

NASA/HQ Update

CEOS Working Group on Calibration and Validation

Budapest, Hungary, May 2006

Landsat Data Gap Issues: Update

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Land-Cover/Land-Use Change Program

Landsat-7 composite image

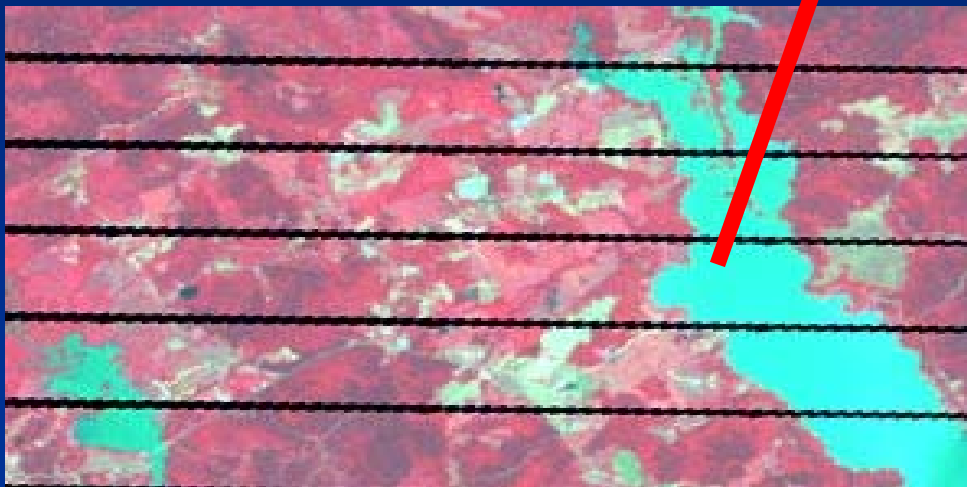


**L-7 composite artifacts from gaps, clouds, and varying phenology
for Path 158 Row 70: Primary scene is 01.27.05, 2nd 02.12.05, 3rd
06.01.04, 4th 05.16.04, and 5th 11.24.04**

Landsat-7: Current Status

- Landsat-7 data alone are insufficient for producing high-quality, regional-to-global LCLUC products
 - Scan Line Corrector failed (end of May 2003)
 - L-7 composites from 2-3 consecutive images are still inadequate for LCLUC studies in areas with persistent clouds and/or significant seasonal changes

Landsat-7 Scan Line 'non-correction' problem



**Seriously degraded
data since 6/1/2003...**

Introduction

- The GEOCOVER-2000 30-m orthorectified Landsat dataset is publicly available
- A Global Mid-Decadal Land Survey is needed for studying changes since 2000
- Landsat-7 coverage is global, but each scene has data gaps
- Landsat-5 coverage is not global and the satellite is 20-yr old!
 - There is a set of international cooperators to deal with for getting data
 - there are gaps, and to fill them some steps should be taken

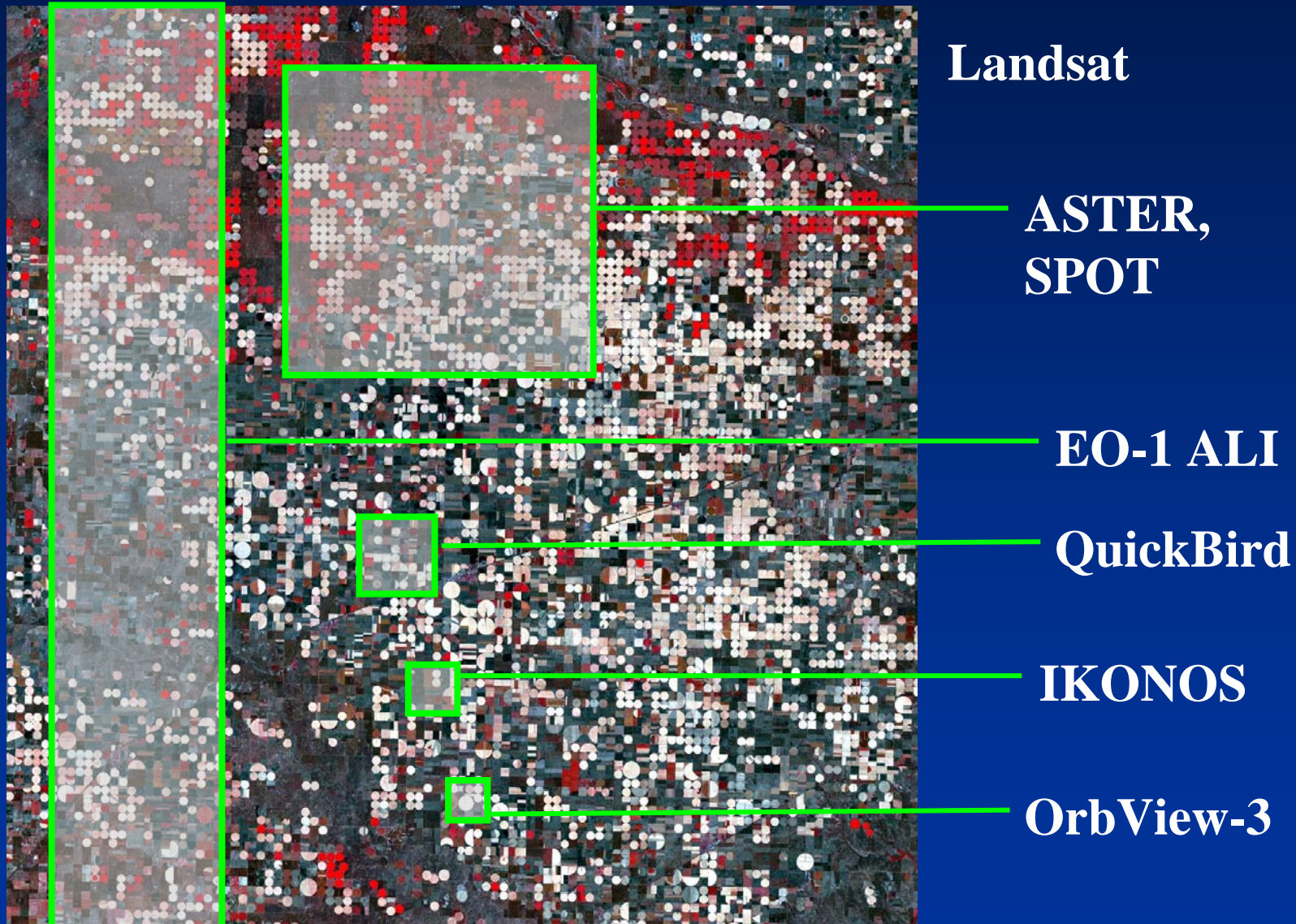
Goals

- Develop a global high-res. dataset for 2004-2006 based mostly on Landsat data
- Develop a strategy for the post-L5 period
- Gain experience in utilizing non-US sources so that a global **decadal** high-resolution 2010 dataset can be developed when L-5 (and maybe L-7) is (are) dead and the next Landsat is yet unavailable

Mid-Decadal Global Land Survey (MDGLS)

- Components
 - Landsat-5 ground stations data where available
 - Landsat-7 composites
 - ASTER to fill the gaps, EO-1/ALI over islands
 - If necessary fill the gaps with foreign data
- USGS leads Phase I – data compilation
 - satellite tasking, ground station coordination
 - scene selection, data transfer
 - ingest into the USGS archive
- NASA leads Phase II – data processing
 - Process the collected data into an ortho-rectified dataset compatible with previous surveys
- Phase III – development of LCLUC products

ALI, ASTER, SPOT May Complement Landsat Scenes



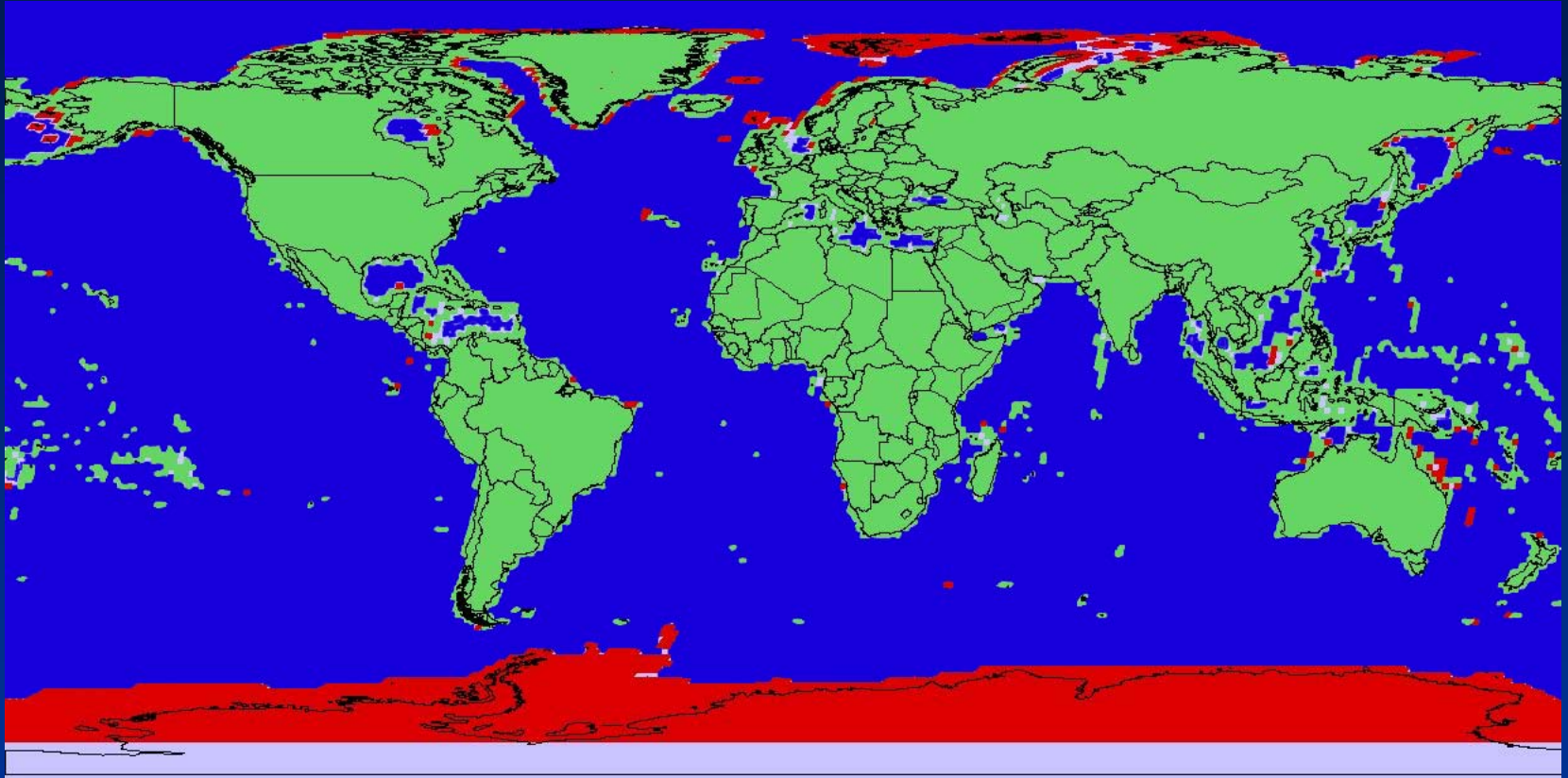
Assembling from Available Pieces



Coverage

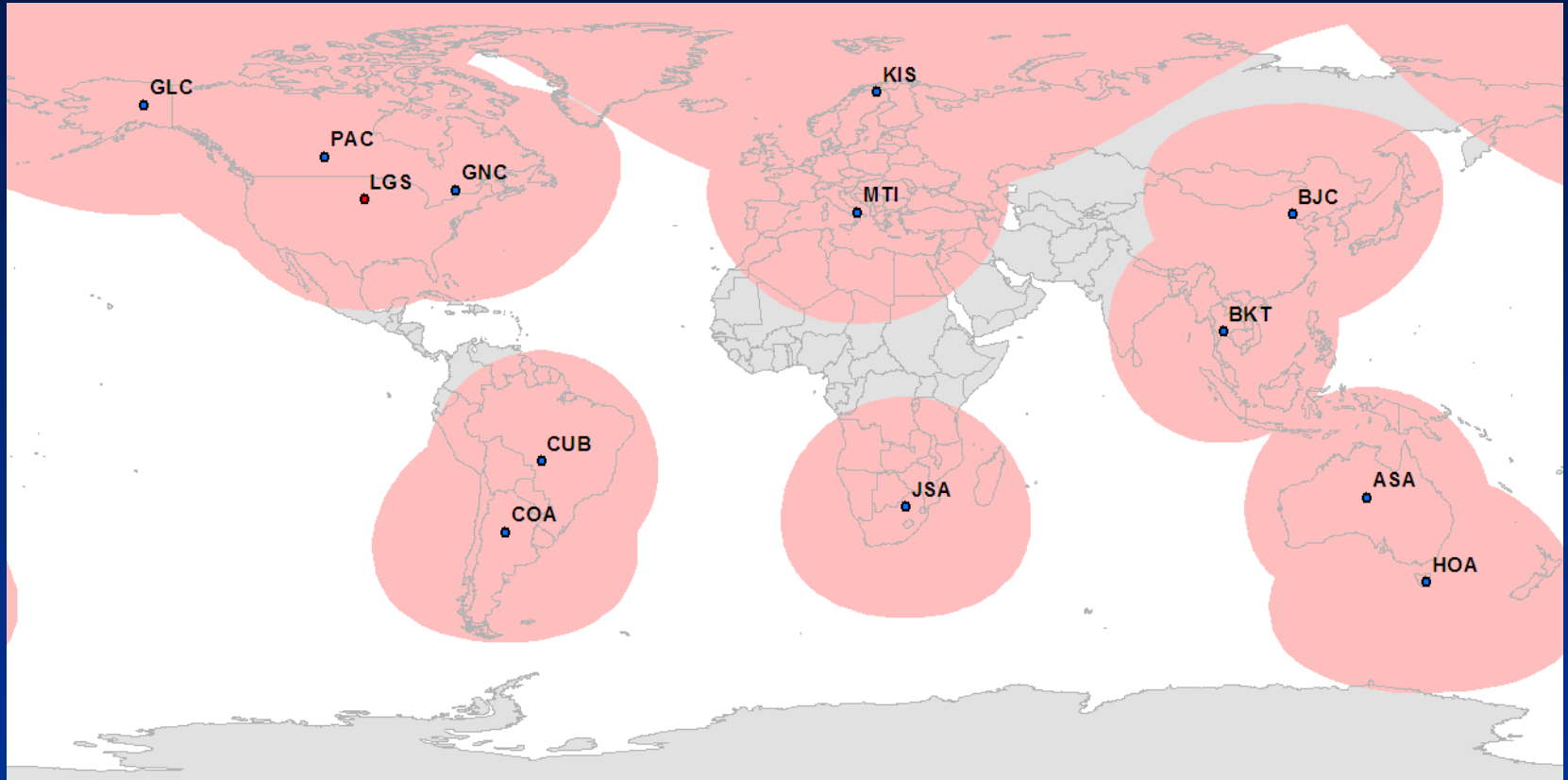
- Past Surveys' Coverage of Unique Coverage
 - 1970's: 6,976 path/rows
 - 1990: 7,037 path/rows
 - 2000: 8,209 path/rows
- MDGLS will include 9,500 scenes
 - Better accounting of islands and reefs
 - Inclusion of the Antarctic continent
 - Full coverage of Arctic area in 'ascending' orbit

MDGLS Baseline Coverage

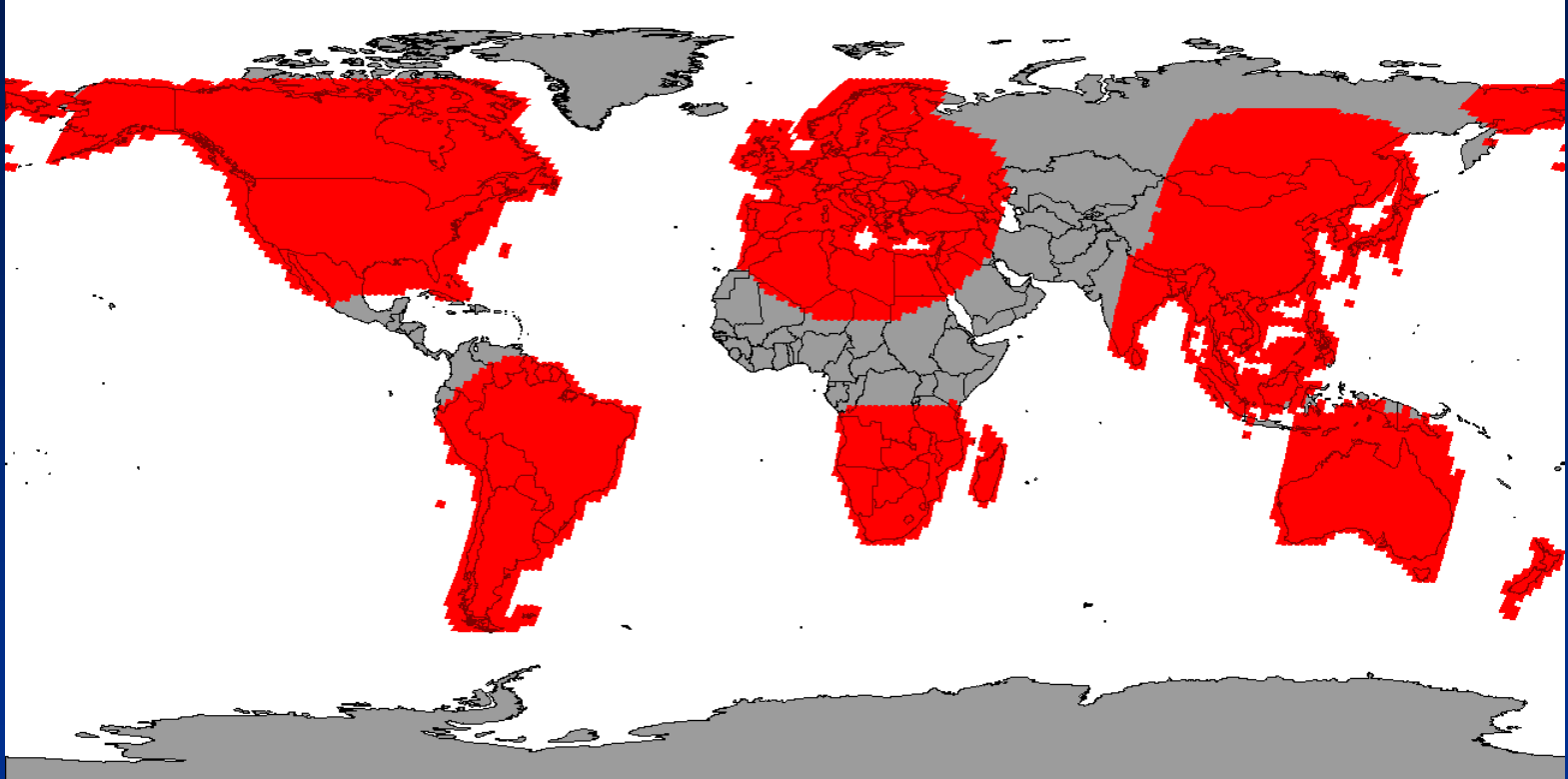


Green = GeoCover 2000 Coverage
Red = New MDGLS Coverage

Current Landsat 5 Station Coverage

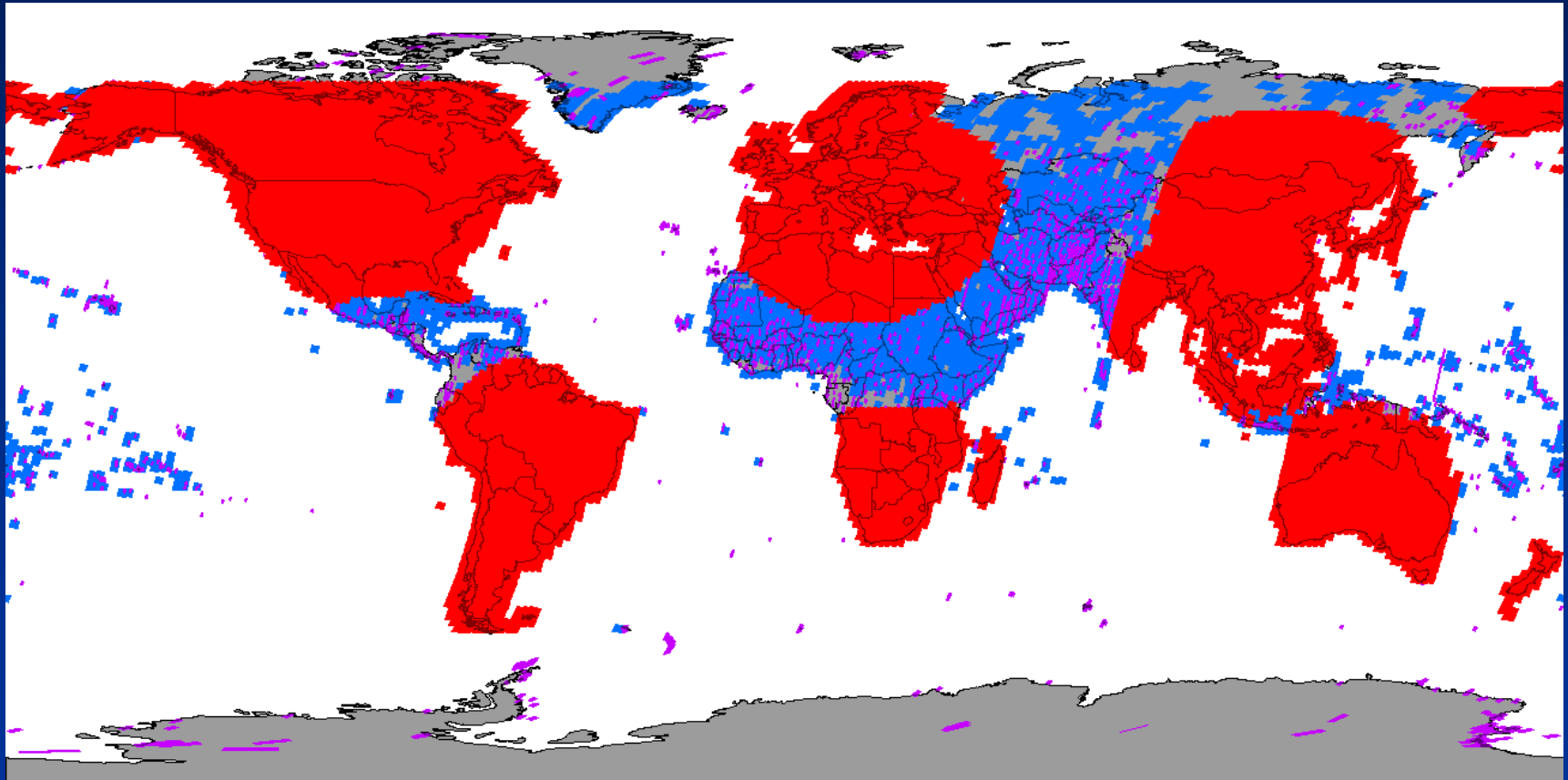


Actual Landsat 5 Coverage

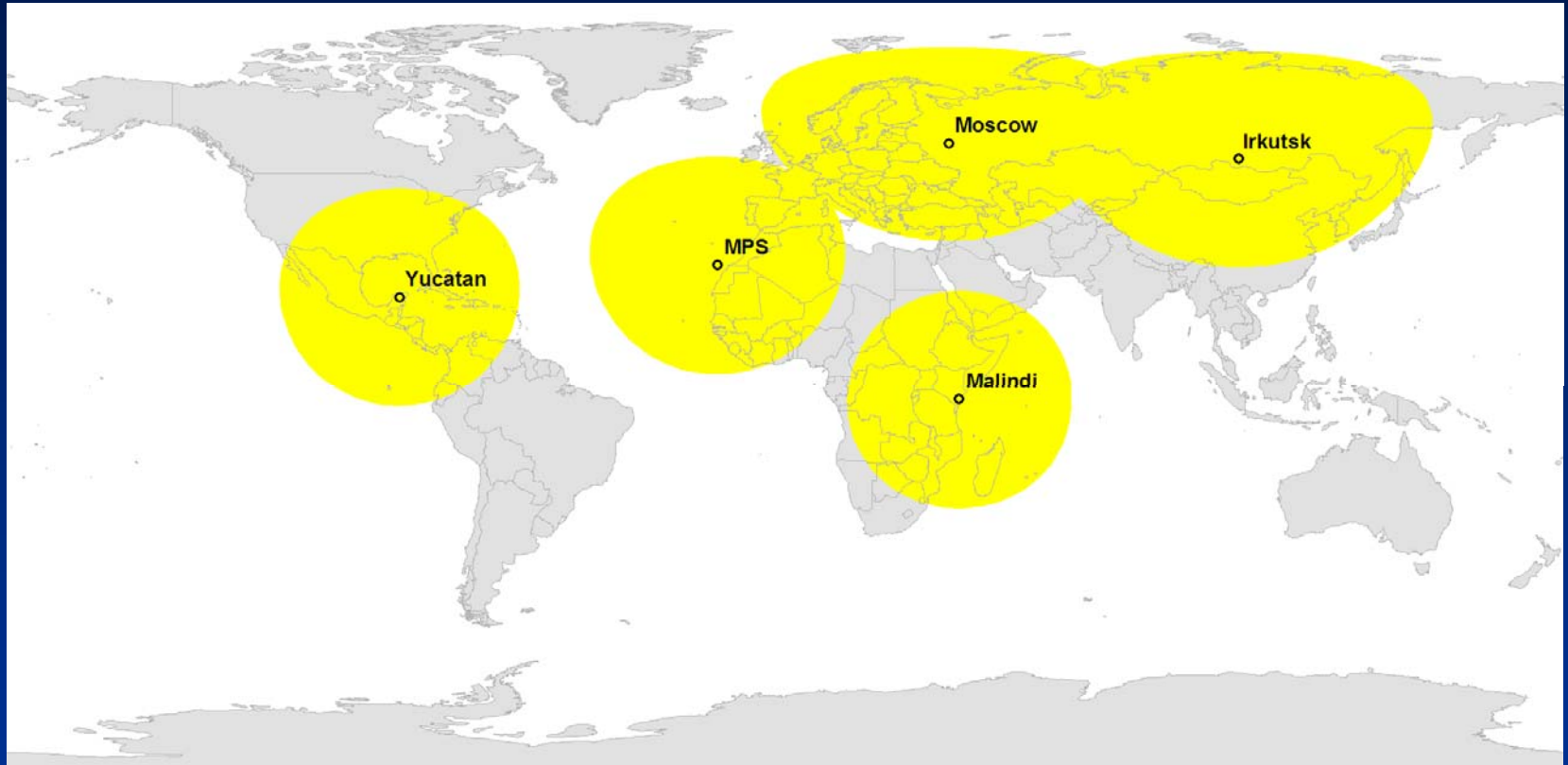


L5/L7 Combined Coverage

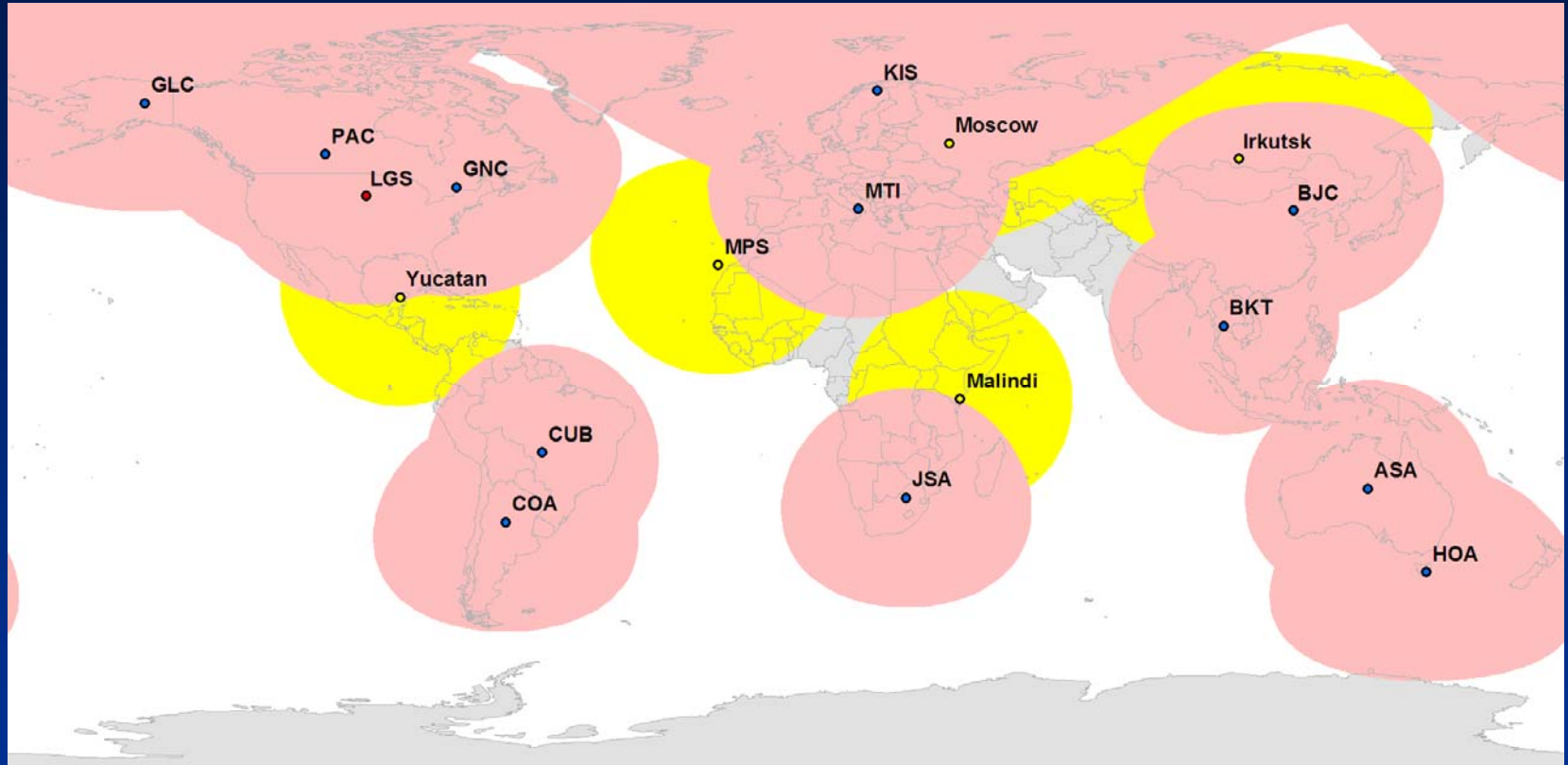
- Almost 2/3rds through the imaging opportunity, 87% of the globe has been covered.



Notional Campaign Station Locations



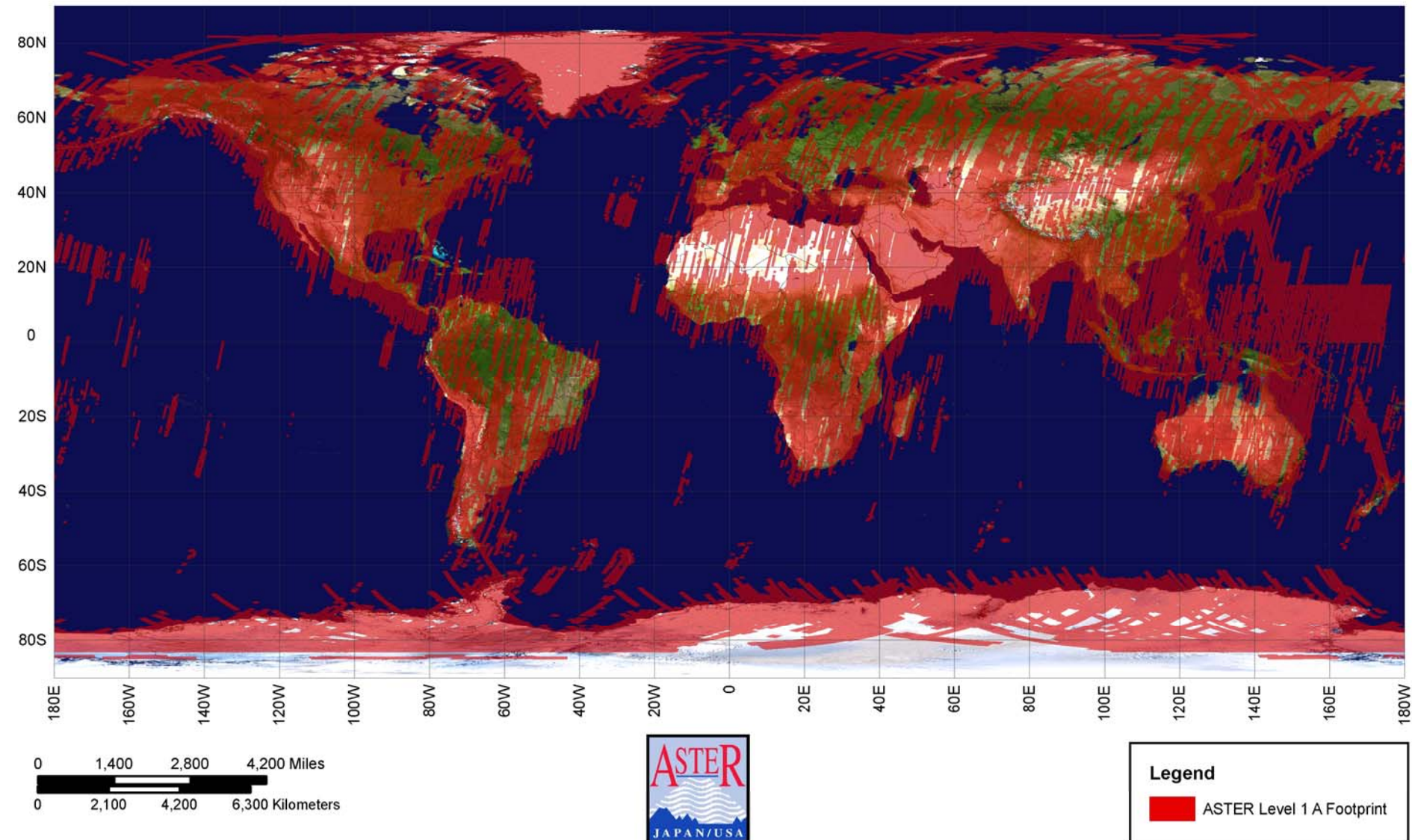
Resulting Global Coverage



ASTER Level 1 A Coverage

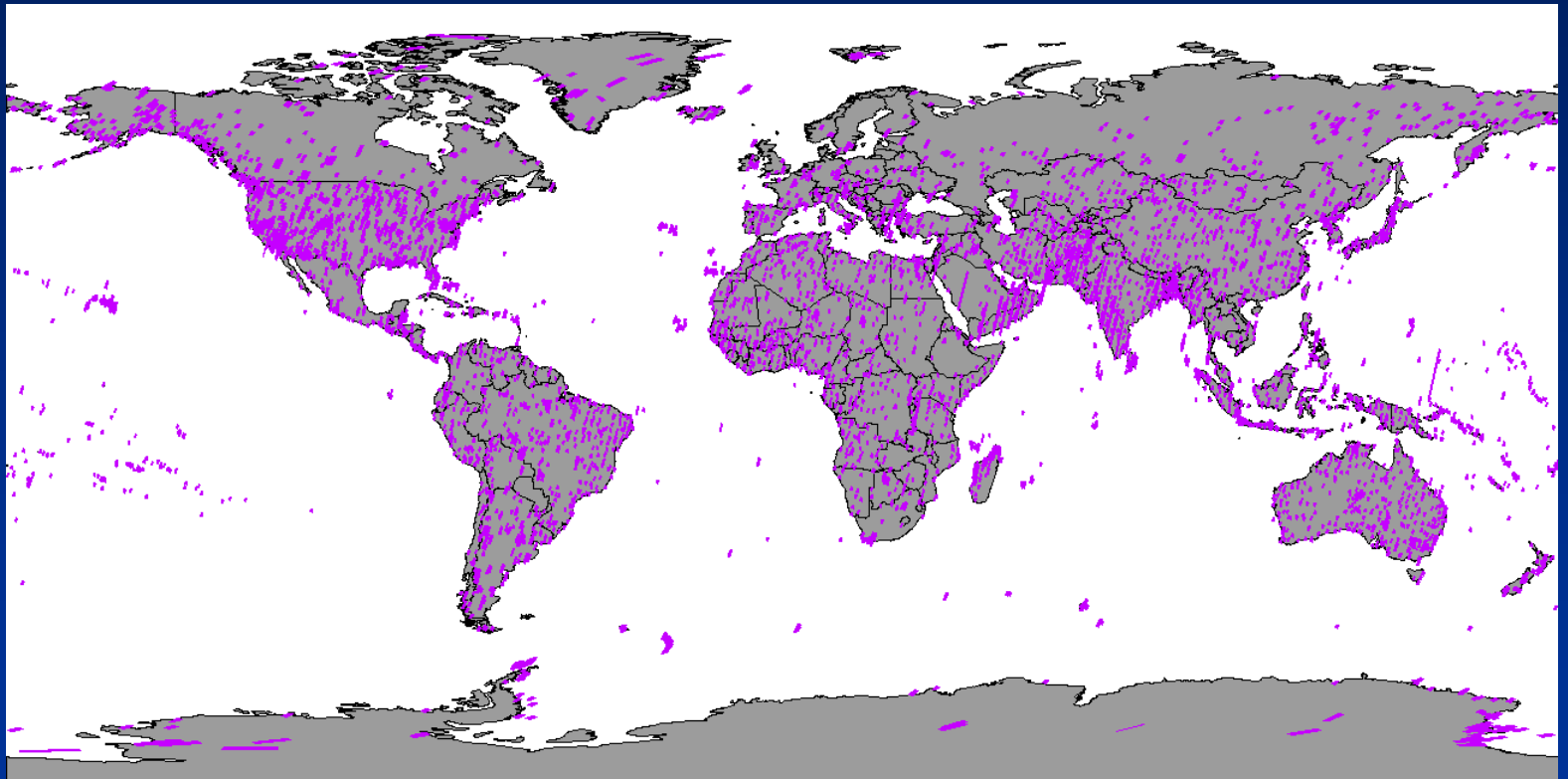
Period: January 2004 - December 2005

Cloud Cover: 10% or less



EO-1 Coverage

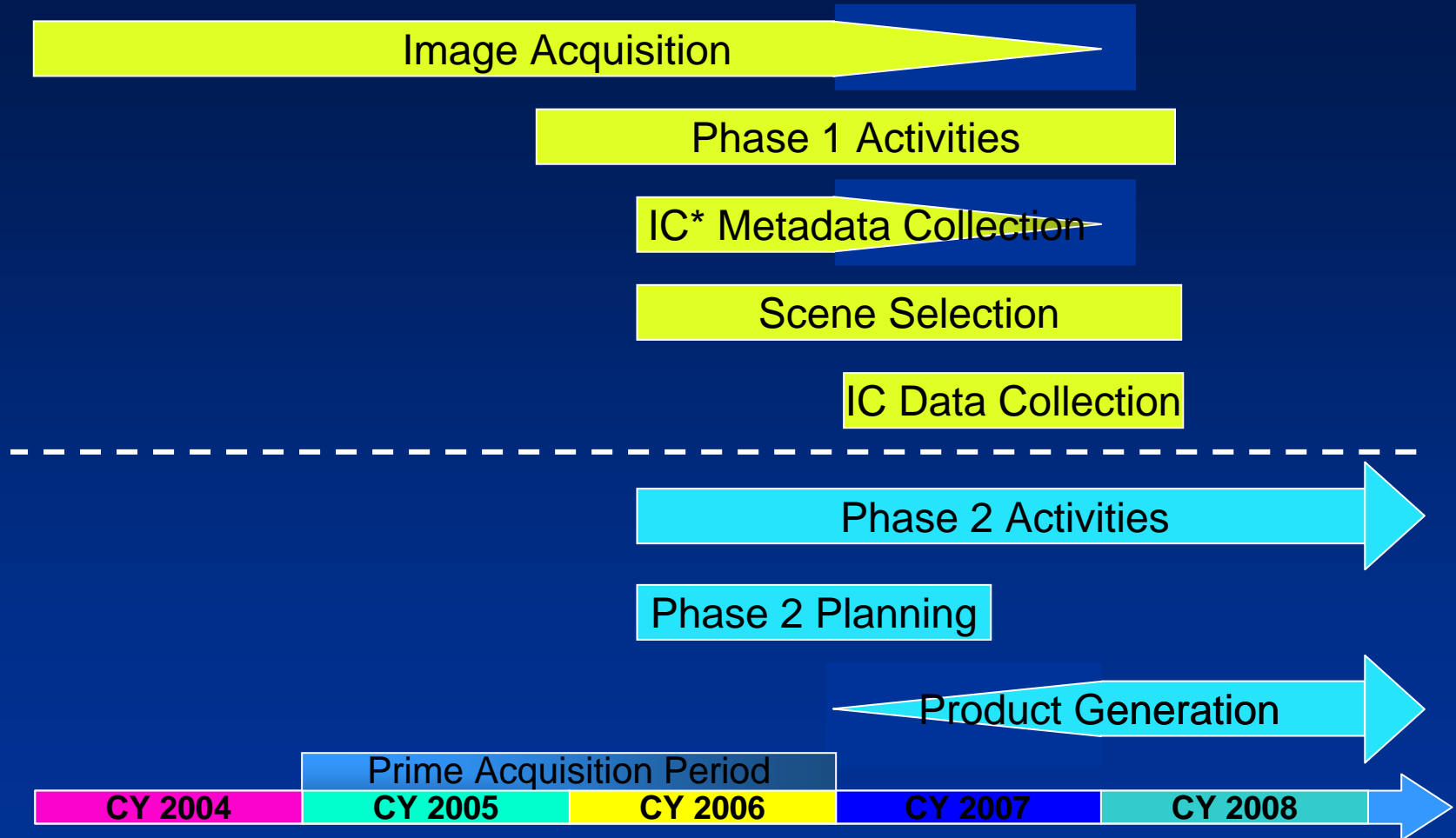
- EO-1 acquisitions over islands and reefs provide some additional coverage



Future

- In 3-4 years(2009-2010)
 - Landsat-5: out of fuel
 - Landsat-7: also out of fuel, and high risk of a gyro failure before that
- Next Landsat (LDCM) after 2010
- Develop a strategy for the Landsat-less years
- Negotiate with foreign sensor data owners
- MDGLS – prototype for GEOSS

MDGLS Schedule



*IC = International Cooperator

Role of CEOS Cal/Val Group

- Phase I
 - Develop a strategy to intercalibrate non-Landsat sources of information for the mid-decadal project
 - Assist with access to foreign sensor data sources
 - Intercalibration of these data
 - “Stitching” exercises
- Phase III
 - Validation of land cover classification using in situ data
- End-of-decade activities
 - Verification of new sensors data quality
 - Inter-calibration

Discussion of Issues

- Two issues:
 - the mid-decadal dataset ca. 2005-2006
 - the “gap filler” dataset
 - The gap filler effort is focused on an effort to provide data for the potential gap between L-7/5 and LDCM
- Change detection creates problems for using a mix of sensors, e.g.spot, so heavy emphasis is on Landsat alone
- However opportunity exists now to prepare for the gap-filler which will likely require multisensor mix
- Multi-sensor issues include:
 - international cooperation
 - Knowledge/inventory of international data, assets and future plans
 - Data policy is an issue which may override availability, technical issues, and availability
- Link to GEOSS is crucial!
- NEEDED: experimental multi-sensor acquisition and analysis

Discussion: L7 vs L5

- L-5 allows “consistent”, “full-scene” coverage, but will be challenging in coordinating acquisition from a constellation of ground stations
- L-7 allows high quality data in non-gap portions of image and a readily accessible archive, but may present problems for change detection and other analyses.

Summary of the Recommendations from the LCLUC Science Team

- Link to mid-dec can be used to inform our normal activities today with L7
- The ceos cal/val sites could be used
- data policy may still be an issue and is not being looked at, as well as some other issues
- Mult-sensor pilot study
 - Landsat → ASTER → IRS → CBERS
 - Also: ALOS, SPOT



谢谢

спасибо

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Thank you!