Post-K&C – First Report

Forest loss detection using ALOS-1 and ALOS-2 SAR data

Stéphane MERMOZ, Alexandre BOUVET

GlobEO
Global Earth Observation

CESBIO

Post-KC Science Team meeting #1
Tokyo, Japan, January 20-24, 2020

Project outline and objectives

- To **assess forest loss areas** in **Vietnam, Cambodia and Laos**, based on ALOS-2 and Sentinel-1 data

- The project will involve activities at the large scale using the ALOS2 mosaics/path data

- Continue the work undertaken in the K&C initiative, which allowed for the production of annual deforestation maps in South-East Asia

Project outline and objectives : study area

- Deforestation hotspot, forest loss from 2009 to 2030 projected to reach 17% to 34% of the total forest area (15 to 30 million ha) (WWF, 2013).

- Illegal and unsustainable logging, conversion of forests for agriculture, construction of dams and infrastructure driven by population growth, increasing market demand, and policies that promote short-term economic growth

- Higher demand and weak law enforcement have hindered efforts to control logging and the log trade

Project outline and objectives :

How the project aims to supported one or more of *the 4 K&C thematic drivers*
Carbon cycle science, **C**limate Change, International **C**onventions, Environmental **C**onservation

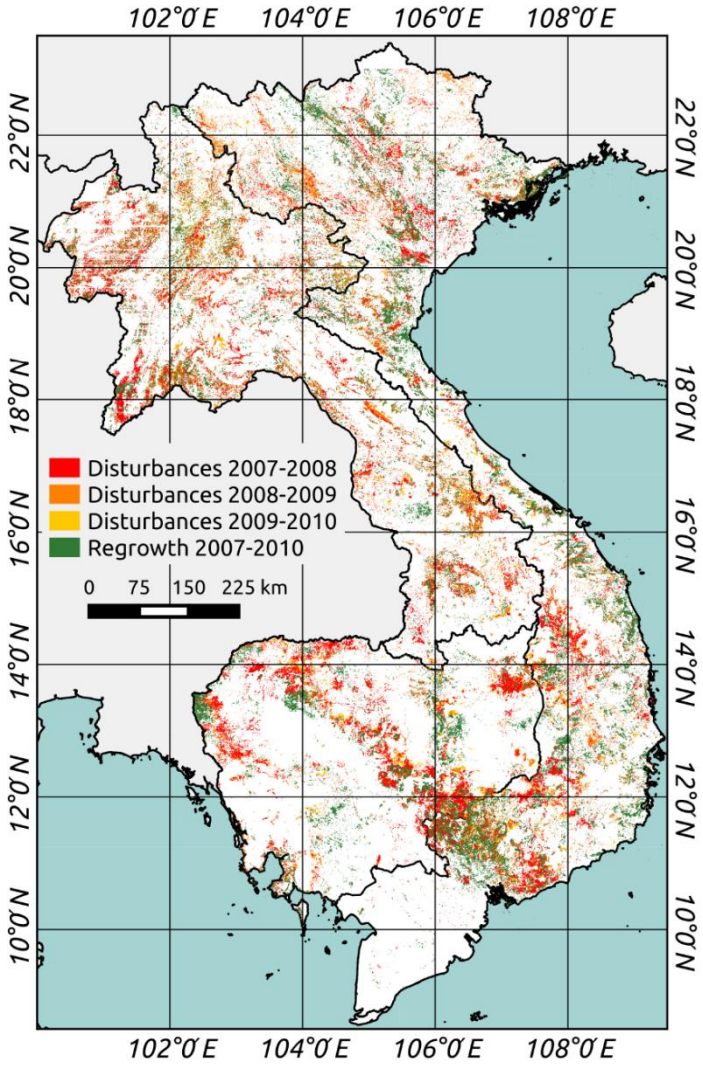
- On-going Committee on Earth Observation satellites (CEOS) activities conducted in Vietnam, around the **Vietnam Open Data Cube** (http://datacube.vn/). Vietnam National Space Center (VNSC) was CEOS Chair 2019

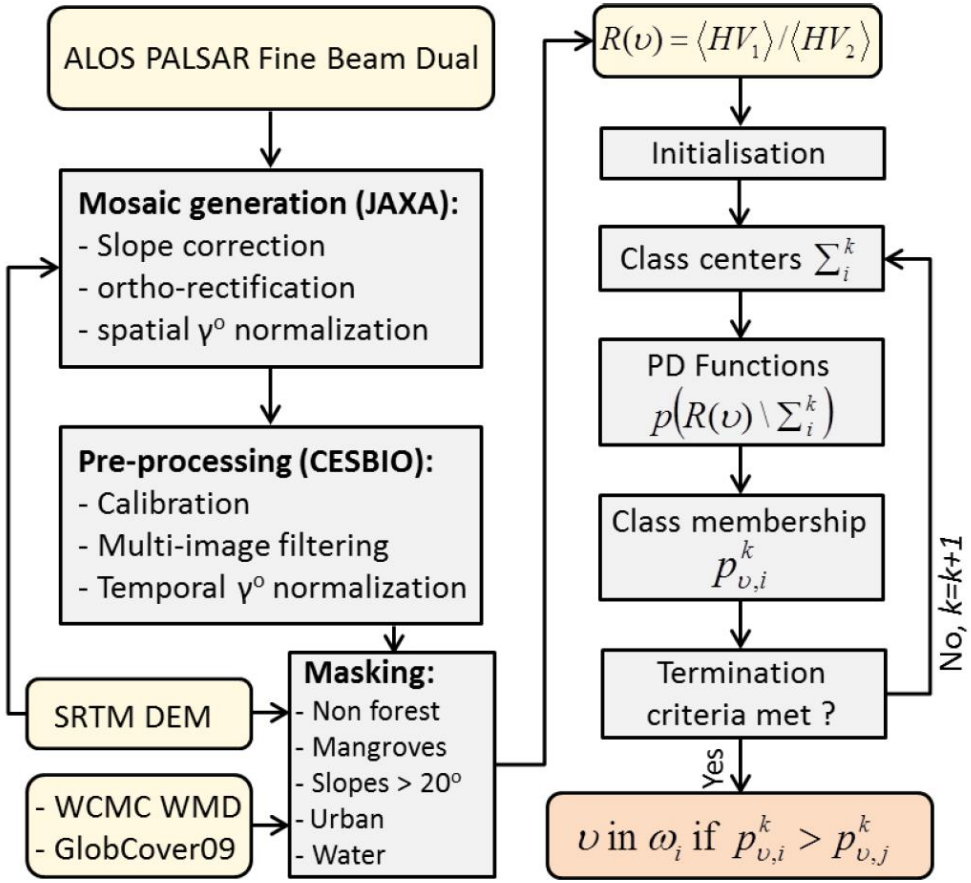
- To the users of public sectors to support their efforts to control logging and log trade

- Assessment of the carbon stocks

Results and significant findings

Deforestation 2007-2010 in Cambodia, Vietnam and LAO PDR using ALOS mosaics





Mermoz et al., 2016, RS

ALOS

K&C Initiative

An international science collaboration led by JAXA

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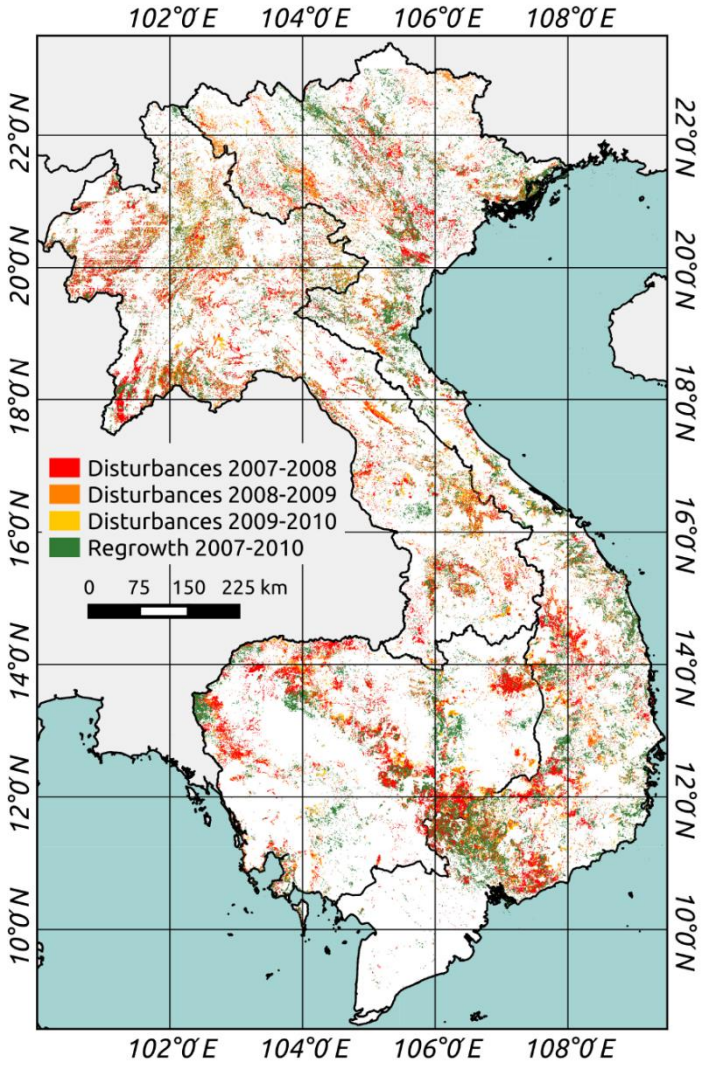

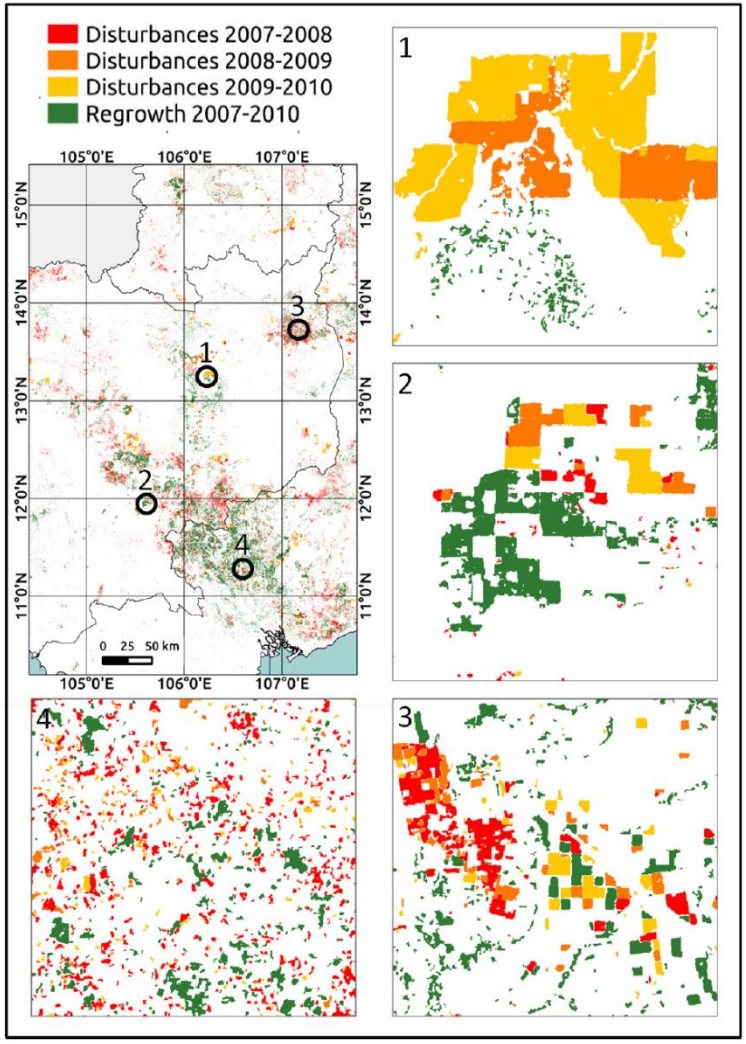

ALOS

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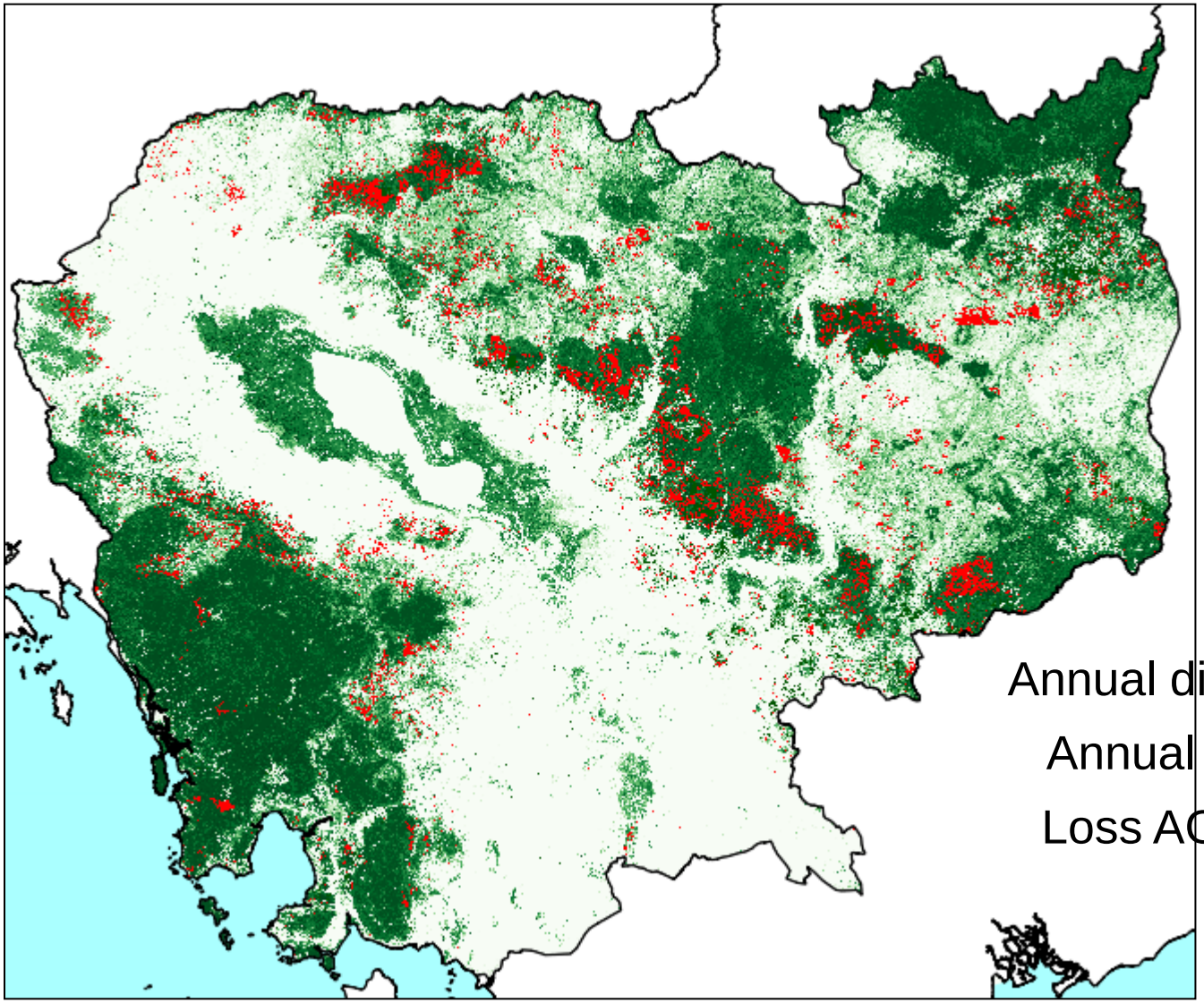
Deforestation 2010-2015 in Cambodia using ALOS-12 mosaics



Landsat tree cover

100%

0

Not published

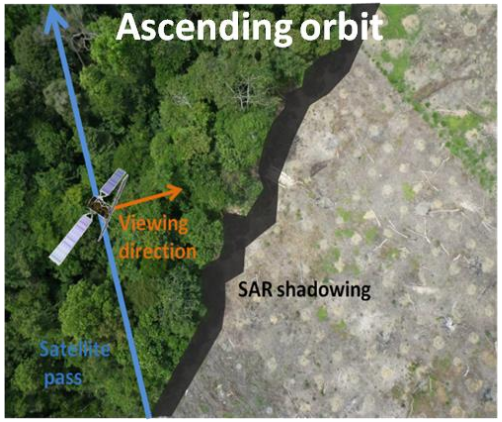
Not validated

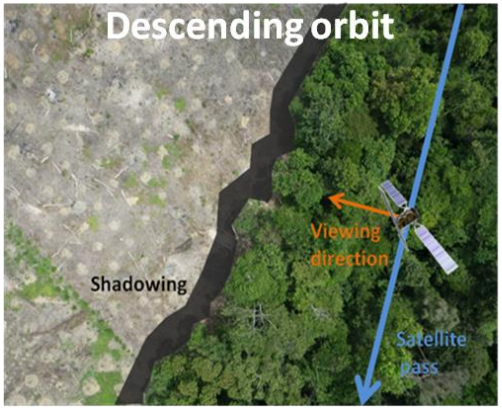
Annual disturbance rate = -1.45%

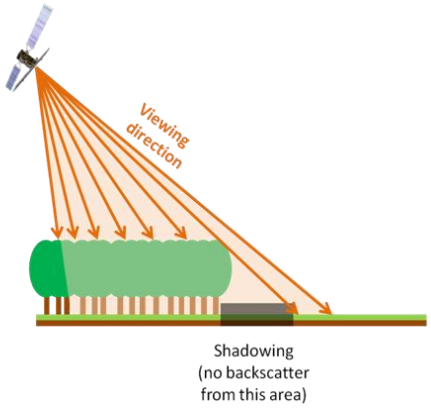
Annual regrowth rate = 0.42%

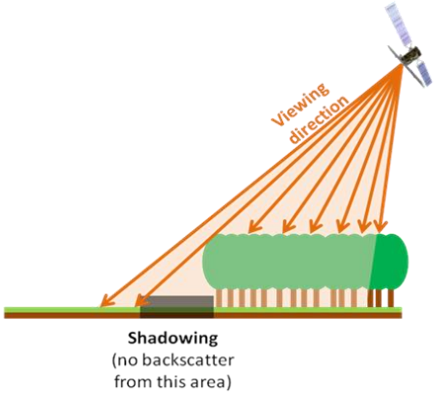
Loss AGB = 134 Mt (Saatchi) /
114 Mt (Baccini)

Deforestation every 12 days using Sentinel-1





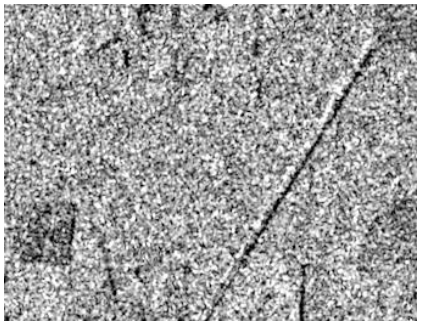




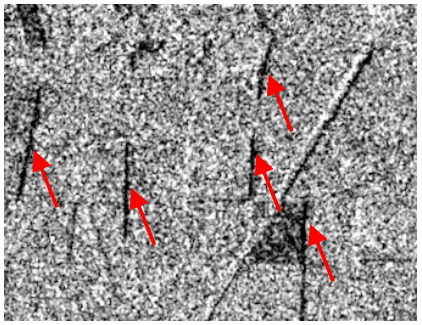
SAR instruments have a **side-looking** geometry.

At high resolutions (e.g. 10m), the **edges of forest patches** are characterized by a **shadow**: an area on the ground which is not reached by the SAR wave, and therefore appear as a dark target

10 May 2015

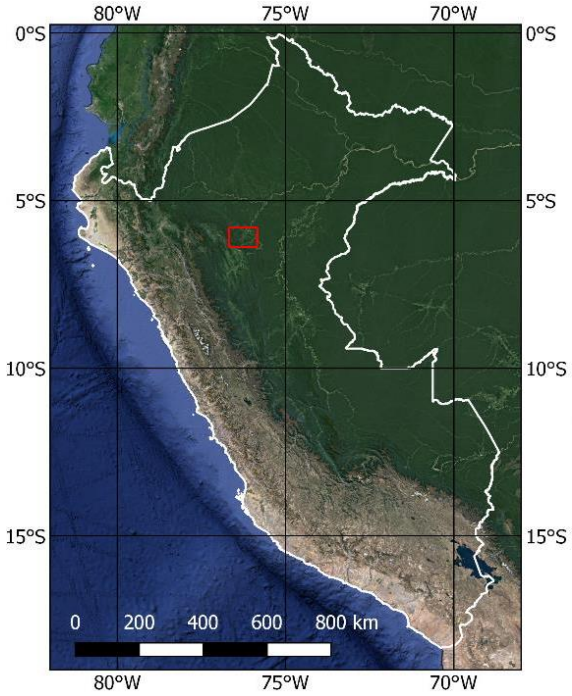


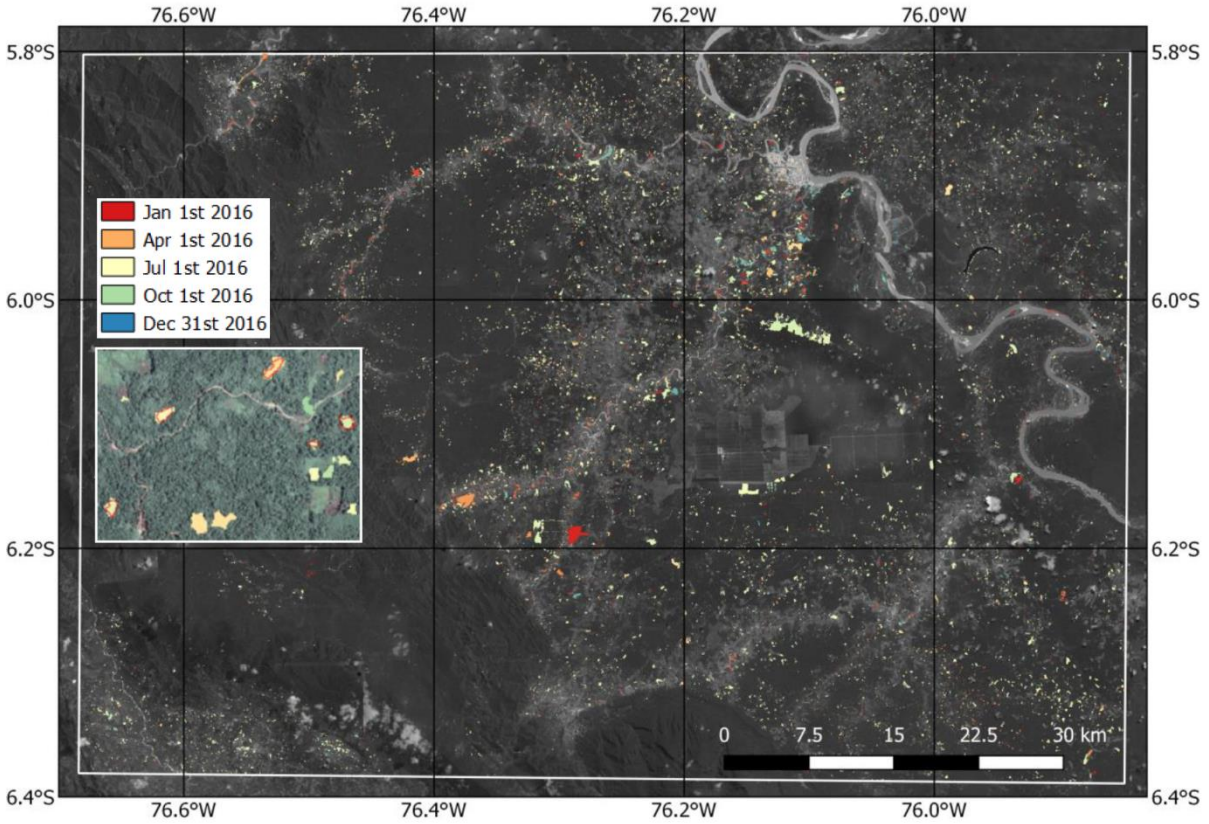
1 October 2016



Bouvet et al., 2018, RS

Deforestation 2016 in Peru every 12 days using Sentinel-1





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ALOS

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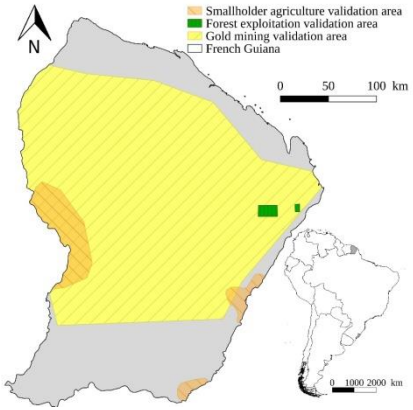
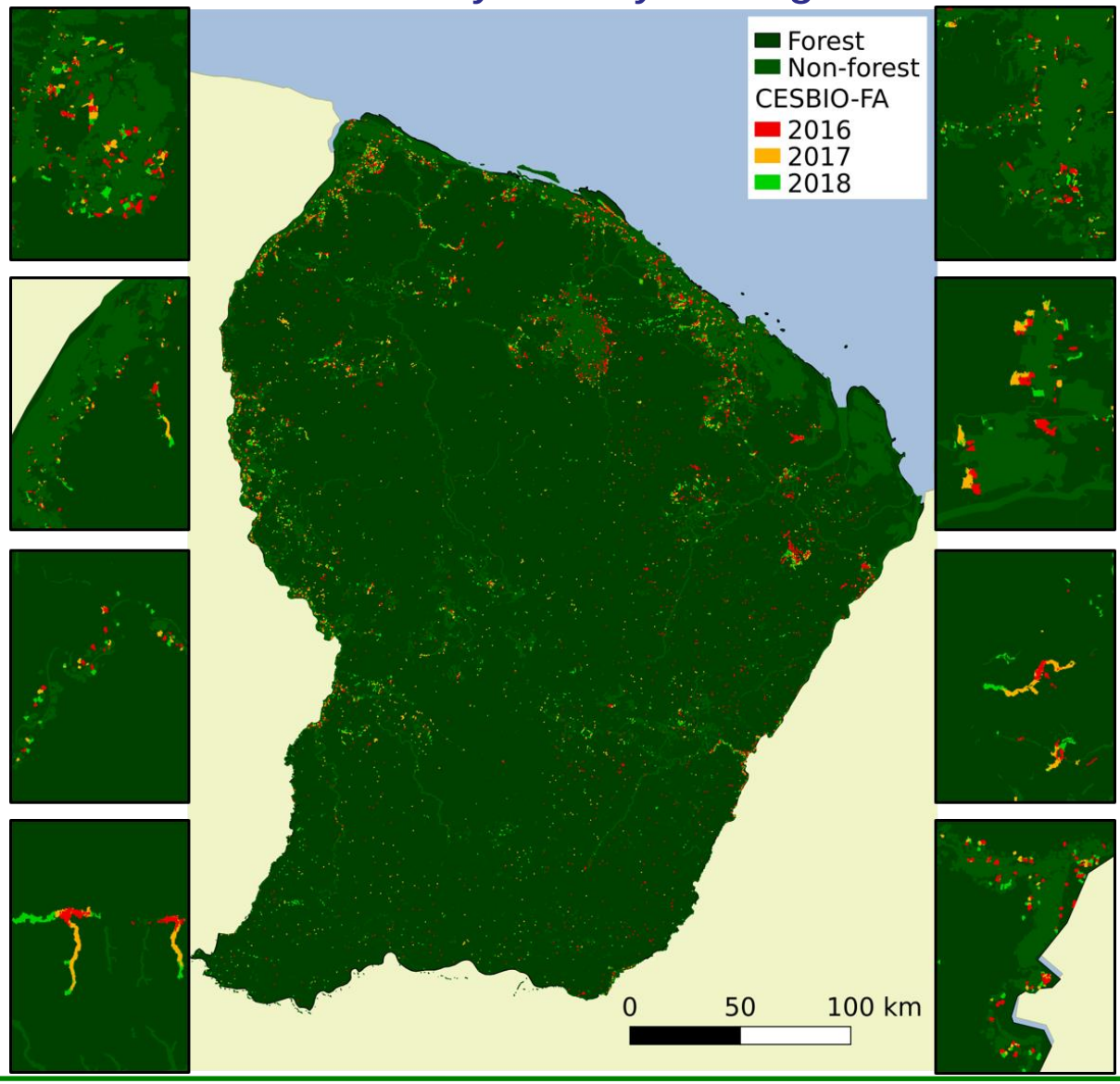
Deforestation 2016-2018 in French Guiana every 12 days using Sentinel-1





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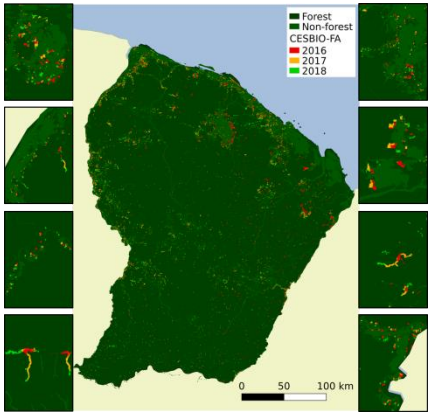

Ballère et al., 2020
Submitted to RSE

FA1: CESBIO FA2: UMD-GLAD

	Smallholder agriculture		Forest exploitation		Gold mining	
	FA1	FA2	FA1	FA2	FA1	FA2
UA deforested area	97,6	100	93,2	100	100	100
UA intact forest	98,5	93,3	97,1	92,1	98,0	94,3
PA deforested area	87,0	61,1	79,8	60,6	83,6	63,9
PA intact forest	99,8	100	99,1	100	100	100
Overall accuracy	98,4	94,0	98,2	94,8	96,7	93,0

Using 2029 (1839 ha) deforested *in situ* plots, following Oloffson 2013/14

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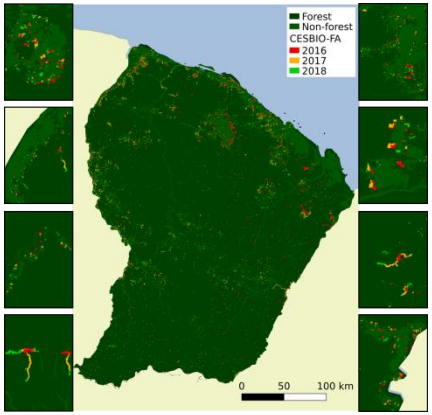

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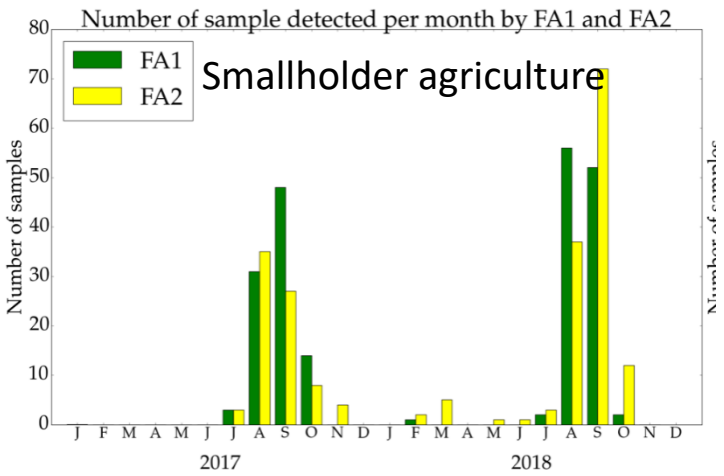

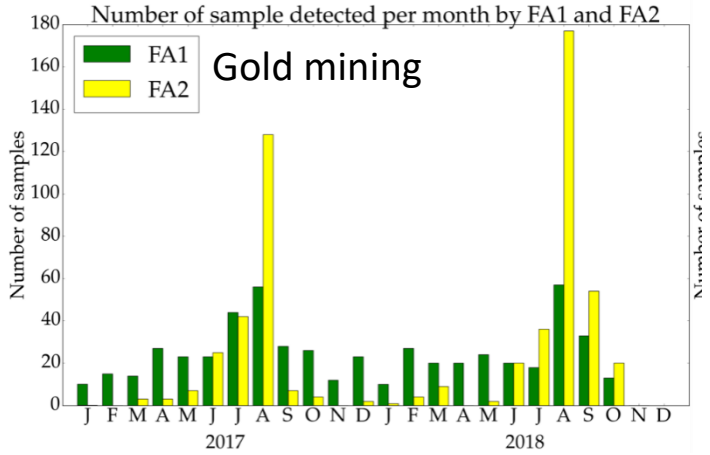

The ESA Sentinel-1 for Observing forests in the tropics (SOFT) project
EO Science For Society

Objective: to provide **forest loss maps every month** over **Vietnam, Cambodia and Laos, based on Copernicus Earth observation Sentinel-1 data**

→ Opportunity to use Sentinel-1 and ALOS-2 data

ALOS

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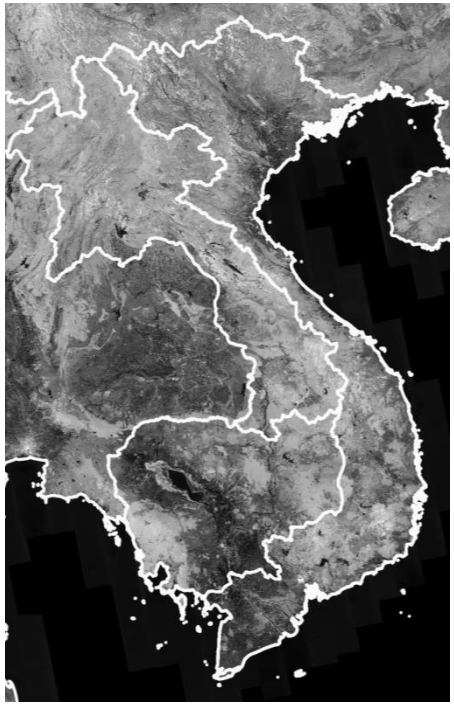

2018 ALOS-2 mosaic HV

ALOS

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The ESA Sentinel-1 for Observing forests in the tropics (SOFT) project
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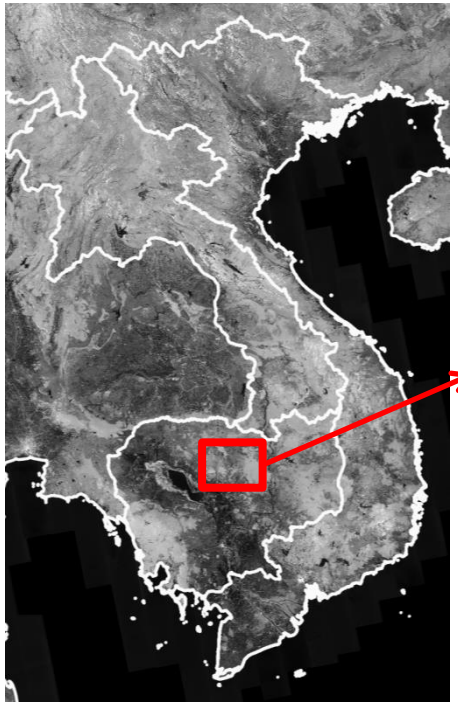

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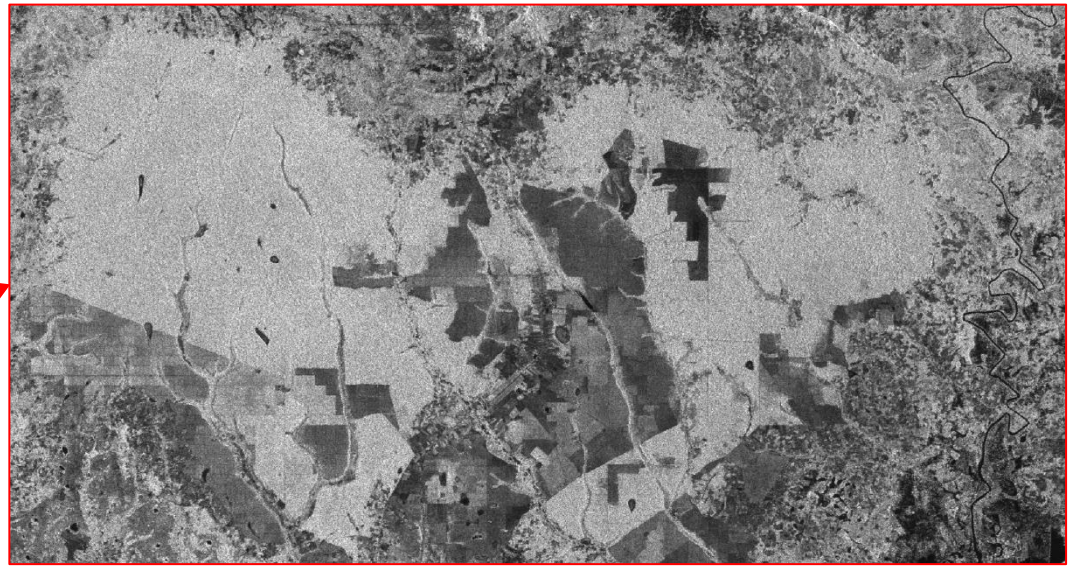

Deliverables and other output

- **Project deliverables**: Forest loss maps at the country scale
- **Peer-reviewed publications**: At least one publication
- **Non-peer-reviewed publications**: One conference per year (ForestSat 2020)

PALSAR/PALSAR-2 data access

Path data to be requested

Thank you

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Deforestation 2017-2015 in Cambodia 2015-2017 using Sentinel-1