

Landsat Science Team

Landsat Operations Project Report

12 February 2013

Kristi Kline

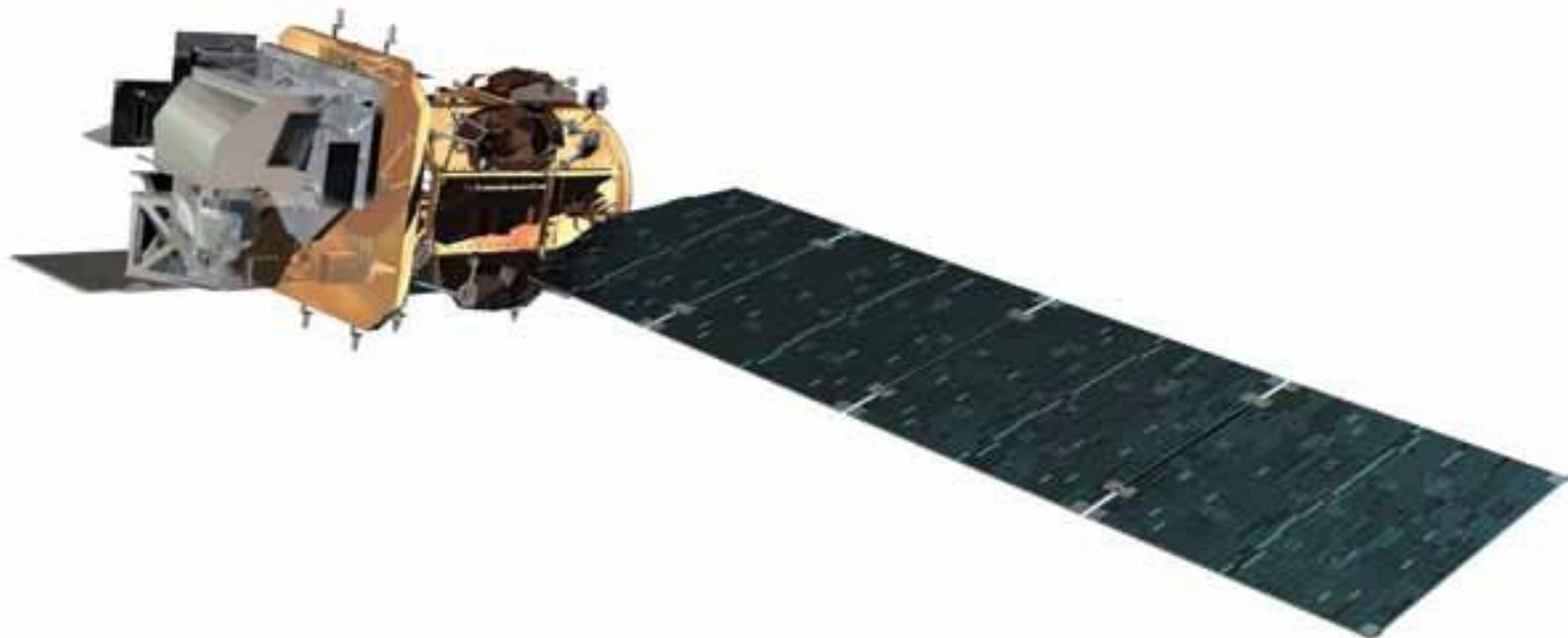
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Landsat 5 and 7 Status (and LDCM!)



LDCM Spacecraft Status



Most Current Status

- **From Ken Schwer:**

- **The Satellite is performing well. Spacecraft activation continues per the timeline - recent activities completed:**
 - ♦ **Star Tracker 1 Initialization**
 - ♦ **Solid State Recorder Initialization**
 - ♦ **Transition to Coarse Earth Pointing mode**
- **Following initialization of Star Tracker 1, the team determined that a simple update to a few parameters is needed which should occur today.**
- **The Sioux Falls ground station is now dialed in - the Mission Ops team can now receive real-time telemetry and uplink commands. So all our grounds stations are now dialed in.**
- **I also wanted to pass along that in addition to Svalbard, the McMurdo ground station dialed in right after launch and has been doing a great job supporting LDCM.**

L&EO and Activation Activities (0-6)

- **L&EO Focuses on Spacecraft Activation and Health and Safety**
- **Day 0**
 - Launch Vehicle Separation
 - Spacecraft Activation RTS
 - S-Band Activation during SGS pass (low rate telemetry)
 - First full pass at Gilmore Creek (GCL) ~ 19:28
 - Solar Panels Deploy over GLC ~ 19:34
 - Switch to High Rate Telemetry ~ 20:11 (after GLC pass)
- **Day 1**
 - First Absolute Time Sequence (ATS command) load
 - Will continue daily from this point forward.
- **Day 2**
 - Active at the X-Band transmitter (Travelling Wave Tube Amplifier (TWTA))
 - First X-Band over LGS about 15:51; Expect SSOH
 - X-Band is utilized from this point forward.
- **Day 3**
 - Attitude Control System (ACS) enabled for verification
- **Day 4**
 - Validate ACS; Several slew maneuvers continue through Day 6
- **Day 6**
 - Finish ACS validation and calibration
 - Turn on OLI heaters
 - First Ancillary Data and Instrument Files
 - 1 set of ancillary data including a test pattern from OLI (~08:05 GMT)
 - 1 set of ancillary data including a test pattern from TIRS (~9:40 GMT)
 - DPAS Ingest and Archive is critical
 - L0Ra data is sent to Ball via cron job, confirmed by Cal/Val



Instrument Activation and First Ascent Burns

- **Feb 18 – Mar 16 (days 7 – 33)**
- **Ascent Burns are dependent on timing with launch and planned under-fly and timing will most likely change**

Monday, February 18, 2013	049	7	Working to get more ancillary data that includes OLI test pattern (E.g. 1x/day)
Tuesday, February 19, 2013	050	8	Engineering Burn
Wednesday, February 20, 2013	051	9	
Thursday, February 21, 2013	052	10	
Friday, February 22, 2013	053	11	
Saturday, February 23, 2013	054	12	
Sunday, February 24, 2013	055	13	Ascent Burn 1
Monday, February 25, 2013	056	14	
Tuesday, February 26, 2013	057	15	Load OLI Pixel Map
Wednesday, February 27, 2013	058	16	
Thursday, February 28, 2013	059	17	Ascent Burn 2

Instrument Activation and First Ascent Burns

Tuesday, March 05, 2013	064	22	TIRS Cyro Cooler Startup	
			TIRS SSM Testing	
			OLI Cooldown	
Wednesday, March 06, 2013	065	23	TIRS First Nominal Cal (Light)	TIRS Instrument team requires Mission Data; UP makes Mission Data available to TIRS Instrument Team.
Thursday, March 07, 2013	066	24		
Friday, March 08, 2013	067	25	TIRS Cal Collects	
Saturday, March 09, 2013	068	26	OLI Check Focus Position	SSOH or S-Band [TBD]
Sunday, March 10, 2013	069	27	TIRS 20 / day from this point forward ; OLI - First Colle	Run through LPGS; Flag as Engineering Data Only. No PR issues.
Monday, March 11, 2013	070	28	Adjust Focus Position of OLI (if required)	Ancillary or SSOH
Tuesday, March 12, 2013	071	29		
				Australia (ASA, DWA) & Indonesia (DKI) scheduled for the whole day. Sched will have all stations active. Turn on X-band, fill and will throw in TIRS scene. Goal is to track and demodulate successfully. There may be TIRS Scenes. Goal is to send them CDFP packets. Optionally the Ics may upload CDFP files.
Wednesday, March 13, 2013	072	30	Check IC Communications Alternative Station for IC Comm	KIS, MTI, NSG
			50 scenes/day (OLI and TIRS)	
Thursday, March 14, 2013	073	31	First LDCM Image; TIRS Temp Sweep	Plan is to have it go through the whole system, User portal is locked down. If issues with data, then Cal/val doesn't turn over scenes until QA is complete. Rachel ensures that scenes are QA'd before announcing as potential public scenes. OLI Will be Modulation Transfer Function (MTF) interval only for first 3 days of OLI.
Friday, March 15, 2013	074	32	First Lamp data (~6 collects)	Scheduling also works in acquisition of all image types.
Saturday, March 16, 2013	075	33	Linearity Collect	Includes Long Ocean



Instrument Ramp Up Period

- **Gene Fosnight, Data Acquisition Manager, is coordinating all acquisitions.**
 - **Priority**
 - 1) **Cal**
 - 2) **CONUS**
 - 3) **Any Image over Land with Cloud Avoidance Applied**

Sunday, March 17, 2013	076	34	100 Scenes / Day
Monday, March 18, 2013	077	35	
Tuesday, March 19, 2013	078	36	
Wednesday, March 20, 2013	079	37	150 scenes / day
Thursday, March 21, 2013	080	38	TIRS 1 1/2 Orbit Collect (black body collect)
Friday, March 22, 2013	081	39	
Saturday, March 23, 2013	082	40	200 scenes / day
Sunday, March 24, 2013	083	41	
Monday, March 25, 2013	084	42	300 scenes / day
Tuesday, March 26, 2013	085	43	Lunar Collect
Wednesday, March 27, 2013	086	44	Lunar Collects, 400 scenes / day



Under-fly

- **Gene Fosnight and Terry Arvidson are working together to plan the under-fly acquisitions**
- **LDCM determines schedule, Landsat 7 acquires the list that LDCM has defined**
- **Data is collected at 400/day**
- **LGN and DPAS treat the underfly as nominal**

Thursday, March 28, 2013	087	45	400/day
Friday, March 29, 2013	088	46	Underfly (400/day)
Saturday, March 30, 2013	089	47	Underfly (400/day)
Sunday, March 31, 2013	090	48	400/day
Monday, April 01, 2013	091	49	400/day

Ascent Burns

- **2 Ascent Burns After Underfly; timing of burns subject to change**

Tuesday, April 02, 2013	092	50	Ascent Burn 3	NOTE: These burns are dependent on underfly and timing. Most likely will change. There is a 15 minute "keep shutter closed" rule. Then imaging should be back to normal. (LGN is high. DPAS is not HIGH priority)
Wednesday, April 03, 2013	093	51	400/day from this point forward with few exceptions when special maneuvers are necessary.	
Thursday, April 04, 2013	094	52	400/day	
Friday, April 05, 2013	095	53	400/day	
			Ascent Burn 4	NOTE: These burns are dependent on underfly and timing. Most likely will change.
Saturday, April 06, 2013	096	54	LDCM on WRS - 400 / day	

On-WRS Verification Period

- **Nominally April 7 – May 13th**
- **International Cooperator (IC) testing commences**
 - **Leave them on-line**
 - **They must hold data until USGS authorizes release of data**
- **Nominal operations of 400/day**
- **Verification of systems**
- **Calibration of instruments / science data**

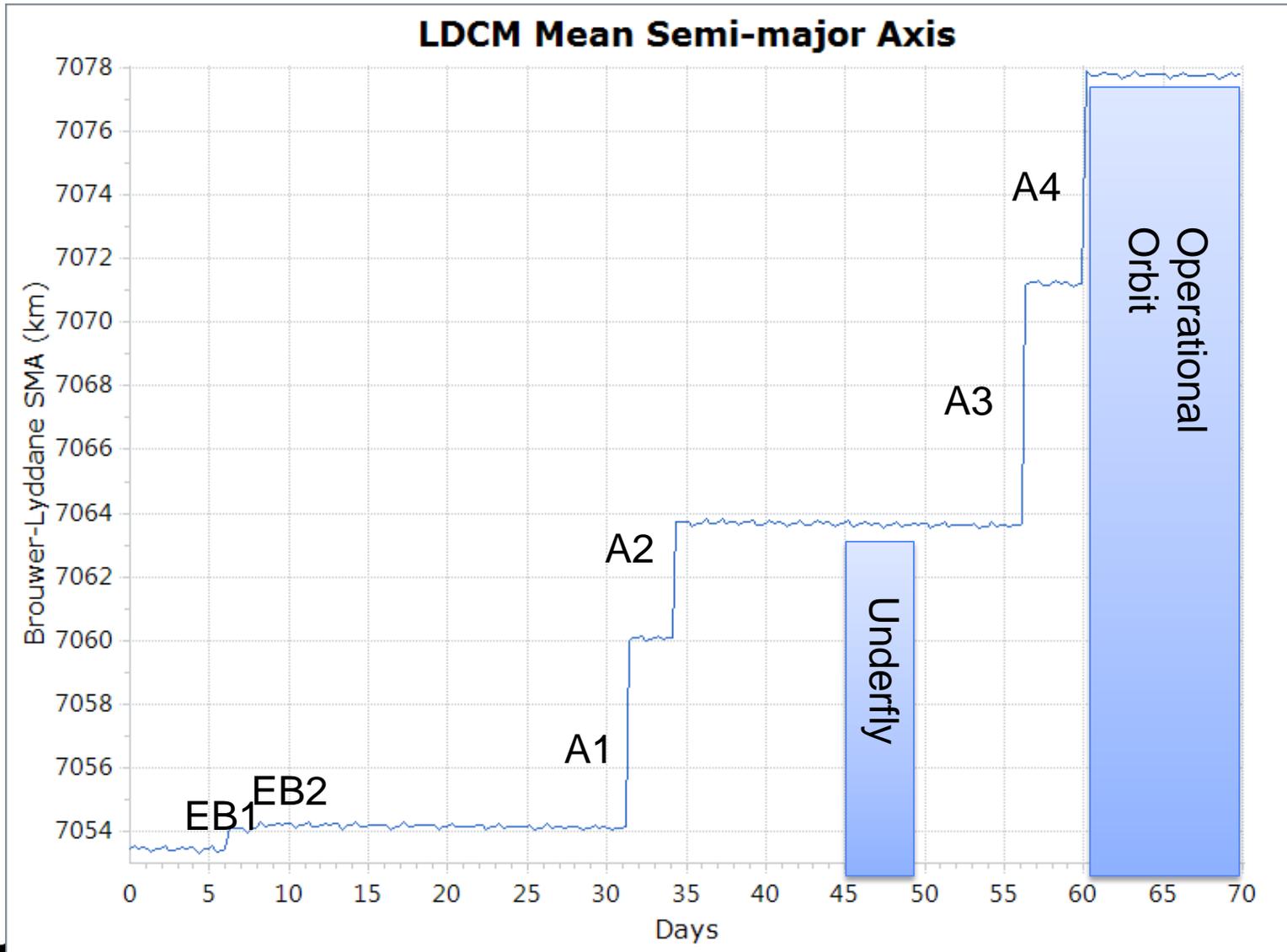
Final Reviews and Transition

- **On-Orbit Acceptance Review (OAR) ~ May 14**
- **Post Launch Assessment Review (PLAR) ~ May 22nd**
- **Mission Transition Review (MTR) ~ May 23rd**

- **Key Transition Activities**
 - **Planning is complete; transition has started**
 - **EROS Transition Activities**
 - ♦ **Complete Items on EROS Transition Checklist**
 - ♦ **Review at Transitions to Operations Review (TTOR)**
 - ♦ **Complete before May 21st**
 - **Mission Operations Transition Checklist**
 - ♦ **Final assessment at the PLAR**
 - **Programmatic Transition Checklist**
 - ♦ **Final assessment at the MTR**

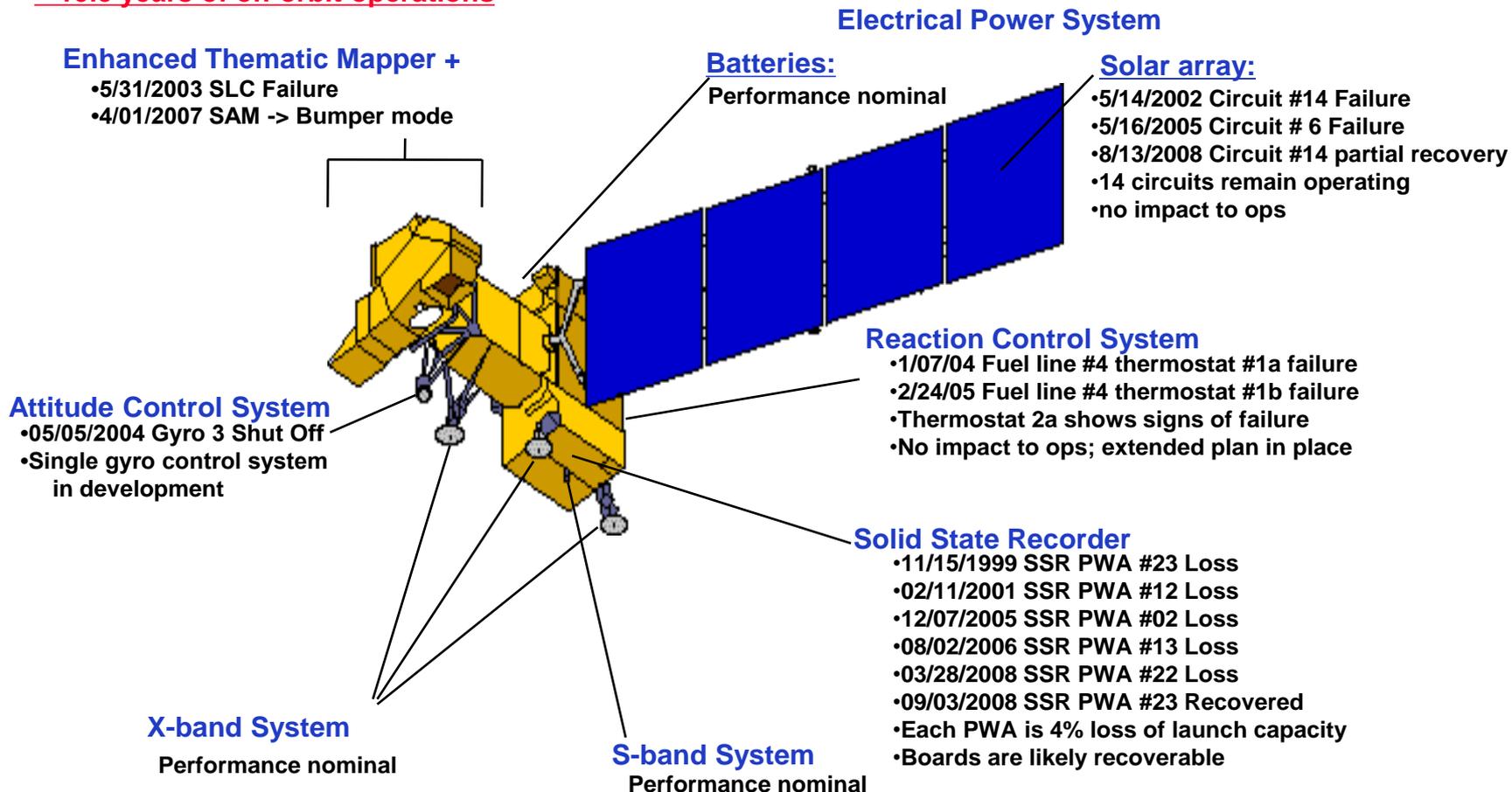


Launch Feb 11 - Beginning of window



Landsat 7 Spacecraft Status

≈ 13.5 years of on-orbit operations

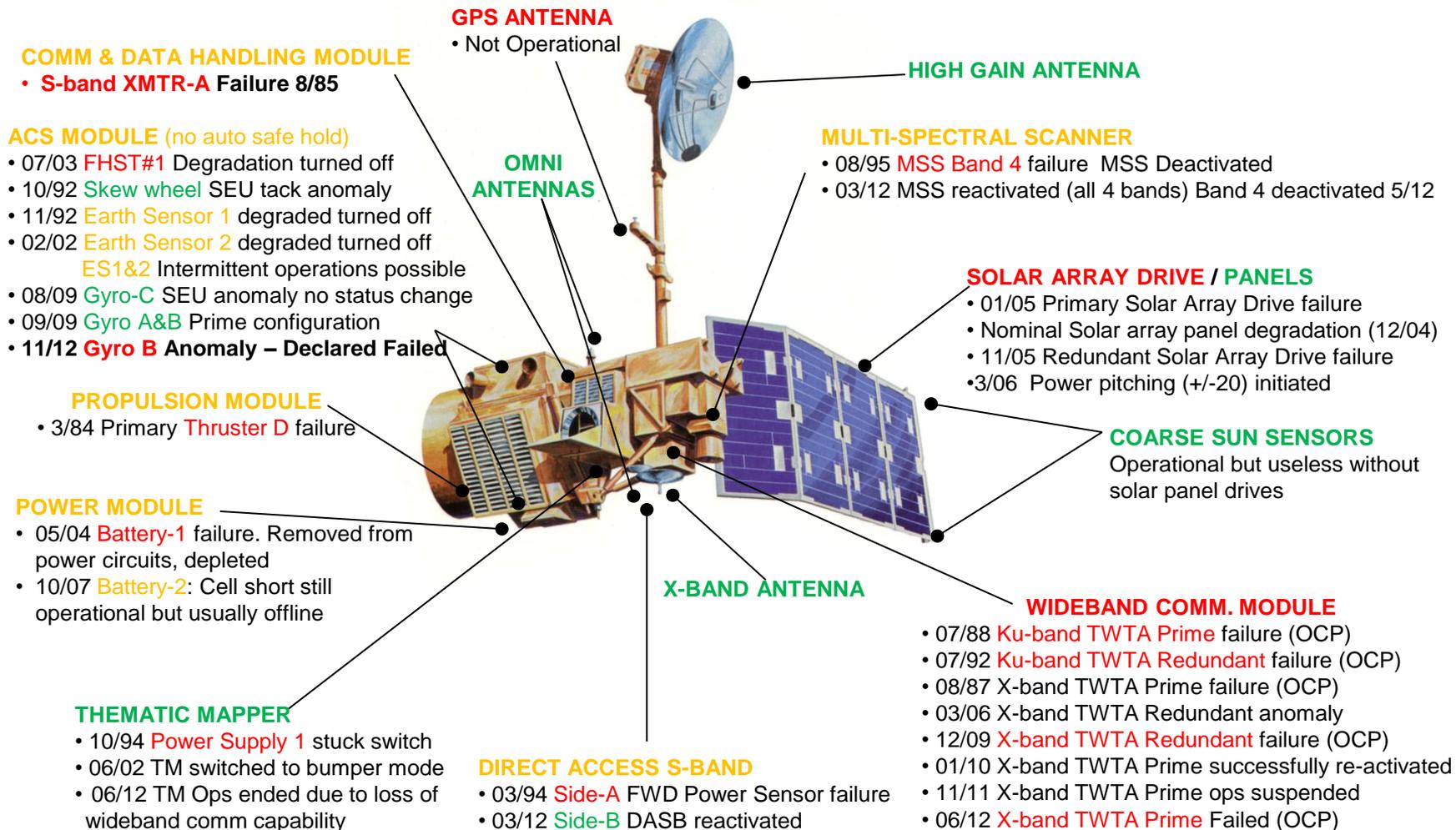


Landsat 7 Collections (US Only)

<i>Year</i>	<i>Distinct WRS scenes in U.S.Archive</i>	<i>Distinct WRS scenes collected (incl. IC)</i>	<i>Distinct Non-calibration WRS scenes collected</i>
All	304.3	334.7	328.9
1999	250.2	363.4	357.3
2000	290.4	380.9	375.0
2001	297.8	375.9	369.9
2002	300.4	378.5	370.7
2003	244.3 ⁽¹⁾	292.4 ⁽¹⁾	286.4 ⁽¹⁾
2004	309.7 ⁽²⁾	331.0 ⁽²⁾	324.2 ⁽²⁾
2005	315.7	318.3	311.5
2006	309.3	312.1	305.3
2007	306.0	312.2	306.3
2008	312.2	319.9	315.0
2009	298.1	308.3	303.3
2010	301.3	301.8	297.0
2011	328.7 ⁽³⁾	333.1 ⁽³⁾	328.3 ⁽³⁾
2012	372.5 ⁽⁴⁾	372.7 ⁽⁴⁾	368.1 ⁽⁴⁾

1. Acquisition rate reduced for several months in 2003 following ETM+ SLC anomaly in late May until early October
2. LGN daily acquisition quota revised to permit up to 300 scenes/day averaged over 2 days
(Many international cooperators terminated Landsat 7 operations as consequence of SLC anomaly)
3. LGN daily acquisition quota revised to permit up to 400 scenes/day averaged over 2 days
4. CUB (Brazil) station forwards all collected imagery to U.S. archive, enabling nearly full coverage of South America

Landsat 5 Spacecraft Status

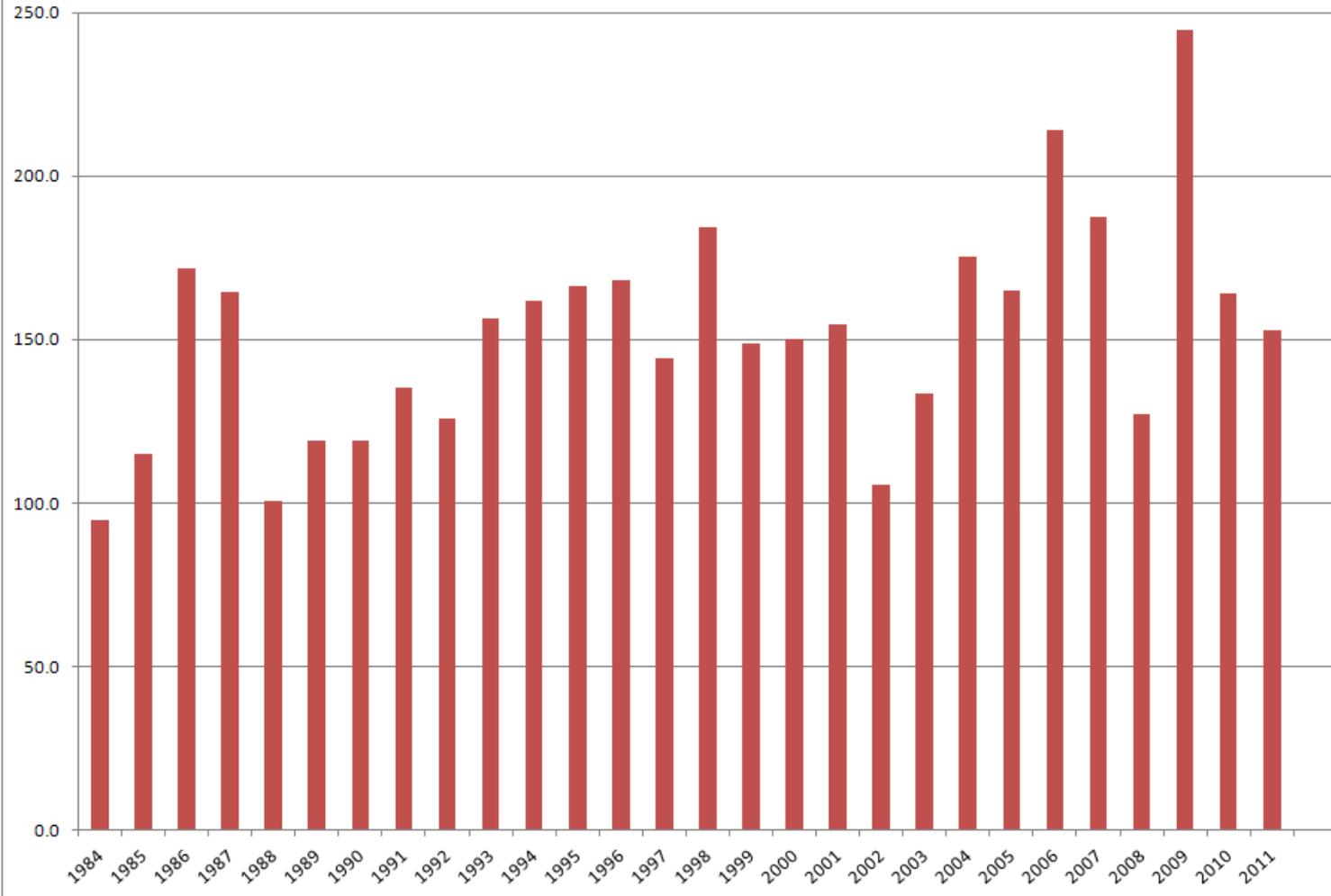


Landsat 5 (TM only) Collections (US Only)

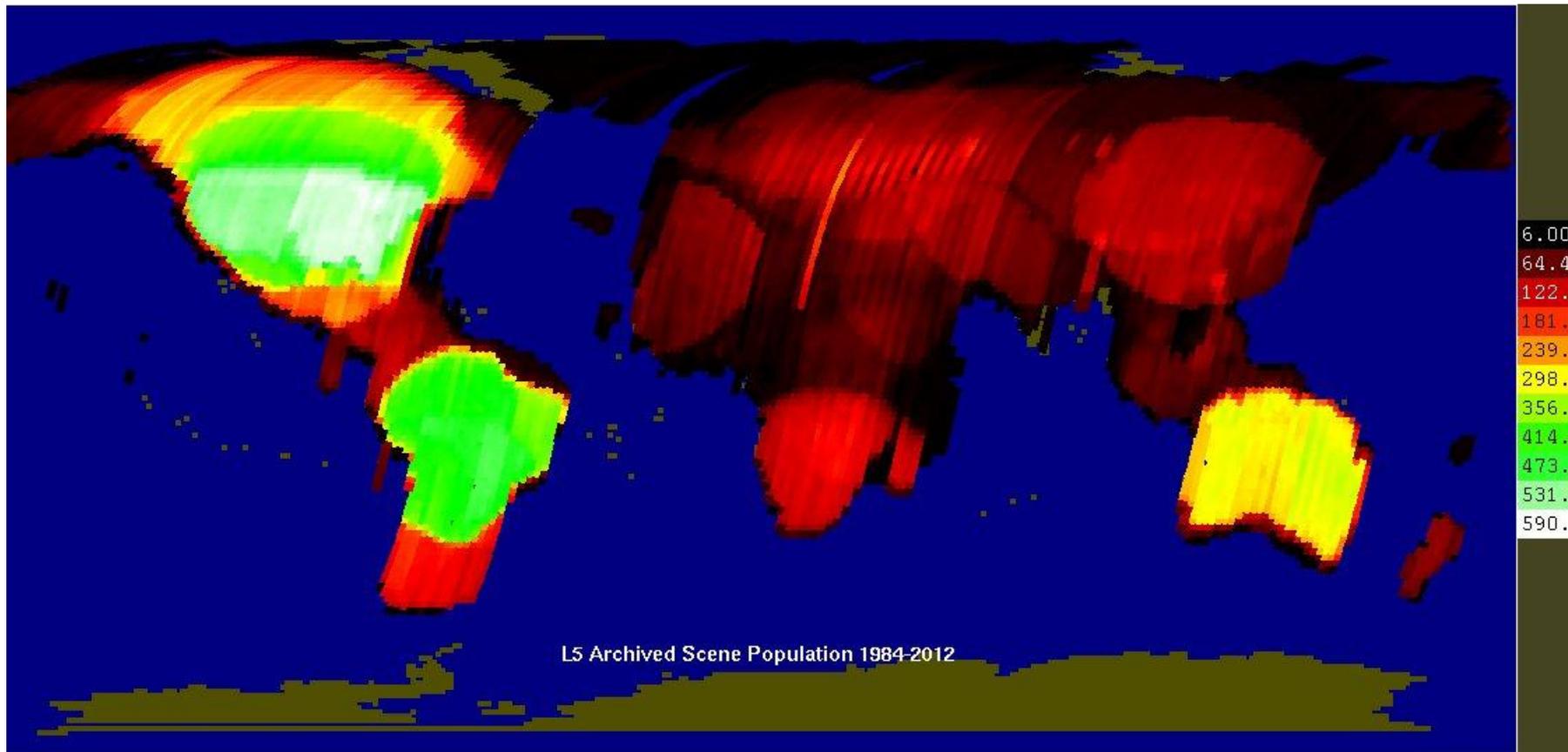
Year	Scene Count	Average Daily	Average CCA
ALL	1,551,736	157.5	44.1
1984	34,558	94.7	45.7
1985	41,930	114.9	51.6
1986	62,678	171.7	46.2
1987	60,013	164.4	44.0
1988	36,701	100.6	46.8
1989	43,451	119.0	43.3
1990	43,551	119.3	44.5
1991	49,467	135.5	44.9
1992	45,902	125.8	45.9
1993	57,114	156.5	42.7
1994	59,116	162.0	42.5
1995	60,715	166.3	44.2
1996	61,332	168.0	46.7
1997	52,703	144.4	43.0

Year	Scene Count	Average Daily	Average CCA
1998	67,223	184.2	40.3
1999	54,376	149.0	45.3
2000	54,775	150.1	44.4
2001	56,487	154.8	47.3
2002	38,556	105.6	44.0
2003	48,784	133.7	41.4
2004	63,969	175.3	45.4
2005	60,243	165.0	43.5
2006	78,070	213.9	42.3
2007	68,431	187.5	41.3
2008	46,480	127.3	42.7
2009	89,302	244.7	46.2
2010	59,919	164.2	41.4
2011	55,868	153.1	41.0

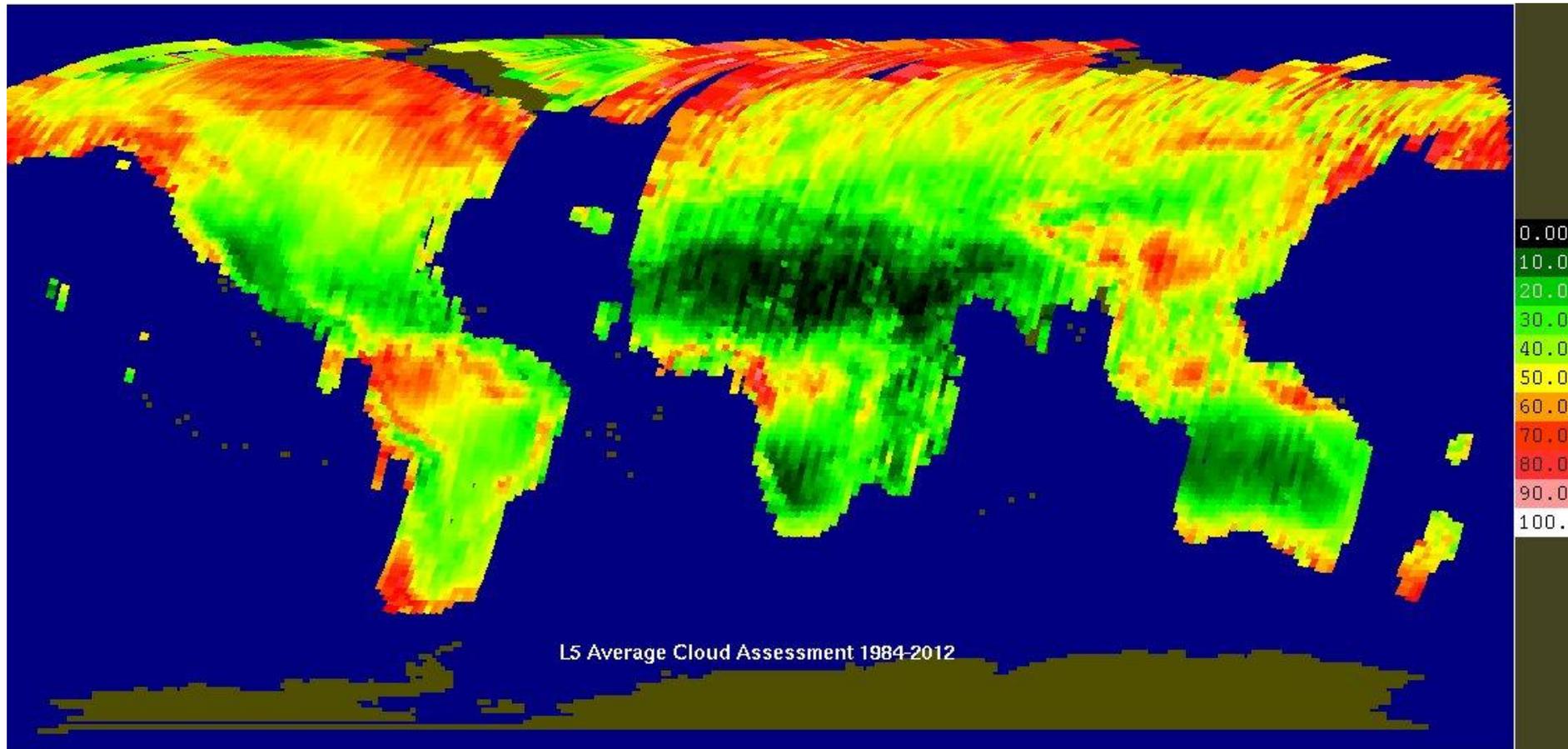
Average Daily Acquisitions in U.S. Archive



Scenes Collected for US Archive



Average Cloud Cover



Landsat Archive and Processing Topics



U.S. Landsat Archive Overview (December 3, 2012)

- **ETM+: Landsat 7**

- 1,513,964 scenes
 - ♦ ~1,406 TB Raw and L0Ra Data
average scene size 487 MB

- **TM: Landsat 4 & Landsat 5**

- 1,611,079 scenes
 - ♦ ~808 TB Raw and L0Ra Data
average scene size 263 MB

- **MSS: Landsat 1 through 5**

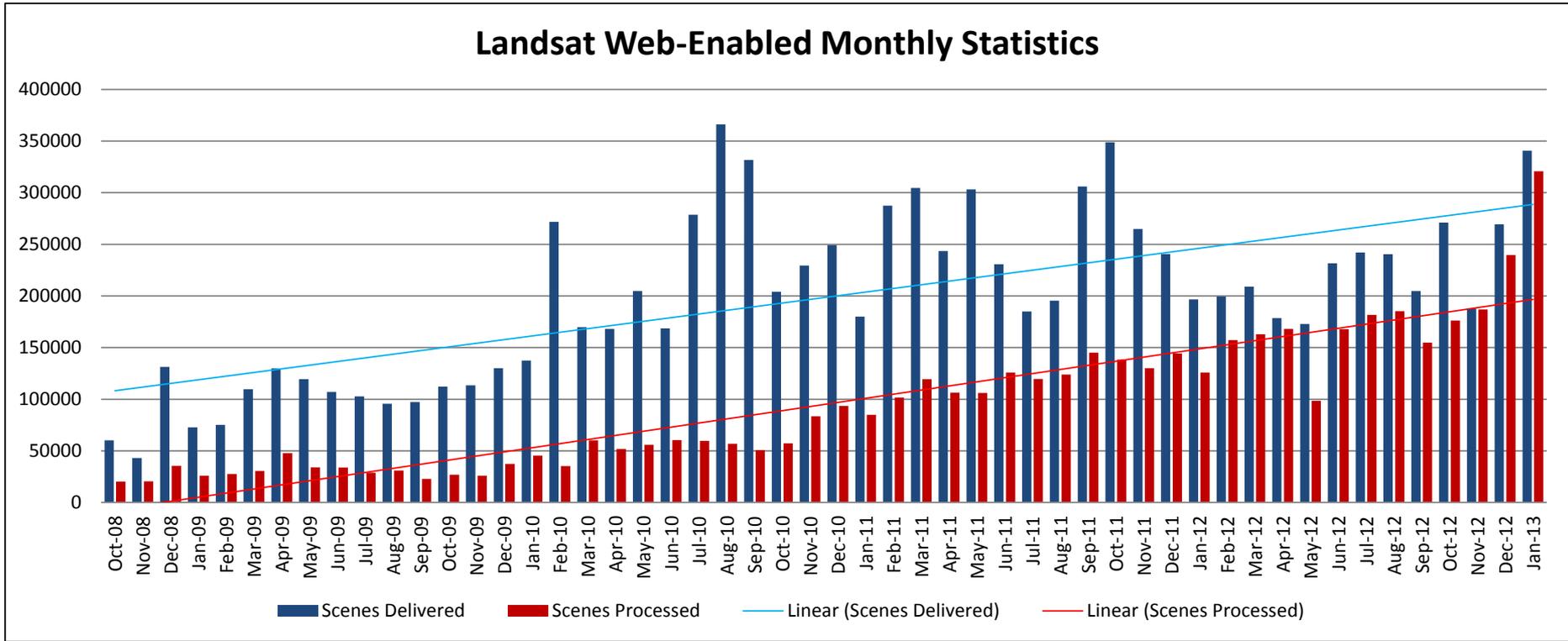
- 631,978 scenes
 - ♦ ~38 TB Raw and L0Ra Data
average scene size 32 MB

- **Total:**

- 3,757,021 scenes
 - ♦ ~2,252 TB Raw and L0Ra Data



Monthly Downloads / Processed



FY09 (Oct '08–Sep '09)

Delivered: 1.14M
Processed: 358K

FY10 (Oct '09–Sep '10)

Delivered: 2.45M
Processed: 567K

FY11 (Oct '10–Sep '11)

Delivered: 2.92M
Processed: 1.27M

FY12 (Oct '11–Sep '12)

Delivered: 2.73M
Processed: 1.82M

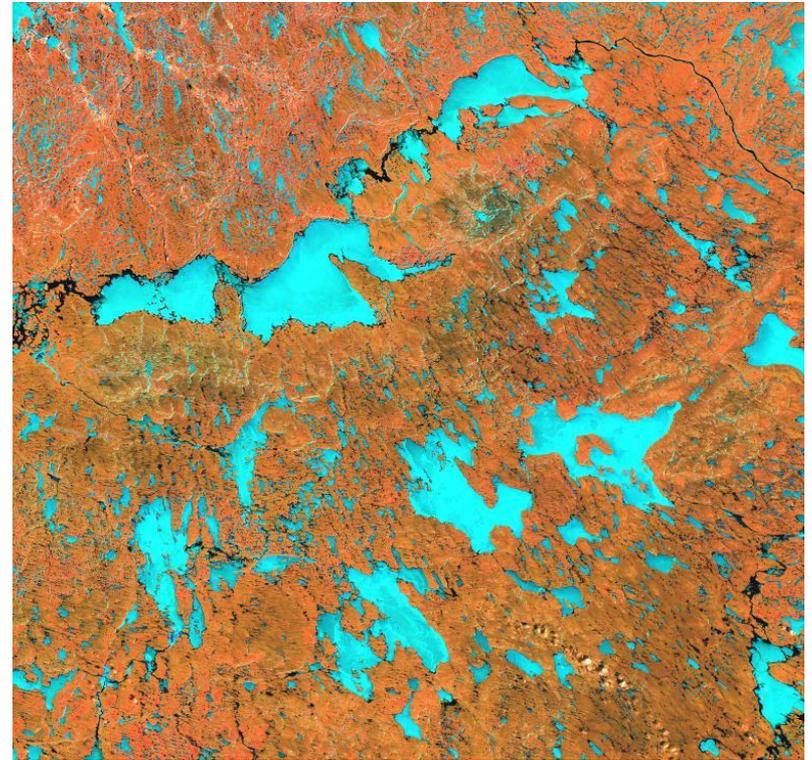
FY13 (Oct '12–Jan '12)

Delivered: 1.07M
Processed: 924K



Landsat Global Archive Consolidation (LGAC)

- Over **1.532 Million** scenes collected so far
 - Over 400,000 “New”
- **Critical goal of data preservation**
 - Especially oldest MSS data on aging media
 - Data format and processing method knowledge
- **Completed Canada, Germany, Taiwan, Indonesia, Puerto Rico**
- **Many stations in work**



Landsat 5 TM image transcribed from CCRS D-1 tape – available in archive

The Woodcock Metric

1,531,899

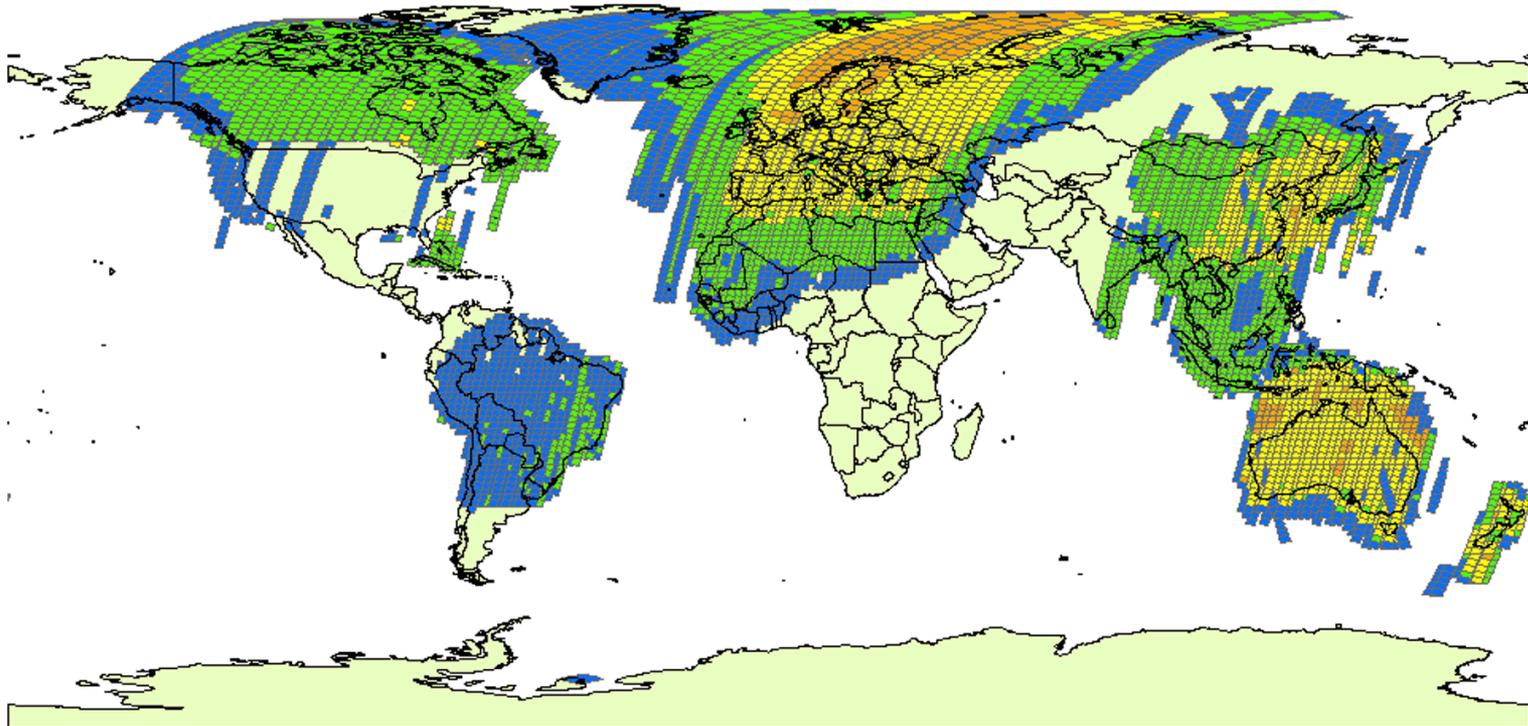
LGAC Statistics by Station

Ground Station ID	Country	Location	Organization	Original Estimate	Total Scenes Ingested (9/2010 - 2/2013)		
					MSS	TM	ETM+
CUB	Brazil	Cuiaba	INPE	480,000	0	276,254	13,364
COA	Argentina	Cordoba	CONAE	195,000	0	88,879	16,228
ASA	Australia	Alice Springs	GA-NEO	600,000	0	129,287	170,502
HOA	Australia	Hobart	GA-NEO		0	5,615	12,253
GNC	Canada	Gatineau	CCRS	660,000	0	53,004	37,867
PAC	Canada	Prince Albert	CCRS		0	369,687	100,212
BJC	China	Beijing	CEODE	415,000	0	66,241	21
KHC	China	KaShi	CEODE		0	14,597	0
MTI	Italy	Matera	ESA	1,545,000	0	2,866	0
FUI	Italy	Fucino	ESA		0	48	0
DKI	Indonesia	Parepare	LAPAN	42,000	0	15,975	28,568
HAI	Japan	Hatoyama	RETEC	403,000	0	1,634	22
HIJ	Japan	Hiroshima	HIT	18,000	0	0	39,102
JSA	South Africa	Hartebeesthoek	CSIR-SAC	153,000	0	53,411	124
BKT	Thailand	Bankok	GISTDA	240,000	0	5,313	23
NSG	Germany	Neustrelitz	DLR	23,000	0	0	163
CPE	Ecuador	Copaxi	CLIRSEN	80,000	0	15,515	0
ISP	India	Shadnagar	NRSA	97,000	0	0	0
RSA	Saudia Arabia	Riyahd	KACST/MAW	69,000	0	327	0
CLT	Taiwan	Chung Li	EOSAT/FRSC	18,000	0	11,586	0
UPR	Puerto Rico	Mayaguez	UPR	42,000	0	315	0
ULM	Mongolia	Ulan Bator	DLR	9,000	0	556	0
BIK	Kyrgyzstan	Bishkek	DLR		0	2,340	0
ISP	Pakistan	Islamabad		34000	0	0	0
TOTALS				5,123,000	0	1,189,783	486,451
					1,676,234		



Unique Data at Internatl Stations – ETM+

L7 ETM+ Scenes Held Only at IGS
(ASA, BJC, BKT, CUB, DKI, ESA, GNC, HAJ, HIJ, HOA, NSG, PAC)



Acquisition Date Range: July 02, 1999 through April 20, 2010

673,132 Total L7 ETM+ Scenes Acquired by IGS

341,326 (51%) Total L7 ETM+ Scenes in both archives (IGS and EROS)

331,806 (49%) Total L7 ETM+ Scenes only at IGS (not at EROS)

8,512 Unique L7 ETM+ Path/Rows

7,209 (85%) Unique L7 ETM+ Path/Rows in both archives (IGS and EROS)

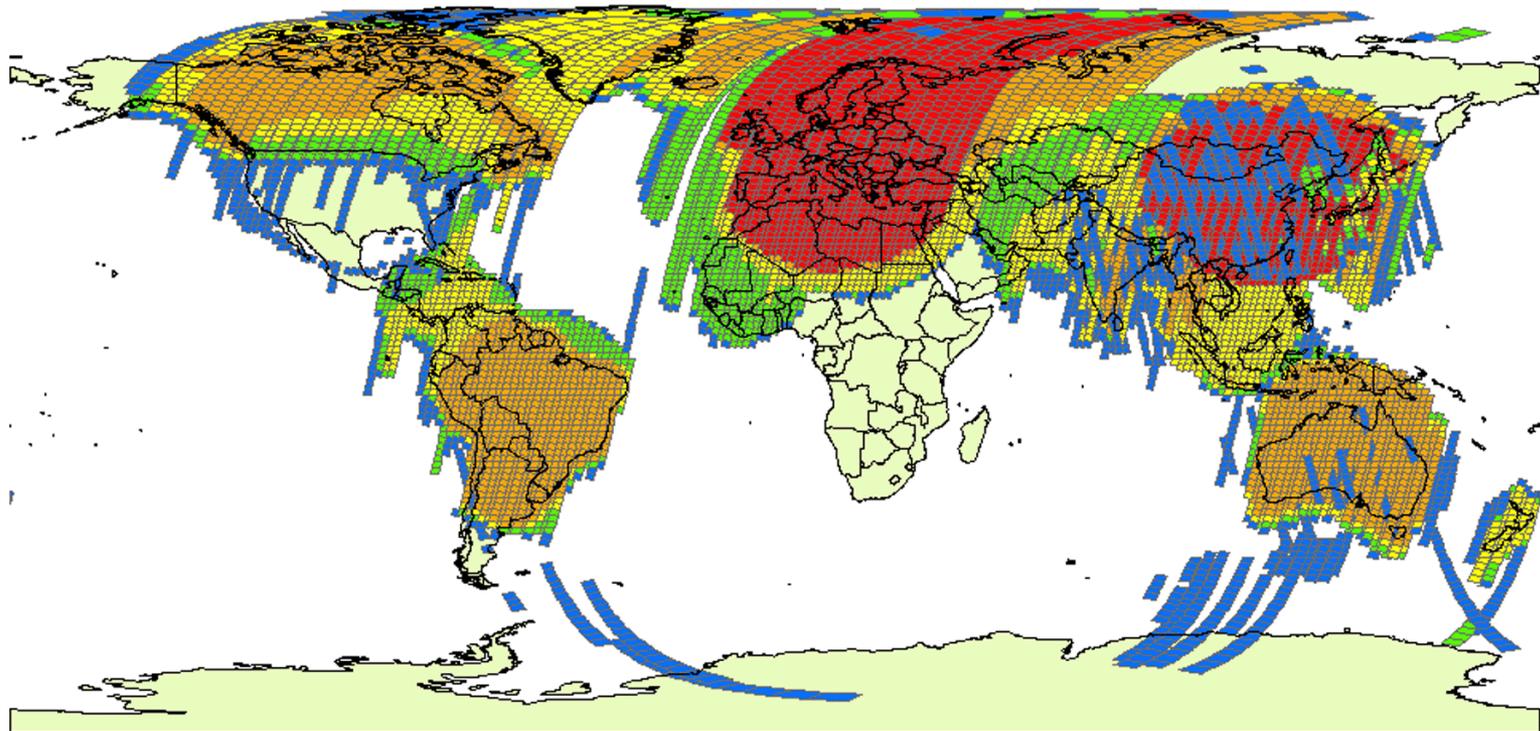
1,303 (15%) Unique L7 ETM+ Path/Rows only at IGS (not at EROS)

Blue 1 - 9 Green 10 - 49 Yellow 50 - 149 Orange 150 - 299



Unique Data at Internatl Stations – TM

L4-5 TM Scenes Held Only at IGS
(ASA, BJC, BKT, CPE, CUB, DKI, ESA, GNC, HAJ, HOA, ISP, PAC, SGI)



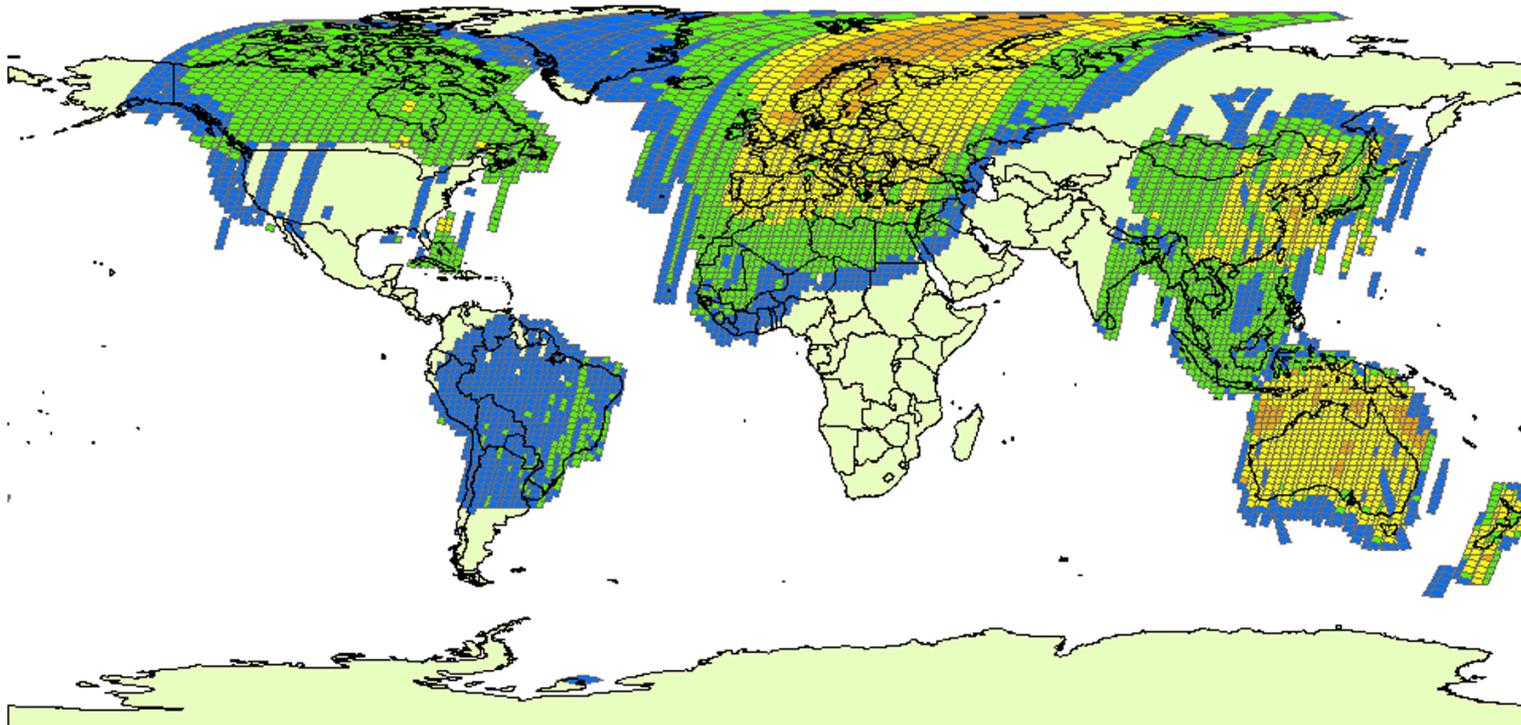
Acquisition Date Range: April 22, 1982 through April 20, 2010
2,800,211 Total L4-5 TM Scenes Acquired by IGS
426,852 (15%) Total L4-5 TM Scenes in both archives (IGS and EROS)
2,373,359 (85%) Total L4-5 TM Scenes only at IGS (not at EROS)
12,342 Unique L4-5 TM Path/Rows
8,518 (69%) Unique L4-5 TM Path/Rows in both archives (IGS and EROS)
3,824 (31%) Unique L4-5 TM Path/Rows only at IGS (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299 ■ 300+



Unique Data at Internatl Stations – MSS

L7 ETM+ Scenes Held Only at IGS
(ASA, BJC, BKT, CUB, DKI, ESA, GNC, HAJ, HIJ, HOA, NSG, PAC)



Acquisition Date Range: July 02, 1999 through April 20, 2010

673,132 Total L7 ETM+ Scenes Acquired by IGS

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8,512 Unique L7 ETM+ Path/Rows

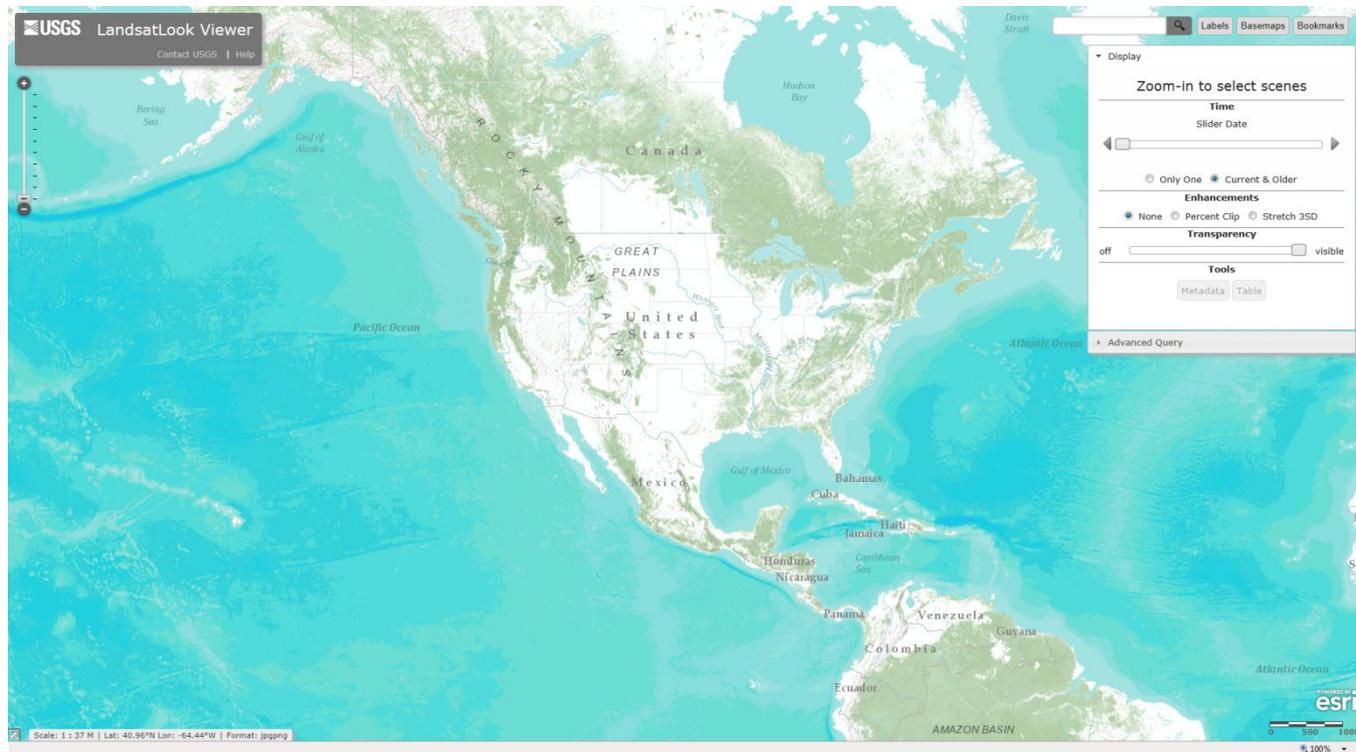
7,209 (85%) Unique L7 ETM+ Path/Rows in both archives (IGS and EROS)

1,303 (15%) Unique L7 ETM+ Path/Rows only at IGS (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299

LandsatLook Viewer

- Began prototype viewer using LandsatLook full resolution browse images
 - <http://landsatlook.usgs.gov>



Landsat Plans

- **Preparing for Landsat 8 operations**
- **Continue collection of LGAC data**
- **Complete TM-A algorithm transition to LPGS**
- **Continue modifications for MSS data**
- **Preparation for Top of Atmosphere reflectance product**
- **Investigating enhancements for data quality**
 - **Better cloud assessment scores**
 - **Improved geometric and radiometric accuracy**
 - **Quality band implementation**

Landsat Plans

- **Investigating LandsatLook browse change**
 - Currently jpeg format
 - Change to geotiff
- **Upcoming calibration update for Landsat 7**
- **Bulk download capability**
- **LandsatLook viewer – review of prototype**
- **EarthNow!**
 - Possible use of COVE tool (CEOS Visualization Environment)

Current COVE Tool

The screenshot displays the COVE Tool interface. At the top, the navigation menu includes: Home, About, COVE Tool, Rapid Aquisition Tool, Mission & Instrument Browser, Documentation, Help, Log In, and Exit Full Screen. Below the menu, regional filters for Africa, Antarctica, Asia, Australia, Europe, North America, and South America are visible.

The left sidebar, titled "Missions and Instruments", features two tabs: "Alphabetical" (selected) and "By Constellation". Under "Alphabetical", the following missions are listed:

- ALOS
- AVNIR-2 - 1584 km (Full Accessible)
- AVNIR-2 - 70 km (Standard)
- PALSAR - 870 km
- ALOS-2 (Notional)
- PALSAR-2 - Fine Beam Dual-Pol (200 km - 28.5-42.5 deg)
- PALSAR-2 - ScanSAR Dual-Pol (Right-Left Looking 350 km - 25.7-49.0 deg)
- PALSAR-2 - 1165 km (Full Accessible)

A filter input field contains the text "Filter (e.g. 'ALOS' or 'na:'. Below this, a "Time Span" section shows dates from 02/12/2013 to 02/13/2013. There are buttons for "Add Coincidence" and "Add Ground Swath".

The "Cart" section shows two items:

- LDCM: TIRS or OLI - 185 km (with a trash icon)
- Landsat-7: ETM - 185 km (with a trash icon)

The main area features a 3D globe with red and green orbital swaths. A vertical toolbar on the right includes: Help, Bookmarks, Regions, Collaborate, Import / Export, and Settings & Overlays. At the bottom of the globe, there is a search bar with the text "Enter a location" and a "Go" button. Attribution text at the bottom of the globe reads: "Data SIO, NOAA, U.S. Navy, NGA, GEBCO © 2013 Cnes/Spot Image © 2013 TerraMetrics Image IBCAO". The Google logo and "Terms of Use" link are also present.

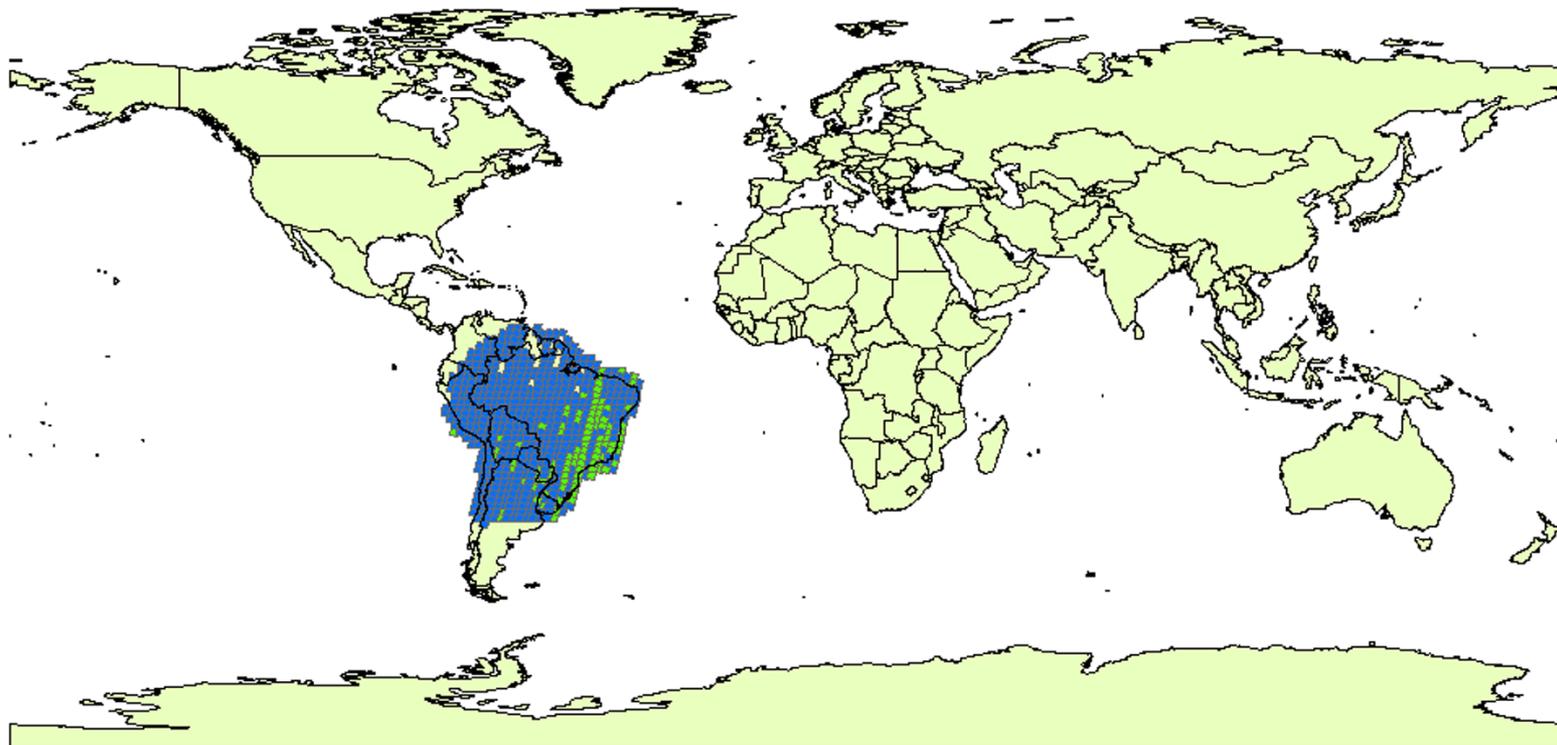


Unique Data at International Stations



Brazil – ETM+

L7 ETM+ Scenes Held Only at CUB



Acquisition Date Range: July 21, 1999 through June 01, 2003

11,348 Total L7 ETM+ Scenes Acquired by CUB

7,555 (67%) Total L7 ETM+ Scenes in both archives (CUB and EROS)

3,793 (33%) Total L7 ETM+ Scenes only at CUB (not at EROS)

662 Unique L7 ETM+ Path/Rows

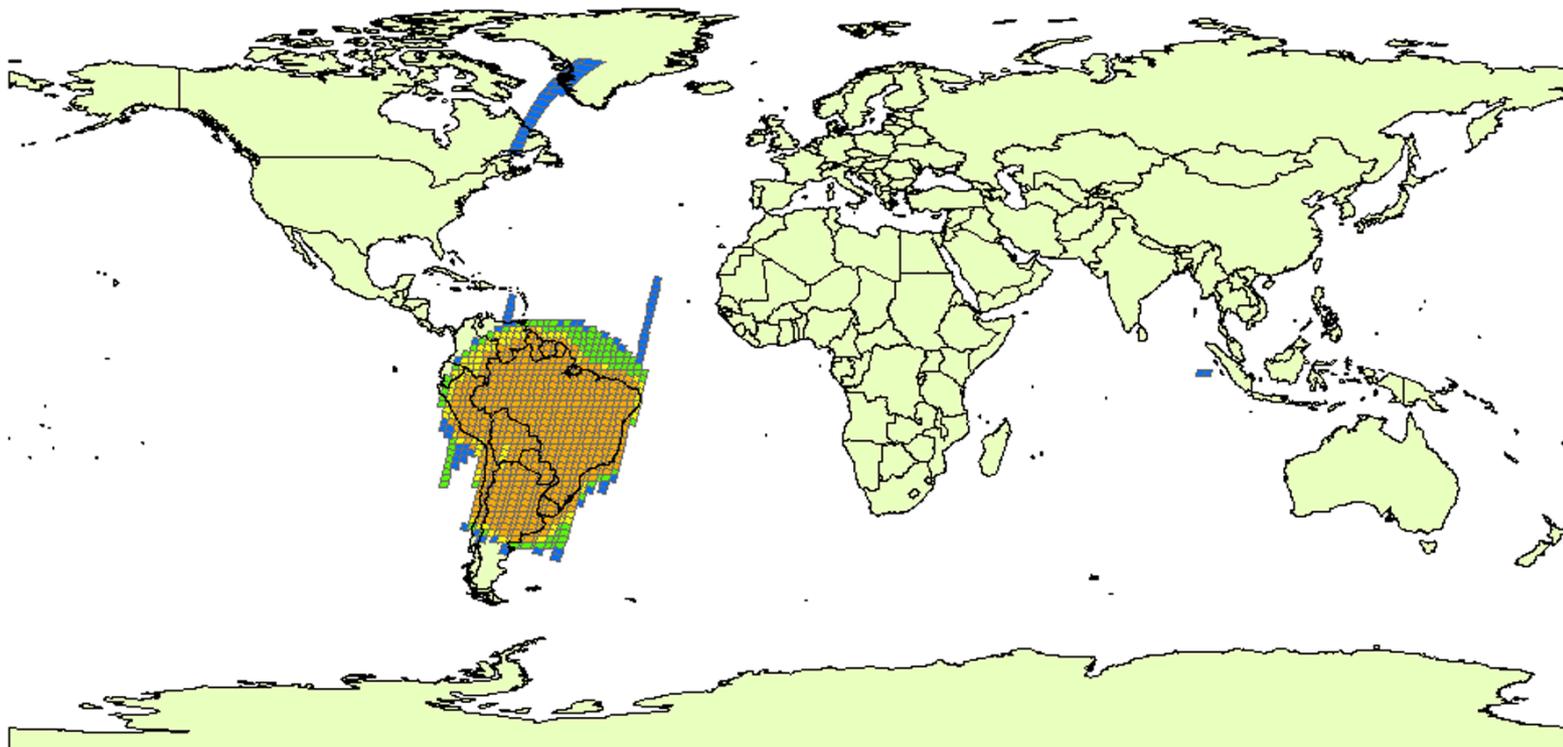
658 (99%) Unique L7 ETM+ Path/Rows in both archives (CUB and EROS)

4 (1%) Unique L7 ETM+ Path/Rows only at CUB (not at EROS)

■ 1 - 9 ■ 10 - 49

Brazil – TM

L5 TM Scenes Held Only at CUB



Acquisition Date Range: April 21, 1984 through February 27, 2010

140,143 Total L5 TM Scenes Acquired by CUB

14,472 (10%) Total L5 TM Scenes in both archives (CUB and EROS)

125,671 (90%) Total L5 TM Scenes only at CUB (not at EROS)

872 Unique L5 TM Path/Rows

727 (83%) Unique L5 TM Path/Rows in both archives (CUB and EROS)

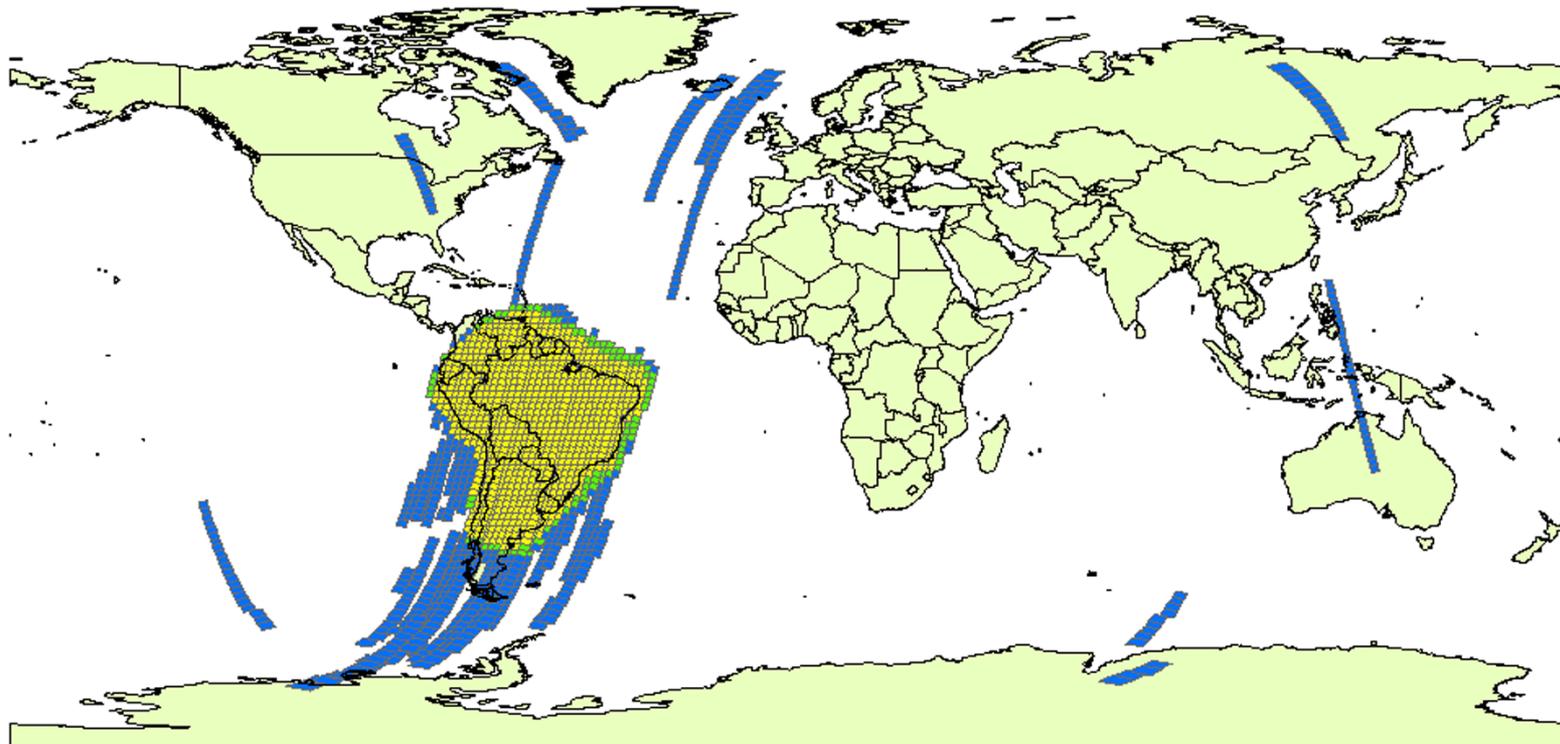
145 (17%) Unique L5 TM Path/Rows only at CUB (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299



Brazil – MSS

L1-3 MSS Scenes Held Only at CUB



Acquisition Date Range: May 21, 1973 through August 23, 1982

83,372 Total L1-3 MSS Scenes Acquired by CUB

3,423 (4%) Total L1-3 MSS Scenes in both archives (CUB and EROS)

79,949 (96%) Total L1-3 MSS Scenes only at CUB (not at EROS)

1,571 Unique L1-3 MSS Path/Rows

415 (26%) Unique L1-3 MSS Path/Rows in both archives (CUB and EROS)

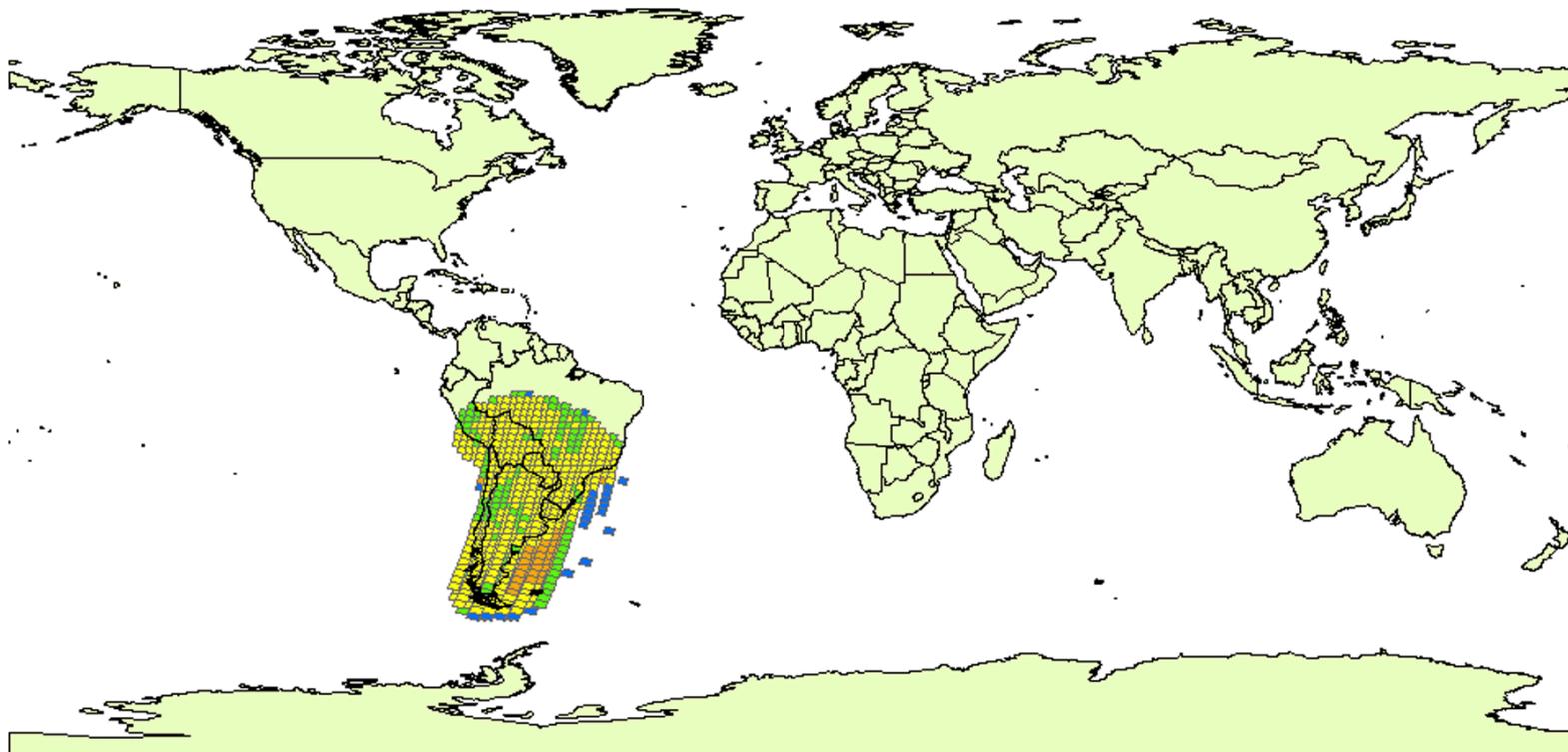
1,156 (74%) Unique L1-3 MSS Path/Rows only at CUB (not at EROS)

1 - 9 10 - 49 50 - 149



Argentina – ETM+

L7 ETM+ Scenes Held Only at COA



Acquisition Date Range: August 05, 1999 through June 01, 2010

119,183 Total L7 ETM+ Scenes Acquired by COA

75,965 (64%) Total L7 ETM+ Scenes in both archives (COA and EROS)

43,218 (36%) Total L7 ETM+ Scenes only at COA (not at EROS)

644 Unique L7 ETM+ Path/Rows

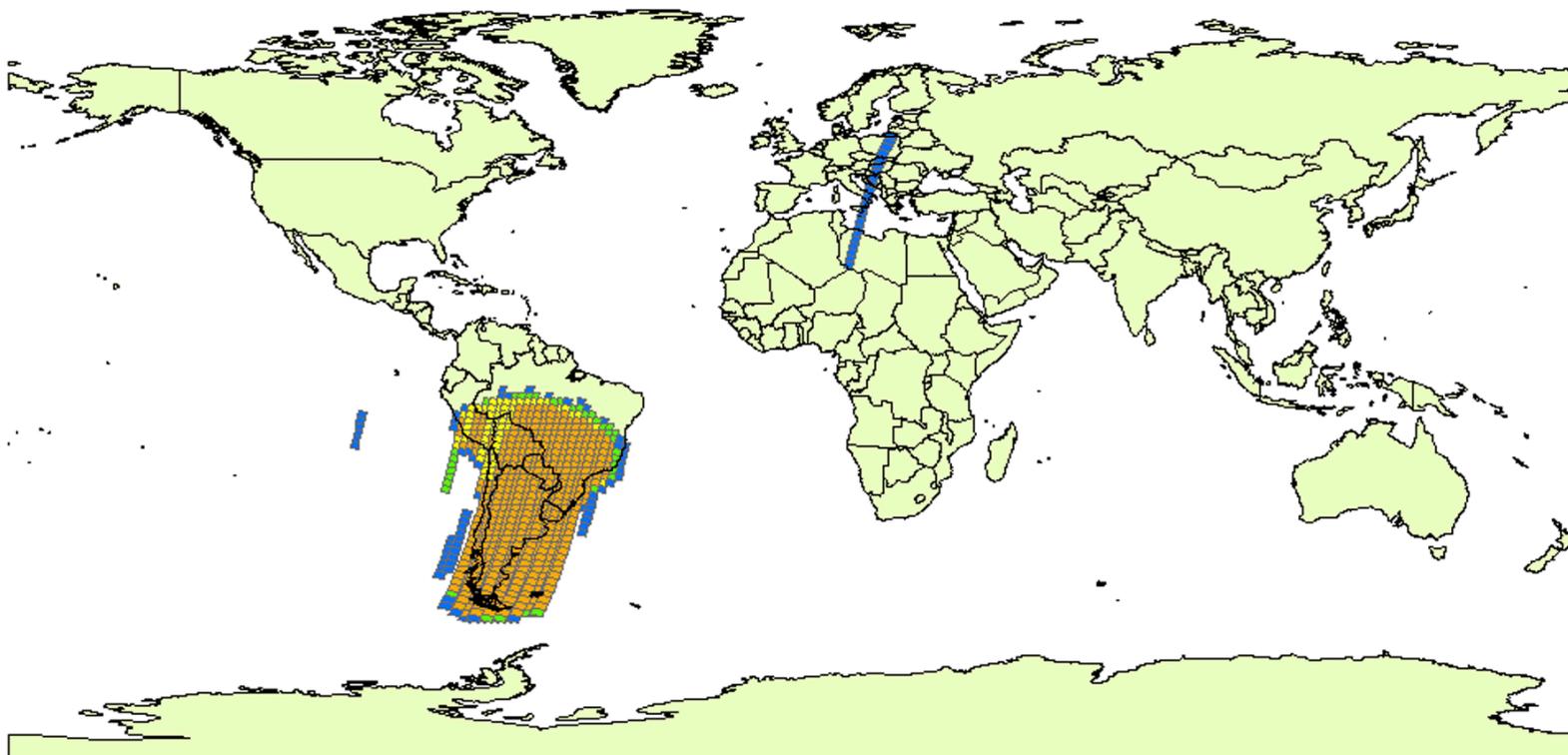
574 (89%) Unique L7 ETM+ Path/Rows in both archives (COA and EROS)

70 (11%) Unique L7 ETM+ Path/Rows only at COA (not at EROS)



Argentina – TM

L5 TM Scenes Held Only at COA



Acquisition Date Range: January 21, 1997 through June 17, 2010

134,347 Total L5 TM Scenes Acquired by COA

15,056 (11%) Total L5 TM Scenes in both archives (COA and EROS)

119,291 (89%) Total L5 TM Scenes only at COA (not at EROS)

705 Unique L5 TM Path/Rows

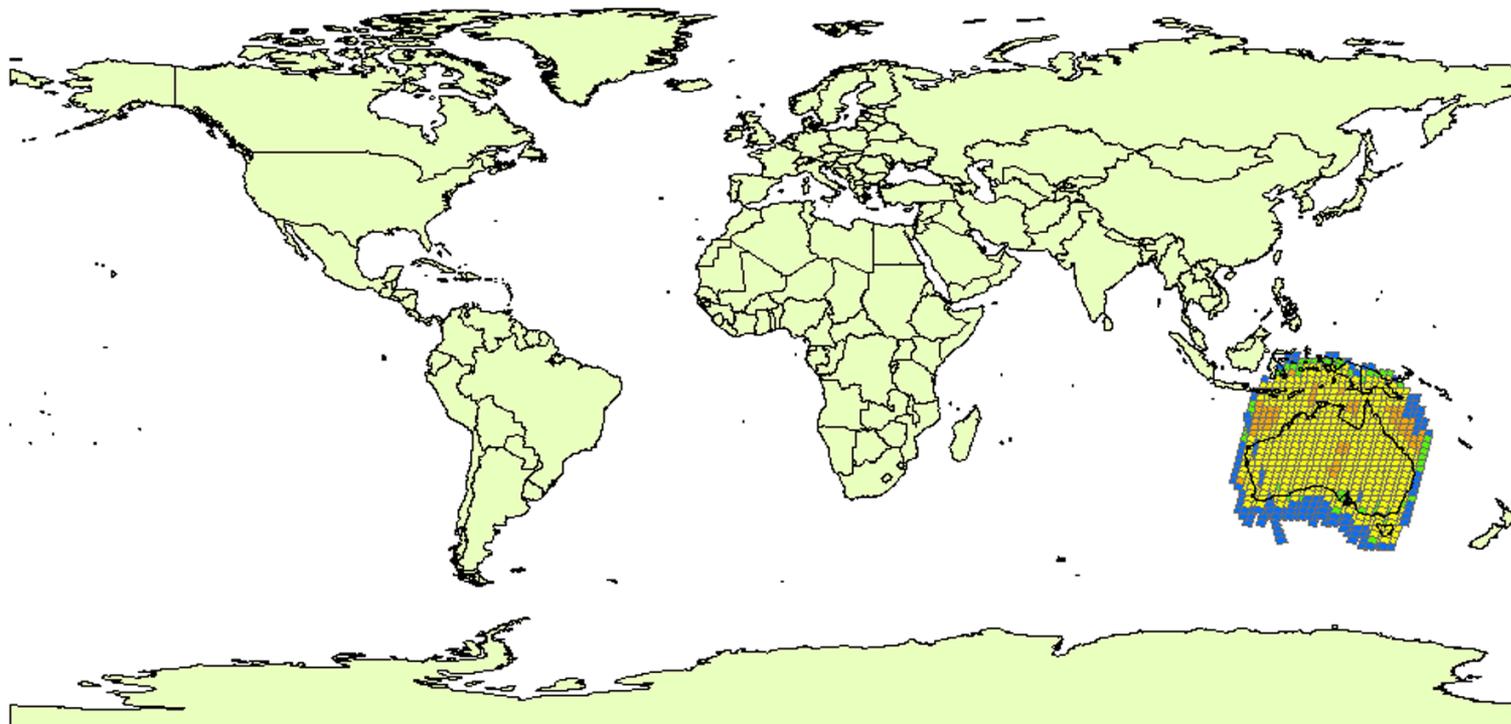
552 (78%) Unique L5 TM Path/Rows in both archives (COA and EROS)

153 (22%) Unique L5 TM Path/Rows only at COA (not at EROS)

1 - 9 10 - 49 50 - 149 150 - 299

Australia (Alice Springs) – ETM+

L7 ETM+ Scenes Held Only at ASA



Acquisition Date Range: July 06, 1999 through April 20, 2010

135,101 Total L7 ETM+ Scenes Acquired by ASA

78,892 (58%) Total L7 ETM+ Scenes in both archives (ASA and EROS)

56,209 (42%) Total L7 ETM+ Scenes only at ASA (not at EROS)

784 Unique L7 ETM+ Path/Rows

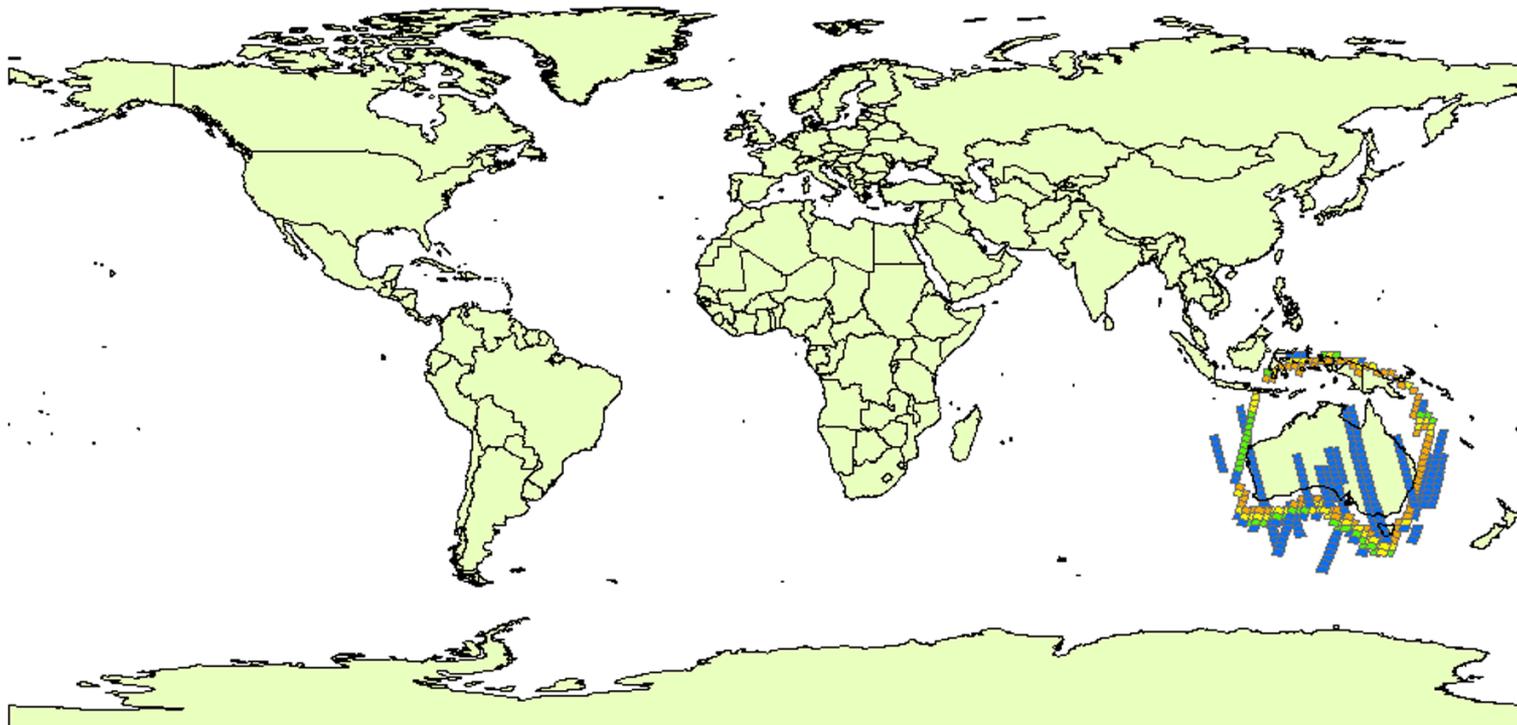
671 (86%) Unique L7 ETM+ Path/Rows in both archives (ASA and EROS)

113 (14%) Unique L7 ETM+ Path/Rows only at ASA (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299

Australia (Alice Springs) – TM

L5 TM Scenes Held Only at ASA



Acquisition Date Range: August 15, 1986 through April 20, 2010

240,454 Total L5 TM Scenes Acquired by ASA

77,809 (32%) Total L5 TM Scenes in both archives (ASA and EROS)

162,645 (68%) Total L5 TM Scenes only at ASA (not at EROS)

948 Unique L5 TM Path/Rows

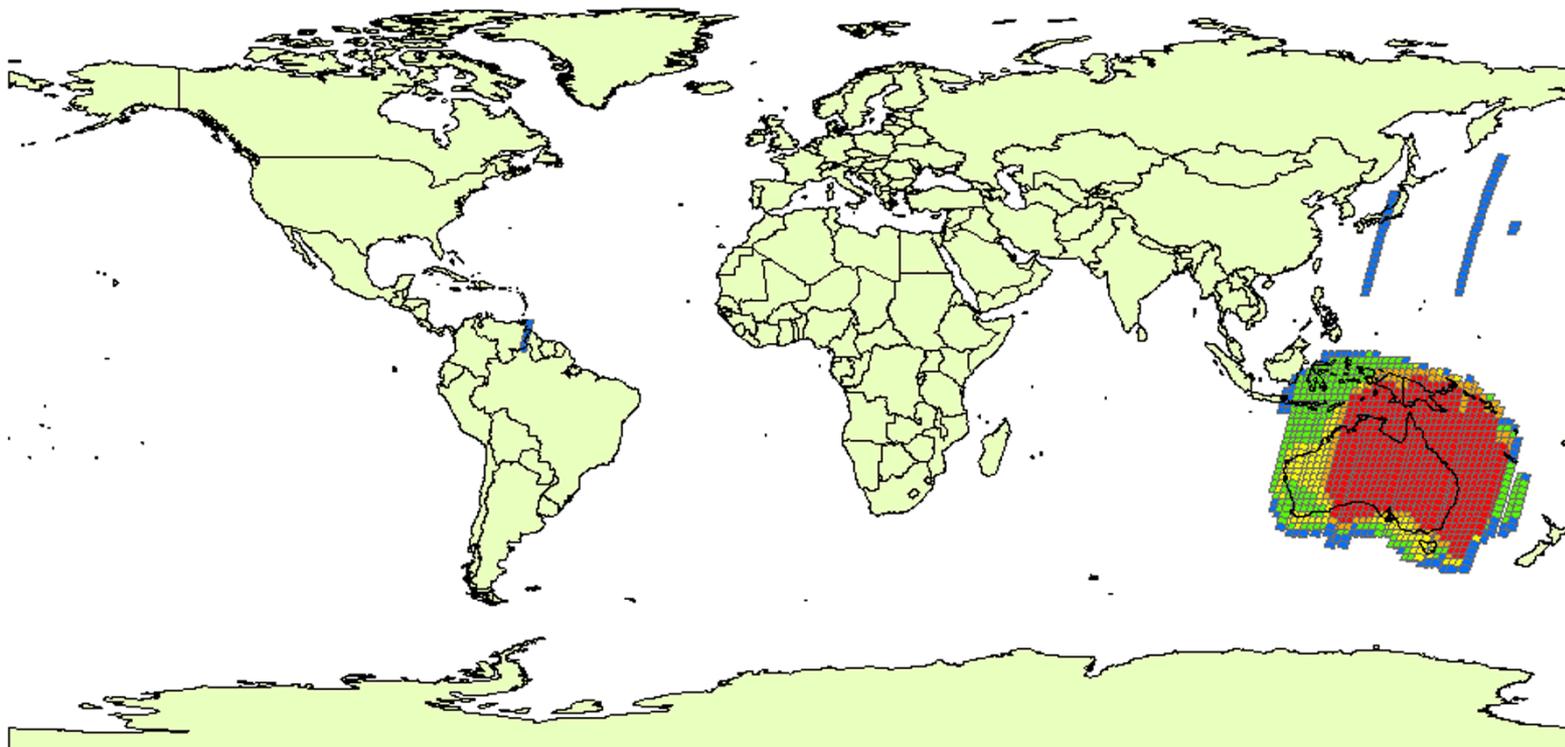
731 (77%) Unique L5 TM Path/Rows in both archives (ASA and EROS)

217 (23%) Unique L5 TM Path/Rows only at ASA (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299 ■ 300+

Australia (Alice Springs) – MSS

MSS Scenes Held Only at ASA



Acquisition Date Range: September 14, 1979 through December 01, 1997

236,310 Total MSS Scenes Acquired by ASA

2,226 (1%) Total MSS Scenes in both archives (ASA and EROS)

234,084 (99%) Total MSS Scenes only at ASA (not at EROS)

1,127 Unique MSS Path/Rows

438 (39%) Unique MSS Path/Rows in both archives (ASA and EROS)

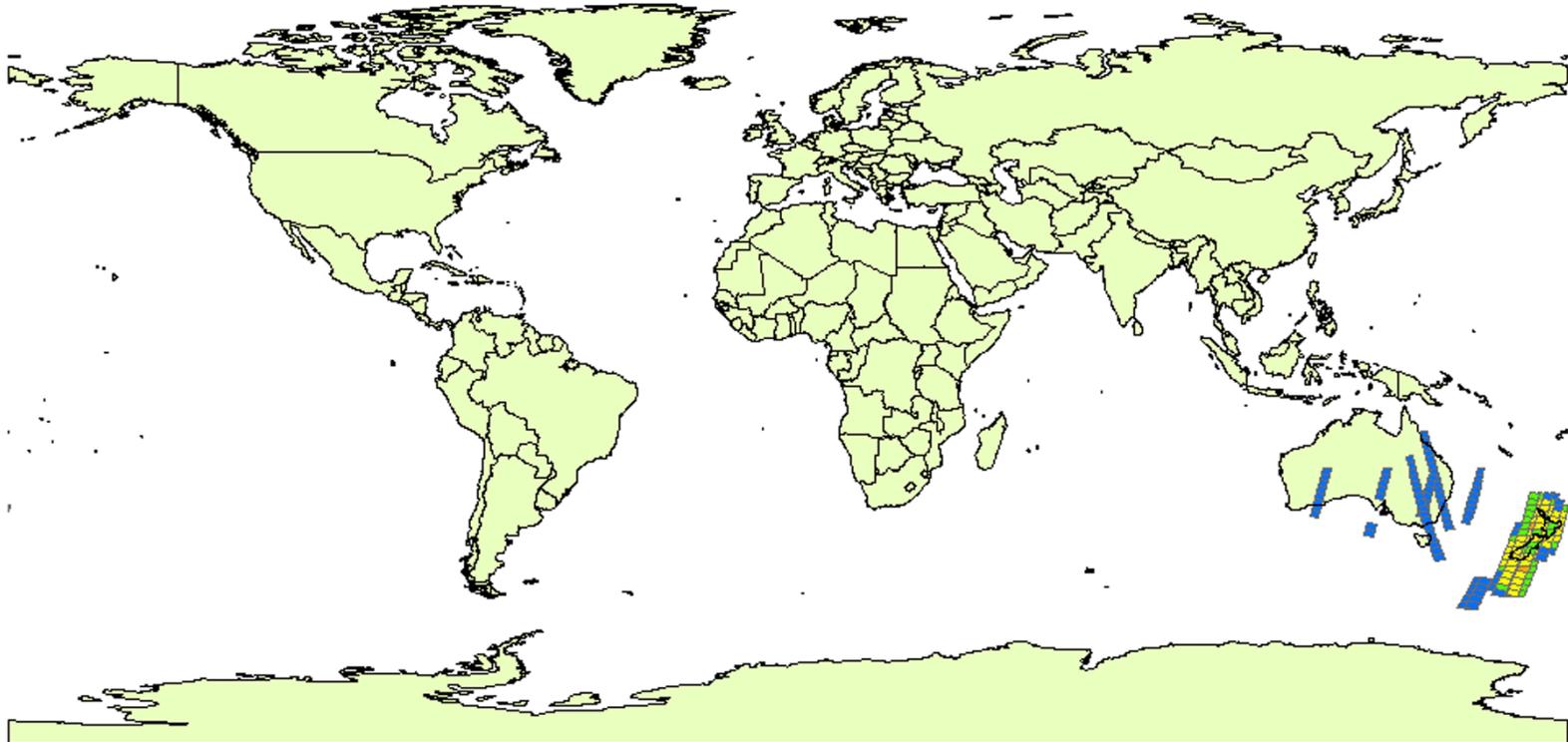
689 (61%) Unique MSS Path/Rows only at ASA (not at EROS)

1 - 9 10 - 49 50 - 149 150 - 299 300+



Australia (Hobart) – ETM+

L7 ETM+ Scenes Held Only at HOA



Acquisition Date Range: July 16, 1999 through March 31, 2010

12,103 Total L7 ETM+ Scenes Acquired by HOA

7,084 (59%) Total L7 ETM+ Scenes in both archives (HOA and EROS)

5,019 (41%) Total L7 ETM+ Scenes only at HOA (not at EROS)

190 Unique L7 ETM+ Path/Rows

104 (55%) Unique L7 ETM+ Path/Rows in both archives (HOA and EROS)

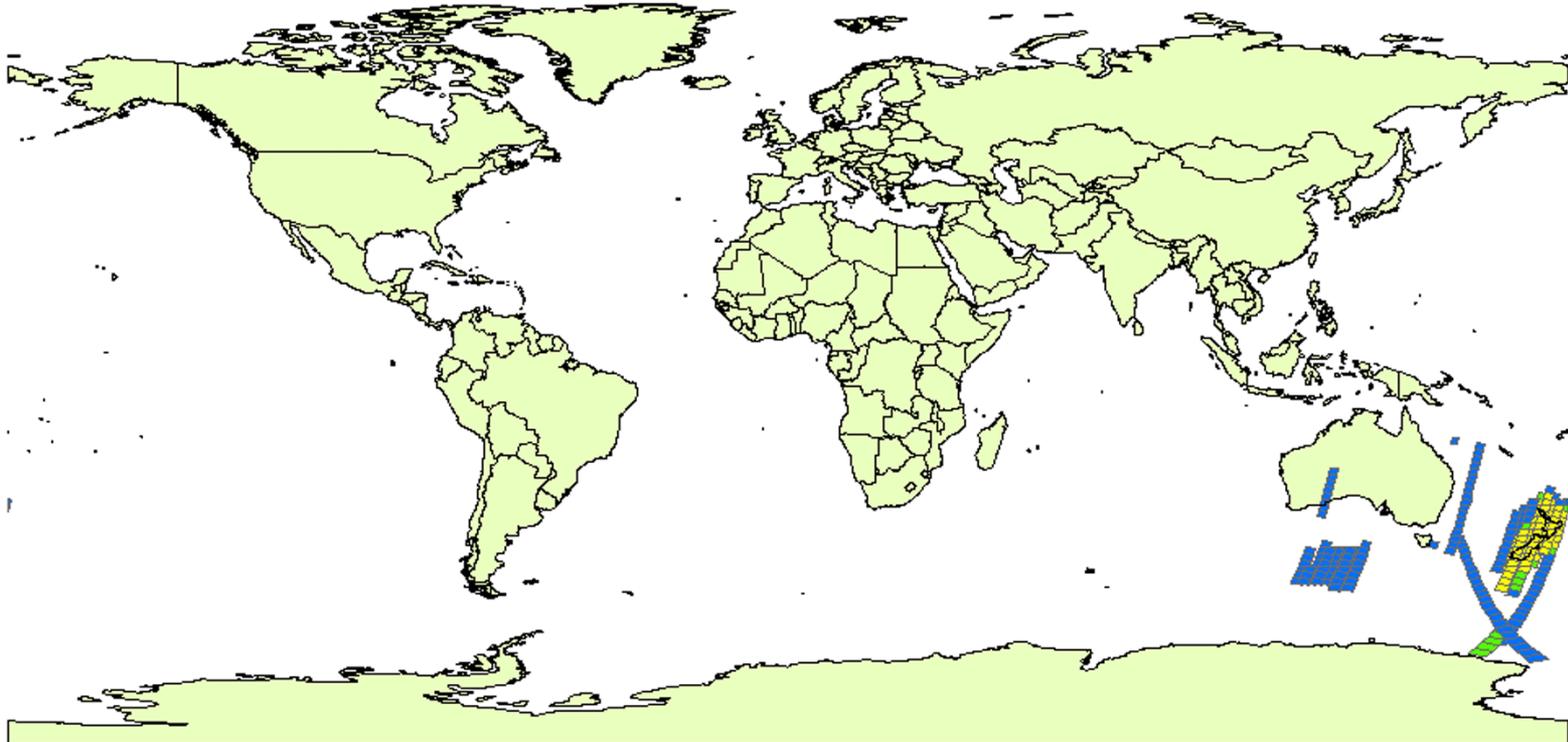
86 (45%) Unique L7 ETM+ Path/Rows only at HOA (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299



Australia (Hobart) – TM

L5 TM Scenes Held Only at HOA



Acquisition Date Range: June 03, 1999 through January 21, 2010

5,523 Total L5 TM Scenes Acquired by HOA

320 (6%) Total L5 TM Scenes in both archives (HOA and EROS)

5,203 (94%) Total L5 TM Scenes only at HOA (not at EROS)

304 Unique L5 TM Path/Rows

135 (64%) Unique L5 TM Path/Rows in both archives (HOA and EROS)

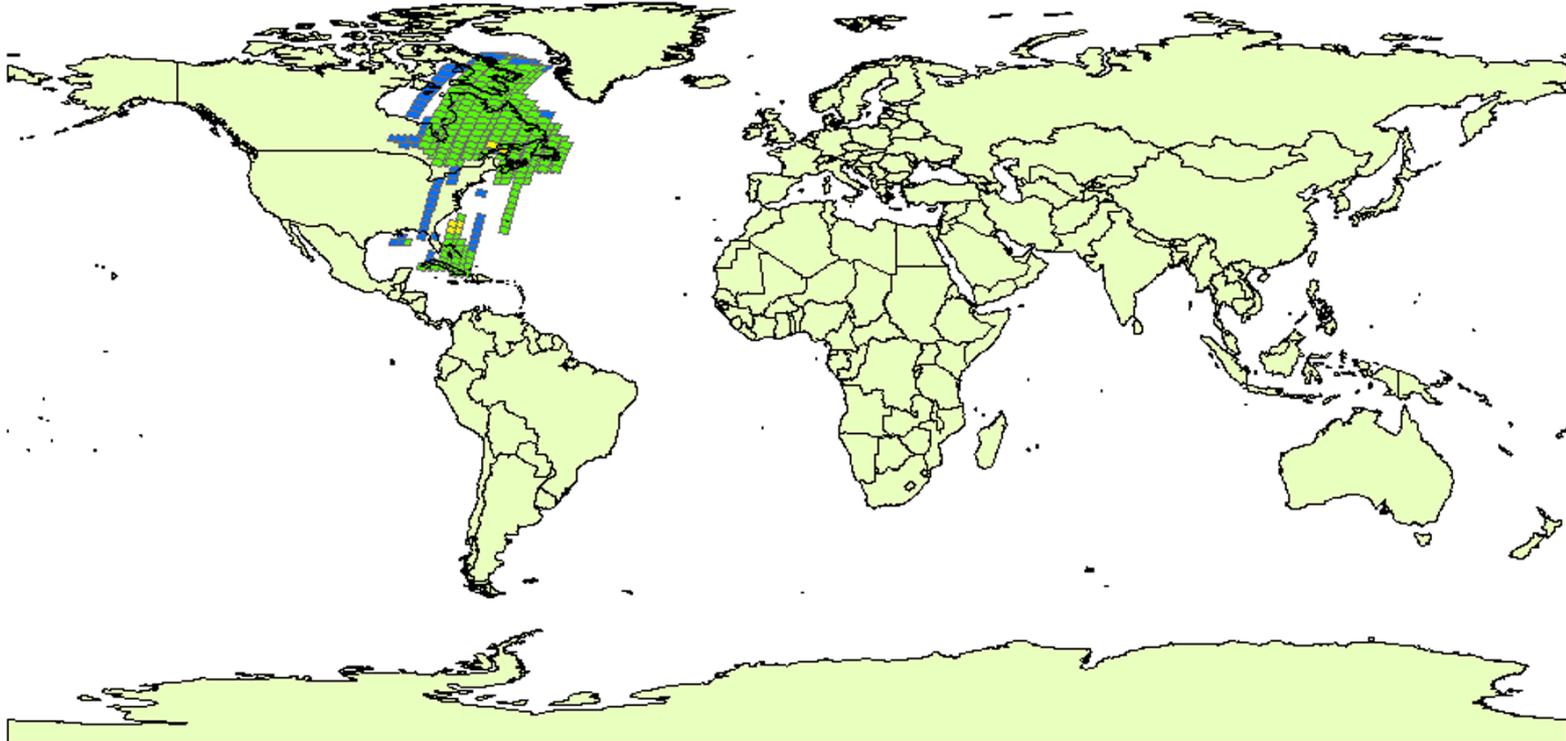
169 (36%) Unique L5 TM Path/Rows only at HOA (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149



Canada (Gatineau) – ETM+

L7 ETM+ Scenes Held Only at GNC



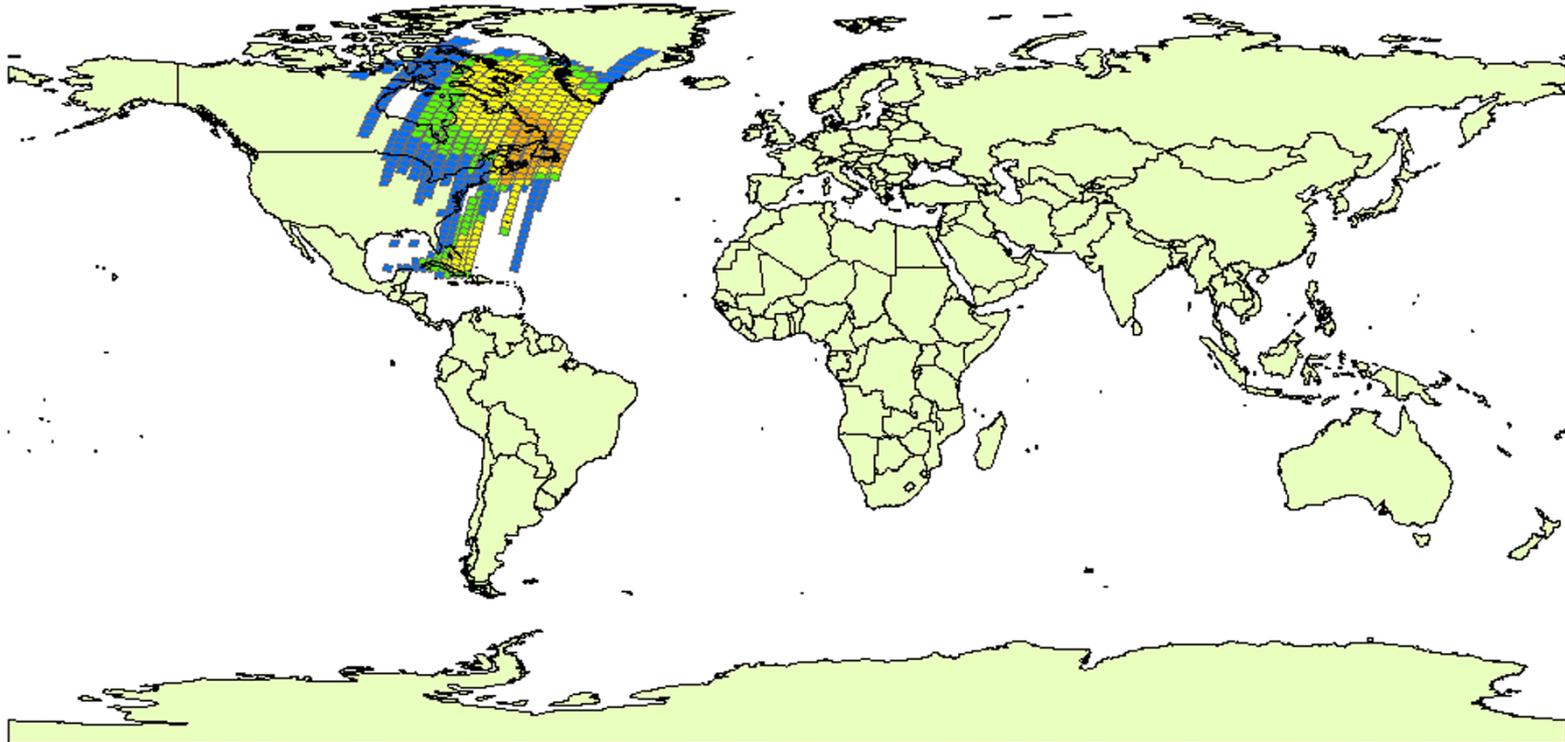
Acquisition Date Range: July 06, 1999 through April 01, 2006
39,706 Total L7 ETM+ Scenes Acquired by GNC
30,284 (76%) Total L7 ETM+ Scenes in both archives (GNC and EROS)
9,422 (24%) Total L7 ETM+ Scenes only at GNC (not at EROS)
642 Unique L7 ETM+ Path/Rows
601 (94%) Unique L7 ETM+ Path/Rows in both archives (GNC and EROS)
41 (6%) Unique L7 ETM+ Path/Rows only at GNC (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149



Canada (Gatineau) – TM

L4-5 TM Scenes Held Only at GNC



Acquisition Date Range: August 22, 1982 through June 29, 2009

89,028 Total L4-5 TM Scenes Acquired by GNC

43,111 (48%) Total L4-5 TM Scenes in both archives (GNC and EROS)

45,917 (52%) Total L4-5 TM Scenes only at GNC (not at EROS)

992 Unique L4-5 TM Path/Rows

773 (78%) Unique L4-5 TM Path/Rows in both archives (GNC and EROS)

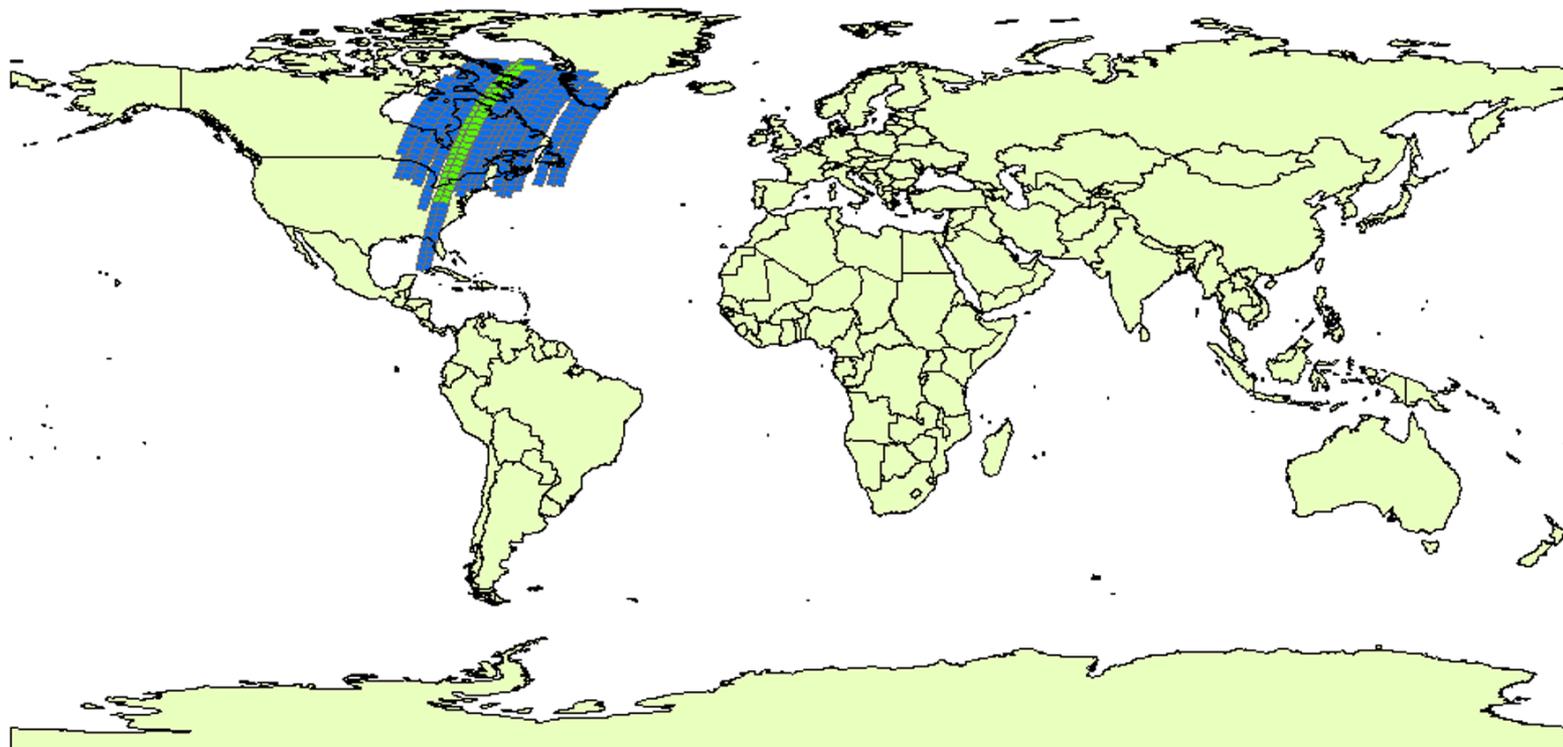
219 (22%) Unique L4-5 TM Path/Rows only at GNC (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299



Canada (Gatineau) – MSS

L5 MSS Scenes Held Only at GNC



Acquisition Date Range: July 29, 1992 through May 10, 1999

1,327 Total L5 MSS Scenes Acquired by GNC

6 (1%) Total L5 MSS Scenes in both archives (GNC and EROS)

1,321 (99%) Total L5 MSS Scenes only at GNC (not at EROS)

413 Unique L5 TM Path/Rows

6 (1%) Unique L5 MSS Path/Rows in both archives (GNC and EROS)

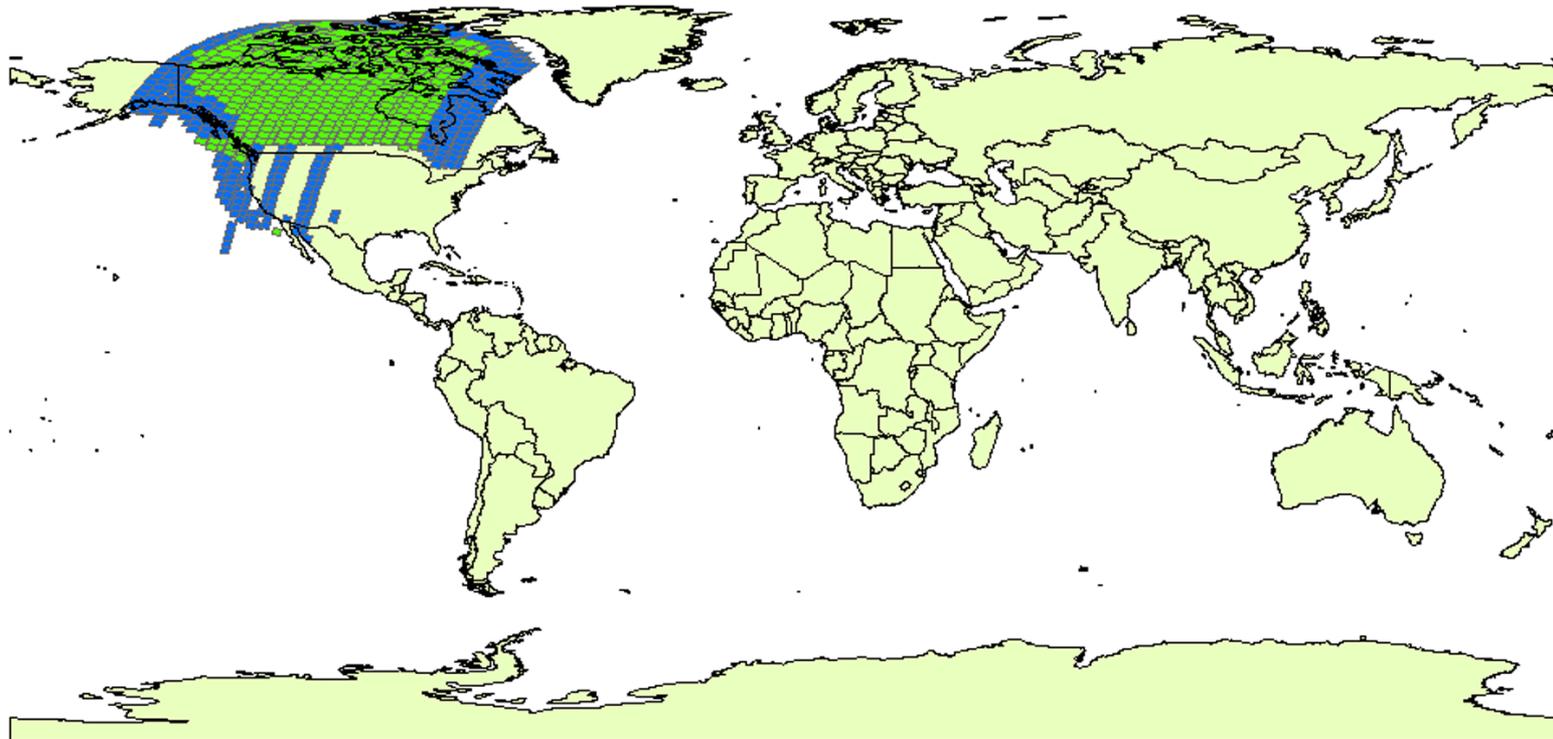
407 (99%) Unique L5 MSS Path/Rows only at GNC (not at EROS)

■ 1 - 9 ■ 10 - 49



Canada (Prince Albert) – ETM+

L7 ETM+ Scenes Held Only at PAC



Acquisition Date Range: July 06, 1999 through April 01, 2006

101,976 Total L7 ETM+ Scenes Acquired by PAC

76,895 (75%) Total L7 ETM+ Scenes in both archives (PAC and EROS)

25,081 (25%) Total L7 ETM+ Scenes only at PAC (not at EROS)

1,564 Unique L7 ETM+ Path/Rows

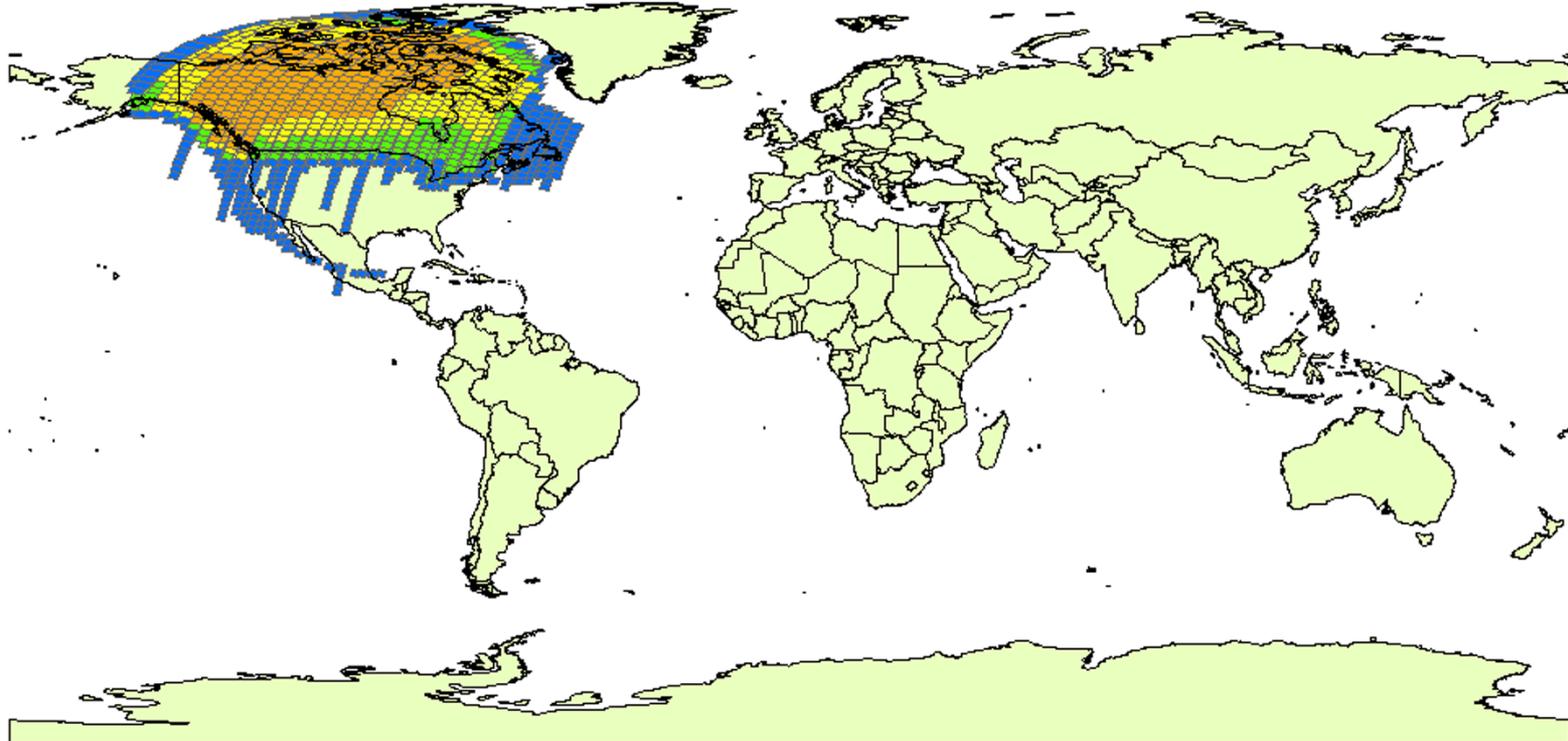
1,469 (94%) Unique L7 ETM+ Path/Rows in both archives (PAC and EROS)

1,145 (6%) Unique L7 ETM+ Path/Rows only at PAC (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149

Canada (Prince Albert) – TM

L4-5 TM Scenes Held Only at PAC



Acquisition Date Range: October 21, 1982 through June 29, 2009

300,184 Total L4-5 TM Scenes Acquired by PAC

139,348 (46%) Total L4-5 TM Scenes in both archives (PAC and EROS)

160,836 (54%) Total L4-5 TM Scenes only at PAC (not at EROS)

1,846 Unique L4-5 TM Path/Rows

1,547 (84%) Unique L4-5 TM Path/Rows in both archives (PAC and EROS)

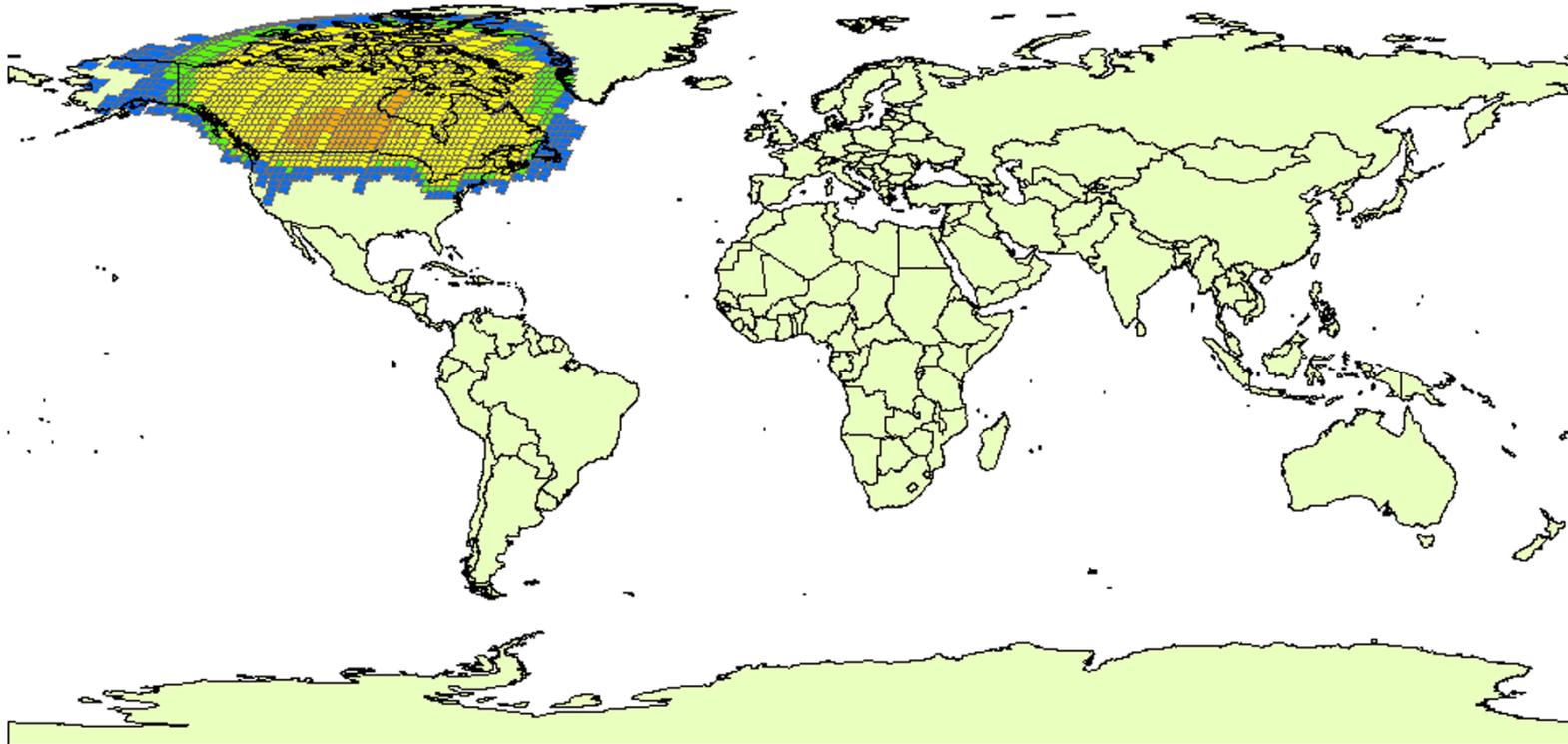
299 (16%) Unique L4-5 TM Path/Rows only at PAC (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299



Canada (Prince Albert) – MSS

MSS Scenes Held Only at PAC



Acquisition Date Range: August 07, 1972 through August 26, 1999

151,899 Total MSS Scenes Acquired by PAC

16,121 (11%) Total MSS Scenes in both archives (PAC and EROS)

135,778 (89%) Total MSS Scenes only at PAC (not at EROS)

1,795 Unique MSS Path/Rows

1,315 (73%) Unique MSS Path/Rows in both archives (PAC and EROS)

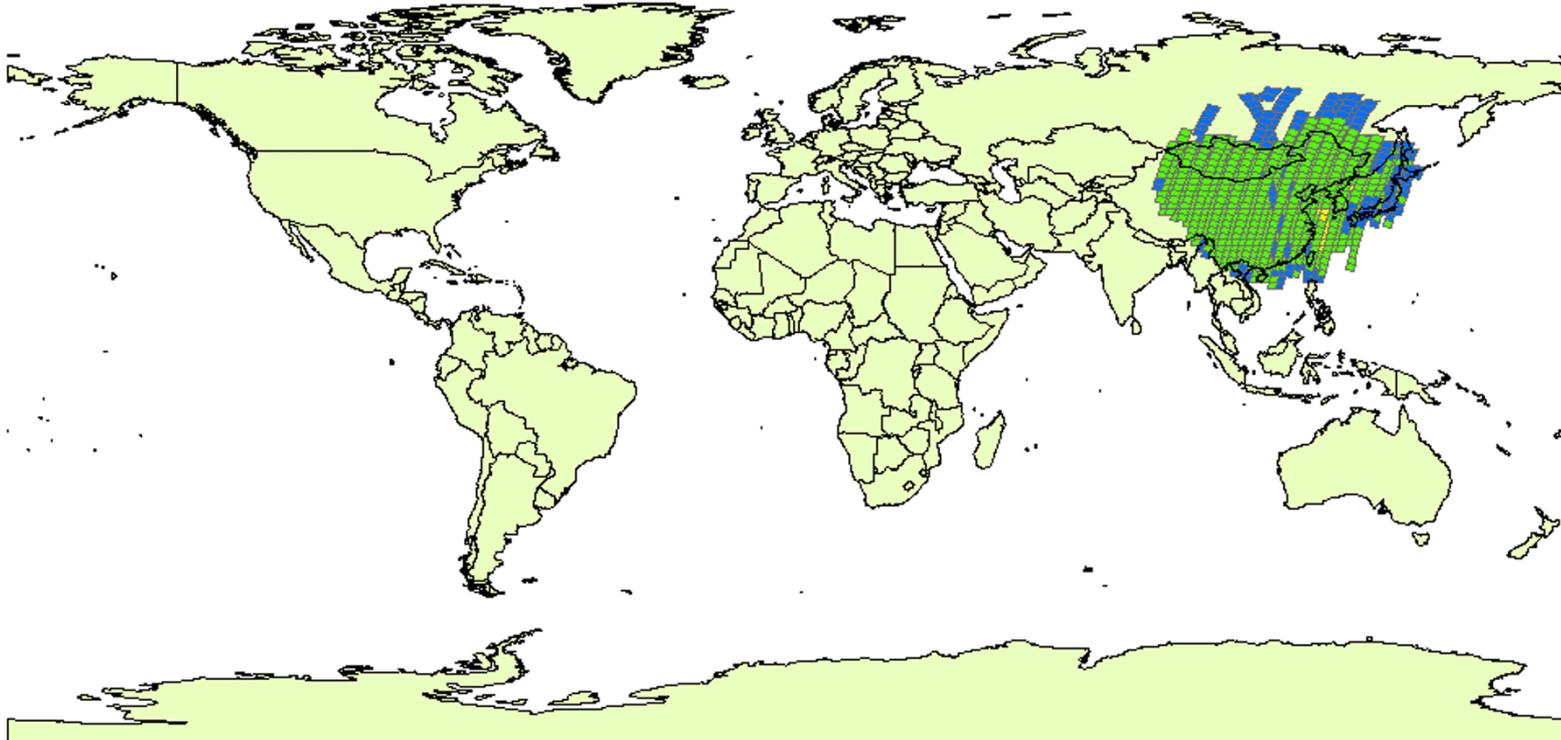
480 (27%) Unique MSS Path/Rows only at PAC (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299



China – ETM+

L7 ETM+ Scenes Held Only at BJC



Acquisition Date Range: July 02, 1999 through November 23, 2006

47,122 Total L7 ETM+ Scenes Acquired by BJC

26,806 (57%) Total L7 ETM+ Scenes in both archives (BJC and EROS)

20,316 (43%) Total L7 ETM+ Scenes only at BJC (not at EROS)

1,091 Unique L7 ETM+ Path/Rows

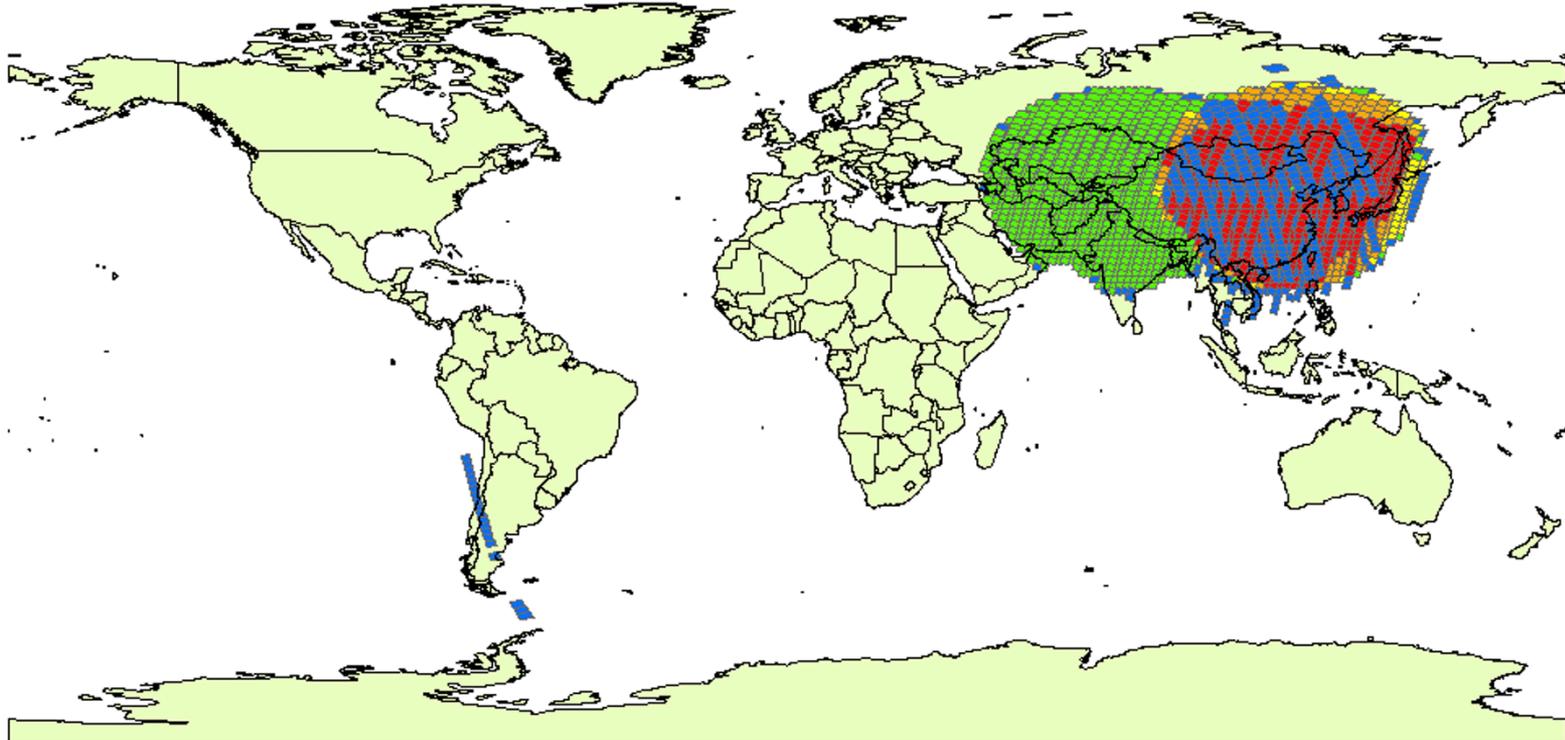
972 (89%) Unique L7 ETM+ Path/Rows in both archives (BJC and EROS)

119 (11%) Unique L7 ETM+ Path/Rows only at BJC (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149

China – TM

L5 TM Scenes Held Only at BJC



Acquisition Date Range: April 16, 1986 through June 15, 2009

401,972 Total L5 TM Scenes Acquired by BJC

15,077 (4%) Total L5 TM Scenes in both archives (BJC and EROS)

386,895 (96%) Total L5 TM Scenes only at BJC (not at EROS)

2,707 Unique L5 TM Path/Rows

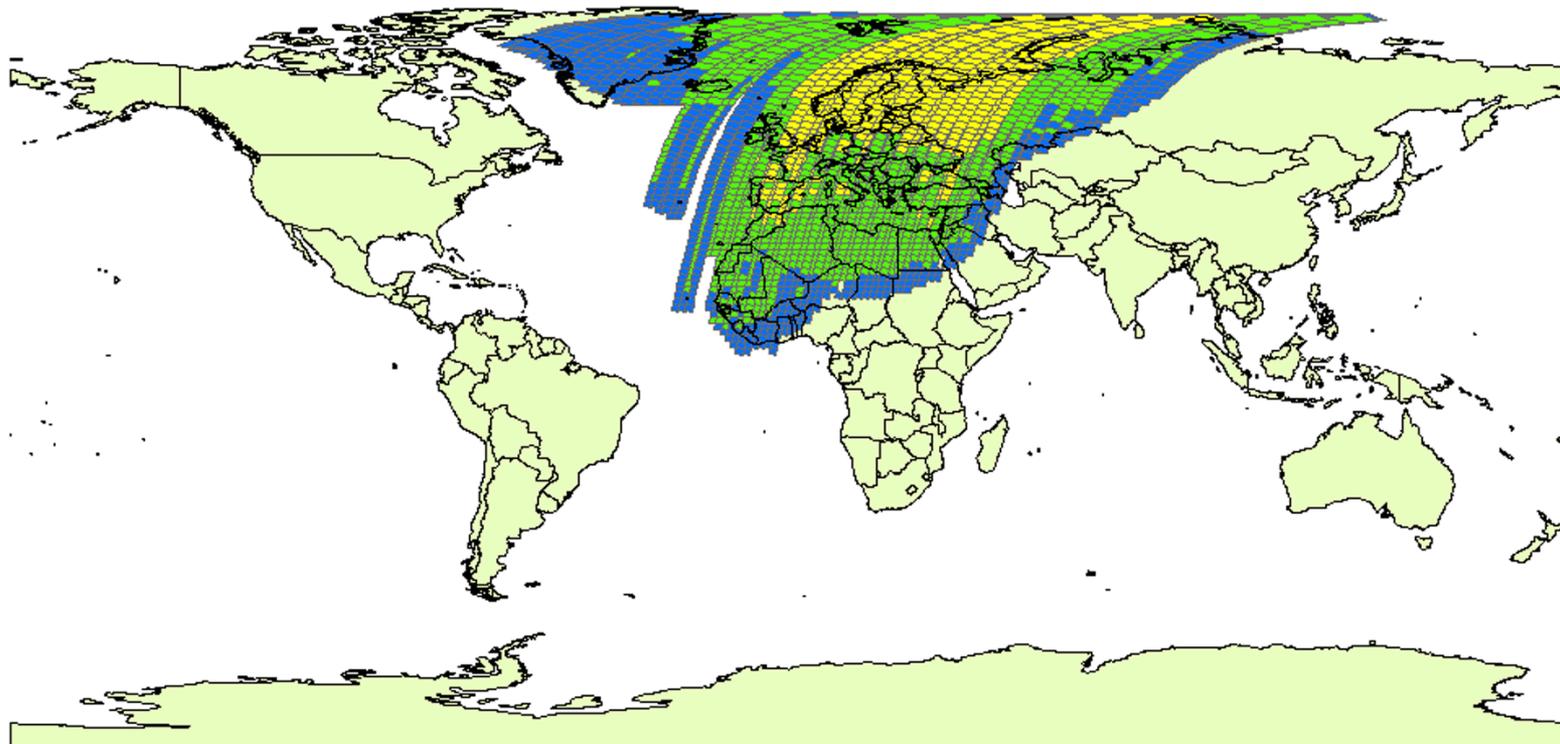
1,735 (64%) Unique L5 TM Path/Rows in both archives (BJC and EROS)

972 (36%) Unique L5 TM Path/Rows only at BJC (not at EROS)

■ 1 - 10 ■ 11 - 49 ■ 50 - 149 ■ 150 - 299 ■ 300+

ESA – ETM+

L7 ETM+ Scenes Held Only at ESA



Acquisition Date Range: July 09, 1999 through December 31, 2003

174,770 Total L7 ETM+ Scenes Acquired by ESA

51,175 (29%) Total L7 ETM+ Scenes in both archives (ESA and EROS)

123,595 (71%) Total L7 ETM+ Scenes only at ESA (not at EROS)

3,313 Unique L7 ETM+ Path/Rows

2,574 (78%) Unique L7 ETM+ Path/Rows in both archives (ESA and EROS)

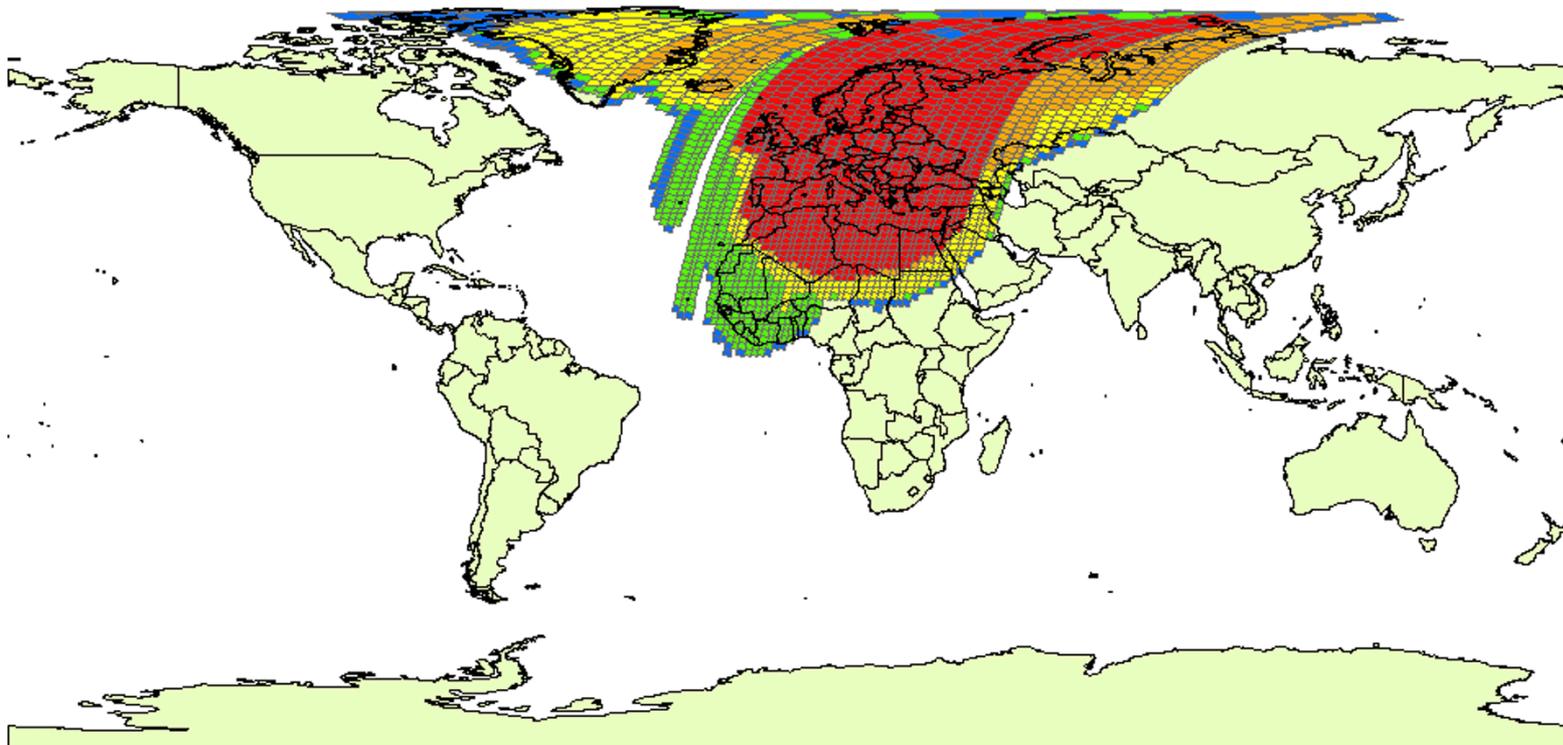
739 (22%) Unique L7 ETM+ Path/Rows only at ESA (not at EROS)

1 - 9 10 - 49 50 - 149 150 - 299



ESA – TM

L5 TM Scenes Held Only at ESA



Acquisition Date Range: December 04, 1982 through February 18, 2010

1,326,429 Total L5 TM Scenes Acquired by ESA

118,743 (9%) Total L5 TM Scenes in both archives (ESA and EROS)

1,207,686 (91%) Total L5 TM Scenes only at ESA (not at EROS)

3,952 Unique L5 TM Path/Rows

2,993 (76%) Unique L5 TM Path/Rows in both archives (ESA and EROS)

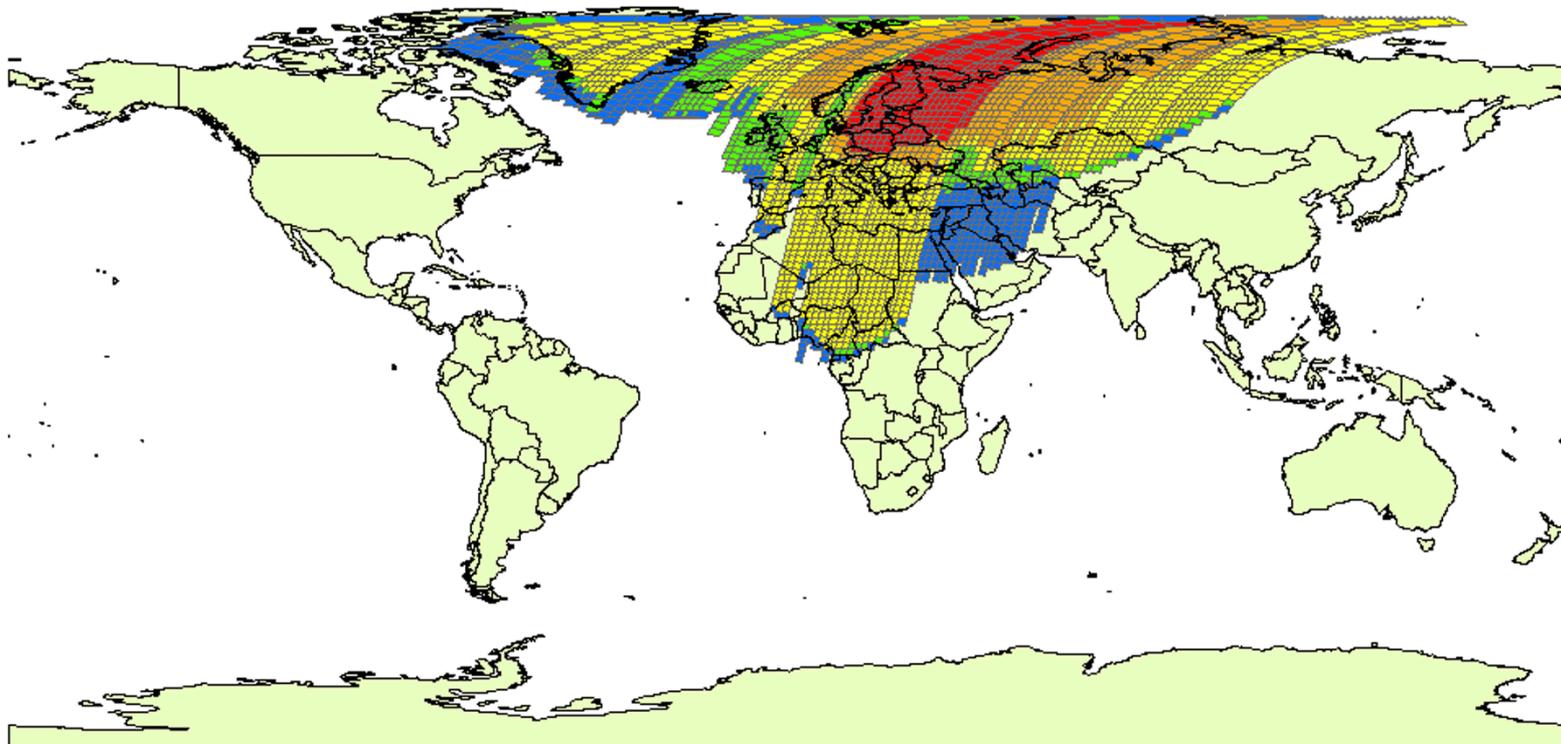
959 (24%) Unique L5 TM Path/Rows only at ESA (not at EROS)

1 - 9 10 - 49 50 - 149 150 - 299 300+



ESA – MSS

MSS Scenes Held Only at ESA



Acquisition Date Range: May 22, 1978 through December 29, 1993

588,318 Total MSS Scenes Acquired by ESA

36,369 (6%) Total MSS Scenes in both archives (ESA and EROS)

551,949 (94%) Total MSS Scenes only at ESA (not at EROS)

3,999 Unique MSS Path/Rows

2,041 (51%) Unique MSS Path/Rows in both archives (ESA and EROS)

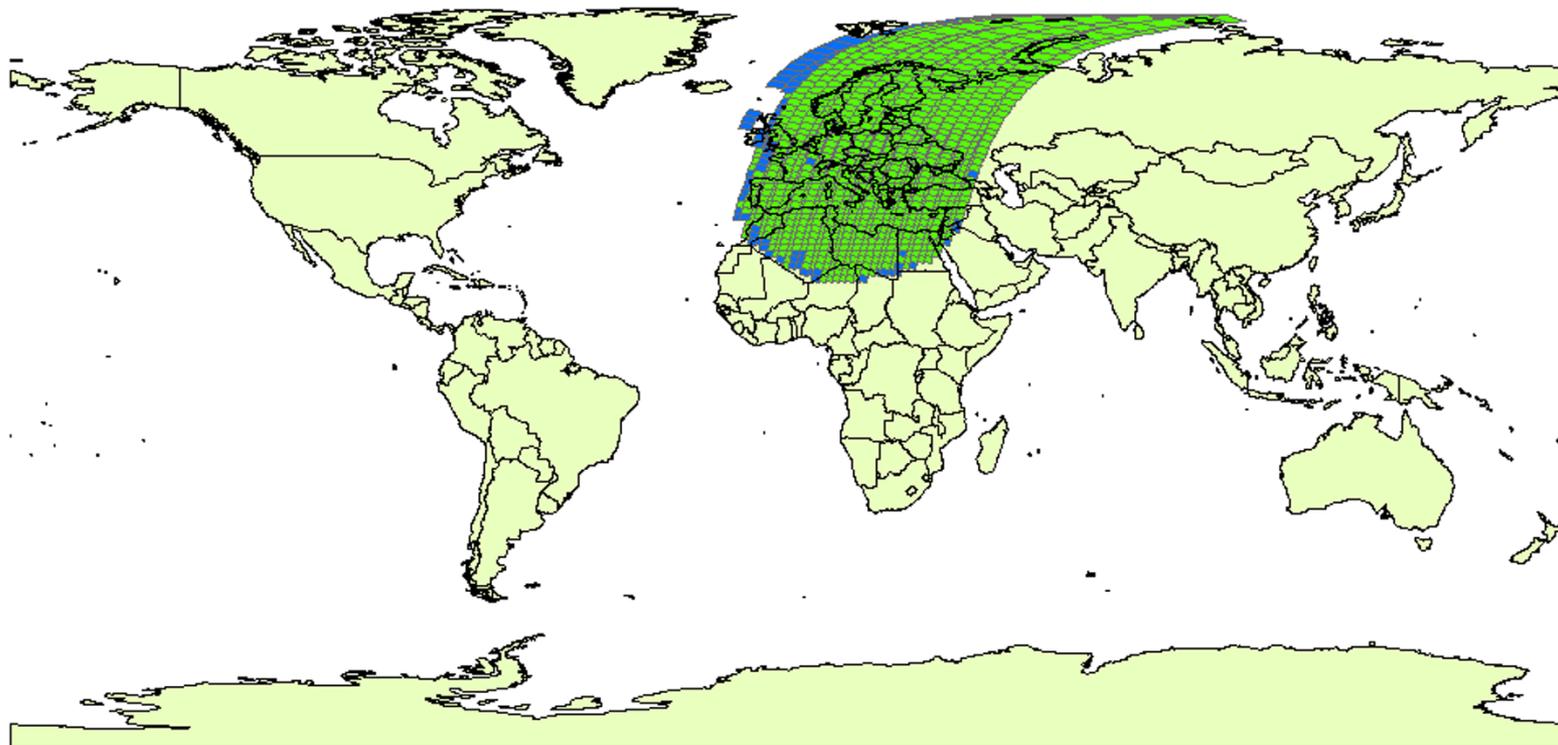
1,958 (49%) Unique MSS Path/Rows only at ESA (not at EROS)

1 - 9 10 - 49 50 - 149 150 - 299 300+



Italy – ETM+

L7 ETM+ Scenes Held Only at FUI



Acquisition Date Range: July 09, 1999 through June 09, 2001

51,380 Total L7 ETM+ Scenes Acquired by FUI

16,189 (32%) Total L7 ETM+ Scenes in both archives (FUI and EROS)

35,191 (68%) Total L7 ETM+ Scenes only at FUI (not at EROS)

1,517 Unique L7 ETM+ Path/Rows

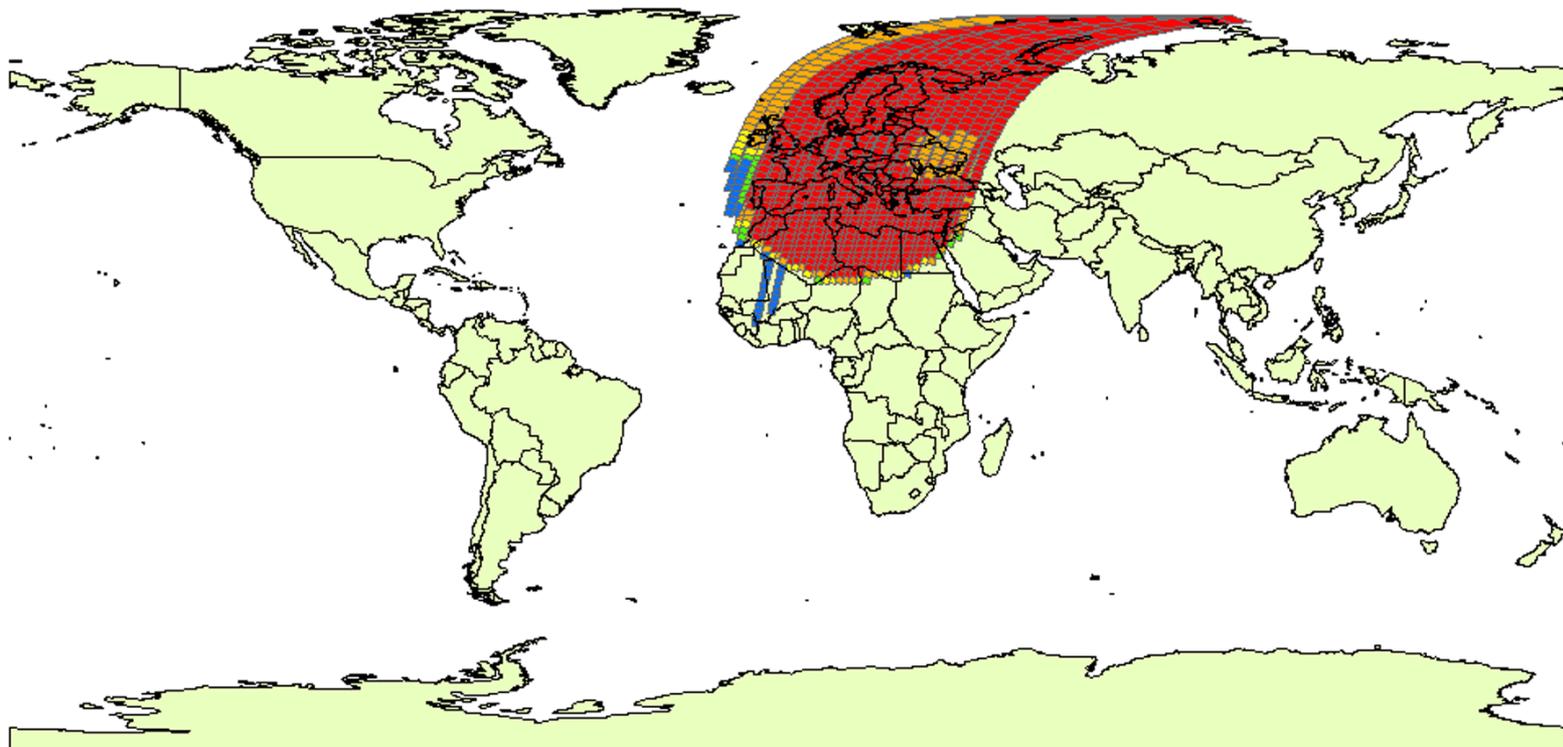
1,244 (82%) Unique L7 ETM+ Path/Rows in both archives (FUI and EROS)

273 (18%) Unique L7 ETM+ Path/Rows only at FUI (not at EROS)

■ 1 - 9 ■ 10 - 49

Italy – TM

L5 TM Scenes Held Only at FUI



Acquisition Date Range: December 04, 1982 through July 16, 2001

566,794 Total L5 TM Scenes Acquired by FUI

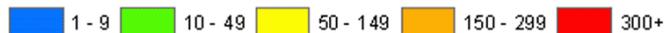
39,779 (7%) Total L5 TM Scenes in both archives (FUI and EROS)

527,014 (93%) Total L5 TM Scenes only at FUI (not at EROS)

1,625 Unique L5 TM Path/Rows

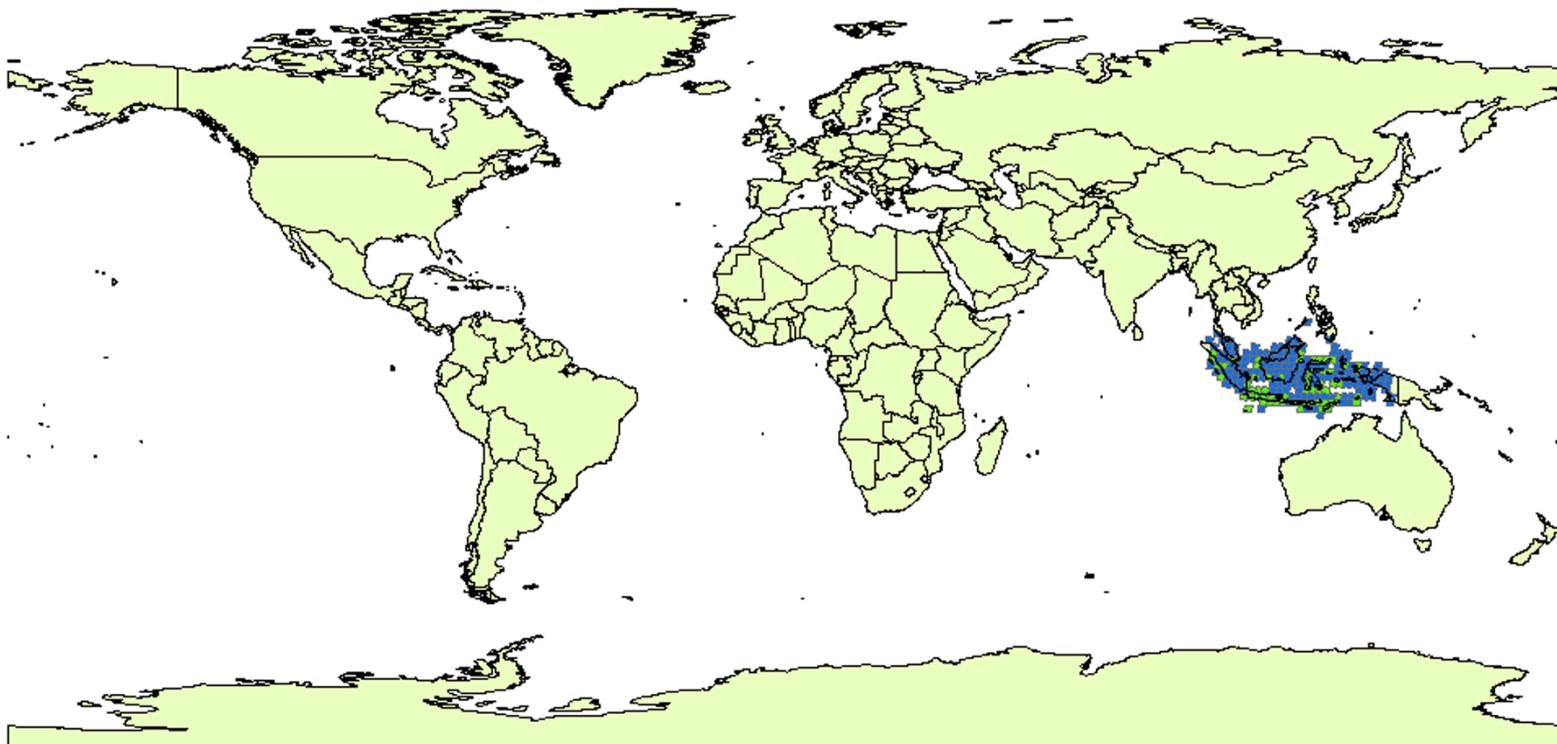
1,361 (84%) Unique L5 TM+ Path/Rows in both archives (FUI and EROS)

264 (16%) Unique L5 TM Path/Rows only at FUI (not at EROS)



Indonesia – ETM+

L7 ETM+ Scenes Held Only at DKI



Acquisition Date Range: April 14, 2000 through March 30, 2007

4,479 Total L7 ETM+ Scenes Acquired by DKI

2,977 (66%) Total L7 ETM+ Scenes in both archives (DKI and EROS)

1,502 (34%) Total L7 ETM+ Scenes only at DKI (not at EROS)

245 Unique L7 ETM+ Path/Rows

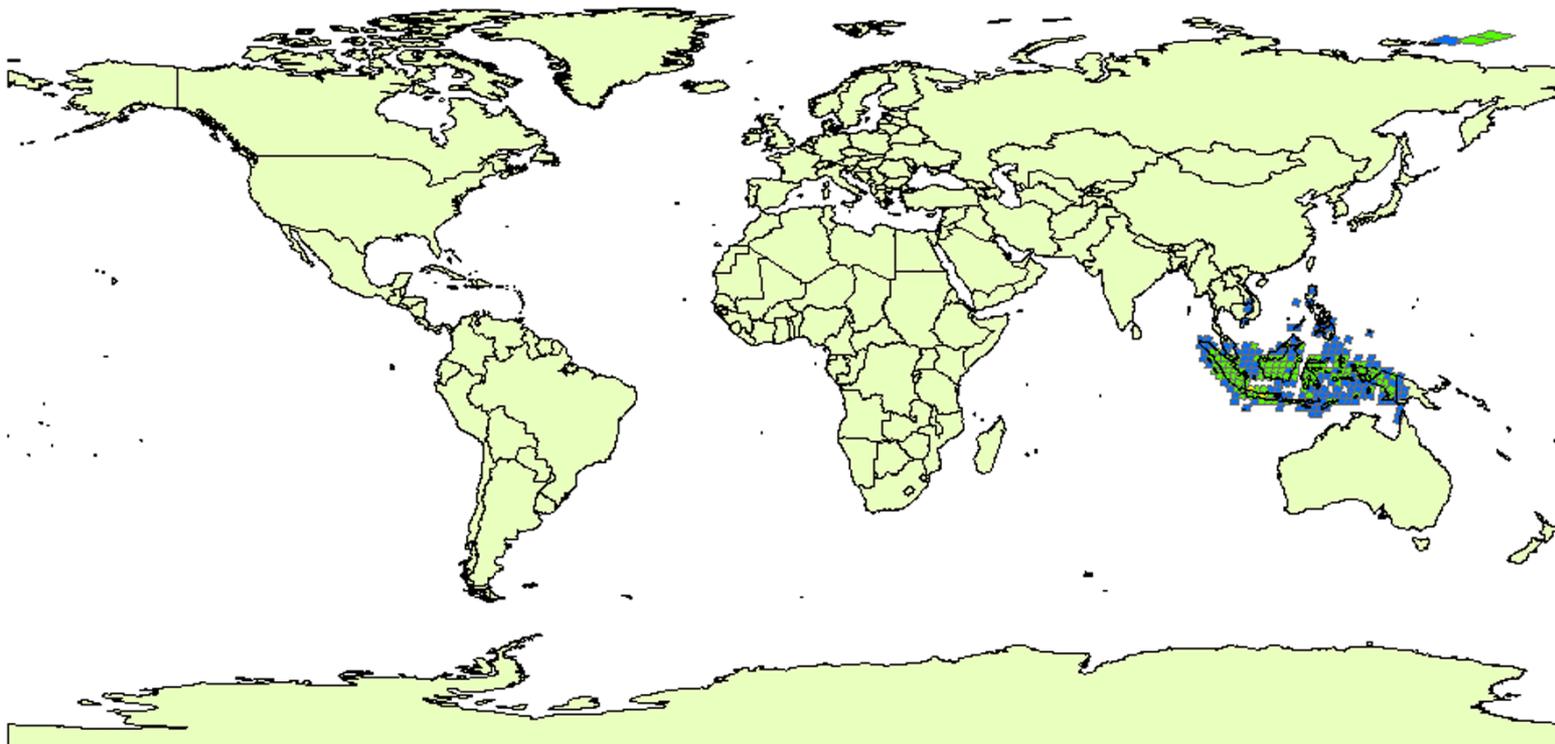
236 (96%) Unique L7 ETM+ Path/Rows in both archives (DKI and EROS)

9 (4%) Unique L7 ETM+ Path/Rows only at DKI (not at EROS)

■ 1 - 9 ■ 10 - 49

Indonesia – TM

L4-5 TM Scenes Held Only at DK1



Acquisition Date Range: March 17, 1992 through November 04, 2000

2,540 Total L4-5 TM Scenes Acquired by DK1

0 (0%) Total L4-5 TM Scenes in both archives (DK1 and EROS)

2,540 (100%) Total L4-5 TM Scenes only at DK1 (not at EROS)

251 Unique L4-5 TM Path/Rows

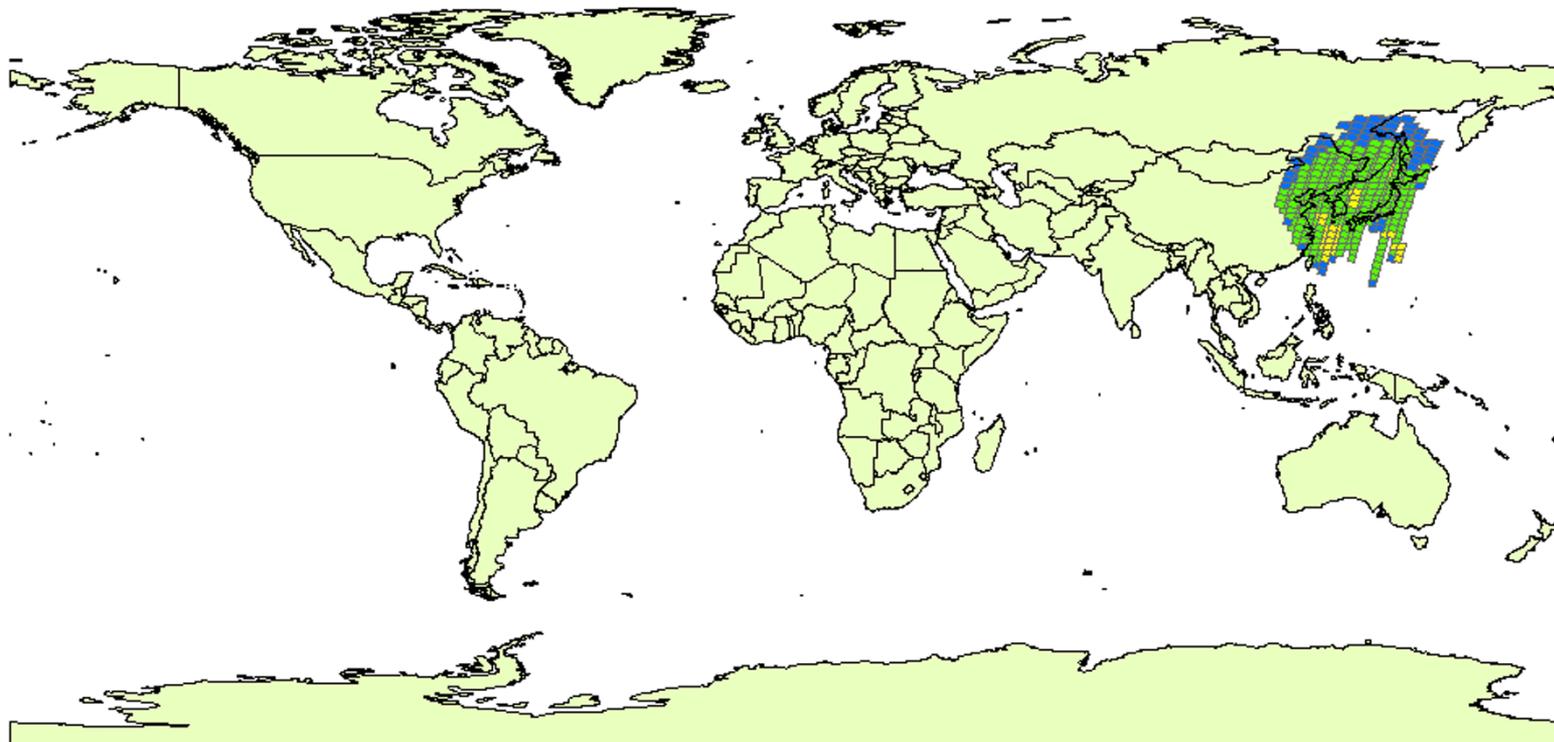
0 (0%) Unique L4-5 TM Path/Rows in both archives (DK1 and EROS)

251 (100%) Unique L4-5 TM Path/Rows only at DK1 (not at EROS)

1 - 9 10 - 49 50 - 149

Japan (Hatoyama) – ETM+

L7 ETM+ Scenes Held Only at HAJ



Acquisition Date Range: May 02, 2000 through December 28, 2004

19,722 Total L7 ETM+ Scenes Acquired by HAJ

10,174 (52%) Total L7 ETM+ Scenes in both archives (HAJ and EROS)

9,548 (48%) Total L7 ETM+ Scenes only at HAJ (not at EROS)

408 Unique L7 ETM+ Path/Rows

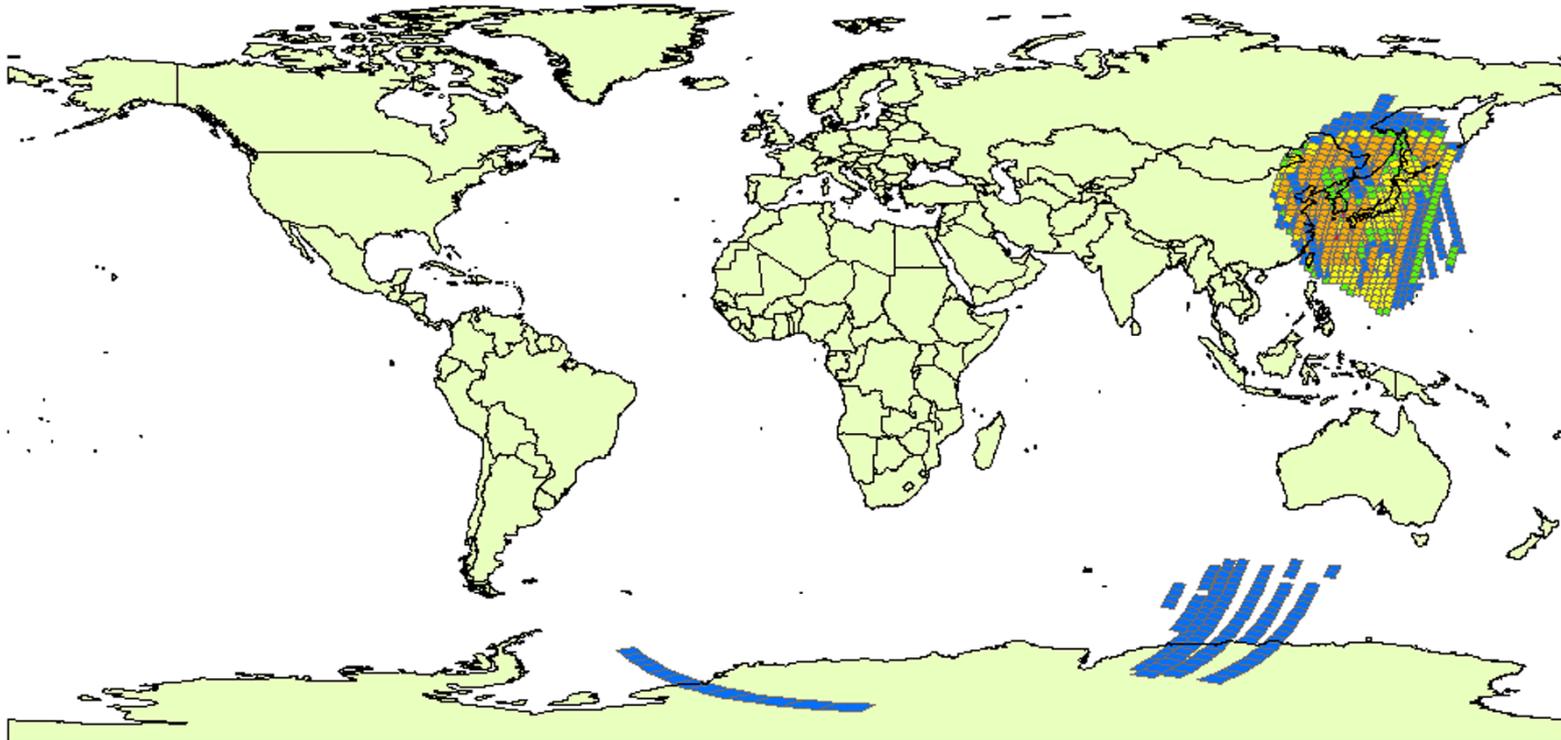
359 (88%) Unique L7 ETM+ Path/Rows in both archives (HAJ and EROS)

49 (12%) Unique L7 ETM+ Path/Rows only at HAJ (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149

Japan (Hatoyama) – TM

L5 TM Scenes Held Only at HAJ



Acquisition Date Range: April 13, 1984 through March 03, 2010

120,163 Total L5 TM Scenes Acquired by HAJ

910 (1%) Total L5 TM Scenes in both archives (HAJ and EROS)

119,253 (99%) Total L5 TM Scenes only at HAJ (not at EROS)

1,112 Unique L5 TM Path/Rows

246 (22%) Unique L5 TM Path/Rows in both archives (HAJ and EROS)

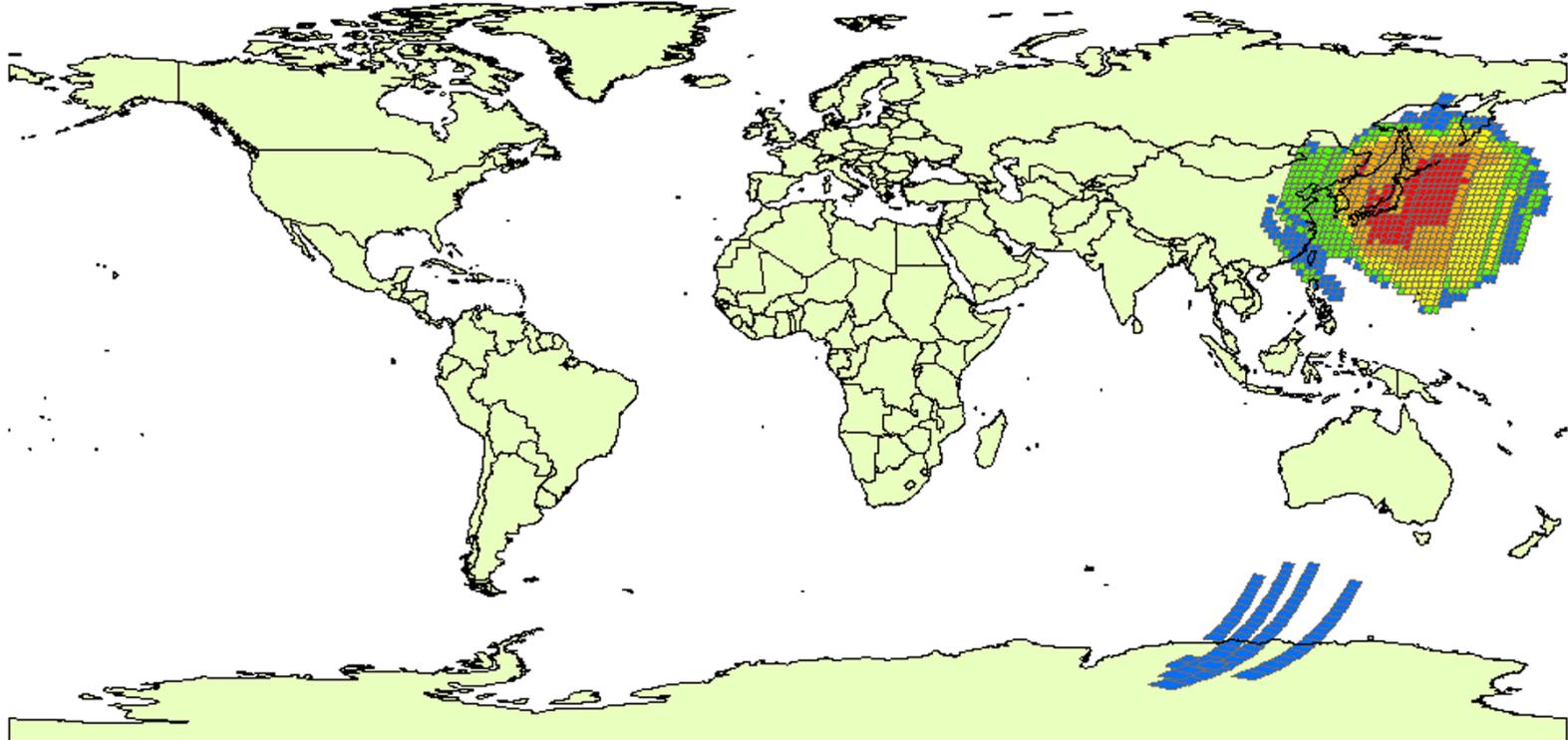
866 (78%) Unique L5 TM Path/Rows only at HAJ (not at EROS)

1 - 9 10 - 49 50 - 149 150 - 299 300+



Japan (Hatoyama) – MSS

MSS Scenes Held Only at HAJ



Acquisition Date Range: February 04, 1979 through July 13, 1998

135,377 Total MSS Scenes Acquired by HAJ

3,264 (2%) Total MSS Scenes in both archives (HAJ and EROS)

132,113 (98%) Total MSS Scenes only at HAJ (not at EROS)

1,085 Unique MSS Path/Rows

271 (25%) Unique MSS Path/Rows in both archives (HAJ and EROS)

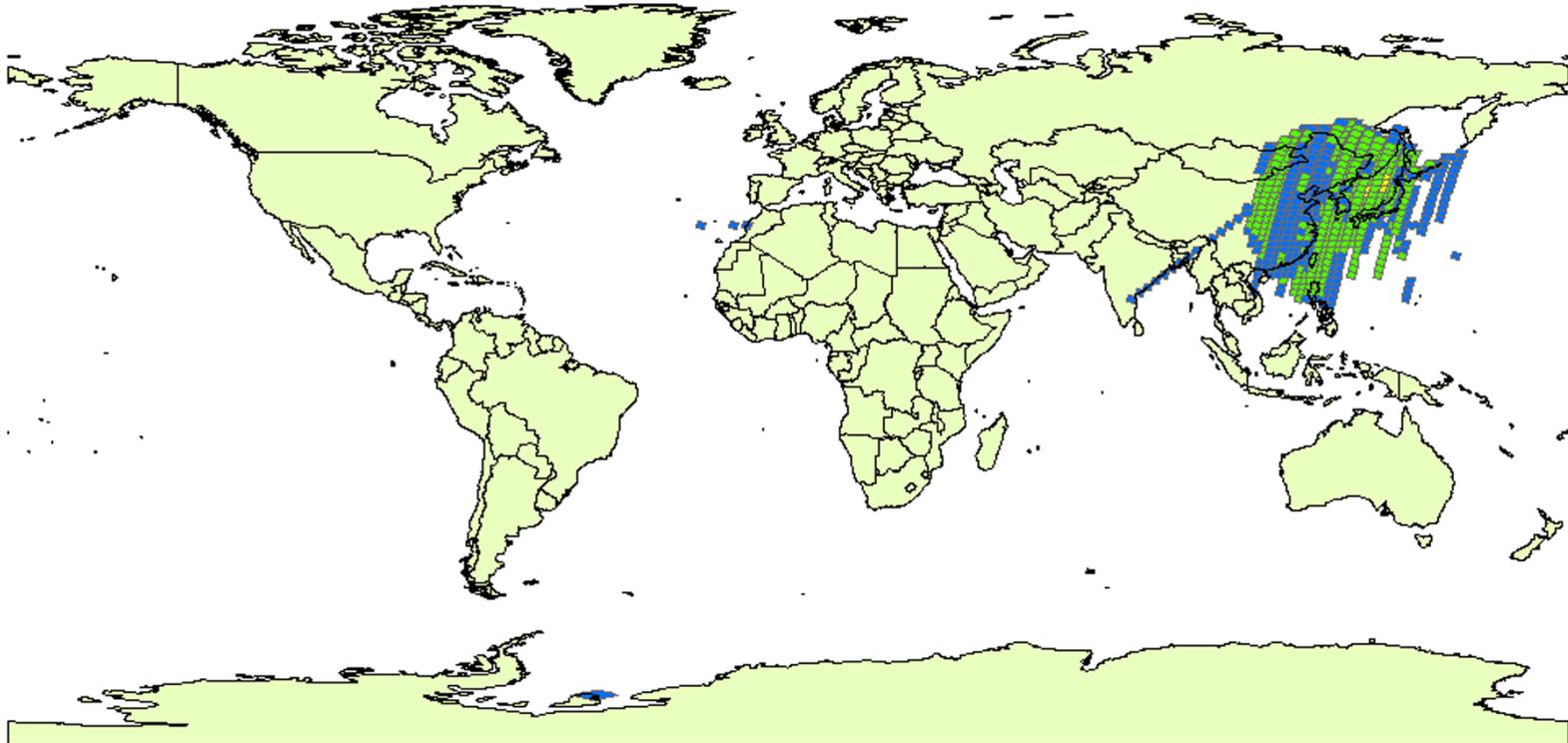
814 (75%) Unique MSS Path/Rows only at HAJ (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149 ■ 150 - 299 ■ 300+



Japan (Hiroshima)– ETM+

L7 ETM+ Scenes Held Only at HIJ



Acquisition Date Range: March 16, 2000 through March 25, 2009

20,850 Total L7 ETM+ Scenes Acquired by HIJ

13,469 (65%) Total L7 ETM+ Scenes in both archives (HIJ and EROS)

7,381 (35%) Total L7 ETM+ Scenes only at HIJ (not at EROS)

618 Unique L7 ETM+ Path/Rows

506 (82%) Unique L7 ETM+ Path/Rows in both archives (HIJ and EROS)

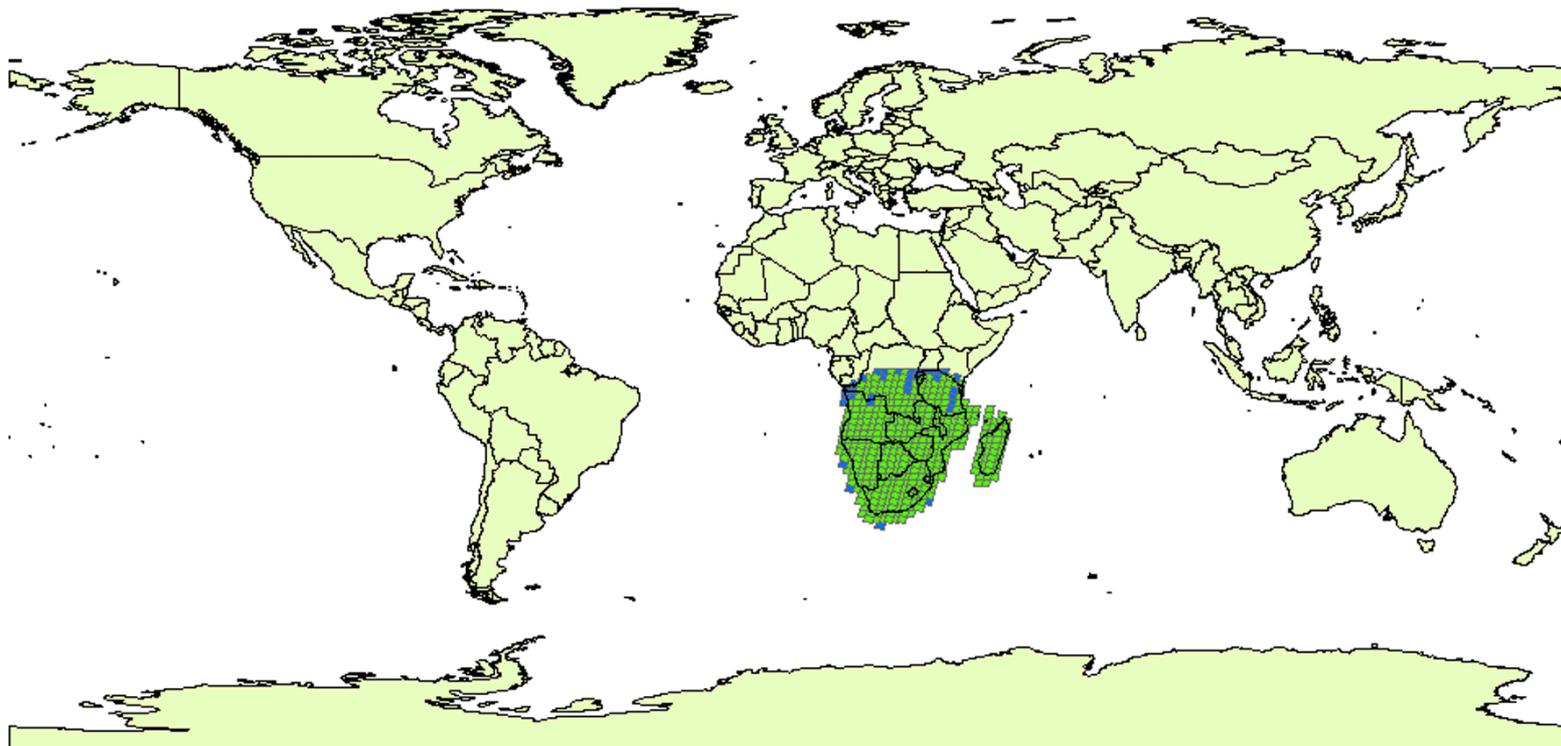
112 (18%) Unique L7 ETM+ Path/Rows only at HIJ (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149



South Africa – ETM+

L7 ETM+ Scenes Held Only at JSA



Acquisition Date Range: February 20, 2001 through December 31, 2003

16,609 Total L7 ETM+ Scenes Acquired by JSA

8,482 (51%) Total L7 ETM+ Scenes in both archives (JSA and EROS)

8,127 (49%) Total L7 ETM+ Scenes only at JSA (not at EROS)

431 Unique L7 ETM+ Path/Rows

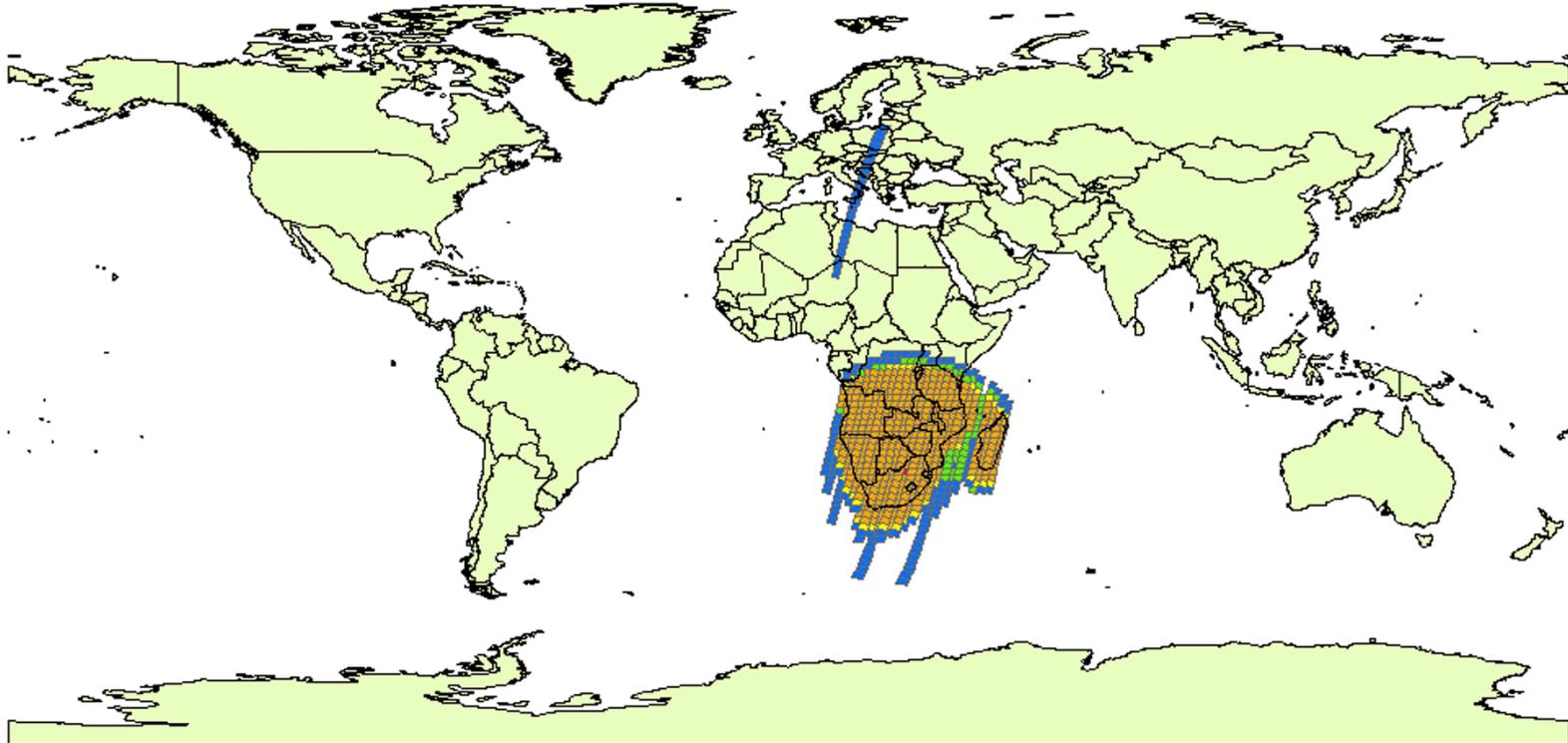
427 (99%) Unique L7 ETM+ Path/Rows in both archives (JSA and EROS)

4 (1%) Unique L7 ETM+ Path/Rows only at JSA (not at EROS)

1-9 10-49

South Africa – TM

L5 TM Scenes Held Only at JSA



Acquisition Date Range: January 06, 1989 through May 29, 2010

120,726 Total L5 TM Scenes Acquired by JSA

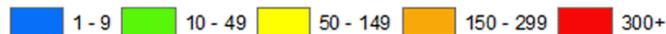
6,397 (5%) Total L5 TM Scenes in both archives (JSA and EROS)

114,329 (95%) Total L5 TM Scenes only at JSA (not at EROS)

673 Unique L5 TM Path/Rows

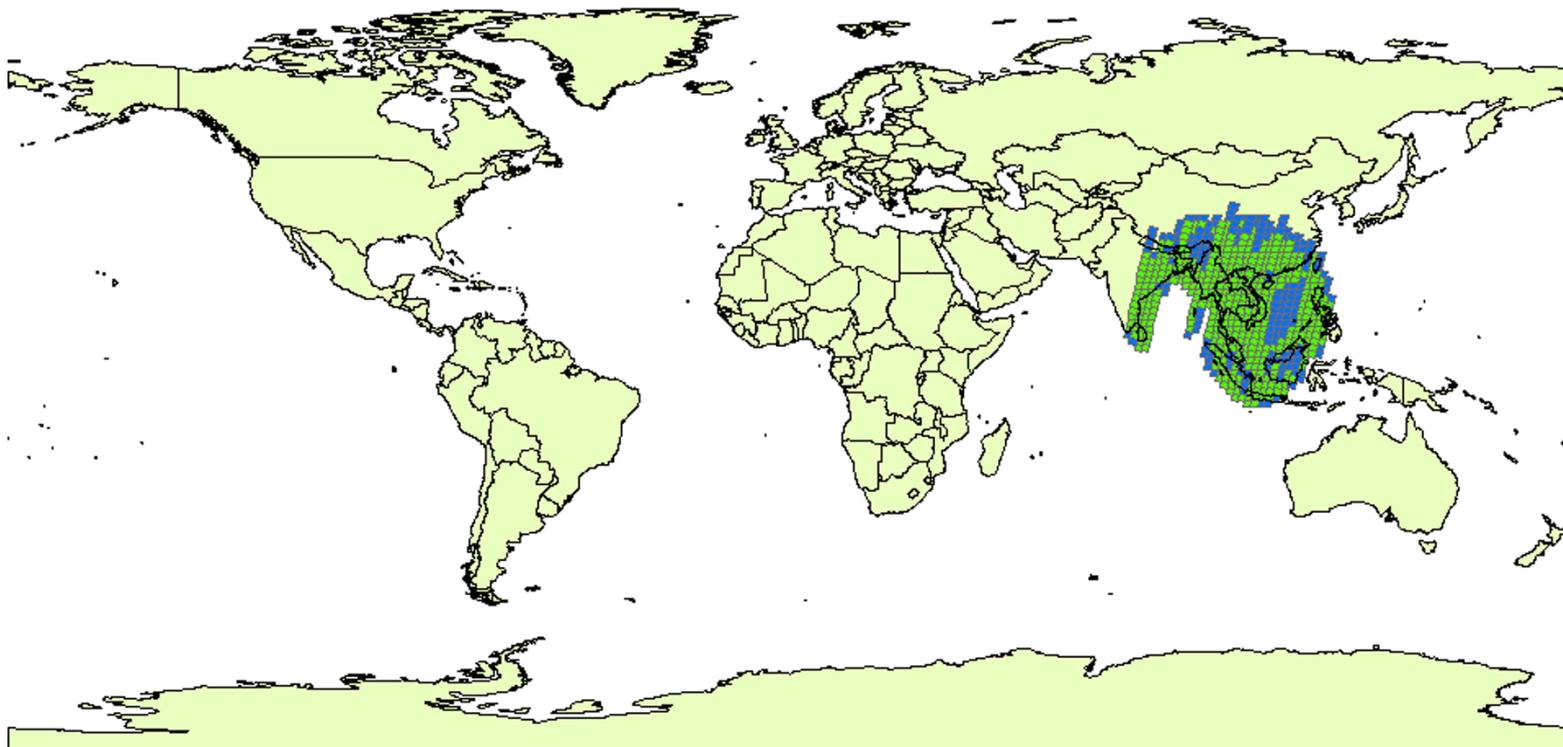
502 (75%) Unique L5 TM Path/Rows in both archives (JSA and EROS)

171 (25%) Unique L5 TM Path/Rows only at JSA (not at EROS)



Thailand – ETM+

L7 ETM+ Scenes Held Only at BKT



Acquisition Date Range: April 20, 2001 through June 29, 2004

18,857 Total L7 ETM+ Scenes Acquired by BKT

10,182 (54%) Total L7 ETM+ Scenes in both archives (BKT and EROS)

8,675 (46%) Total L7 ETM+ Scenes only at BKT (not at EROS)

641 Unique L7 ETM+ Path/Rows

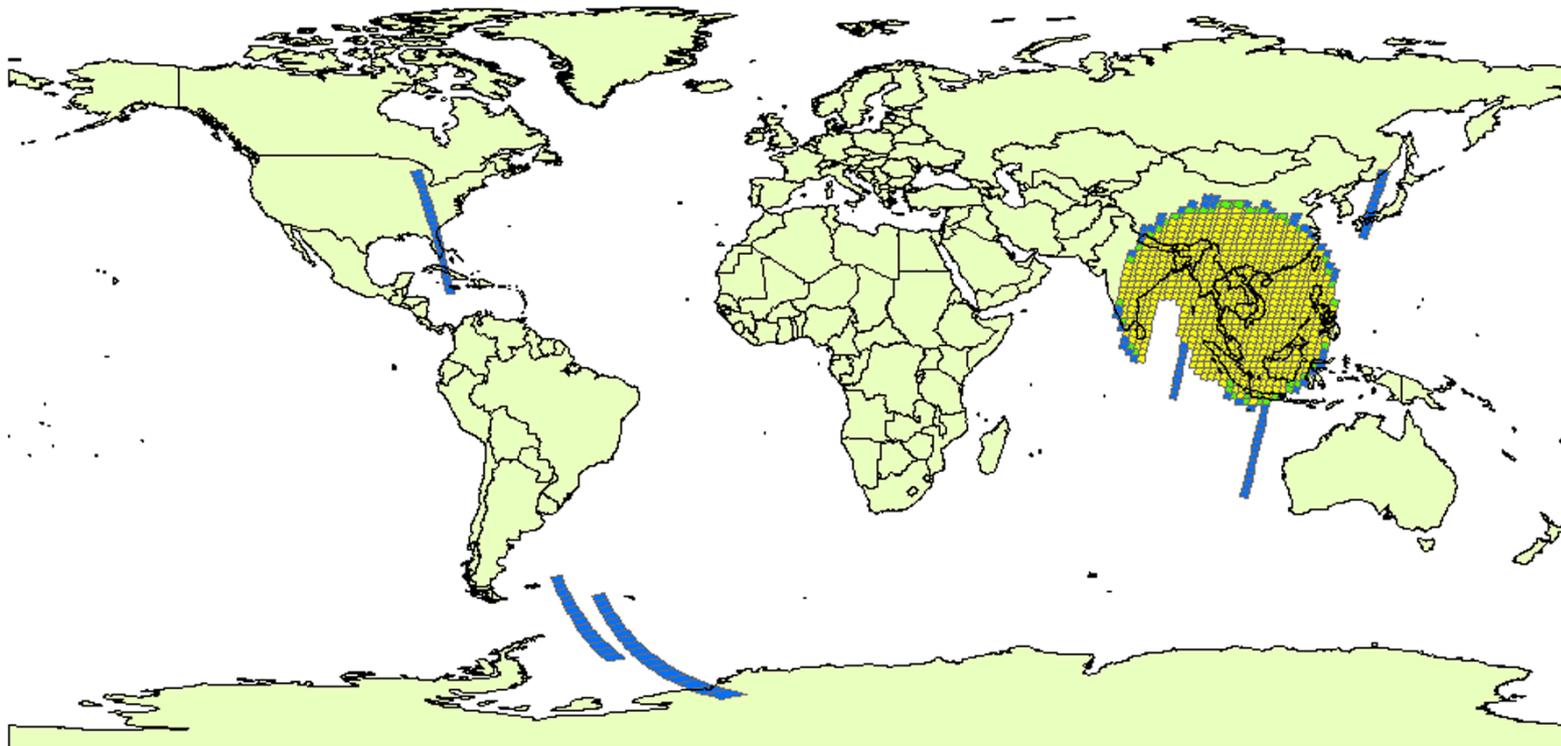
596 (93%) Unique L7 ETM+ Path/Rows in both archives (BKT and EROS)

45 (7%) Unique L7 ETM+ Path/Rows only at BKT (not at EROS)

■ 1 - 10 ■ 11 - 49

Thailand – TM

L4-5 TM Scenes Held Only at BKT



Acquisition Date Range: August 03, 1990 through July 31, 2009

70,910 Total L4-5 TM Scenes Acquired by BKT

2,737 (4%) Total L4-5 TM Scenes in both archives (BKT and EROS)

68,173 (96%) Total L4-5 TM Scenes only at BKT (not at EROS)

869 Unique L4-5 TM Path/Rows

581 (67%) Unique L4-5 TM Path/Rows in both archives (BKT and EROS)

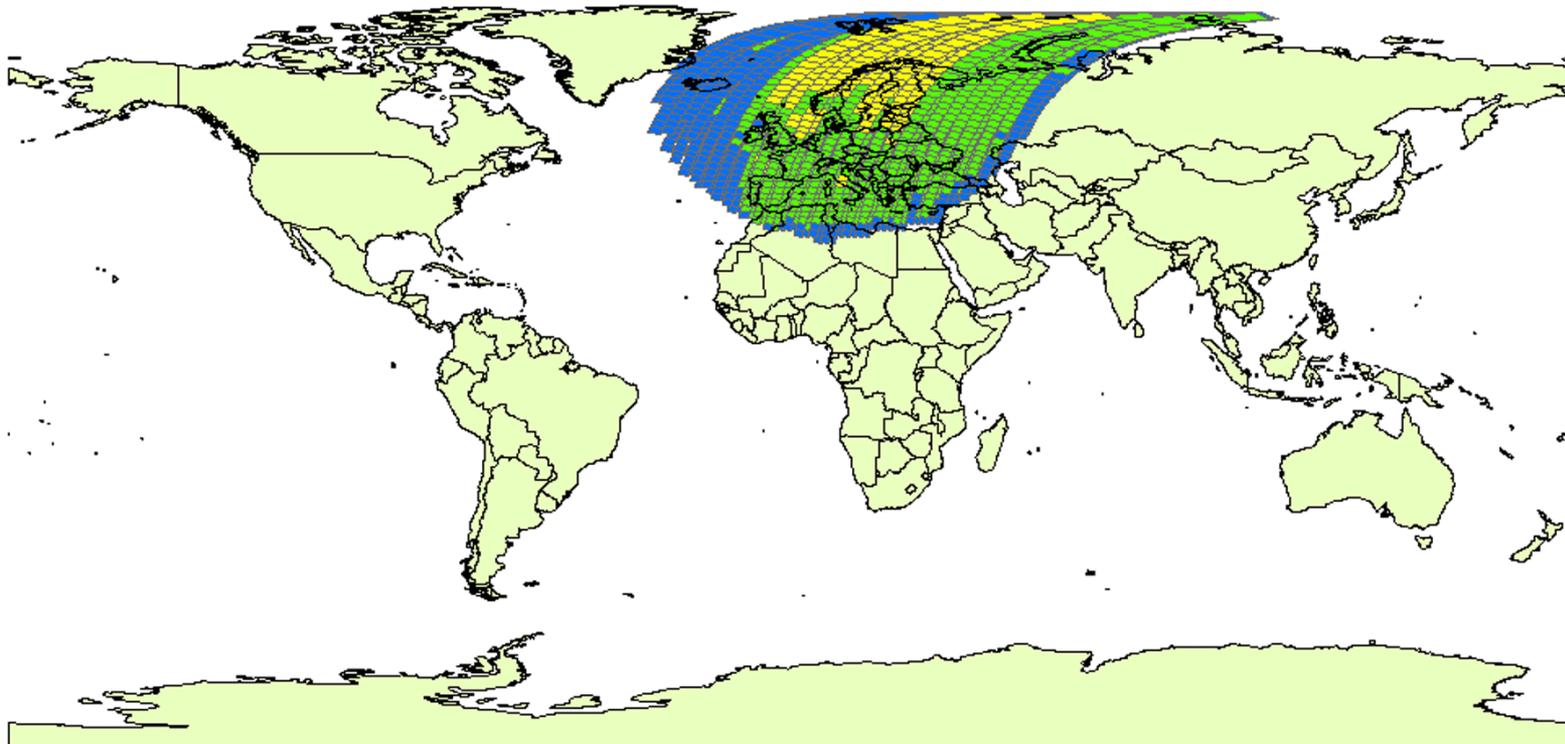
288 (33%) Unique L4-5 TM Path/Rows only at BKT (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149



Germany – ETM+

L7 ETM+ Scenes Held Only at NSG



Acquisition Date Range: July 28, 1999 through December 03, 2003

87,098 Total L7 ETM+ Scenes Acquired by NSG

25,833 (30%) Total L7 ETM+ Scenes in both archives (NSG and EROS)

61,265 (70%) Total L7 ETM+ Scenes only at NSG (not at EROS)

1,954 Unique L7 ETM+ Path/Rows

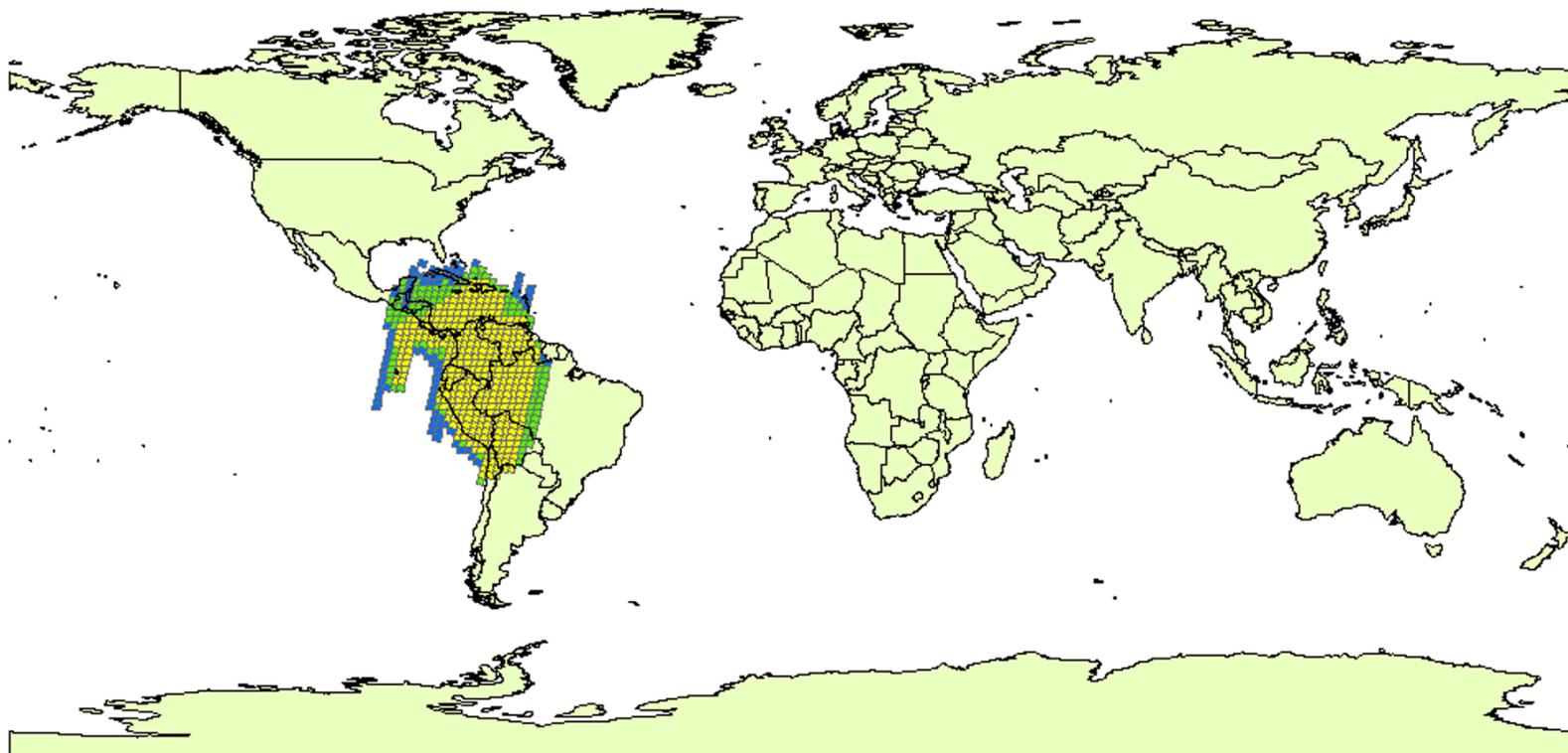
1,330 (68%) Unique L7 ETM+ Path/Rows in both archives (NSG and EROS)

624 (32%) Unique L7 ETM+ Path/Rows only at NSG (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149

Ecuador – TM

L5 TM Scenes Held Only at CPE



Acquisition Date Range: November 04, 1985 through July 15, 2001

39,913 Total L5 TM Scenes Acquired by CPE

9,749 (24%) Total L5 TM Scenes in both archives (CPE and EROS)

30,164 (76%) Total L5 TM Scenes only at CPE (not at EROS)

586 Unique L5 TM Path/Rows

515 (88%) Unique L5 TM Path/Rows in both archives (CPE and EROS)

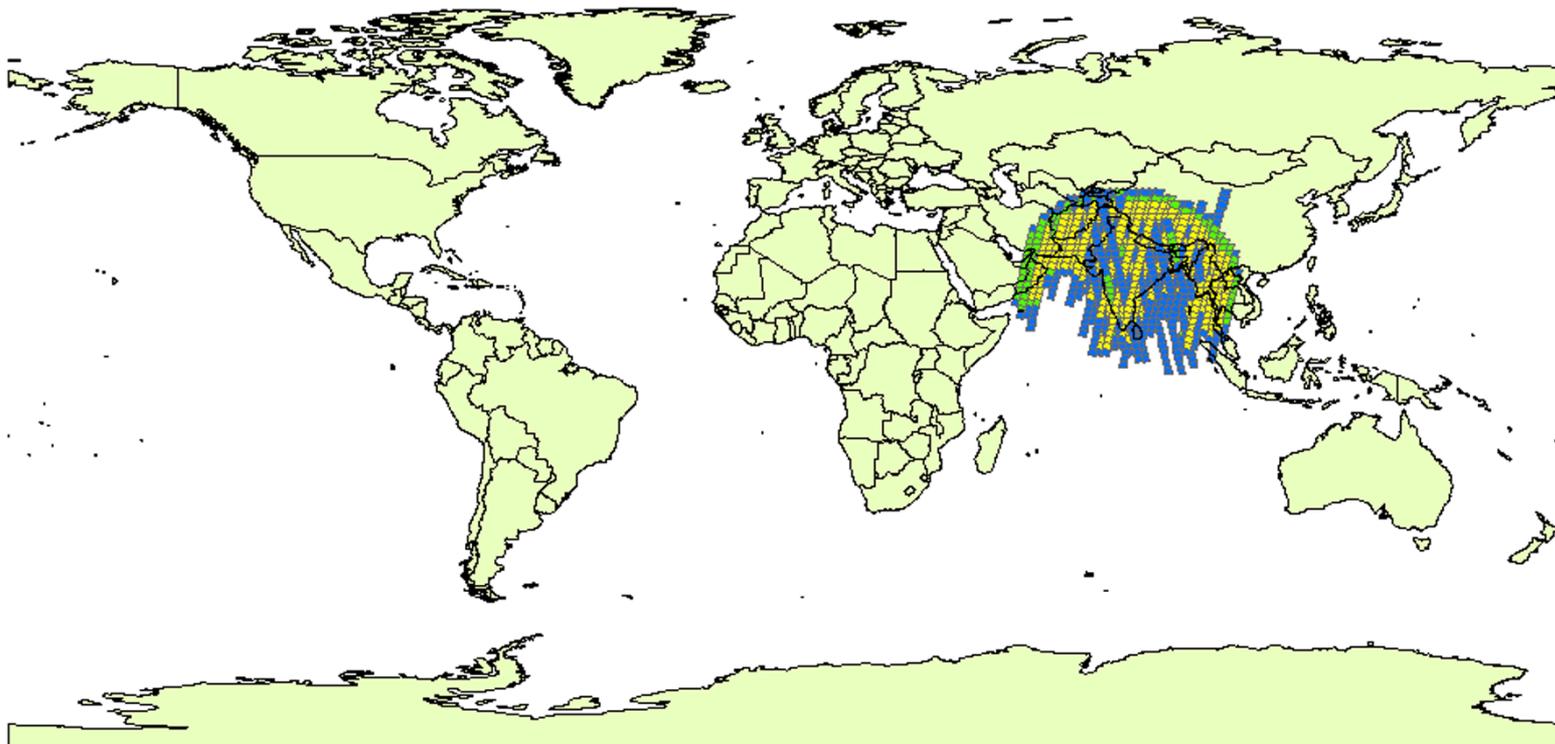
71 (12%) Unique L5 TM Path/Rows only at CPE (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149



India – TM

L5 TM Scenes Held Only at SGI



Acquisition Date Range: January 04, 1986 through October 29, 2001

38,688 Total L5 TM Scenes Acquired by SGI

664 (2%) Total L5 TM Scenes in both archives (SGI and EROS)

38,024 (98%) Total L5 TM Scenes only at SGI (not at EROS)

1,024 Unique L5 TM Path/Rows

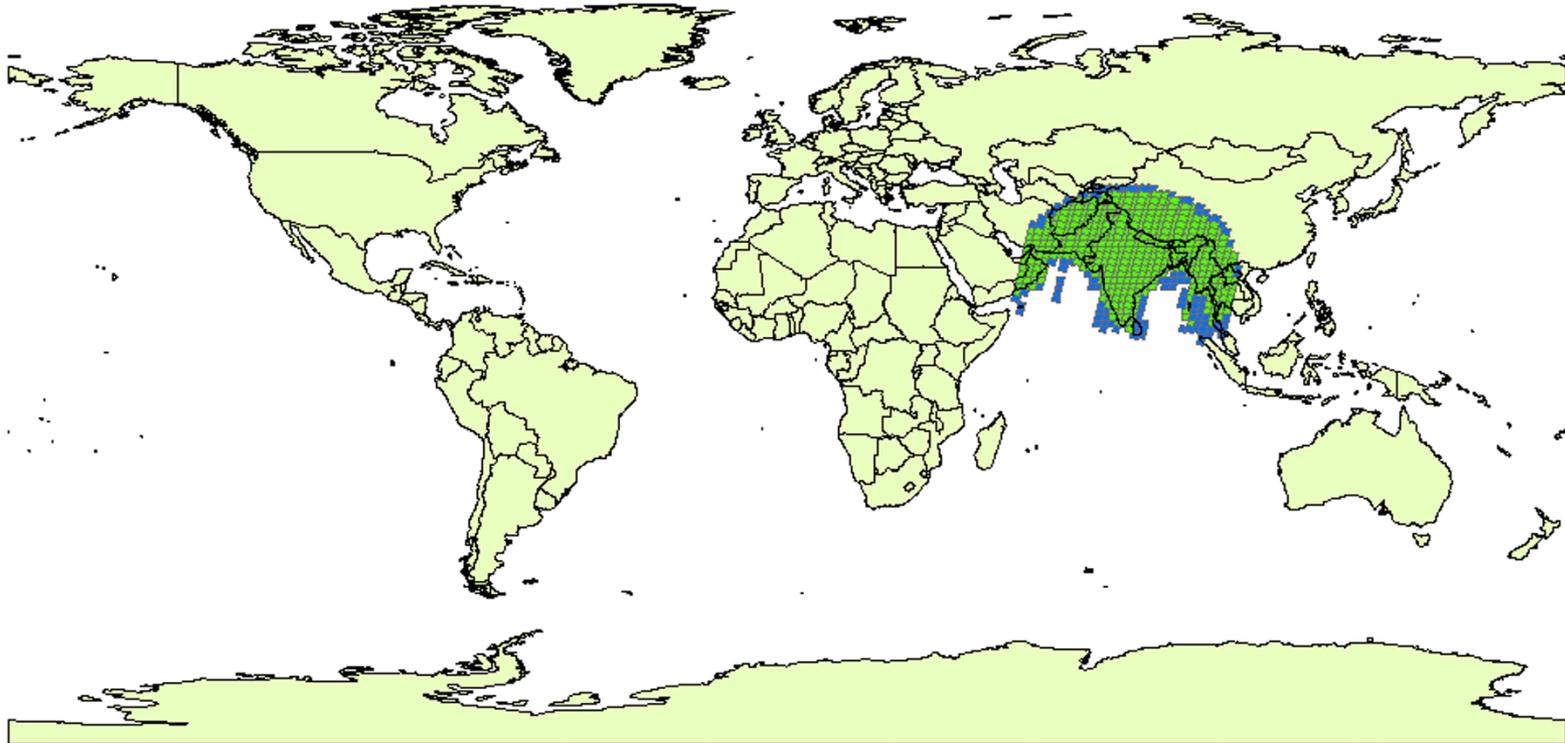
216 (21%) Unique L5 TM Path/Rows in both archives (SGI and EROS)

808 (79%) Unique L5 TM Path/Rows only at SGI (not at EROS)

■ 1 - 9 ■ 10 - 49 ■ 50 - 149

India – MSS

L4-5 MSS Scenes Held Only at SGI



Acquisition Date Range: January 01, 1983 through April 08, 1992

11,943 Total L4-5 MSS Scenes Acquired by SGI

203 (2%) Total L4-5 MSS Scenes in both archives (SGI and EROS)

11,740 (98%) Total L4-5 MSS Scenes only at SGI (not at EROS)

548 Unique L4-5 MSS Path/Rows

104 (19%) Unique L4-5 MSS Path/Rows in both archives (SGI and EROS)

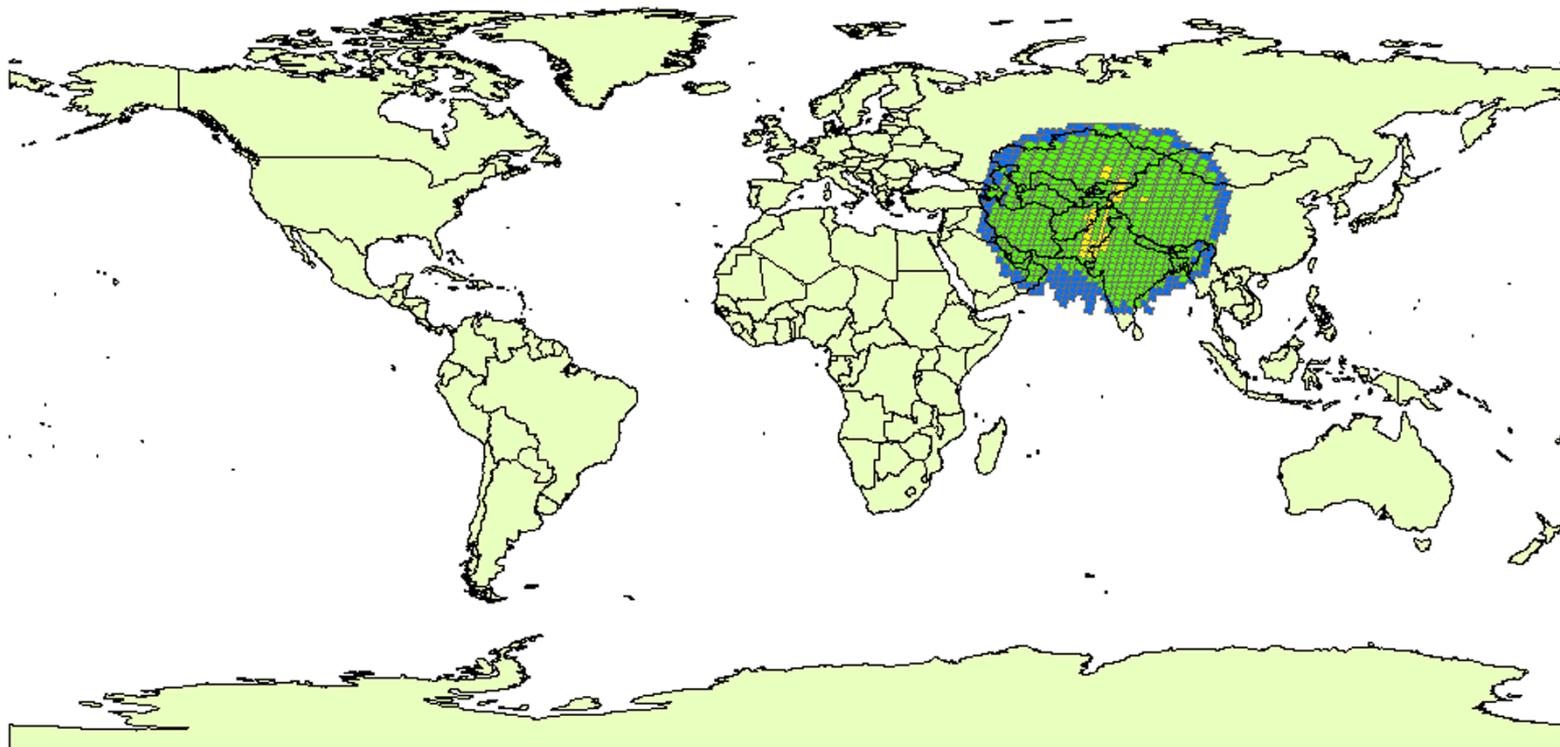
444 (81%) Unique L4-5 MSS Path/Rows only at SGI (not at EROS)

■ 1-9 ■ 10-49



Pakistan – TM

L5 TM Scenes Held Only at ISP



Acquisition Date Range: January 21, 1989 through December 31, 1999

24,264 Total L5 TM Scenes Acquired by ISP

3,912 (16%) Total L5 TM Scenes in both archives (ISP and EROS)

20,352 (84%) Total L5 TM Scenes only at ISP (not at EROS)

899 Unique L5 TM Path/Rows

498 (55%) Unique L5 TM Path/Rows in both archives (ISP and EROS)

401 (45%) Unique L5 TM Path/Rows only at ISP (not at EROS)

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