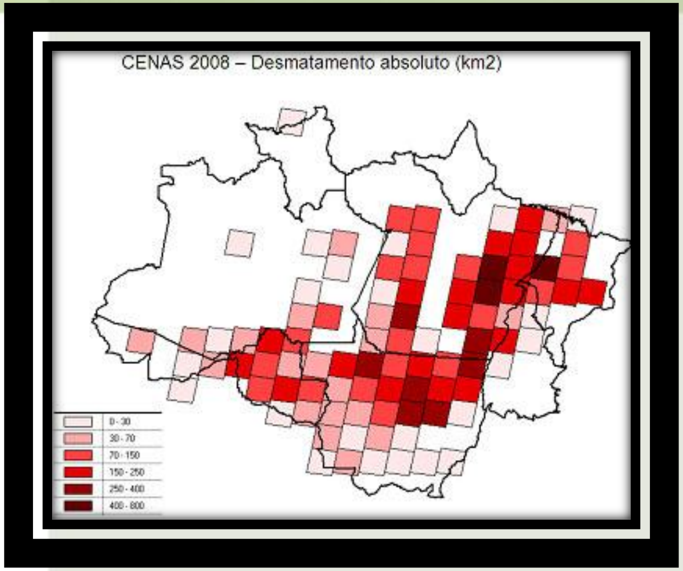
Use of ALOS images to support the protection of the Brazilian Amazon forest


CENAS 2008 – Desmatamento absoluto (km2)
0 - 30
30 - 70
70 - 150
150 - 250
250 - 400
400 - 800

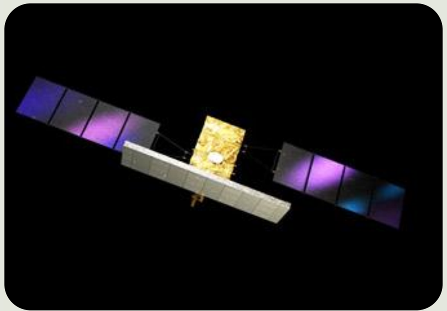
Landsat-based
Annual rates of deforestation
6.25 ha
Statistics

sistema
DETER
detecção de desmatamento
em tempo real

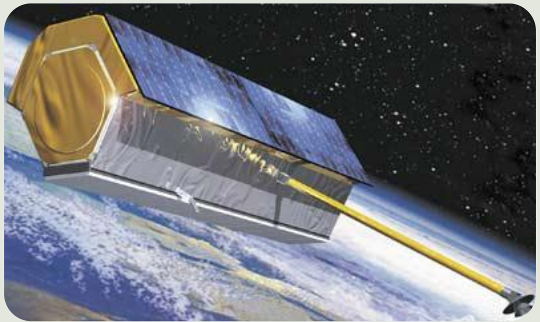
MODIS-based
Bimontly new fronts of deforestation
25 ha
Law enforcement

Use of ALOS images to support the protection of the Brazilian Amazon forest

Cosmos SkyMed



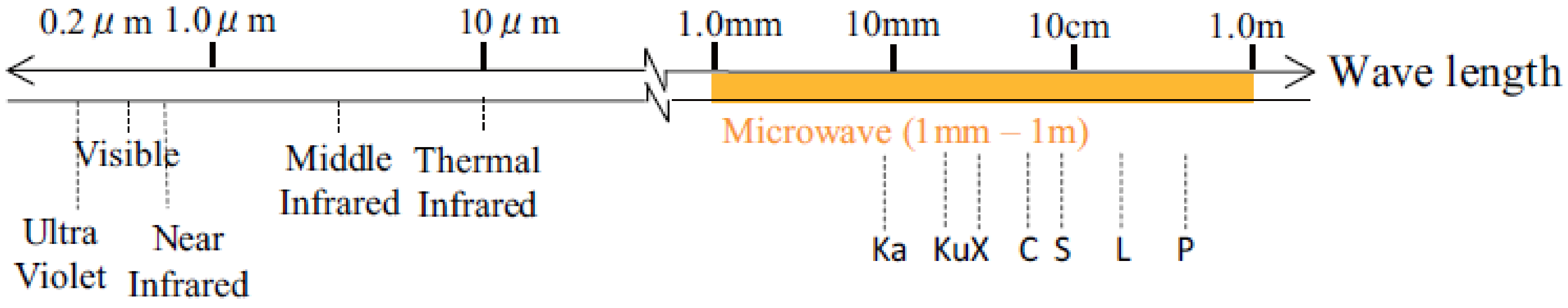
TerraSAR-X

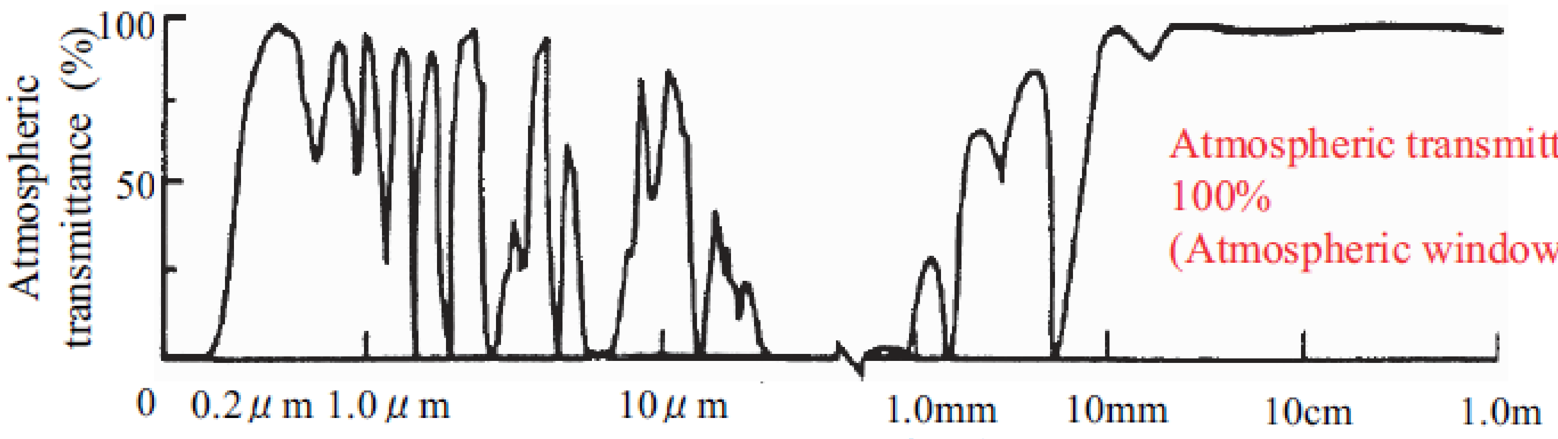


RADARSAT-2

ALOS PALSAR

Use of ALOS images to support the protection of the Brazilian Amazon forest


0.2 μ m
1.0 μ m
10 μ m
1.0mm
10mm
10cm
1.0m
Wave length
Visible
Ultra Violet
Near Infrared
Middle Infrared
Thermal Infrared
Microwave (1mm – 1m)
Ka
KuX
C
S
L
P



Atmospheric transmittance is almost 100%
(Atmospheric window)

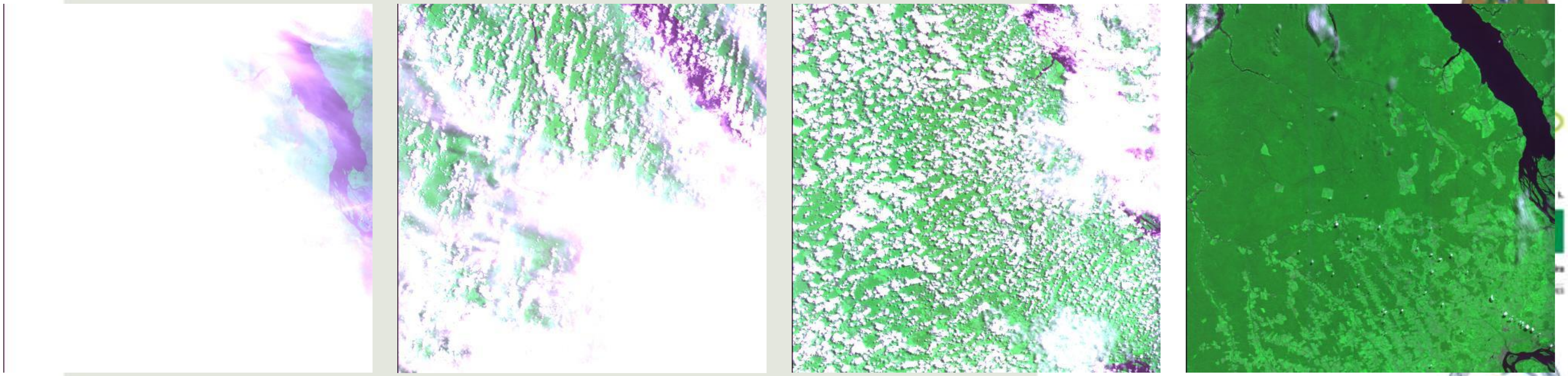
Cloud particle
(Radius -10 μ m)

Rain drop
(Radius -1.0mm)

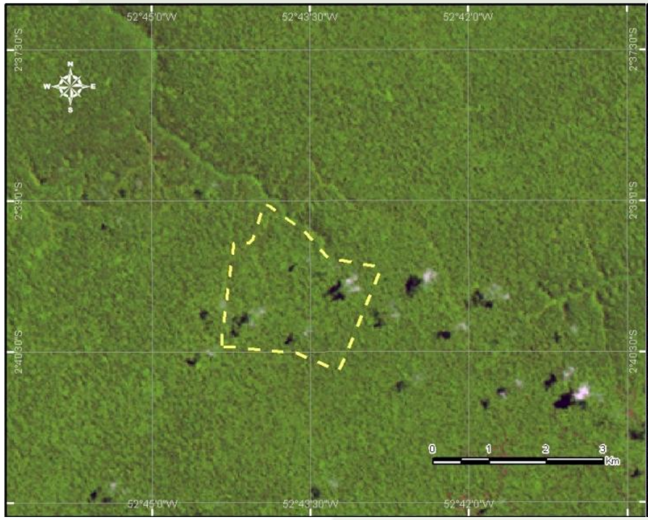
Little disturbed by rain drops and clouds

Use of ALOS images to support the protection of the Brazilian Amazon forest

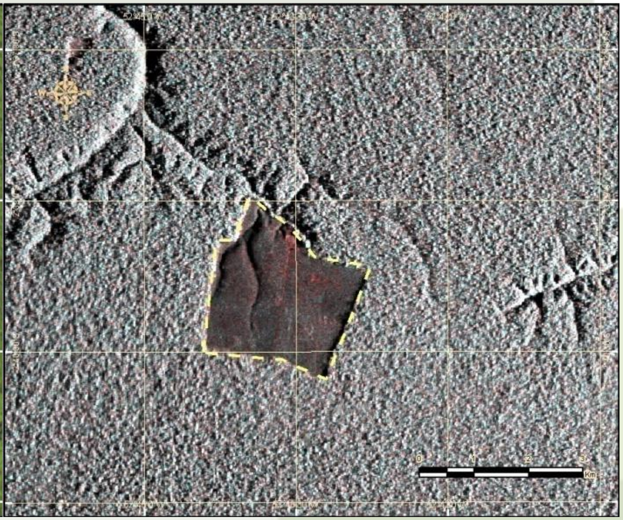
CBERS 2



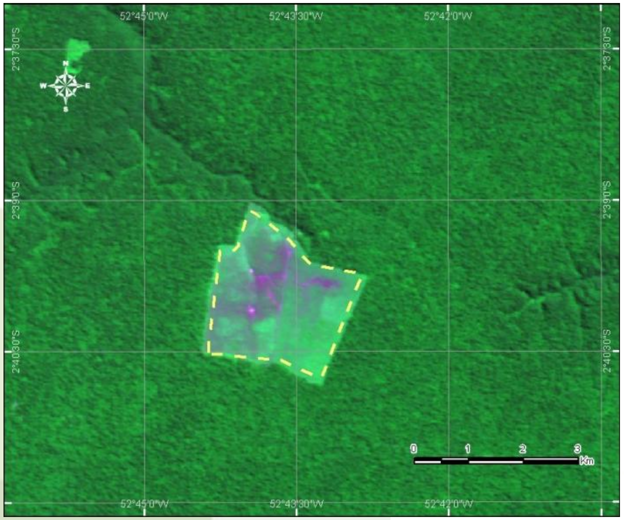
17/01/2006 10/03/2006 05/04/2006 22/06/2006


52°45'0"W
52°43'30"W
52°42'0"W
2°37'30"S
2°39'0"S
2°40'30"S
0
1
2
3
Km

LANDSAT 19/08/2005



RADAR R99B 07/04/2006


52°45'0"W
52°43'30"W
52°42'0"W
2°37'30"S
2°39'0"S
2°40'30"S
0
1
2
3
Km

CBERS 2 22/06/2006

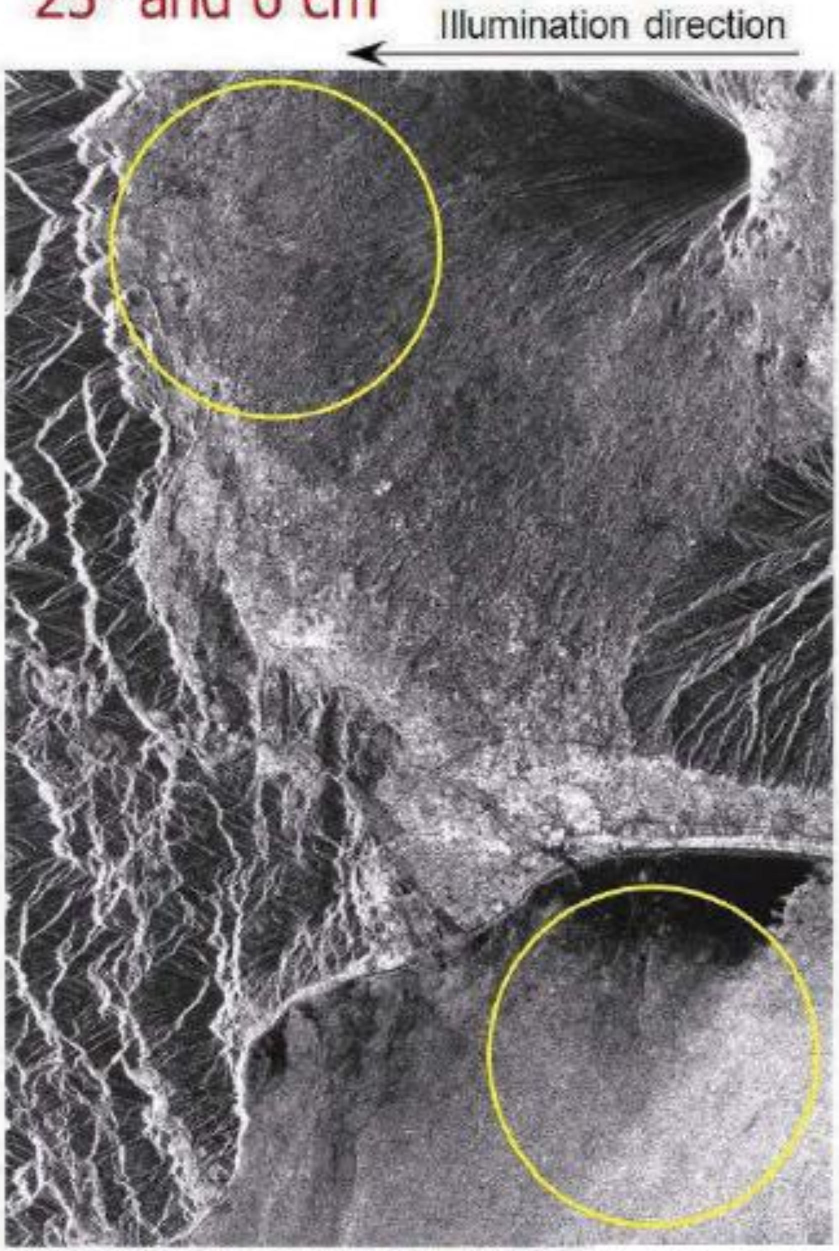
CSR/IBAMA

Detecting New Fronts of Deforestation in Amazonia Using Radar Technology

20 technicians
190.000.000 Brazilians
7.000.000.000 inhabitants

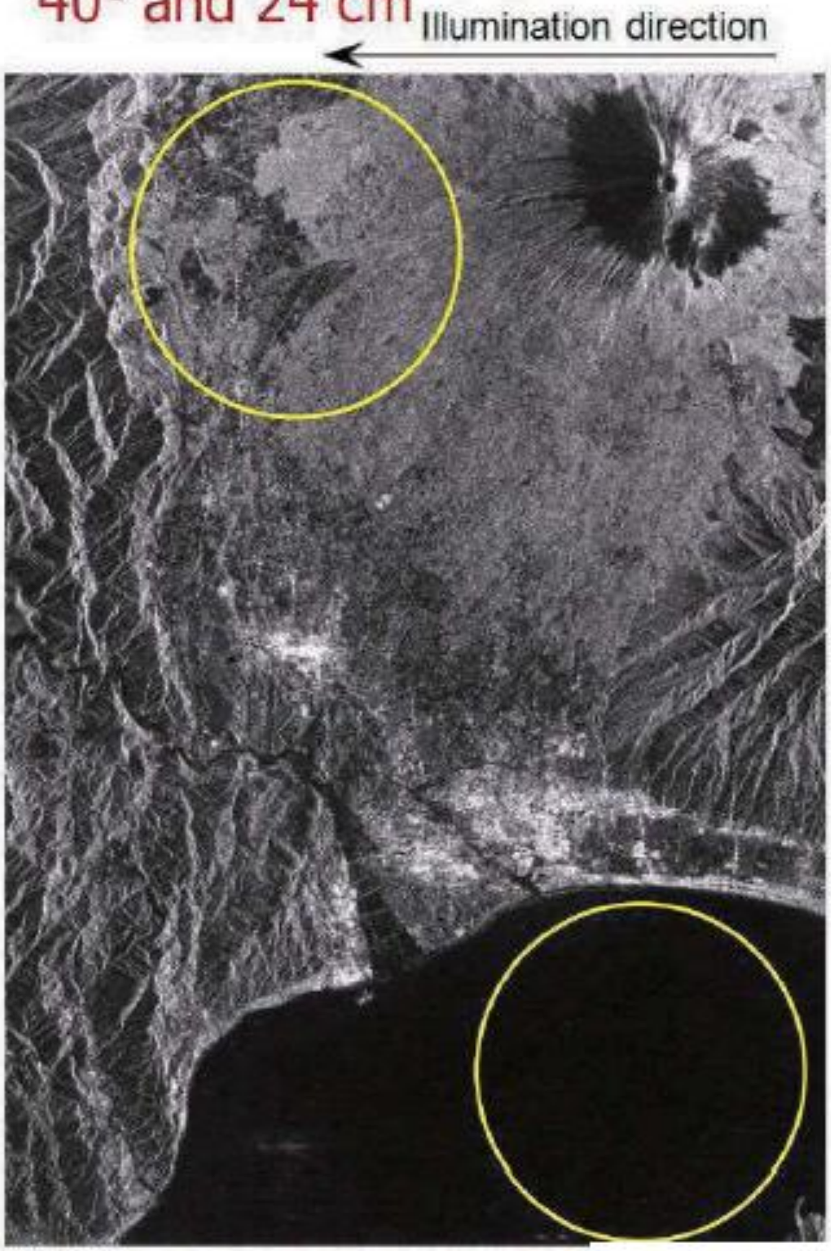
Edson E. Sano
E-mail: edson.sano@ibama.gov.br

23° and 6 cm


Illumination direction

ERS-1 SAR 16-NOV-91 D70-24 ©METI/JAXA

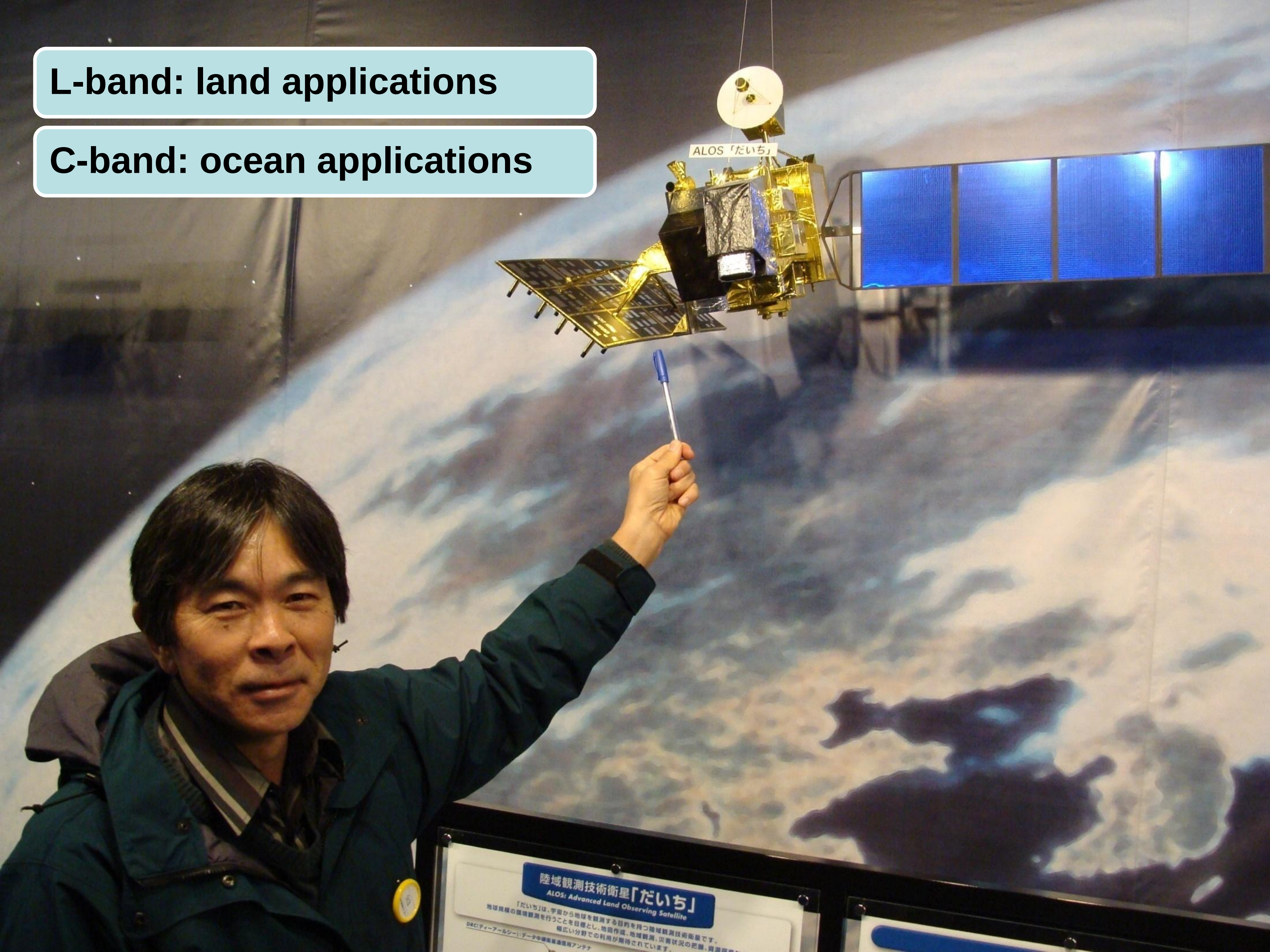
40° and 24 cm


Illumination direction

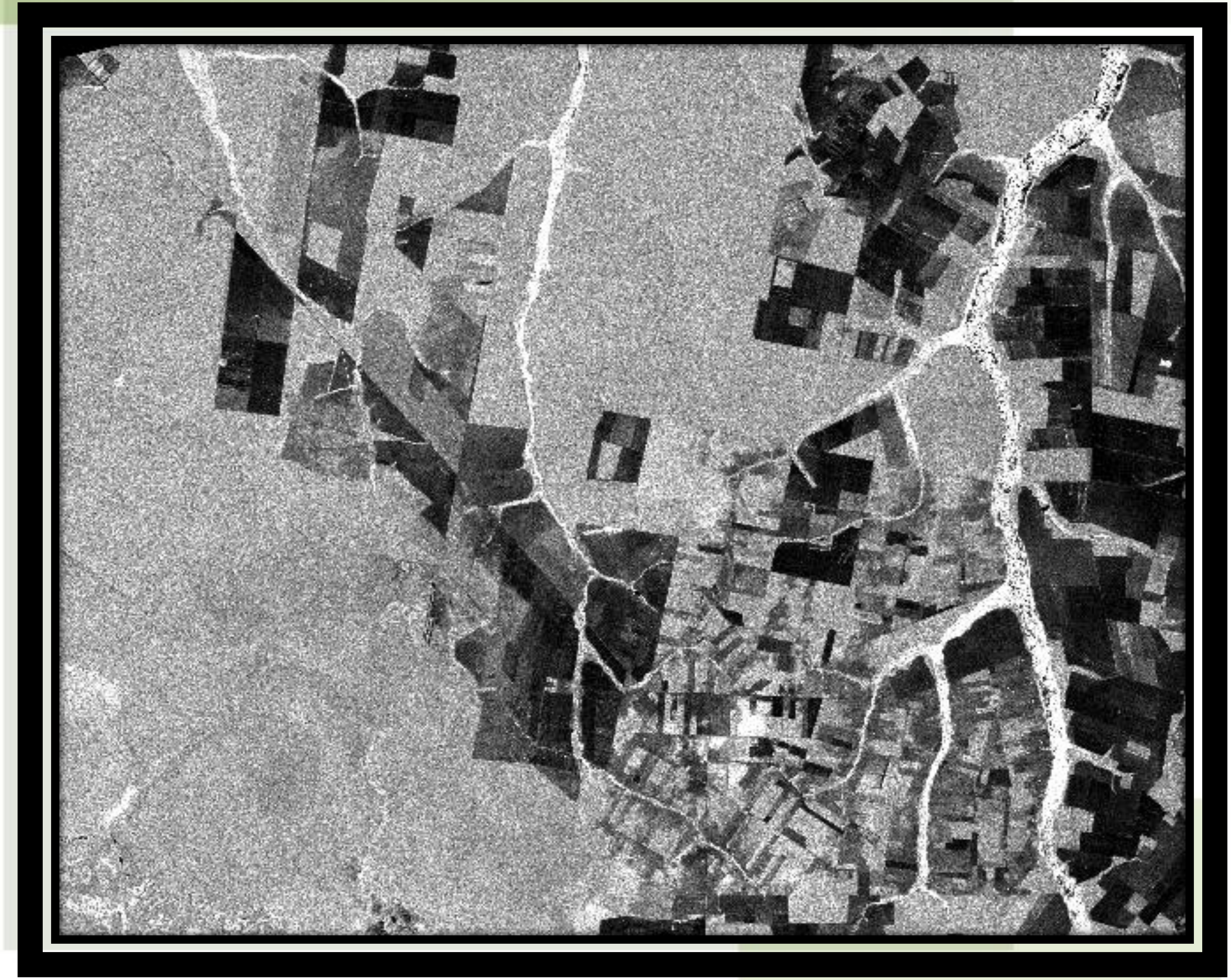
JERS-1 SAR 23-APR-92 D065-2 ©METI/JAXA

L-band: land applications

C-band: ocean applications

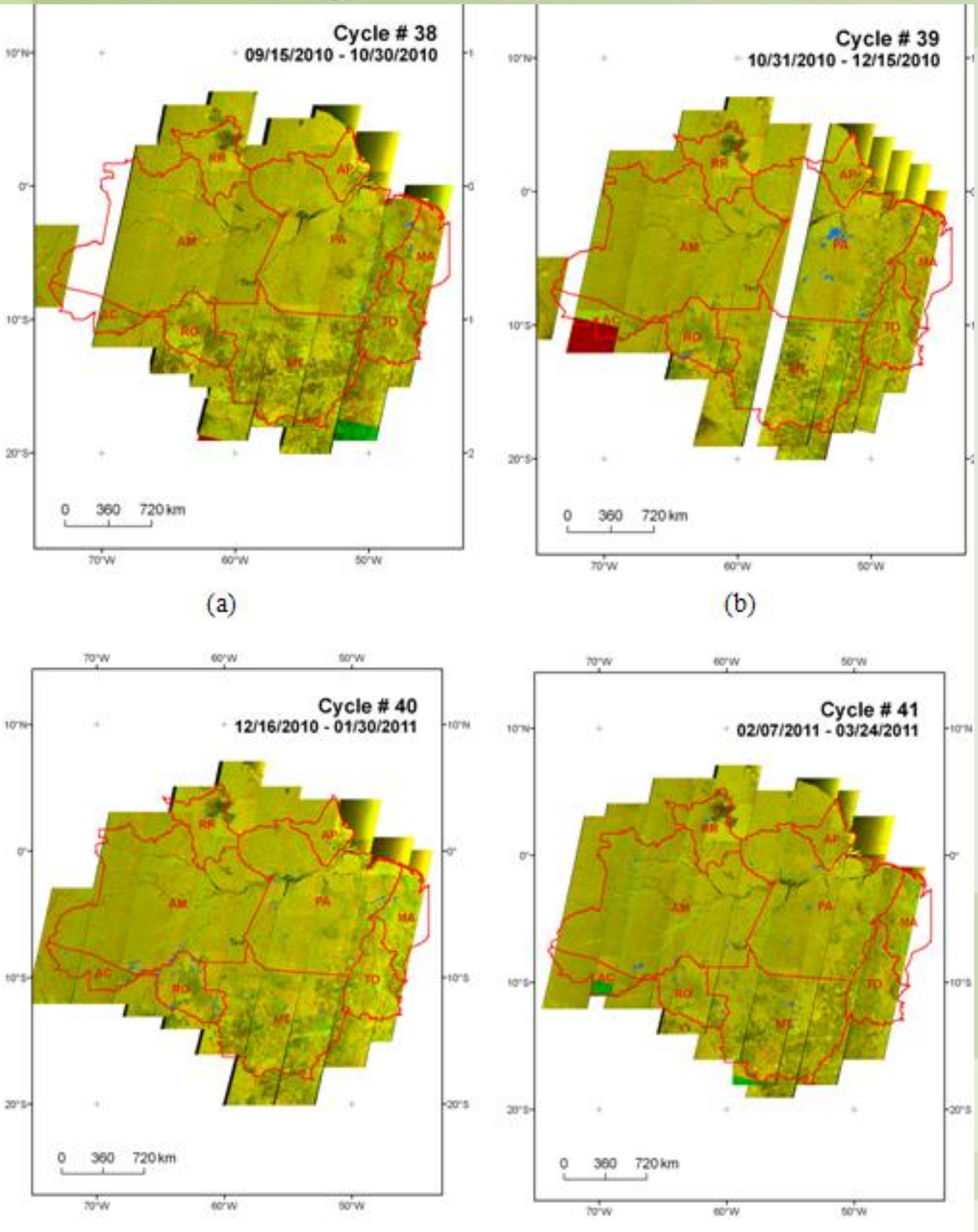

ALOS「だいち」
陸域観測技術衛星「だいち」
ALOS: Advanced Land Observing Satellite

Use of ALOS images to support the protection of the Brazilian Amazon forest



ALOS PALSAR Fine Mode Pol_HH

Use of ALOS images to support the protection of the Brazilian Amazon forest


Cycle # 38
09/15/2010 - 10/30/2010
Cycle # 39
10/31/2010 - 12/15/2010
Cycle # 40
12/16/2010 - 01/30/2011
Cycle # 41
02/07/2011 - 03/24/2011
RR
AP
AM
PA
MA
AC
RO
MT
TO
10°N
0°
10°S
20°S
70°W
60°W
50°W
0 360 720 km

(a) (b)

ALOS PALSAR
(ScanSAR mode)
COVERS AMAZÔNIA
EVERY 45 DAYS

Use of ALOS images to support the protection of the Brazilian Amazon forest

IBAMA
MMA

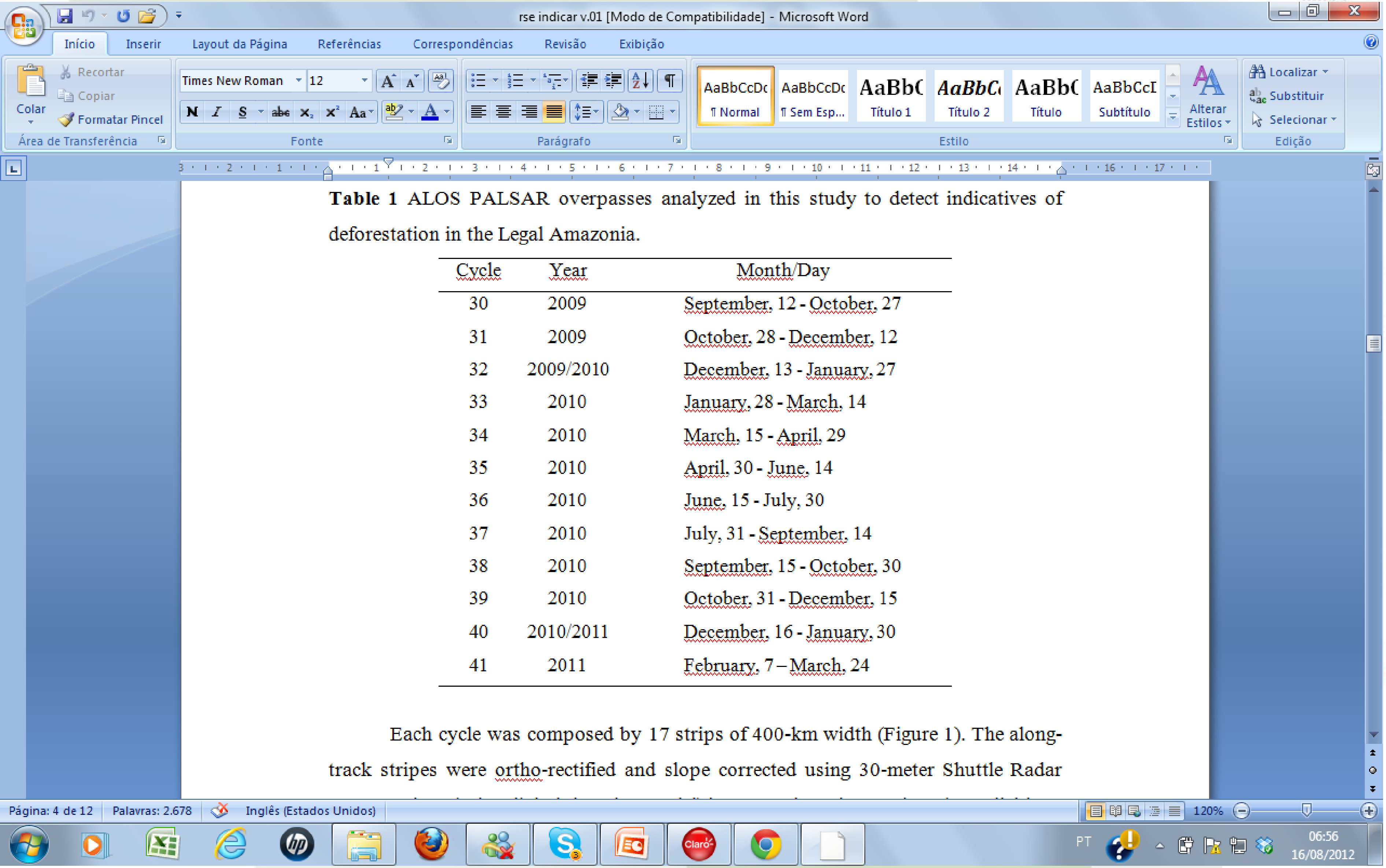

rse indicar v.01 [Modo de Compatibilidade] - Microsoft Word
Início
Inserir
Layout da Página
Referências
Correspondências
Revisão
Exibição
Colar
Recortar
Copiar
Formatar Pincel
Área de Transferência
Times New Roman
12
Fonte
Parágrafo
AaBbCcDc ¶ Normal
AaBbCcDc ¶ Sem Esp...
AaBbC(Título 1
AaBbC(Título 2
AaBbC(Título
AaBbCcI Subtítulo
Alterar Estilos
Estilo
Localizar
Substituir
Selecionar
Edição
Página: 4 de 12
Palavras: 2.678
Inglês (Estados Unidos)
120%
PT
06:56
16/08/2012

Table 1 ALOS PALSAR overpasses analyzed in this study to detect indicatives of deforestation in the Legal Amazonia.

Cycle	Year	Month/Day
30	2009	September, 12 - October, 27
31	2009	October, 28 - December, 12
32	2009/2010	December, 13 - January, 27
33	2010	January, 28 - March, 14
34	2010	March, 15 - April, 29
35	2010	April, 30 - June, 14
36	2010	June, 15 - July, 30
37	2010	July, 31 - September, 14
38	2010	September, 15 - October, 30
39	2010	October, 31 - December, 15
40	2010/2011	December, 16 - January, 30
41	2011	February, 7 – March, 24

Each cycle was composed by 17 strips of 400-km width (Figure 1). The along-track stripes were ortho-rectified and slope corrected using 30-meter Shuttle Radar

Approach

DATA INPUT
ScanSAR images

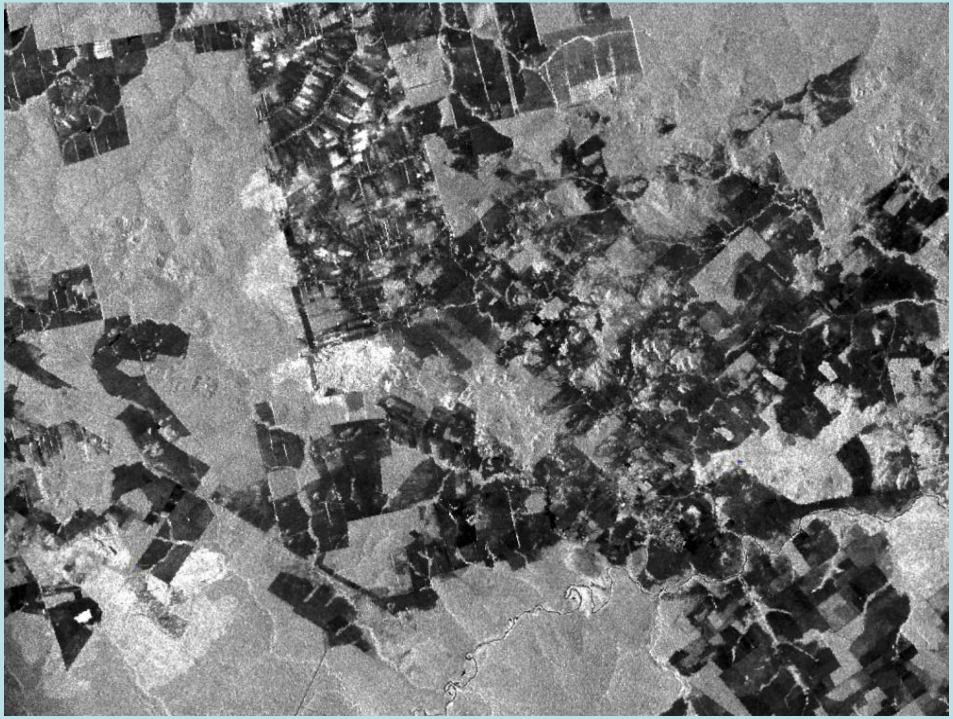
- **Uses ScanSAR images with 100 meter spatial resolution, pre-processed by JAXA**

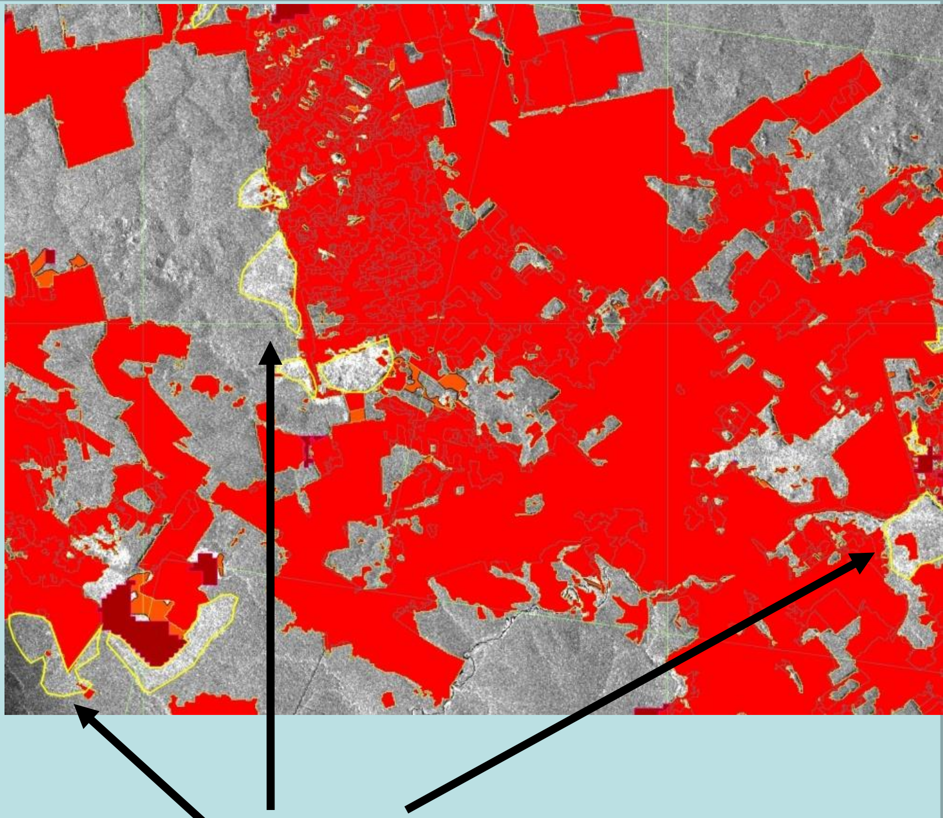
GIS DESKTOP
Visual interpretation (polygon extraction)
SHP, KML

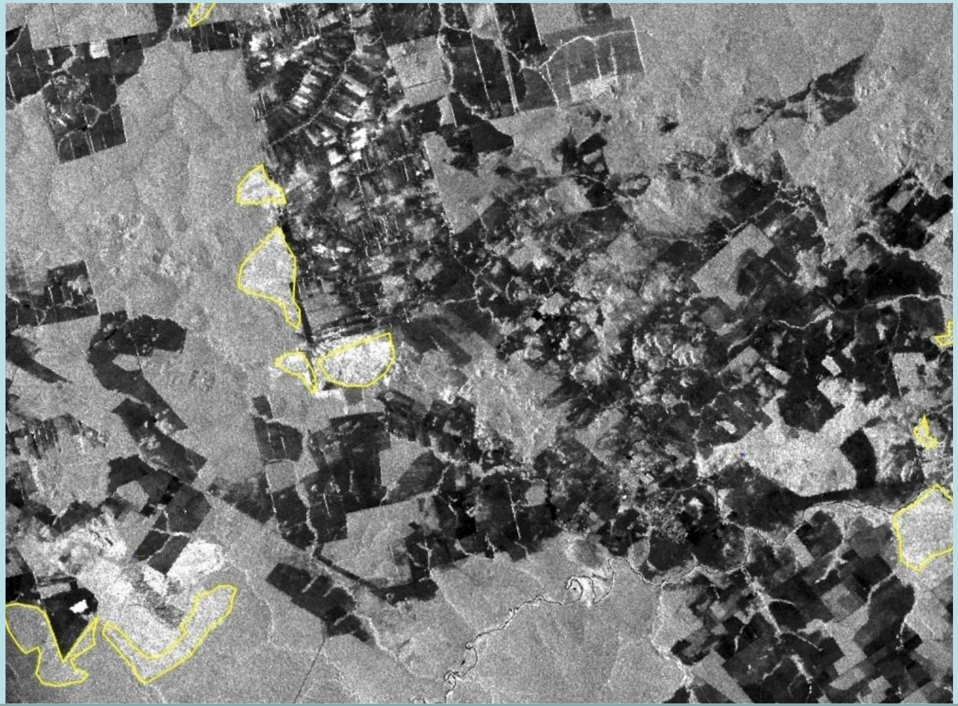
LOCAL OFFICES
Field validation, reports

FINAL PRODUCTS
GPS coordinates
Reports

- **Masks previous PRODES data**
- **Some polygons are verified in the field**







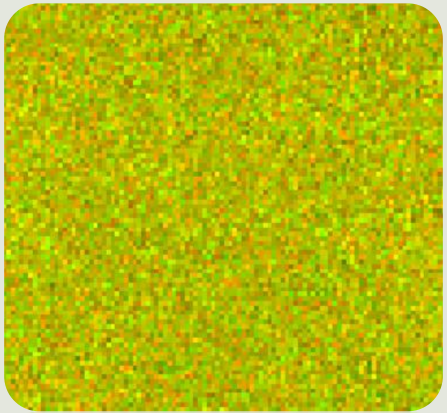
New Detections

Legend

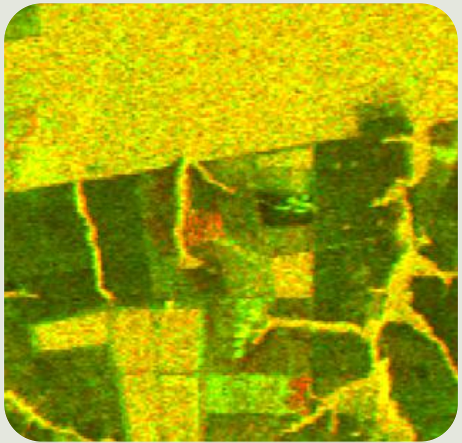
- ☐ ALOS deforestation detection
- 🟥 Deforestation by DETER 2007
- 🟥 Deforestation older than 2006 by PRODES
- ☐ Forest by PRODES

Use of ALOS images to support the protection of the Brazilian Amazon forest

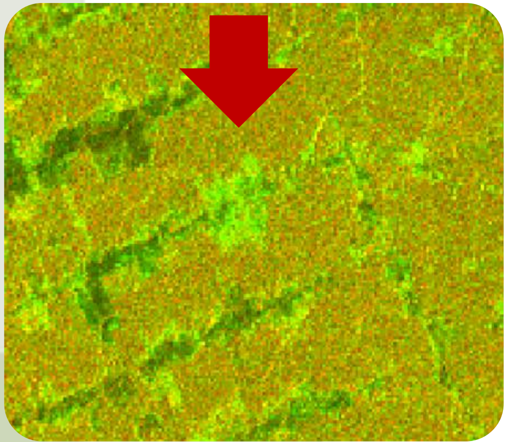
Color Composite RGB: New-Old-Old imageries



Primary forest



Consolidated deforestation

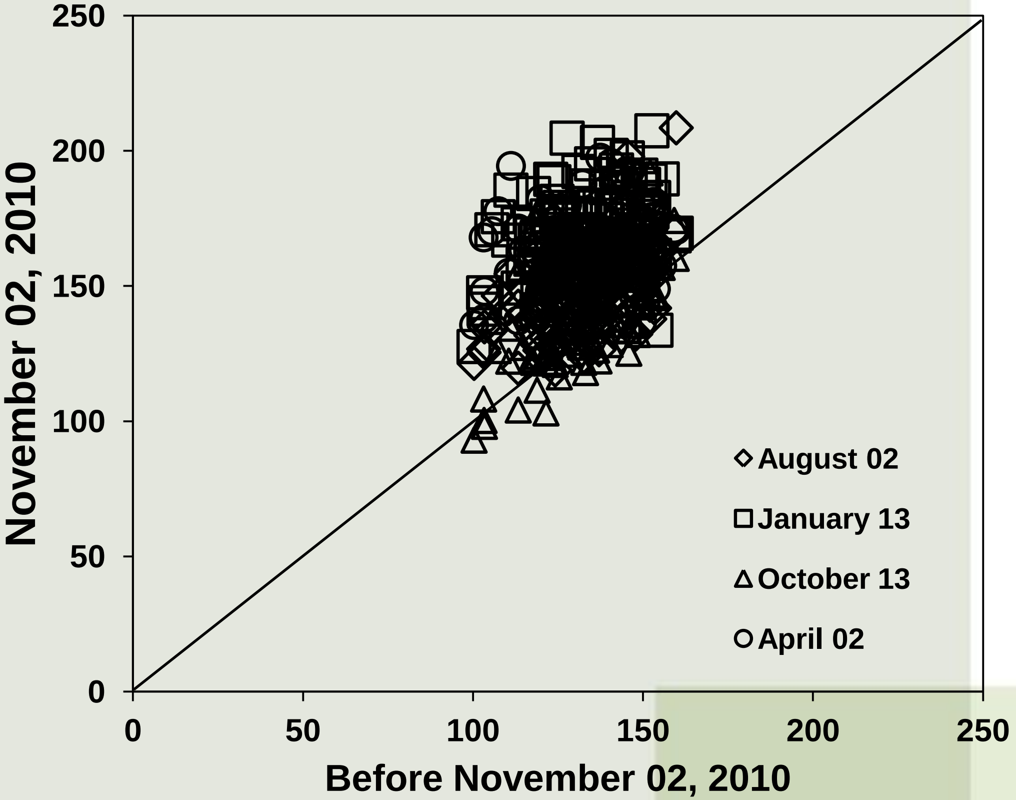


New front of deforestation

Use of ALOS images to support the protection of the Brazilian Amazon forest

IBAMA
MMA

RADAR SIGNALS OF NEW FRONTS OF DEFORESTATION ARE HIGHER THAN OTHER LAND COVER CLASSES



ALOS PALSAR ScanSAR Mode Pol_HH

1,328 Polygons Identified

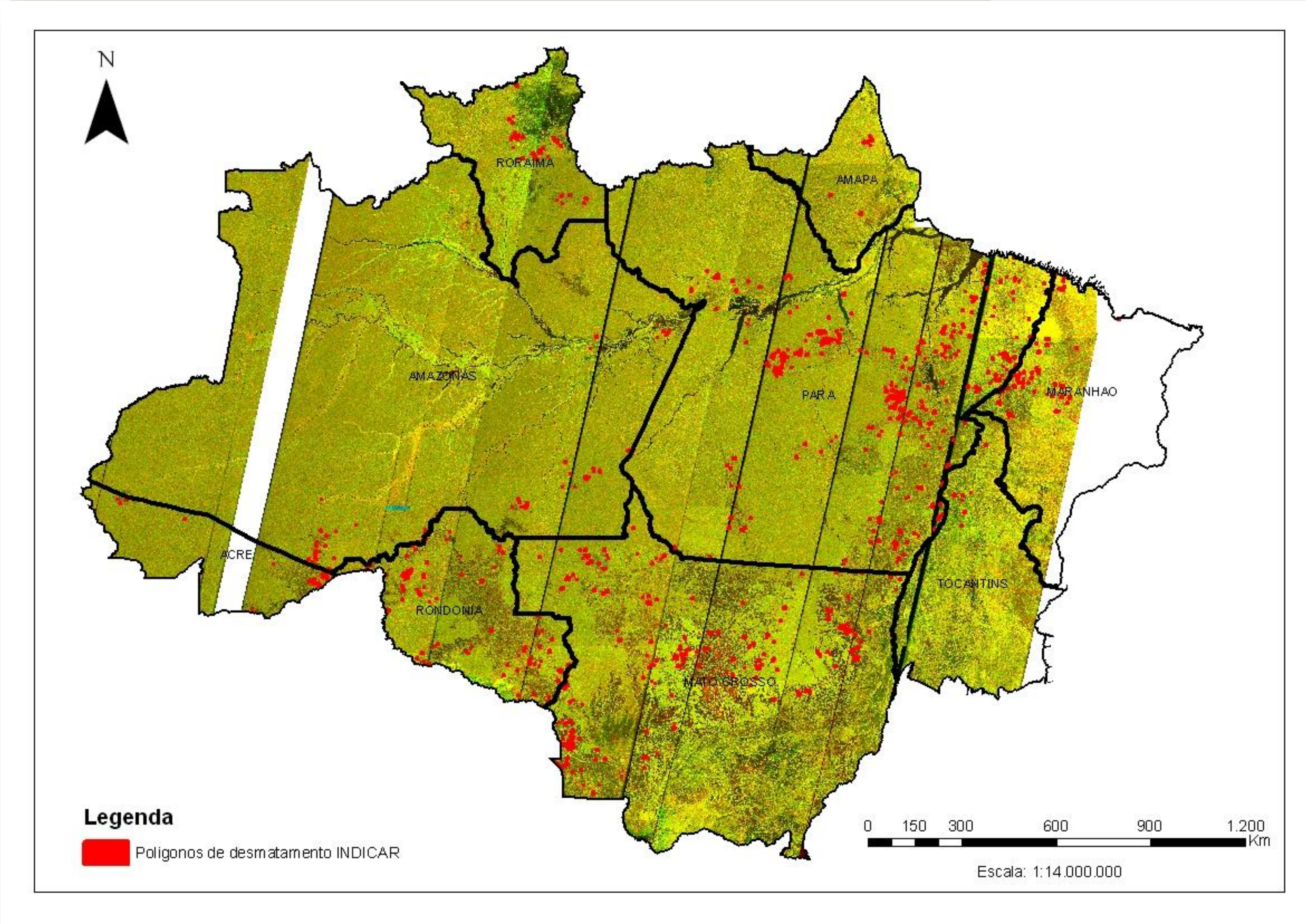
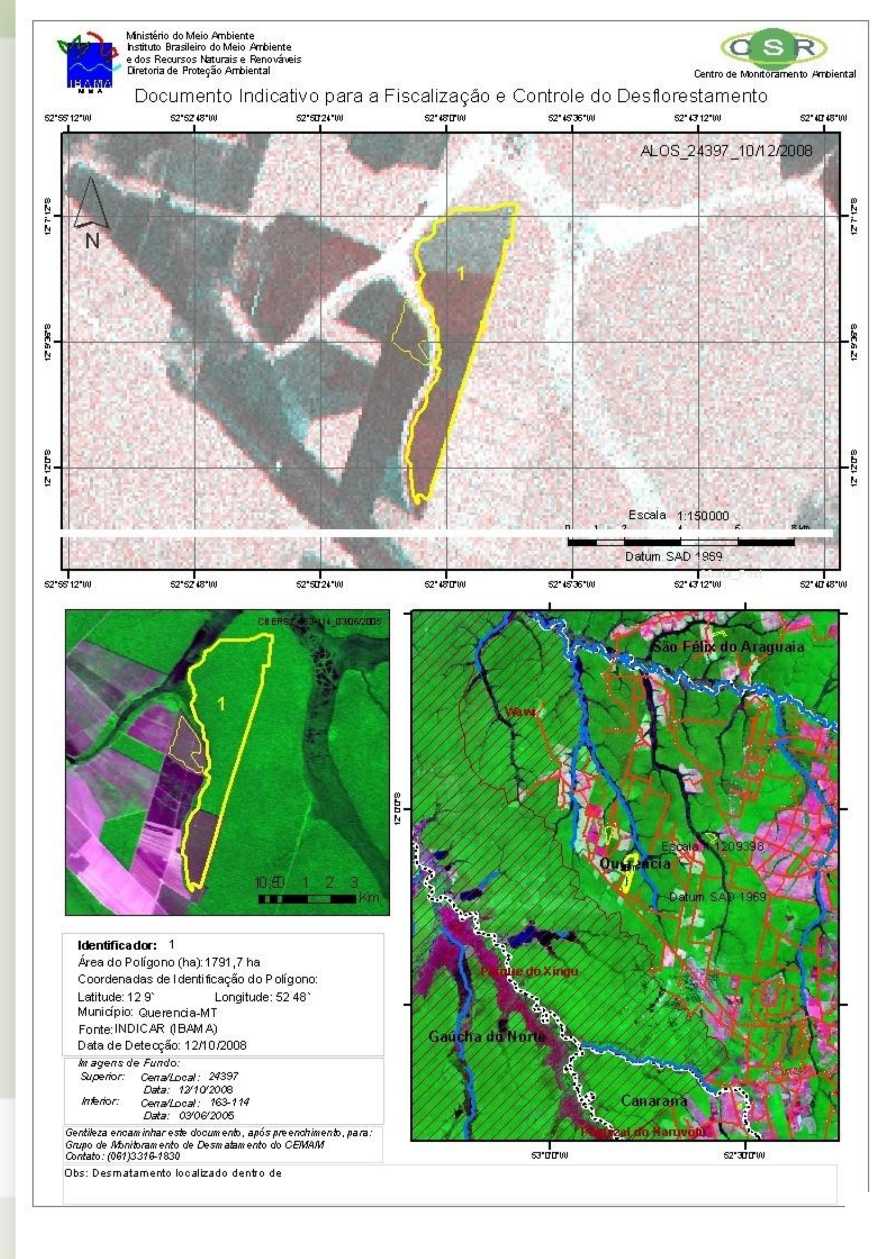

N
RORAIMA
AMAPA
AMAZONAS
PARA
MARANHAO
ACRE
RONDONIA
MATO GROSSO
TOCANTINS
Legenda
🟥 Poligonos de desmatamento INDICAR
0 150 300 600 900 1.200
Km
Escala: 1:14.000.000

Photo: Ramiro Costa

Photo: Ramiro Costa

Use of ALOS images to support the protection of the Brazilian Amazon forest

Law enforcement for illegal deforestations


52°55'12"W
52°52'48"W
52°50'24"W
52°48'0"W
52°45'36"W
52°43'12"W
52°40'48"W
12°7'12"S
12°9'36"S
12°12'0"S
ALOS_24397_10/12/2008
N
1
Escala 1:150000
Datum SAD 1969
CBERS2_163-114_03/06/2005
10,50 1 2 3 Km
São Félix do Araguaia
Wawi
Querência
Escala 1:1209398
Datum SAD 1969
Parque do Xingu
Gaúcha do Norte
Canarana
12°0'0"S
53°0'0"W
52°30'0"W

Ministério do Meio Ambiente
Instituto Brasileiro do Meio Ambiente
e dos Recursos Naturais e Renováveis
Diretoria de Proteção Ambiental

Centro de Monitoramento Ambiental

Documento Indicativo para a Fiscalização e Controle do Desflorestamento

Identificador: 1
Área do Polígono (ha): 1791,7 ha
Coordenadas de Identificação do Polígono:
Latitude: 12 9` Longitude: 52 48`
Município: Querencia-MT
Fonte: INDICAR (IBAMA)
Data de Detecção: 12/10/2008

Imagens de Fundo:
Superior: Cena/Local: 24397
Data: 12/10/2008
Inferior: Cena/Local: 163-114
Data: 03/06/2005

Gentileza encaminhar este documento, após preenchimento, para:
Grupo de Monitoramento de Desmatamento do CEMAM
Contato: (061)3316-1830

Obs: Desmatamento localizado dentro de

Photo: Ramiro Costa

Use of ALOS images to support the protection of the Brazilian Amazon forest

- ✓ Today, with the INDICAR system, the entire Amazonia can be monitored throughtout the year;

- ✓ Over 1,200 polygons were already detected by INDICAR;

- ✓ Local offices uses this information for field operations;

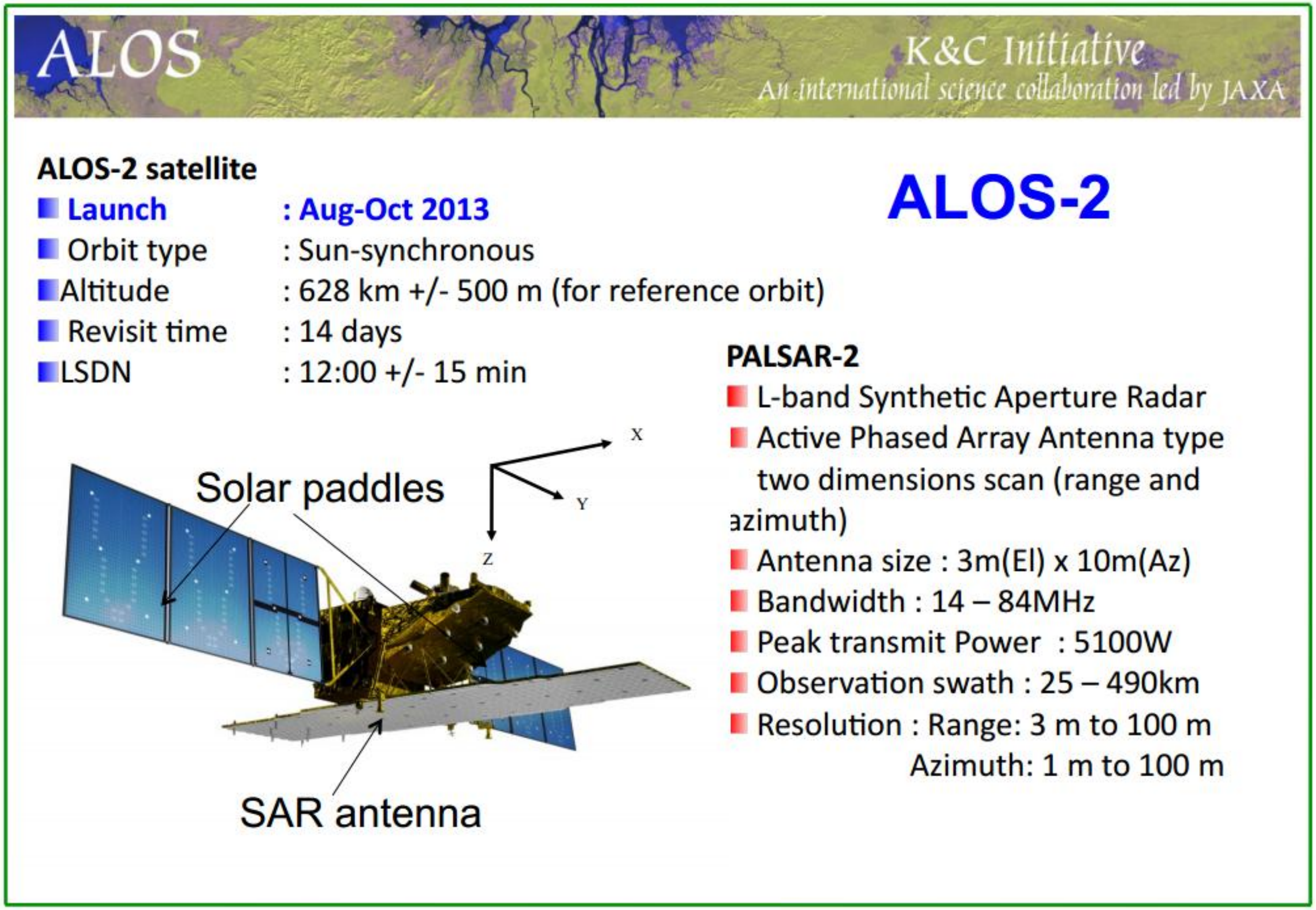
- ✓ CSR/IBAMA team has now expertise to detect deforestation from other biomes as well.

Perspectives

CAR

CADASTRO AMBIENTAL RURAL

Perspectives



ALOS

K&C Initiative

An international science collaboration led by JAXA

ALOS-2

ALOS-2 satellite

Launch	**: Aug-Oct 2013**
Orbit type	: Sun-synchronous
Altitude	: 628 km +/- 500 m (for reference orbit)
Revisit time	: 14 days
LSDN	: 12:00 +/- 15 min

PALSAR-2

- L-band Synthetic Aperture Radar
- Active Phased Array Antenna type two dimensions scan (range and azimuth)
- Antenna size : 3m(El) x 10m(Az)
- Bandwidth : 14 – 84MHz
- Peak transmit Power : 5100W
- Observation swath : 25 – 490km
- Resolution : Range: 3 m to 100 m
  Azimuth: 1 m to 100 m

Expectation: continuity of cooperation after ALOS-2 lauching

Thank you very much !

Dr. Makoto Ono

Dr. Masanobu Shimada

MASANOBU
SHIMADA