

JJ-FAST update

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1. Current status of JJ-FAST

2. Improvement of the deforestation detection algorithm

- Recent

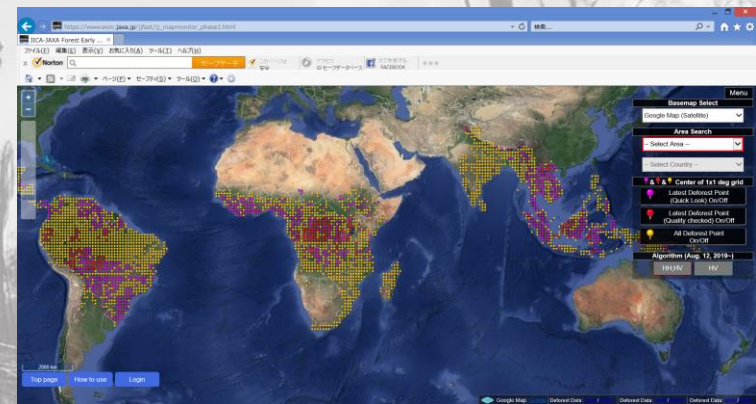
- Near future

3. Summary

What is **JJ-FAST**?

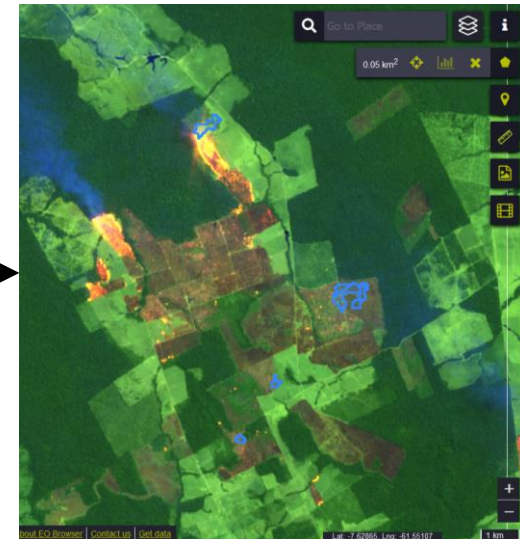
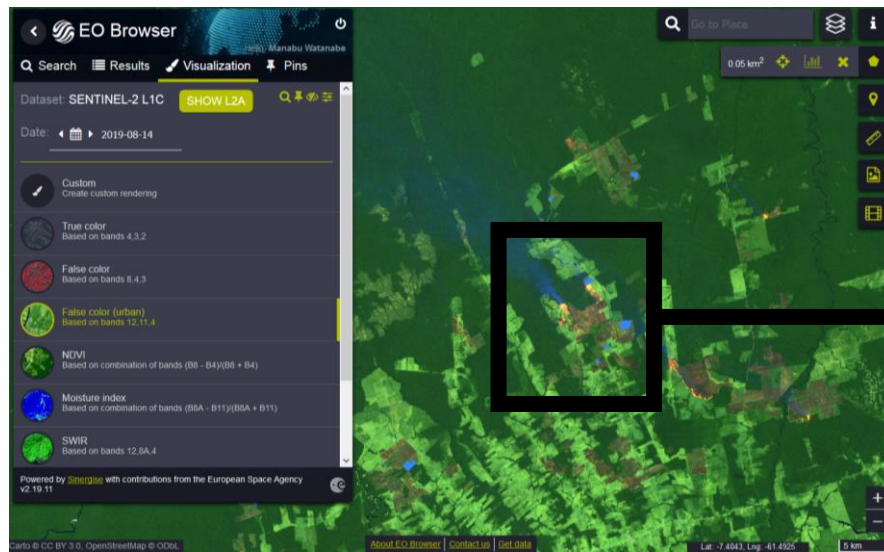



- > **“First SAR-based global”** early warning system for tropical forest
(http://www.eorc.jaxa.jp/jjfast/jj_index.html)
- > **“77 countries”** cover
- > **“Every ~1.5 month”** monitoring
- > **“Free access”** from PC or mobile phone
- > **“Rainy”** and dry season monitoring
using SAR data (PALSAR-2/ScanSAR)
- > JJ-FAST algorithm detects 2600ha illegal deforestation.
Four farms were fined US\$ 3,500,000



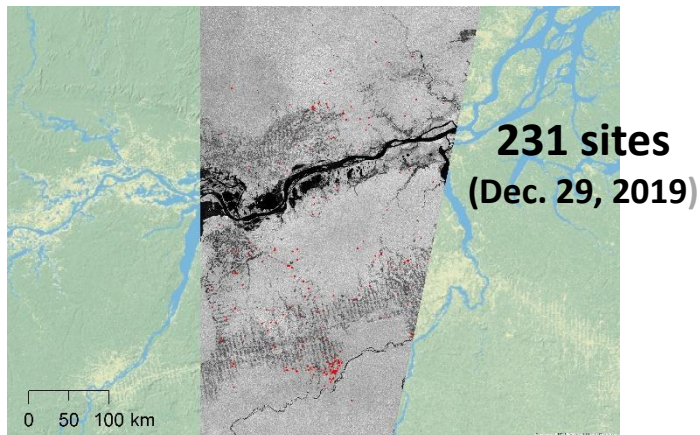
IBAMAによる違法伐採者の取り調べ

■ Forest fire & deforestation last summer in Brazil

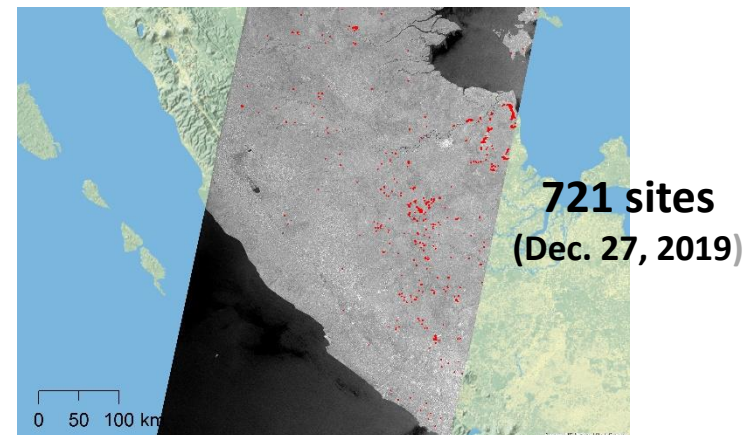


 Detected by JJ-FAST

■ Recent deforestation hot spot detected with JJ-FAST



Brazil (rainy season)



Indonesia(rainy season)

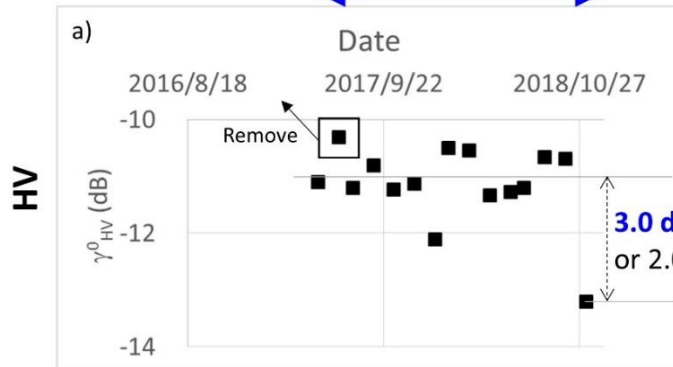
Improvement history

	JFY 2016			JFY 2017		JFY 2018		JFY 2019	
	4	11	12-3	4-6	7-3	4-5		6-	
Target country	Project start	Amazon	Amazon Africa	Amazon Africa	South America, Africa, SE-Asia (77 country)				
Deforestation detection algorithm		V0			V1	V2		V2_1	
Num. of data used		2				11	16	21	
Polarization		HV			HV, HH, HH/HV				
Minimum detection size		5ha			3ha				
Deforestation info. Provision timing (after observation)		12 to 17 days					3 to 4 days		

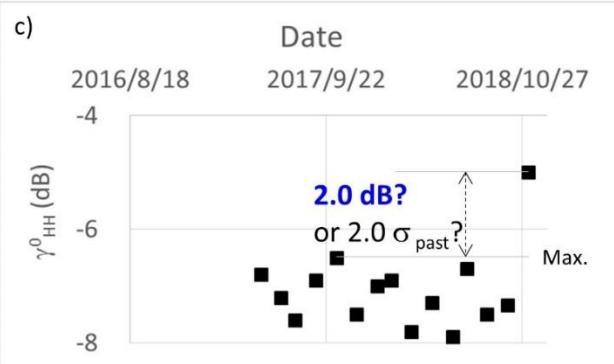
Recent improvement

Before June, 2019

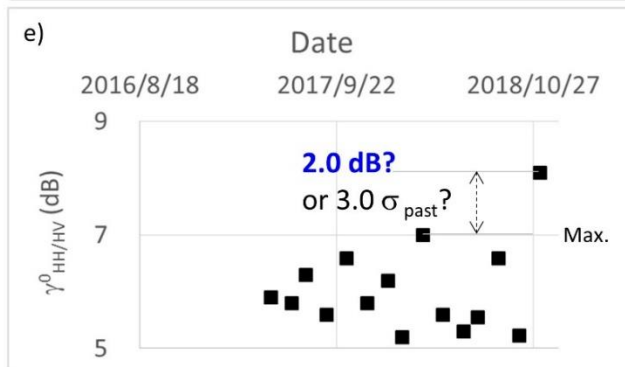
16 data



HV



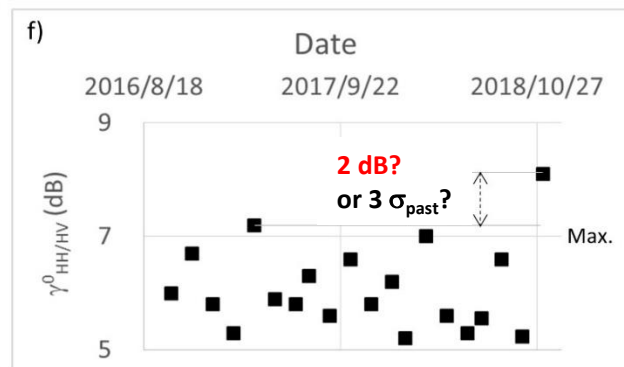
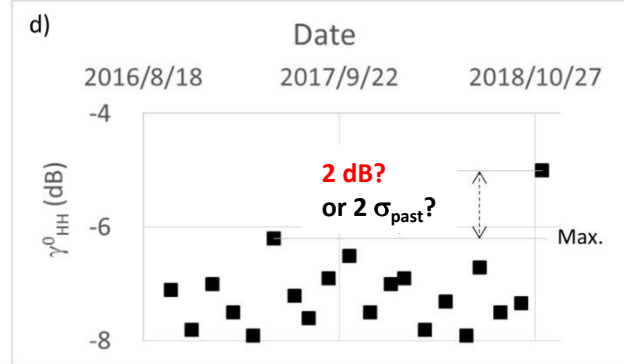
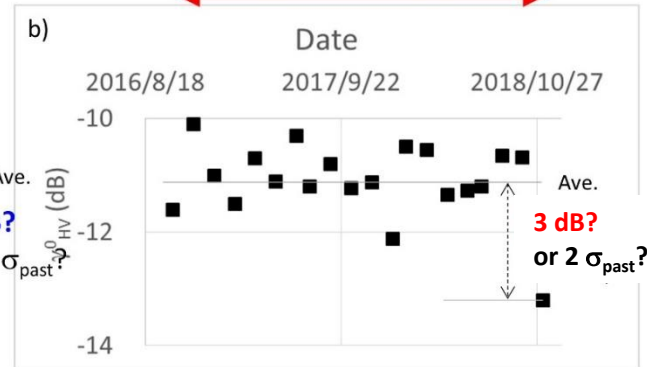
HH



HH/HV

After July, 2019

21 data

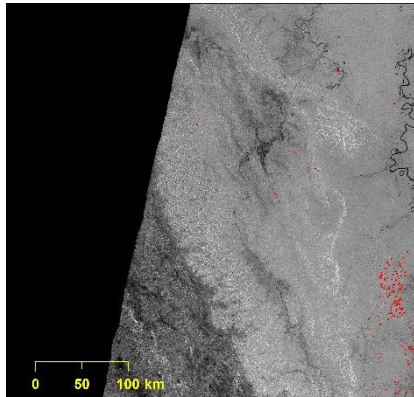


Accuracy evaluation

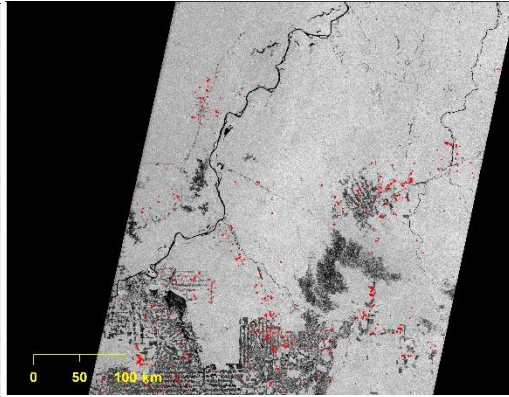
Site : Hot deforestation spot (7 scenes)

Validation data: GLAD*

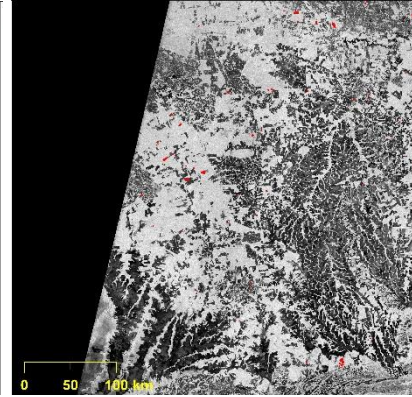
Peru (Pucallpa)



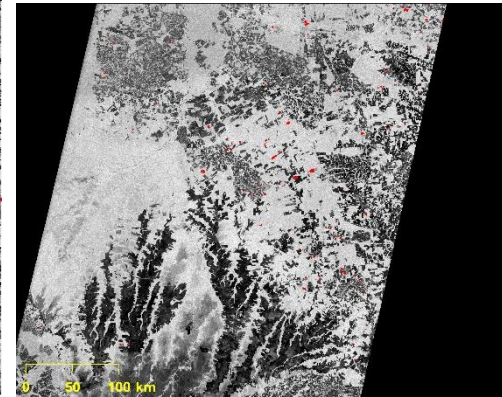
Brazil (Porto Velho)



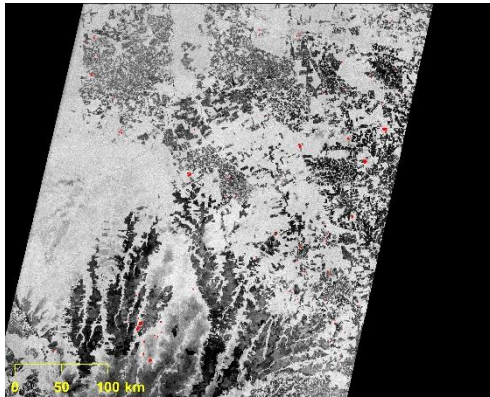
Brazil (Sinop, path125)



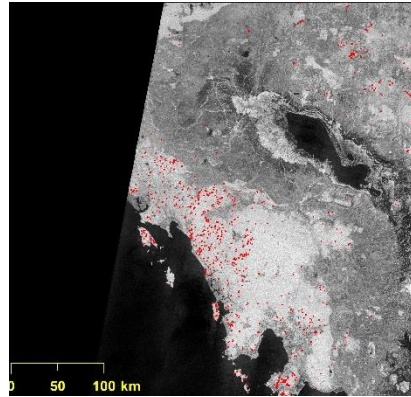
Brazil (Sinop, path126, Nov. 9)



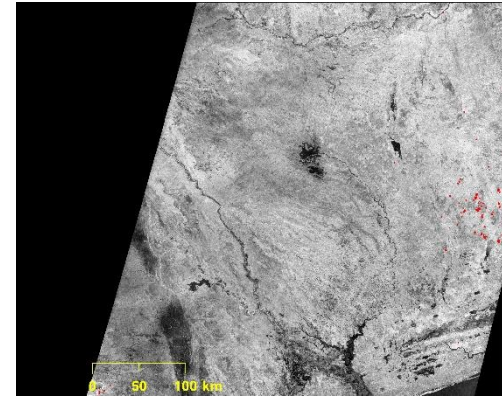
Brazil (Sinop, path126, Sept. 28)



Cambodia (N11E103)



Mozambique (S23E034)

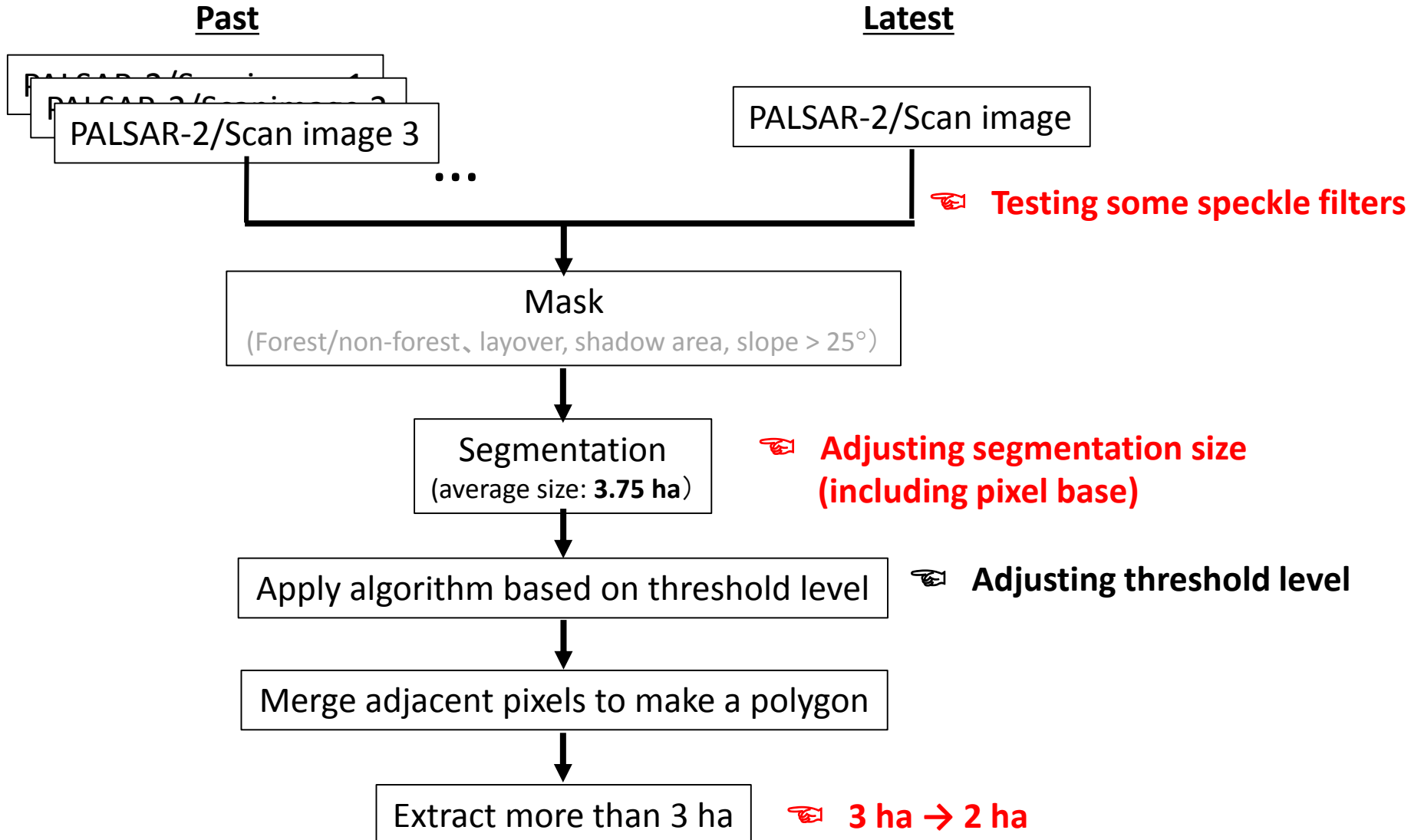


User's accuracies : 59.9% → 66.7%
Correctly detected polygons : 697 → 901

* Global Land Analysis and Discovery (Landsat based deforestation detection system)

Pixel based processing (under evaluation)

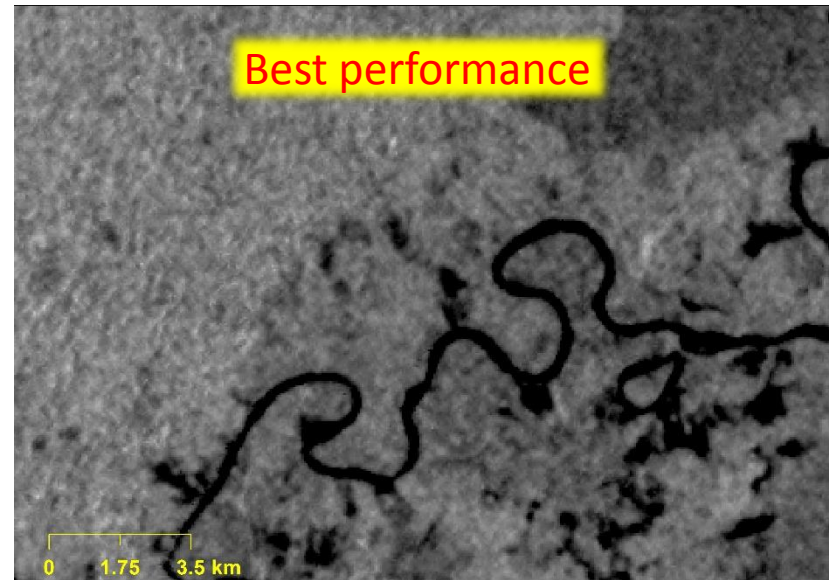
Purpose: Reduce minimum deforestation detection size from 3ha to **2ha**.
Improve detection accuracies.



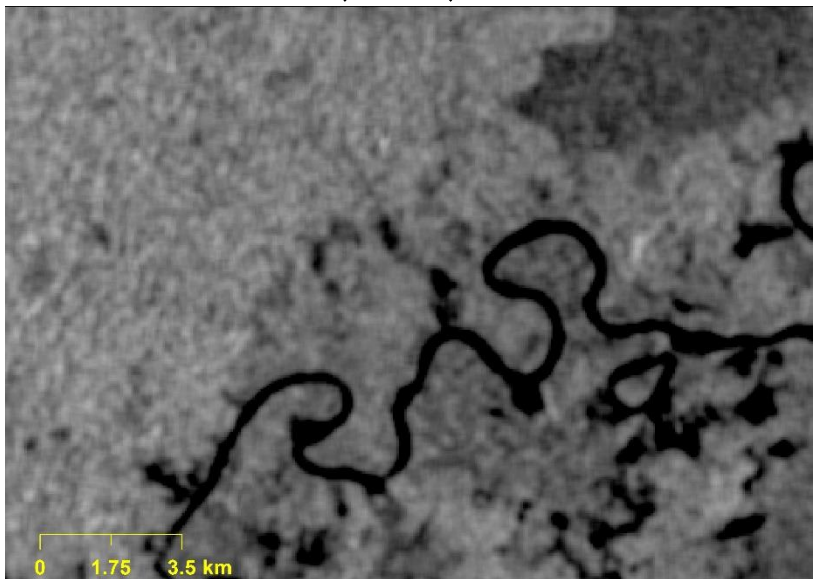
Testing some speckle filters



No speckle filter
(current)



Lee-sigma filter
(Window size: 5 Sigma: 1)



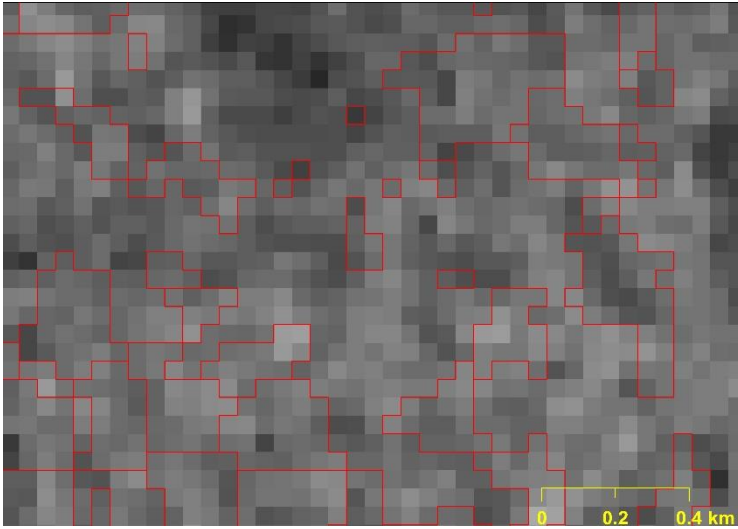
Enhanced Lee filter
(Window size: 5)



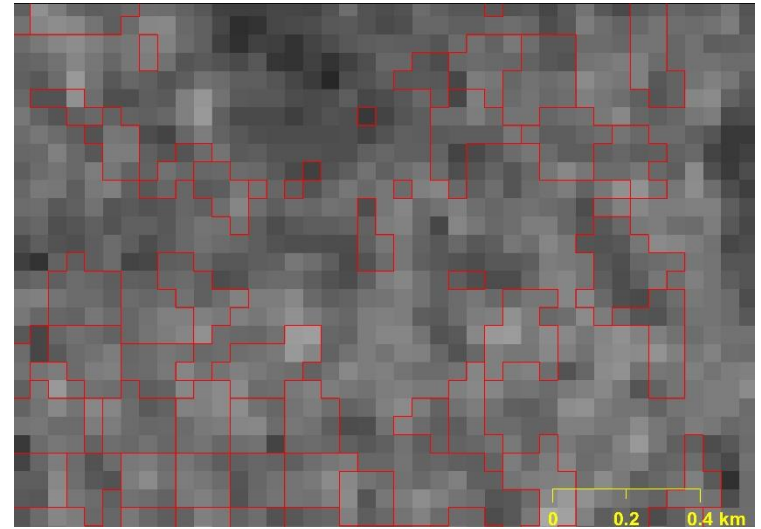
Frost filter
(Window size: 5)

Adjusting segmentation size

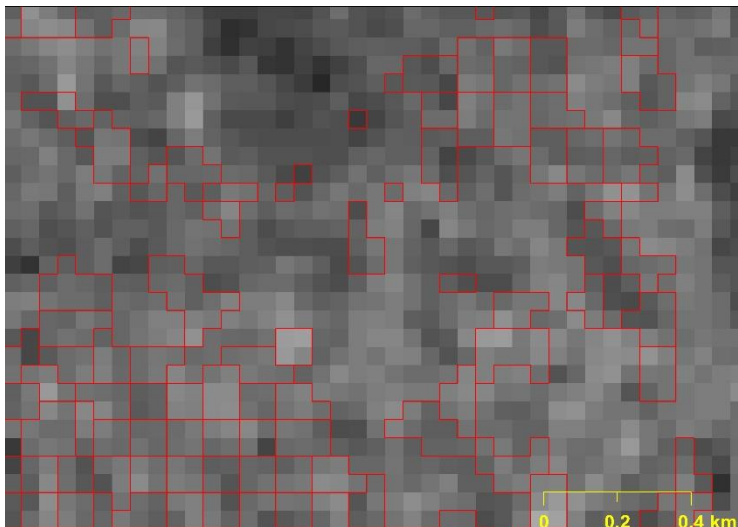
Segmentation method : slic



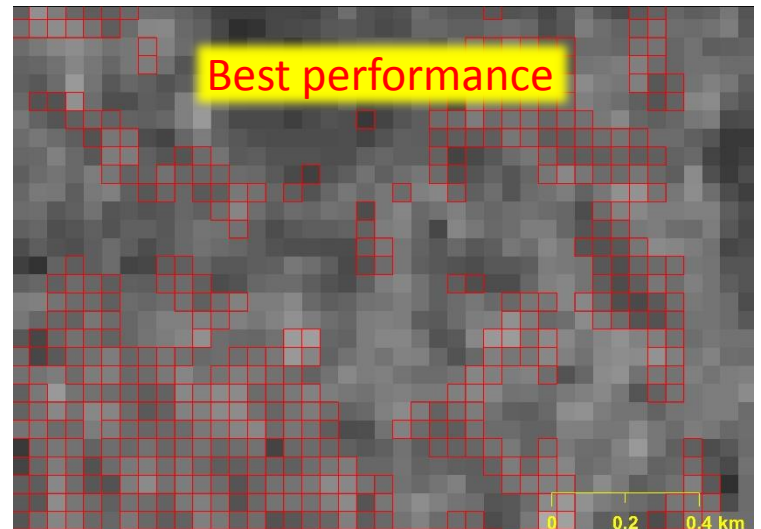
3.75 ha(current)



2.5 ha



1 ha



Pixel base

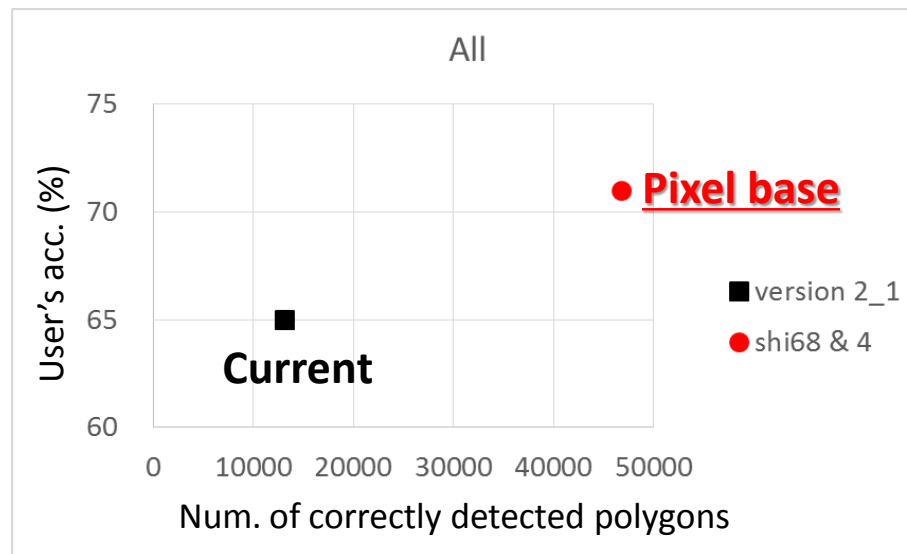
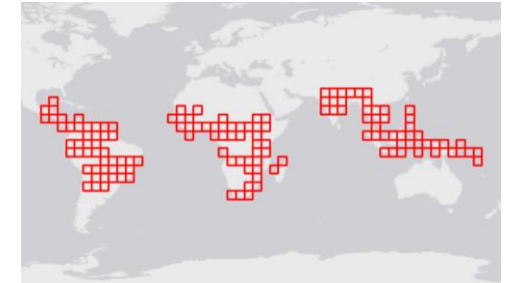
Pixel based processing evaluation

Validation : GLAD + visual inspection

Target cycle : April 22 – May 19, 2019

Site : **135 Scene**(5x5 deg.)

Middle-south America : 45, South-east Asia 45, Africa 45



- Estimate from GLAD and visual inspection

User's Acc. : Improve 6.0 %

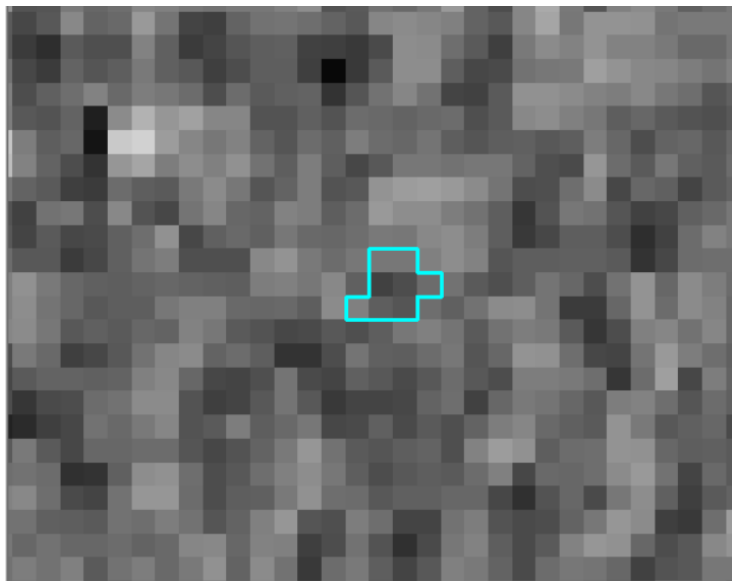
Num. of correctly detected polygons : 3.6 times

(Minimum detection size : 3 ha → 2 ha)

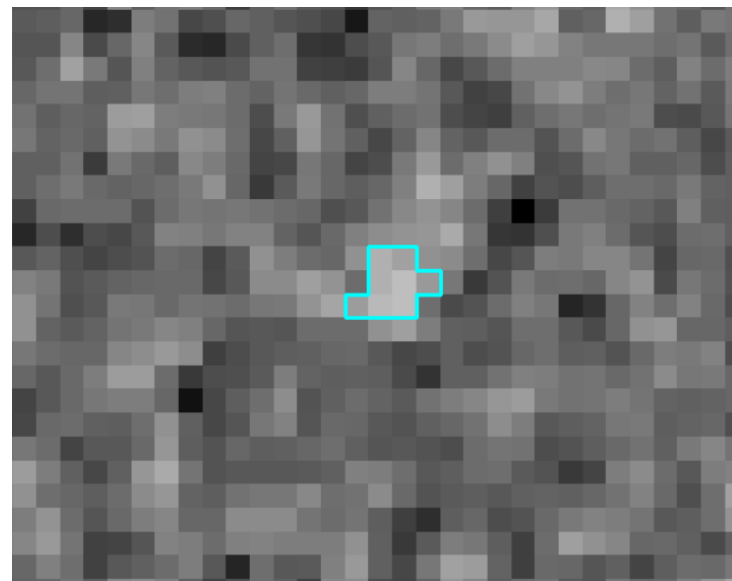
Pixel based processing shows prospective results!

Example of 2.0 ha detection

PALSAR-2/HH



Sept 27, 2018

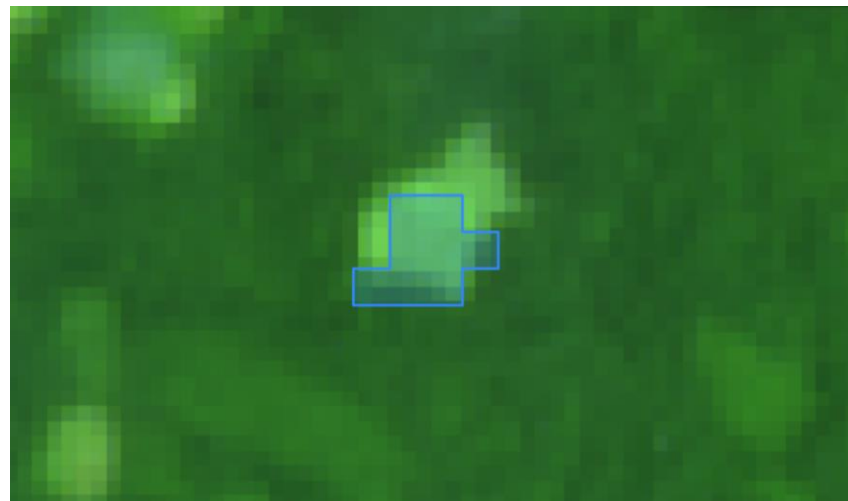


Nov. 8, 2018

Sentinel-2



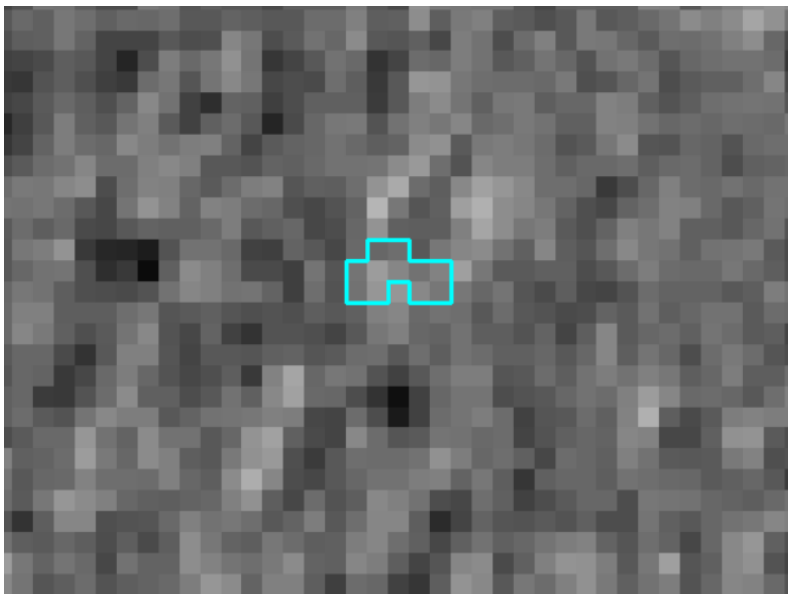
Sept. 13, 2018



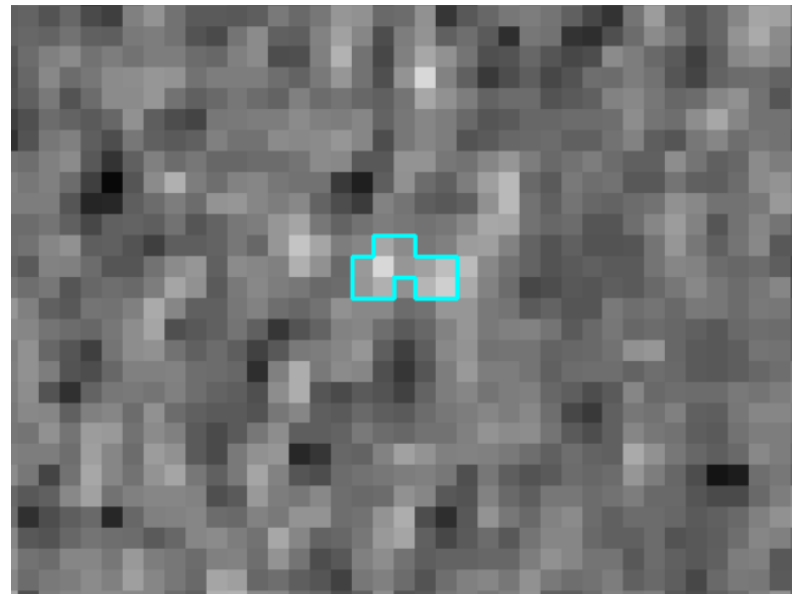
Oct. 18, 2018

Example of 2.0 ha detection

PALSAR-2/HH

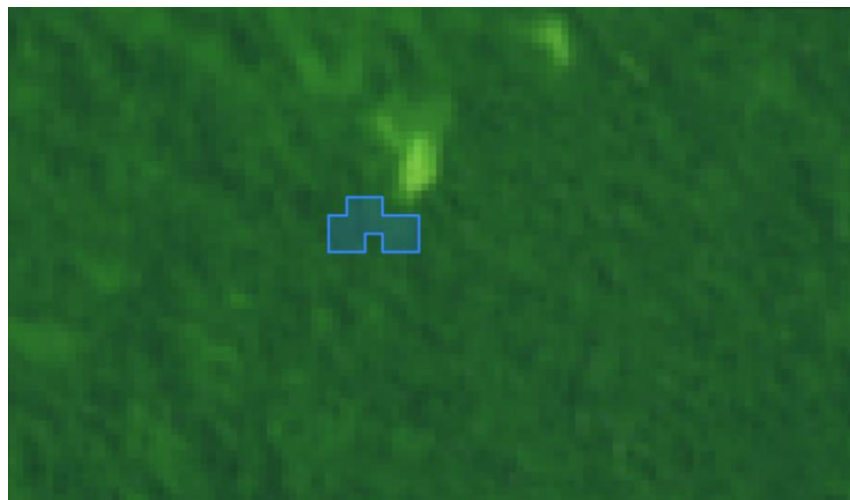


Sept. 27, 2018



Nov. 8, 2018

Sentinel-2



Sept. 13, 2018



Oct. 3, 2018

Summary

- Current status of JJ-FAST
 - Improvement of the algorithm1
 - Num. of data used : 16 -> **21**
 - Deforestation info. provision timing : **3 to 4 days** after PALSAR-2 observation
 - Pixel based processing (under evaluation)
 - User's Acc. : Improve 6.0 %
 - Num. of correctly detected polygons : 3.6 times
(Minimum detection size : 3 ha → **2 ha**)
- Pixel based processing shows prospective results!**

ACKNOWLEDGEMENTS

This research was supported by the research budget of JAXA. The research results will be used for the JJ-FAST system, funded by JICA (Japan International Cooperation Agency) and JAXA, and will be used for early-deforestation detection in global tropical forests.