The Next UNFCCC Commitment Period: ALOS Potential to Support Credits for"Reduced Emissions from Deforestation in Developing Counties (REDD)"?

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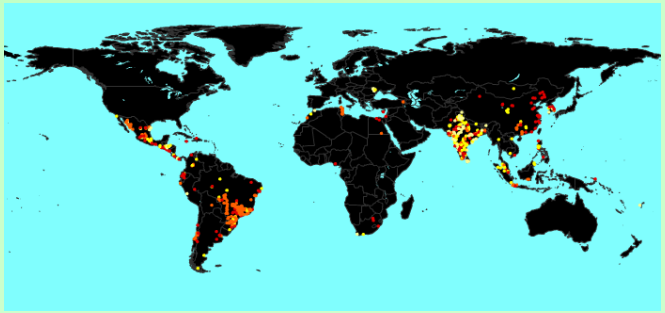
Tropical Forests in the UNFCCC

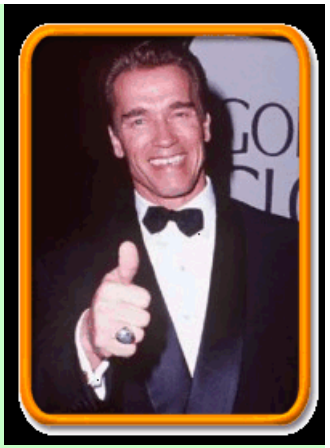
- The UNFCCC signed at UN world environmental summit in Rio de Janeiro in 1992
- Negotiation of binding targets began in Kyoto
- Important debate: include mechanisms of reducing GHG emissions from tropical forests?

Tropical Forests in flexibilization mechanisms:

- The Clean Development Mechanism: designed to make it easier for countries to achieve their GHG reduction targets
- Permits investments in other countries that reduce/avoid GHG emissions
- Should investments to slow GHG emissions from tropical deforestation be included?



Tropical Forests in the CDM: Pro's



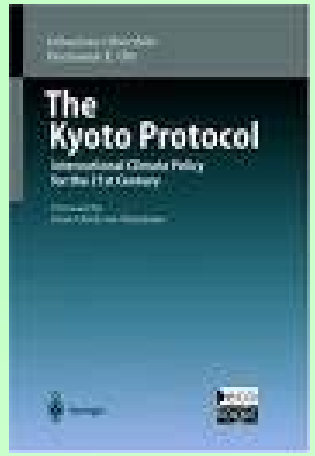
- Win-win situation: reduction of GHG emissions PLUS biodiversity/forest conservation
- Inexpensive way to reduce GHG emission: could increase success of countries in achieving emissions targets

Tropical Forests in the UNFCCC: Con's

- The real problem is fossil fuel combustion; by including tropical deforestation, there will be less pressure on developed nations to change their ff-dependent economies
- Difficult to measure! Inadequate information about forest cover, biomass
- Problems with "leakage"; gains made in reducing emissions from deforestation today can be lost through increased deforestation tomorrow.

Results: Avoided Deforestation Excluded from Kyoto Protocol

- Surprising alliance between Brazilian government, international NGOs (Greenpeace, WWF, Climate Action Network) excluded avoided deforestation from the CDM mechanism in the Kyoto Protocol for the period 2008-2012.



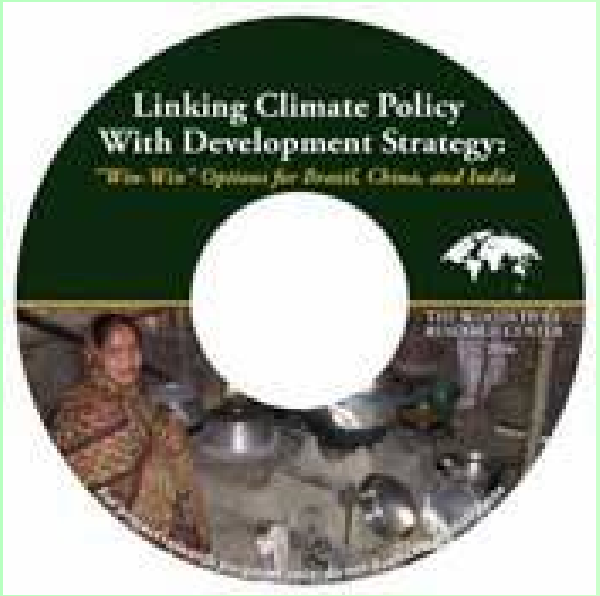
As negotiations begin for 2013-2016, tropical forests have returned

- "Compensated Reduction" proposal finds political backing: nation-wide reductions in GHG emissions from tropical deforestation/degradation supported in Montreal (2005) by the "Coalition for Rainforest Nations"

At the COP In Nairobi, November 2006, Brazil joined this support

- Brazilian government supports the idea of a “fund” to support reductions in tropical deforestation
- Coalition for Rainforest Nations accelerates work on technical issues
- ALOS emerges as important tool in helping to realize the potential of “Reduced Emissions from Deforestation and Degradation” of tropical forests

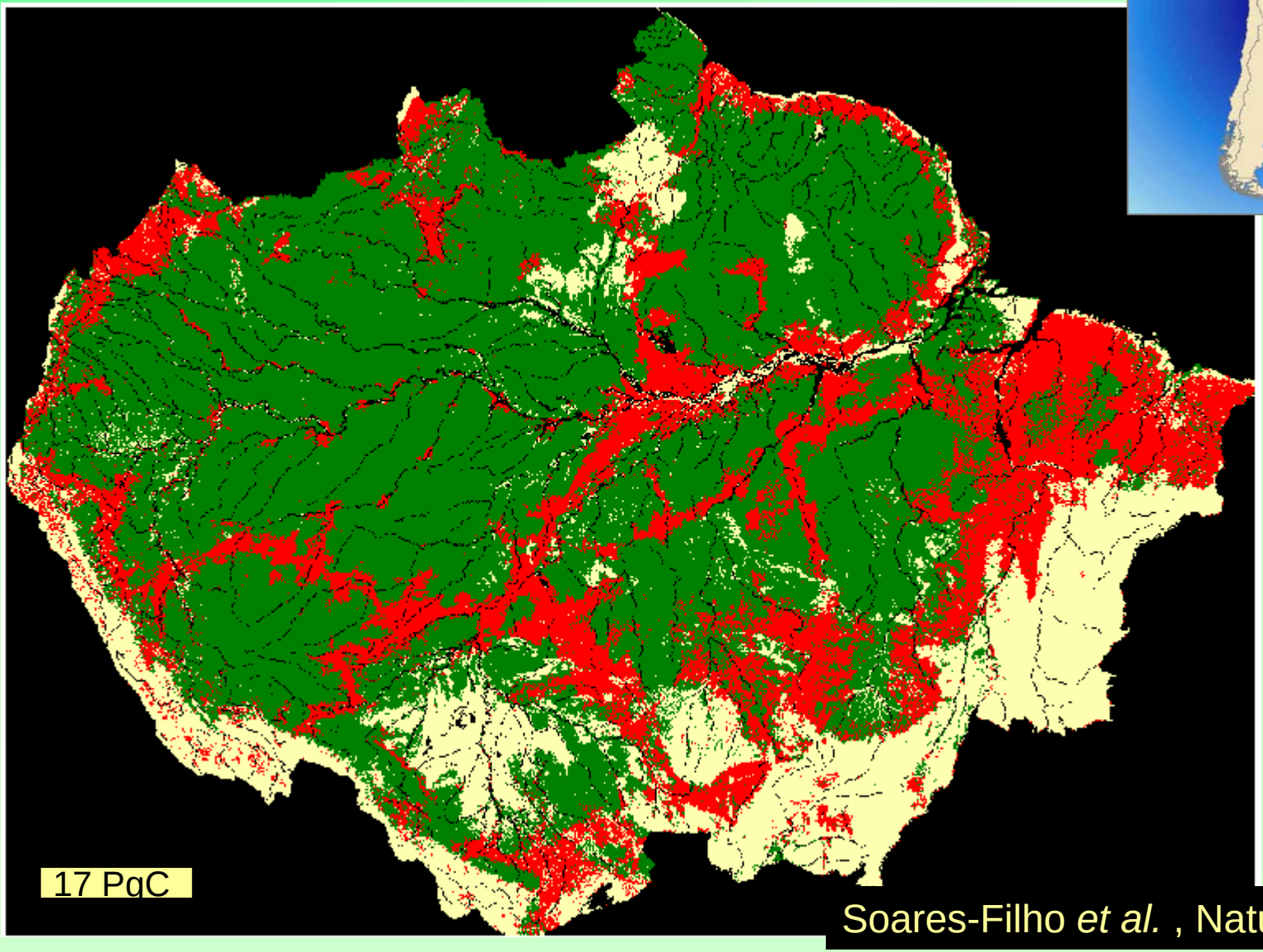
WHRC Linkages



- IPAM/Brazil -Moutinho
- UNEP – WHRC Dep. Director Kilaparti Ramakrishna is on leave as Chief Policy Advisor to UNEP
- History of Involvement in Proposals for REDD Crediting
- $1M Grant from Hewlett Foundation to investigate “Win-Win Strategies Linking Climate Policy with Development Growth”
- $1M Grant from Goldman/Sachs for “Valuation of Avoided Deforestation”
- Long history of Amazon and Africa programs with biomass and forest cover mapping with remote sensing

2050 Governance Scenario :

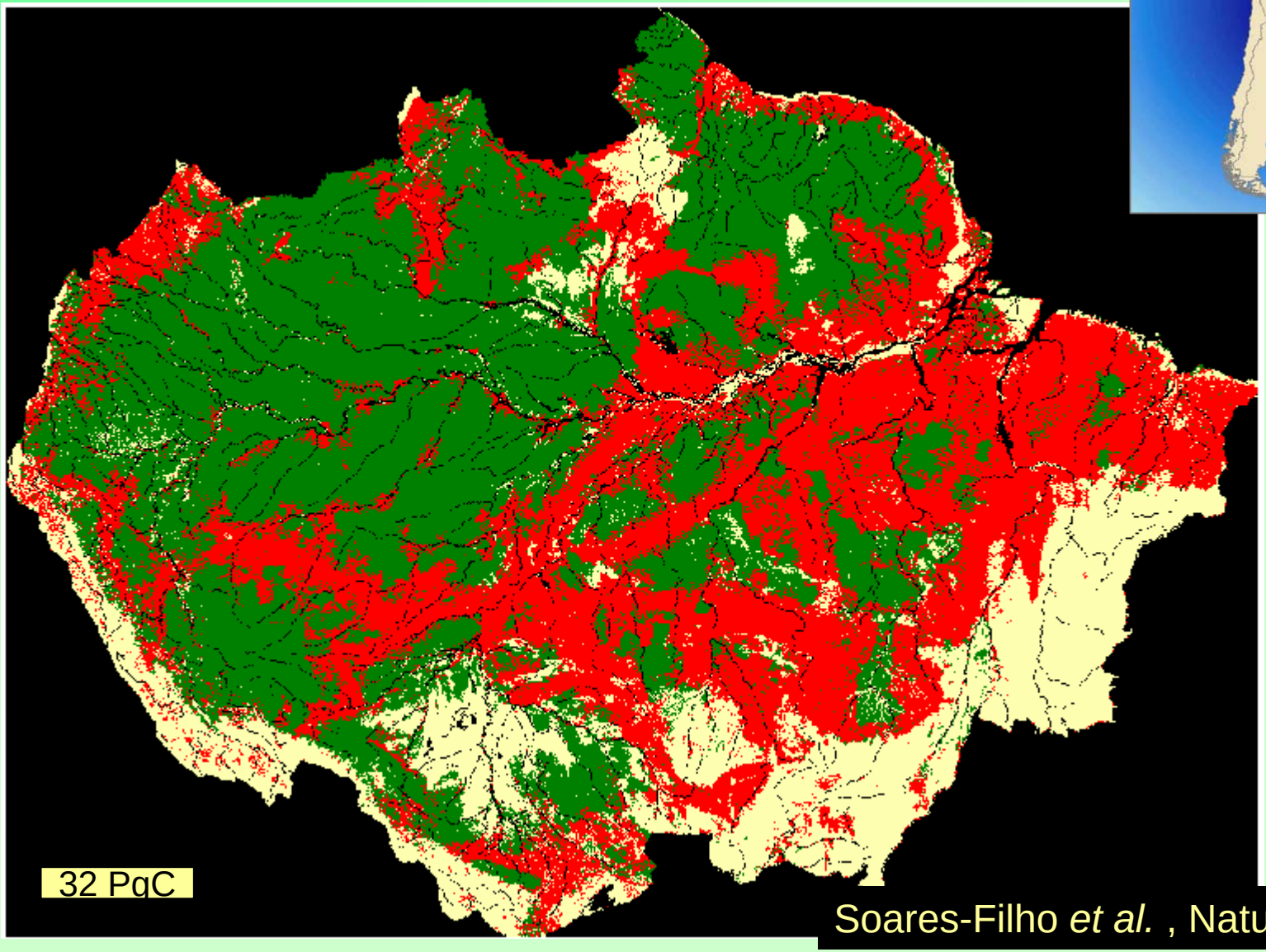
Deforested 1,655,734 km² (Reduction: 40%)
Forest 4,363,410 km²
Non-Forest 1,497,685 km²



Soares-Filho *et al.* , Nature,2006

2050 Business as Usual:

Deforested 2,698,735 km² (32 PgC emitted by 2050)
Forest 3,320,409 km²
Non-forest 1,497,685 km²



Soares-Filho *et al.* , Nature,2006

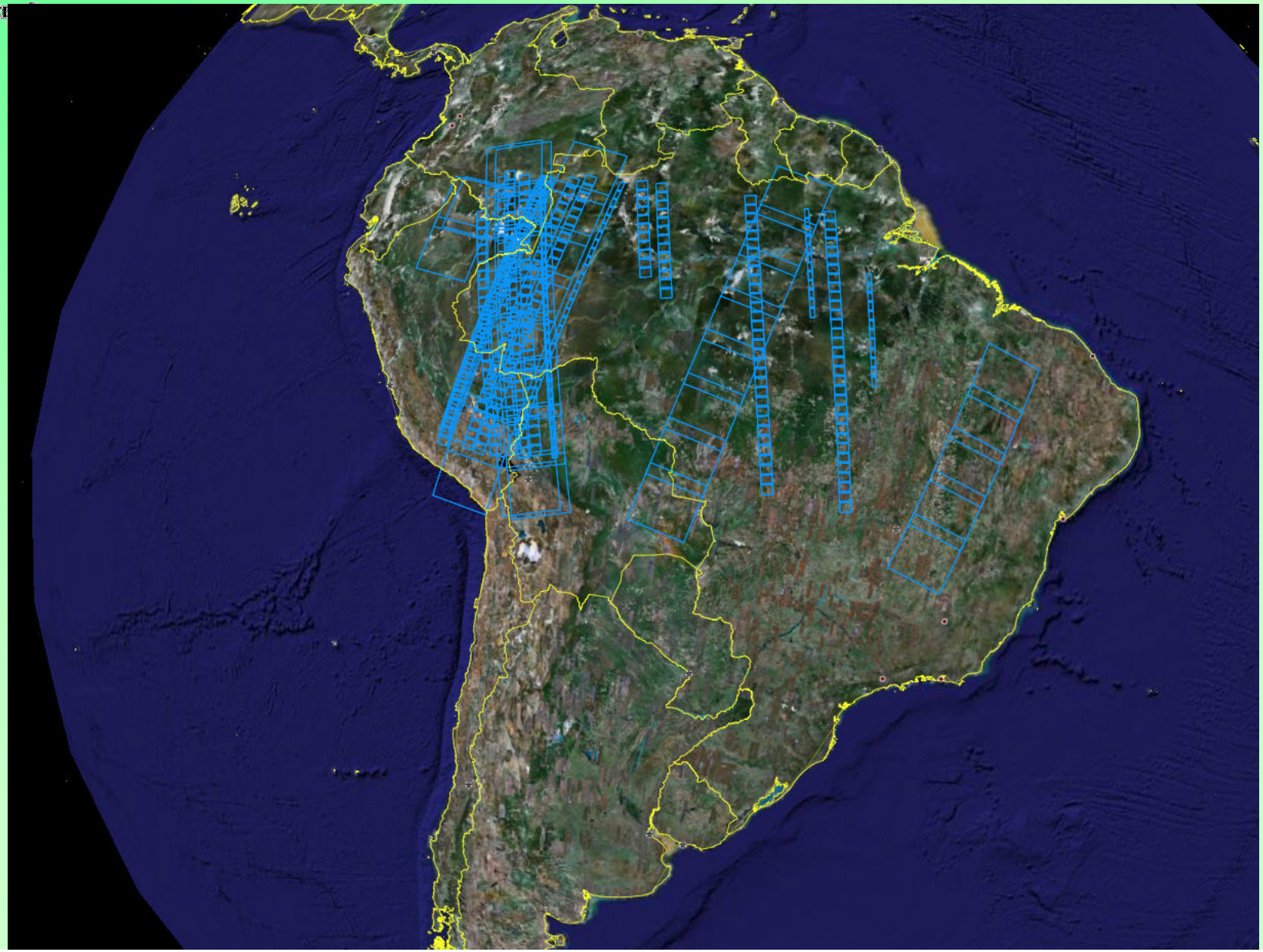
ALOS/JERS (PAL)SAR Strength for Tropical Forest Mapping and Monitoring

- **Cloud penetration**! ->
- Dedicated Observation Strategy ->
- Narrorw observation timeframes (GRFM, ALOS K&C Datasets) ->
- Ideal to establish baselines for deforestation rates

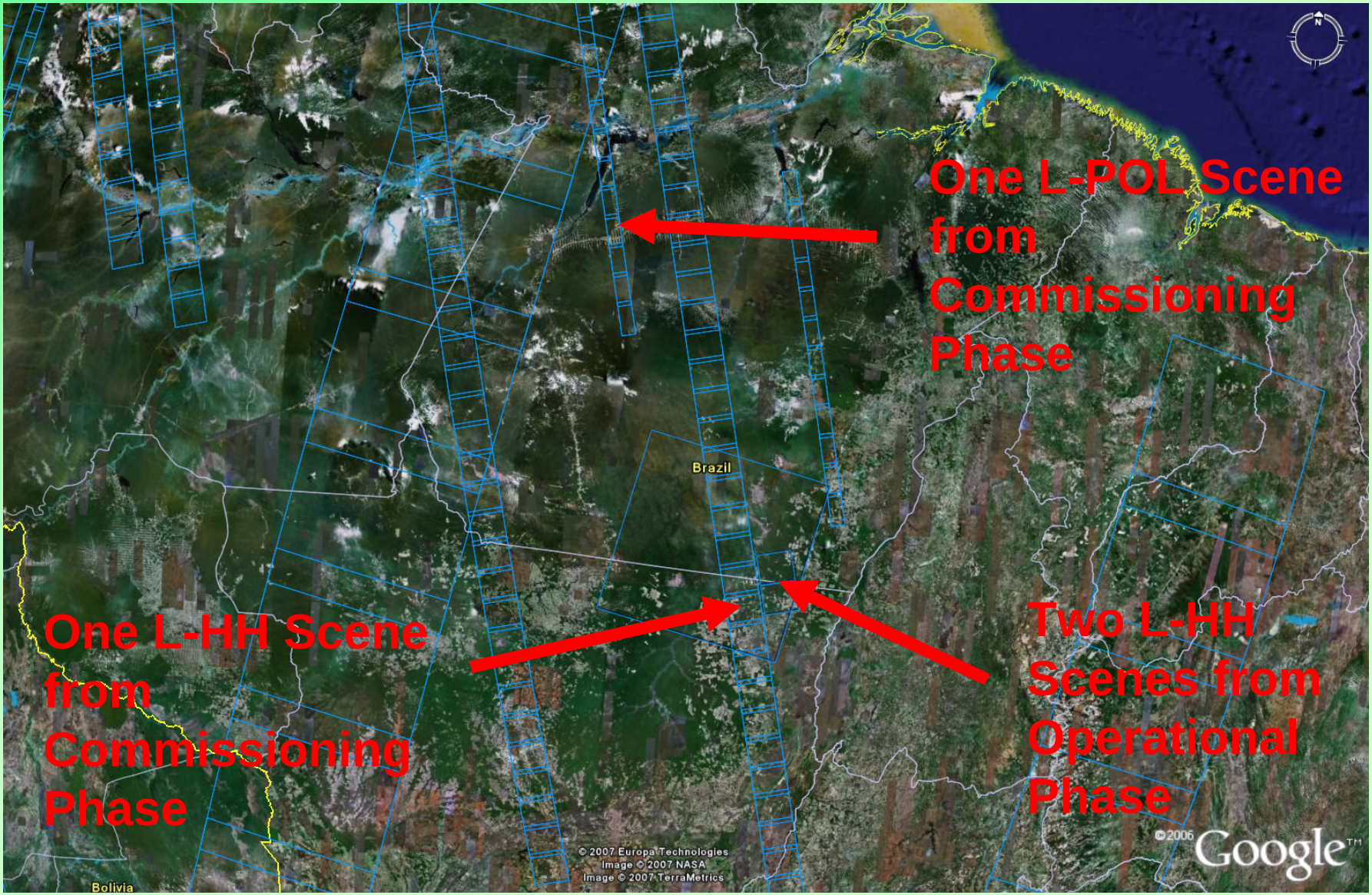
ALOS/JERS (PAL)SAR Challenges

- For ready/wide use and acceptance of the Radar data we need
  - To be able to pinpoint strengths **and** limitations
  - Best orthorectification and calibration possible
  - Make data available at zero/very low cost to end user (developing countries)

Amazon Pilot Studies



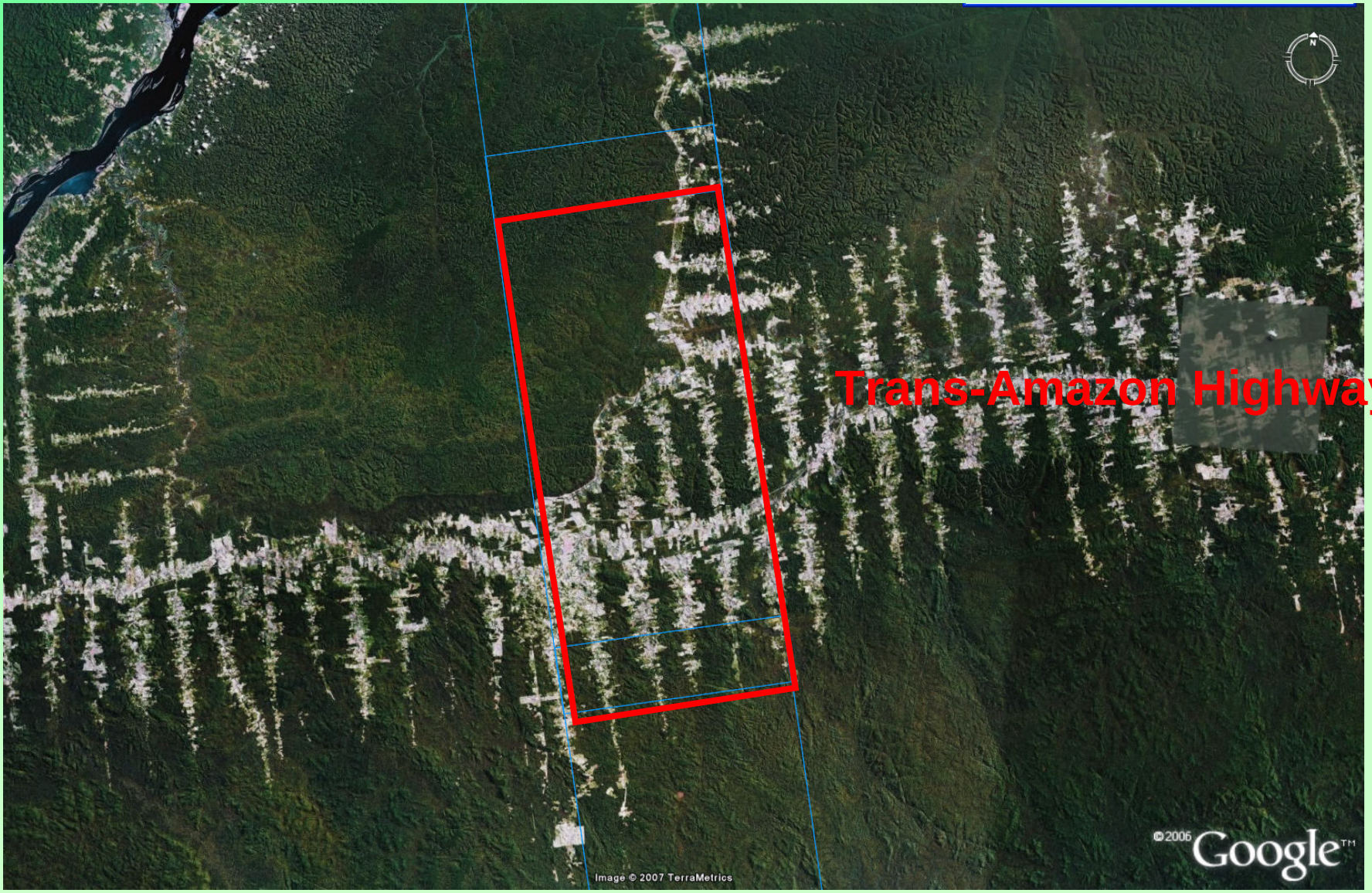
Selected Scenes for Pilot Research



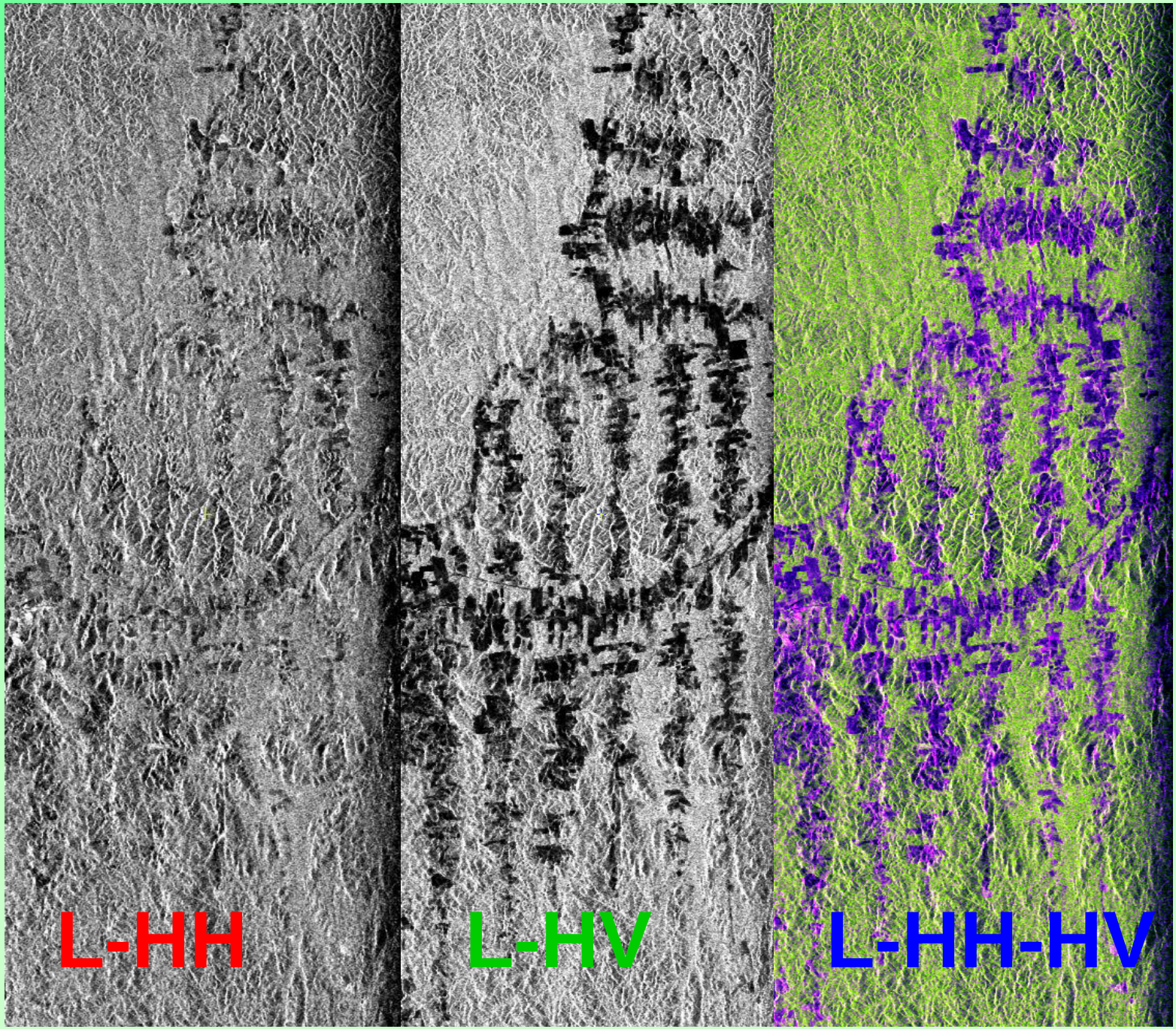
Forest Mapping With ALOS

- How well can ALOS map deforested and degraded tropical forest?

ALOS Polsar Scene 21-Oct-2006



THE WOODS HOLE RESEARCH CENTER



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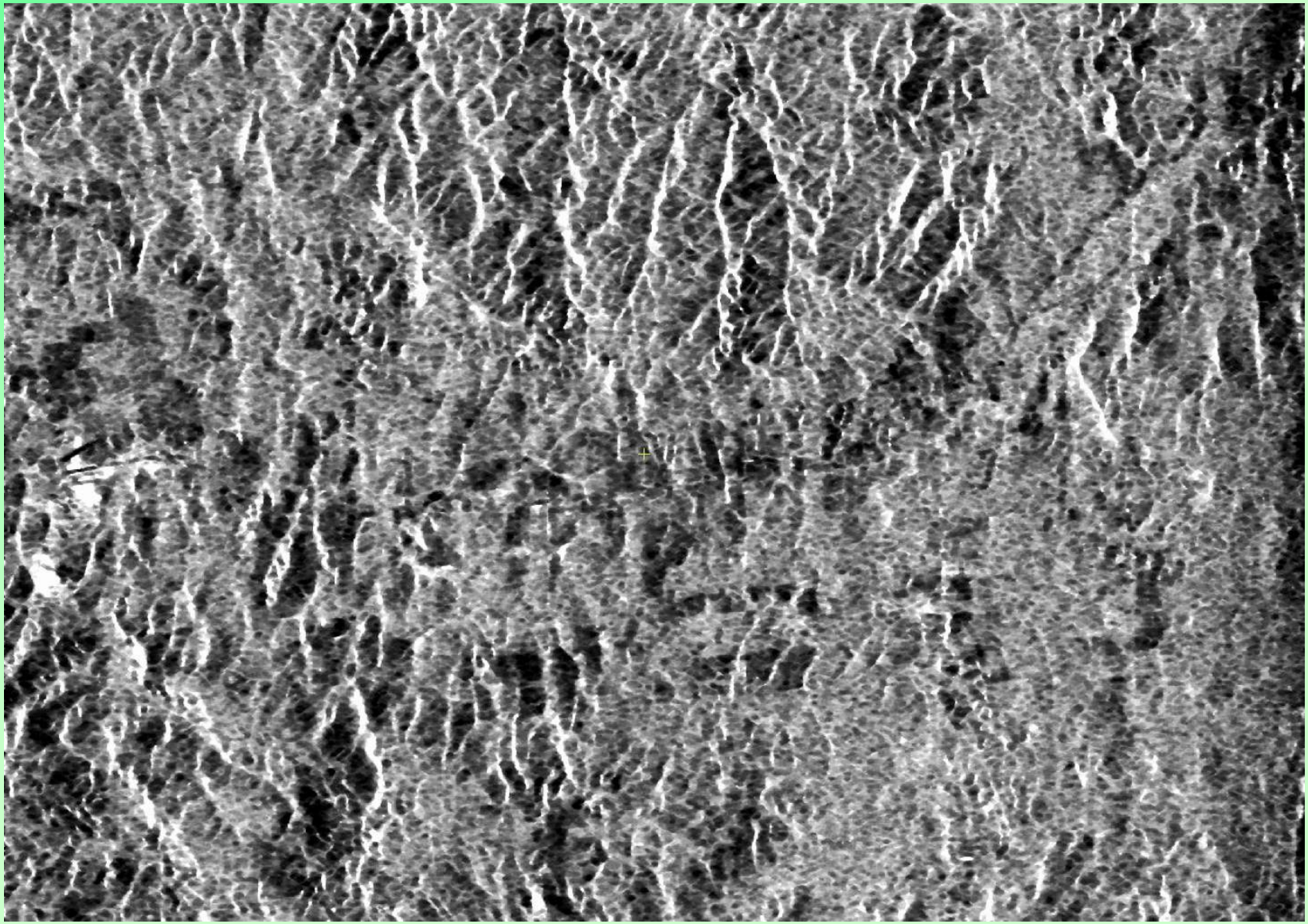
L-HH



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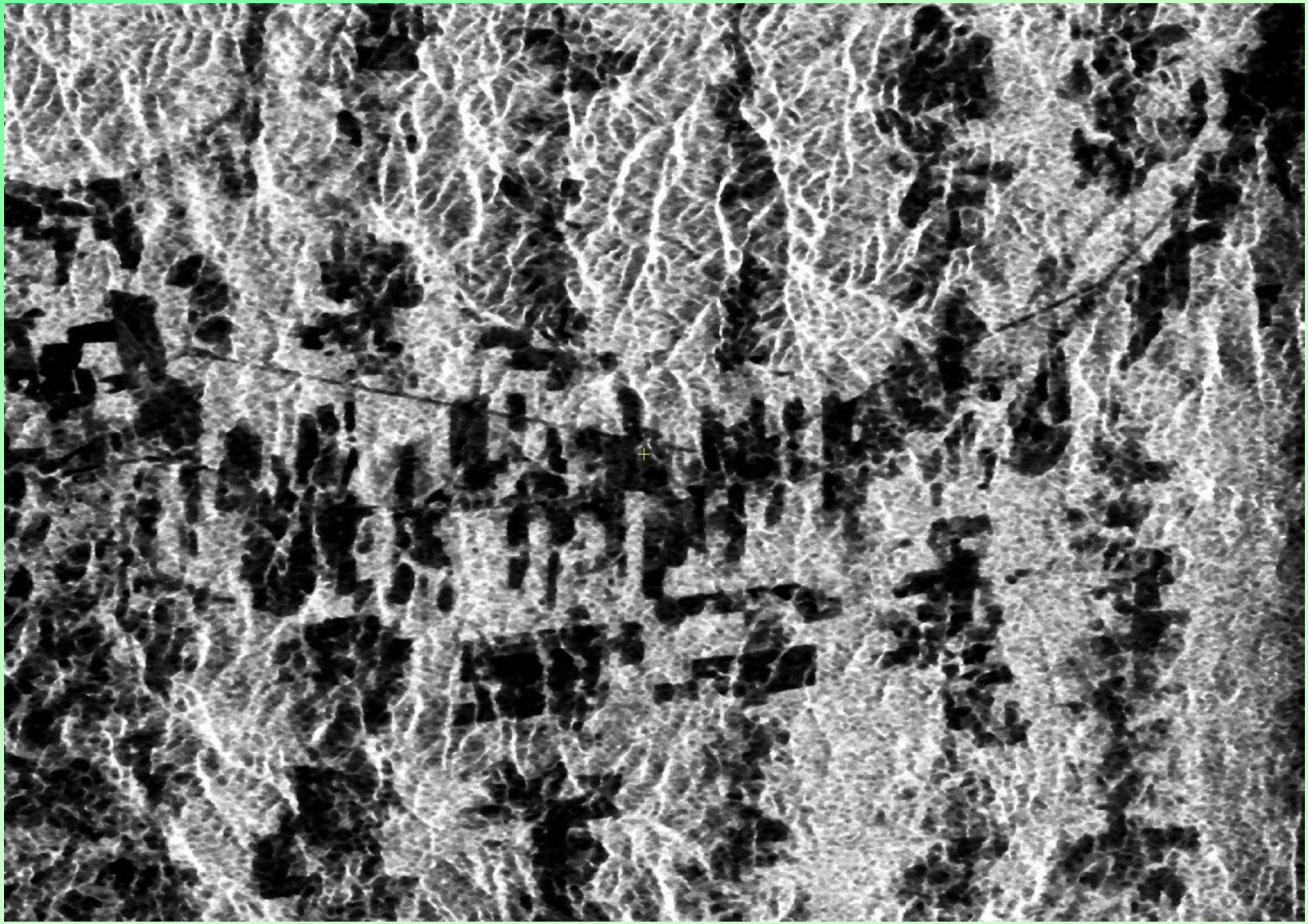
L-HV



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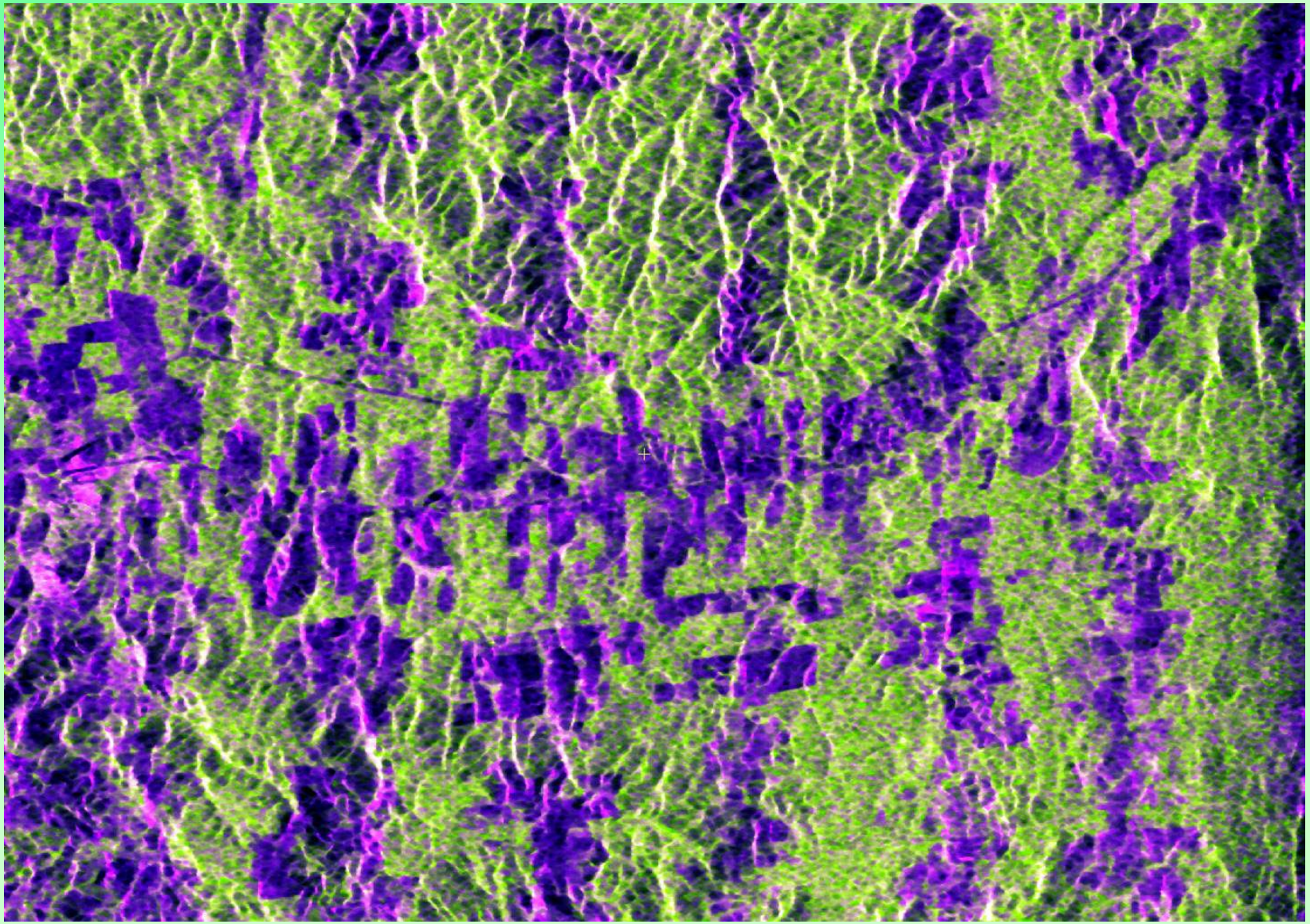
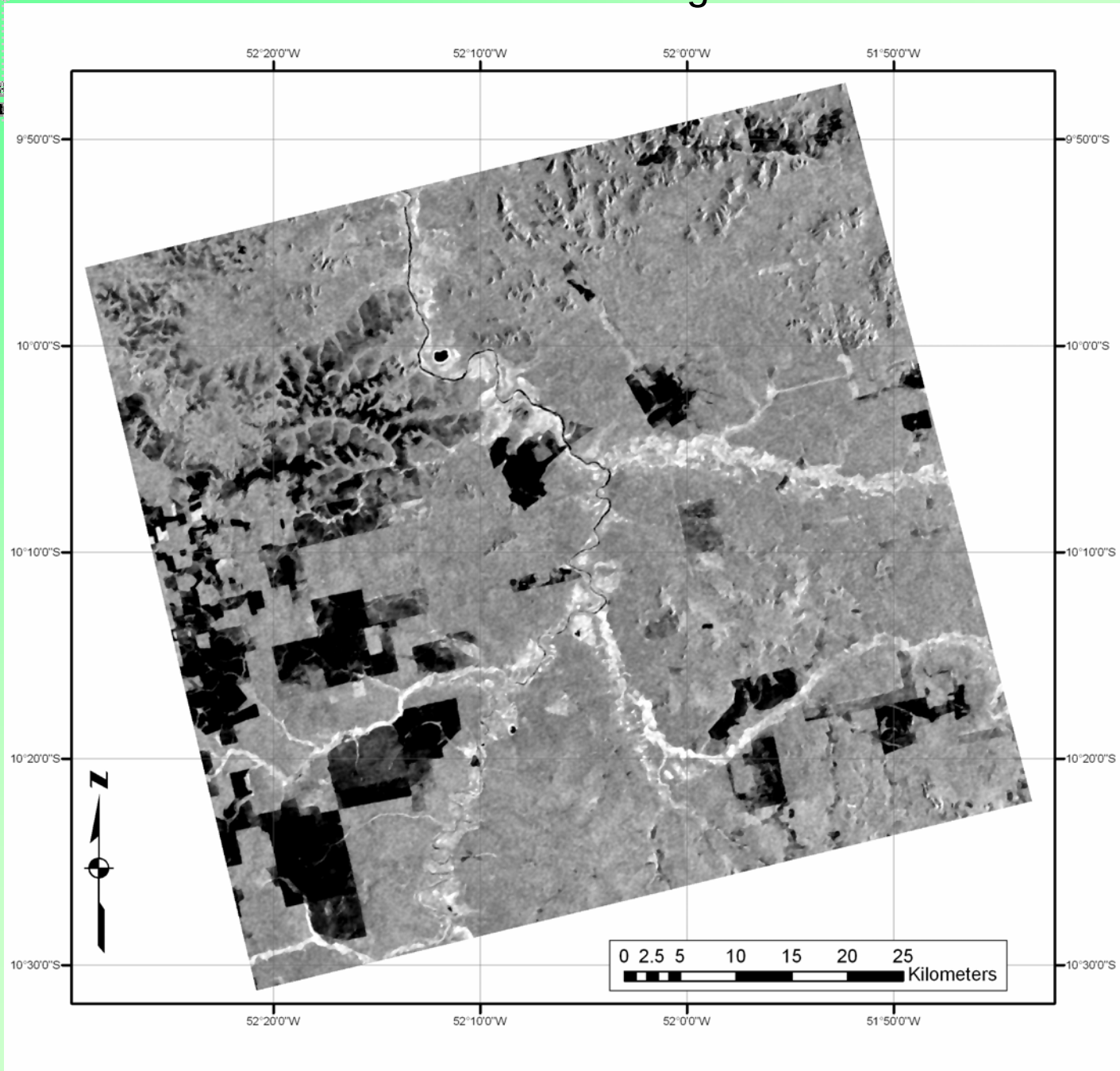
HH/HV/HH-HV Composite



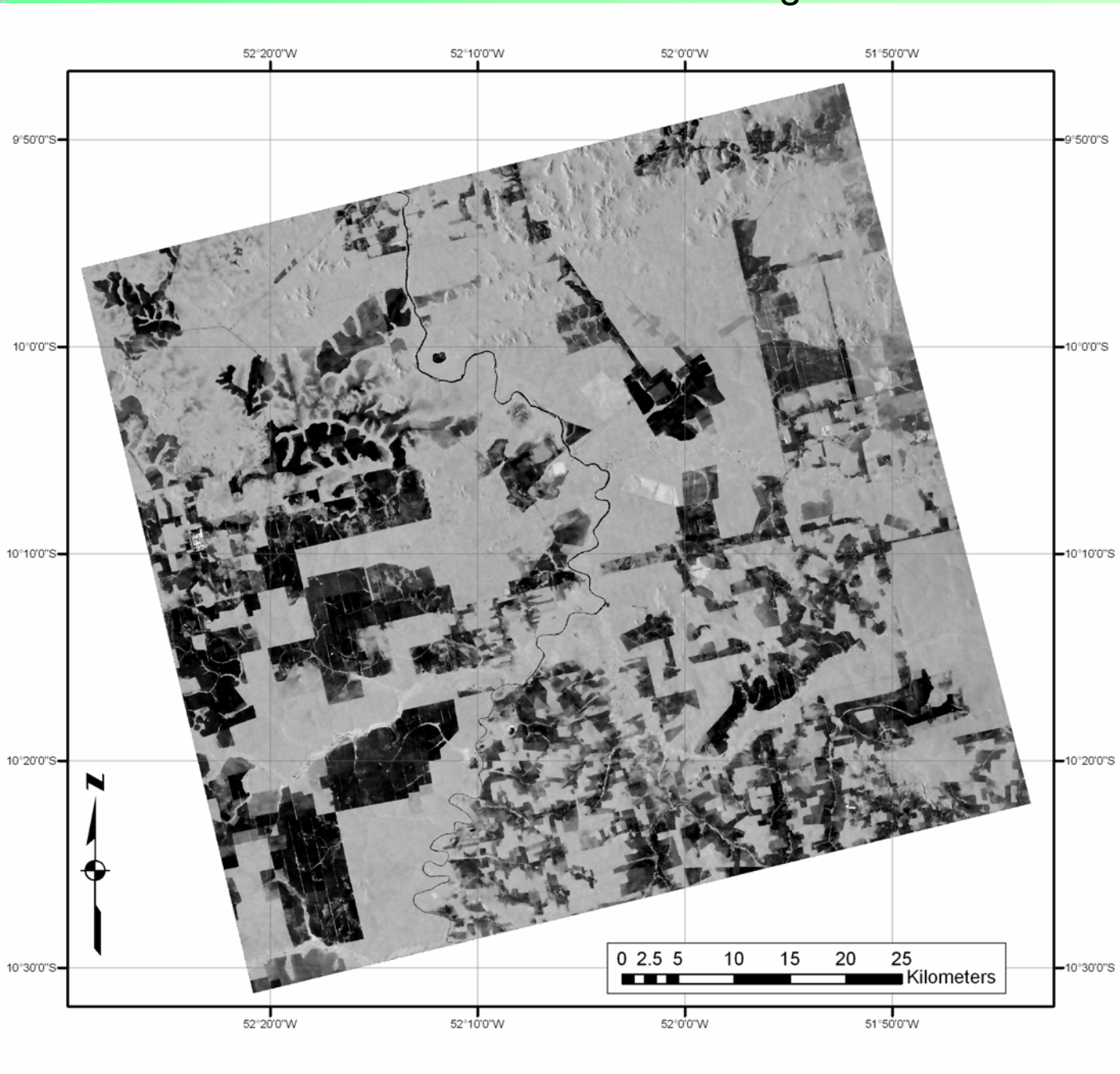
Change Detection ALOS-JERS

- Can ALOS and JERS be used jointly to establish decadal deforestation rates?
- What types of changes are detected? What types are not detected?

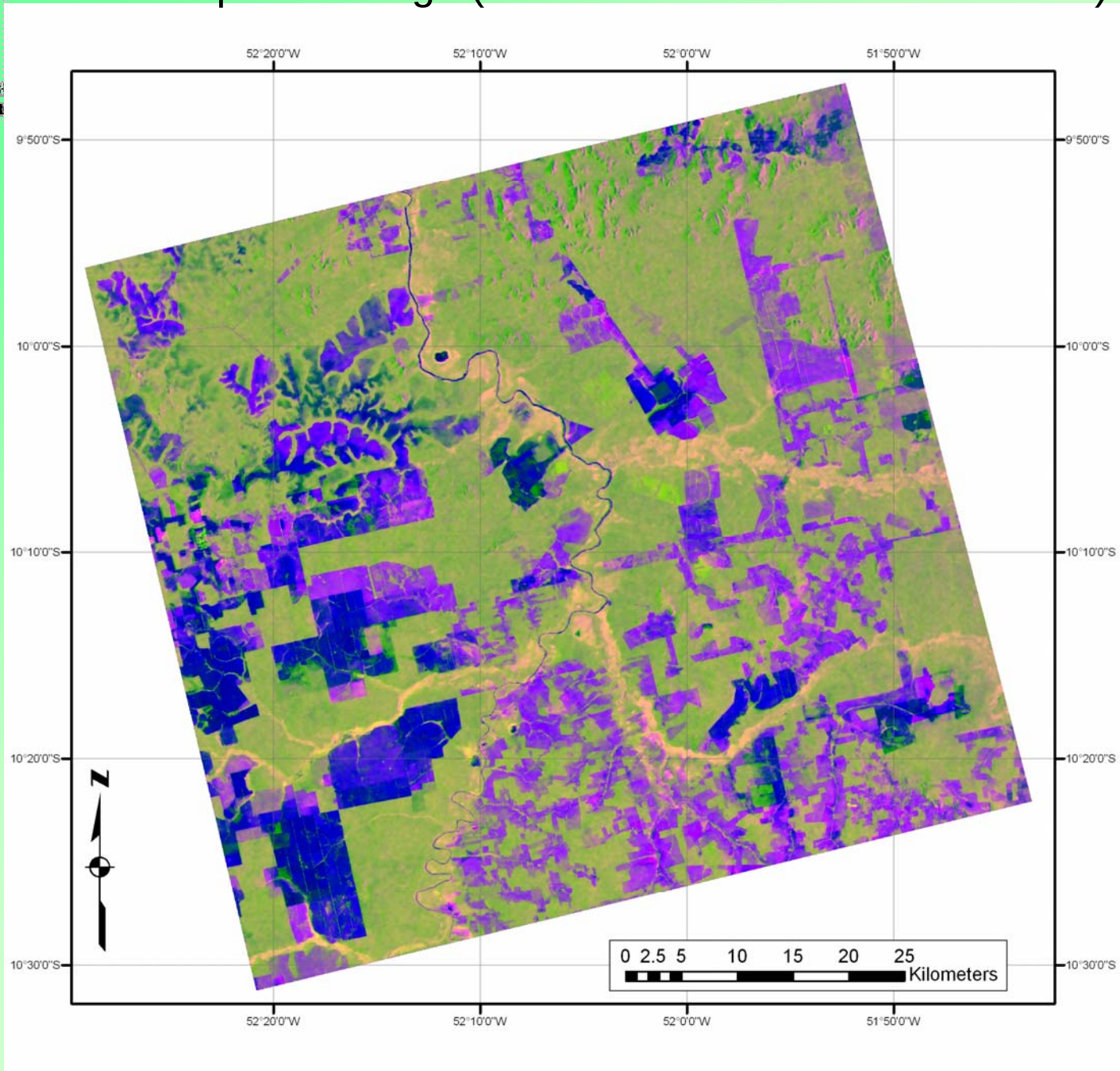
1996 JERS Image

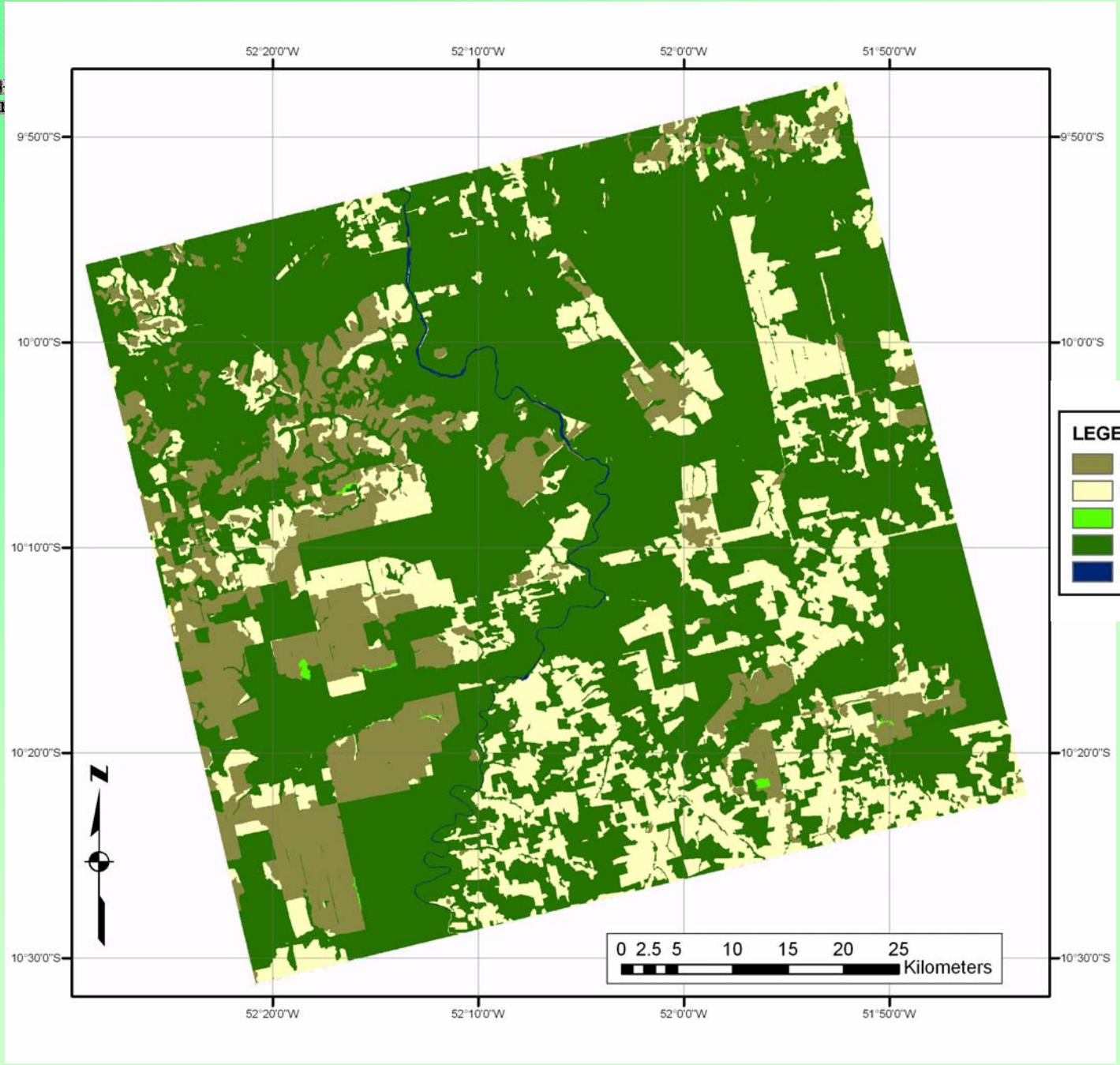


2006 ALOS-PALSAR Image



Color Composite Image (R-G-B = JERS-ALOS-Difference)




52°20'0"W
52°10'0"W
52°0'0"W
51°50'0"W
9°50'0"S
10°0'0"S
10°10'0"S
10°20'0"S
10°30'0"S
LEGEND
Deforestation (pre 1996)
Deforestation (post 1996)
Recent Logging
Intact Forest
River Channel
N
0 2.5 5 10 15 20 25
Kilometers

Africa Pilot Study

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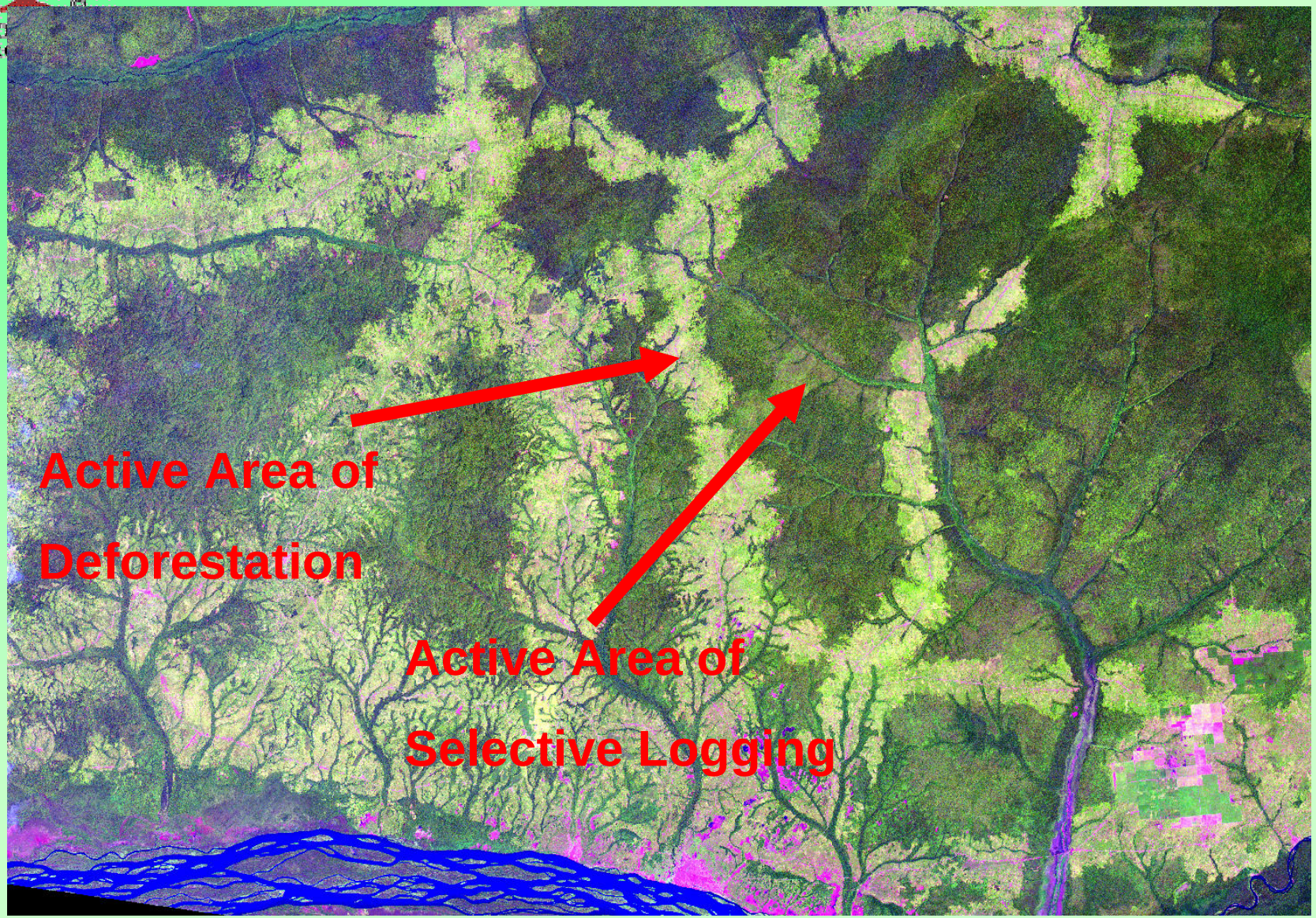
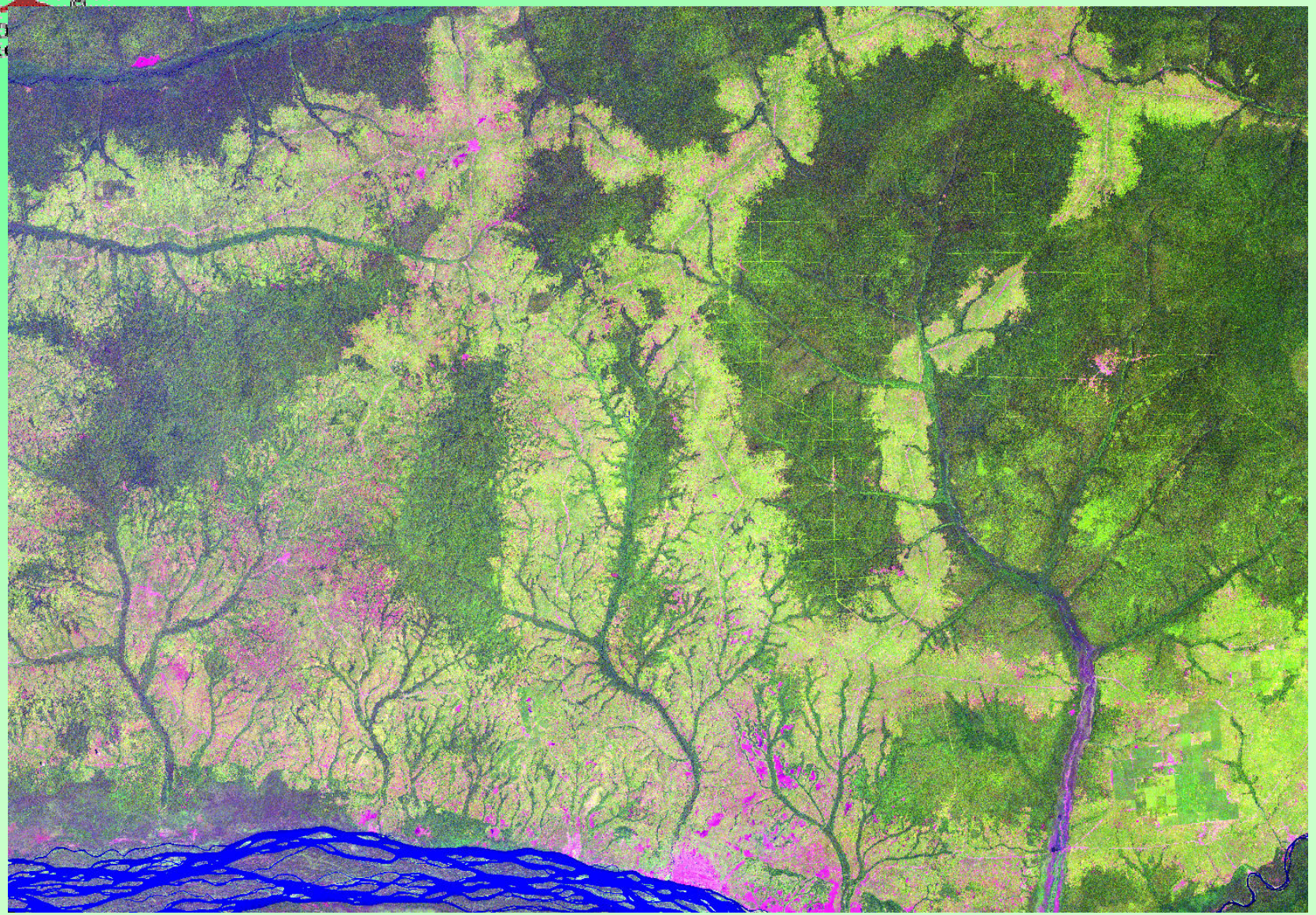


1990 Landsat (RGB=543) DRC near Bumba

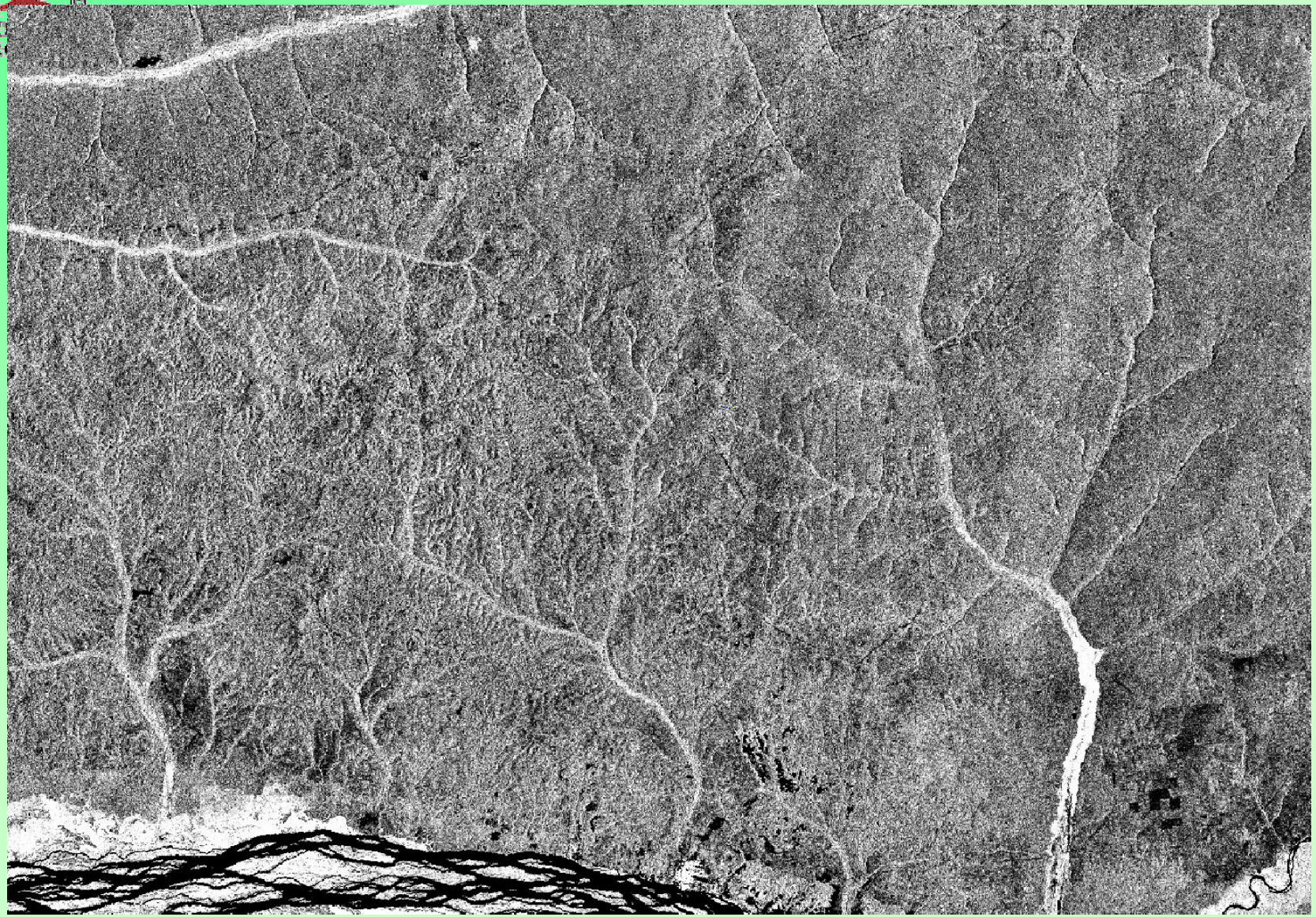
Approximate Scene Center: 2° 33'47" lat 22° 26'41" lon



2001 Landsat (RGB=543) DRC near Bumba

Approximate Scene Center: 2° 33’47” lat 22° 26’41” lon

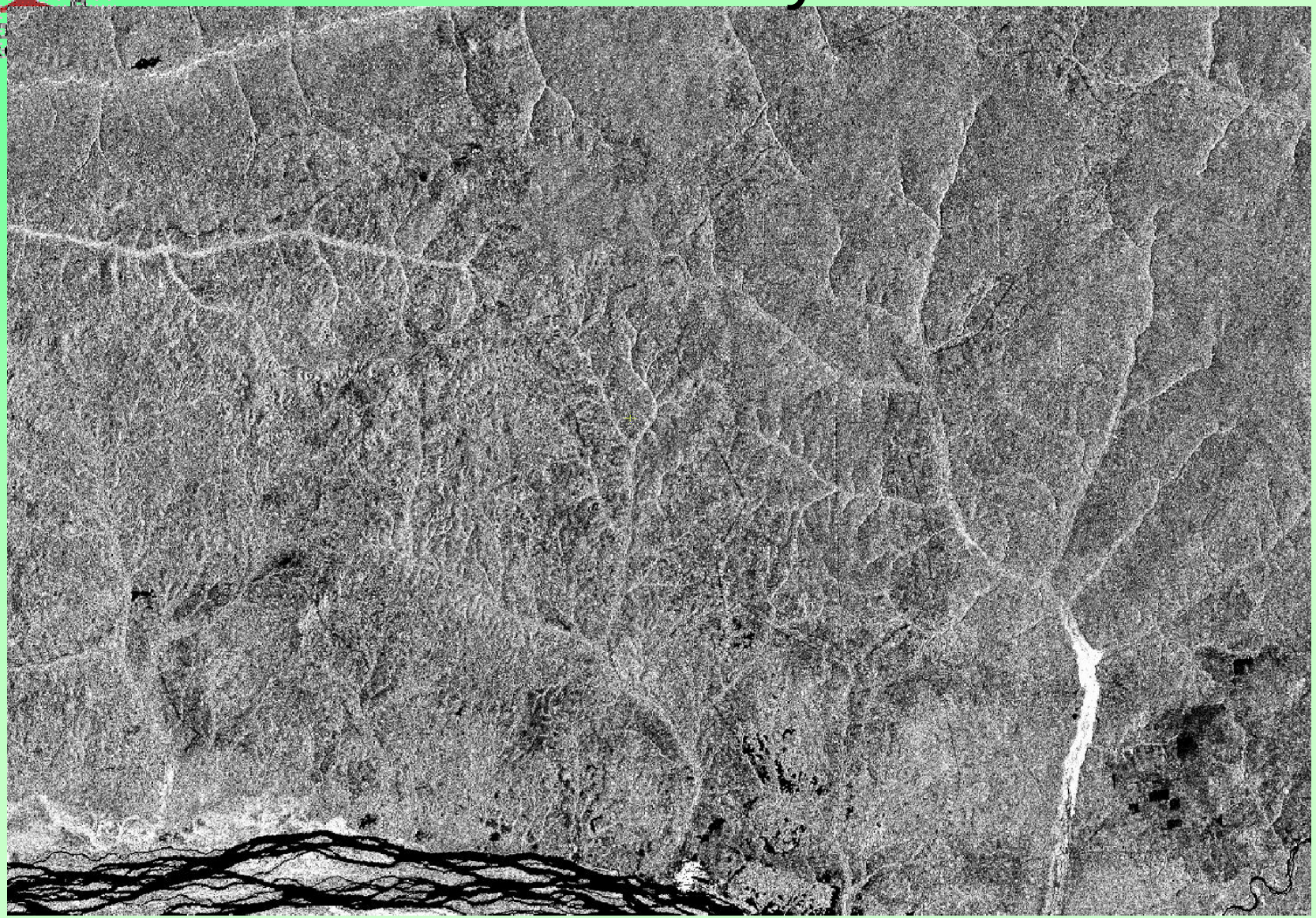
JERS GRFM Wet Season



Wet Season JERS 100 m DRC near Bumba

Approximate Scene Center: 2° 33'47" lat 22° 26'41" lon

JERS GRFM Dry Season



Dry Season JERS 100 m DRC near Bumba

Approximate Scene Center: 2° 33'47" lat 22° 26'41" lon

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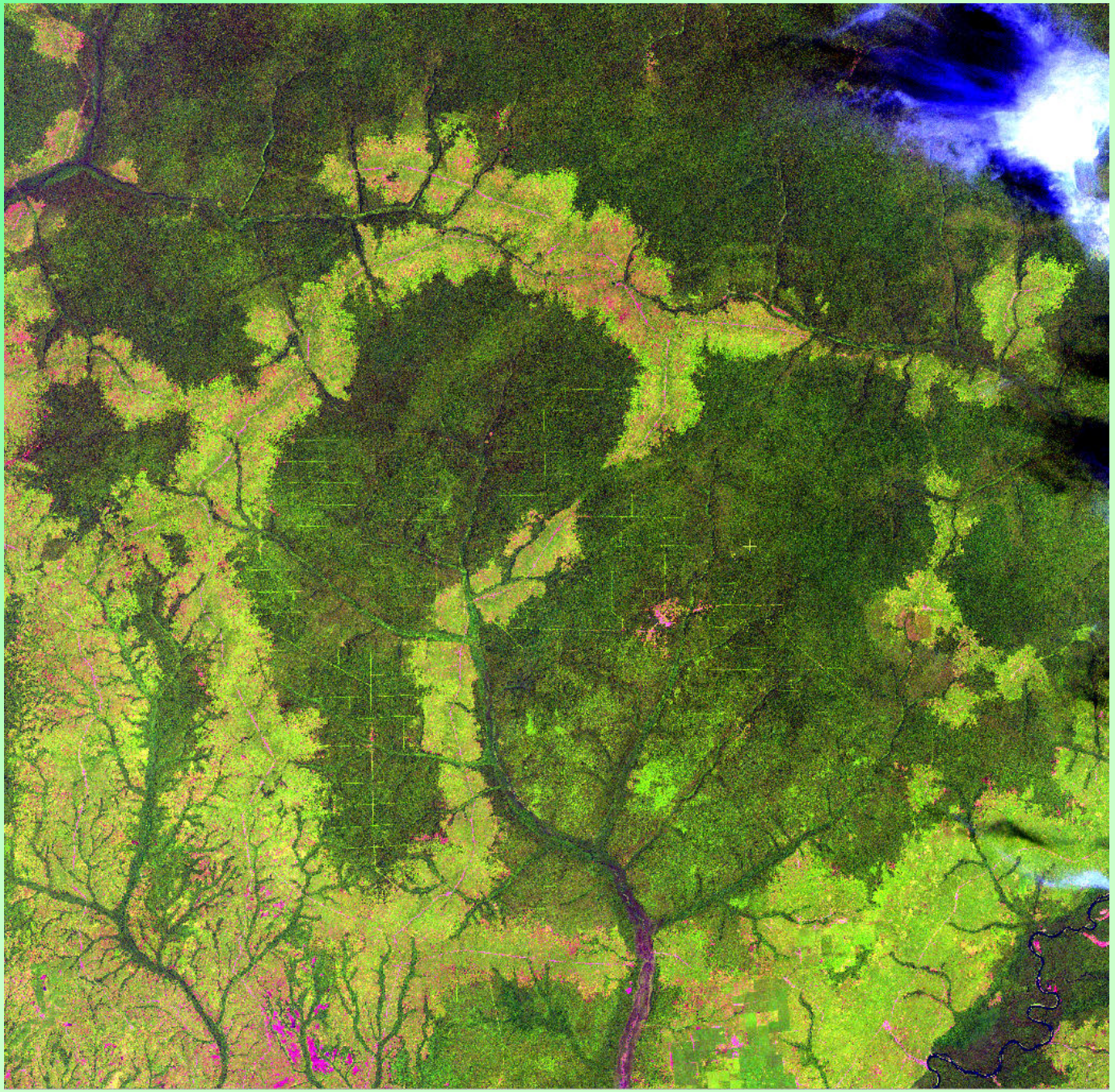

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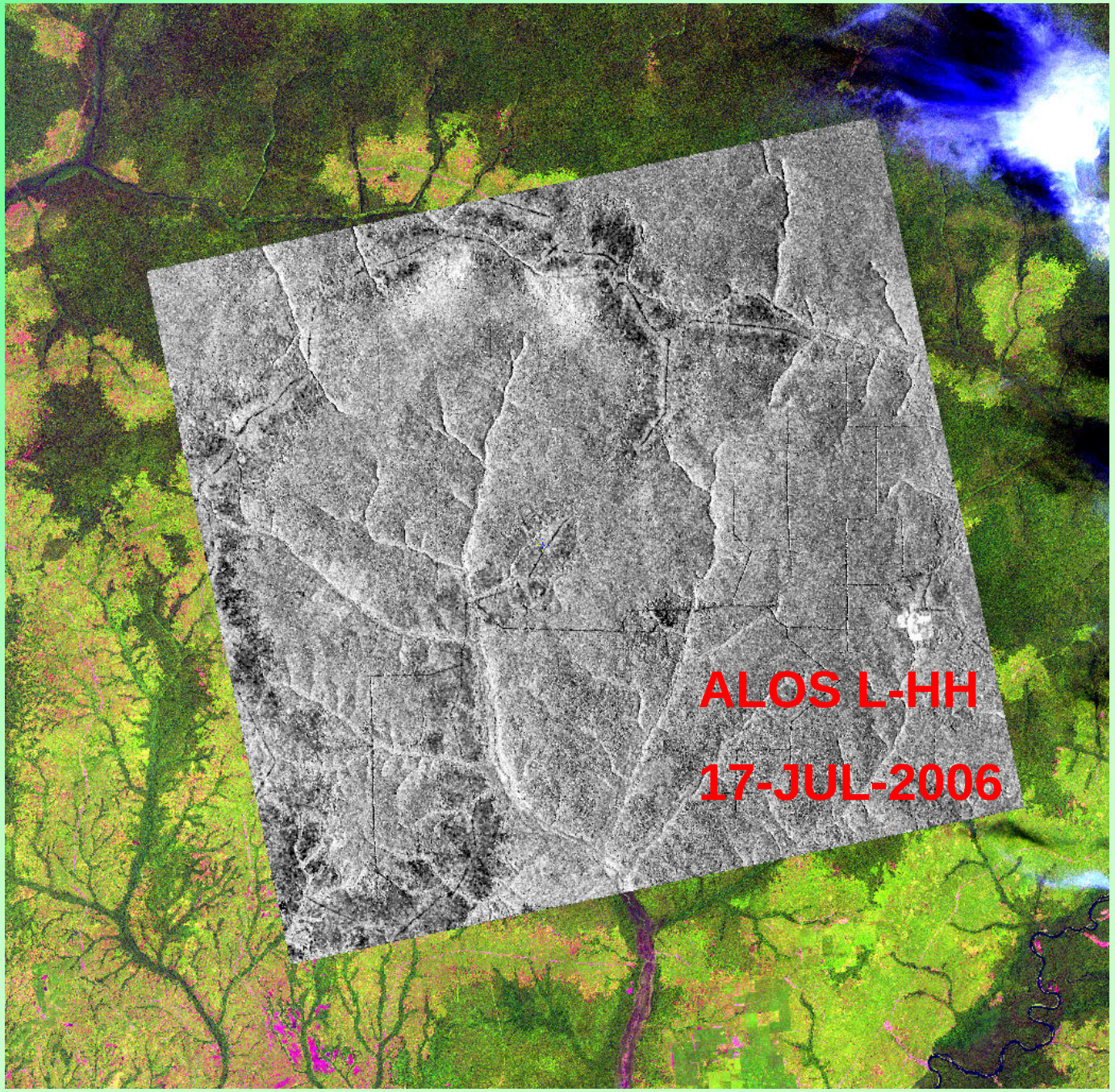
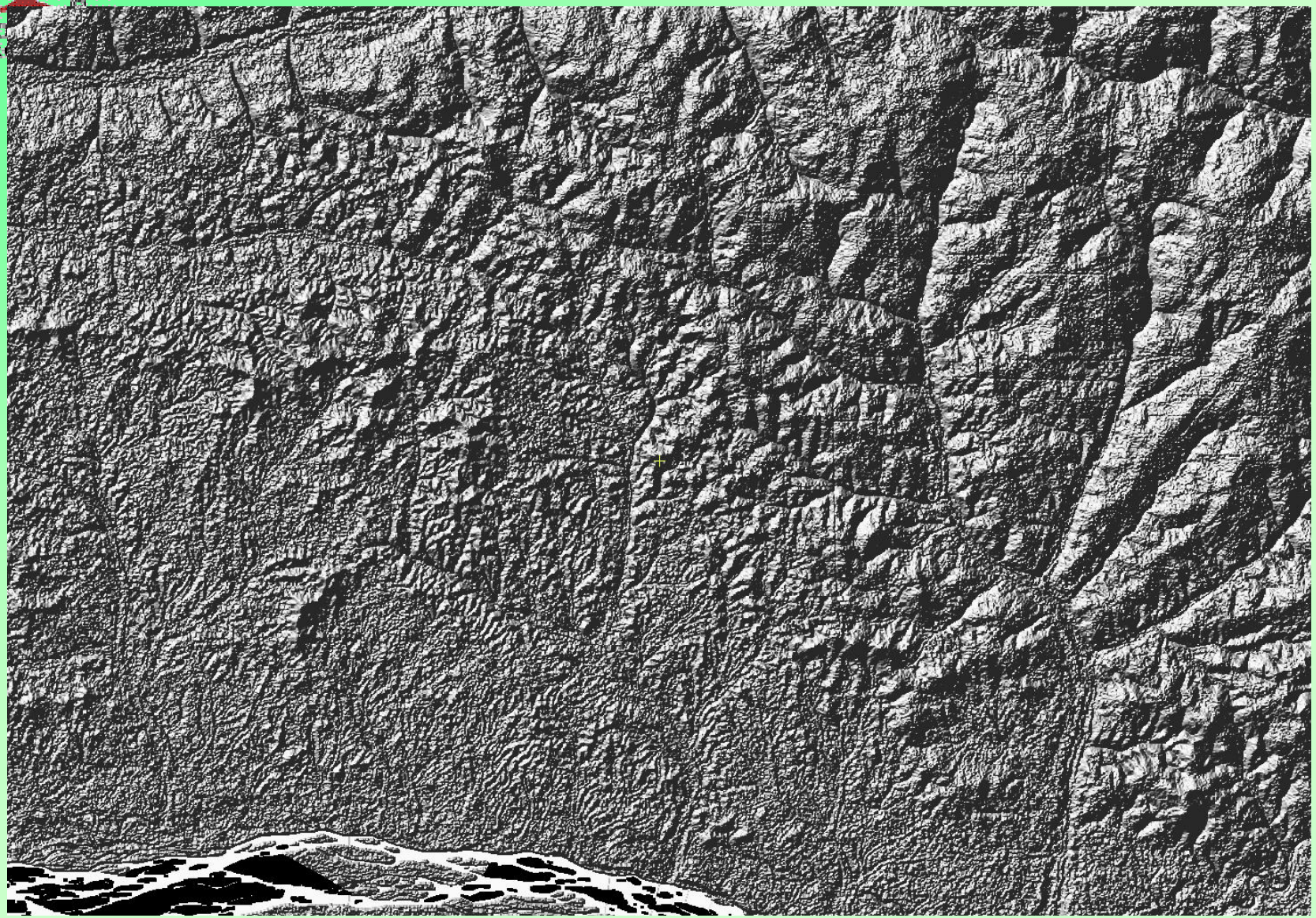
1.28.2001



RGB = 543
ALOS



SRTM 90 m DRC near Bumba

Approximate Scene Center: 2° 33’47” lat 22° 26’41” lon

Uganda Bwindi Area

What can L-HV provide in Africa

- Ask SIR-C …

SIR-C Datatake April 1994

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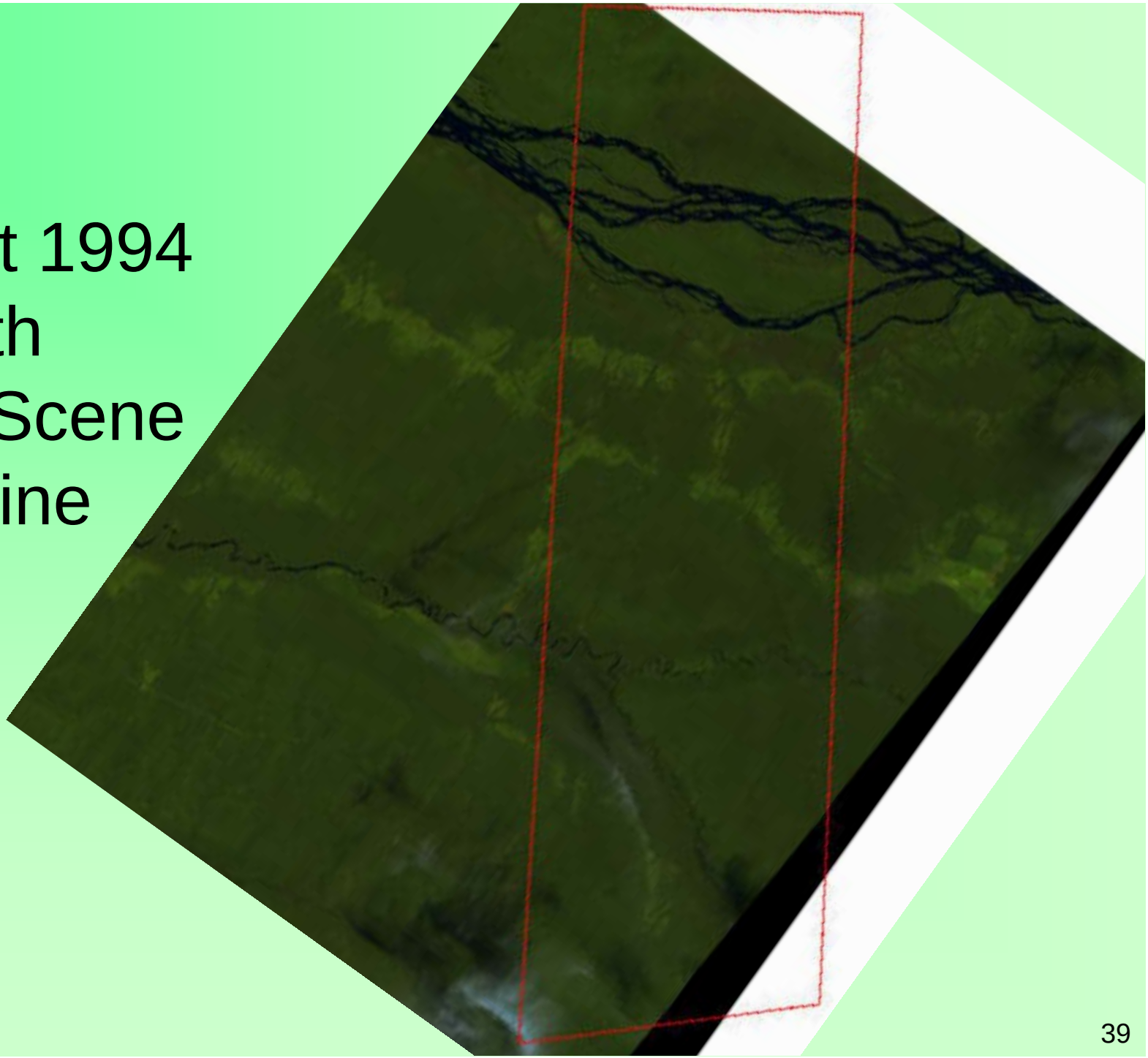
Landsat 1994 with SIR-C Scene Outline



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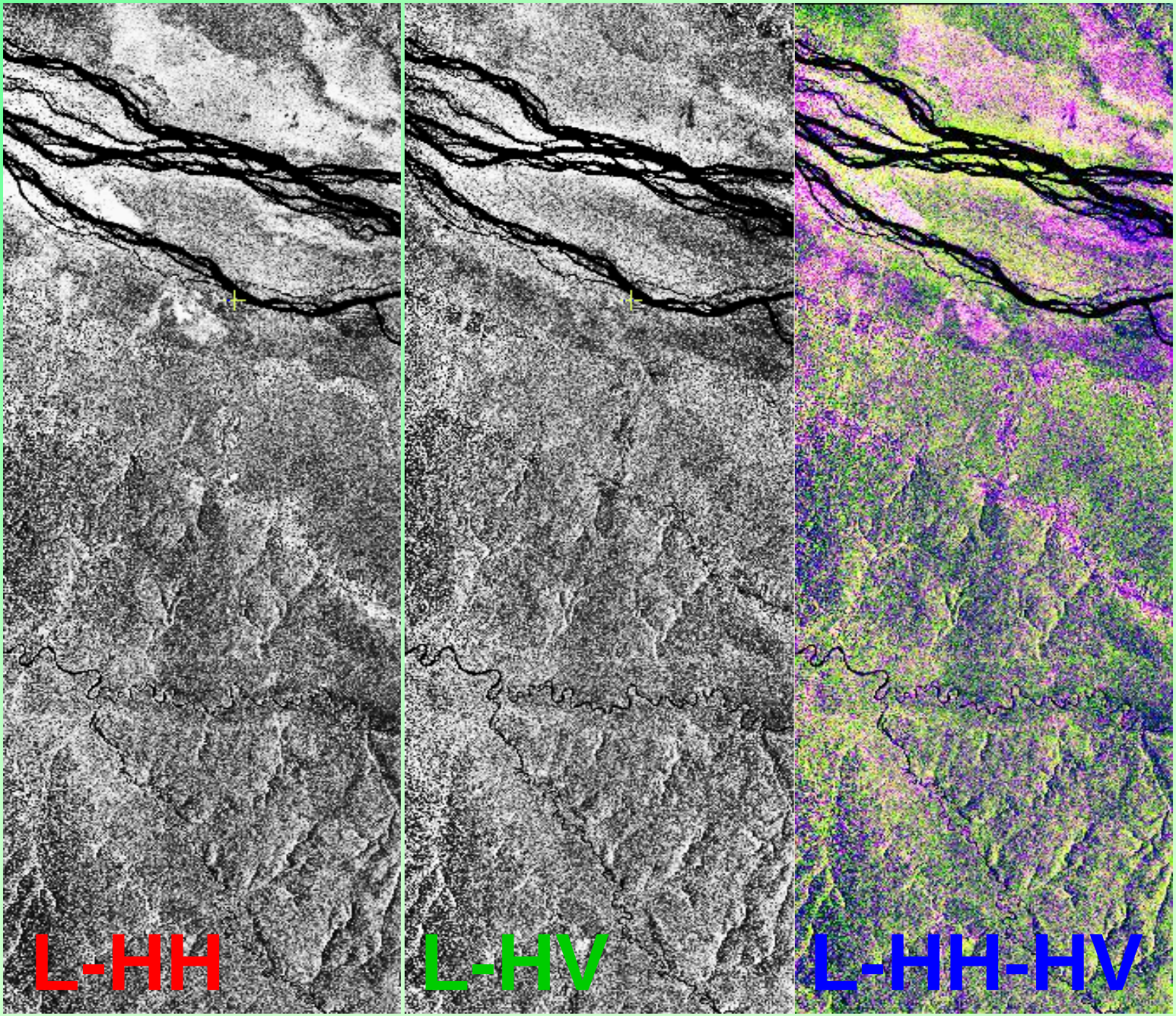
SIR-C Data

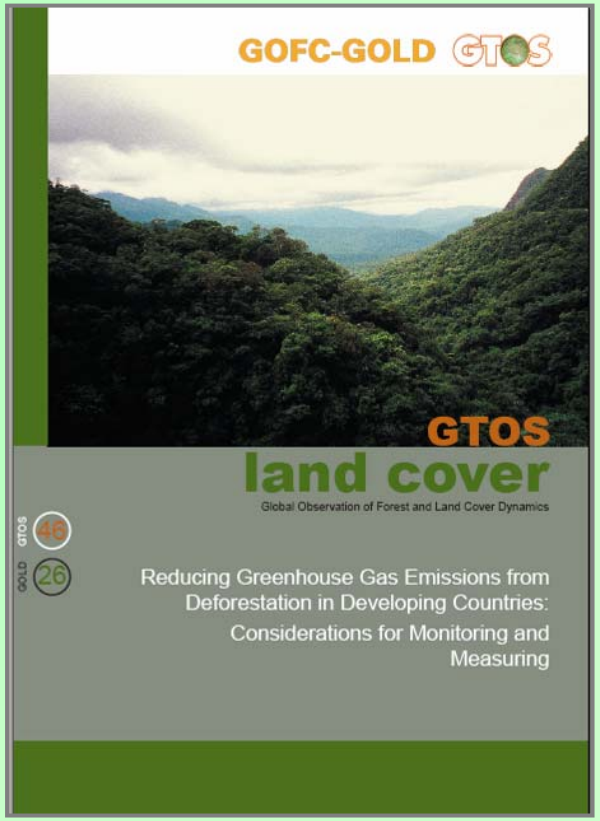
10-APR-1994



REPORT OUTLINE

Reducing Greenhouse Gas Emissions from Deforestation in Developing Countries: Considerations for Monitoring and Measuring

- ***Executive summary***
  - Common statements on technical feasibility
- ***Context from agenda item 6 of COP-11***
- ***Monitoring deforested area***
  - Can be done with confidence, variety of methods
- ***Monitoring degraded forest area***
  - Important, more challenging
- ***Monitoring carbon stock changes***
  - Established in IPCC + remote sensing
- ***Estimating emissions***
  - Area x carbon stock change



From Martin Herold - GOFC

Radar in the GOFC-GOLD Jena Workshop Report

- "The use of Radar satellite observations is less operational but can help where appropriate temporal coverage is not available due to cloud cover."
- "Data from optical sensors have been widely used for deforestation monitoring. Data from Lidar and Radar (ERS1/2 SAR, JERS-1, ENVISAT-ASAR and ALOS PALSAR) have been demonstrated to be useful in project studies, however, so far they are not widely used operationally for tropical deforestation monitoring."
- "In the timeframe of the next commitment period, the utility of Radar and Lidar may be enhanced depending on data acquisition, access and scientific developments."
- "Methods to identify forest degradation use high resolution data. Radar data can potentially detect degradation though this application needs further development."
- "Experimental data from Radar observations reveal potential for biomass mapping."

Are these statements still accurate after the ALOS launch?

Concluding Remarks and Open Questions

- HV-polarization on ALOS is crucial for forest monitoring band. L-HH has ambiguities
- L-HH/HV acquisition strategy is probably most useful for deforestation detection and biomass mapping
- Establish decadal deforestation rates: :
  - Promising results for Brazil's deforestation belt (conversion to agroindustrial land)
  - Less promising for parts of Africa.
  - How can we assess the limitation of the GRFM dataset?
- Need to test coherence data, InSAR products? If proven useful, can those be part of the standard KC production?

Concluding Remarks and Open Questions

- ALOS will play a critical role in supporting the current political process for Credits for Reduced Emmissions from Deforestation and Degradation
  - Timing might be of the essence, the political process is well underway, GOFC-GOLD activities are underway
- Need a strategy to integrate ALOS K&C Datasets with GOFC-GOLD Activities -> this process is tight (what can be said at the April workshop?)
- What are the long term plans for ALOS-2, ESA and NASA SAR plans?
- WHRC is involved in CfRN REDD process:
  - advise on economic carbon credit valuation (Goldman/Sachs Cooperation)
  - designing of win-win solutions for economic development and ecological preservation (Hewlett Grant)
  - Support development of accounting methods from remote sensing for deforestation and regrowth biomass estimation with large field activities in Amazon and Africa
- Attend meeting on Monday/Tuesday next week of Scientific Advisory body to CfRN on technical solutions to measure deforestation/biomass with RS

What is the message from the ALOS K&C Team to the CfRN?

- Deforestation
- Degradation
- (Regrowth) Biomass
- Operational potential from ALOS, C-band SAR's and long term prospects of radar missions
- Data availability
- Time needed to demonstrate potential
- What can be promised now, what not?