



Landsat Global Archive Consolidation (LGAC)

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Presented By:

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U.S. Department of the Interior

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Agenda

- **Background**
- **Process for Project**
- **Intent of this Activity**
- **Historical Perspective**
- **Challenges**

Background

- **The USGS is evaluating the process, cost and relative merit for consolidating a copy of the global archive of historical Landsat imagery at EROS**
 - ◆ There is growing concern about the state of historical archives, especially at inactive stations where we have no operational contact
 - ◆ The global historical archive extent has not been actively monitored
 - ◆ There is an increasing interest from user community and USGS/NASA for more frequent surveys
 - ◆ New tools such as LASSI are being developed and made available to support large scale scene selections/data mining
 - ◆ A consolidated archive would better support/facilitate global change analysis and assessment

Goal of LGAC

- Describe the initiative to the International Cooperators (IC) and determine their willingness to participate in this effort
- Determine the location, extent and condition of the historical Landsat archives around the world
- Generate a list of the instrument (MSS, TM, ETM+), data format and media type at each location
- Assess the equipment, software, logistics and level of effort necessary to acquire, ingest, process and archive the data
- Develop an estimated cost and schedule for project
- Report out to USGS management and the Landsat Science Team on the findings

Historical Perspective

- **Over the past 35 years, over 50 ground stations have been configured to receive Landsat data**
- **Currently, there are 24 ground stations around the world that are configured to operationally receive Landsat data (19 currently active)**
- **Beyond the current stations, there are 9 historical collection sites operated by 7 organizations that we believe could have a significant, unique historical archive**

Process Description for the Project

- **Pre-Phase A: Landsat Global Archive Consolidation Study**
 - ◆ Perform initial study of global archive content
 - Define project process
 - Promote the project within the International Cooperator (IC) community through emails and meetings
 - Contact specific inactive ground stations to encourage participation in the project
 - Perform survey of ICs to determine ROM estimate of data volume in global archive
 - ◆ Establish a notional cost basis for work
 - ◆ Present study results to USGS management
 - ◆ ***Gain Authorization to proceed to Phase A***

Process for Project

- **Phase A: Develop Detailed Plan for Implementation**

- ◆ Create a definitive list of scenes to be collected from around the world (through Landsat Metadata Definition Document (LMDD) implementation)
 - Acq Date, Path/Row, Media, Location
 - Identify redundancy with current US archive holdings
- ◆ Identify areas of investment necessary for project execution
 - Software: Ingest, processing, web support
 - Hardware: Media Tape Drives, Archive media, infrastructure upgrades (storage capacity)
 - Personnel requirements for implementation and execution
- ◆ Negotiate formal project agreements with the IC participants
 - Identify roles and responsibilities of ICs versus USGS
 - Document deliverable items (data, PCD, ephemeris), delivery schedule, delivery media, schedule
 - Establish funding responsibilities between ICs and USGS
- ◆ Create a detailed implementation schedule and cost estimate
- ◆ ***Present Detailed Implementation Plan and gain authorization to proceed with execution***

Process for Project

- **Phase B: Development of Project Capabilities**
 - ◆ Procure necessary media and archive hardware
 - ◆ Develop necessary software
 - ◆ Purchase media and consumables
 - ◆ Formalize Project Agreements with participating ICs
- **Phase C: Execute Archive Consolidation**
 - ◆ ICs copy archive content to agreed format and media
 - ◆ Delivery of media to EROS
 - ◆ Ingest of data, creation of metadata
 - Work problematic media to recover data
 - Tracking/communications of progress via web-tools
 - ◆ Completed archive consolidation

Content of the U.S. archive

USGS Archive Content

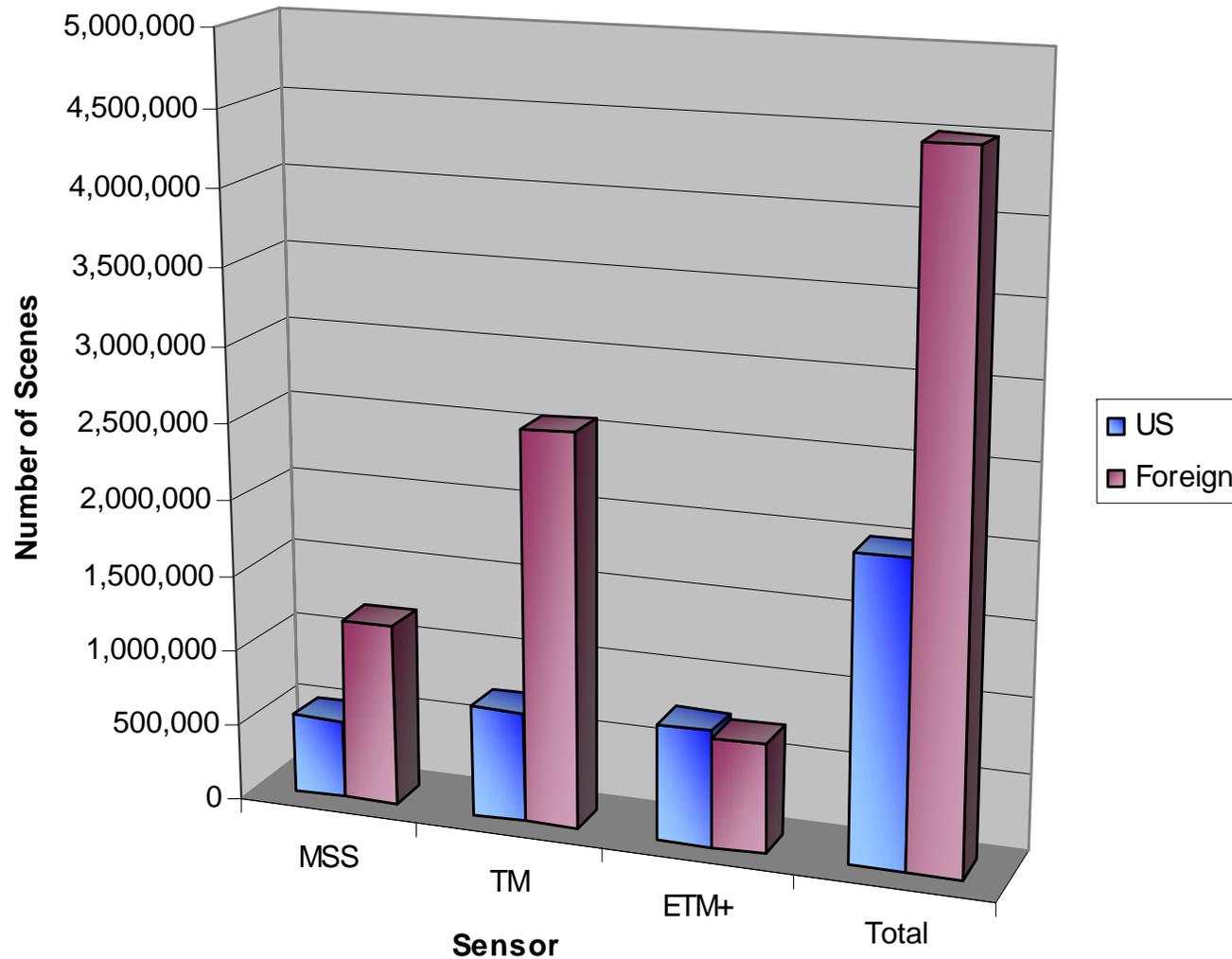
Satellite	Sensor	Date Range	Data Format	Scenes	Volume	Media
L1 - 5	MSS	Jul 23, 1972 – Nov 18, 1993	MSS-X, WBV	521,999	15.71 TB	DLT 7000
L4 – L5	TM	Mar 1, 1984 – Current	TM-A, TM-R, RCC	729,387	365 TB	9940B
L7	ETM+	Apr 15, 1999 – Current	L0Ra, RCC	761,709	707 TB	9940B
				2,013,095	1088 TB	

Content of the foreign archives

Archive Content of Argentina, Australia, Brazil, Canada, China, Ecuador, ESA, Hiroshima IT, Pakistan, South Africa, Thailand

Satellite	Sensor	Date Range	Data Format	Scenes	Volume	Media
L1 - 5	MSS	1972 – 1999	MSS	1,204,727	72 TB	DLT 7000 Sony SD-1 HDDT
L4/L5	TM	Aug 17, 1982 – Current	TM-A, TM-R, RCC	2,583,339	777 TB	DLT 7000 Sony SD-1
L7	ETM+	July 1, 1999 – Current	L0Ra, RCC	721,579	332 TB	DLT 7000 Sony SD-1 SAIT1-500 HDD
				4,509,645	1181 TB	

Global Archive Content



Challenges

- **Communications**

- ◆ Reestablishing contact with older, possibly inactive stations

- **Technical**

- ◆ Working equipment compatible with older media
- ◆ Media in poor or unstable condition due to age or storage conditions
- ◆ Determining data tape formats
- ◆ Determining image data formats
- ◆ Assembling/determining necessary ancillary information to successfully process the imagery

- **Programmatic**

- ◆ Costs and logistics of retrieving the global archive
- ◆ Cost of engineering, software, ingestion and storage

Next Steps...

- ✓ **Used downlink records to estimate likely archive locations and extent**
- ✓ **Delivered a presentation to the active ICs at a the last Landsat Ground Station Operations Working Group meeting discussing the project**
 - ✓ All station present expressed support for the activity
- ✓ **Develop partial list of data types, formats, medias and interest**
 - ✓ Need to initiate contact with historical IC station operators
- ✓ **Develop an initial estimate on the state of the global Landsat archive held by the IC community**
- **Transition study activities to USGS International Ground Station Network Manager (Steve Labahn)**
- **Create a high-level plan for consolidating a copy of that archive at EROS**
 - ◆ Include technical challenges, level of effort estimates, a coarse schedule and costs
- **Present the plan to USGS and Science Team**
- **Wait for authorization and funding to proceed**

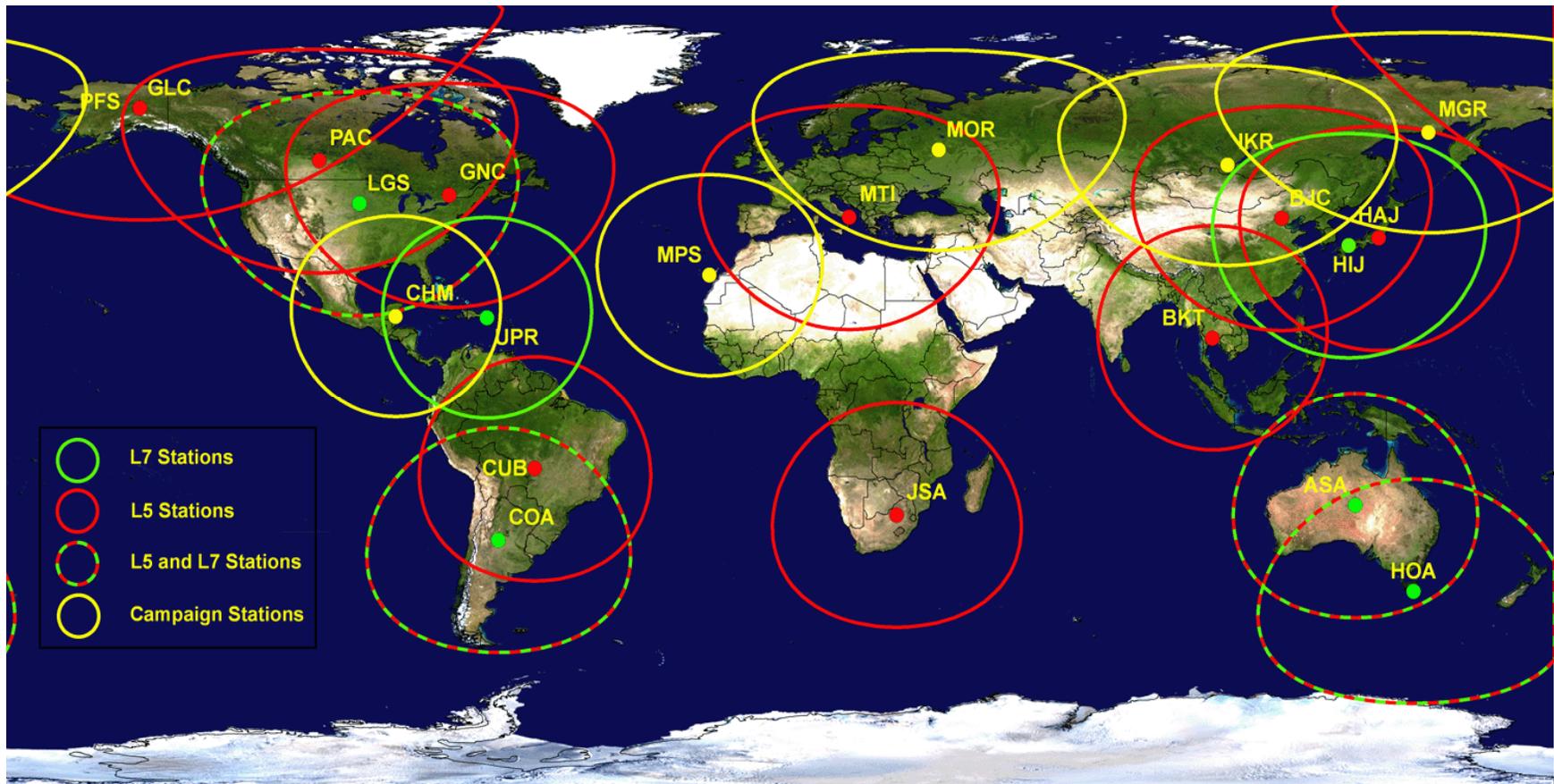


Backup Slides

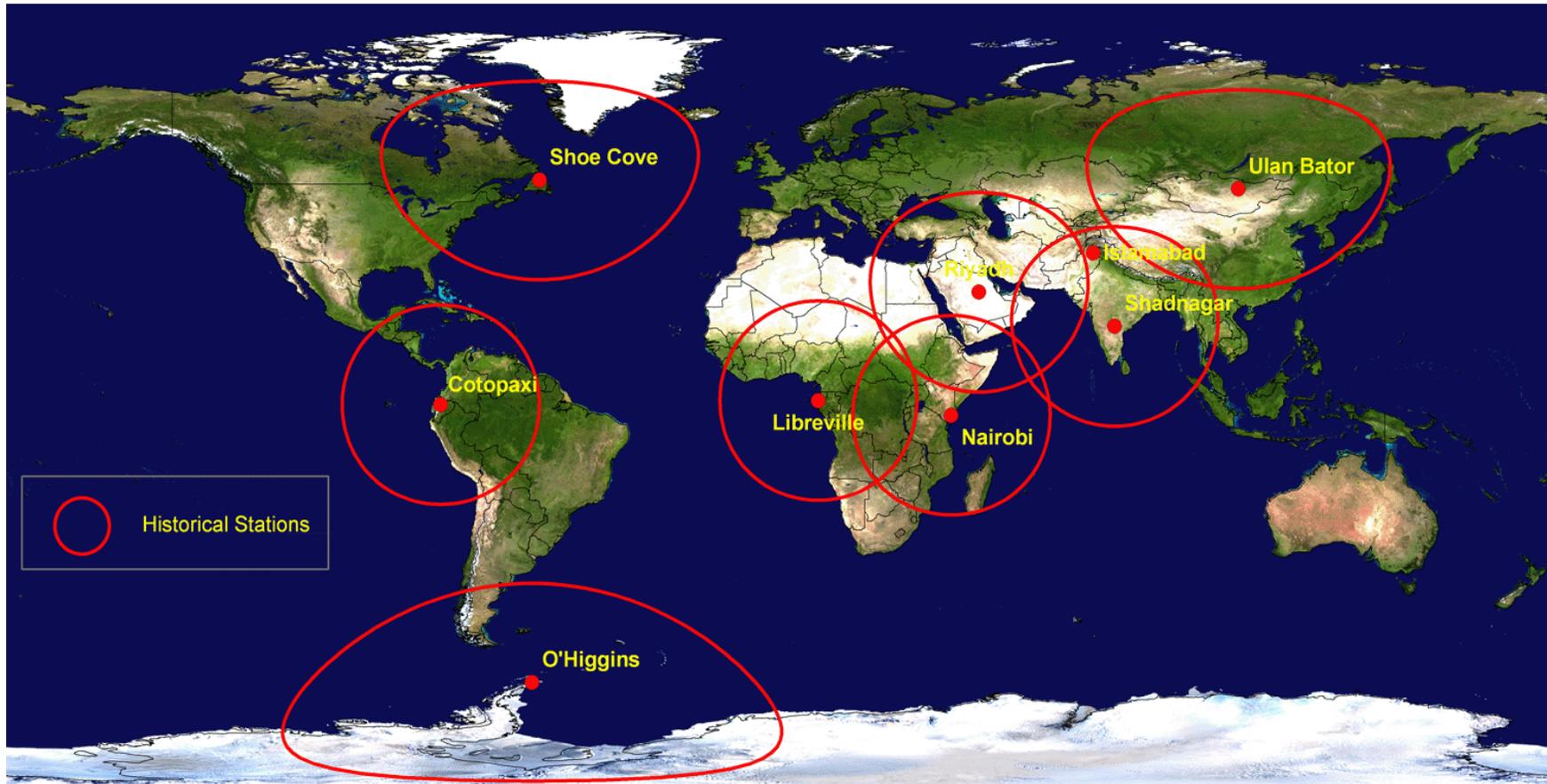
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Current Stations



Historical Stations



Are there other stations we should be considering?