

Global Land Surveys: GLS 2005 Status and GLS 2010 Planning

Jeff Masek

NASA Goddard Space Flight Center

John Dwyer

U.S. Geological Survey

USGS Earth Resources Observation and Science (EROS) Center

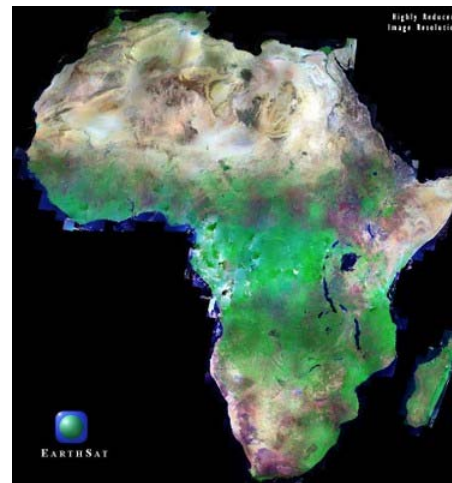
U.S. Department of the Interior

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Global Land Survey Data Sets

Global cloud-free, orthorectified Landsat data sets centered on 1975, 1990, 2000, 2005, and 2010

- Partnership between USGS and NASA, in support of CCSP
- Support global assessments of land-cover, land-cover change, and ecosystem dynamics (disturbance, vegetation health, etc)
- Pilot project for routine global monitoring in LDCM era
- GLS 2005 primarily Landsat-7 ETM+ and Landsat-5 TM imagery, with ASTER and EO-1 ALI data as needed



GLS1975 - 2005 Release Schedule

Existing Geocover 1975, 1990, and 2000 data sets are being reprocessed to improve geometry (“GLS” standard)

GLS2000 is complete and available except for ~9 regions that are being reprocessed to improve geometry

GLS1975/1990 to be released by end of August (metadata details currently being worked)

GLS2005:

- Landsat-7 portion should be nearly complete by end of July
- Landsat-5 portion should be complete by end of September
- EO-1 processing TBD

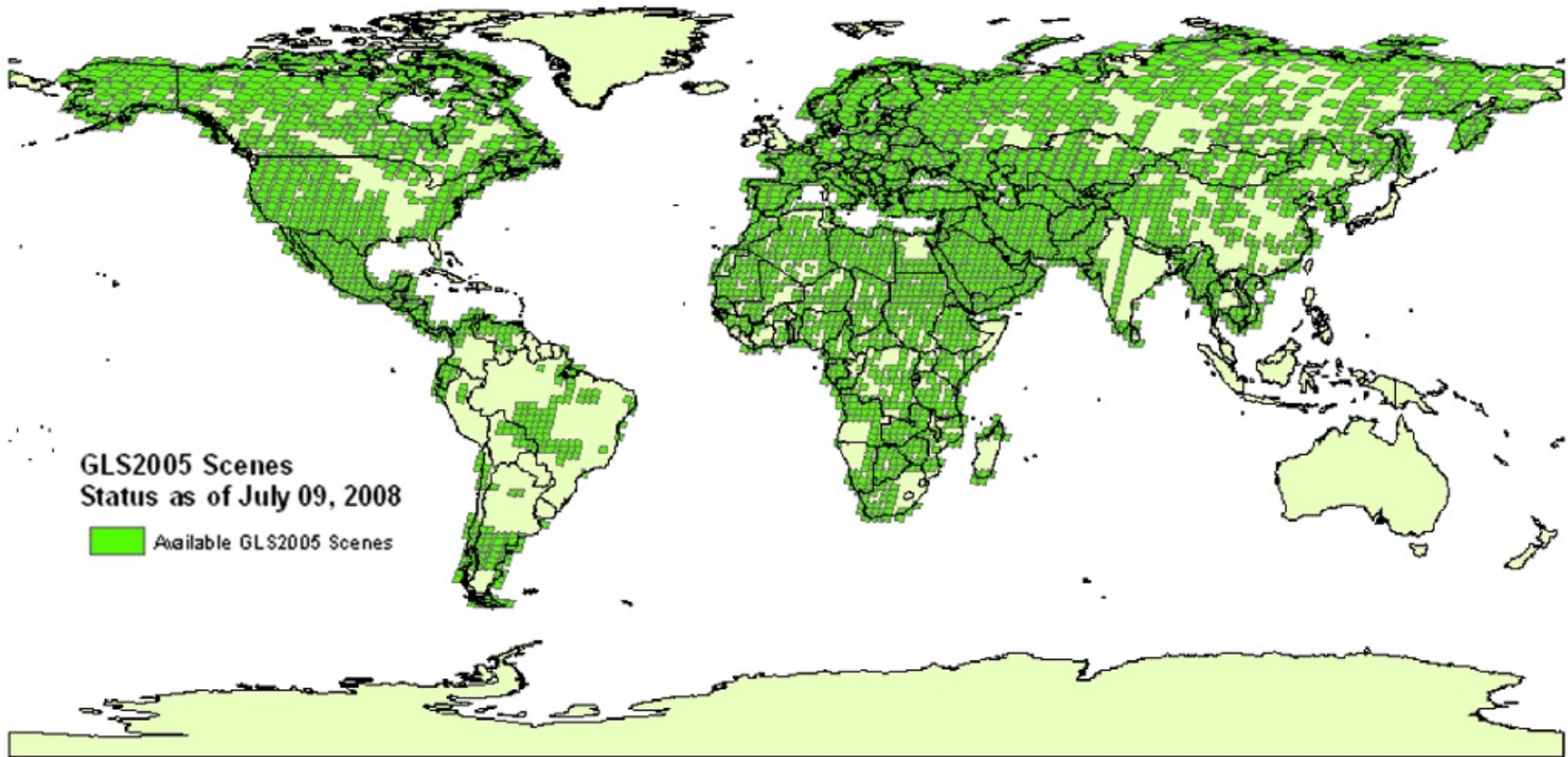
Official “due date” - December 31



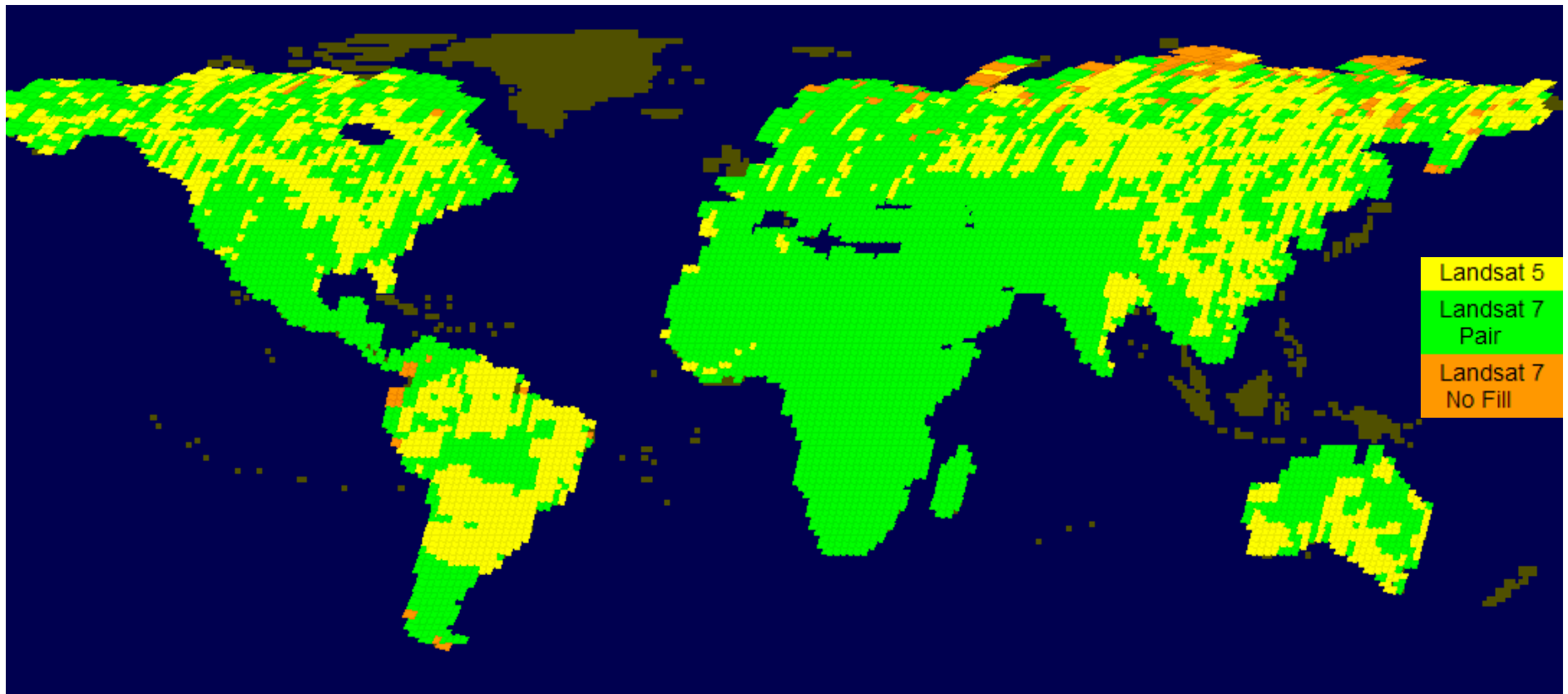
3,792 GLS2005 images available for download as of 7/9/2008

Missing areas include:

- Regions not yet processed (Australia, SAM, Greenland...)
- Landsat-5 selections (processed after August)
- Small regions where GLS2000 map base is being reprocessed



GLS2005 Metadata: Sensor Choice

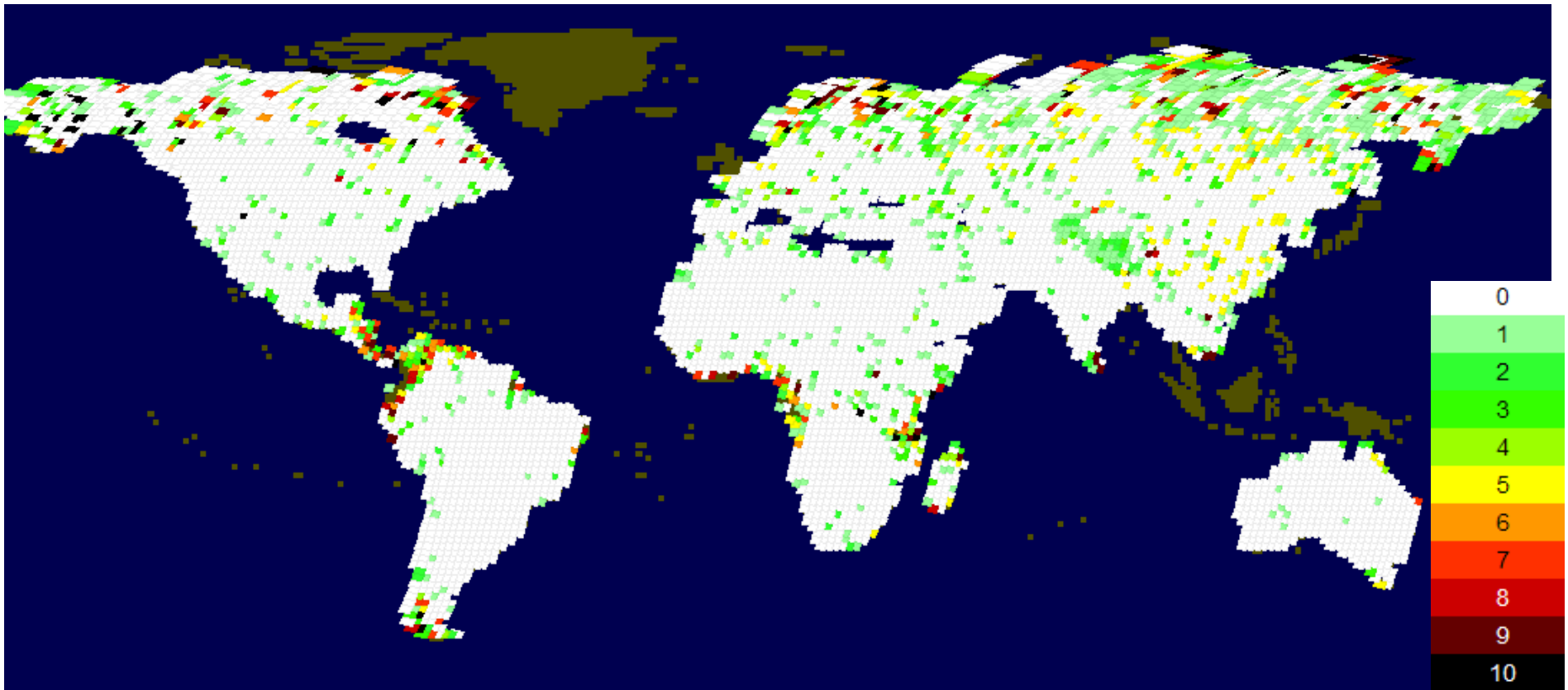


Landsat 5: 2109

Landsat 7: 4658



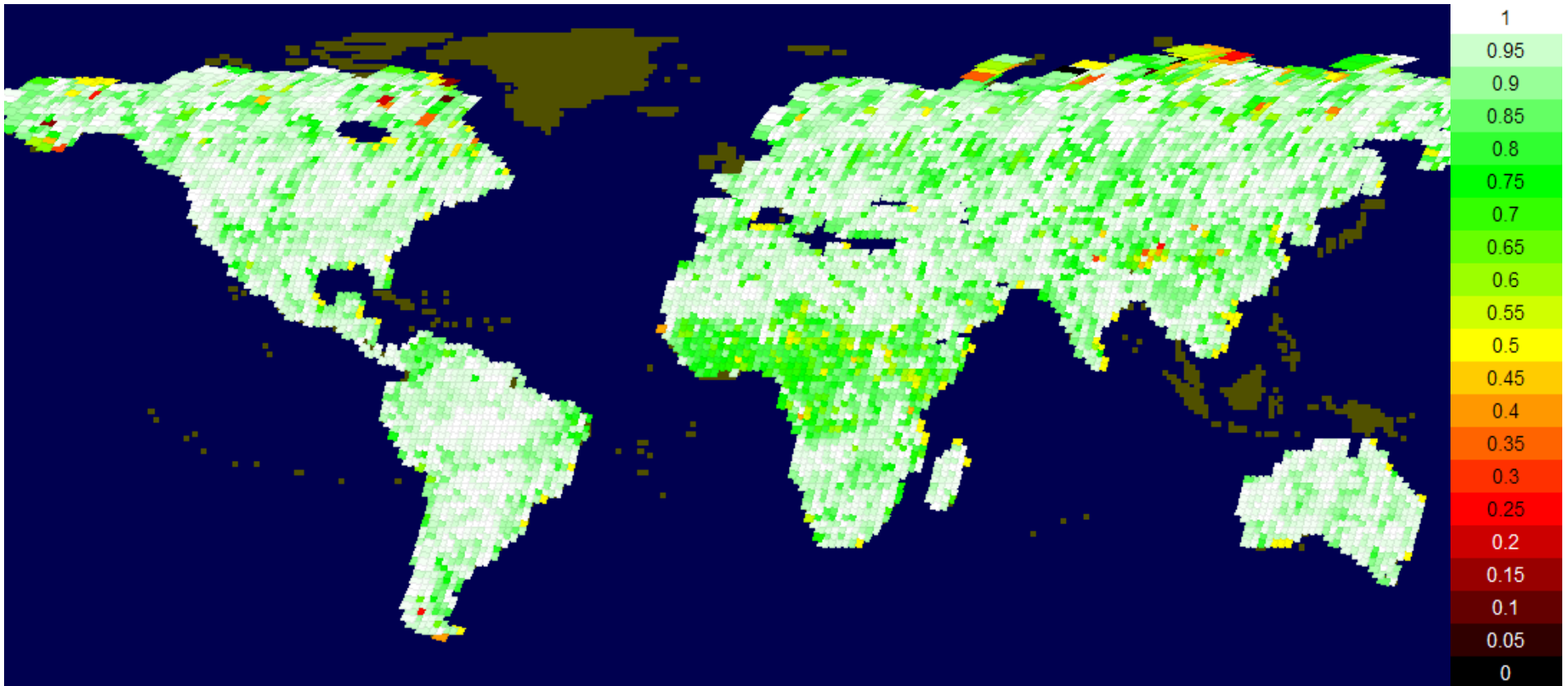
Cloud Cover- Base Image



ACCA average: 1.33%



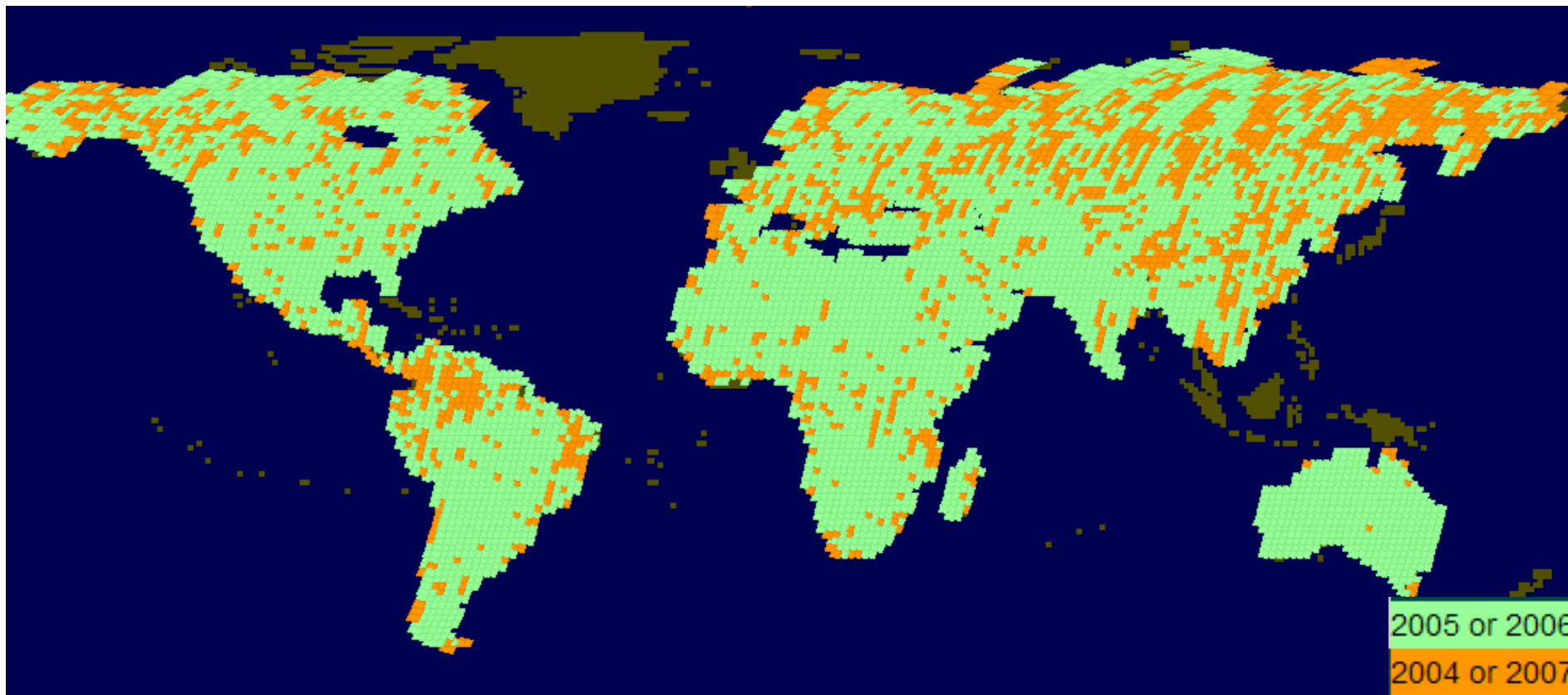
NDVI-Base Image



NDVI average: 0.914 (normalized)
NDVI average: 0.501 (raw)



Year Preference



 2004: 673

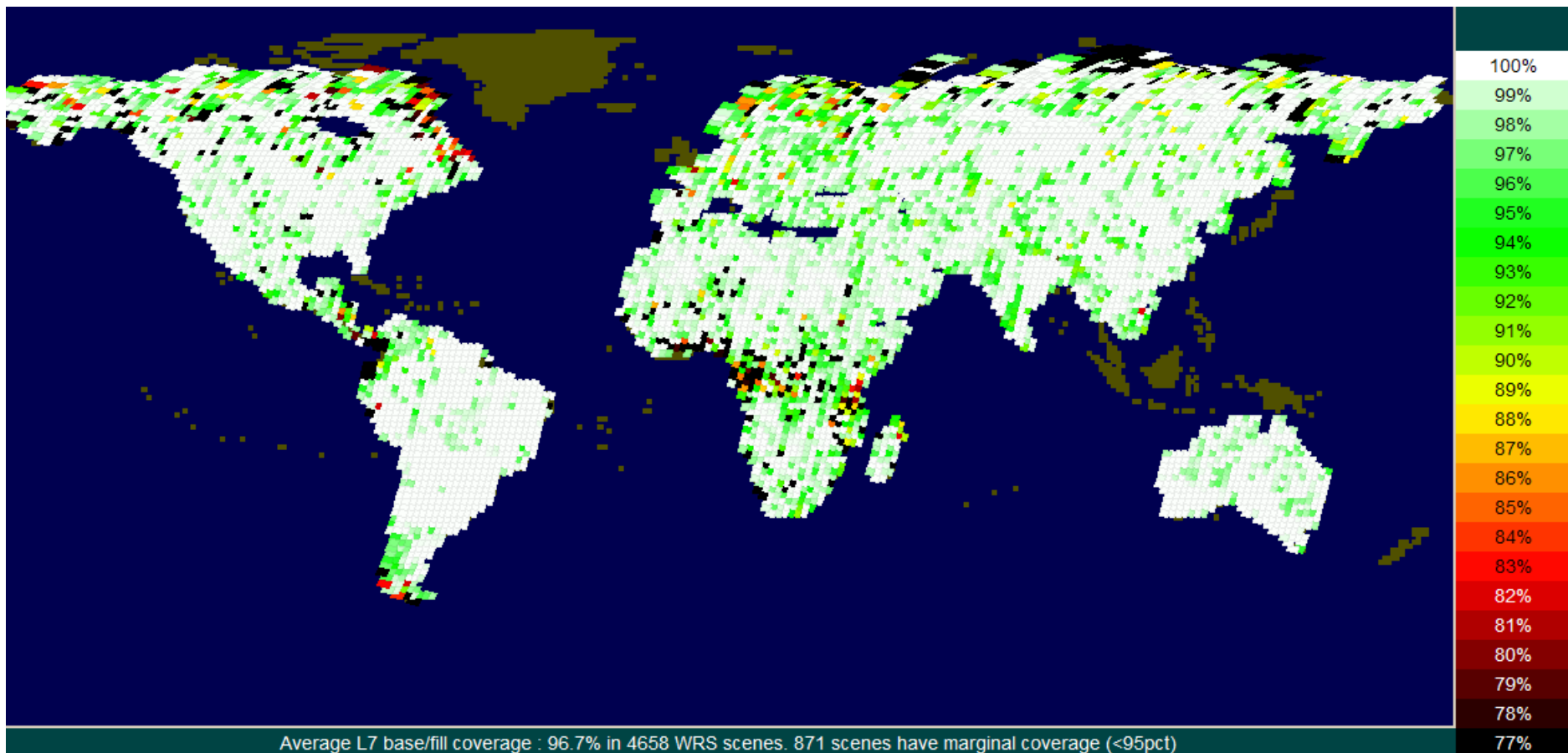
2005: 2485

2006: 2661

2007: 948



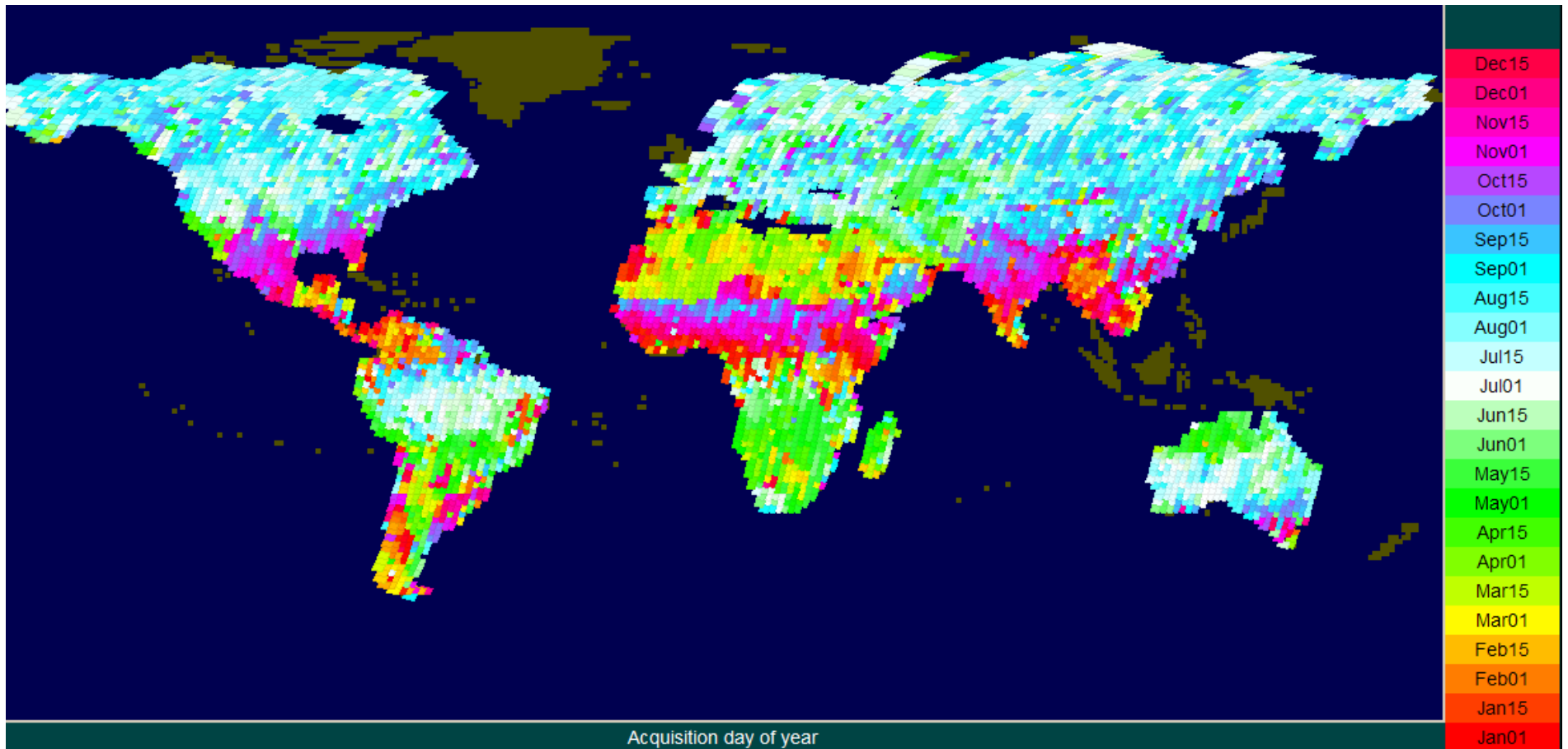
Area Coverage



Area Coverage average: 0.977%



Acquisition Day of Year



Part 2: GLS 2010 Preparations



Background

- **Successful GLS2005 effort has stimulated interest in GLS2010 dataset development**
- **The Group on Earth Observations (GEO) has defined three tasks that are complementary to GLS2010:**
 - **Task DA-07-02, which includes a subtask to “Coordinate 2010 Dataset with Contributions from Available International Assets”**
 - **Task AG-07-03 “Global Mapping of Agricultural Areas at 30m...Undertaken at 5 year intervals for 2005 and 2010”**
 - **Task DA-07-03 “Virtual Constellations,” specifically the Land Surface Imaging (LSI) Constellation**



Implementation Strategy

- **International participation is strongly desired**
 - **Augment gaps in Landsat coverage**
 - **Provide data coverage for participating agency ground station footprints**
 - **Intensify regional collection of multi-sensor data**
- **Landsat TM and ETM+ would be the “baseline” data sources and represent the U.S. contribution to the international effort**
 - **NASA and USGS have drafted MOU - waiting for signatures**
- **Pursue international participation through the CEOS LSI Constellation Study Team**

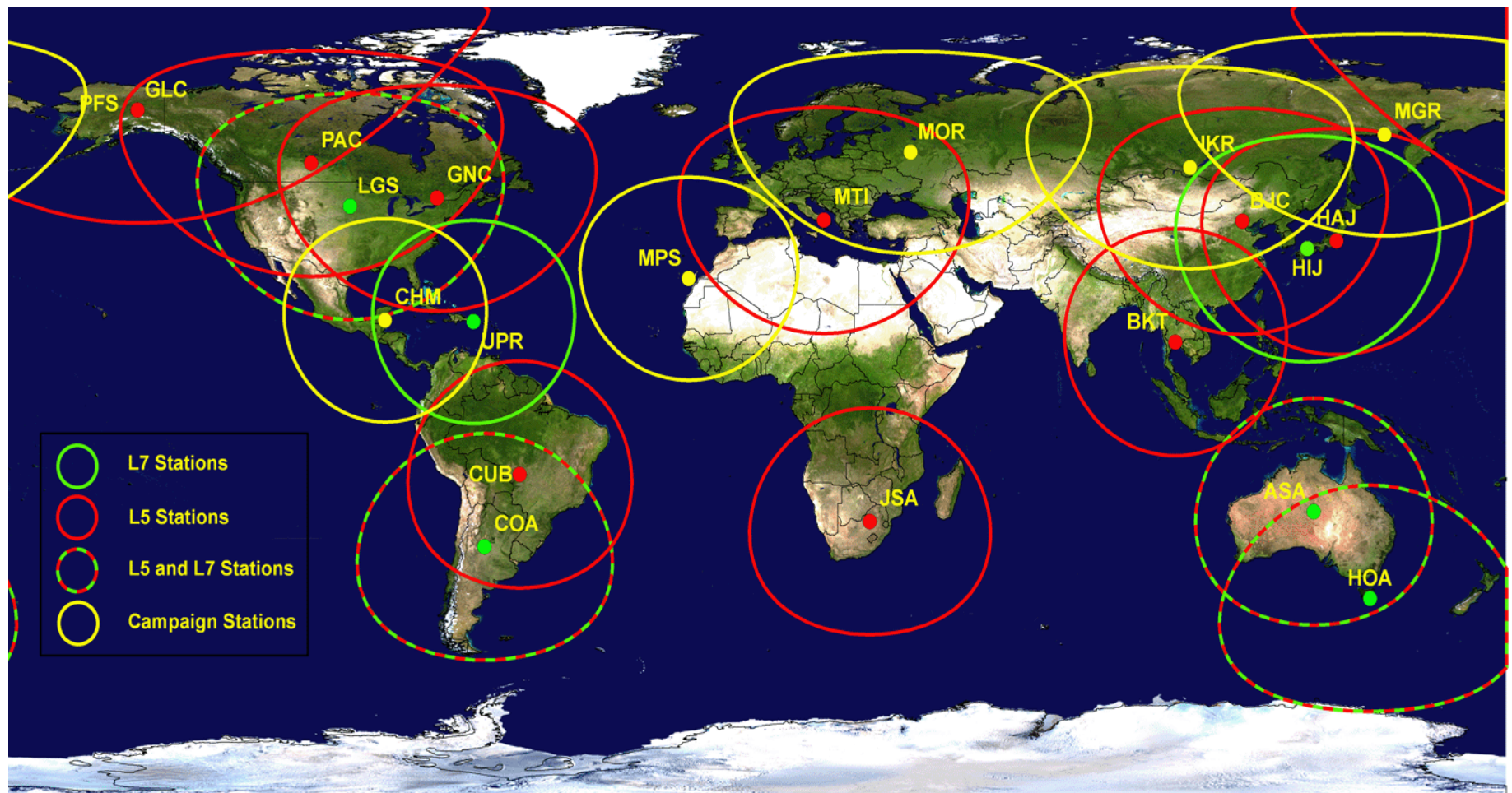


Data Compilation Strategy

- Landsat ETM+ and TM L1T data will be available at no cost
- LASSI tool developed for GLS 2005 will assist high grading the USGS Landsat archive
- International data collection
 - Contributions under LSI Constellation
 - *Data purchase through commercial brokerage*
 - *Data purchase through agency to agency agreements*



Combined Ground Station Network



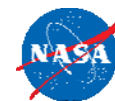
International Agreements

- **Landsat 7**
 - **Indonesia (DKI) dropping back from full IC status due to L7 ETM+ bumper mode processing issues – focusing on LDCM**
- **Landsat 5**
 - **China (KaShi) (through CAS/CEODE)**
 - **RSGS name change: CEODE - Center for Earth Observation and Digital Earth**
 - **Certification passes ongoing**
 - **Minor updates to the agreement documents in work**
 - **State Department raised U.S.-China space & security relationship concerns**
 - **Making the case: Augmentation of existing cooperation and potential US civil and military value**
 - **Russia (Irkutsk, Magadan, Moscow) (through ScanEx)**
 - **2008 unlikely for full IC status turn-on (funding issues)**
 - **Potential GLS2010 participant (campaign station status)**
 - **Mexico (Chetumal) (through CONABIO)**
 - **No indication that Chetumal will extend past its current planned completion date of July 5 (funding issues)**
 - **Potential GLS2010 participant (campaign station status)**
 - **Kenya (Malindi) (through ESA)**
 - **May & September campaigns**
 - **Potential GLS2010 participant (campaign station status)**
 - **Australia**
 - **Working Landsat 5 NOAA novation letter**

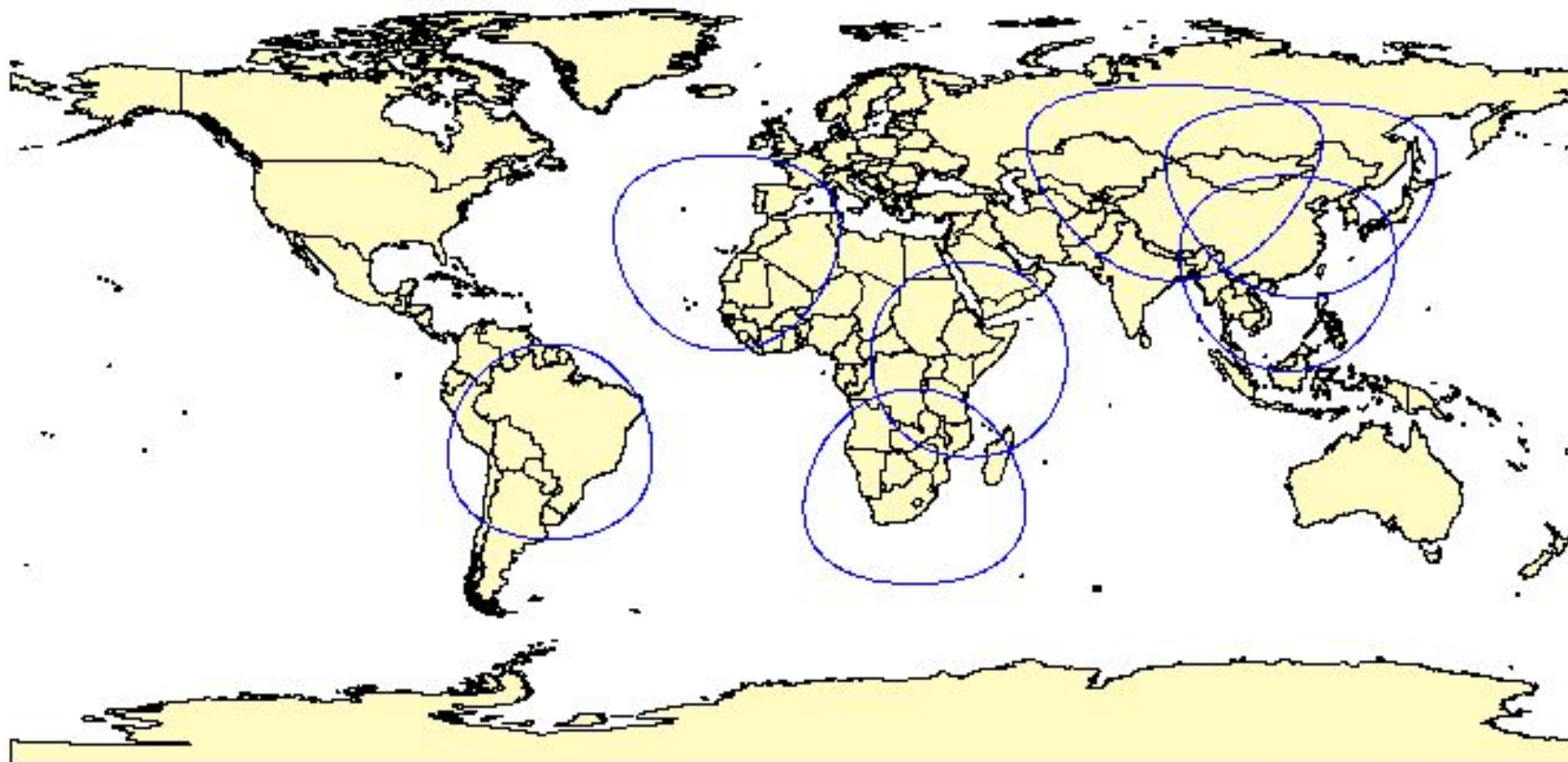


Current moderate-resolution imaging systems

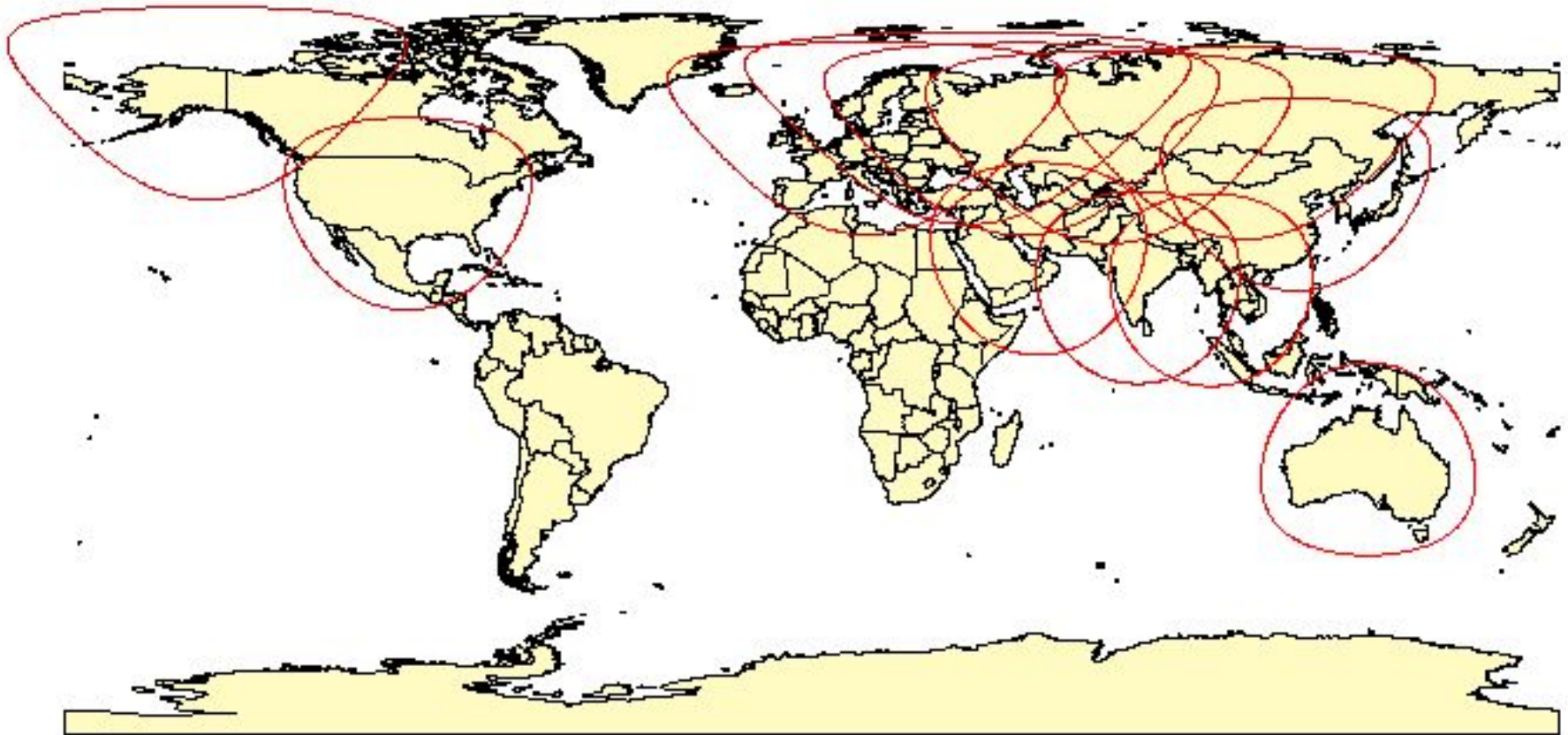
Mission	Platform	Sensor(s)	Country1	Country2	Org 1	Org 2	Launch Date(s)
EOS	Terra	ASTER	Japan	USA	METI	NASA/USGS	2000
CBERS	CBERS-3, 4	MUX, IRS, WFI	China	Brazil			2009, 2011
Monitor	Monitor-E	RDSA	Russia		KhSC		2003
SPOT	SPOT-4	HRVIR	France		CNES	SPOT	1998
SPOT	SPOT-5	HRG	France		CNES	SPOT	2002
	THEOS	MS	Thailand		GISTDA		2008
DMC	AlSat-1	DMC	Algeria			DMC	2002
DMC	Beijing-1	DMC	China			DMC	2005
DMC	UK-DMC	DMC	UK			DMC	2003
DMC	Deimos-1	DMC-2G	Spain		Deimos	DMC	2008
DMC	Nigeria Sat-2	DMC-2G	Nigeria			DMC	2009
DMC	UK-DMC2	DMC-2G	UK			DMC	2008



CBERS Acquisition Circles



IRS P6 (Resourcesat) Acquisition Circles



Coverage Summary

- **Landsat-7 can acquire global coverage (but with SLC gaps)**
- **Between CBERS and AWIFS, only west Africa, central America, southern South America, and Greenland cannot be acquired**
- **Adding Landsat-5 IGS and Campaign stations, only west Africa cannot be acquired**
 - **Chetumal campaign station critical**
 - **Russian campaign stations critical in the absence of AWIFS**
 - **Malindi station critical in the absence of CBERS and/or failure of CBERS to implement Africa network**



Notional Timeline for Implementation

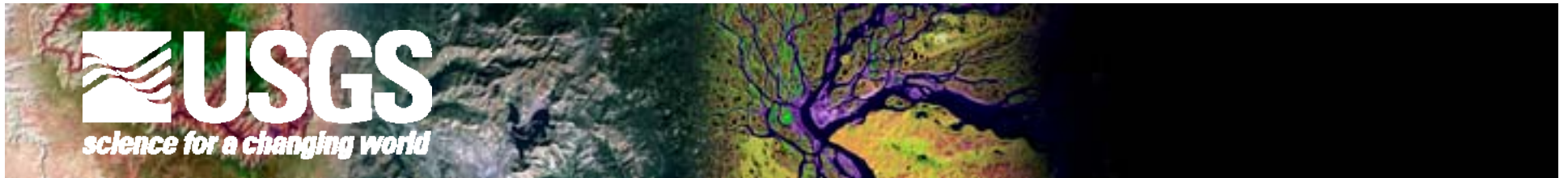
- **Implementation Plan (Sept 2008)**
- **Solicit international participation (Sept 2008)**
- **Establish terms and formal agreements (January 2009)**
- **Define GLS 2010 product specifications (Spring 2009)**
- **Data collection (Spring 2009 - Fall 2010)**
- **Compile metadata and browse (Fall 2010)**
- **Perform scene selection (Winter 2010-11)**
- **Initiate product generation (Spring 2011)**
- **Provide web-enabled data access (Summer 2011)**



Issues

- **Data policy and redistribution**
- **Levels of data processing and product specifications**
- **Gap-filling of ETM+ SLC-off data**
- **Data archive and distribution – centralized or distributed?**
- **Instrument cross-calibration and generation of multi-instrument products**

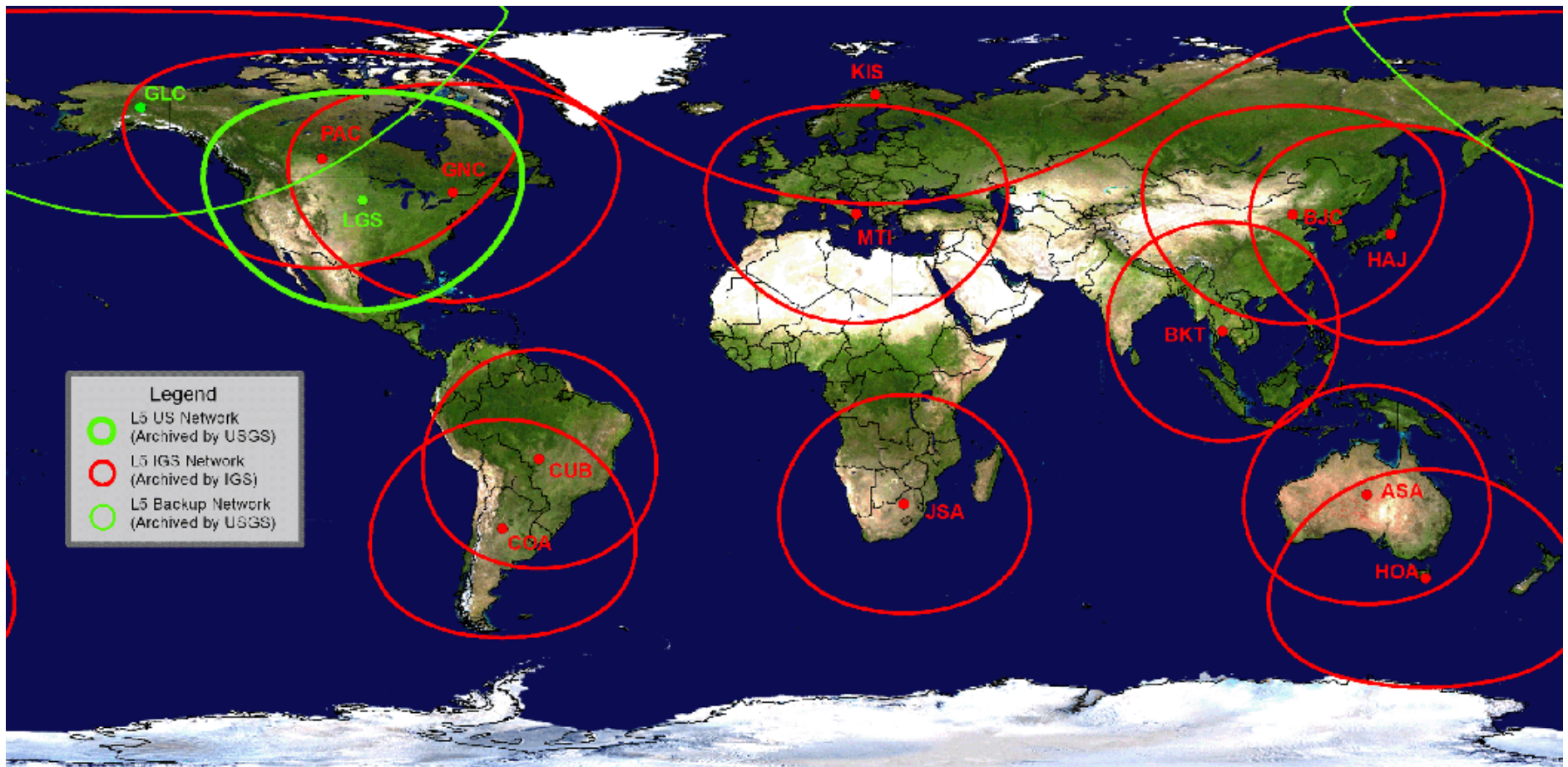




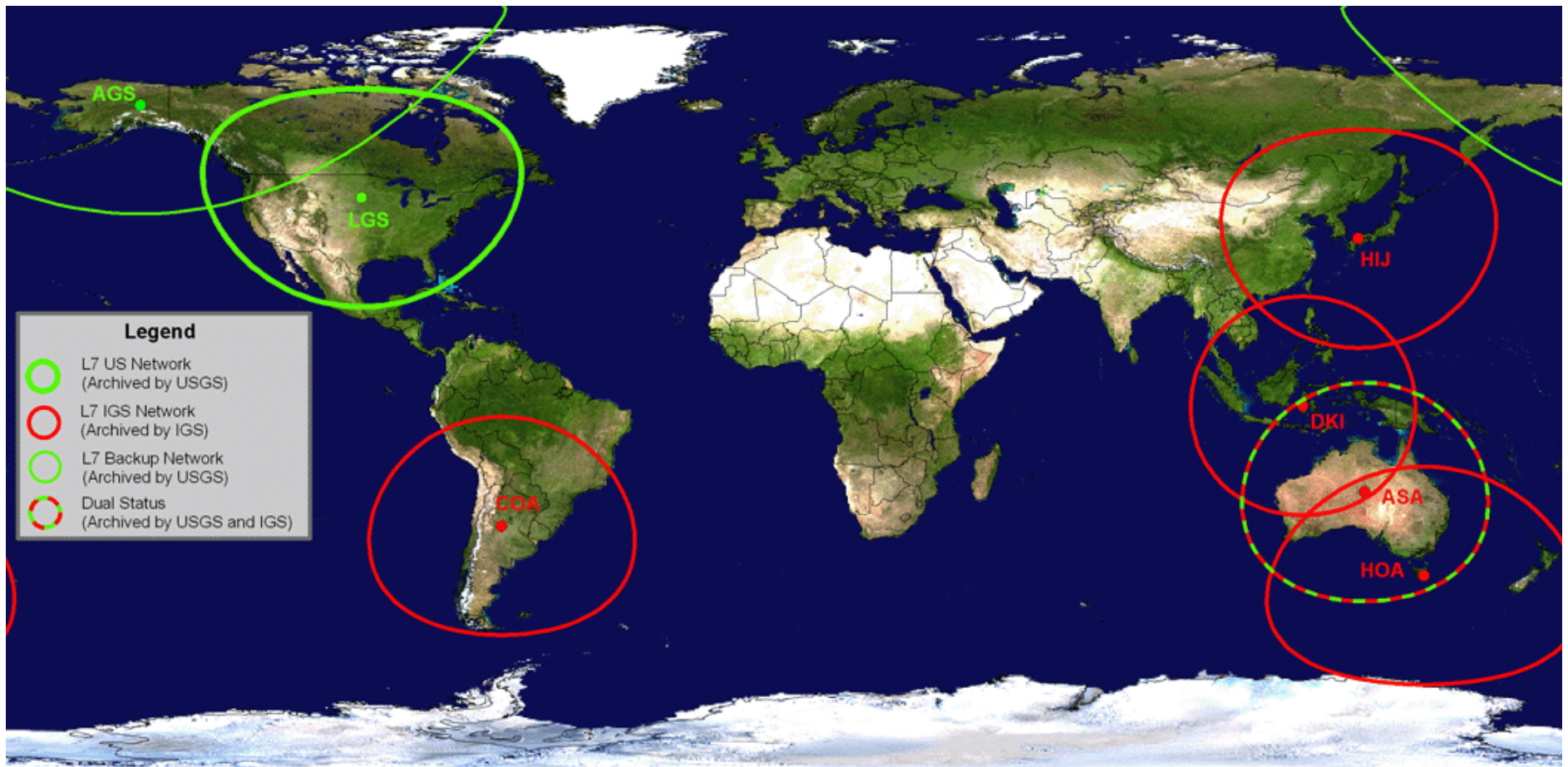
Thank You

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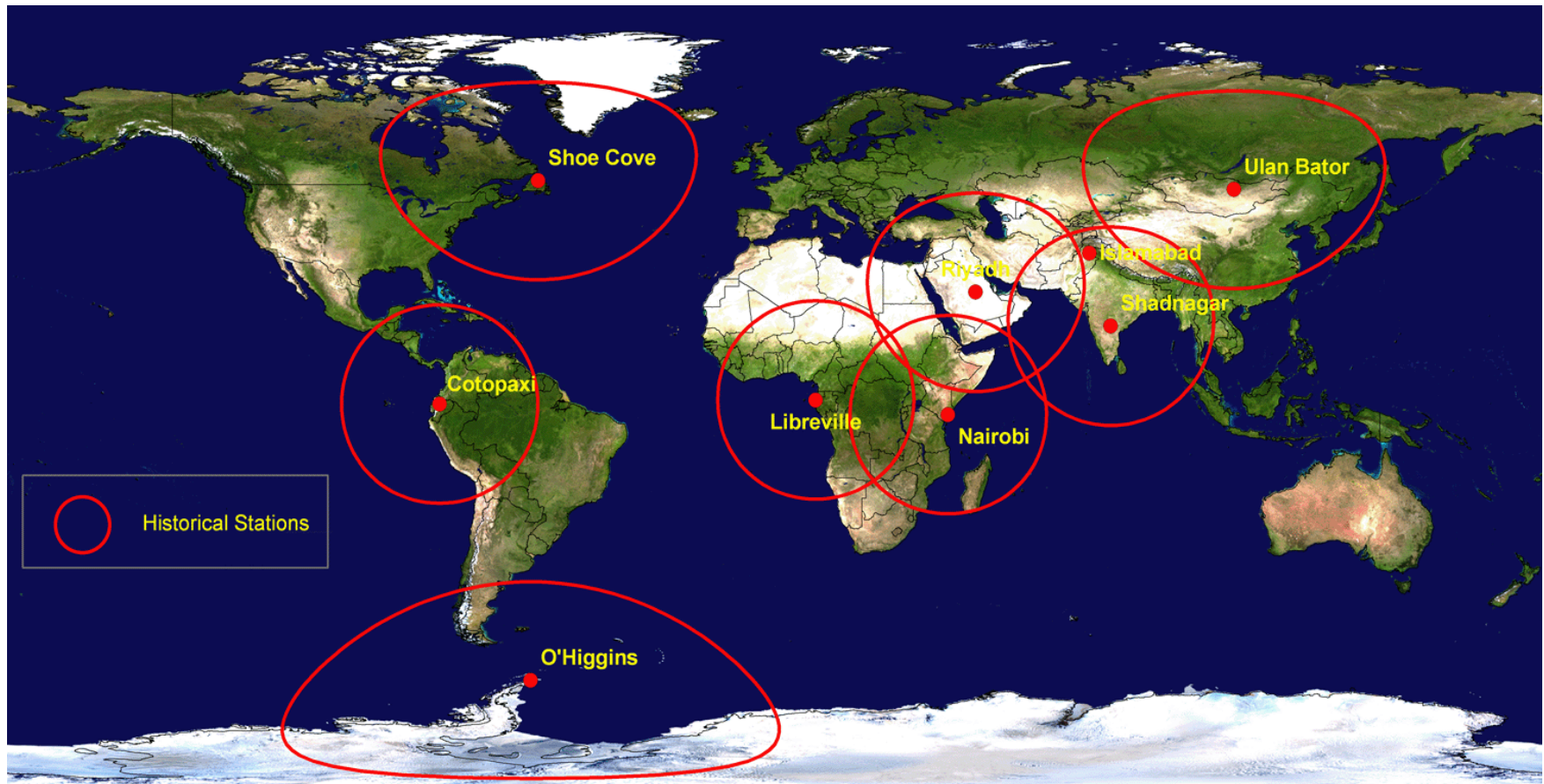
Landsat 5 Ground Station Network



Landsat 7 Ground Station Network



Historical Stations



Ground Station Identifiers




Country	Location	Identifier	Satellite Rcvd
Argentina	Córdoba	COA	L5, L7
Australia	Alice Springs	ASA, ASN	L5, L7
Australia	Hobart	HOA	L5, L7
Brazil	Cuíaba	CUB	L5
Canada	Gatineau	GNC	L5
Canada	Prince Albert	PAC	L5
China	Beijing	BJC	L5
China	KaShi	KHC	L5
Italy (ESA)	Matera	MTI	L5
Indonesia	Parepare	DKI	L7
Japan	Hatoyama	HAJ	L5
Japan	Hiroshima	HIJ	L7
Kenya (ESA)	Malindi	MLK	L5*
Mexico	Chetumal	CHM	L5*



* Campaign Station



Ground Station Identifiers

Country	Location	Identifier	Satellite Rcvd
Norway	Svalbard	SGS	L5, L7
Russia	Irkutsk	IKR	L5*
Russia	Magadan	MGR	L5*
Russia	Moscov	MOR	L5*
South Africa	Hartebeesthoek	JSA	L5
Spain (ESA)	Maspalomas	MPS	L5*
Sweden (ESA)	Kiruna	KIS	L5
Thailand	Bangkok	BKT	L5
U.S.	Gilmore Creek, AK	GLC	L5*
U.S.	Poker Flats, AK	AGS	L5, L7
U.S.	Poker Flats, AK	PFS (PF1, PF2)	L5, L7
U.S.	Sioux Falls, SD	LGS	L5, L7
U.S. 	Univ. of Puerto Rico	UPR	L7  

* Campaign Station