

# Global Land Surveys 1975-2010

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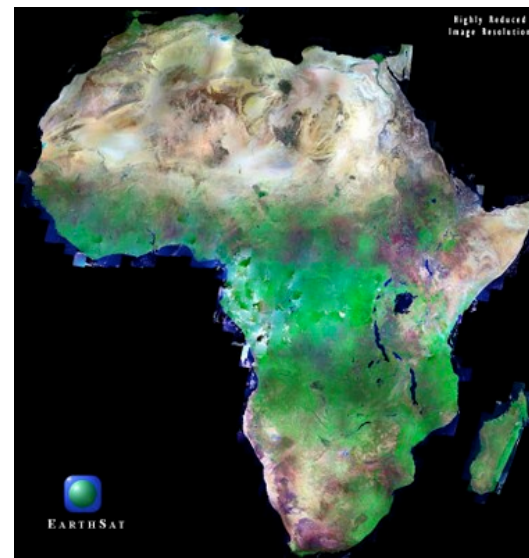
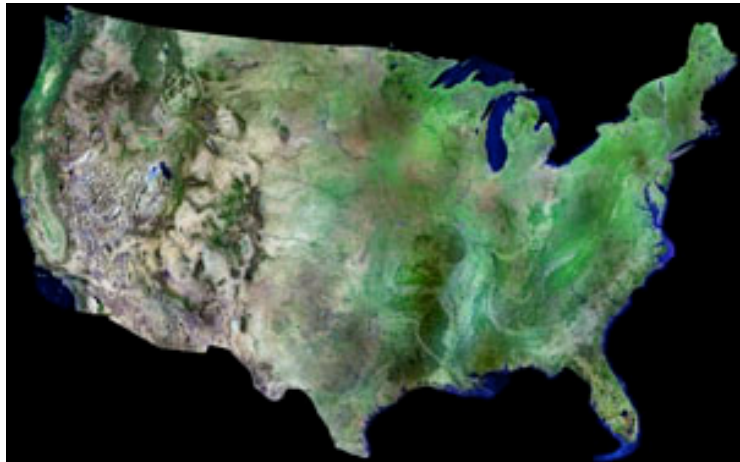
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USGS EROS

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

# Global Land Survey Data Sets

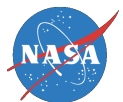
**Global cloud-free, orthorectified Landsat data sets centered on 1975, 1990, 2000, 2005, and 2010**

- 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 Rationale

- **“Best of archive” subset for long-term monitoring of land cover and ecological change**
  - Cloud-minimized, optimal seasonality (peak green)
  - Leverage international archives
  - Gap-filled (for ETM+)
  - Free, open, orthorectified (not an issue now)
- **Consistent, ~decadal record for trend analysis**
- **A “baseline” that can be supplemented with web-enabled data**



# History

- 1997: NASA contracts with Earthsat Corp (later MDA Federal) to produce a wall-to-wall Landsat coverage for 1990 and 1975 [Geocover product]
- 2001: NASA contracts for a Year 2000 follow-on dataset
- 2006-2008: NASA and USGS partner to
  - Reprocess earlier Geocover datasets with MDA - new dataset called “Global Land Survey (GLS)”
  - Create new GLS2005 data set for 2004-2007 period



# GLS 1975-2005

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

- SRTM digital topography (+ DTED, CDED, NED)
- improved density of ground control
- <25m RMSEr\_error for 2000; <40m for 1990; <75m for 1975

GLS2000, 1990 now complete and available for download via GLOVIS/EarthExplorer and bulk order

GLS2005 95+% complete, available for download

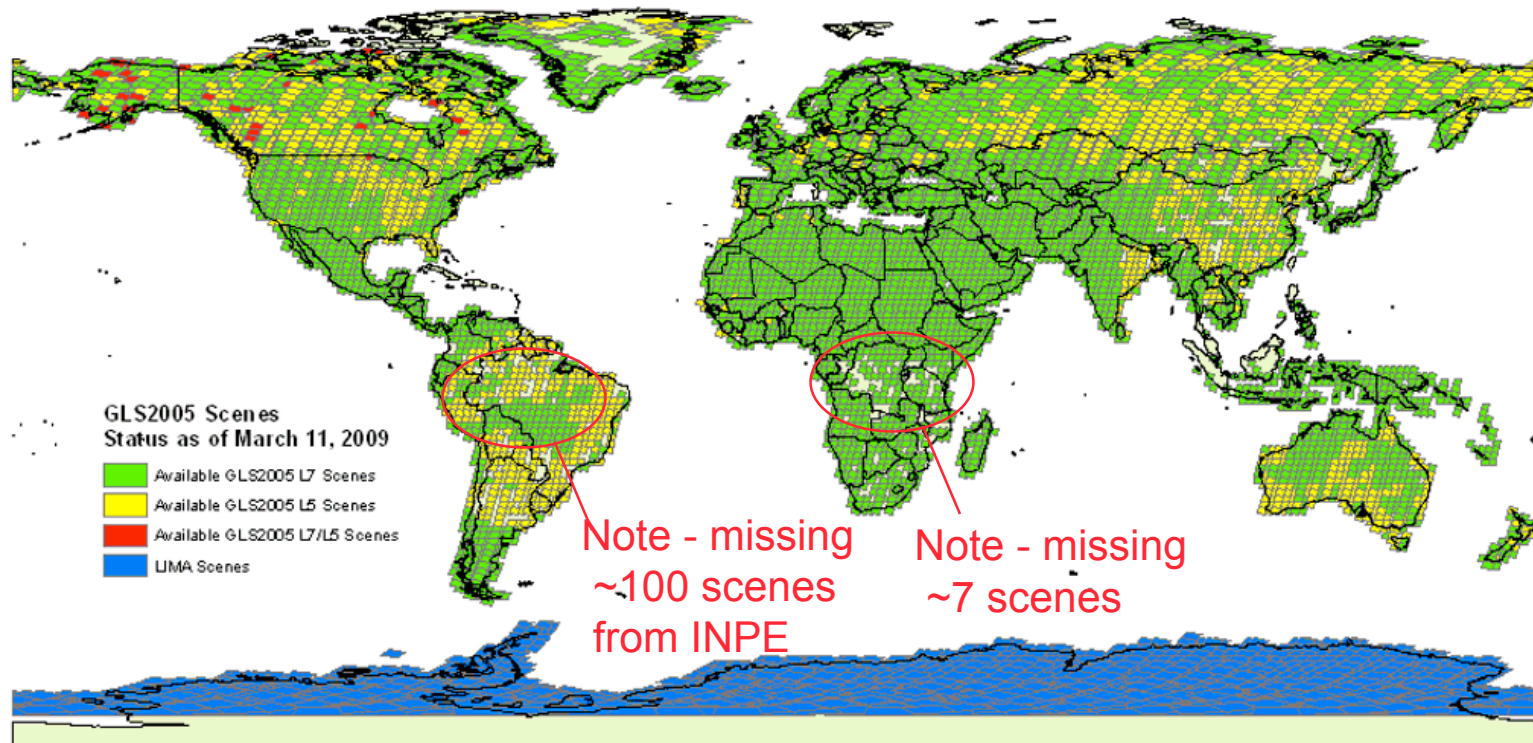
- few scenes to be reselected for QA, missing scenes in S.Am.
- EO-1 ALI island/reefs scenes being processed

GLS1975 to be released mid-April



# GLS 2005 Current Status

- Until completion, GLS2005 available on per-scene basis through GLOVIS/Earth Explorer
- Bulk data distributed to LCLUC ROSES 2007 "GLS" team members to enable 2-year analysis schedules





WRS-2  
Path / Row:     
Lat / Long:

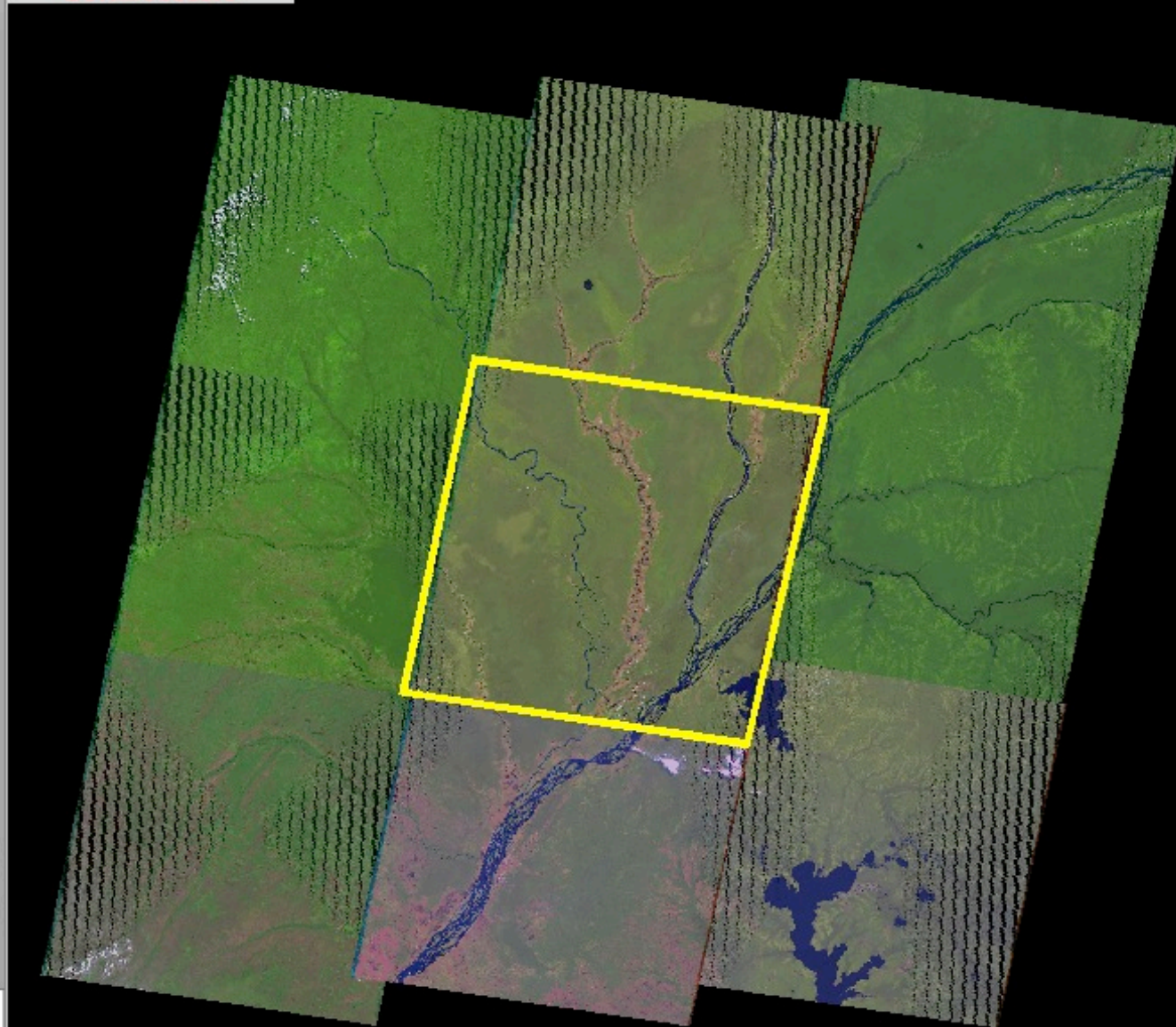


Scene Information:

ID: LE71810602006175ASN00  
Date: 2006/6/24

GLS 2005 Scene List

Downloadable



# GLS2010 Overview

- **Need for GLS2010**
  - Pre-sorted “best of archive” for land cover science
  - Inclusion of International Data
  - Gap-filled products from Landsat-7
  - Decadal consistency for change detection
- **2009-2010 acquisition window**
- **USGS/NASA MOU Signed 2008**
- **Relying on Landsat-5, 7, but with international contributions through CEOS Land Surface Imaging (LSI) Constellation**





# GLS2010 Schedule & Plans

## 2009

- Set up L5 campaign stations, begin downlinks
- Target EO-1 ALI acquisitions for islands and reefs
- Obtain sample data sets from SPOT-5, CBERS-2b, AVNIR, THEOS

## 2010

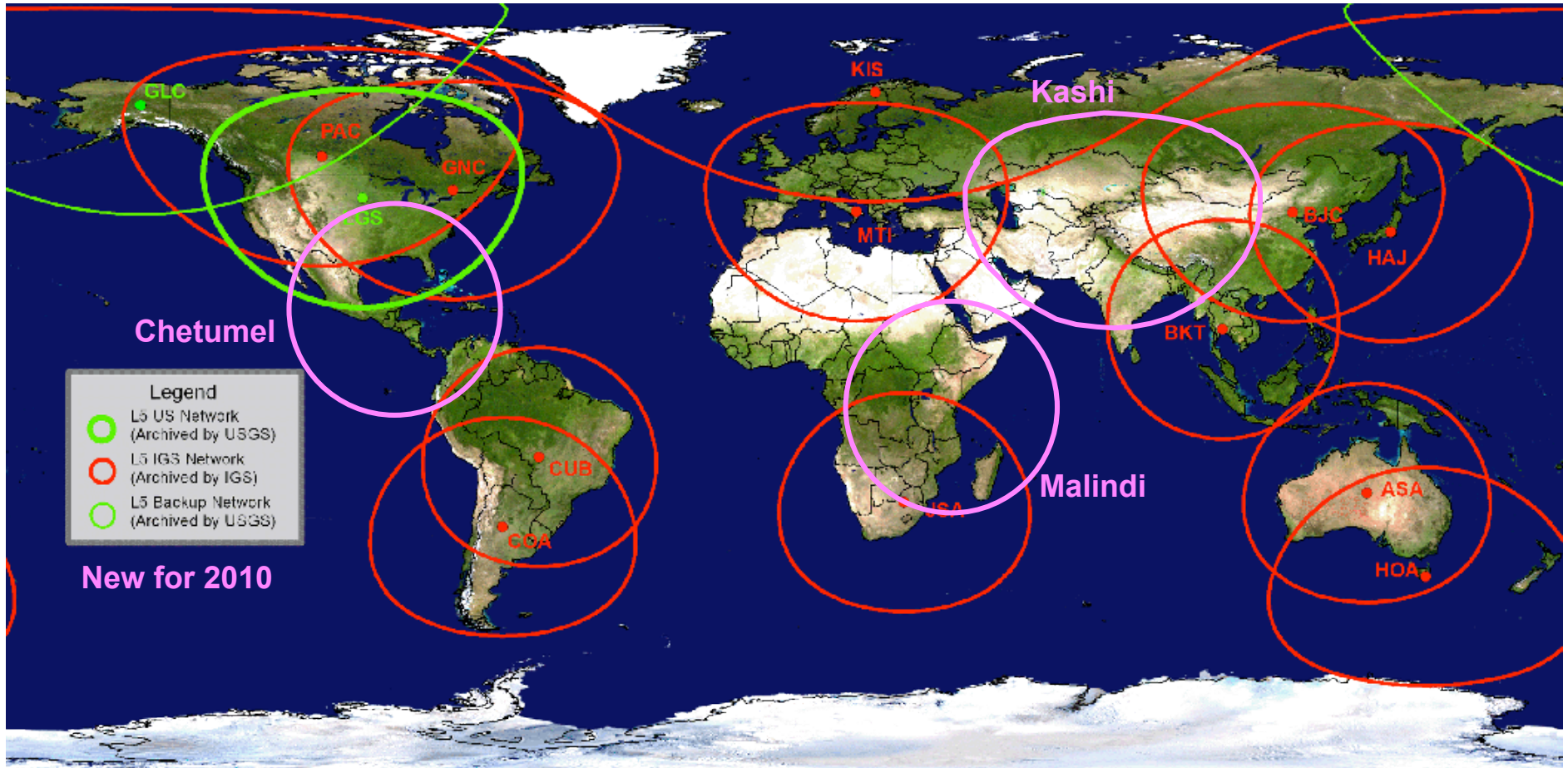
- Continue ground station operations
- Additional international data acquisition/contribution?
- Begin scene selection process via LASSI
- Deploy gap-filling code at GSFC

## 2011

- Obtain collects from IC's
- Process L5/L7 data to L1T at EROS
- Gap-filling of L7 imagery at GSFC
- Release final product by end of 2011



# Landsat-5 Ground Stations

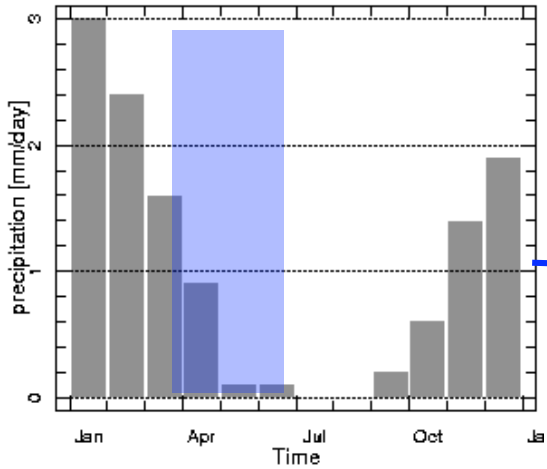
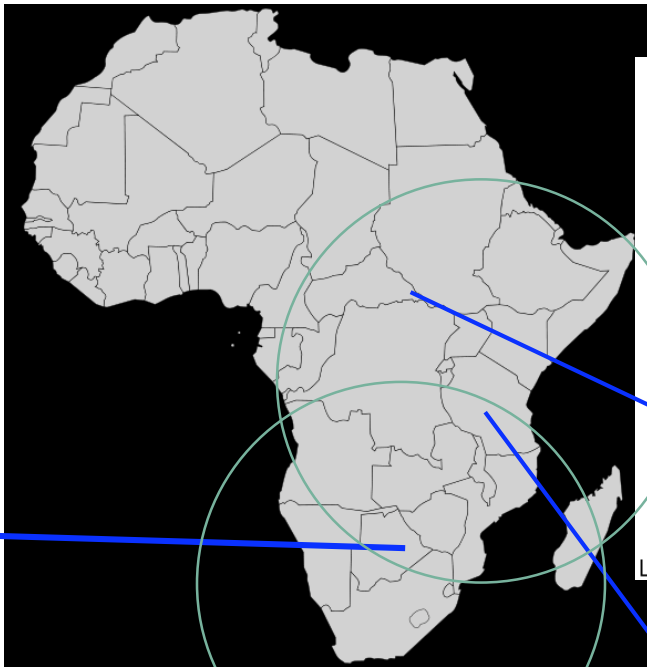


Russian stations questionable

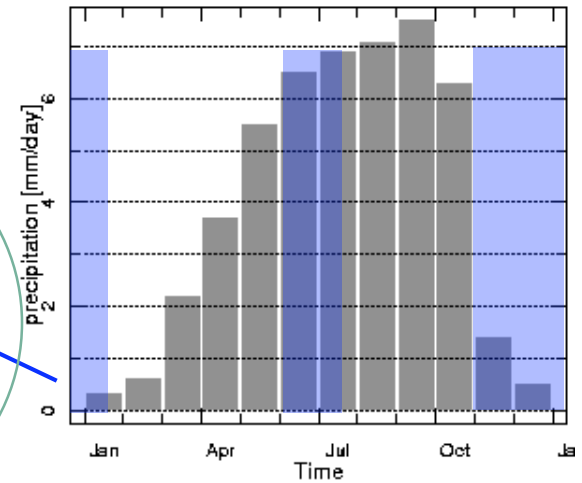
Landsat-5 “gaps”: northeast Siberia, west Africa



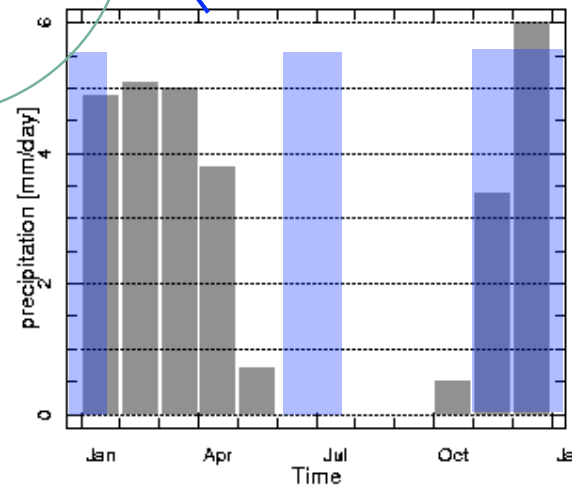
# Malindi and South Africa 2009 Schedules



Longitude 23.75E Latitude 21.25S



Longitude 24.75E Latitude 6.25N



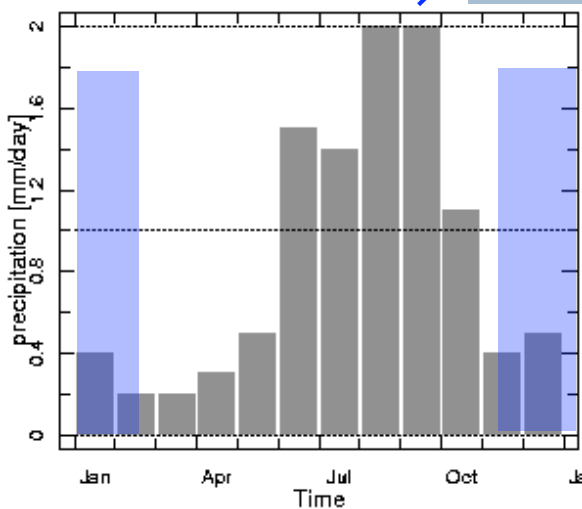
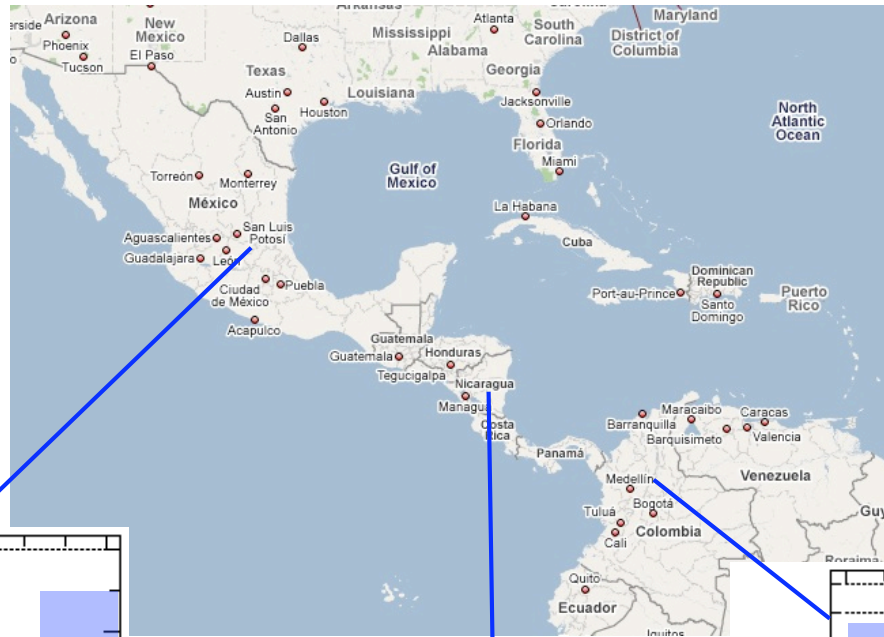
Longitude 33.25E Latitude 5.75S



Data courtesy IRI, Lamont-Dougherty/Columbia



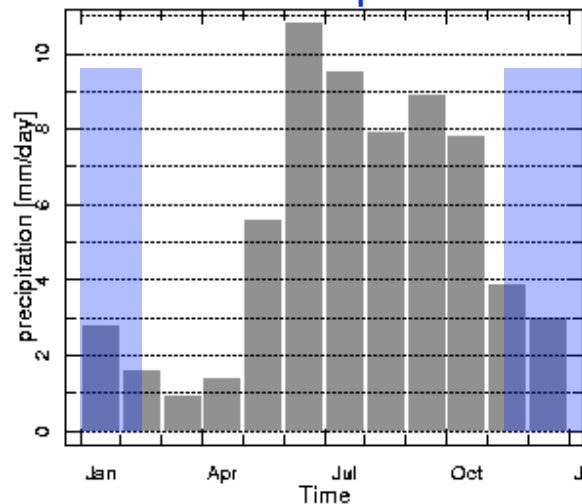
# Chetumel Acquisition 2009 Acquisition Schedule



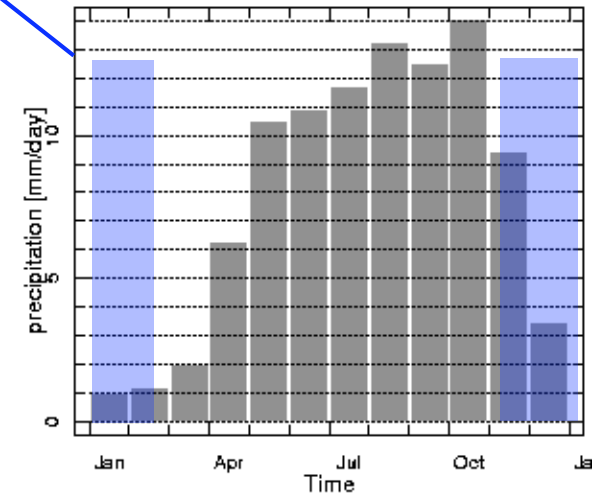
Longitude 102.25W Latitude 23.75N



Data courtesy IRI, Lamont-Dougherty/Columbia



Longitude 85.25W Latitude 13.25N



Longitude 74.75W Latitude 8.25N



# International Participation

- **Letter sent to space agencies in October 2008 soliciting data contributions through CEOS LSI Constellation activities**
  - Regional Data Set Initiatives (Townshend)
  - GLS2010 (Masek)
- **Positive responses from JAXA, CNES, INPE, CONAE, GISTDA**
- **Initially focused on three “target” areas for data intercomparison (Central South America, southern Africa, SE Asia).**
- **Spring 2009: Work with agencies to acquire data and host through CEOS WGIS Land Portal.**



# Science Products

The GLS effort is focusing on both data products and long-term land cover analysis

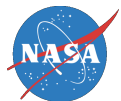
**NASA LCLUC (ROSES2007) and Earth Science Information Systems programs are funding analyses of GLS (1975-2005) record:**

- Chander, G. (USGS EROS) - Sensor cross-calibration
- Davis, B. (NASA SSC) - Sensor intercomparison for land cover
- Giri, C. (USGS EROS) – Monitoring Tropical Mangrove Forests
- Hansen, M. (SDSU) – Forest Cover in Humid Tropics
- Skole, D. (MSU) – Tropical Forest Cover Change
- Townshend, J. (UMD) –Global Forest Cover Change Data Record
- Xiao, X. (UNH) – Land Cover Products for Monsoon Asia



# Future Science Directions

- **October 2008 GLS Science Team meeting suggestions:**
  - **Synthesis project to document decadal trends in global forest dynamics**
  - **Broader topical scope - include studies of urbanization and agriculture extent**
  - **Move toward global, annual updates of land cover condition around the globe**



# Conclusions

- **Global Land Survey offers decadal views of the Landsat archive for monitoring long-term trends in land-cover and ecology**
- **GLS1975, 1990, 2000 reprocessed**
- **GLS2005 is available now; to be complete by mid-2009**
- **Development of GLS2010 is underway**

*Thank You*





Table 1: Current and/or planned (w/ launch before 2010) moderate-resolution remote sensing missions.

Satellites	Sensor	Agency	Resolution (VIS, m)	Status
<b>ALOS</b>	<b>AVNIR-2</b>	JAXA	10.0	active
AlSat-1	SLIM-6	ASAL, DMC	32.0	active
Beijing-1	SLIM-6	MoST, DMC	32.0	active
<b>CBERS-2</b>	<b>IRMSS</b>	CAST, INPE	80.0	active
<b>CBERS-2, 2B</b>	<b>HRCC</b>	CAST, INPE	20.0	active
<b>EO-1</b>	<b>ALI</b>	NASA	30.0	active
HJ-1A, B	CCD	CAST	30.0	active
<b>IMS-1</b>	<b>MX-T</b>	ISRO	37.0	active
<b>IRS-1C, 1D</b>	<b>LISS-III A</b>	ISRO	23.5	active
<b>IRS-P6</b>	<b>LISS-III B</b>	ISRO	23.5	active
<b>IRS-P6</b>	<b>AWiFS</b>	ISRO	56.0	active
<b>Landsat-5</b>	<b>TM</b>	NASA	28.5	active
<b>Landsat-7</b>	<b>ETM+</b>	NASA	28.5	active
NigeriaSat-1	SLIM-6	NASRDA, DMC	32.0	active
SAC-C	HRPC	CONAE	35.0	active
<b>SAC-C</b>	<b>HRTC</b>	CONAE	35.0	active
<b>SPOT-4</b>	<b>HRVIR</b>	CNES, SPOT	20.0	active
<b>SPOT-5</b>	<b>HRG</b>	CNES, SPOT	10.0	active
SPOT-5	HRS	CNES, SPOT	10.0	active
<b>Terra</b>	<b>ASTER</b>	NASA, METI	15.0	active
THEOS	MS	GISTDA	15.0	active
AlSat-2	NAOMI	ASAL	10.0	prelaunch
SMOTR-1	multi	Gaskom, RSC	20.0	prelaunch
SMOTR-2	multi	Gaskom, RSC	40.0	prelaunch
UK-DMCSat-2	SLIM-6	BNSC, DMC	22.0	prelaunch

