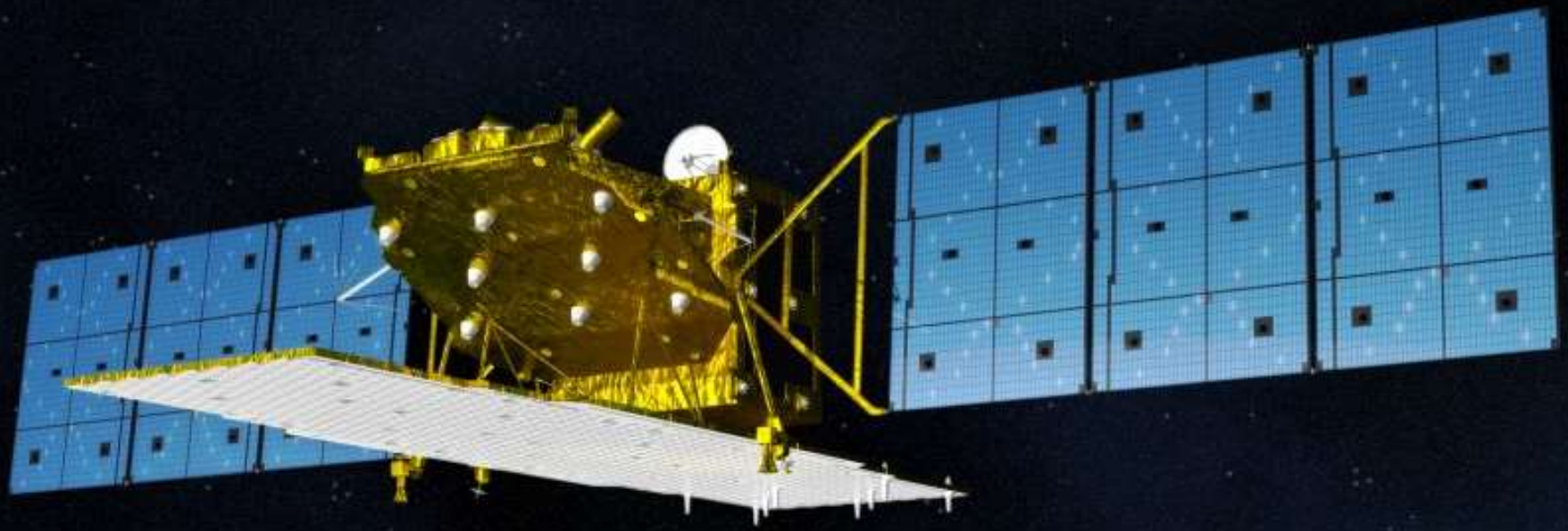


Monitoring forest & tree cover in Africa with Japanese satellite.

JAXA

Presented by Manabu Watanabe

(Tokyo Denki University)

Contents

1. Japanese satellites

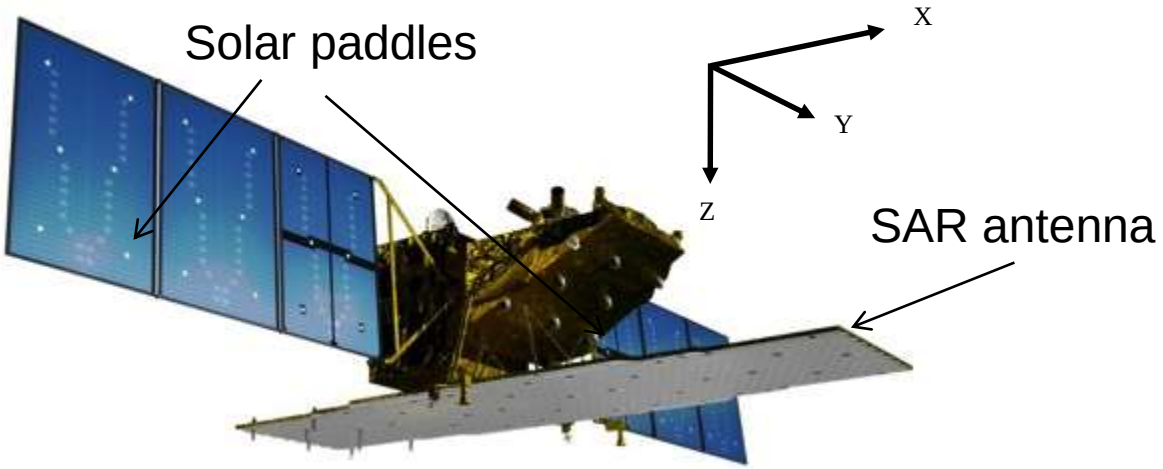
2. Forest/Non-Forest Map

3. JICA-JAXA Forest Early Warning System in the Tropics
   (***JJ-FAST***)

1. Japanese satellites

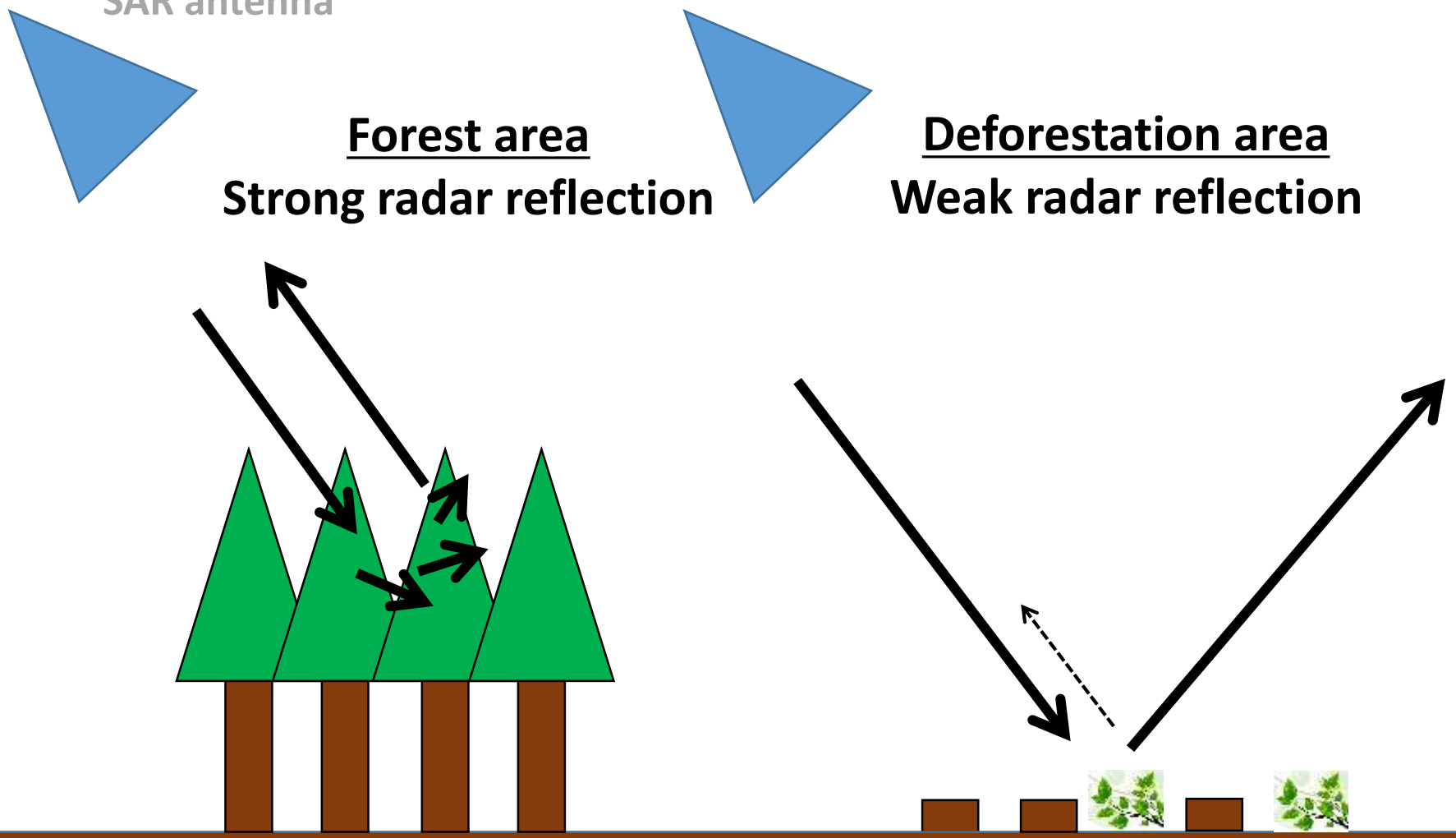
for monitoring forest & tree cover

	JERS-1	ALOS	ALOS-2
Operation	1992 – 1998	2006 – 2011	**2014 – (in operation)**
Revisit time	44 days	46 days	14 days
Sensor	(**L-band SAR**)	PALSAR (**L-band SAR**), PRISM, AVNIR-2	PALSAR-2 (**L-band SAR**)
Observation swath	75 km	35– **350**km	25 – **490**km
Resolution	18 m	Range : 10 m to 100 m Azimuth: 10 m to 100 m	Range : 3 m to 100 m Azimuth: 1 m to 100 m



L-band SAR satellite series have been operated only in Japan!

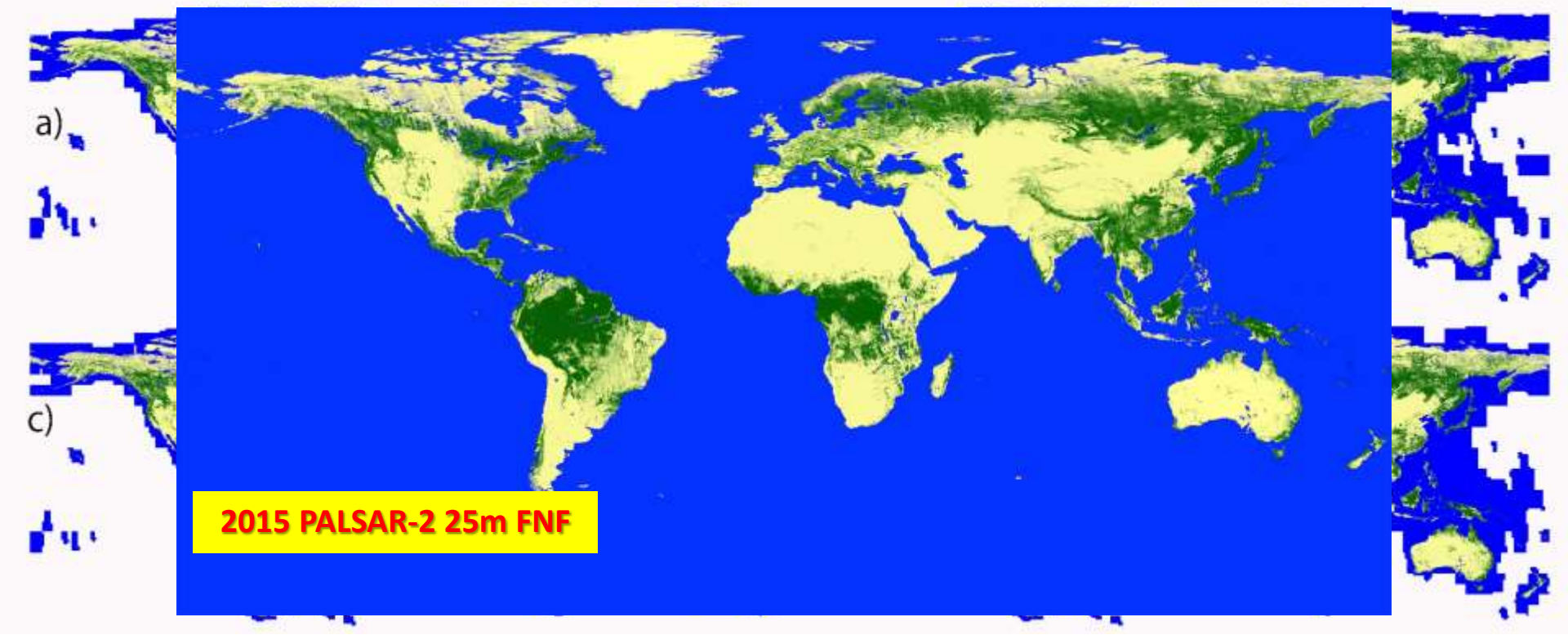
Characteristics of L-band SAR data



Easy to classify forest and non-forest area

2. Forest/Non-Forest (FNF) Map

25m FNF classification results (2007-2010)



Masanobu Shimada, Takuya Itoh, Takeshi Motooka, Manabu Watanabe, Shiraishi Tomohiro, Rajesh Thapa, and Richard Lucas, "New Global Forest/Non-forest Maps from ALOS PALSAR Data (2007-2010)," Remote Sensing of Environment, DOI=10.1016/j.rse.2014.04.014.

Comparison of the PALSAR-PALSAR-2-FRA

FRA: Global Forest Resources Assessments

Area	2010			2015		
	PALSAR(2010) [1000ha]	FRA(2010) [1000ha]	Relarive Error (±) [%] (PALSAR vs FRA)	PALSAR-2(2015) [1000ha]	FRA(2015) [1000ha]	Relarive Error (±) [%] (PALSAR vs FRA)
Indonesia	103,811	94,432	9.93%	95,703	91,010	5.16%
South America	811,082	843,995	-3.90%	789,918	833,881	-5.27%
Africa	653,447	638,187	2.39%	599,593	624,009	-3.91%
Brazil	436,358	498,458	-12.46%	435,823	493,538	-11.69%
Colombia	77,667	58,635	32.46%	73,117	58,502	24.98%
Peru	76,266	74,811	1.95%	74,656	73,973	0.92%
Venezuela	56,890	47,505	19.76%	52,856	46,683	13.22%
Ecuador	17,472	12,942	35.01%	16,794	12,548	33.84%
Indonesia	103,811	94,432	9.93%	95,703	91,010	5.16%
Papua New Guinea	31,124	33,573	-7.29%	31,916	33,559	-4.90%
Malaysia	17,964	22,124	-18.80%	18,578	22,195	-16.30%
Congo (Kinshasa)	167,631	154,135	8.76%	165,012	152,578	8.15%
Mozambique	26,961	38,972	-30.82%	24,359	37,940	-35.80%
Tanzania	27,029	47,920	-43.60%	25,584	46,060	-44.45%
Central African Republic	52,781	22,248	137.24%	51,521	22,170	132.39%
Congo (Brazzaville)	24,610	22,411	9.81%	24,499	22,334	9.69%
Gabon	23,861	22,000	8.46%	23,867	23,000	3.77%
Cameroon	36,565	19,916	83.59%	36,003	18,816	91.34%
Nigeria	28,317	9,041	213.21%	18,576	6,993	165.64%

PALSAR, PALSAR-2 meets FRA generally. In average 95% agreement

Forest/Non-Forest Map is available from
http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/fnf_index.htm
with free of charge

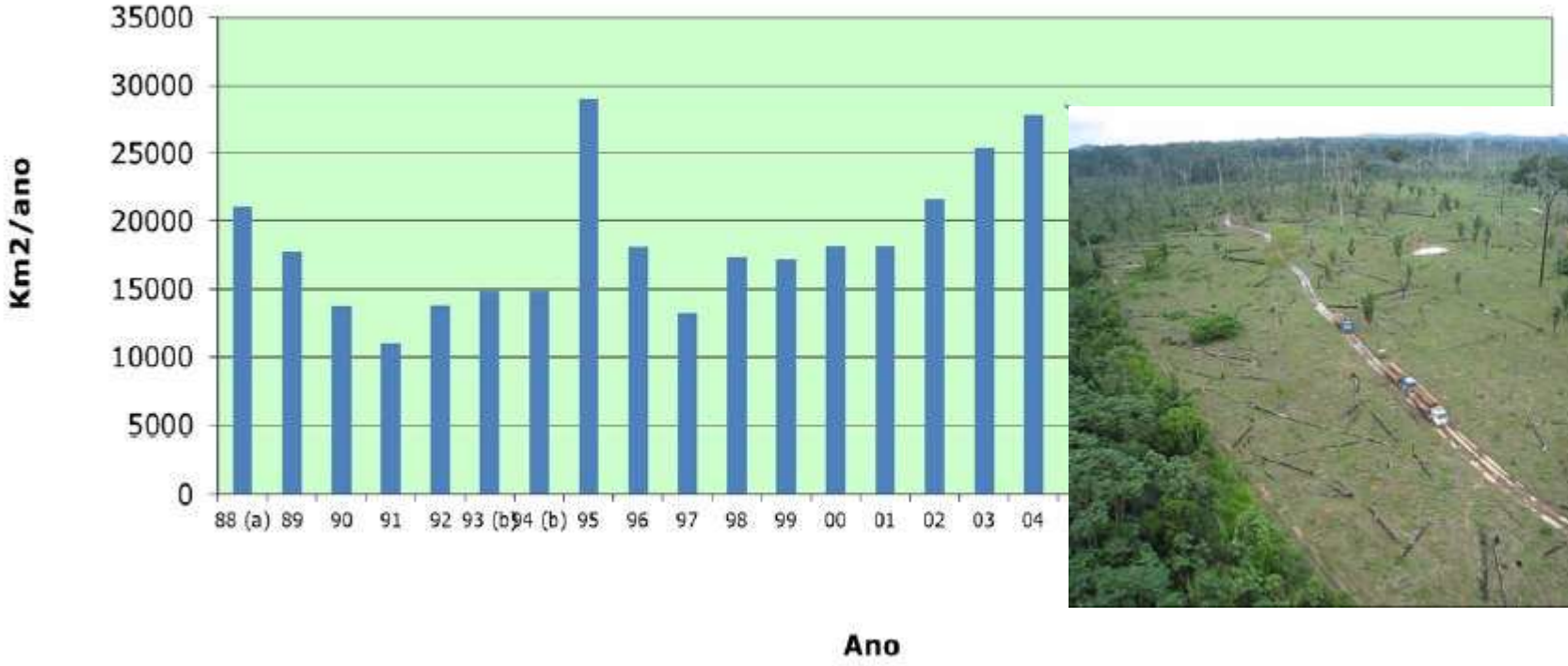
2. Forest/Non-Forest Map Findings

- **First PALSAR-2 global mosaic of 2014/2015 and the forest/non-forest were created** after the ALOS-2 launch in 2014.
- PALSAR-2 FNF (2015) shows the **good agreement with the FRA2015** as well as the PALSAR data because PALSAR-2 has better imaging and calibration performances even more than PALSAR.
- PALSAR/PALSAR-2 shows the annual decrease of the (natural) forest in the pan-tropical regions at in these years (2007-2015) and may cause the global warming.
- Reprocessing of the PALSAR-2 data and more tempo-spatio analysis for determination of threshold.
- Eight year L-band SAR global data (2007-2015) is now available for the forest analysis.
- These data will be open to the public after January 2016.
- From now, **global FNF will be generated routinely and annually** and the change will be open to the public (Forest monitor).

3. JJ-FAST

Previous operation in Brazil

Annual Deforestation in the Legal Amazon

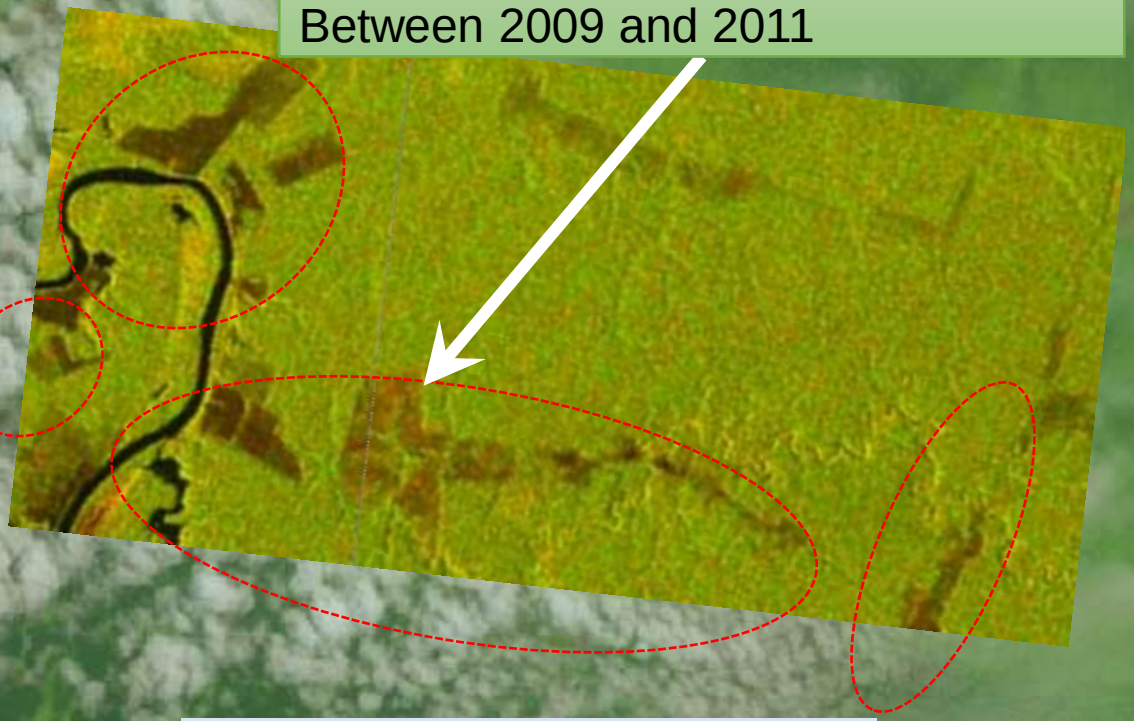


Source: INPE

- Brazilian government has been tackling illegal deforestation using optical satellite images (Landsat) since 2004.
- **Challenge was deforestation detection in the rainy season.**

Landsat 5 Image on 2011/09/07

Forest Density Difference by ALOS Between 2009 and 2011



Almost a half period of a year, the Amazon Forest is covered with clouds.

The PALSAR can detect deforestation even in the rainy season or night time.

IBAMA（Brazilian Institute of Environment and Renewable Natural Resources) and DPF (Federal Police Department) implemented the project.

During the Project…

Year	Detection of Deforestation	Illegal Logging
2010	1,007	140
2011 (stopped in April)	176	11

New Tropical Forest Early Warning System with PALSAR-2 (*JJ-FAST*)

JICA

- Forest Governance Initiatives coordination
- International conference and seminars
- Human capacity development

Joint Development & Operation

JAXA

- System development -Tropical Forests Early Warning System -
- Web site development to disclose the Early Warning System

↓

- Concession management by private companies
- Illegal deforestation monitoring by government agencies

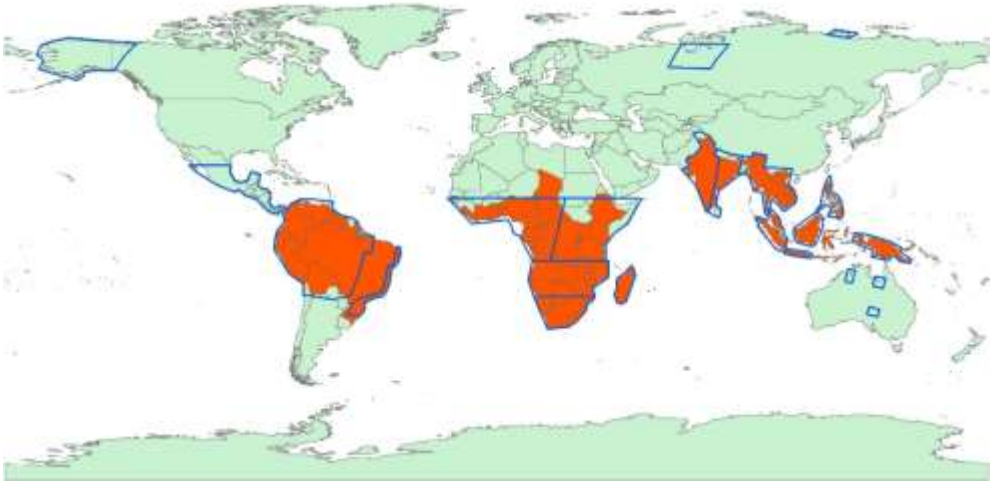
↓

Contributing to " Improvement of Forest Governance in Tropical Forest"

Target Area: Approximately 16.6 million km^2

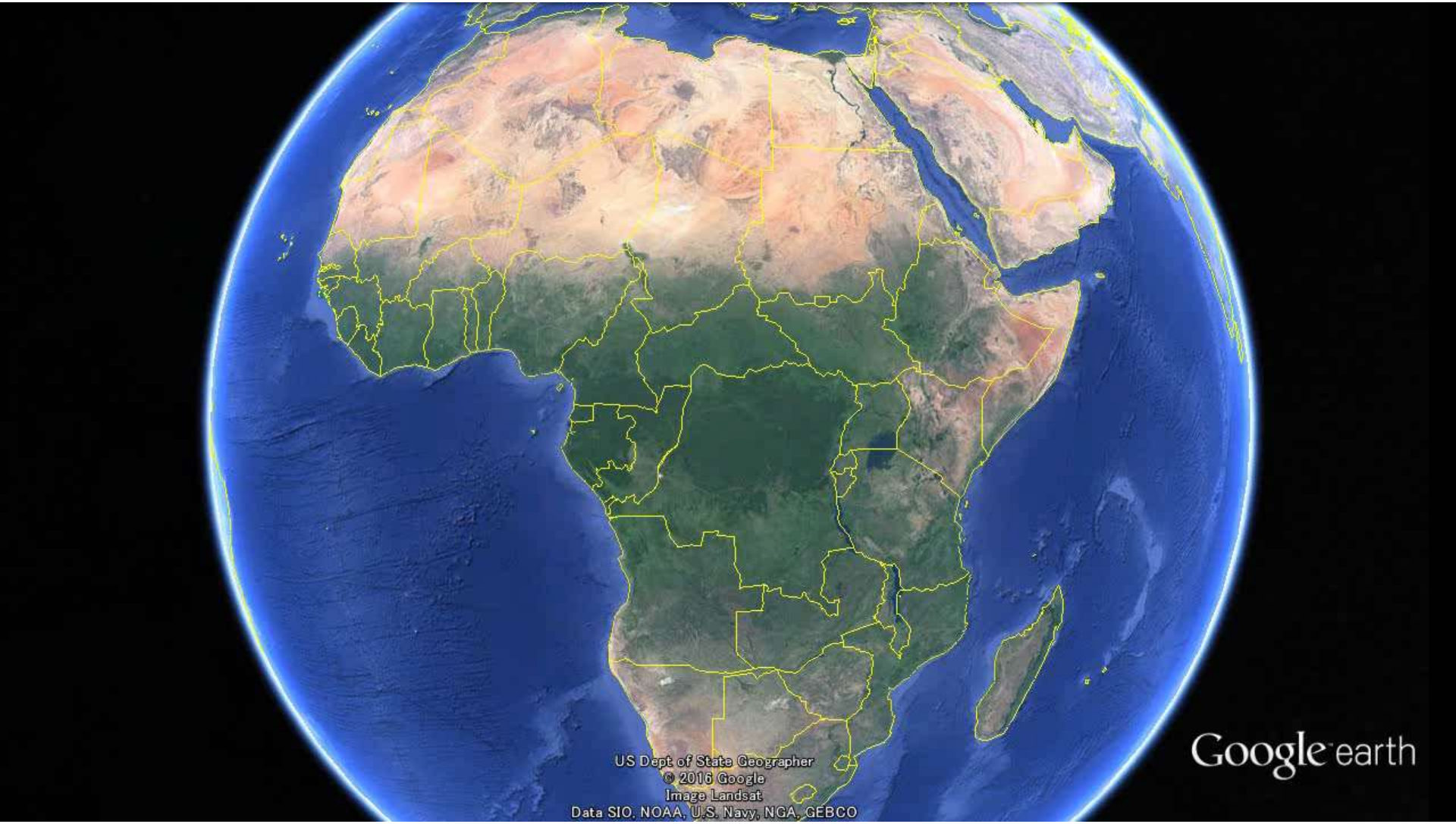
About *JJ-FAST*

- "**Every ~1.5 month**" Global Tropical forest observation
  (Unprecedented frequency)
- Cover 53 countries containing tropical forest



- "**Free access from PCs and mobile devices**" from anywhere in the world.
- "**Deforestation in a rainy season**" is detected through SAR sensor (PALSAR-2)
- The service starts from
  November 2016 : South America
  December 2016 : Central part of Africa
  April 2017 : South part of Africa
  April 2018 : All 53 countries

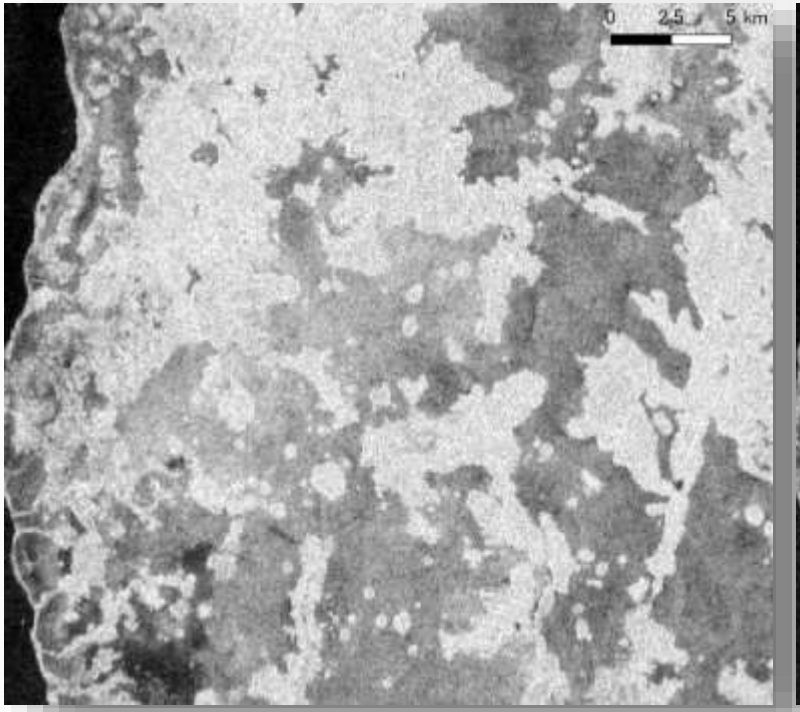
Africa/Democratic Republic of Congo



Africa/Democratic republic of Congo

Area: North part of Kinshasa

Deforestation observed



July 24, 2015

July 22, 2016

1 years

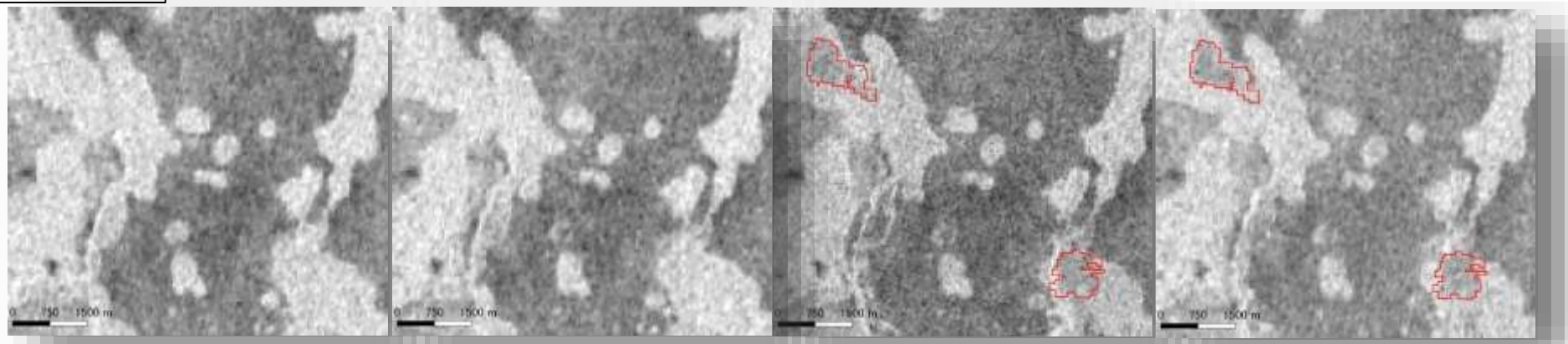
Deforestation area is represented by **darker gray** color by SAR image

Dry Season

Rainy Season

PALSAR-2

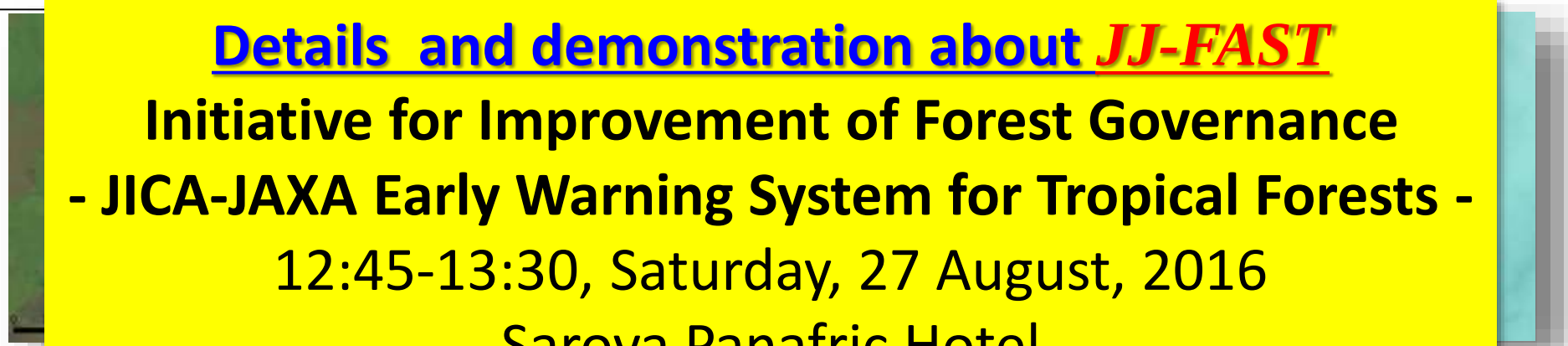
Deforestation



Jul. 24, 2015 → 42 days → Sep. 4, 2015 → 42 days → Oct. 16, 2015 → 84 days → Jan. 8, 2016

Landsat-8

Deforestation?



Details and demonstration about *JJ-FAST*

Initiative for Improvement of Forest Governance

- JICA-JAXA Early Warning System for Tropical Forests -

12:45-13:30, Saturday, 27 August, 2016

Sarova Panafric Hotel

Summary

1. Introduce Japanese satellites

2. Forest/Non-Forest Map

- **Forest/Non-Forest Map is available with free of charge**
  http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/fnf_index.htm
- Forest/Non-Forest Map from L-band SAR* meets FRA**
  (95% In average)

3. *JJ-FAST* (JICA-JAXA Forest Early Warning System in the Tropics)

- "**Every ~1.5 month**" Global Tropical forest observation
- "**Free access from PCs and mobile devices**" from anywhere in the world.
- The service starts from
  November 2016 : South America
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