

Deforestation Monitoring System:

JICA-JAXA

**Forest Early Warning System in the Tropics
(JJ-FAST)**

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1. Introduction

Global warming

- Land use change (\approx deforestation) contributes 11% of anthropogenic greenhouse gas emissions.
- REDD+ scheme is being developed.

Photo: Tokyo Times

Illegal logging

- Most deforestations occur in tropical forest.
- Illegal logging is one of large factors (50-90% of timber volume is estimated as illegal).

Satellite monitoring

- Cost-effective method by observing remotely, widely, and periodically.
- It is suitable for forest monitoring.

2. Satellite sensor



Radar sensor: ALOS-2

Democratic Republic of the Congo

3. Synthetic Aperture Radar (SAR)

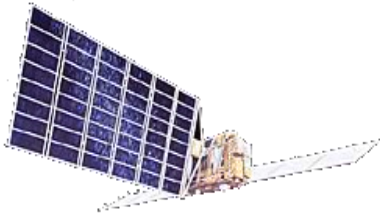


SAR transmits microwave, which penetrate cloud!

SAR can observe both day and night regardless of cloud cover.

4. JAXA's SAR satellites

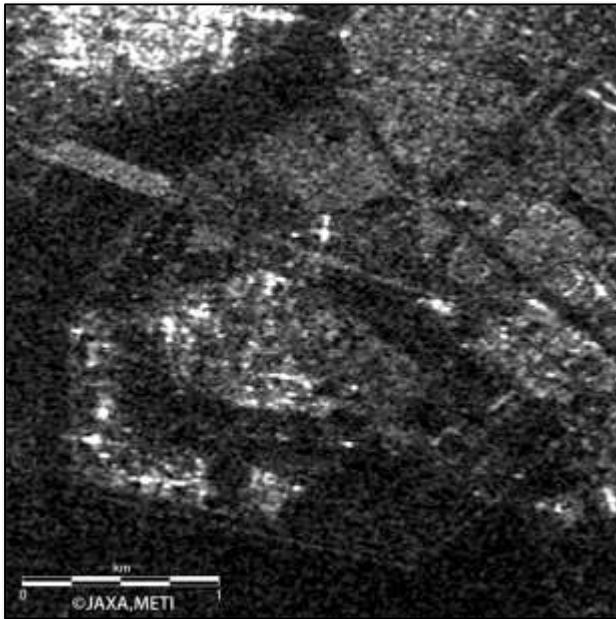
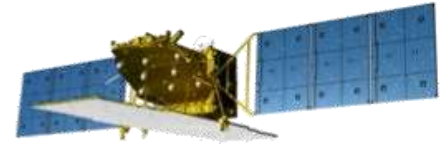
JERS-1/SAR



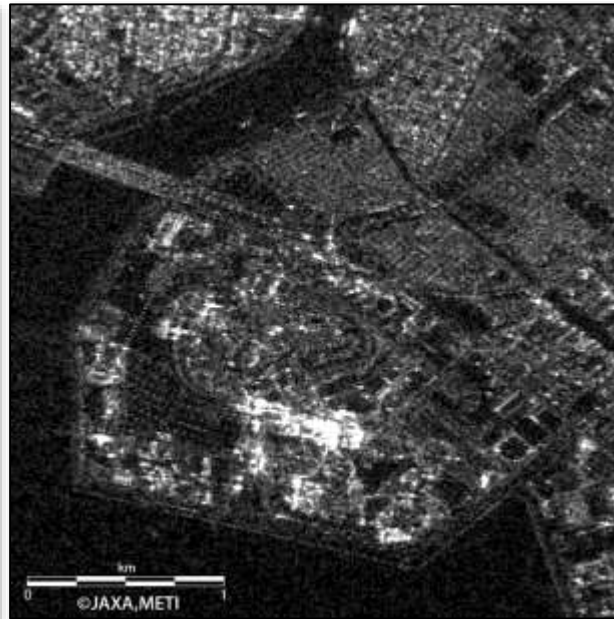
ALOS/PALSAR



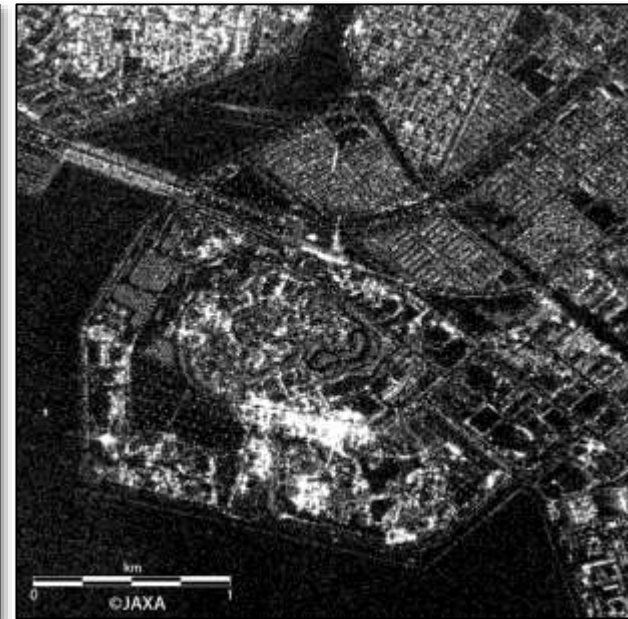
ALOS-2/PALSAR-2



1992 - 1998
Resolution = 18m



2006 - 2011
Resolution = 10m



2014 -
Resolution = 3m

5. ALOS-2/PALSAR-2



Sensor: **L-band SAR**

Orbit altitude: **628km**

Launch: **May 24, 2014**

Lifetime: **5 years (7 years)**

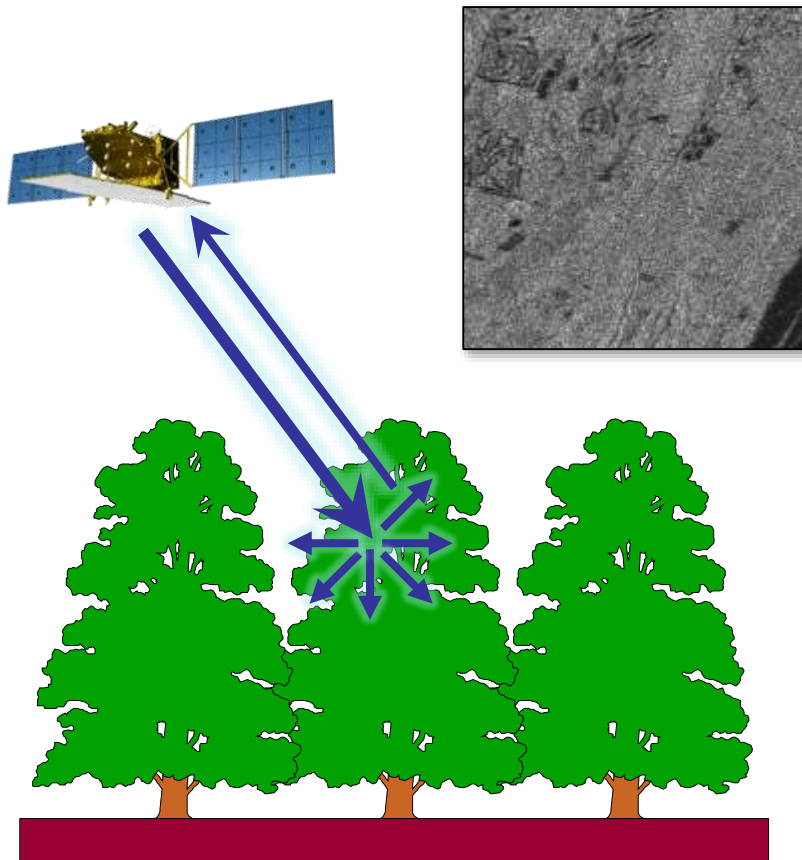
Observation mode: **Spotlight**

Strip

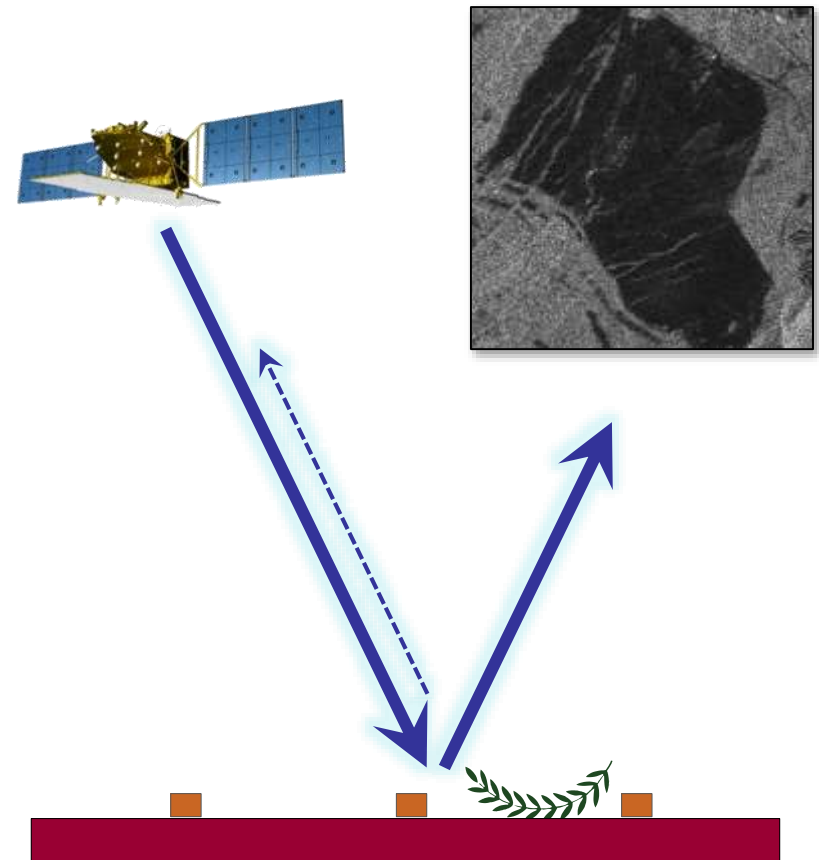
ScanSAR

6. Deforestation detection

Forest: Bright



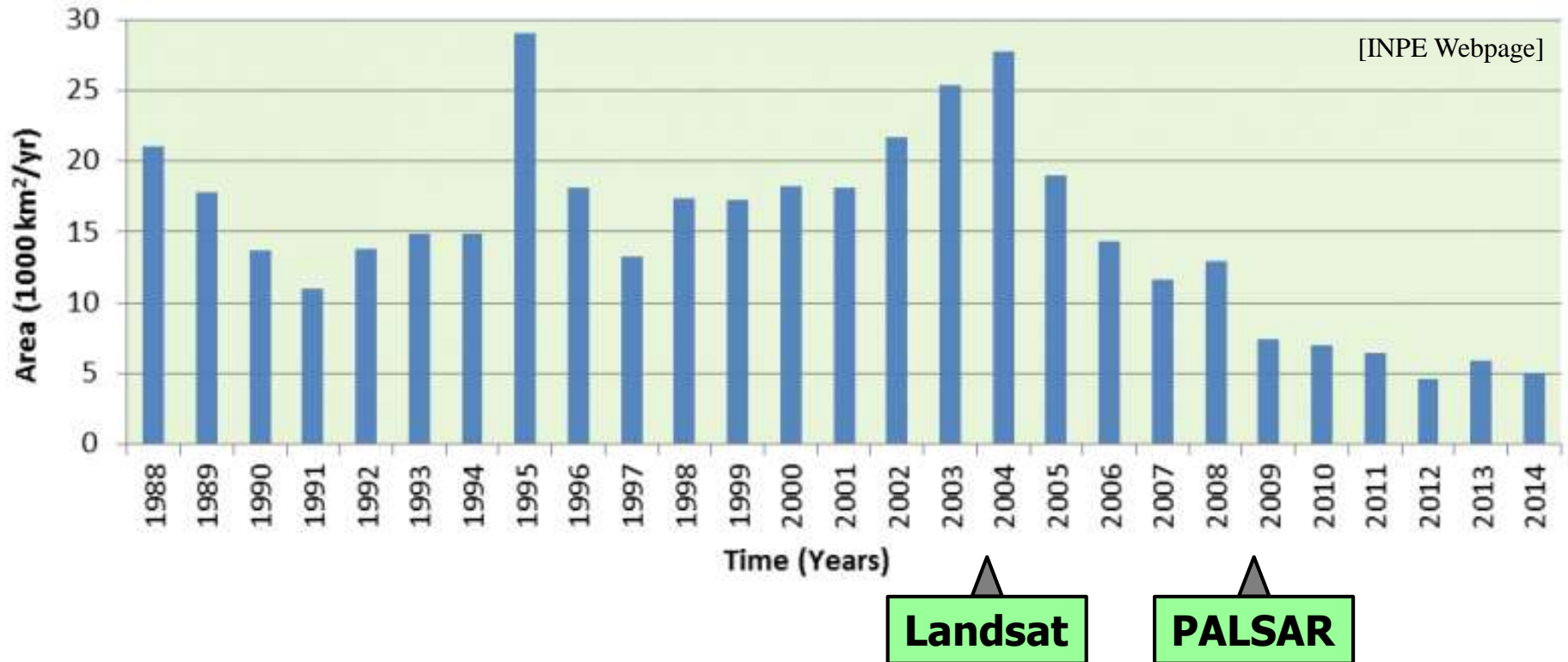
Non-Forest: Dark



Dark change area may represent deforestation!

7. Case of Brazil

Annual deforestation in the Legal Amazon



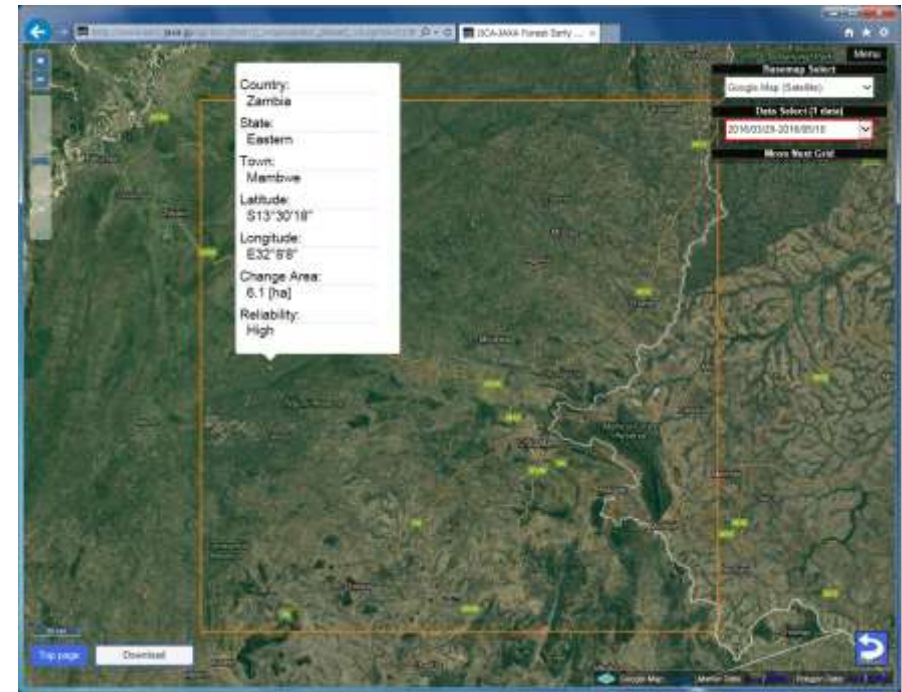
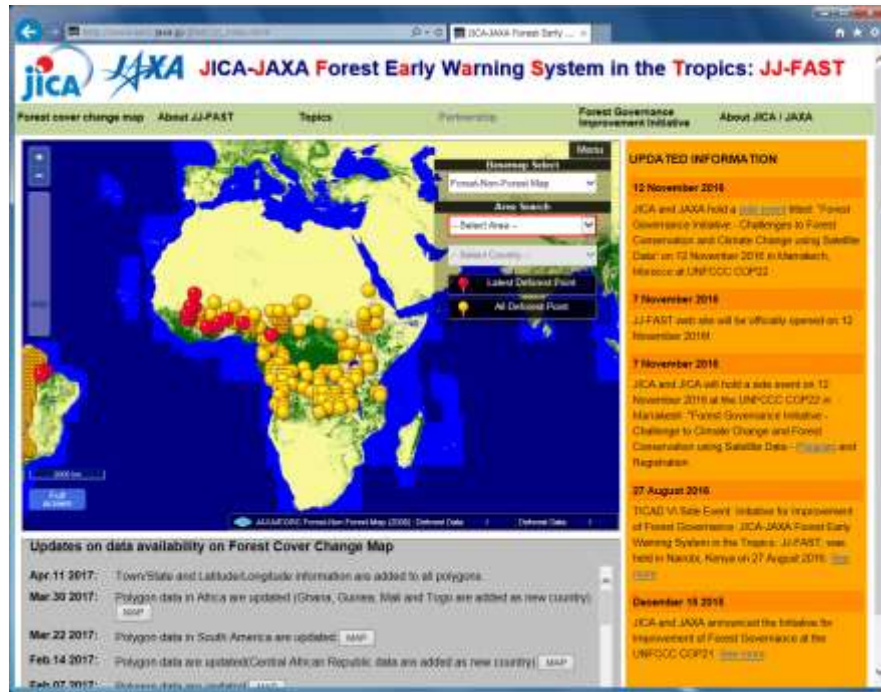
The government effectively use satellite data for illegal logging monitoring!

PALSAR is especially useful for cloudy Amazonian forest.

PALSAR contributed to reduce the illegal logging by half.

8. New monitoring system

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



Released in November 2016!

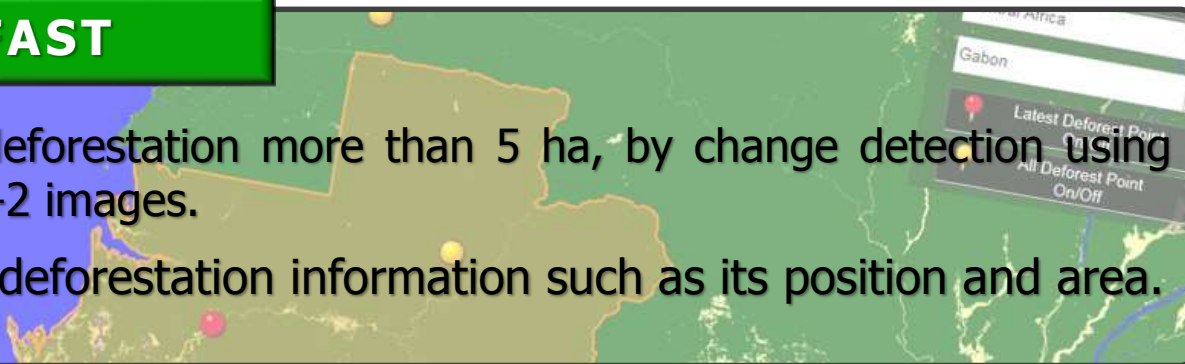
Positioning information of deforestation is available.

<http://www.eorc.jaxa.jp/jjfast/>

8. New monitoring system

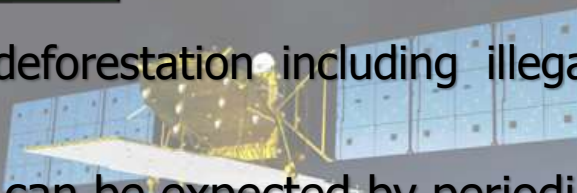
What is JJ-FAST

- It detects deforestation more than 5 ha, by change detection using two PALSAR-2 images.
- It provides deforestation information such as its position and area.



Objective of JJ-FAST

- Early warning of deforestation including illegal logging (every 1.5 months).
- Suppression effect can be expected by periodic open information.



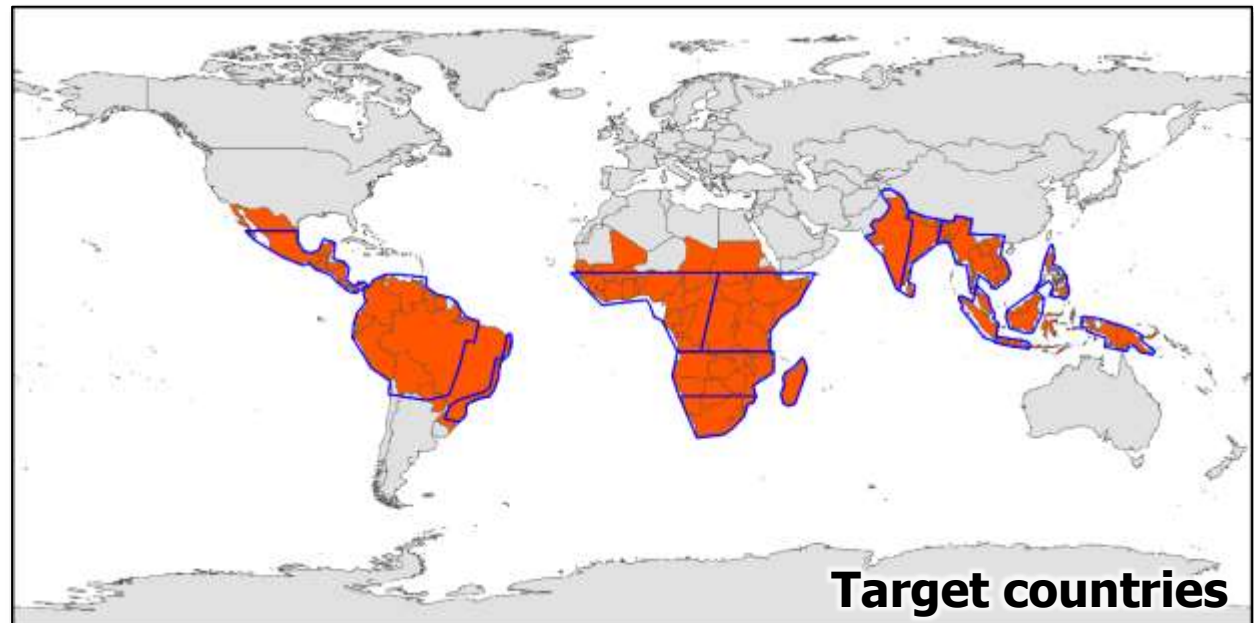
Usage of JJ-FAST

- User can download deforestation polygon and PALSAR-2 image.
- He can identify illegal logging by GIS analysis using land-use map or concession map.

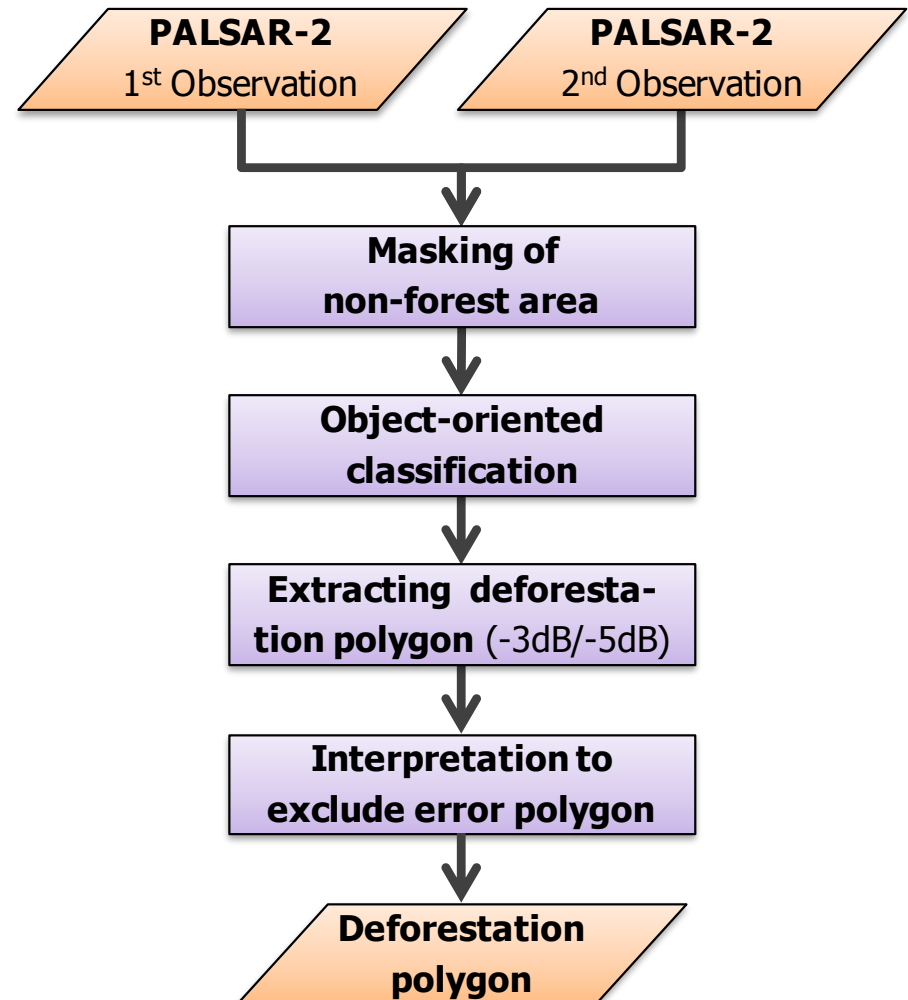
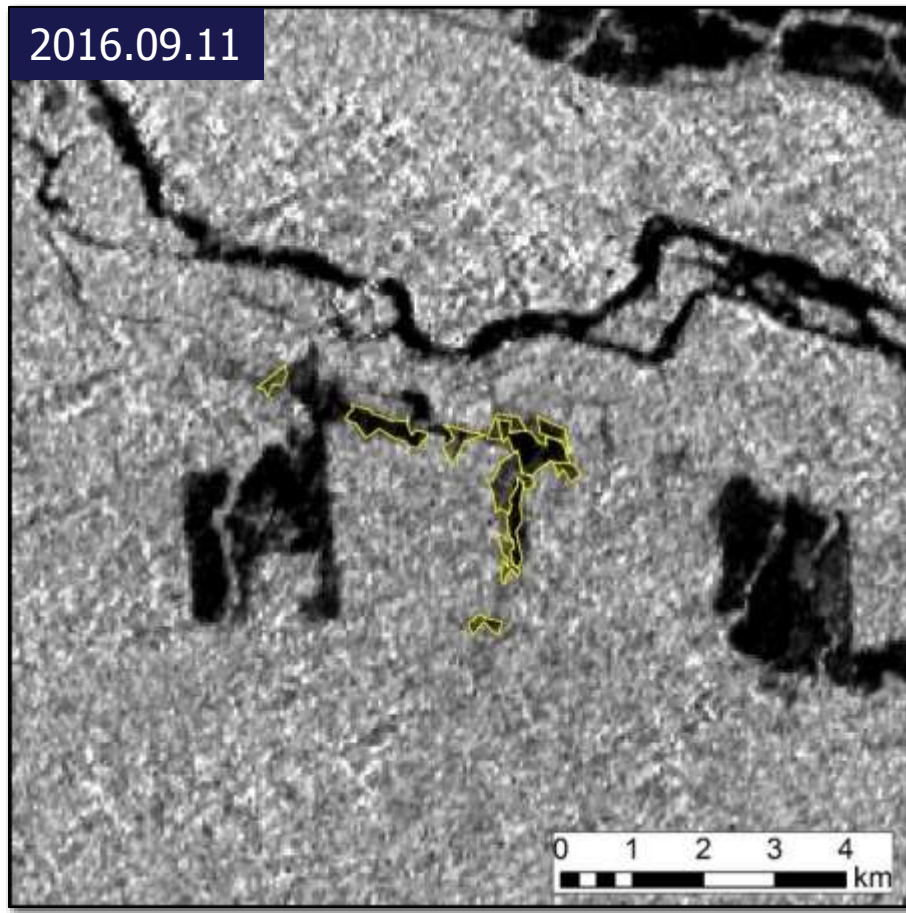


8. New monitoring system

Data source	ALOS-2/PALSAR-2 (ScanSAR mode)
Target area	About 80 countries
Update	Every 1.5 months
Characteristics	<ul style="list-style-type: none"> - Global coverage: almost all tropical forests. - Cloud-cover area observation: even in rain season. - Small data traffic: forester can use it in the field.



9. Detection algorithm



10. Field survey for validation

Peru



Some issues were identified.
Detection accuracy was 62.5%.

Botswana



Demand of forest burn area detection.
Deforestation was correctly detected.

11. Schedule

	JFY2016					JFY2017												JFY2018		
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Target area	South America / Africa										South America / Africa / Asia (All the 80 countries)									
Algorithm	Interpretation					Semi-Automatic							Full-Automatic							
Validation	▲ Peru						▲ Botswana													
									▲ Gabon											
													▲ Peru / Brazil							

We are now improving the algorithm
to be full automatically and more accurately.

12. Usage example of JJ-FAST

Government's Forest Division

responsible for monitoring illegal logging

Office



Field



13. Conclusion

Deforestation monitoring system JJ-FAST ...

- provides up-to-date information for global tropical forests.**
- is not influenced by cloud cover, even in rain season.**
- strongly supports your forest management!**

