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Benefits of the new Landsat data access policy; FRA2010 and beyond

Alan Belward on behalf of the TREES-3 optical RS team; Frédéric Achard, René Beuchle, Hugh Eva, Hans-Juergen Stibig, Silvia Carboni, Rastislav Raši, with Andreas Brink, Catherine Bodart, Philippe Mayaux

Project Objectives

TREES-3 –in partnership with FAO

- Reducing uncertainties in global estimates of forest cover change and related carbon emissions
- Supporting EU external relations (Rio Conventions, development and trade)

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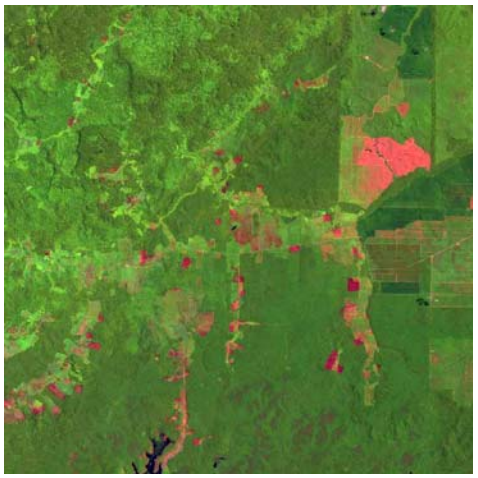
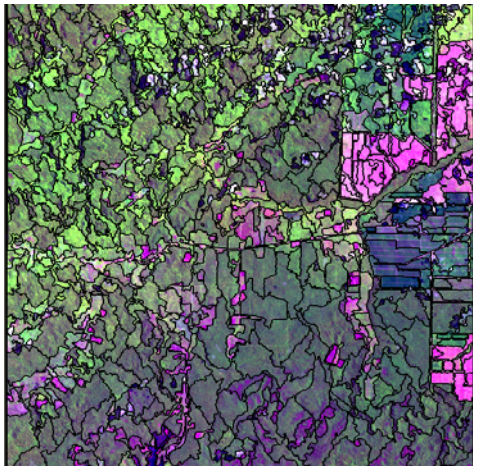
Source; USGS S01_W053_tm_226-061_23081986
S01_W053_etm_226-061_08042003; segmentation JRC

TREES-3

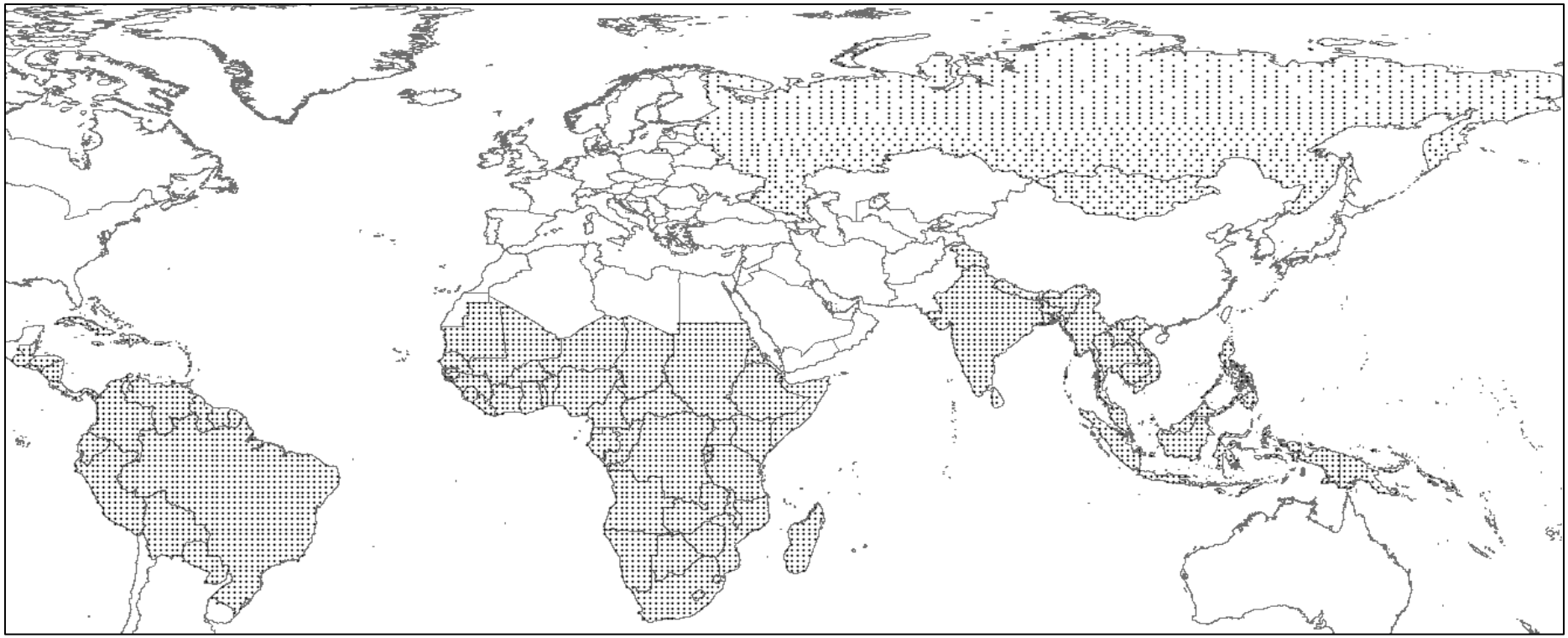
- Forest cover maps at regional scale
- Location of rapidly changing regions - hotspots
- Forest cover change measurements from 1990 to 2000 to 2005
- Carbon emission estimates from forest cover changes
- Assessment of deforestation drivers at sub-regional levels



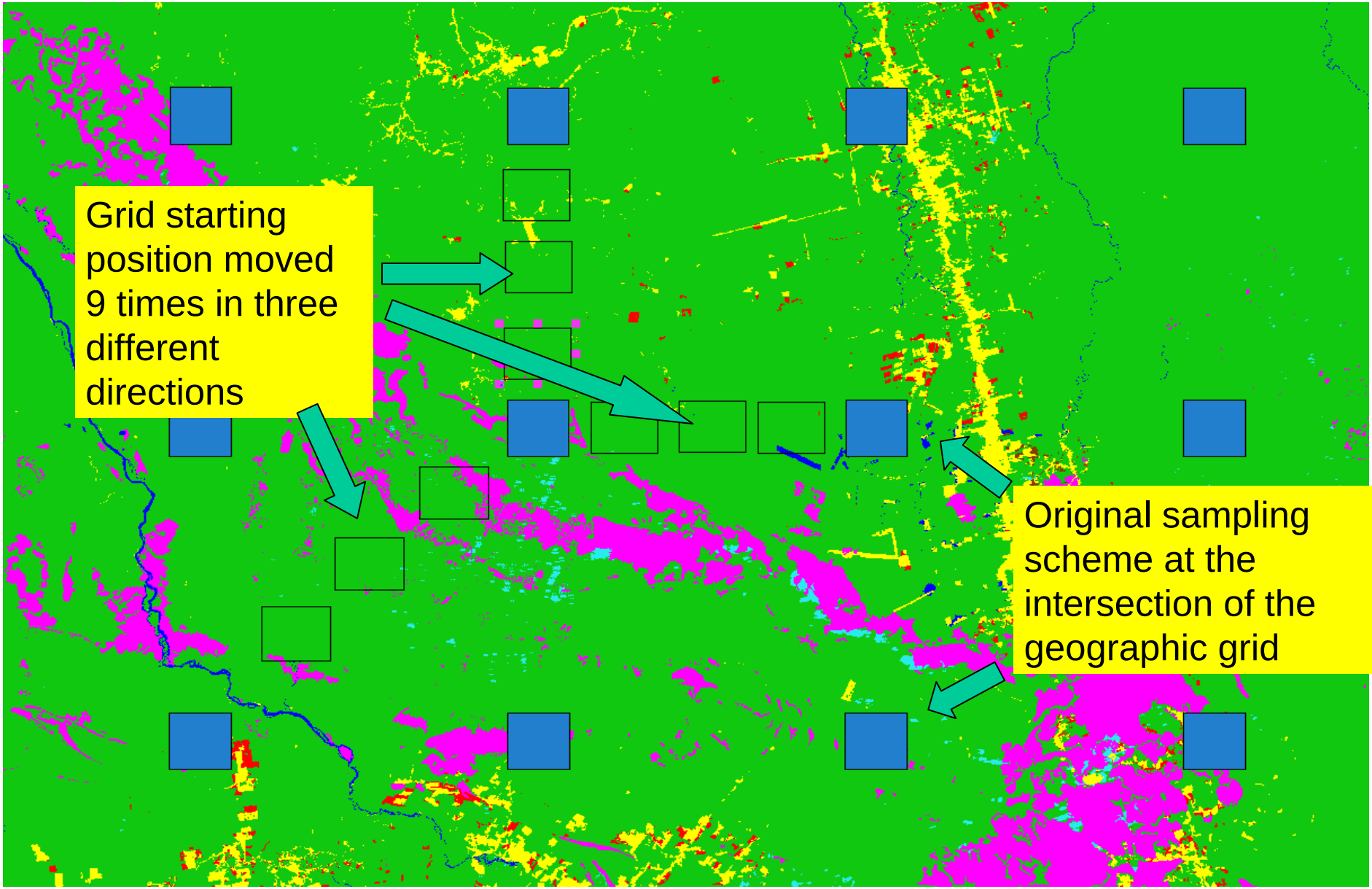


Source: P. Mayaux et al, 2005, Tropical forest cover change in the 1990s and options for future monitoring *Phil Trans R. Soc.* B **360**, 373-384

Systematic sampling



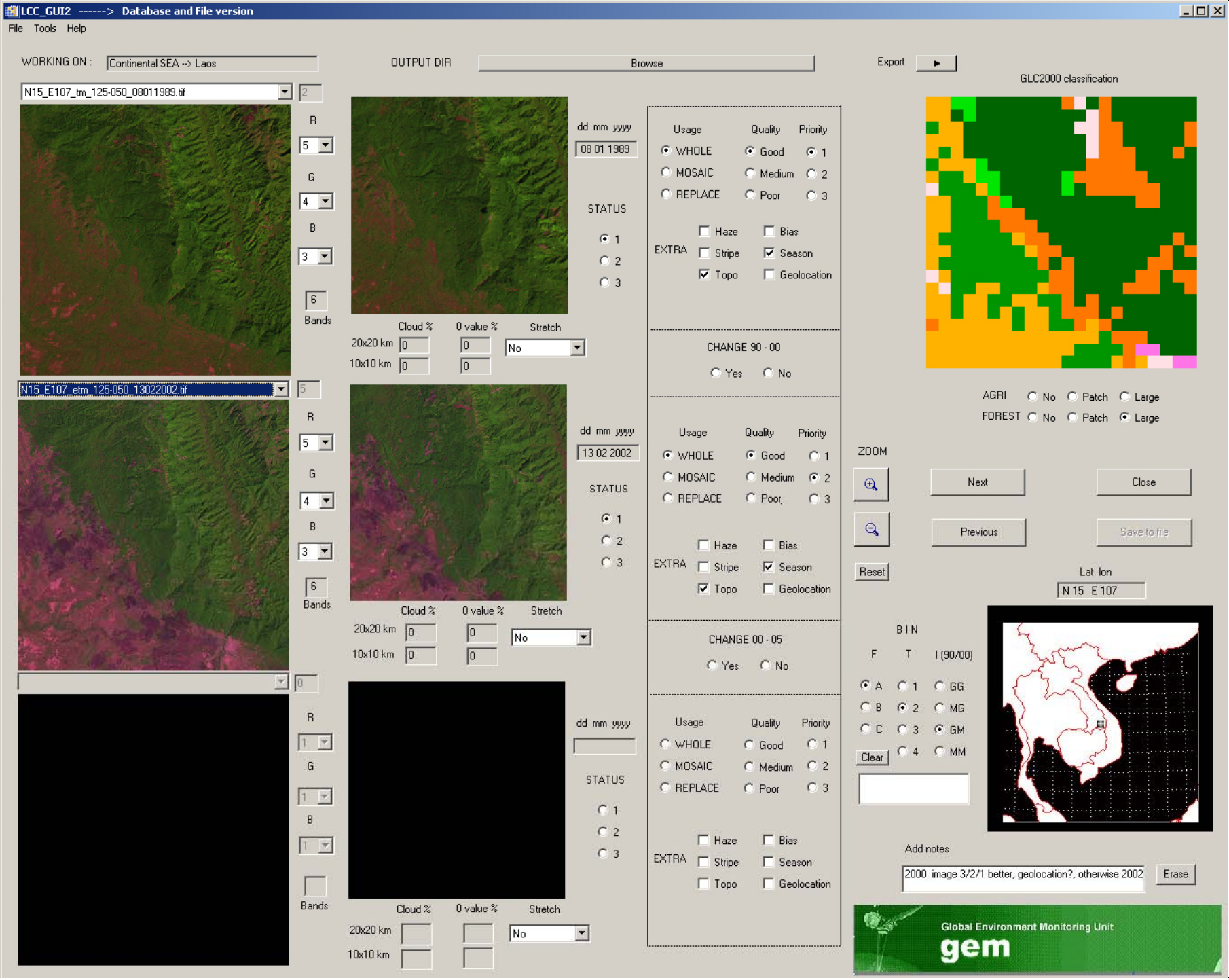
Source; F. Achard



Source; F. Achard

Comparison between INPE wall to wall assessment and the global sampling approach over Brazilian Amazonia

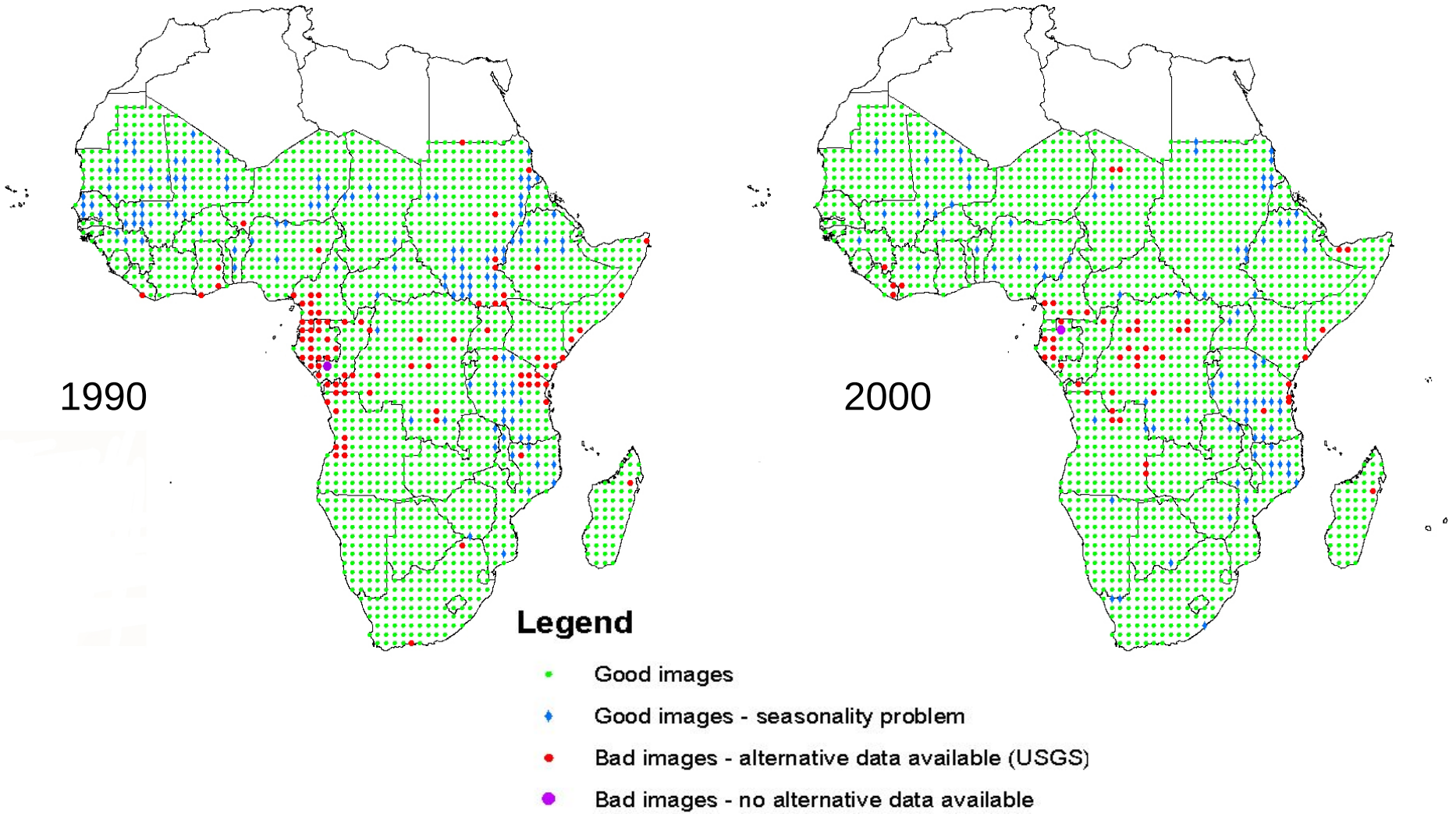
Source	***Deforestation 2002*** (km sq)
INPE / PRODES	
(full sample)	*25,282*
TREES / FAO	
Sampling mean (n=10)	*26,085*
Standard error $(\sigma/\sqrt{n})$	*1,015*


LCC_GUI2 ------> Database and File version
File Tools Help
WORKING ON : Continental SEA --> Laos
OUTPUT DIR
Browse
Export
GLC2000 classification
N15_E107_tm_125-050_08011989.tif
N15_E107_etm_125-050_13022002.tif
R
G
B
Bands
dd mm yyyy
08 01 1989
13 02 2002
STATUS
Usage
Quality
Priority
WHOLE
MOSAIC
REPLACE
Good
Medium
Poor
EXTRA
Haze
Stripe
Topo
Bias
Season
Geolocation
Cloud %
0 value %
Stretch
20x20 km
10x10 km
No
CHANGE 90 - 00
CHANGE 00 - 05
Yes
No
AGRI
FOREST
Patch
Large
ZOOM
Next
Previous
Close
Save to file
Reset
Lat lon
N 15 E 107
BIN
F
T
I (90/00)
Clear
Add notes
2000 image 3/2/1 better, geolocation?, otherwise 2002
Erase
Global Environment Monitoring Unit
gem

Source; Andreas Brink, Catherine Bodart, Philippe Mayaux

2047 sample points; 90% good, 141 replacement scenes identified
139 of these are held by USGS

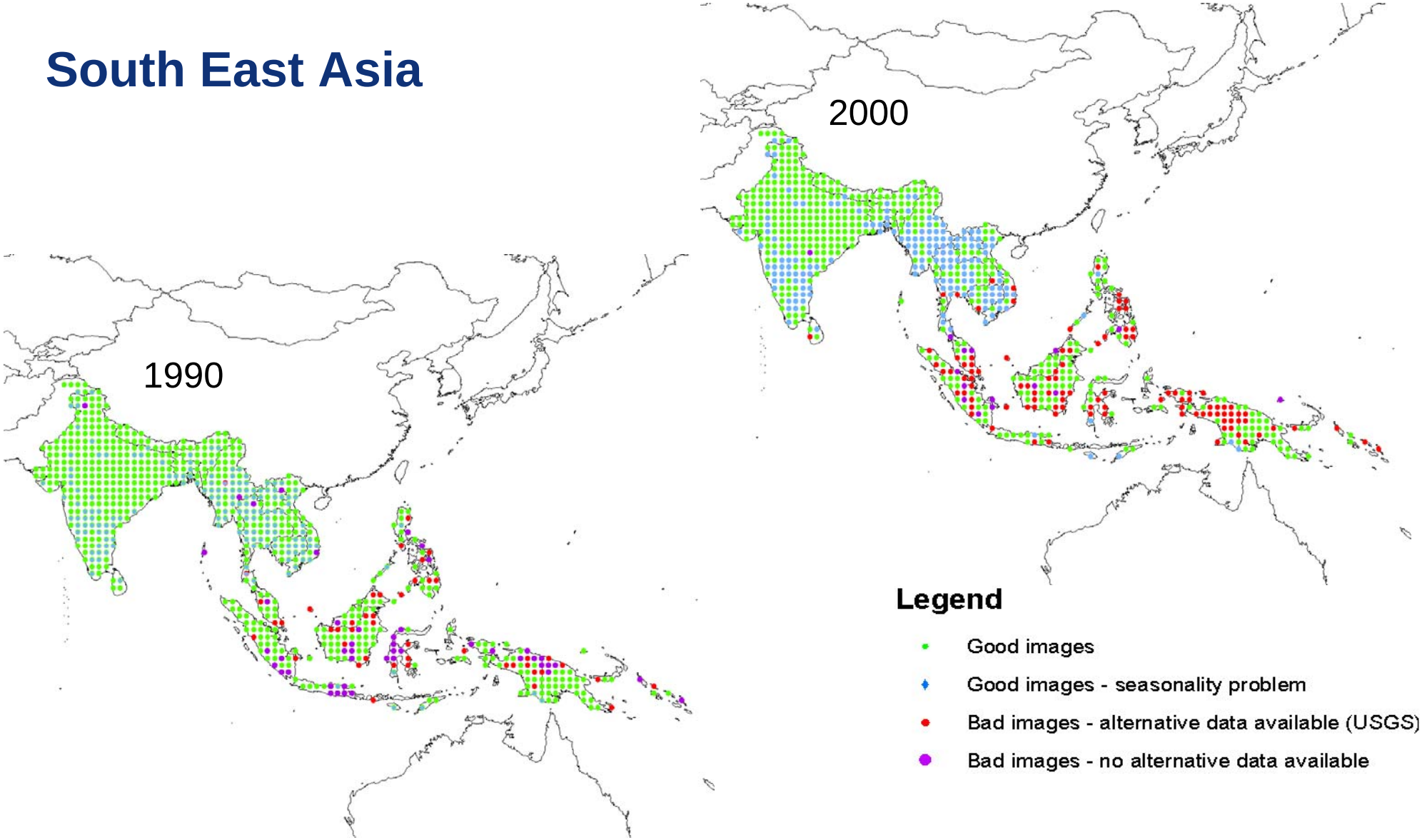
Africa



Source; Hans-Juergen Stibig

741 sample points; 80 % good, 224 replacement scenes identified
162 of these held by USGS

South East Asia



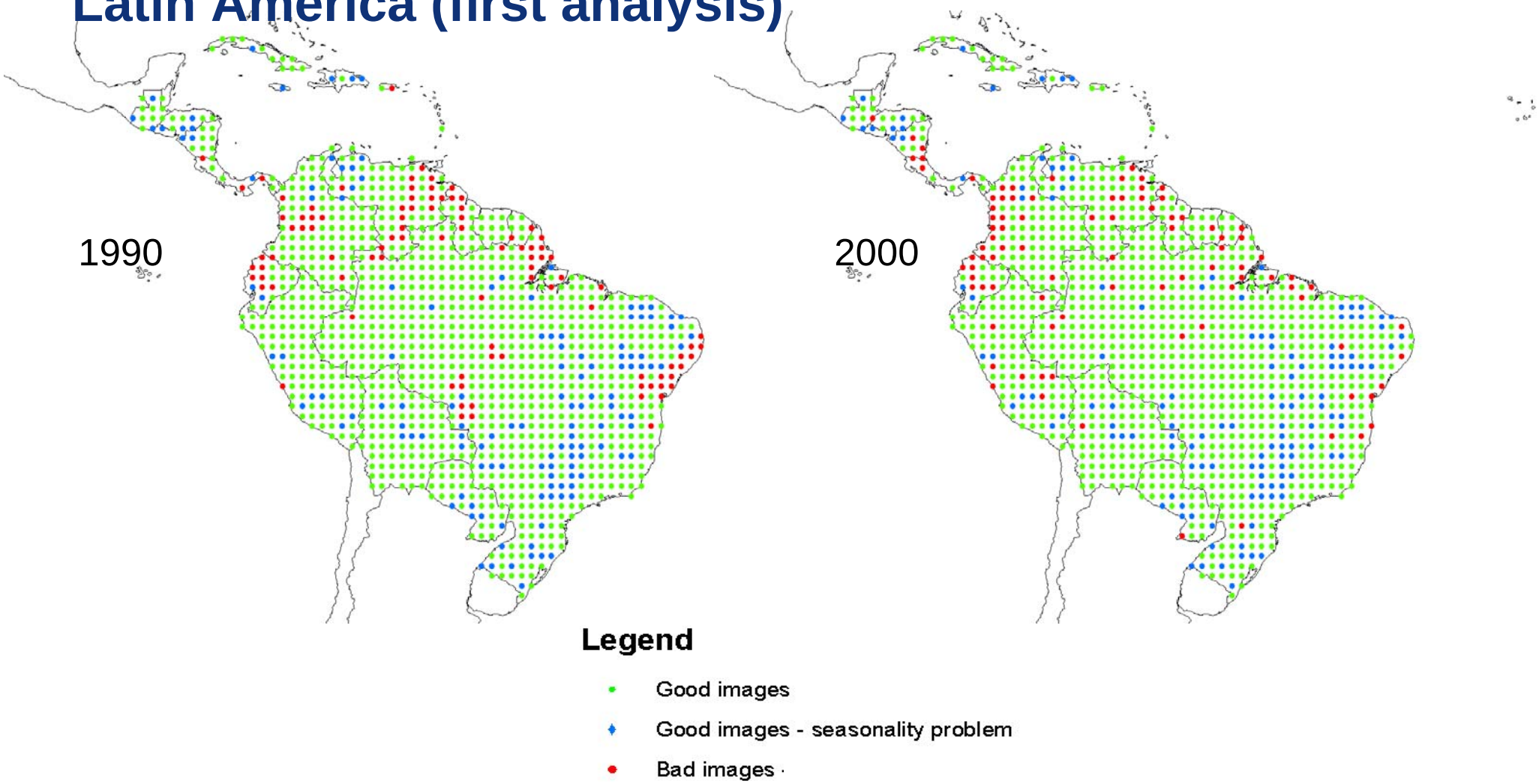
Source; Hugh Eva

1230 sample points; 80% good, 187 replacement scenes identified …

Latin America (first analysis)

1990

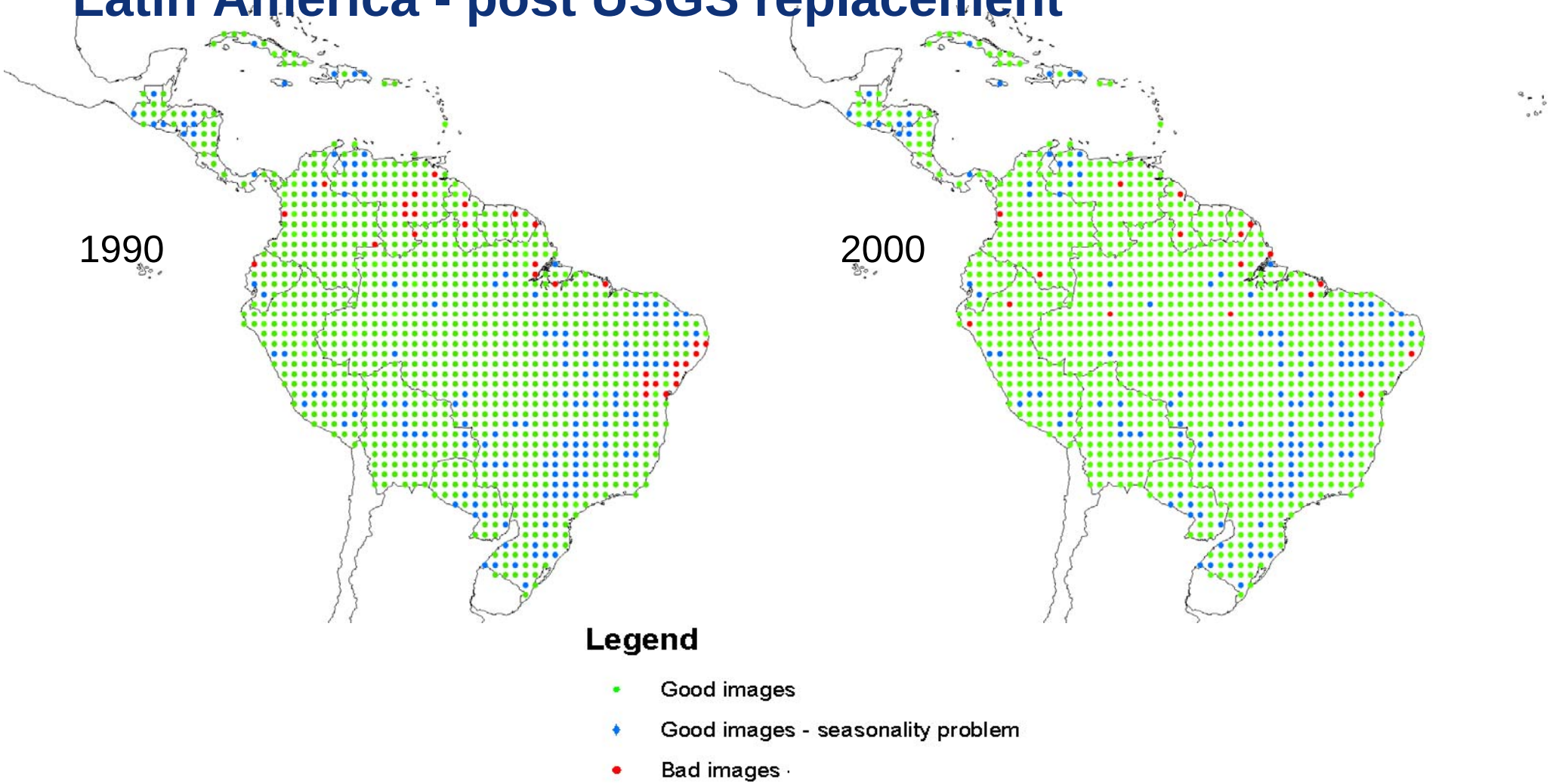
2000



Source; Hugh Eva

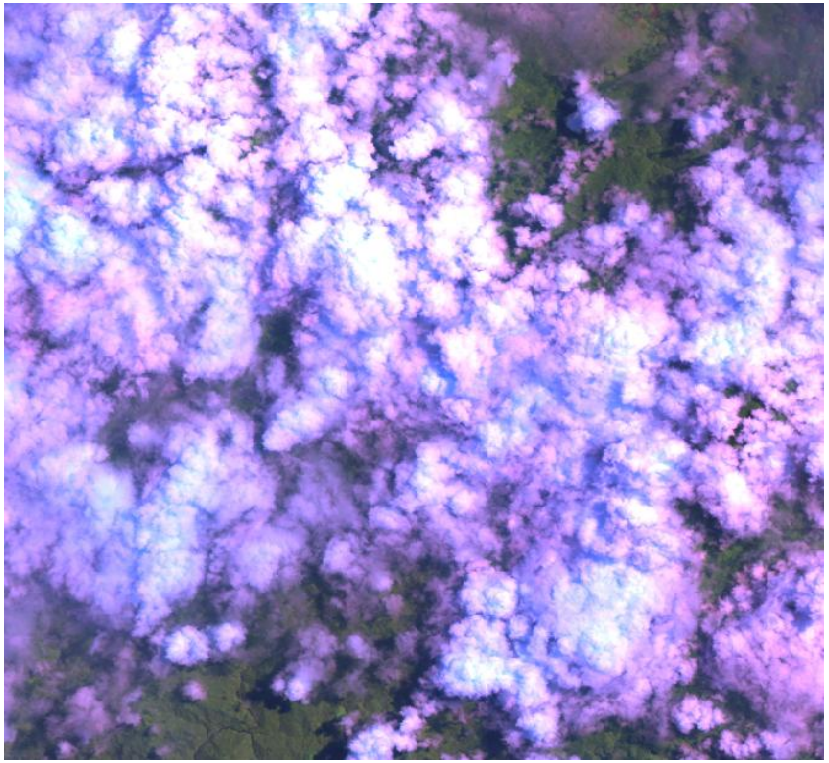
1230 sample points; 80% good, 187 replacement scenes identified
…146 of these delivered by USGS

Latin America - post USGS replacement

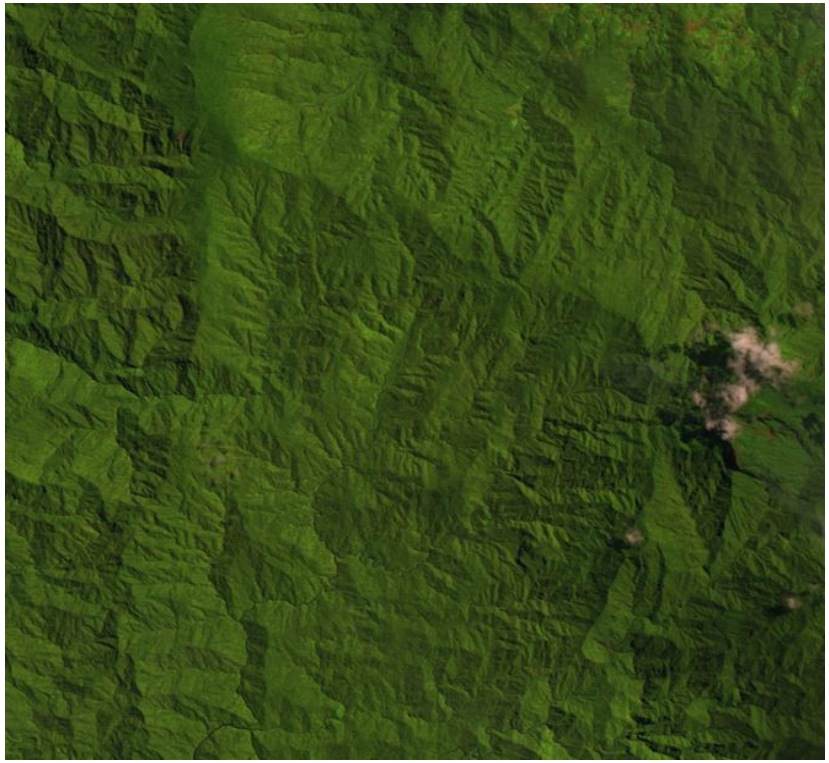


USGS Replacements for TREES-3 and FRA 2010

1. Cloud Cover



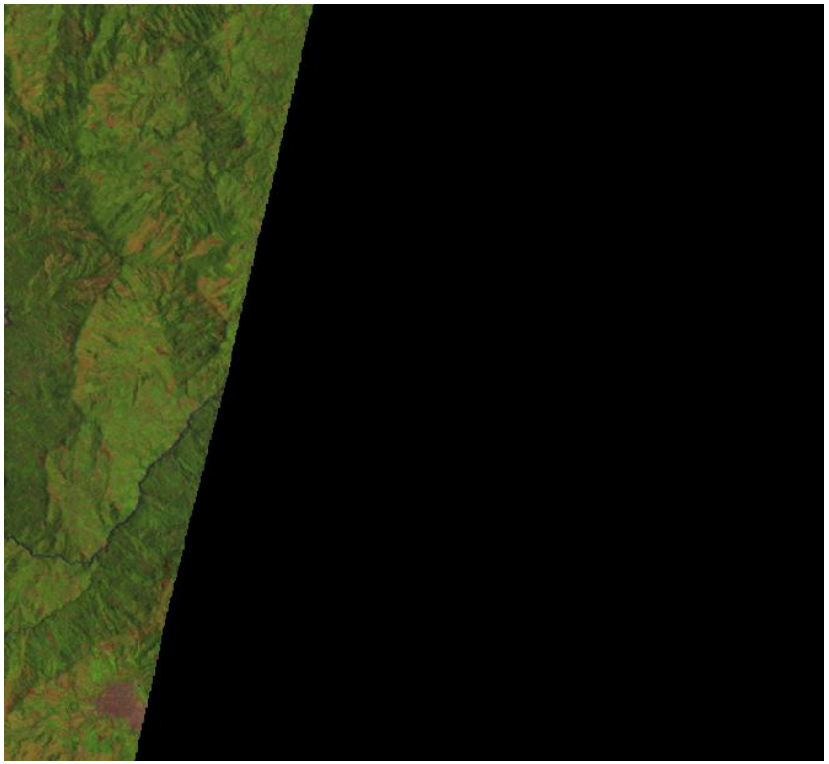
N03_W077_etm_009-058_24082001



***USGS* Replacement**
N03_W077_tm_009-58_07051999

USGS Replacements for TREES-3 and FRA 2010

2. Missing Data

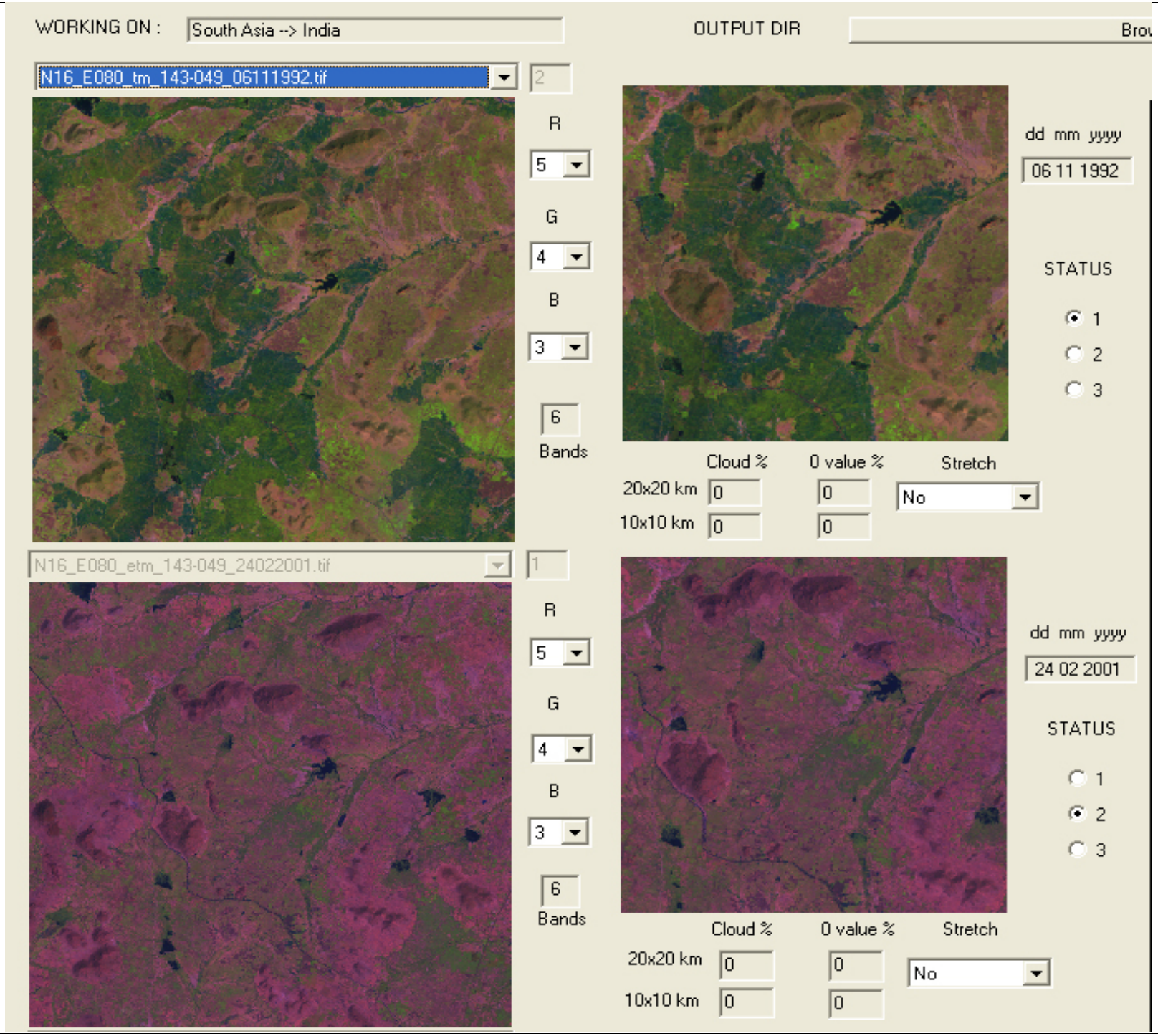


N05_W075_tm_009-056_08091986

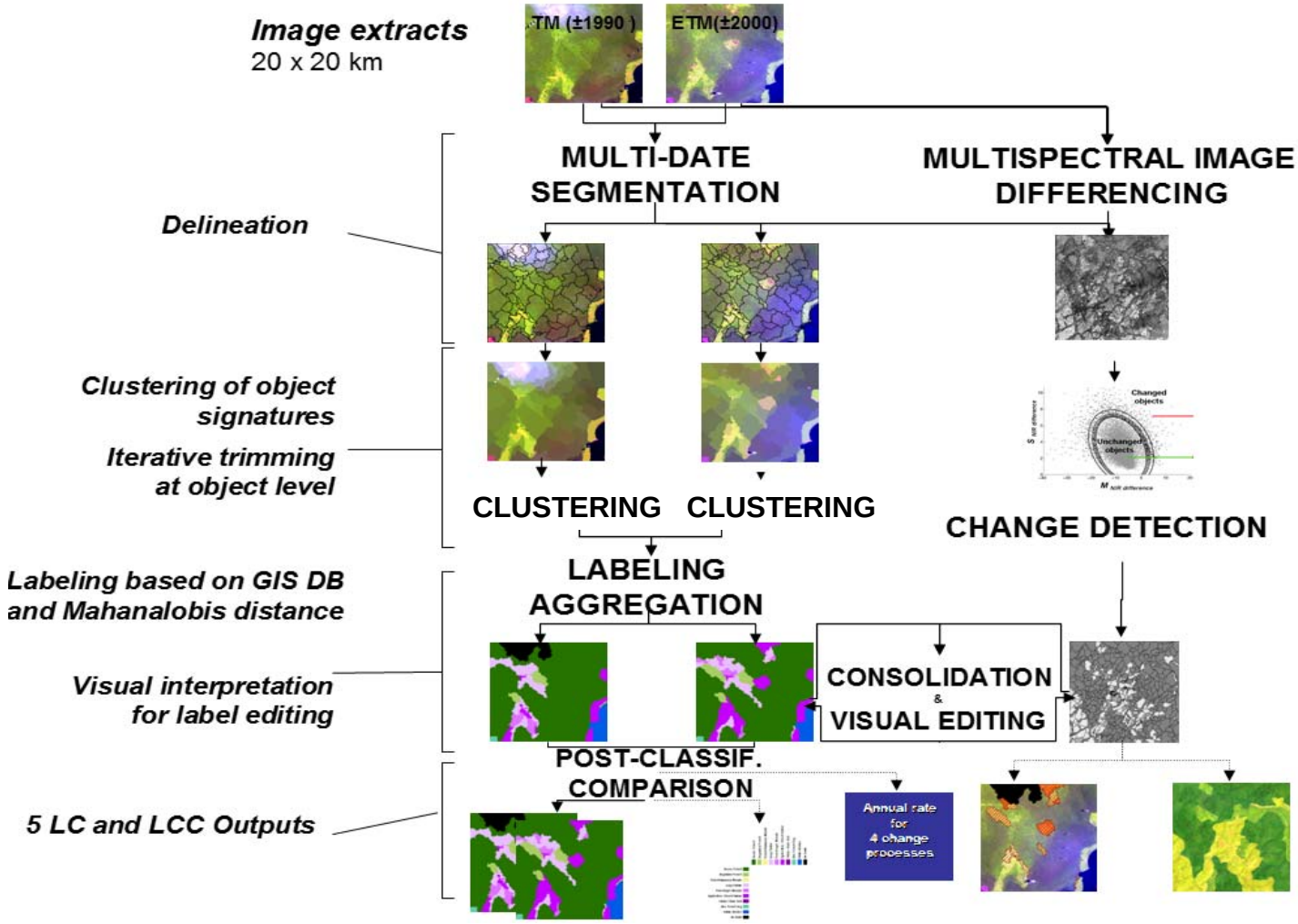
***USGS* Replacement**

New: N05_W075_tm_008-057_31071986

Improving Seasonal Match



Development of a semi-automated labeling procedure
(in co-operation with University Catholique de Louvain-la-Neuve)



Validation of Land Cover semi-automatic interpretations through regional Workshops & partnership FAO

Joint FAO / JRC proposal submitted to the European Commission

Joint JRC / FAO participation to the "EuroGEOSS" proposal submitted to the European Commission

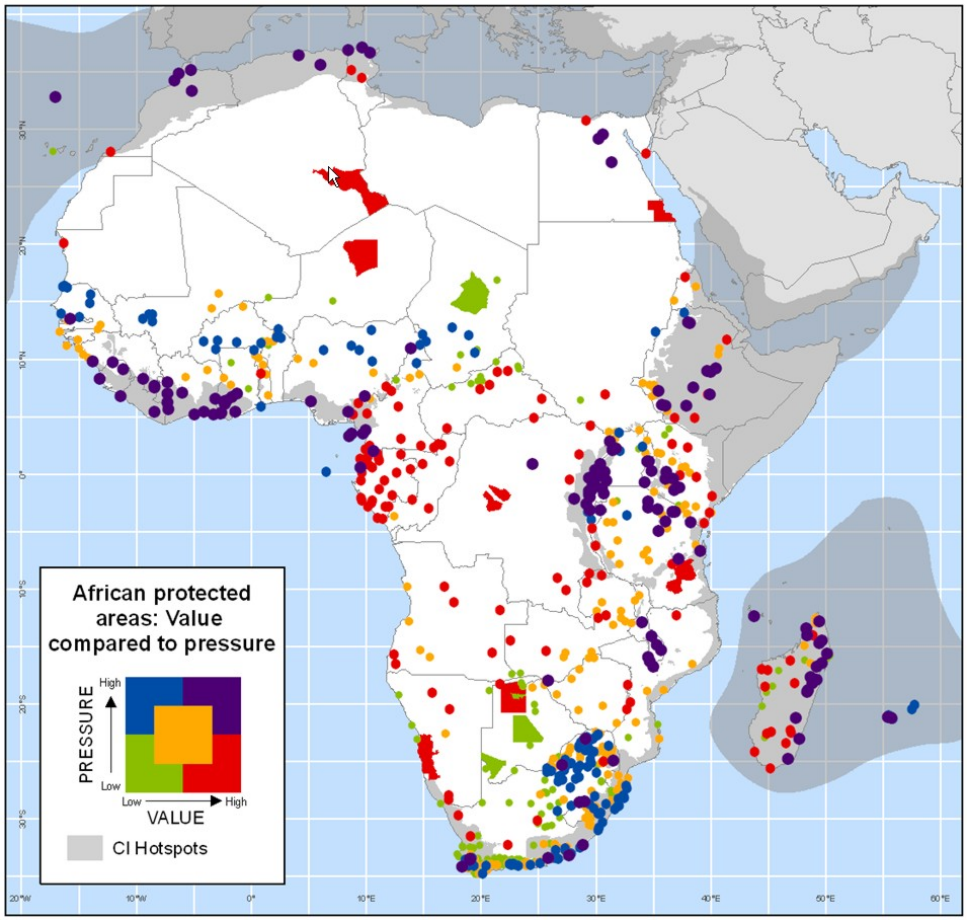
Conclusions

Benchmark for other data providers

Revised data access policy = considerable improvements to the quality of the FRA 2010 RS exercise

REDD is already increasing demand for high-quality forest cover change metrics – historical and contemporary observations

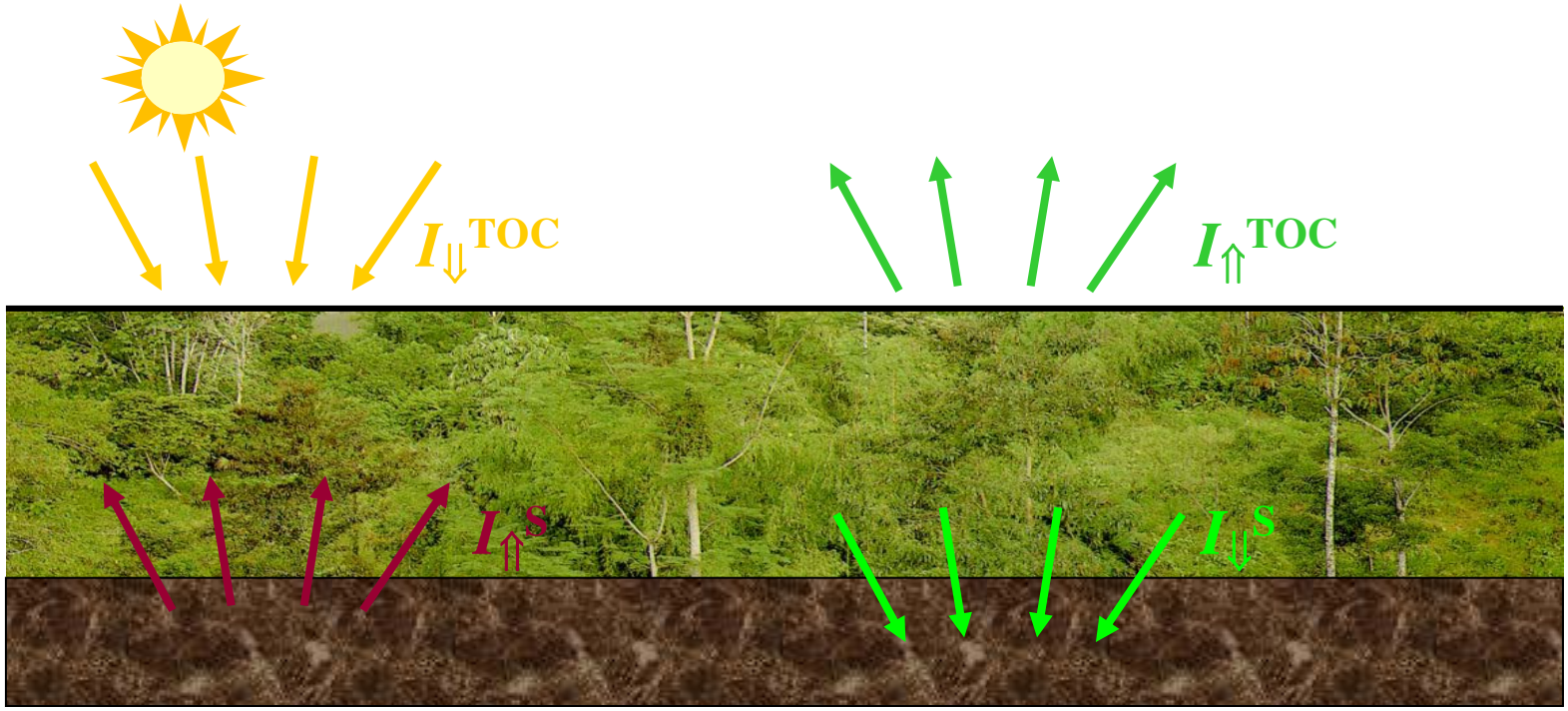
Other drivers – biofuels, land availability, biodiversity, sustainable forest management, international trade agreements – further increase the demand



JRC – FAPAR with Landsat 7 ETM +: Preliminary results

FAPAR Team: N. Gobron, I. Andredakis,
M. Robustelli & M. Taberner

Fraction of Absorbed Photosynthetically Active Radiation (FAPAR)



$$\mathbf{FAPAR} = [(I_{\Downarrow}^{TOC}+I_{\Uparrow}^{S})-(I_{\Uparrow}^{TOC}+I_{\Downarrow}^{S})] / I_{\Downarrow}^{TOC}$$

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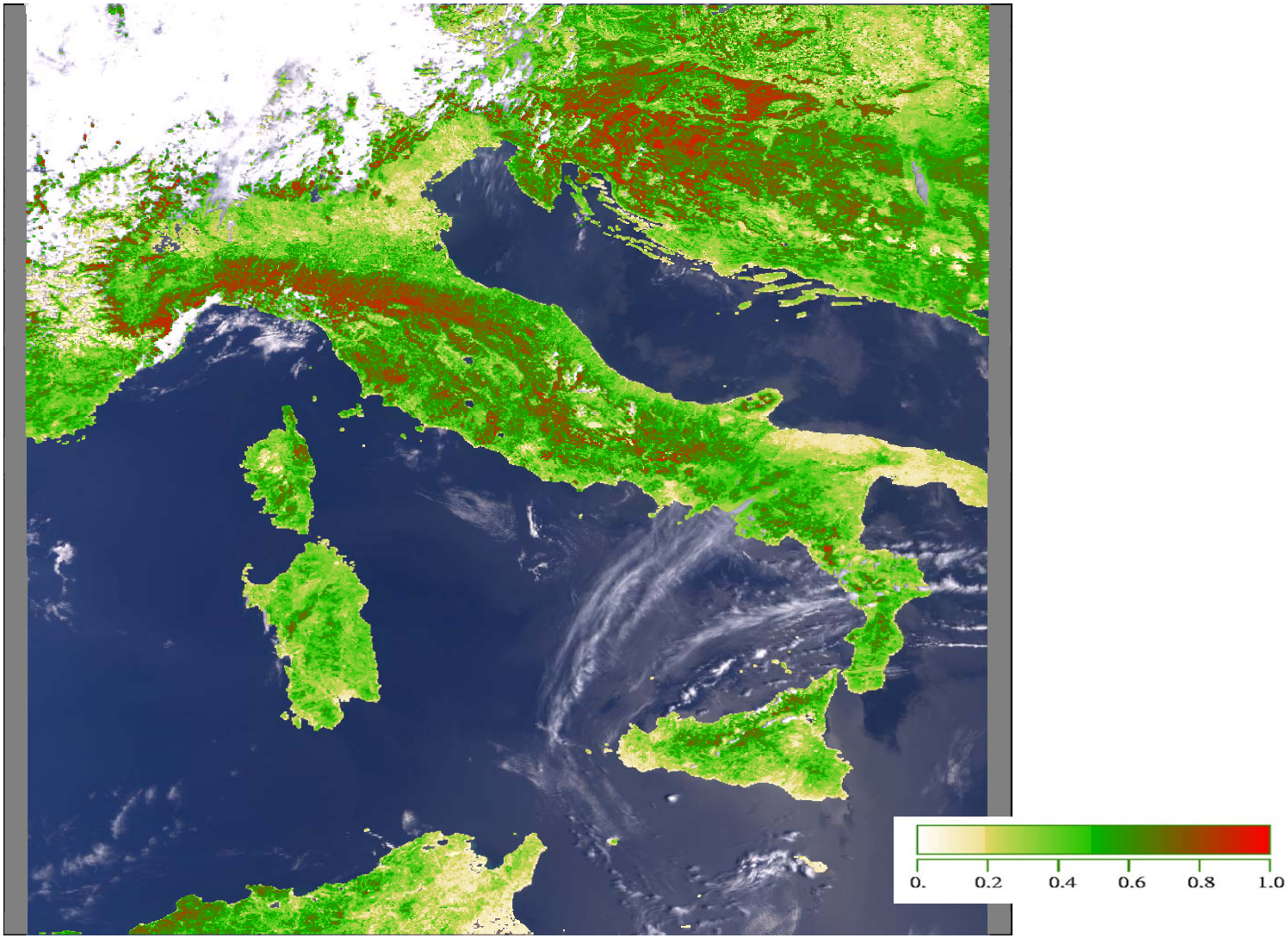
Source: Gobron, N., B. Pinty, M. M. Verstraete and J.-L. Widlowski (2000) ' Advanced Vegetation Indices Optimized for Up-Coming Sensors: Design, Performance and Applications ', IEEE Transactions on Geoscience and Remote Sensing, 38, 2489-2505.

Routinely generated from daily MERIS data

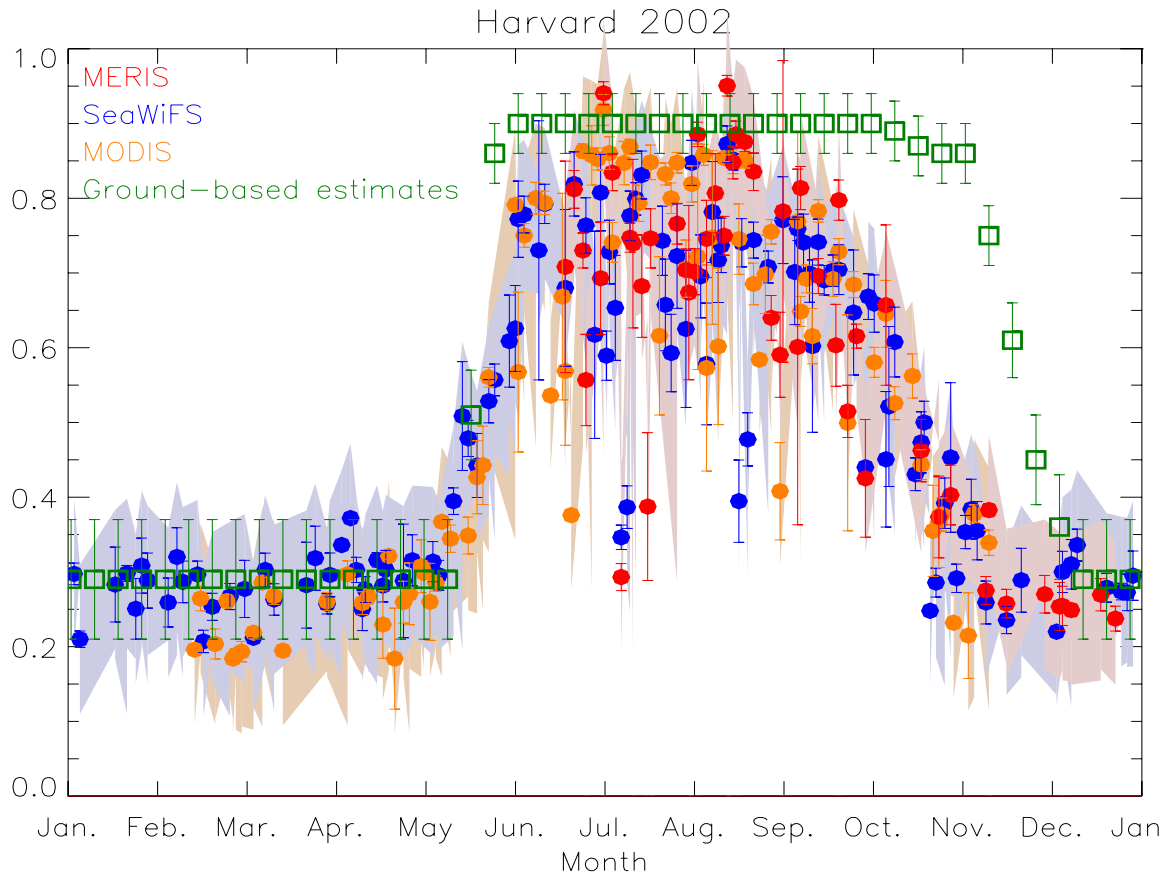


Source; Nadine Gobron with BIGFOOT team

Gobron N. et. al. (2008) 'Uncertainty estimates for the FAPAR operational products derived from MERIS – Impact of TOA radiance uncertainties and validation with field data', RSE, *submitted*

A Landsat ETM FAPAR product

- Validation of FAPAR products from low resolution sensors
- Training for Sentinel-2 and Sentinel-3 land products
- Upscaling carbon fluxes from tower measurements



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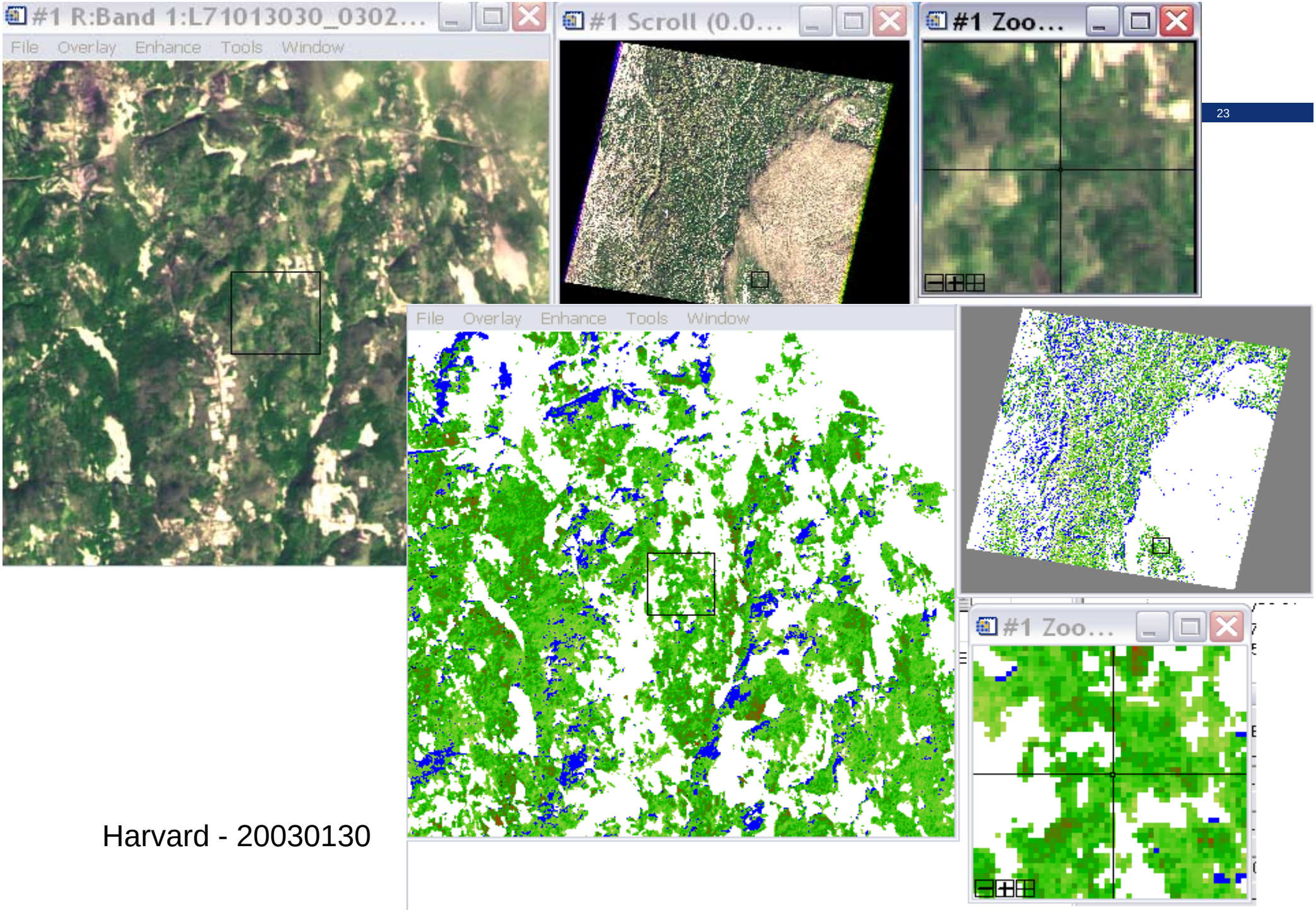
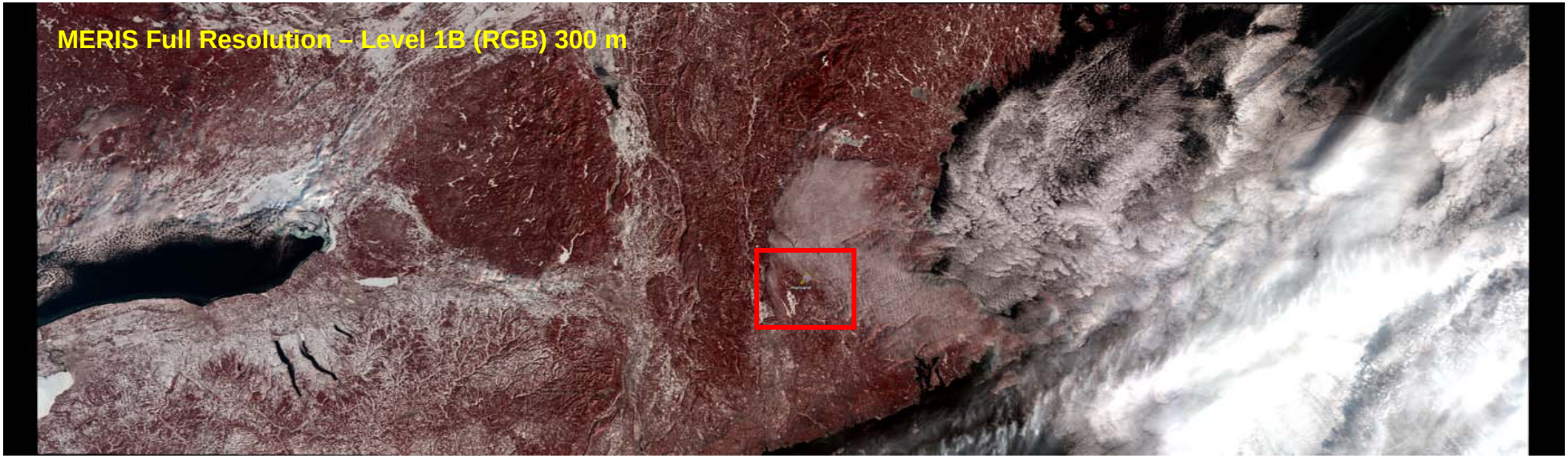
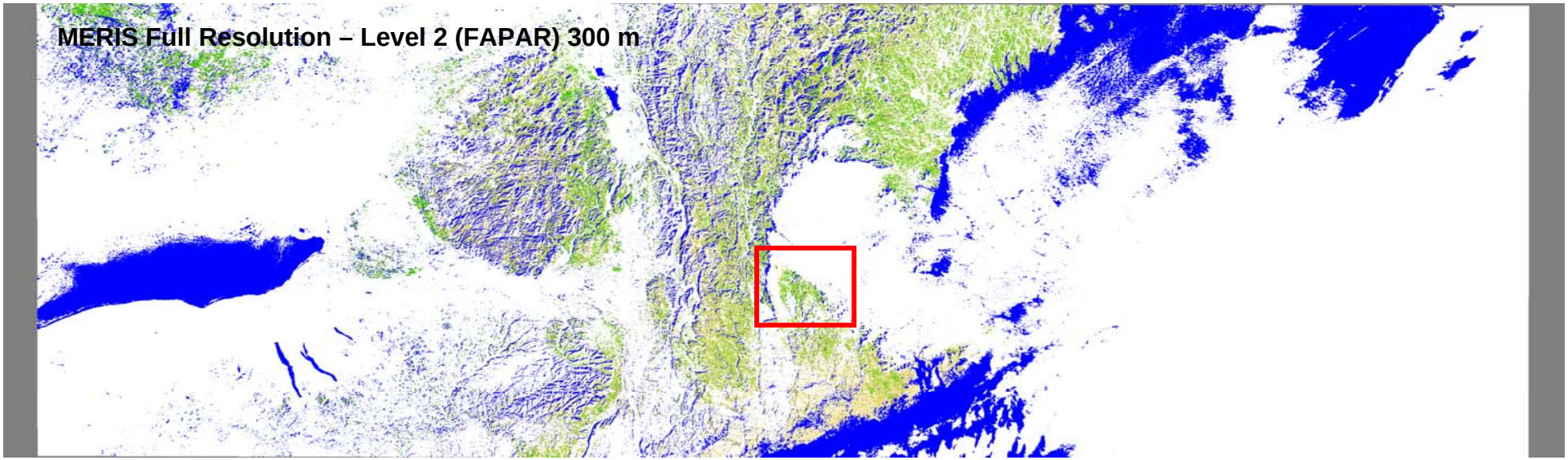
Source; Nadine Gobron

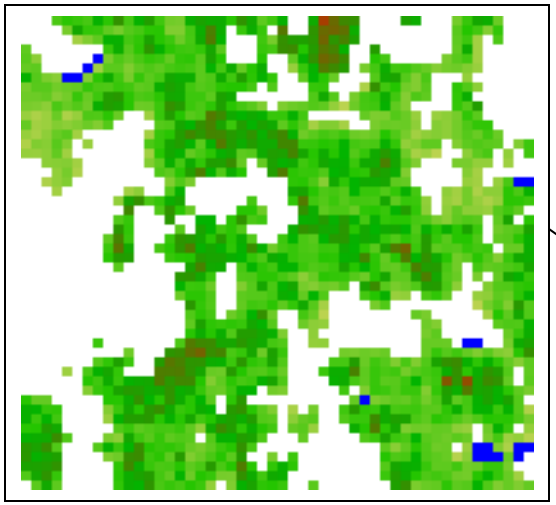
RGB Image = Bands 3 4 1

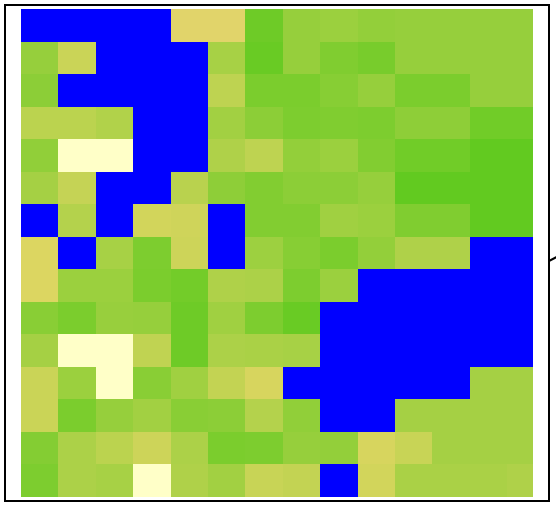


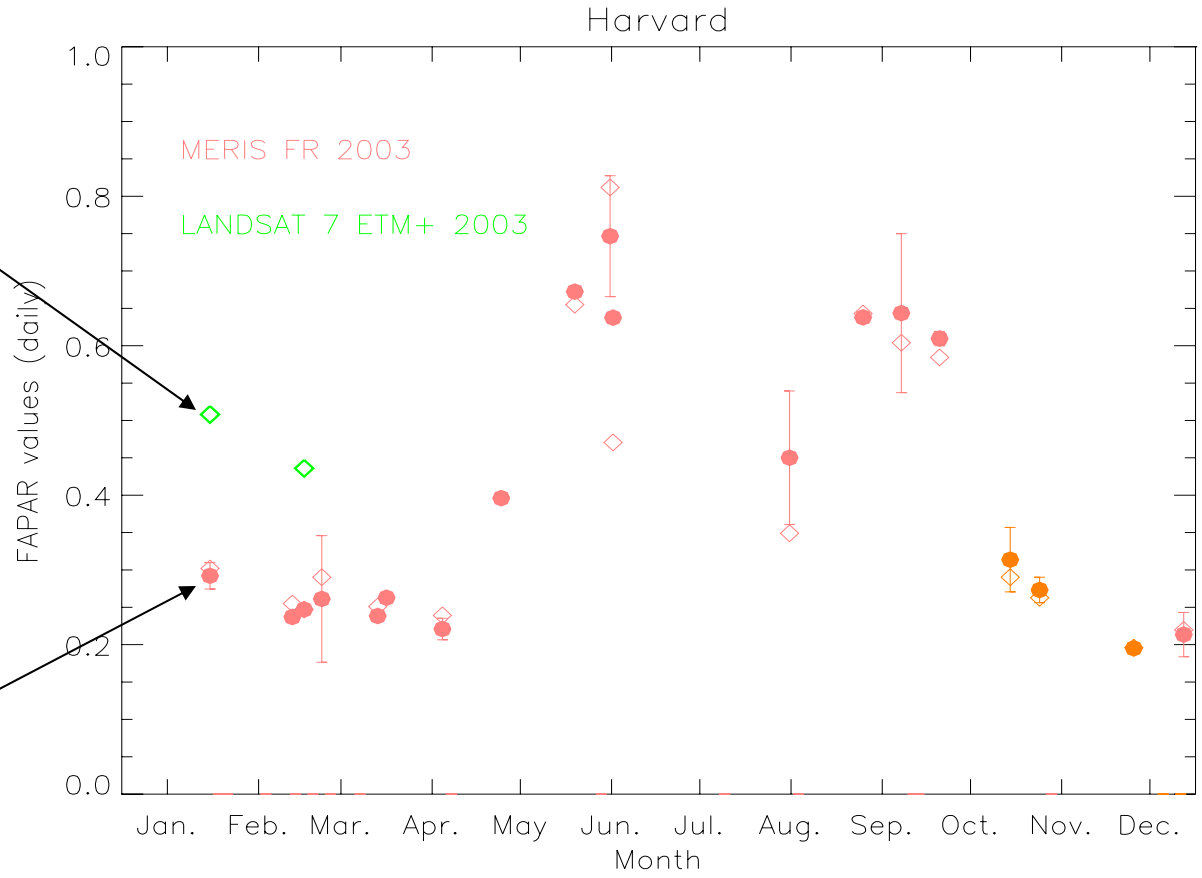
Harvard - 20030130


MERIS Full Resolution – Level 1B (RGB) 300 m


MERIS Full Resolution – Level 2 (FAPAR) 300 m






Harvard
MERIS FR 2003
LANDSAT 7 ETM+ 2003
FAPAR values (daily)
1.0
0.8
0.6
0.4
0.2
0.0
Jan.
Feb.
Mar.
Apr.
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Month