UN-REDD PROGRAMME

LOW EMISSION CAPACITY BUILDING PROGRAMME

REMOTE SENSING:

THE APPROACH TO THE SATELLITE LAND MONITORING SYSTEM

REGIONAL AFRICAN WORKSHOPS ON REDD+ NATIONAL FOREST MONITORING SYSTEMS AND GREENHOUSE GAS (GHG) NATIONAL INVENTORY SYSTEMS

Livingstone – Zambia

February- 2014

THE IPCC APPROACH of MRV

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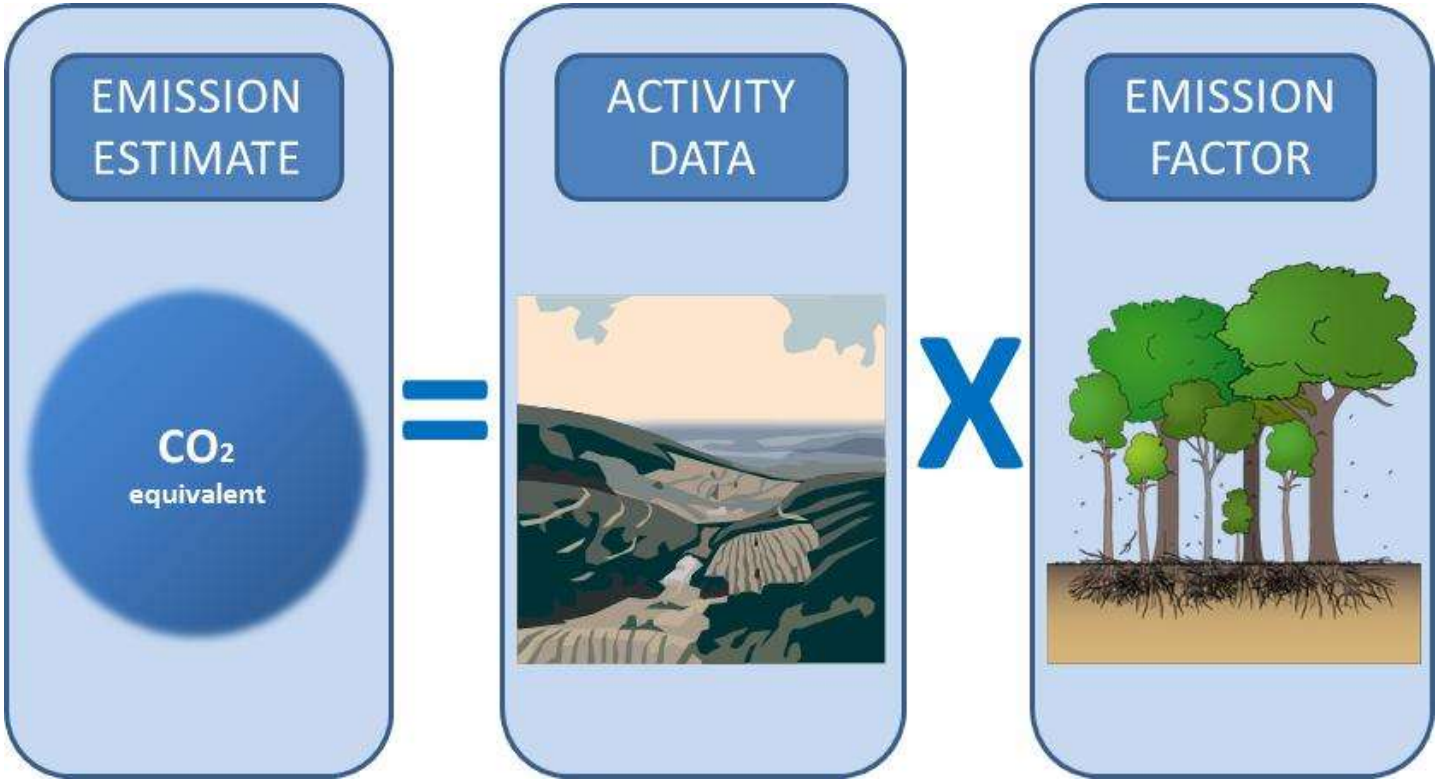

WHY REMOTE SENSING?

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Activity Data: Land Cover – Land Use Representation

IPCC indication: Countries should characterize and account for all relevant land areas in a country consistently and as transparently as possible. Data should reflect the **historical trends in land-use area**.

IPCC 2003 LULUCF Guidance suggests three Approaches:

- Approach 1: Basic land-use data
- Approach 2: Survey of land use and land-use change
- **Approach 3: Geographically explicit land use change data**

In almost all the developing countries the only way to represent land with a time frame of 20 years backward is the use of satellite remote sensing data

WHY REMOTE SENSING? [1.]

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- Activities REDD+ can be successfully accomplished with Satellite images:
  - ✓Forest Area Change Monitoring;
  - ✓Near-Real time deforestation detection ;
  - ✓Land use changes patterns (modeling and tracking Human Activities);
  - ✓Forest Degradation;
  - ✓Calculation and monitoring of Biomass;

1. *Herold, Martin. Remote sensing and REDD+. Colloquium presentation at Edinburgh University*

WHAT MEANS FOREST IN YOUR COUNTRY?

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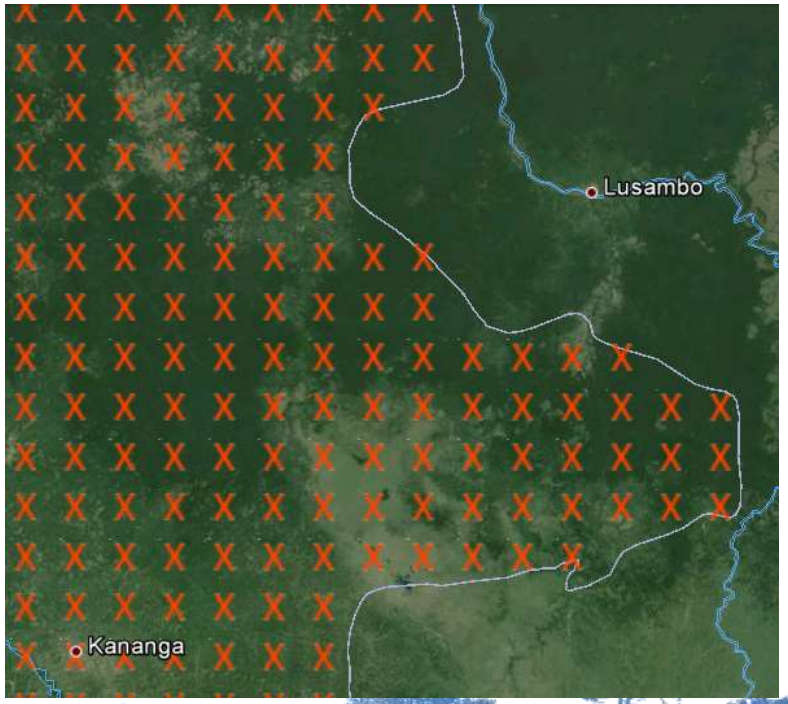
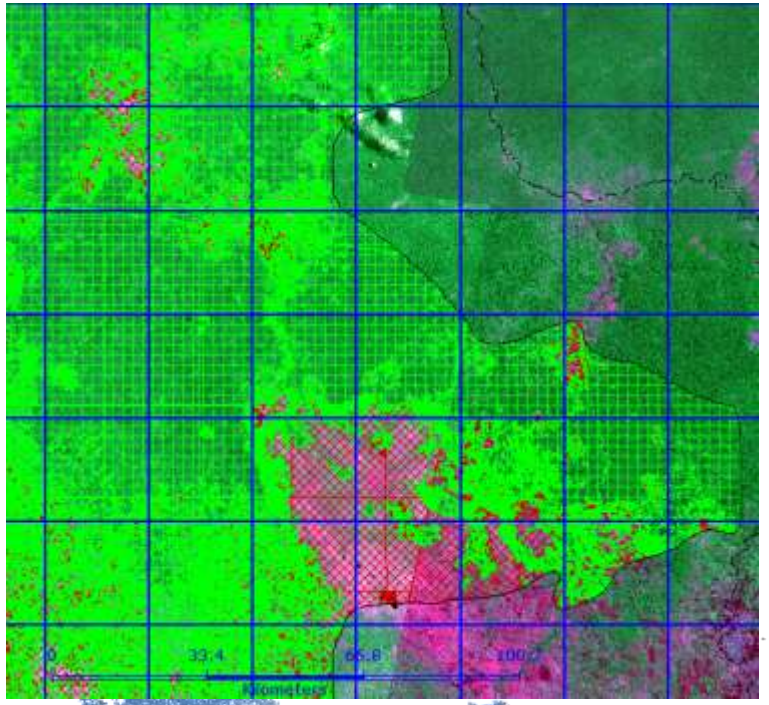
- National forest definition and its **representation** in the Satellite Monitoring System

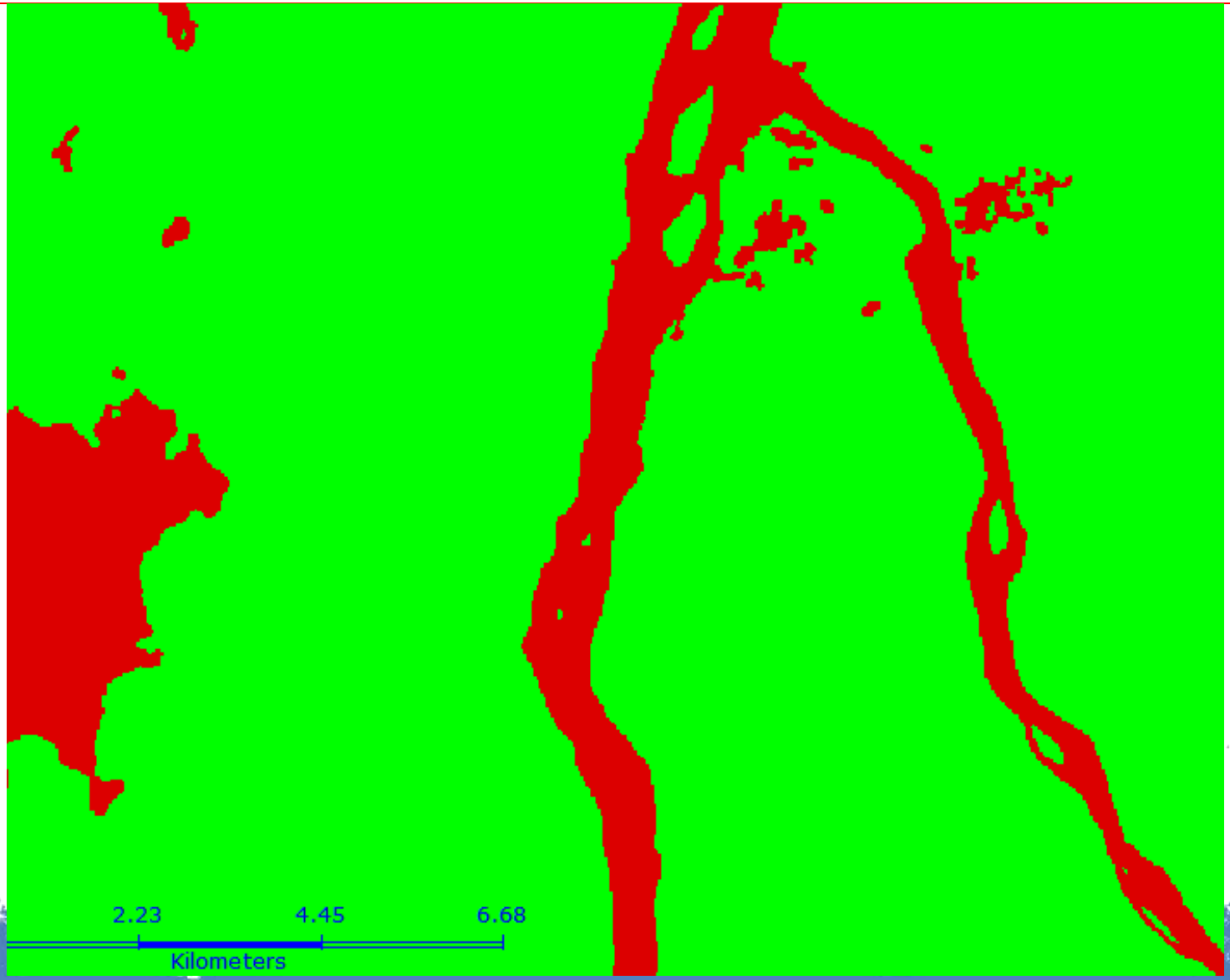
WHY WALL TO WALL METHOD?

- The SFMS needs to provide full coverage of the national territory, to detect and prevent **leakage** occurring from one region to the next





UNCERTAINTIES OF SLMS



UNCERTAINTIES OF SLMS

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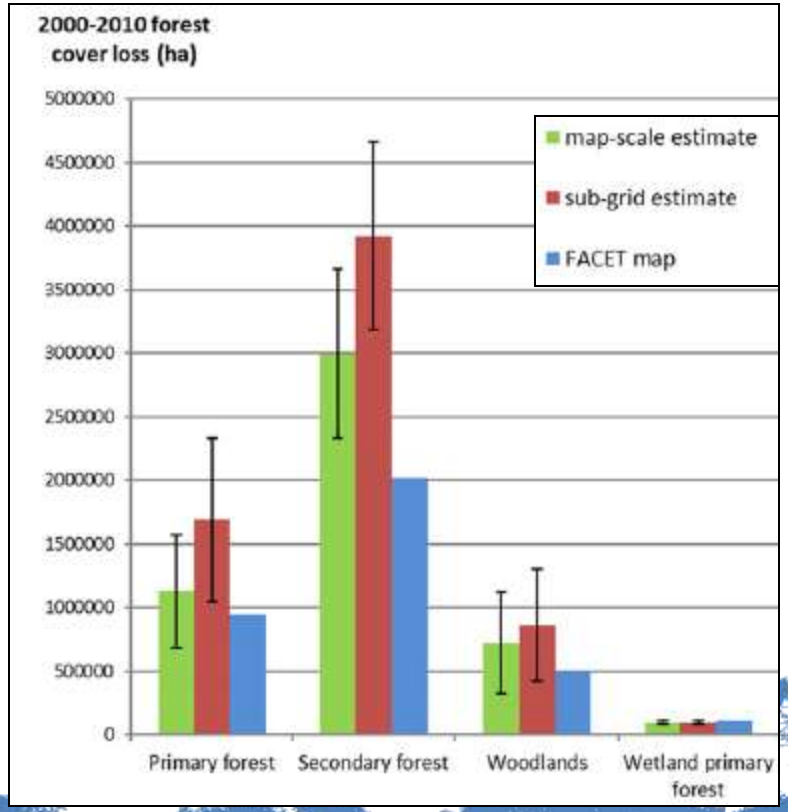
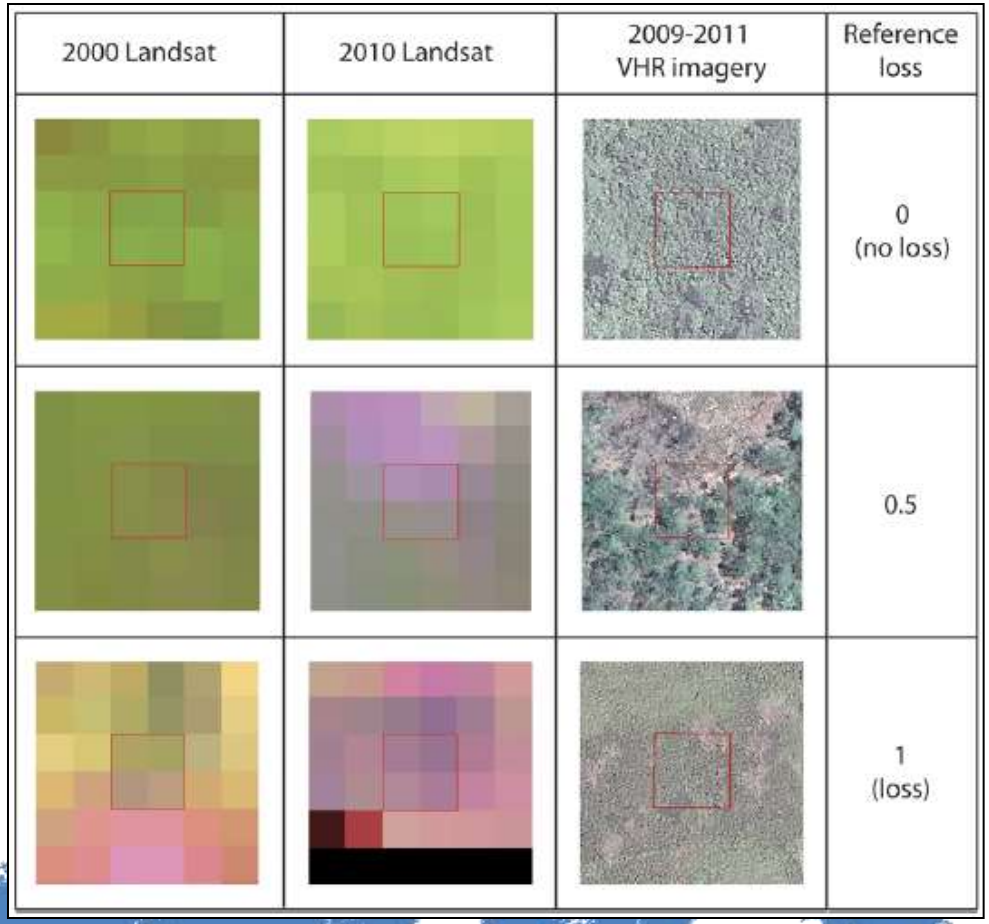
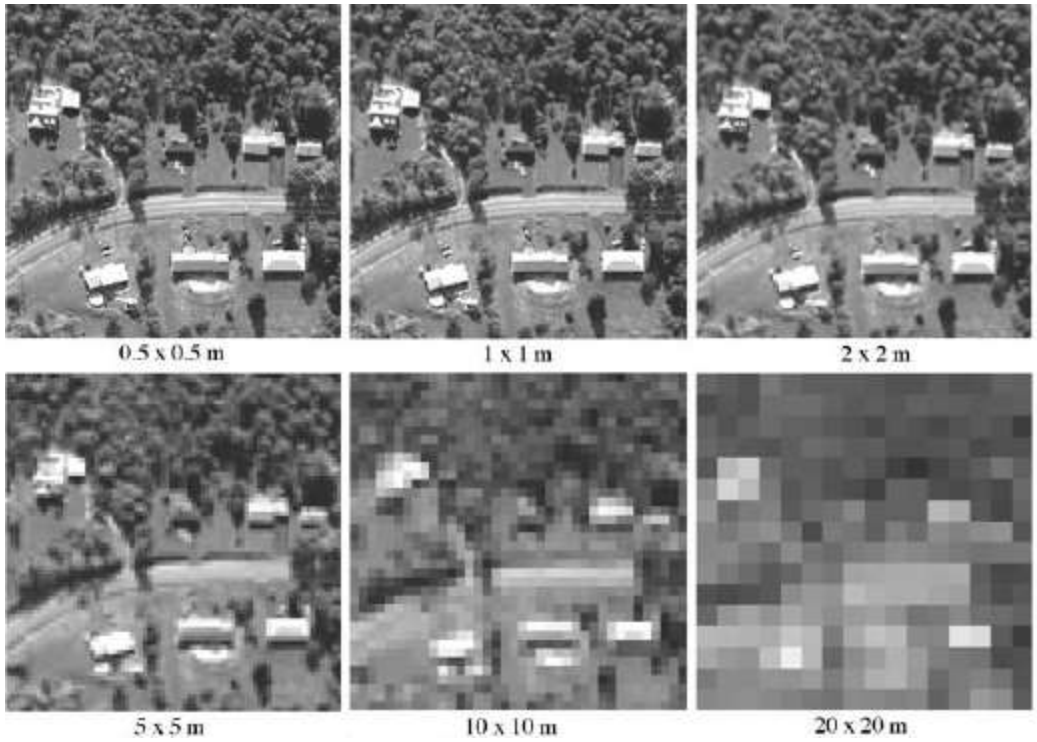
Uncertainties linked to interpretation of remote sensing data.

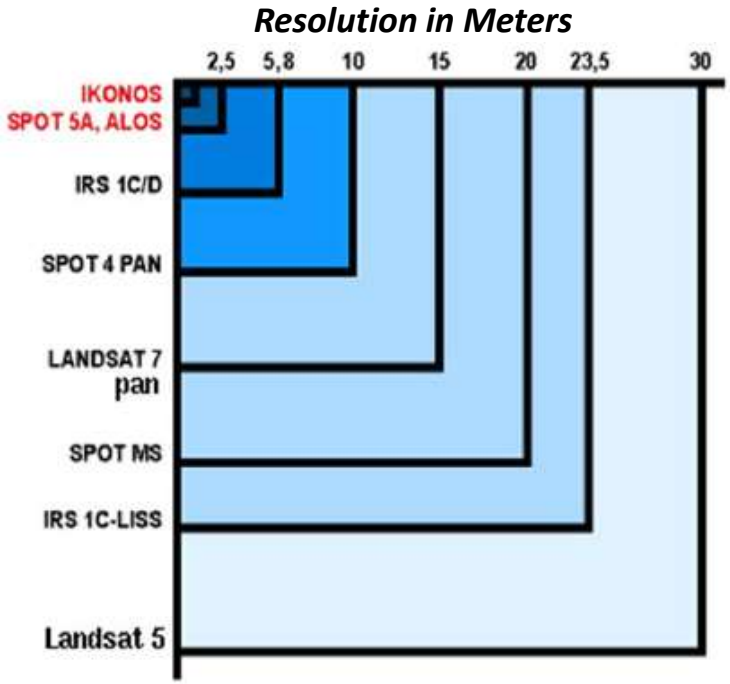




CHARACTERISTICS OF SAT. IMAGES

- Spatial Resolution: Pixel size on Object Detection



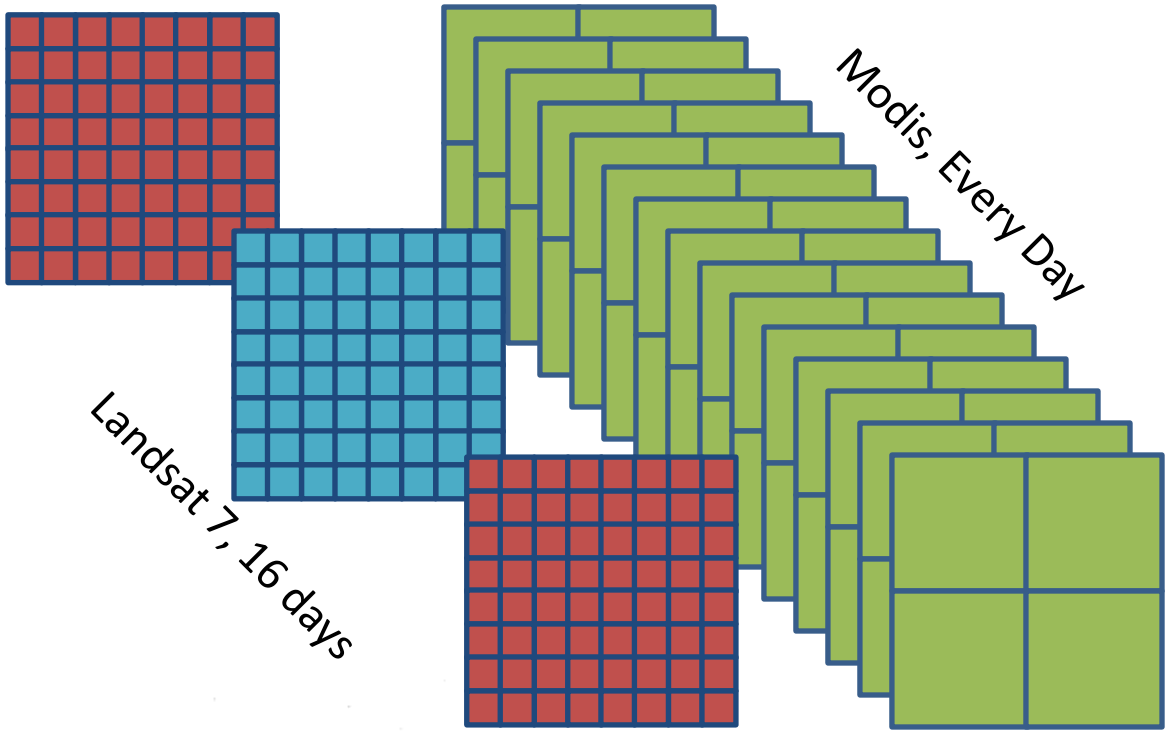


Source. Potapov. Optical Remotely Sensed Data for Forest Mapping / Monitoring Applications

CHARACTERISTICS OF SAT. IMAGES

- Temporal Resolution: Re-Visit the same place

Sensor	Temp Res. Days
Landsat ETM	16
Landsat TM	16
Ikonos	3
Geo eye 1	3
Spot 5	2
Quick Bird 2	3
IRS - P7	4
World view 2	4
MODIS	1
Orbview 3	3



CHARACTERISTICS OF SAT. IMAGES

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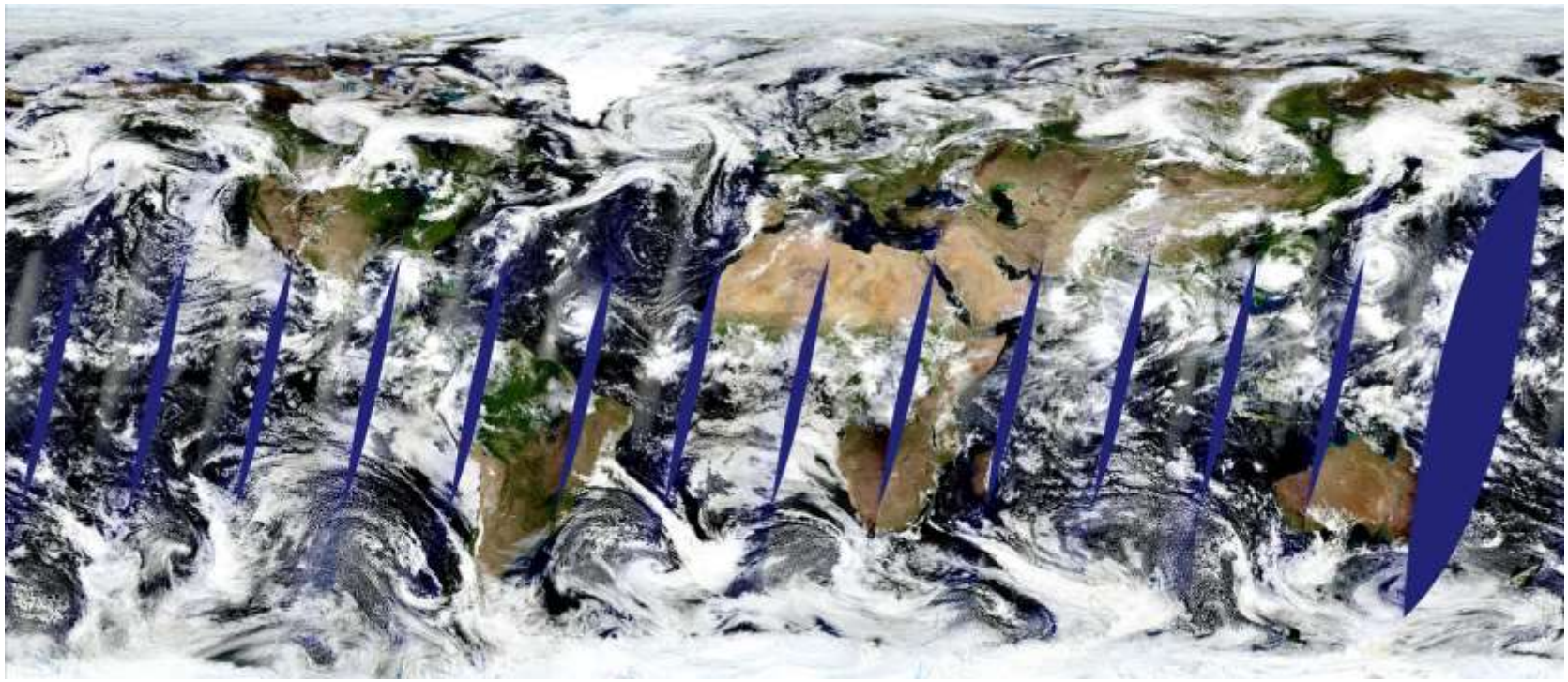
Lower temporal resolution = Lower chances to get cloud-free data



CHARACTERISTICS OF SAT. IMAGES

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- Price and data availability

Data	Price USD (per km^2)	Launched
QuickBird (0.6m)	$ 16.0	2001
Ikonos(1m)	$ 10.0	1999
Formosat(2m)	$ 8.5	2004
SPOT 5 (2.5m)	$ 3.4	2002
SPOT (20m)	$ 0.9	2002
RapidEye	$ 1.1	2004
Landsat 4-5-7 (30m)	FREE	1980

MAIN STEPS OF SLMS

1. IMAGES SELECTION

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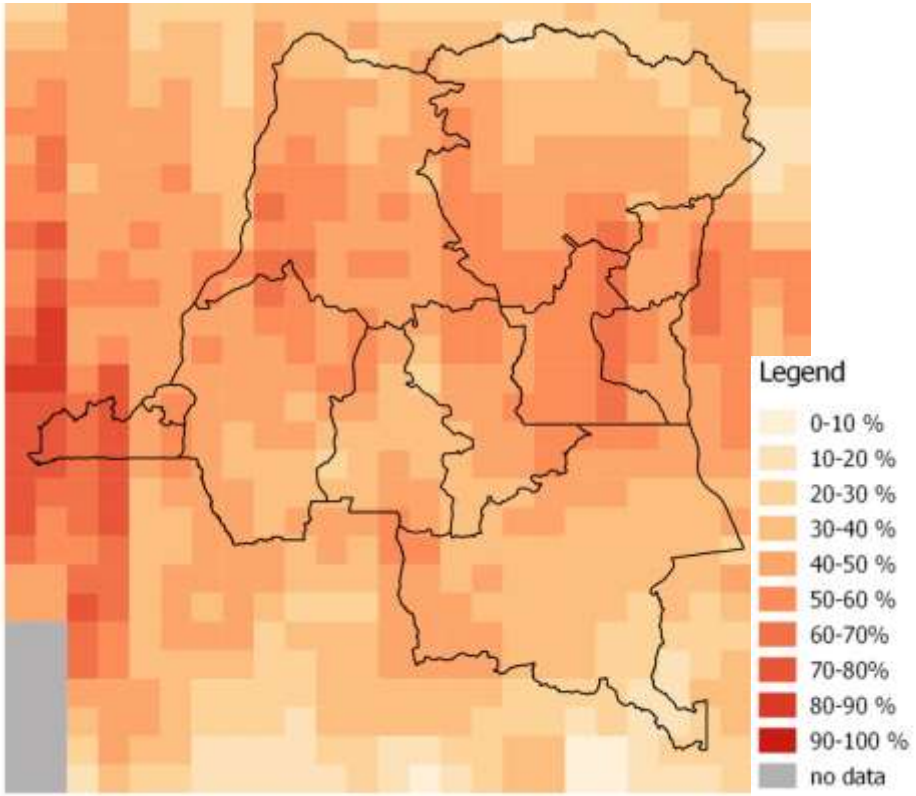
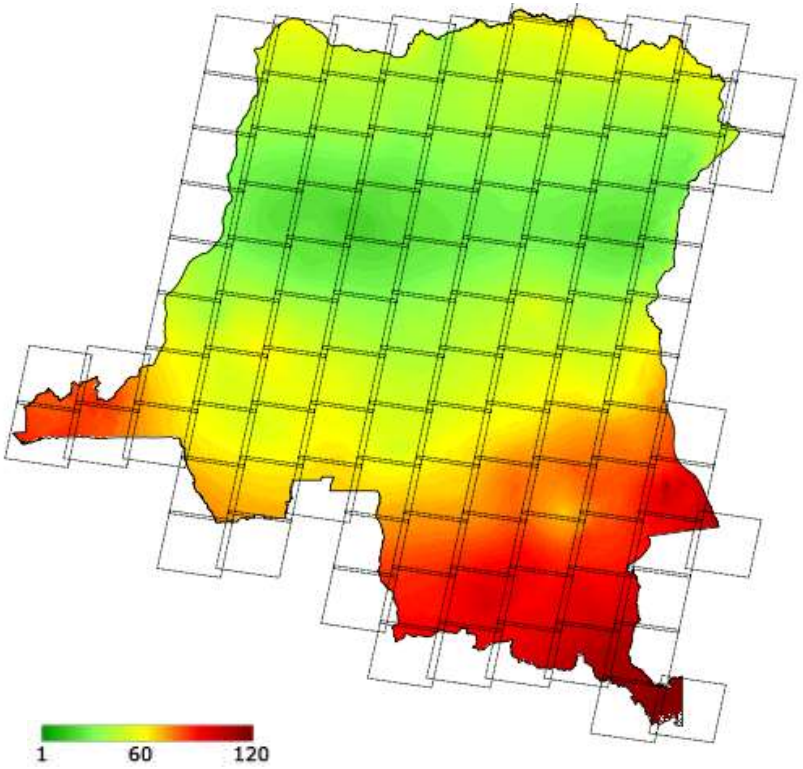
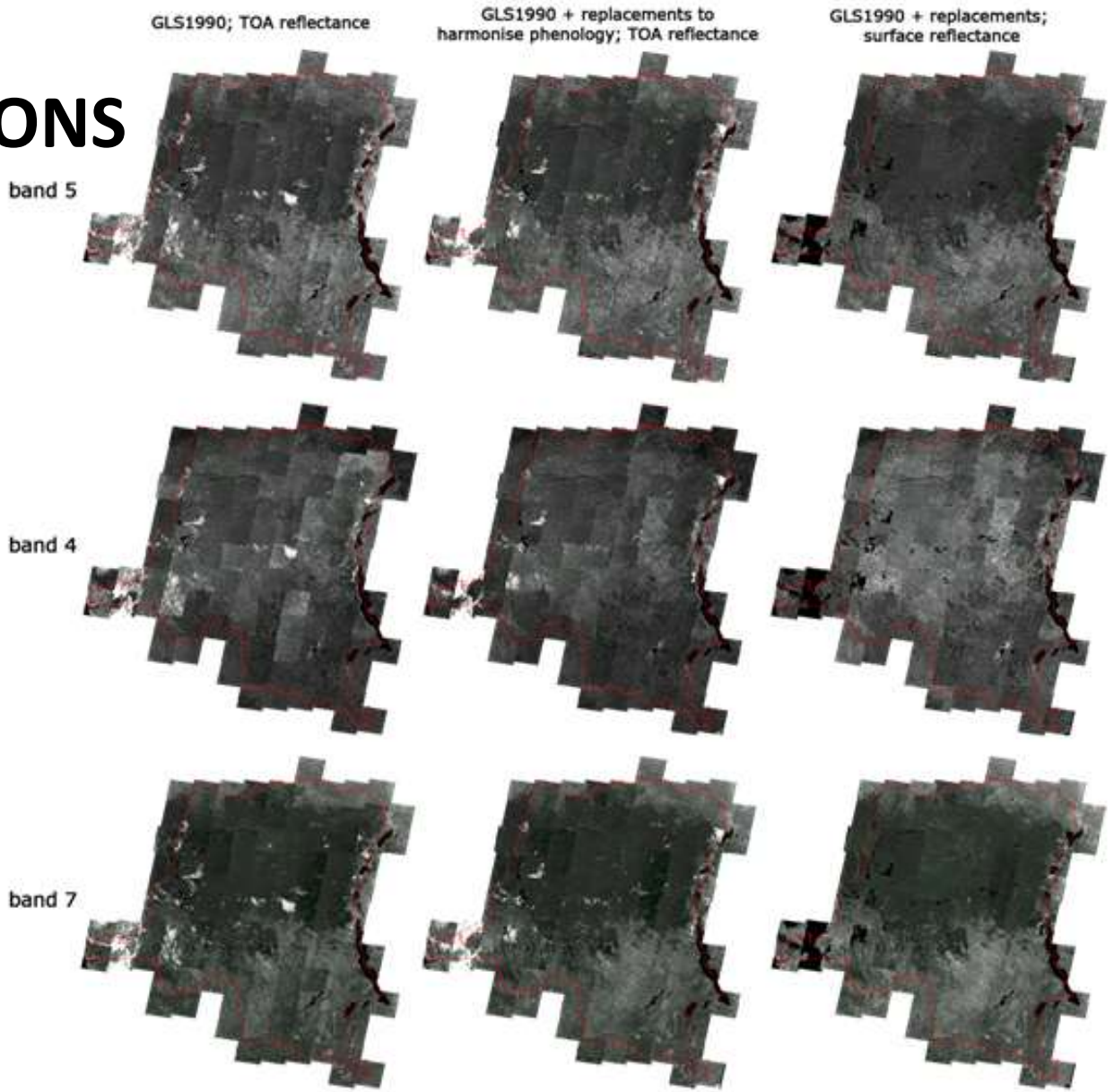
Evaluation of Cloudiness in Landsat ETM



Precipitation Seasonality (days)



2. CORRECTIONS



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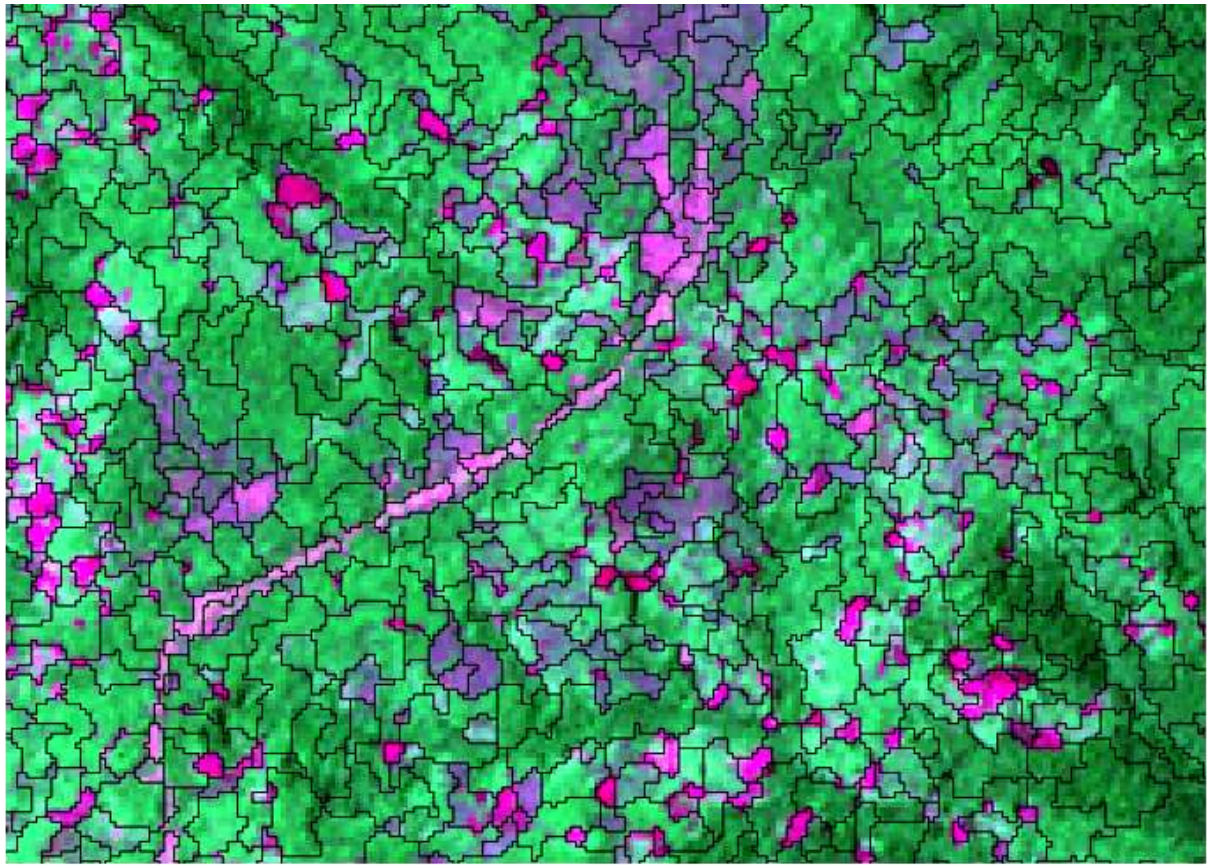
3. SEGMENTATION



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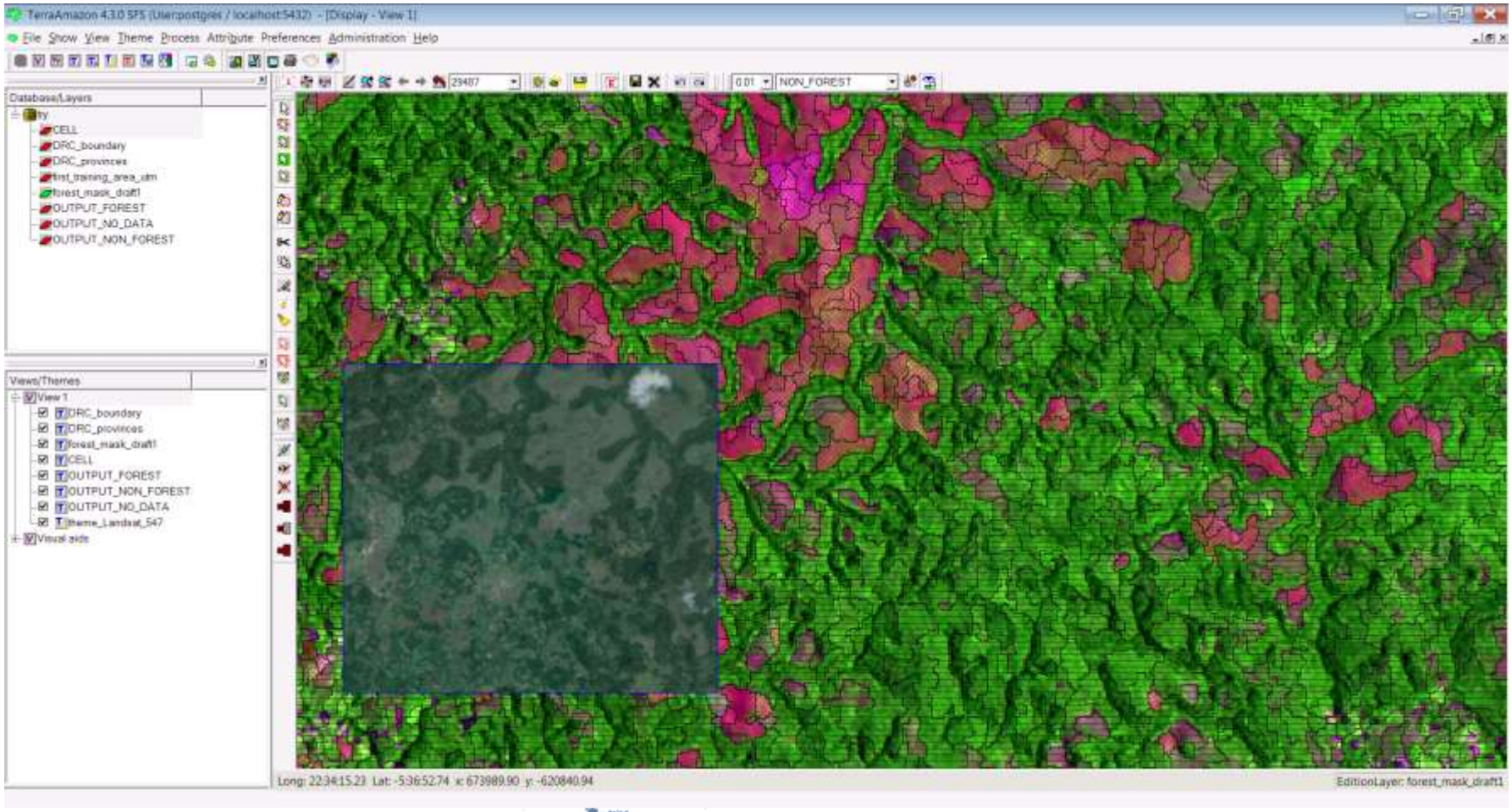
4. FINAL CLASSIFICATION



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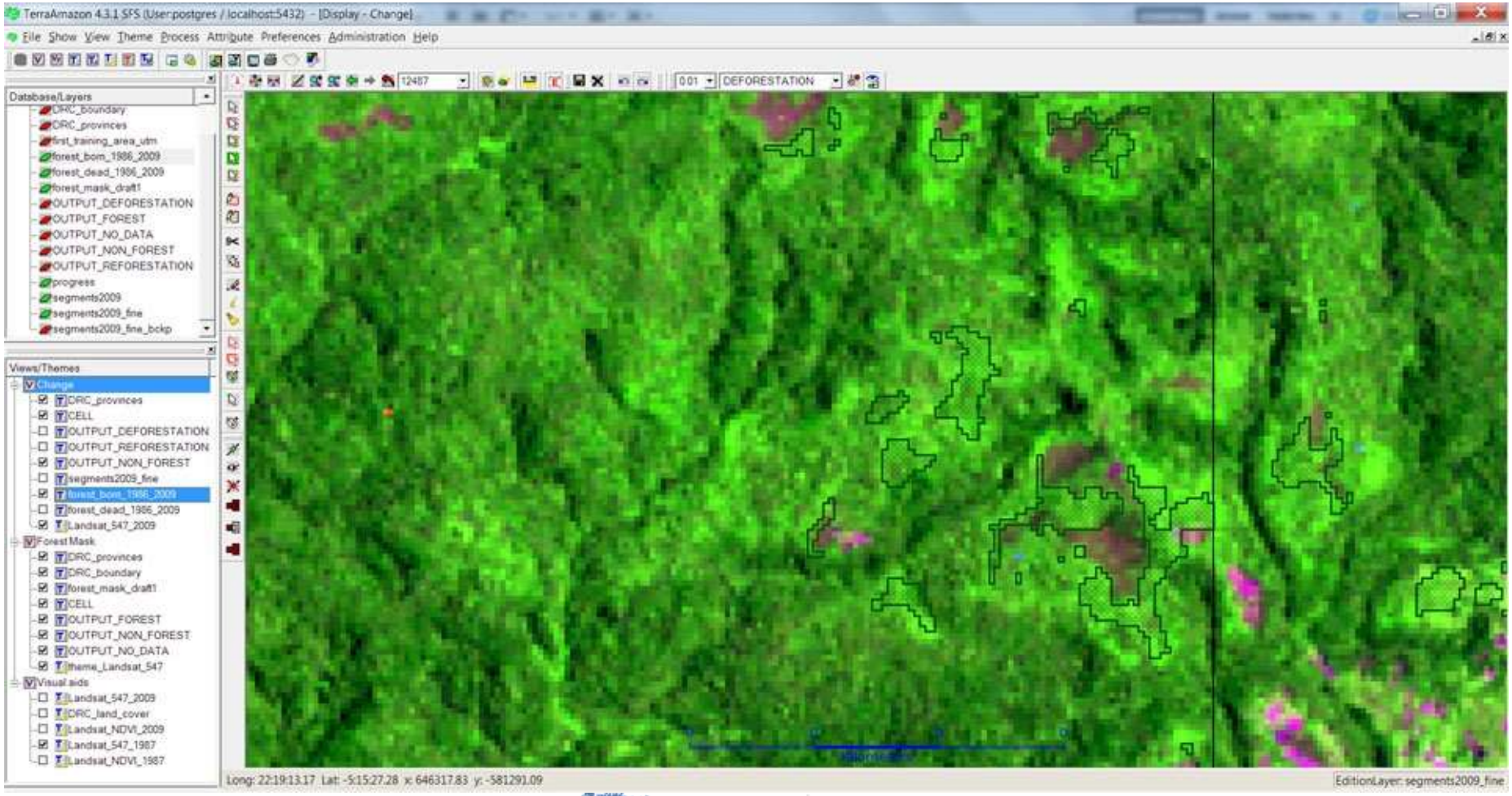
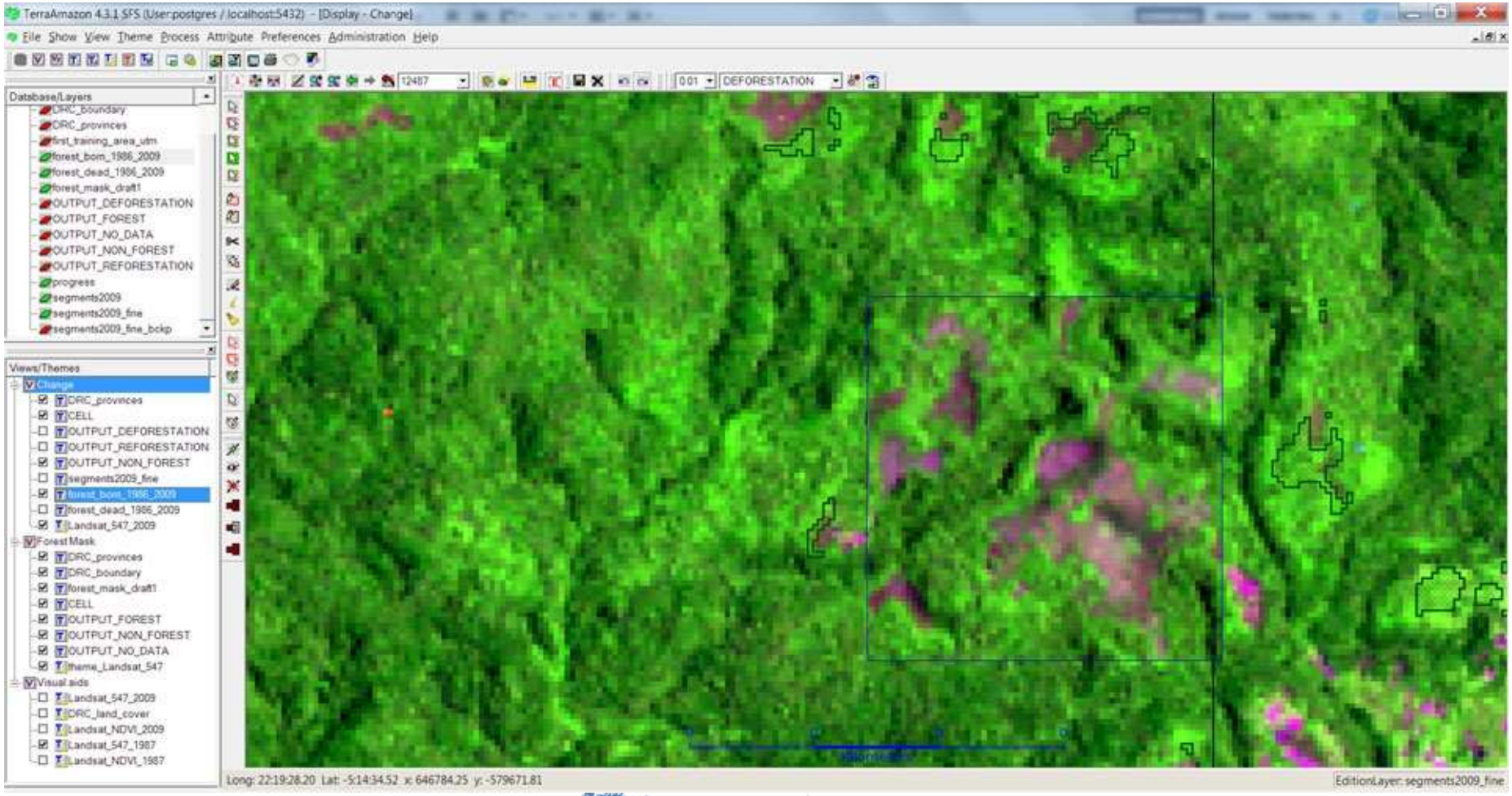
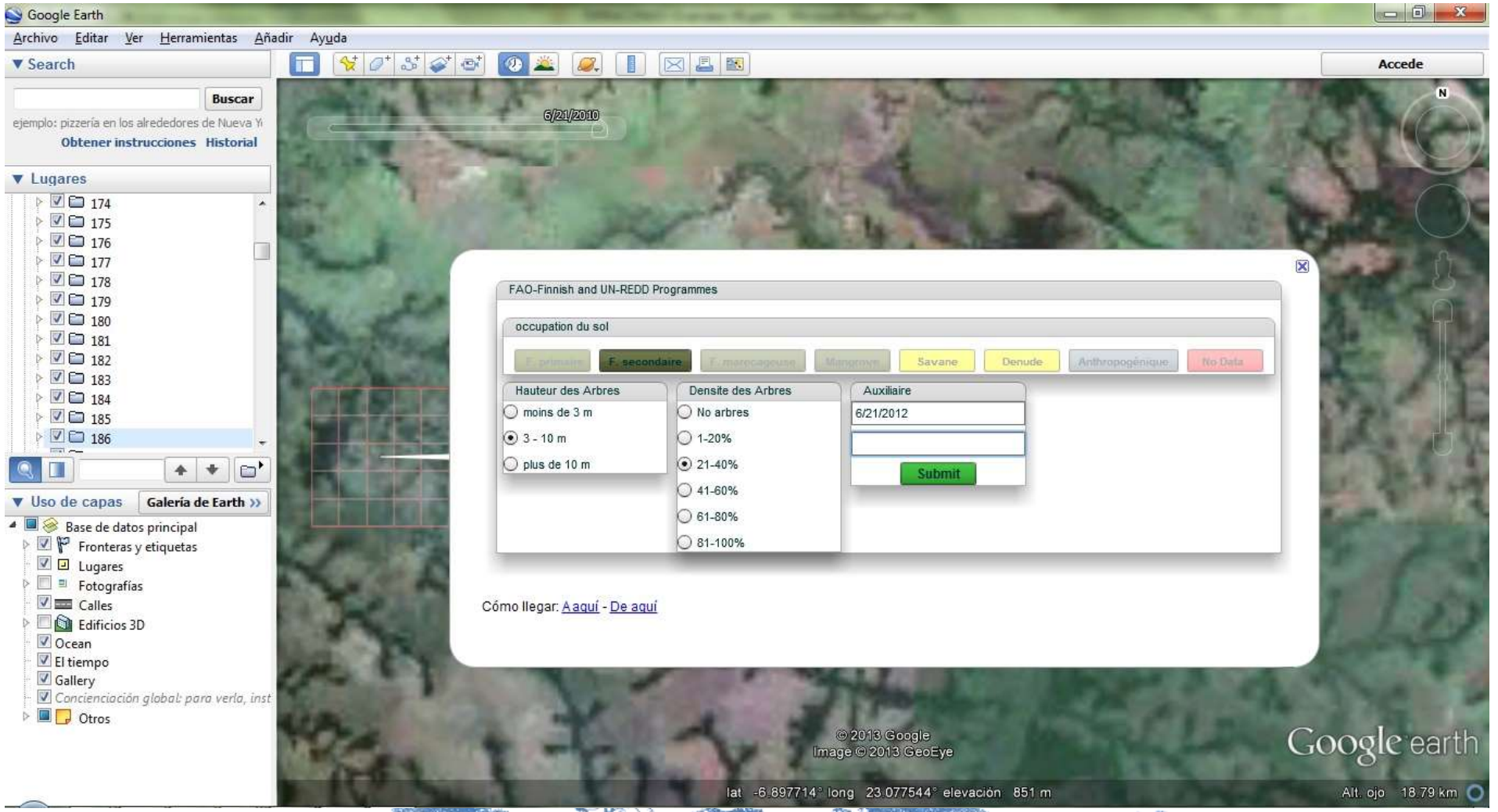
5. CHANGE DETECTION



5. CHANGE DETECTION

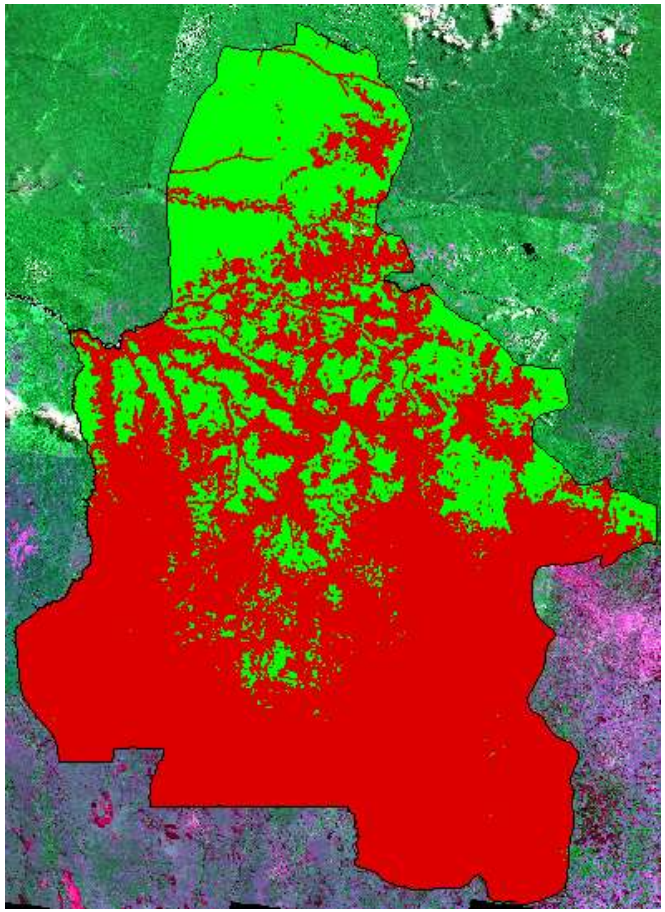


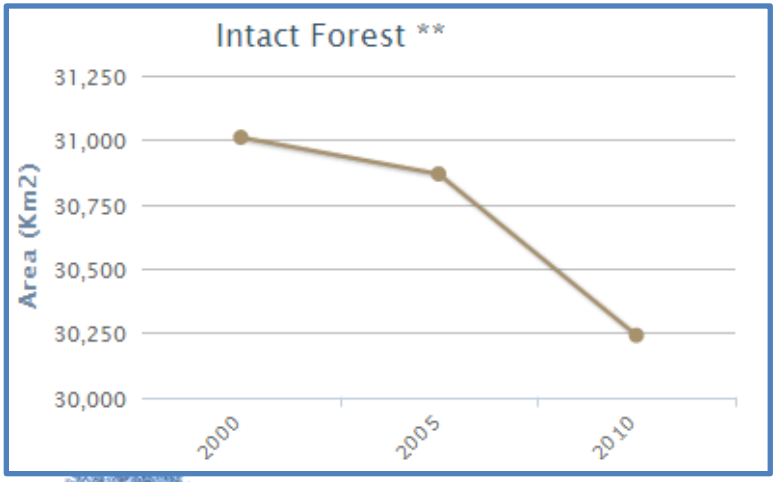
6. VERIFICATION



7. FIELD VALIDATION and QC

8. REPORT STATISTICS





Challenge - 1

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- Understand benefits and limits of the National Monitoring System.
- Consider seasonality and historic climate changes.
- Forest /deforestation definition and what can be actually mapped
- Forest degradation and what can be actually mapped/measured
- Measuring v. monitoring (one point in time v. multiple points in time with comparable results)

Challenge - 2

- Different sensors, different resolution, different processing chain, storage, different visual interpretation, ease of use,… …CONSISTENCY, COMPARABILITY
- Permanent cloud coverage and use of radar data
- Remote sensing needs trained national technicians to reduce Interpretation's errors.
- Carbon maps and LiDAR (airborne or space-based) still experimental and expensive

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Thank you

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