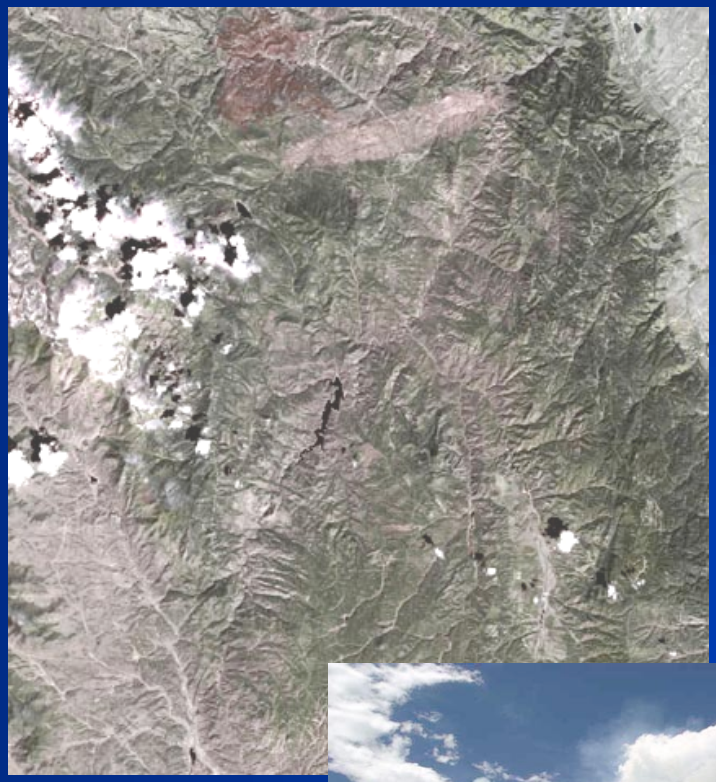
We Work Globally



Loss of Wetland in Southern Iraq

USGS

We Respond to Disasters



May 2001

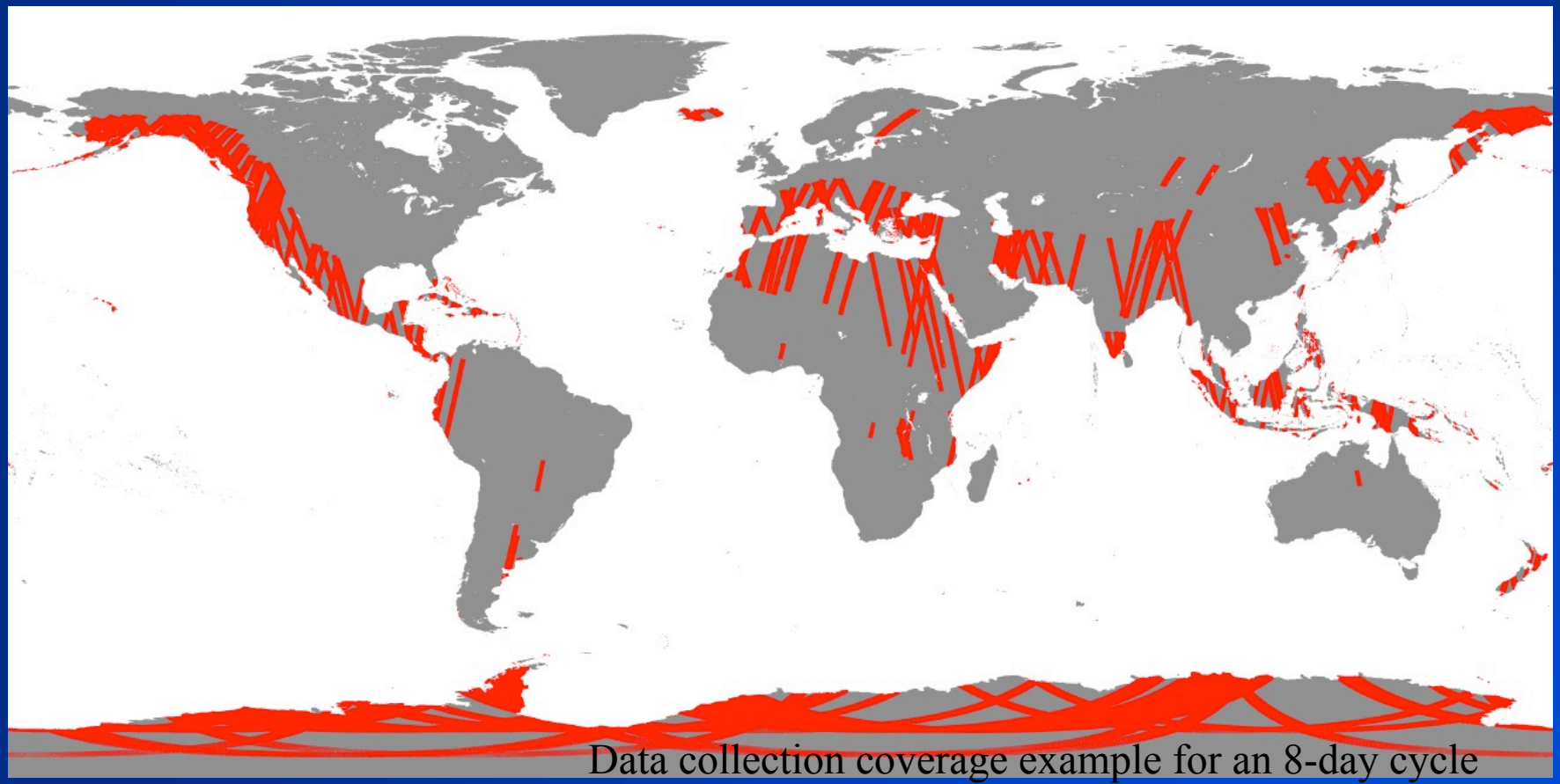
June 2002

Hayman Fire, CO

USGS

We Provide Data for Hazards Monitoring

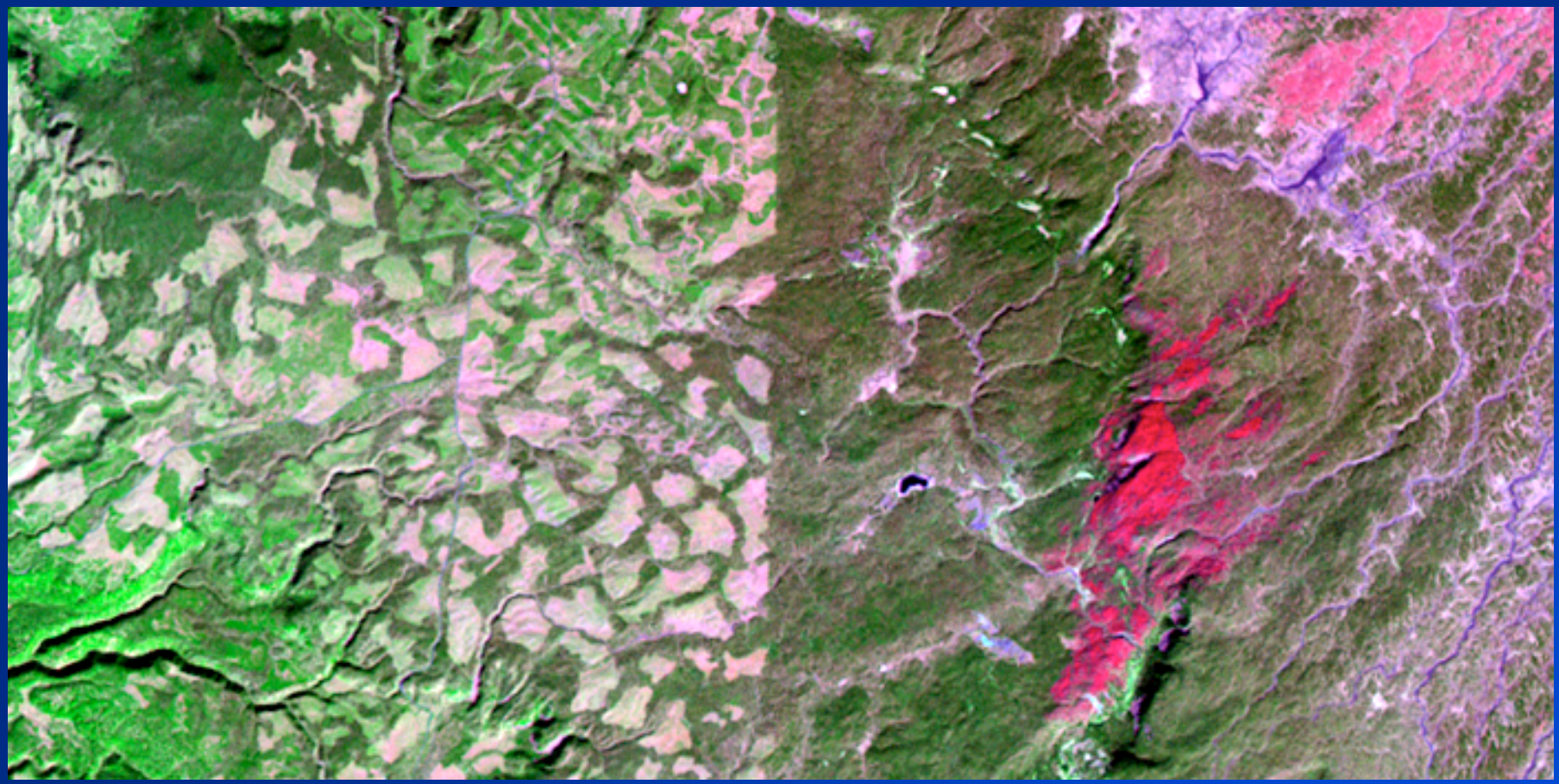
Areas of earthquake/volcano/Ice hazards



Data collection coverage example for an 8-day cycle

USGS

We Facilitate Land Resources Monitoring



Landsat 7 image shows boundary between Targhee National Forest and Yellowstone National Park

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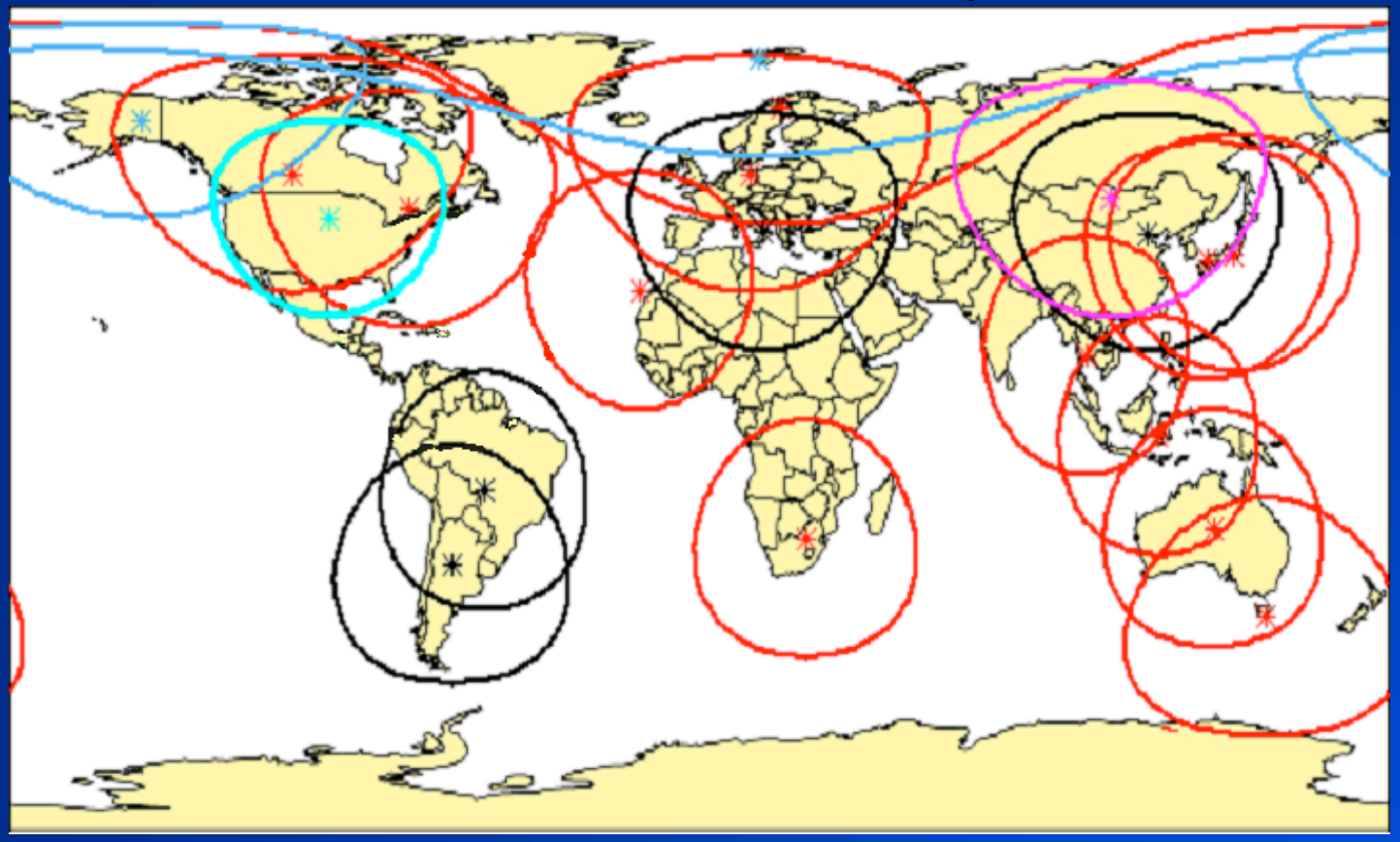
We Encourage and Educate

USGS

We Cooperate Internationally

Landsat International Cooperators



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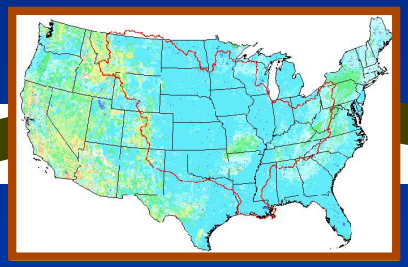
Examples of Scientific Applications

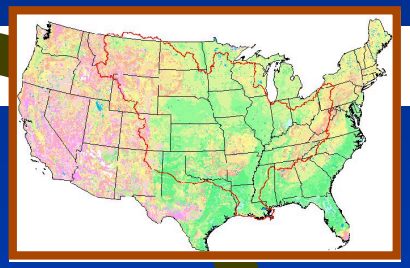
USGS

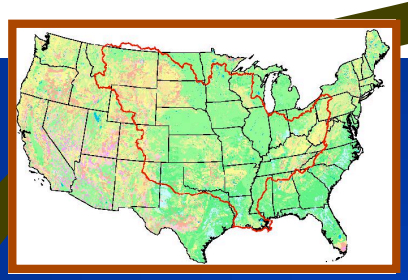
Environmental modeling

Soil Fines / Total Soil Volume



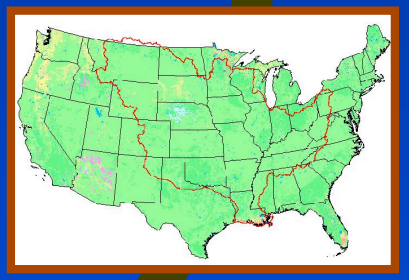
Effective Depth of Soil Fines
(volume soil fines / total area)



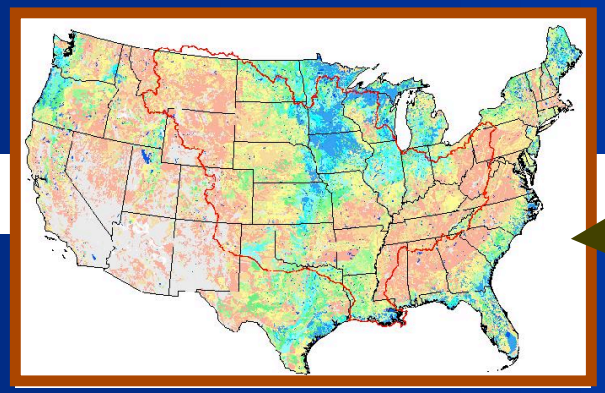


Soil Area / Total Area

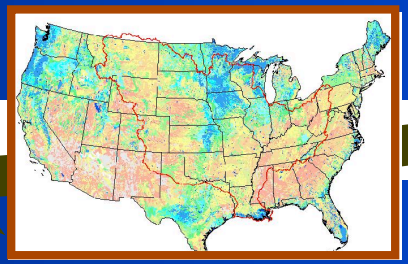
Average Bulk Density
(mass soil fines / vol. soil fines)



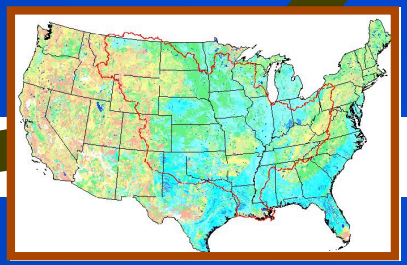
Soil Organic Carbon (kg C / m2)
Total Profile



Soil Carbon Intensity
(mass soil carbon / mass soil fines)

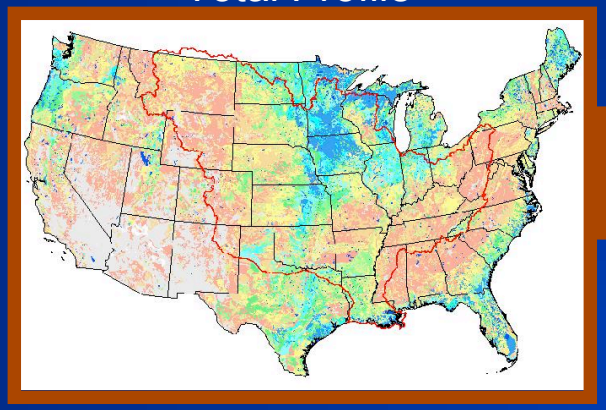


Soil Mass / Unit Area
(mass soil fines / total area)



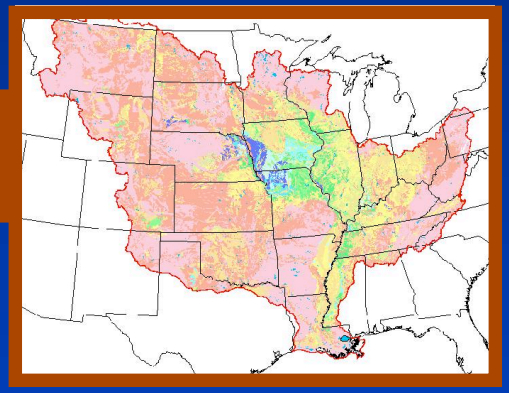
Environmental modeling

Soil Organic Carbon (kg C / m^2)
Total Profile

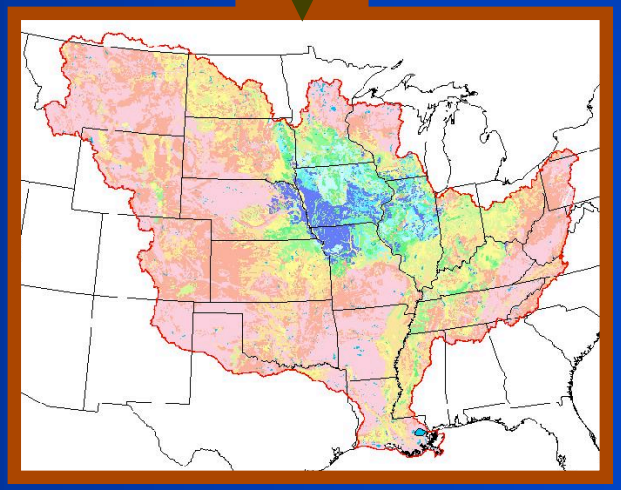


*

1982 Erosion Rate (g / m^2 / yr)
Total Area Basis



Over 500,000 points compiled from NRI database for soil, land use, and erosion



1982 Carbon Erosion Rate (g / m^2 / yr)

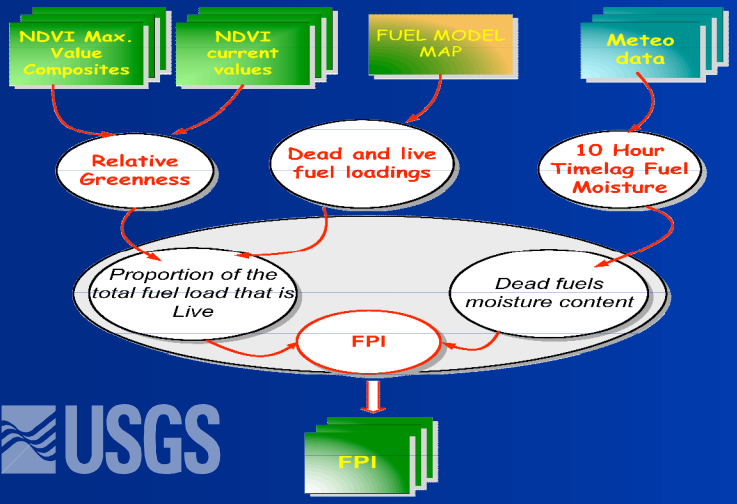
Carbon Movement

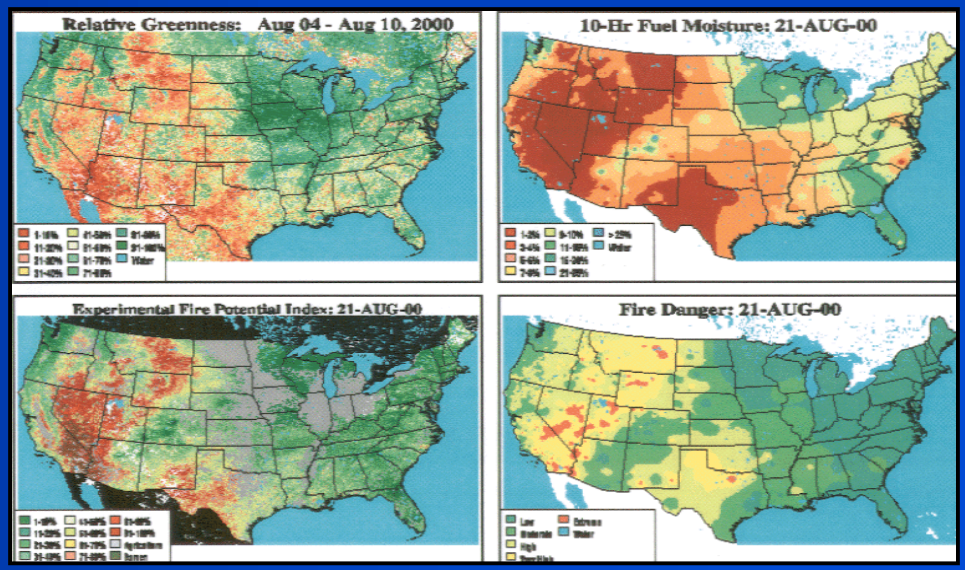
USGS

Fire Danger Monitoring and Forecasting

- Vegetation greenness mapping to estimate live-dead fuel ratio and fuel moisture
- Incorporation of weather and climate variability models
- Improved Fire Potential Index as a tool for fire danger forecasting

Fire Danger Modeling





Fire Fuels Assessment

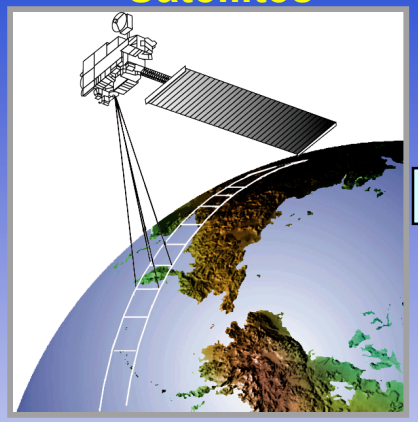
- Integrated mapping strategy (remote sensing, field data, ecological modeling)
- Mapping vegetation types and structure (height, size and density) at 30-m resolution (LANDFIRE project with Forest Service)
- Role of new sensors such as MODIS, LIDAR, and IFSAR
- Repeatability of fuel assessment strategies

Fieldwork

Fire Fuel Mapping and Characterization

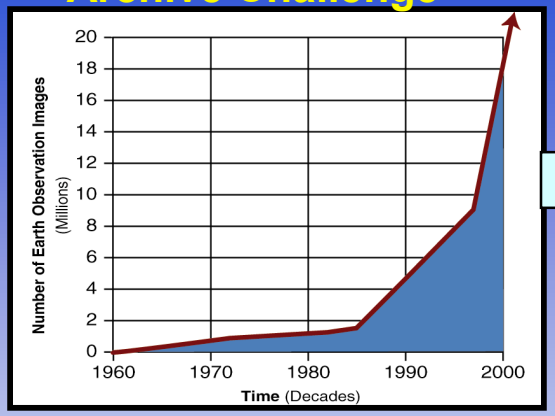
Land Remote Sensing from Space: Acquisition to Applications

Earth Observation Satellites



- Declassified Systems
- Landsat 1-5
- NOAA - POES
- Shuttle Radar
- Landsat 7 (1999)
- NASA-EOS (1999)
- High Resolution Systems

USGS National Archive Challenge



- Preserve
- Provide Access
- Process
- Reproduce
- Distribute
- Hold in Trust

Data Applications

- Land Cover
- Fire Danger Rating
- DOI Land Management
- Natural Hazards
- Coastal Zones
- Environmental Monitoring
- Emergency Response

Expanding to over 18 million images of the earth!

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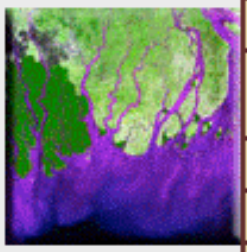
Geography – *The National Map*

Earth Resources Observation Systems (EROS) Data Center | Site Map | Site Search

Products | Science | NASA LP DAAC | Satellite Missions | NSLRSDA | About EROS

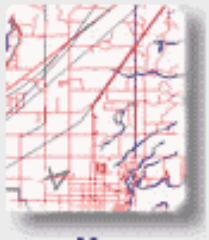
- Fire Science
- Land Cover
- US Greenness
- International Activities
- Phenological Characterization
- UNEP/GRID
- AmericaView
- Information Science
- Conferences
- Geologic Applications
- Carbon Cycle Research
- Topographic Science

Earth As Art



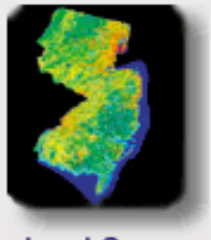
nnouncement: USGS to stop Photographic Production

source of land information for exploring our changing planet.


Map


Elevation


Satellite

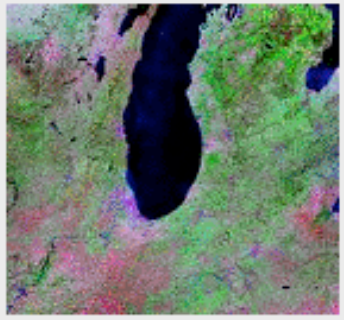

Land Cover

Featured Sites — *Archive*

Annual Meeting of the Great Plains/Rocky Mountain Division of the Association of American Geographers

September 30 - October 2, 2004 Sioux Falls, South Dakota Sponsored by: Geography Department of South Dakota State University & the USGS EROS Data Center

Featured Products — *Archive*



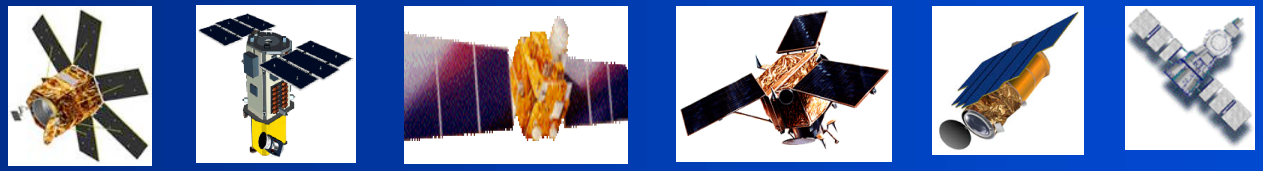
Landsat Orthorectified TM Mosaics

The USGS EROS Data Center is pleased to announce the release of the Landsat Orthorectified TM Mosaics. These 5°x6° mosaics are derived from the Landsat orthorectified scene-based imagery data set which was released in December 2003. The

Partnerships are Critical To Us

Government Programs

Commercial Providers



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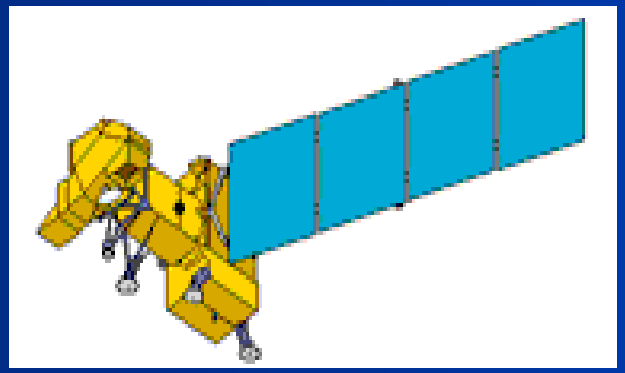
Examples of Data Currently Being Acquired and Archived at EROS Data Center



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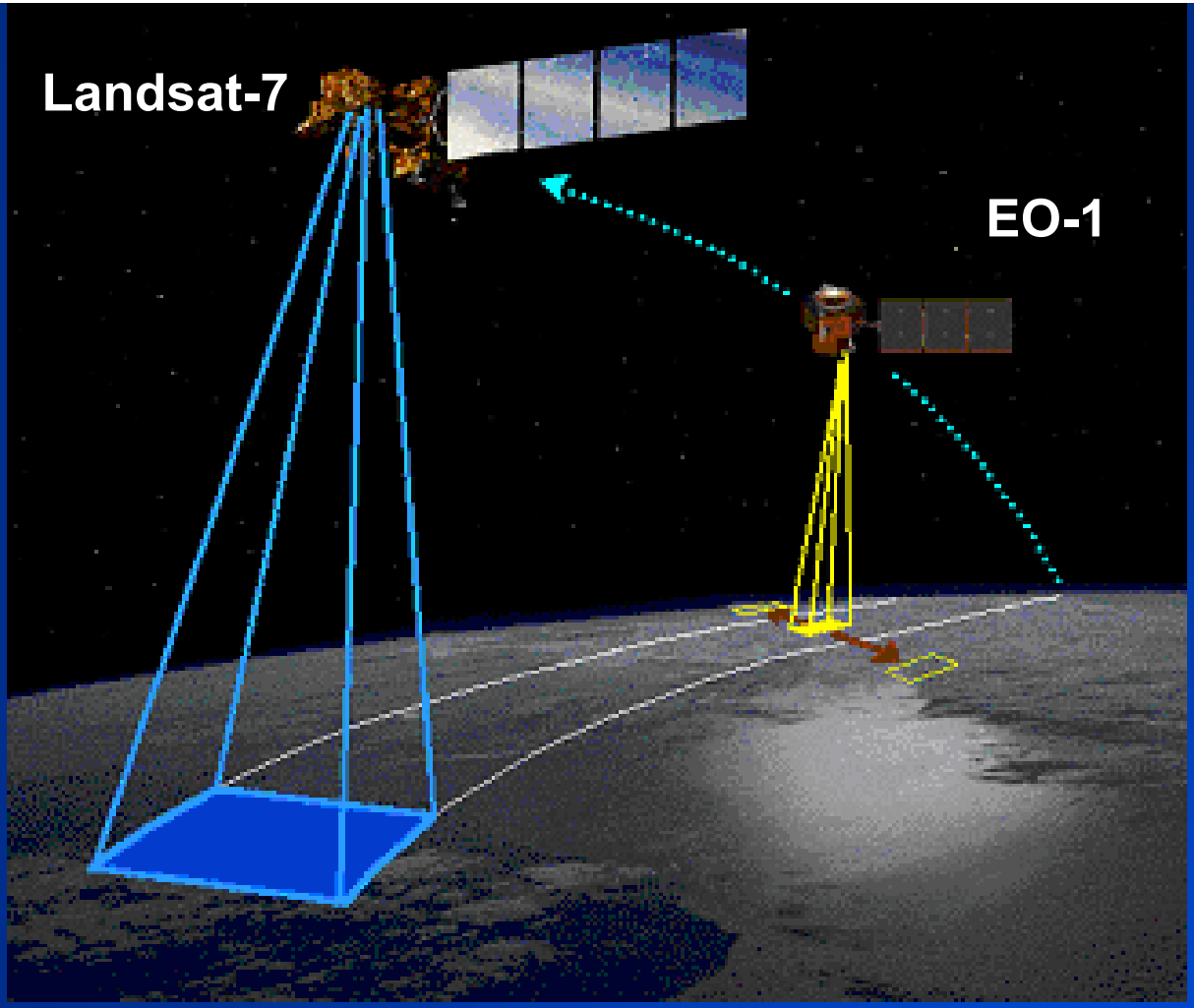
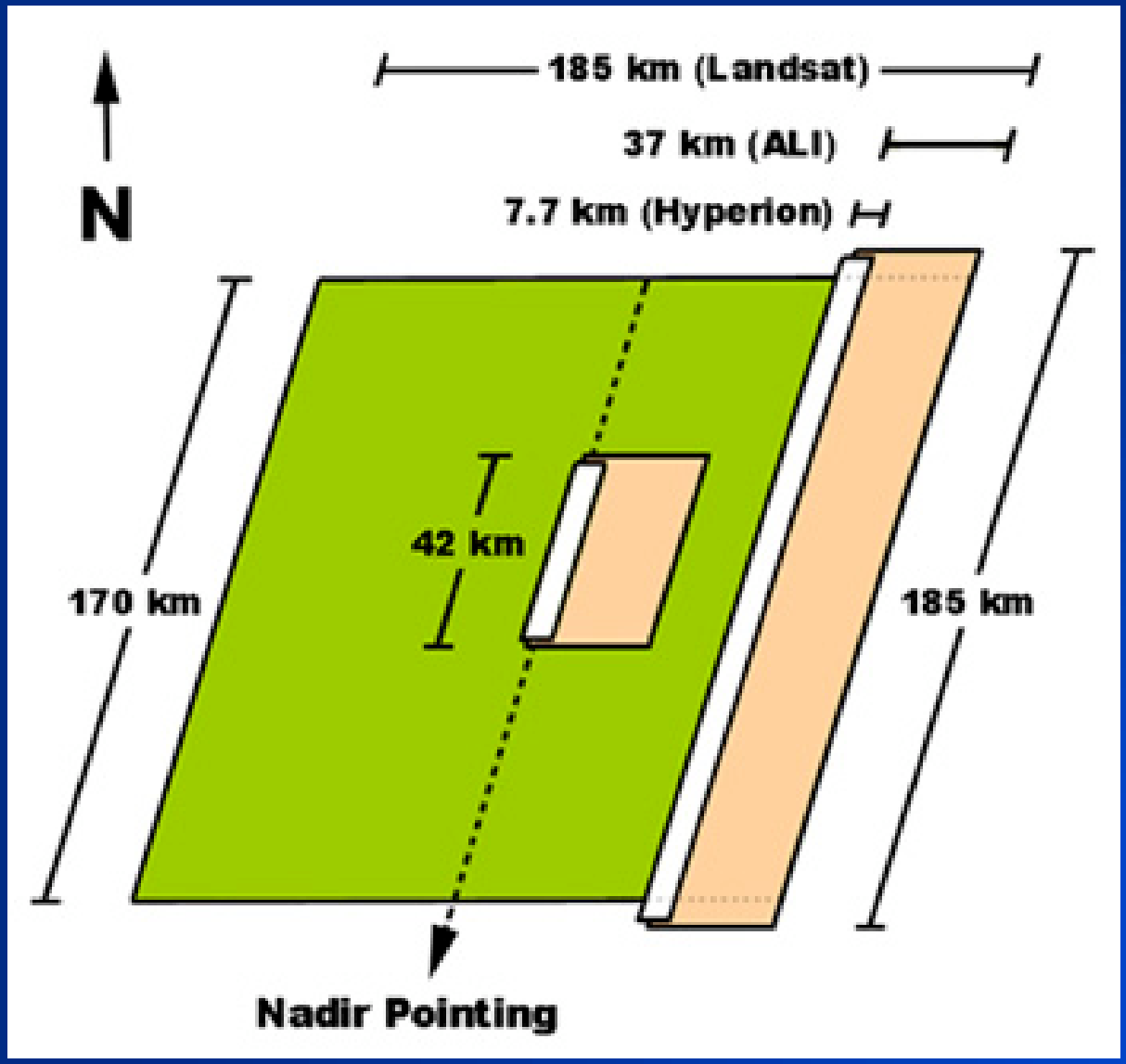


EO-1 *is flying in formation with* ***Landsat 7****, trailing the latter by approximately one minute. Pointable sensors onboard EO-1 allow off-nadir viewing capability outside the current (nadir) WRS path.*

USGS



Landsat

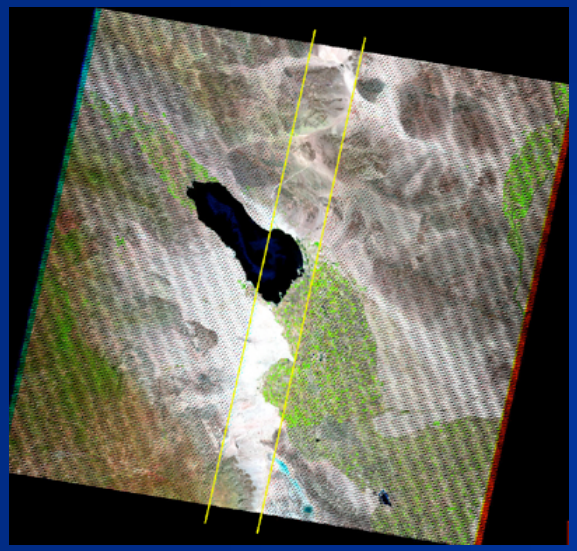
EO-1

ALI

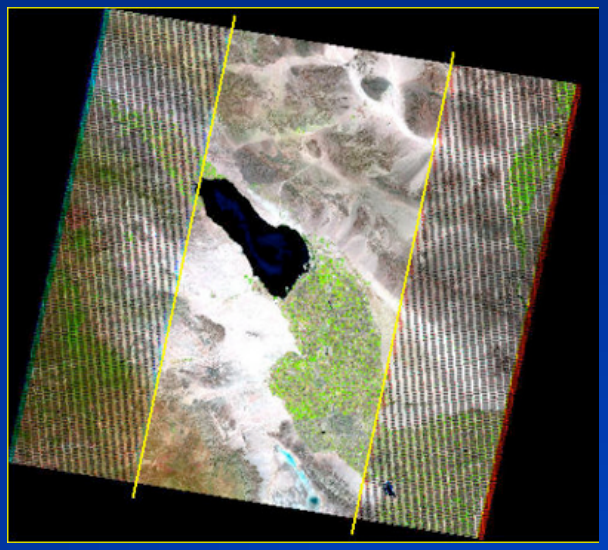
Hyperion

USGS

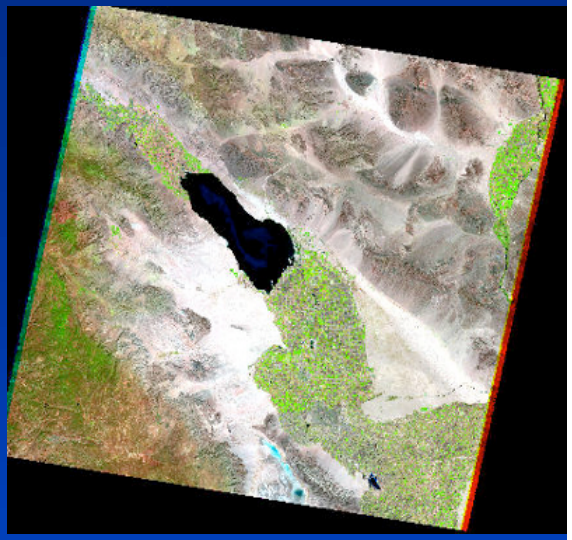
Landsat SLC-off product enhancements



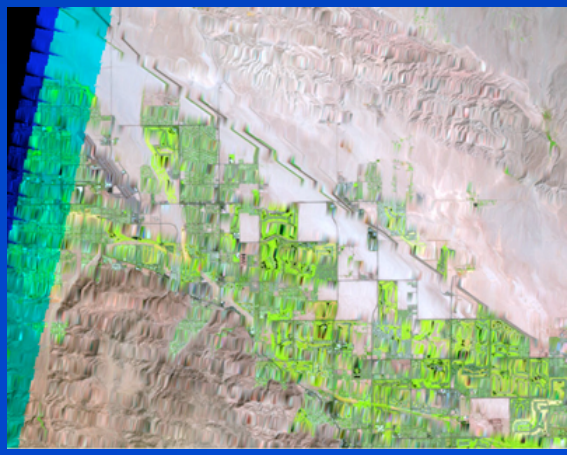
2-pixel interpolation



7-pixel interpolation



15-pixel interpolation

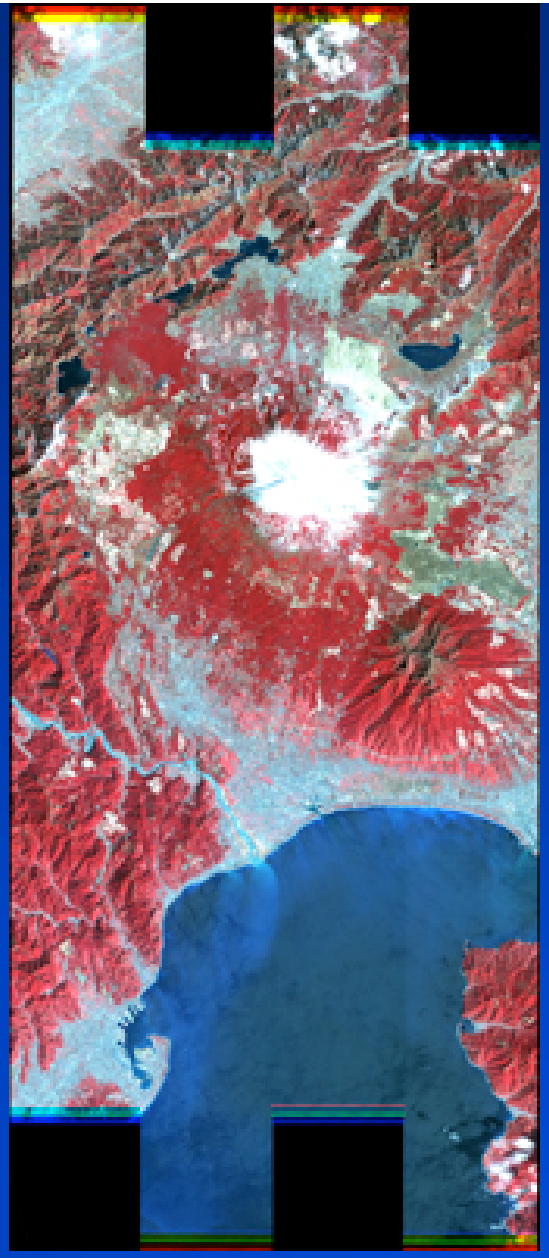


Edge of scene

ALI

Band	Wavelengh(μm)	pixel size (m)
Pan	0.48 - 3.69	10
MS - 1'	0.433 - 0.453	30
MS - 1	0.45 - 0.515	30
MS - 2	0.525 - 0.605	30
MS - 3	0.63 - 0.69	30
MS - 4	0.775 - 0.805	30
MS - 4'	0.845 - 0.89	30
MS - 5'	1.2 - 1.3	30
MS - 5	1.55 - 1.75	30
MS - 7	2.08 - 2.35	30

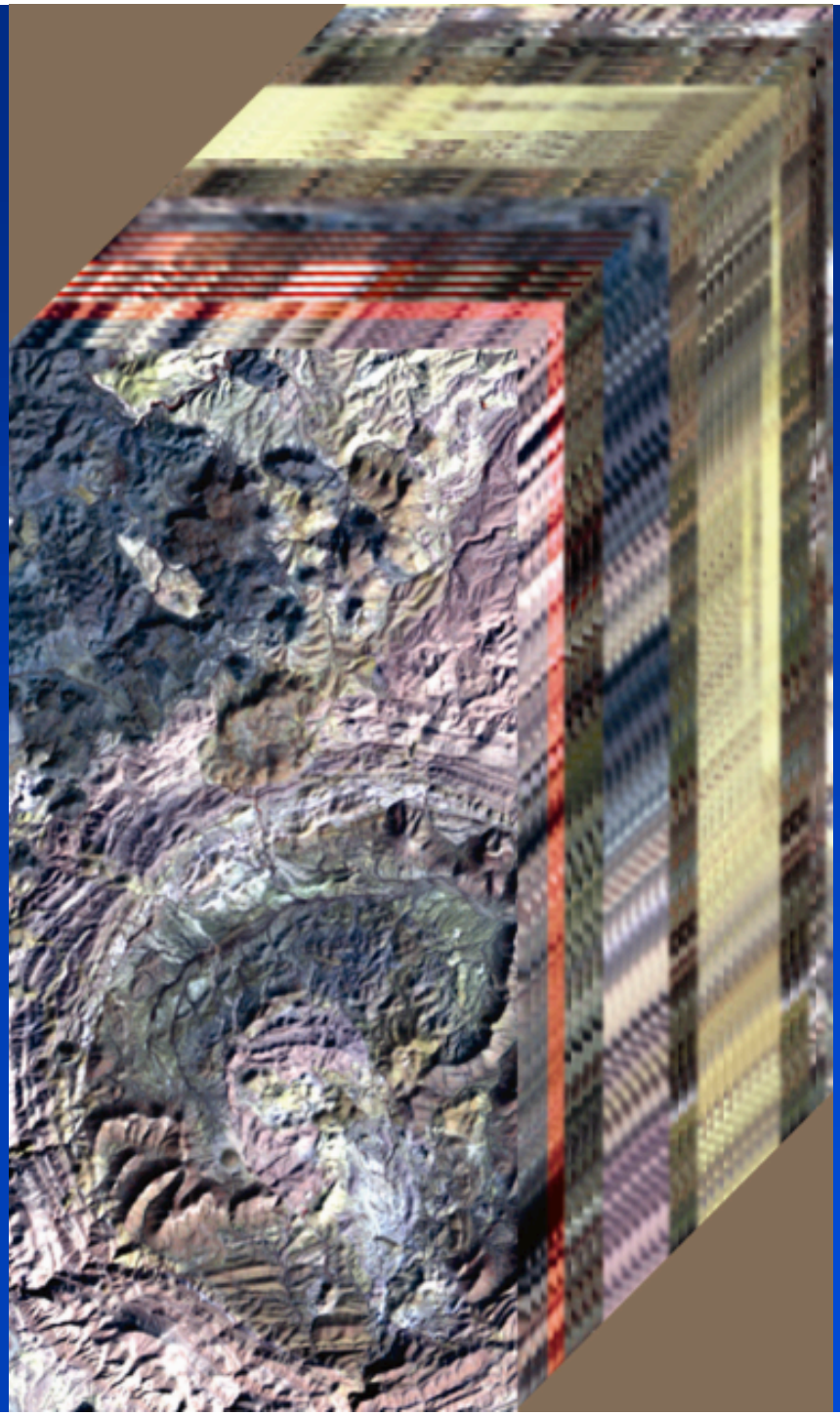
USGS



Mt. Fuji, Japan

Hyperion

220 spectral bands (from 0.4 to 2.5 µm) with a 30-meter resolution.



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Earth Observing 1 (EO-1)

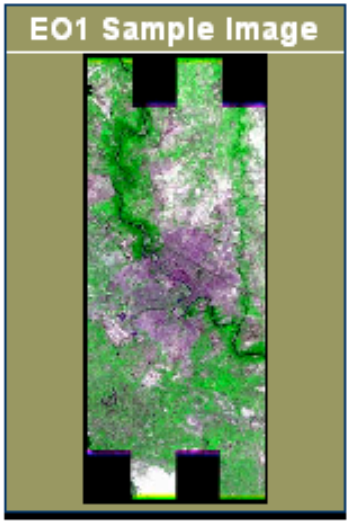
HOME | PRODUCTS | ACQUISITION | DAR | SENSORS | SAMPLES | DOCUMENTS | FAQ | CONTACT US | RELATED LINKS | USER GUIDE | SITE MAP

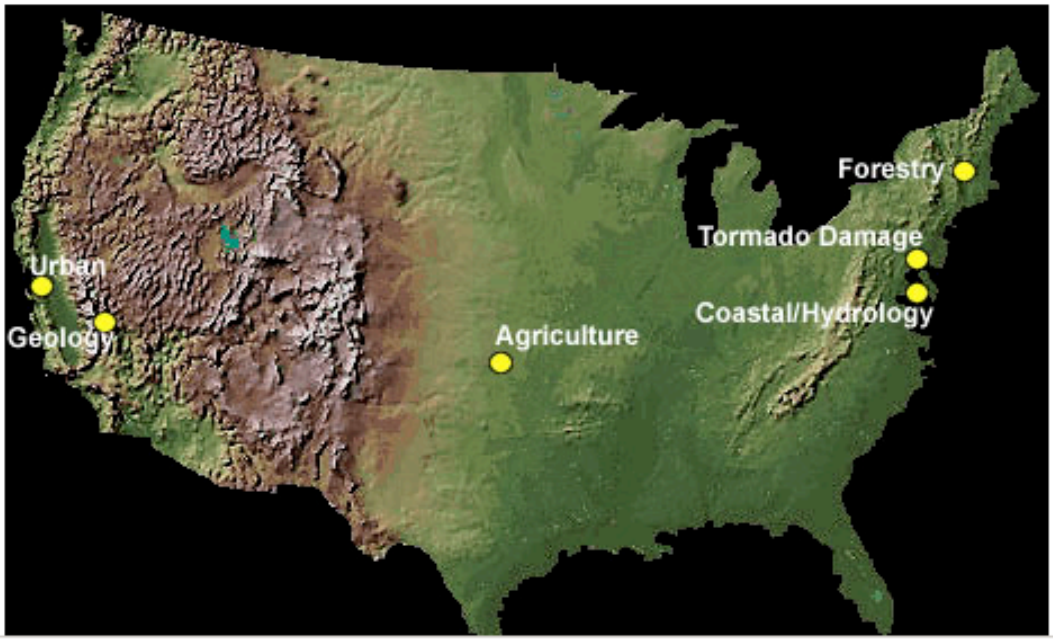
ALI | HYPERION | LEISA | SAMPLE DATA

Samples

EO-1 full resolution sample data are available via File Transfer Protocol (FTP). Please note that the files and images do not represent the final United States Geological Survey (USGS) packaged product to be distributed. For instance, file naming conventions or offsets in the line direction of the Advanced Land Imager (ALI) Level 1 radiometric data may change, where the four separate detector arrays are stitched, may be visible. Current product format information can be found under product description or FAQs.

Sample scenes are categorized by potential applications of the data. Among the uses of EO-1 imagery are geologic, urban, coastal/hydrology and forestry applications. To learn more about the sample data, simply click on the site of interest.





File Edit View Favorites Tools Help

Back Search Favorites Media

Google Search Web 588 blocked AutoFill Options

Land Processes Distributed Active Archive Center

- About LP DAAC
- Data Products
- Order Data
- Data Tools
- Help/Education
- Links
- Contact Us

Data Access

- EOS Data Gateway
- Data Pool
- Custom ASTER Da
- Browse Tool

Search LP DAAC

Satellite Imagery
- Terra ASTER
- Terra & Aqua MODIS
- Landsat Pathfinder
- NASA Science Data Purchase
- AVHRR

Elevation
- Global 30 Arc-Second Elevation Data

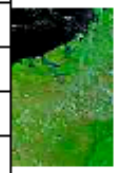
Land Cover
- Global Land Cover Characterization

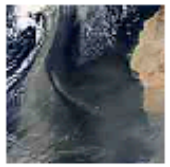
Airborne Imagery
- Airborne Imagery

RADAR
- SIR-C

The Land Processes Distributed Active Archive Center (LP DAAC) was established as part of NASA's Earth Observing System (EOSDIS) initiative ...d-related data collected by ...nter-disciplinary study ...arth system. The role of ... processing and ...stribution of MODIS land ... the Terra and Aqua

Galleries


MODIS


MODIS

Scenes Available
September 6, 2004
ASTER Over 1,144,000
MODIS Over 9,956,000

News!

...Workshop
LP DAAC Data Tool Releases
ASTER/MODIS Data Workshop Registration
Participate in New Data Survey

USGS NASA NASA Earth Science Enterprise Data and Services ESIP FEDERATION

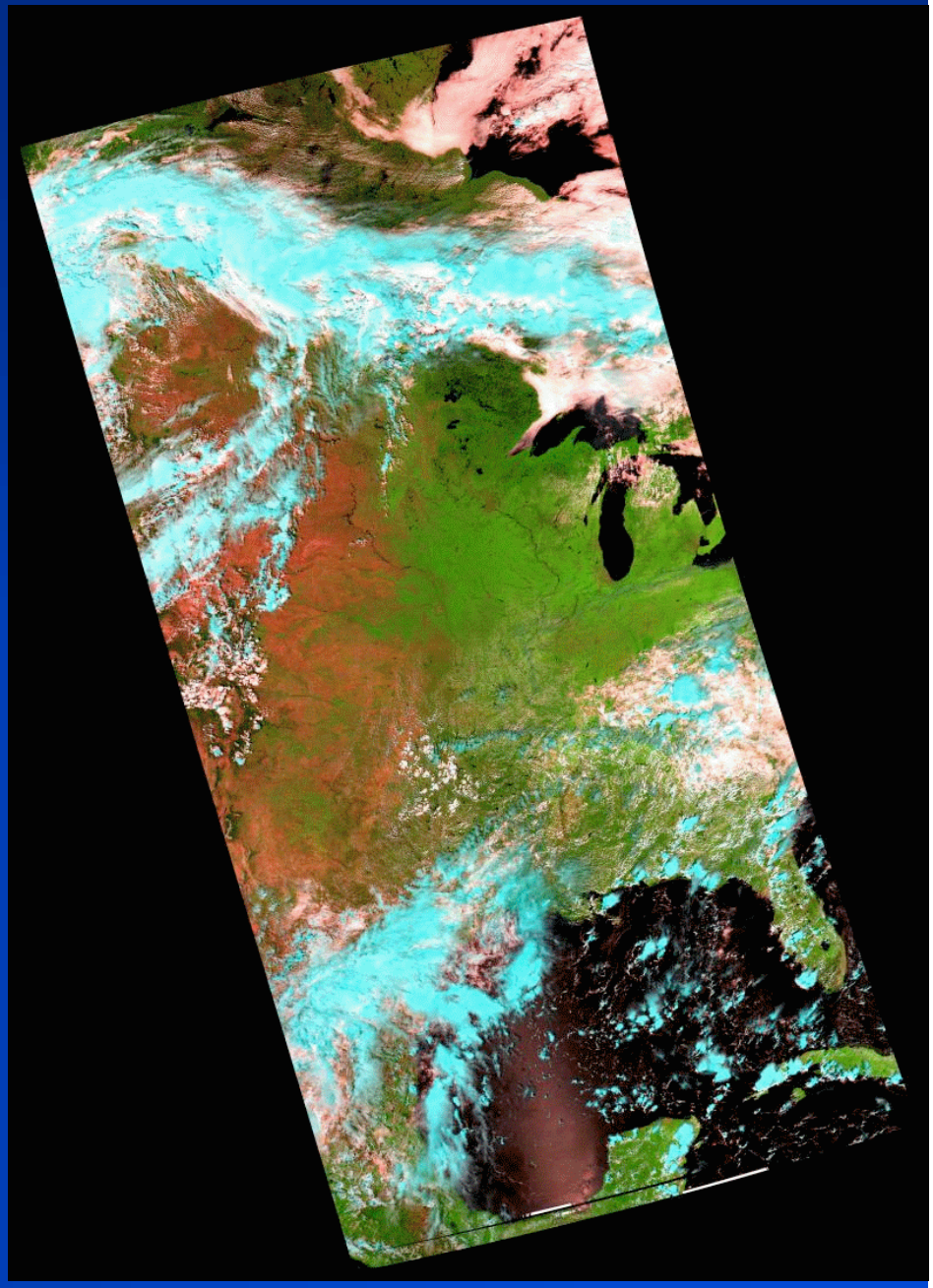
LP DAAC | EDC Home | About | Products | Data Tools | Order Data | News | Help/Edu | Links | Contact Us

MODIS-Land Products

36 wavebands from

.459 to 14.385 □m

250, 500, and 1000 m
spatial resolution



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MODIS-Land Products

-Surface Reflectance

-Land Surface Temperature and Emissivity

-Land Cover/Change

-Vegetation Indices

-Thermal Anomalies/Fire

-Leaf Area Index/Fraction of Photosynthetically Active Radiation (LAI/FPAR)

-Net Primary Vegetation Production

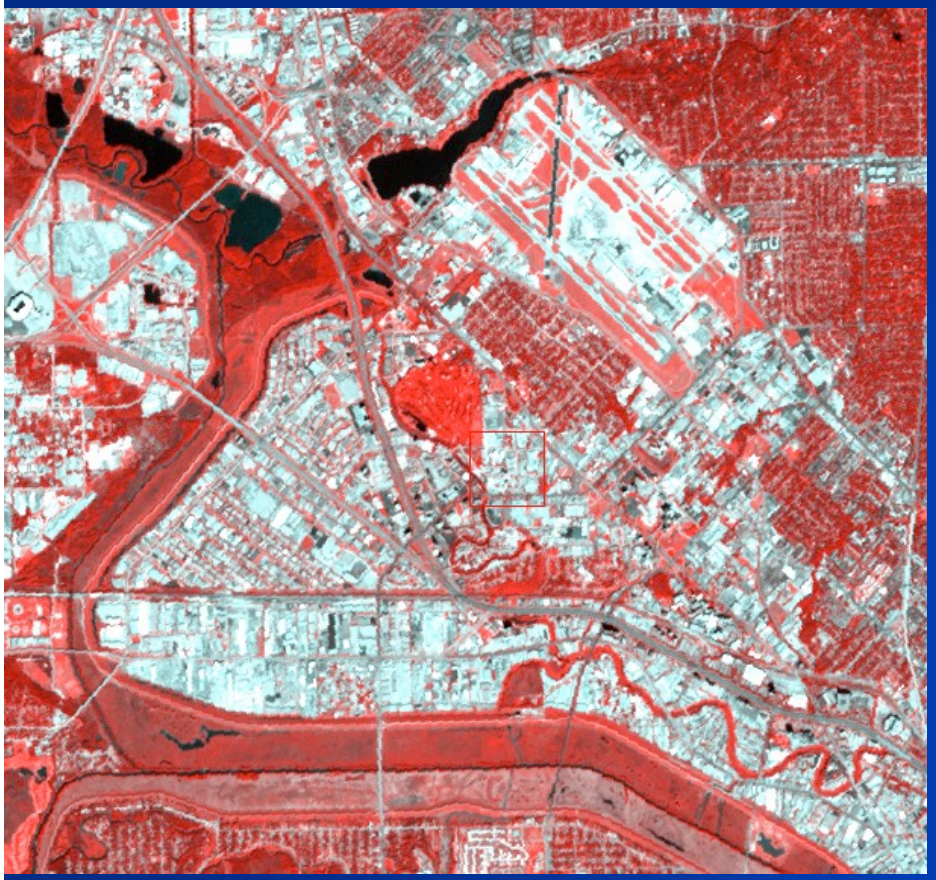
-Bidirectional Reflectance Distribution Function / Albedo

-Vegetation Conversion/Continuous Fields

USGS

http://modis.gsfc.nasa.gov/data/dataproducts.php?MOD_NUMBER=44

ASTER – Land Products: Dallas, TX



Surface reflectance (color-IR)

Land surface temperature

USGS

ASTER – Land Products

ASTER Sensor Systems: Baseline Performance Requirements

Subsystem	Band No.	Spectral Range (μm)	Radiometric Resolution	Absolute Accuracy (σ)	Spatial Resolution	Signal Quantization Levels
VNIR	1 2 3N 3B	0.52 - 0.60 0.63 - 0.69 0.78 - 0.86 0.78 - 0.86	NE Δρ 0.5 %	≤± 4 %	15 m	8 bits
SWIR	4 5 6 7 8 9	1.600 - 1.700 2.145 - 2.185 2.185 - 2.225 2.235 - 2.285 2.295 - 2.365 2.360 - 2.430	NE Δρ≤ 0.5 % NE Δρ≤ 1.3 % NE Δρ≤ 1.3 % NE Δρ≤ 1.3 % NE Δρ≤ 1.0 % NE Δρ≤ 1.3 %	≤± 4 %	30 m	8 bits
TIR	10 11 12 13 14	8.125 - 8.475 8.475 - 8.825 8.925 - 9.275 10.25 - 10.95 10.95 - 11.65	NE ΔT≤ 0.3 %	≤ 3K (200 –240K) ≤ 2K (240 –270K) ≤ 1K (270 –340K) ≤ 2K (340 –370K)	90 m	12 bits

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ASTER – Land Products

•Standard Products include all ASTER scenes that have been collected to date.

• Level 1A (Raw uncorrected)
Level 1B (Systematic correction)
Level 2 (Systematic Decorrelation Stretch)

On-Demand Products are created by applying a specific processing algorithm to Level 1B data Level 2 (On-Demand Decorrelation Stretch)
Level 2 (Brightness Temperature)
Level 2 (Surface Emissivity)
Level 2 (Surface Reflectance)
Level 2 (Surface Kinetic Temperature)
Level 2 (Surface Radiance)
Level 2 (Surface Radiance - TIR only)
Level 3 (ASTER DEM; created from Level 1A data)

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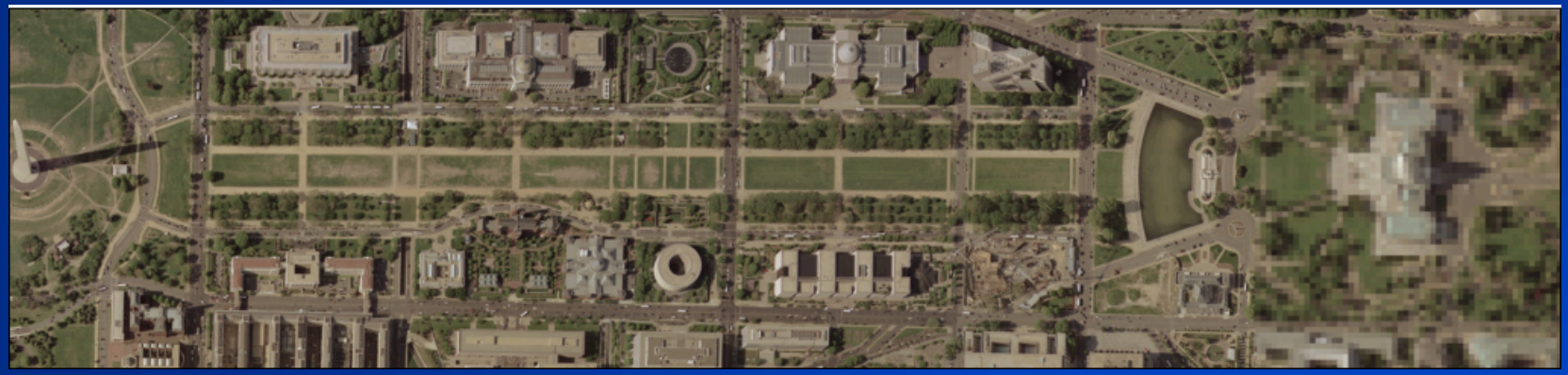
Additional Data at EROS…

High Resolution Orthoimagery

Where is this?



The Mall of Washington D.C.

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How about that detail?

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USGS

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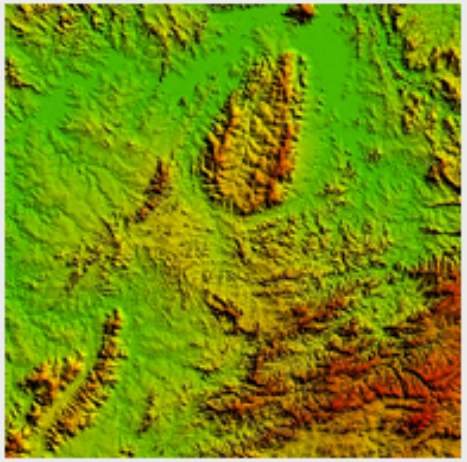
Topographic Data

Shuttle Radar Topography Mission DTED®

Contents:



SRTM DTED® subset image
(central Brazil)

back to Elevation Product List

USGS

Topographic Data

National Elevation Dataset (NED)

Contents:

NED subset image
(Grand Canyon)

back to Elevation Product List

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Not only satellite data collected at EROS (also *in situ*)

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EDC Instrument Farm

- USGS support to science data networks
- Useful for calibration, characterization and product validation

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Instrumentation Networks

- **CORS: *Constantly Operating Reference Station*: National Geodetic Survey/NOAA**
  - GPS carrier phase and code range measurements in support of 3-dimensional positioning
  - Positioning accuracies that approach a few centimeters relative to the National Spatial Reference System, both horizontally and vertically
  - Two CORS sites in the Data Center area (SDSF and SFSD) provide excellent resolution and accuracy.
  - http://www.ngs.noaa.gov/CORS/
- **GSOS: *GPS Surface Observing System*: Forecast Systems Lab/NOAA**
  - Provides T, P, RH and computes integrated precipitable water vapor
  - improved moisture observations to support weather forecasting, climate monitoring, and research
  - http://gpsmet.noaa.gov/jsp/index.jsp

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Instrumentation Networks

- **SURFRAD: *Surface Radiation Budget Network*: Surface Radiation Research Branch/NOAA**
  - UV, VIR, TIR radiation information with wind, T, & P. http://www.srrb.noaa.gov/surfrad/
- **CRN: Climate Reference Network: National Climatic Data Center/NOAA**
  - Provides local microclimate data w/ solar and IR data.
  - Very precise instrumentation for temperature and wind;
  - Much interest from other instruments.
  - http://www.ncdc.noaa.gov/oa/climate/uscrn/index.html
- **SCAN: *Soil Climate Analysis Network*: Natural Resources Conservation Service/USDA**
  - automated system, collects soil moisture and soil temperature data along with precipitation, pressure, wind, and solar radiation data.
  - http://www.wcc.nrcs.usda.gov/scan/site.pl?sitenum=2072&state=sd

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For your interest or acquisition

Earth Explorer

earthexplorer.usgs.gov

Microsoft TerraServer

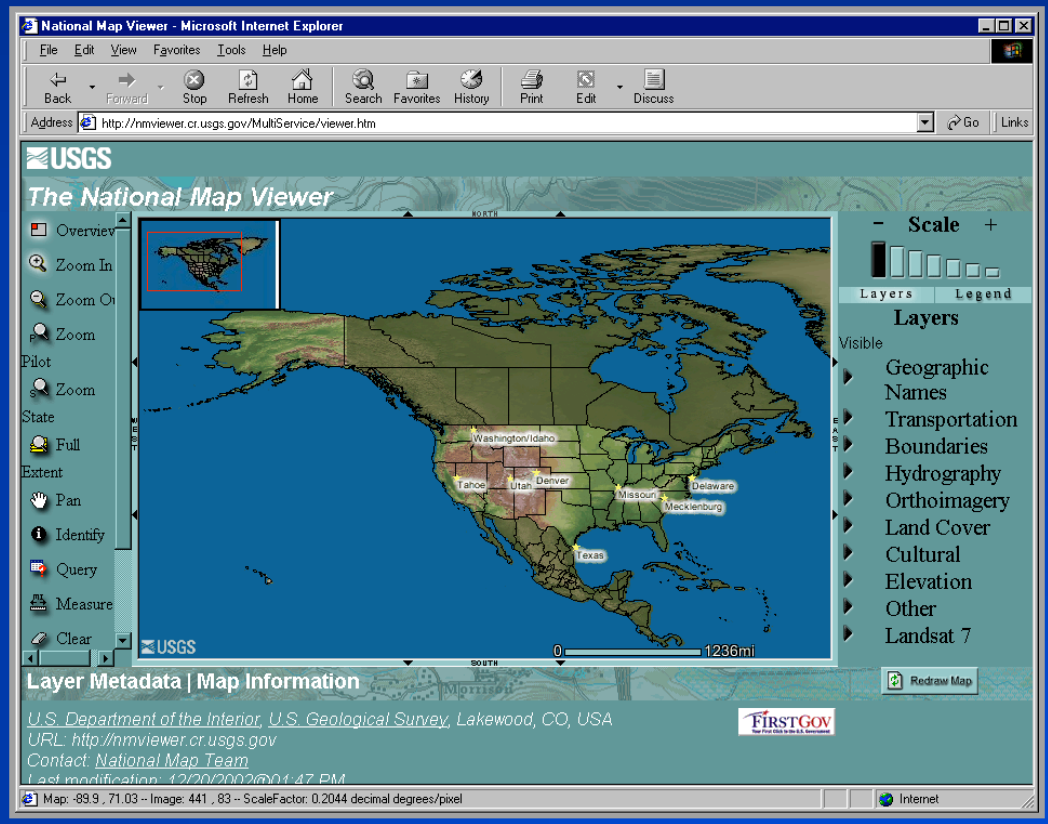
terraserver.microsoft.com

Global Visualization Viewer

http://glovis.usgs.gov/

The National Map

nationalmap.usgs.gov



USGS

USGS EROS Data Center

General Public tours M-F, 10 a.m. and 2 p.m.

http://edc.usgs.gov

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USGS EROS Data Center

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