



USGS Agency Report

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ICCAGRA

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

Landsat Web-enabled Data

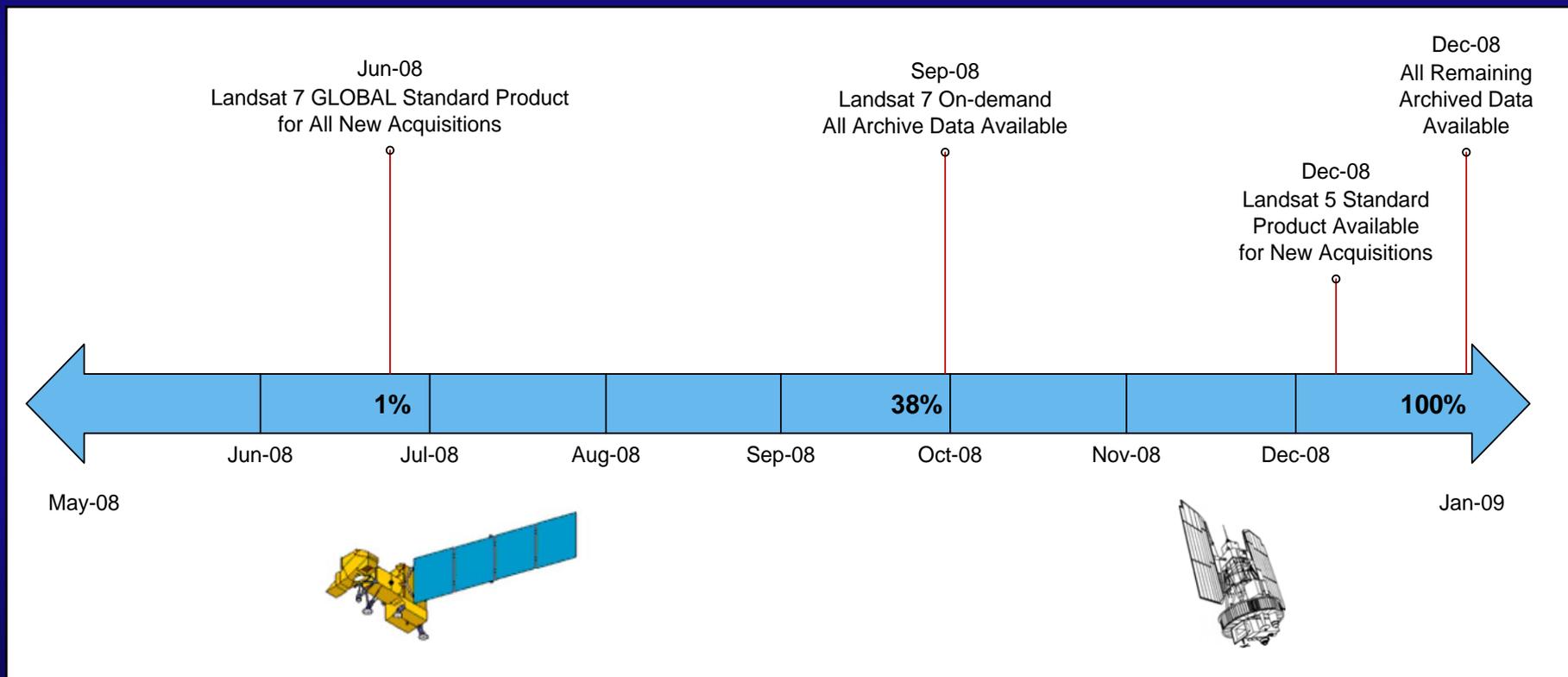


Landsat Standard L1T

- Newly acquired data that will be automatically processed
 - $\leq 20\%$ cloud cover, 9 quality
- All other data (and archive data) can be ordered at no-charge
 - L7: Sep 30, 2008
 - L5 TM, L4 TM, L1-5 MSS: Dec 31, 2008
- Pixel size: 15m/30m/30m
- Media type: Download (web-enabled)
- Product type: L1T (terrain-corrected)
- Output format: GeoTIFF
- Map projection: UTM
- Orientation: North up
- Resampling: Cubic convolution
- DEM: GLS DEM (SRTM, NED, CDAD, DTED, GTOPO 30)

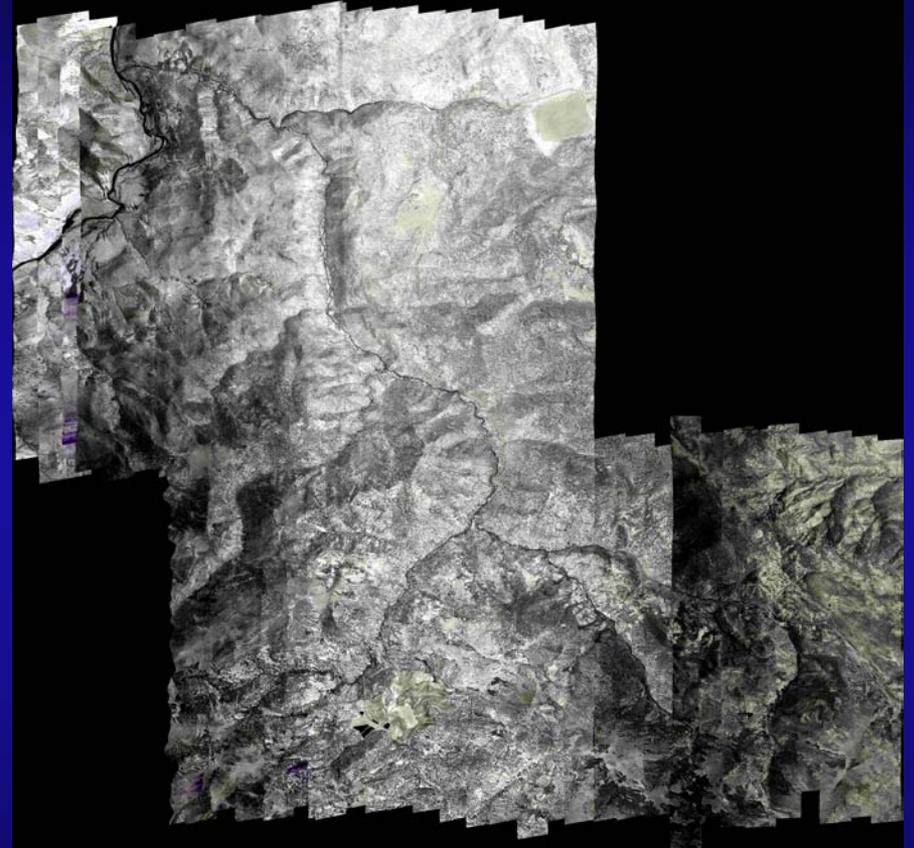
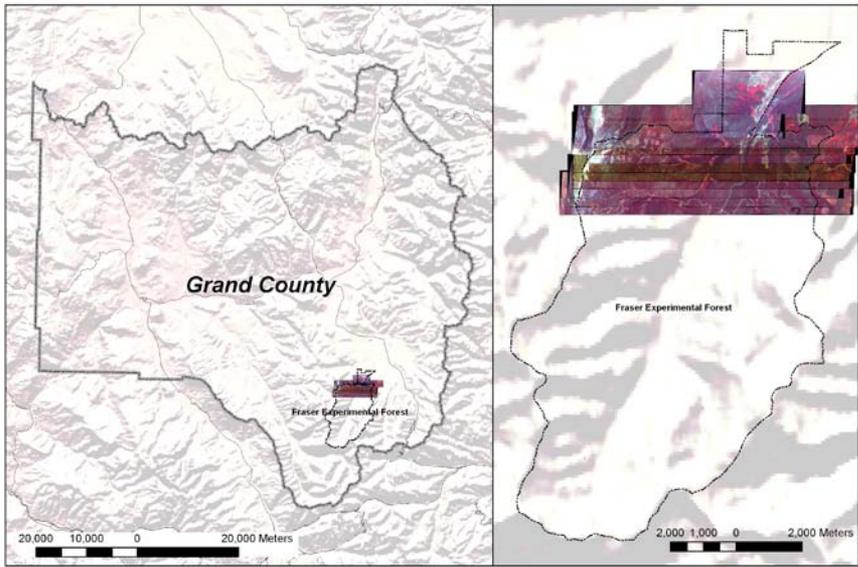


Landsat Web-Enabling Timeline

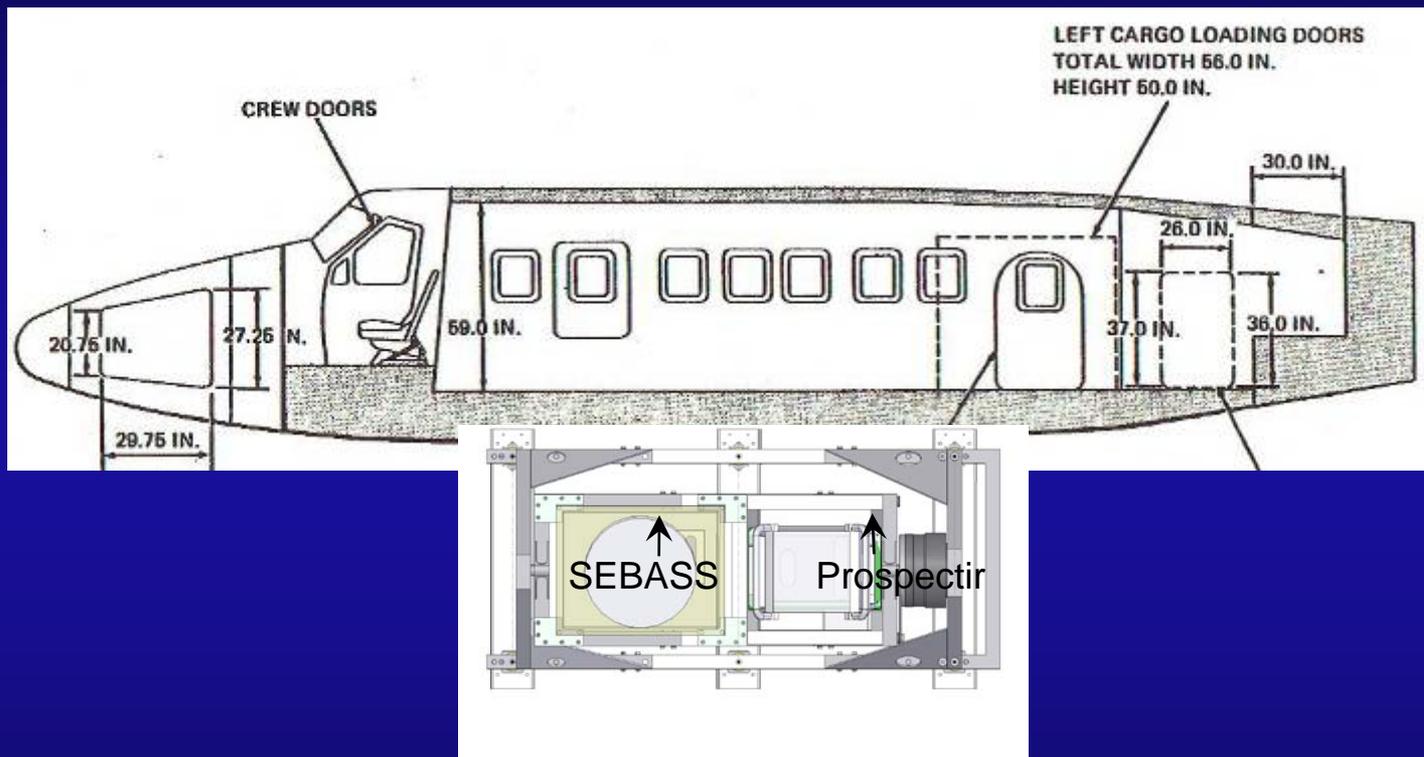


Contract Activity - SEBASS

Sebass Flight Coverage
6/28/2008



Upcoming IR&D “Full Spectrum” Collection Capability



Aerospace Full-Spectrum Sensors

- **ProspecTIR**
 - **VNIR**
 - 0.4-0.99 μm
 - 64 – 238 channels
(2.2 – 19.5 nm)
 - **SWIR**
 - 0.97-2.45 μm
 - 64 – 238 channels
(6.2 – 25 nm)
 - 0.52 / 1.31 mrad IFOV
(0.25 – 5.0 m GSD)
 - GPS/INS
- **SEBASS**
 - **MWIR**
 - 2.5 – 5.3 μm
 - 128 channels
(~25 nm)
 - **LWIR**
 - 7.6 – 13.5 μm
 - 128 channels
(~50 nm)
 - 1.1 mrad IFOV
(0.5 – 5.0 m GSD)
 - GPS/INS



“Full Spectrum” Collect Locations

Sponsors Pay Only for Their Flight Days (~\$25K/day)



EAARL Update

- **Recent Activities**
 - Support for Hurricanes Gustav and Ike
- **Upcoming Missions**
 - Survey S. Atchafalaya Basin in November
 - Mountain Stream Mapping - TBD
 - Possible AK North Slope collect Summer 2009
- **Replacement Laser funded**
 - Scanning configuration change leading to improved capabilities



UAS Issues

- **FAA COA and associated regulations**
- **Operator Training**
- **Defining UAS classes**
- **Procurement Vehicle Establishment**
 - Purchase or lease?
 - Contract for data?
- **Sensor Development**
 - Currently available: SAR, IR, FMV, LIDAR, MS, HyperSpectral
 - Sensor vs. Platform
- **Dissemination/Archiving of Data**
- **Analysis of Data**
 - Right Tools?
 - FMV
- **USGS UAS Roadmap to be developed this FY**



Data Management and Digital Delivery of Analog Data

Douglas R. Binnie
Information Solution Branch Chief

**USGS Center for Earth Resources Observation and Science (EROS)
Sioux Falls, South Dakota**

The USGS Film Archive

- 59,500 rolls of film
 - 8.6 million images



- Over 70,000 photo indexes



Background

- After 30 years of operation, the decision was made in 2004 to close the photo lab and only provide digital access to the more than 9-million frames of imagery in the archive



Why Change was Necessary

- Customer demand for film based products was declining
- Cost to produce film/paper products was increasing
- Some raw stock used at EROS was no longer being manufactured
- Demand for digital products was increasing



Decision

- Provide on-demand scanning at 7, 14, or 21 micron spot size
- Digitize USGS aerial collections using automated high performance cameras and generate a searchable browse
- Create single frame metadata from photo indexes to improve user access to historical photos
- Provide internet access and electronic data delivery at no charge to the user



Scanning

- Use High Resolution photogrammetric quality scanners
- Standard output spot size is 21 micron (1200 dpi) with options to 7 micron spot size (3600 dpi)
- Output format = TIFF
- File size = 120 MB for B/W and 360 MB for Color
- All scanned products are currently generated on-demand and not archived



Phoenix IV Digitizing System

- Phoenix IV was built in house using a Logetronic photographic printer base
- Outfitted with a frame edge detection system for film advancement and a light source consisting of 144 LEDs
- Utilizes a Kodak 13.9 mega-pixel digital camera to capture each frame
- Streams data into a PC to generate an on-line browse and a medium resolution (400 dpi) digital file



Digitizing Output Specifications

- **Browse files**
 - Format = JPG
 - Black and White size = 148 KB
 - Color size = 400 KB
 - Resolution = 72 dpi
- **Medium-resolution files**
 - Format = TIFF
 - Black and White size = 13 MB
 - Color size = 38 MB
 - Resolution = 400 dpi
 - Non-photogrammetric quality
 - Minimal data editing (format, adjust polarity, add USGS Visual Identification)



Digitizing Process

- Digitize photo indexes and provide on-line access
- Digitize each roll of film to generate a full frame browse including orphans and provide on-line access
- Archive the medium-resolution products in a mass storage system and provide on-demand electronic access to the data



Medium-resolution
Digitization System



Digitized Map Index



Digitized Aerial Image



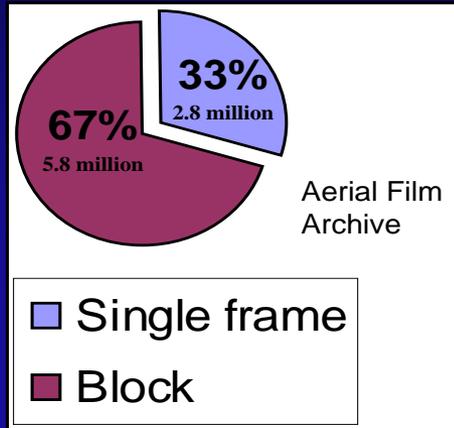
Phoenix V Prototype

- Phoenix V was built using the same Logetronic printer base and automated frame edge detection system as the Phoenix IV
- Uses an enhanced light source consisting of 675 LED's to improve scanning efficiency
- Utilizes a Better Light 416 mega-pixel scanning back
- Outputs a 25 micron spot size (1000 dpi) digital image



Creating Single Frame Metadata

8.6 Million Frames



- Implemented processes and software
- Working USGS historical collection
 - 68,000 indexes
 - 2,600,000 frames
- 350,000 frames annually



Photo Index



Single Frame



Preservation and Access

- Manage all on-line, near-line and off-site data locations using a mass storage system architecture
 - Robotic tape storage
 - Data migration to newer media
 - Creation of backup copies for off-site storage
 - Supports electronic data distribution



SL8500 Mass Storage System



Data Discovery

- Combines “Point and Click” ease with textual query capabilities to form an easy to use search and order interface
- Allows users to search spatially over multiple datasets

The screenshot displays the USGS EarthExplorer website interface. At the top, the USGS logo and tagline "science for a changing world" are visible. The main navigation bar includes "Home", "Prices", and "Help". A message banner indicates "There are 3 messages." Below this, a query instruction states: "Query and order satellite images, aerial photographs, and cartographic products through the U.S. Geological Survey." The interface is divided into three main sections: 1. Select your dataset(s), 2. Enter your search criteria, and 3. Search >>>. Section 1 lists various datasets such as Aerial Photography, AVHRR, Declassified Data, Digital Elevation, Digital Line Graphs, Digital Maps, EO-1, Global Land Survey, Landsat Archive, Landsat Decadal, Landsat Science, Radar, SPOT, and USGS Commercial. Section 2 contains search fields for "Address/Place name" (with a search button), "From (mm/dd/yyyy)" (set to 01/01/1920), and "To (mm/dd/yyyy)" (set to 12/31/2020). A "Search" button is present. Below the search fields is a map of the United States with a blue selection box over the eastern coast. The map includes a scale bar (1000 mi / 1000 km) and a "Map" button. Section 3 shows the "Area Selected" as "Degree/Minute/Second" and "Decimal". The coordinates are displayed as "1. Latitude: []° []' []" North and "Longitude: []° []' []" West.



Data Search Results

- Search results grouped by dataset
- Displays browse imagery and footprints by scene
- Allows users to export results into a KML file viewable in Google Earth

Preview Image	Show Footprint	Show All Fields	Exclude	Order	Qty	Price	DOWNLOADS	all frames from roll	Product Availability	Entity ID	Acquisition Date	Quality	Cloud Cover	Image Type	Frame Height in Feet	Scale	Length x Width (MM)	Recording Technique	NW Corner	NE Co
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164731	View	High/Medium	AR5780026164731	1978/06/20	8	0	CIR	65003	65000	229 x 229	Vertical Reconnaissance	60° 51'18.00"N, 152° 57'18.00"W	60 51'28.8152 42'18.1
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164732	View	High/Medium	AR5780026164732	1978/06/20	8	0	CIR	65003	65000	229 x 229	Vertical Reconnaissance	60° 51'19.08"N, 152° 55'48.00"W	60 51'30.0152 40'41.1
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026176028	View	High/Medium	AR5780026176028	1978/06/20	8	0	BW	65003	130333	229 x 229	Vertical Reconnaissance	60° 37'48.00"N, 152° 10'48.00"W	60 38'15.4151 40'48.0
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026176029	View	High/Medium	AR5780026176029	1978/06/20	8	0	BW	65003	130333	229 x 229	Vertical Reconnaissance	60° 37'48.99"N, 152° 09'43.49"W	60 38'16.7151 39'34.4
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026176030	View	High/Medium	AR5780026176030	1978/06/20	8	0	BW	65003	130333	229 x 229	Vertical Reconnaissance	60° 37'50.12"N, 152° 08'30.01"W	60 38'18.0151 38'12.0
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164820	View	High/Medium	AR5780026164820	1978/06/20	8	0	CIR	65003	67333	229 x 229	Vertical Reconnaissance	60° 34'06.00"N, 152° 05'53.99"W	60 34'23.0151 50'12.0
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164821	View	High/Medium	AR5780026164821	1978/06/20	8	0	CIR	65003	67333	229 x 229	Vertical Reconnaissance	60° 34'09.72"N, 152° 02'28.50"W	60 34'26.4151 46'55.0
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164822	View	High/Medium	AR5780026164822	1978/06/20	8	0	CIR	65003	67333	229 x 229	Vertical Reconnaissance	60° 34'13.27"N, 151° 59'12.01"W	60 34'30.0151 43'48.0
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164692	View	High/Medium	AR5780026164692	1978/06/20	8	0	CIR	65003	64000	229 x 229	Vertical Reconnaissance	61° 40'12.00"N, 158° 03'36.00"W	61 40'12.0157 48'00.0
	Show	Show	<input type="checkbox"/>			\$3.00 \$30.00	ARS780026164693	View	High/Medium	AR5780026164693	1978/06/20	8	0	CIR	65003	64000	229 x 229	Vertical Reconnaissance	61° 40'12.00"N, 158° 08'06.00"W	61 40'12.0157 52'23.0

[Redefine Criteria](#) [Result Summary](#)
[Add Selected Items to Shopping Basket](#) [Hide Excluded Records](#)
[Add All Retrieved Items to Shopping Basket](#) [Restore All Excluded Records](#)
[View Shopping Basket](#) [Change Columns and Sort Order of Results](#)



Data Download

Sign in

Register to Download

You must be a registered user to download files. If you are already a registered user, please sign in below. If you are not a registered user, you may become one by initiating the [registration process](#).

* Please Note: Once you sign in, you may be asked a subset of questions if they were left blank in your registration profile.

Sign in using your USGS registered user name and password

Enter User Name:

Enter Password:

[Forgot your password?](#)

and continue using this site without signing on or registering.

Accessibility FOIA Privacy Policies and Notices

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URL: <http://earthexplorer.usgs.gov/>
Page Contact Information: pustsecv@usgs.gov
Page Last Modified: April 21, 2008

- Registered users can electronically download selected datasets at no cost to them

Download Information

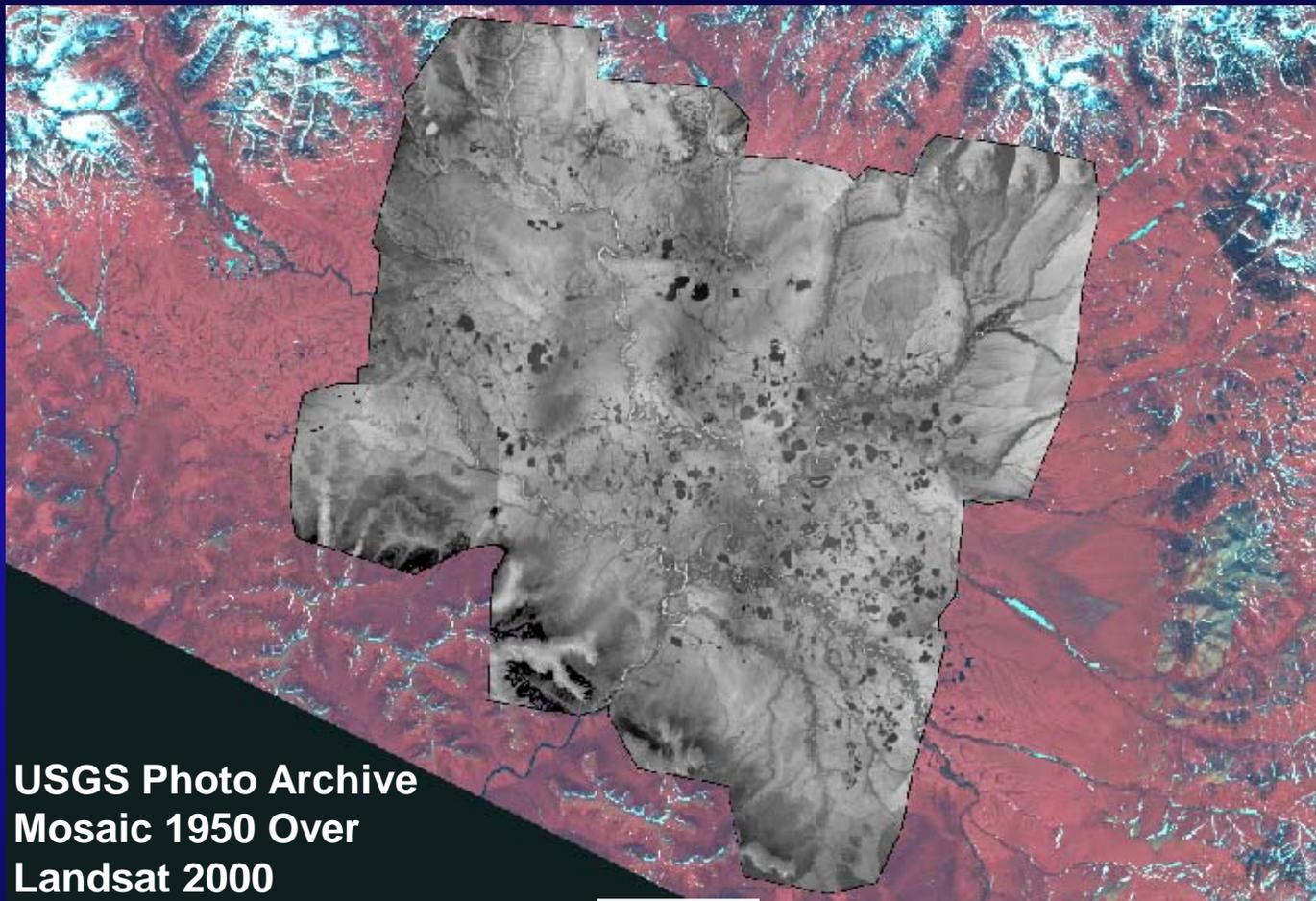
for

File Name: 5RRD07012_201.tif

- Due to high demand and limited bandwidth, please limit downloads to one file per session.**
- This free service is intended to satisfy low volume data requests.
- Use of this data requires analysis software which is not typically found on workstations. Software is available on the internet or from commercial vendors.
- Initiation of this data transfer may be delayed several minutes** while the file is retrieved from our robotic tape library.
- Note that data you have requested may be several hundred megabytes in size and transfer time may exceed an hour on a broadband (DSL, cable, T1) line.



Change Analysis



~ 55 miles



Summary

- **Over 6 million frames have been digitized and over one million single frame metadata records have been generated since the program began**
- **On-line indexes and browse files simplifies archive access and promotes increased interest in the USGS/EROS film archive**
- **Digitizing effort uncovers images that were not previously accessible (orphan imagery)**
- **Once the data are in digital form it can be easily combined with other data sources to support change analysis**
- **This new approach enhances archive value and assures continued data access to support the ever changing needs of the science community**

