Biomasse forestière
&
Changement couverture forestière

Animateur: CESBIO (Equipe Biomass, Thuy Le Toan)

Contributeurs & Utilisateurs: EDB, LSCE, INRA , CIRAD, SIRS CNRM, CNPF, Agro-ParisTech

Produit 'Biomasse forestière'

Above Ground Biomass (AGB) en t/ha, 25 ou 50m, 1 carte / an

❑ Enjeu scientifique: rôle des forêts sources ou puits de carbone. Enjeu sociétal: ressources forestières, marché de carbone

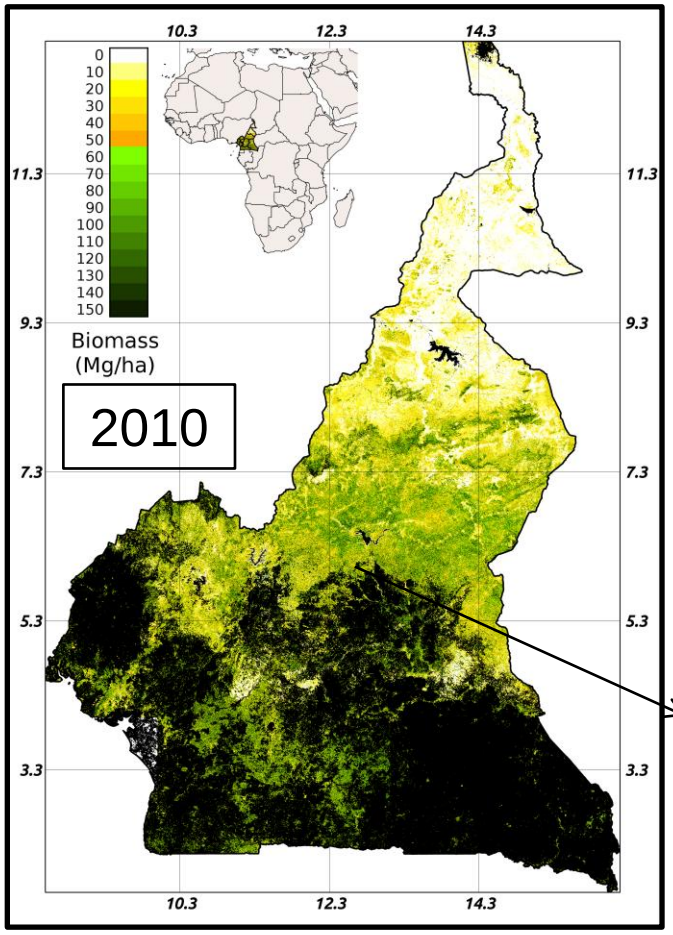
❑ **Méthode actuelle (avant BIOMASS)**

utilisant les satellites existants (ALOS-PALSAR→ limité à 150 t/ha)

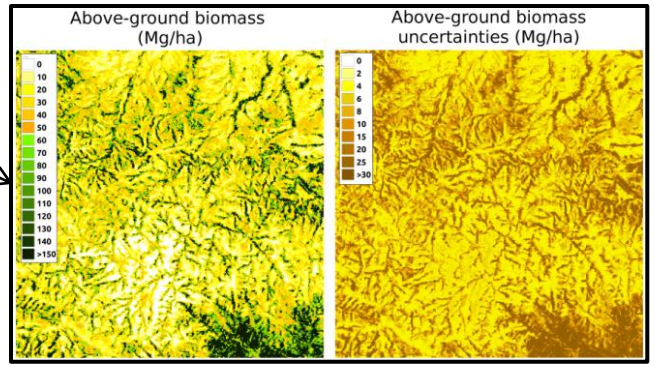
- Méthode généralisable globalement. Exemples sur diverses forêts
- ALOS-1: 2007, 2008, 2009, 2010
  ALOS-2: lancé Mars 2014, données prévues en 2015
- Besoin en images: collaboration avec JAXA
  - Equipe CESBIO: Kyoto et Carbon Initiatives
  - Collaboration JAXA-CNES?
- Besoin en données auxilliaires:
  - AGB des parcelles de référence (ajustement de la méthode et validation)
  - DEM (SRTM), Un plus: carte LULC

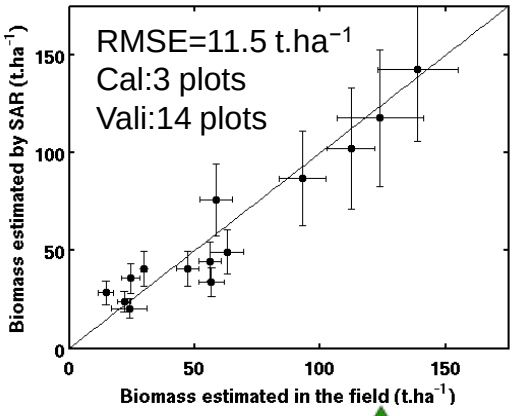
❑ Degré de maturité: moyen à élevé. Intervention humaine: limitée

Produit 'Biomasse forestière' Cameroun



	Surface area (ha)	Mean AGB ($Mg.ha^{-1}$)	AGB (Tg)	Carbon (TgC)
Mosaic forest-croplands	1,811,150	89.5	162.9	81.4
Mosaic forest-savanna	5,187,900	75.6	394.2	197.1
Deciduous woodland	10,352,400	53.3	553.6	276.8
Deciduous shrubland – sparse trees	1,949,000	30.7	59.8	29.9
Others	6,622,340	12.6	83.4	41.7
TOTAL	25,922,790	48.2	1253	**626.9**



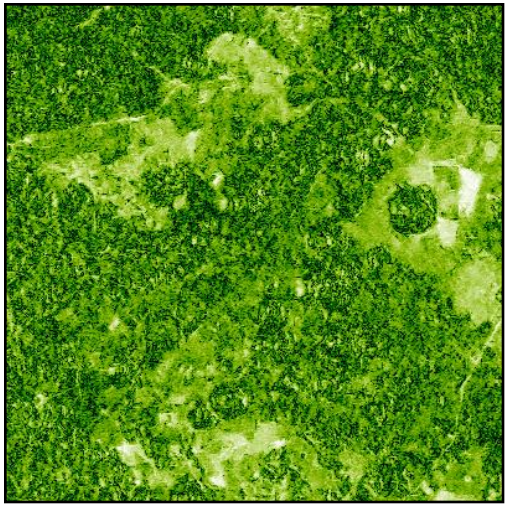


Total aboveground carbon stock:
- This study: 626.9 TgC
- Nasi et al. (2009): 710 TgC

Produit 'Biomasse forestière' Cameroun

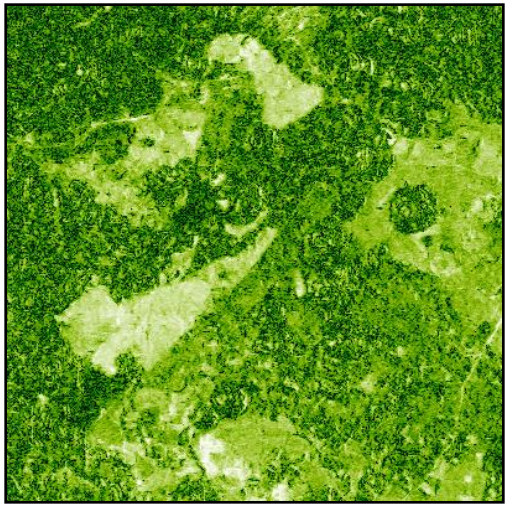
Savanna represents 55% of Cameroon surface and 73% of land cover change events
- Annual change area in savanna : 0.077%
- 50% of land cover change events: <0.2ha

Detail: biomass map 2007



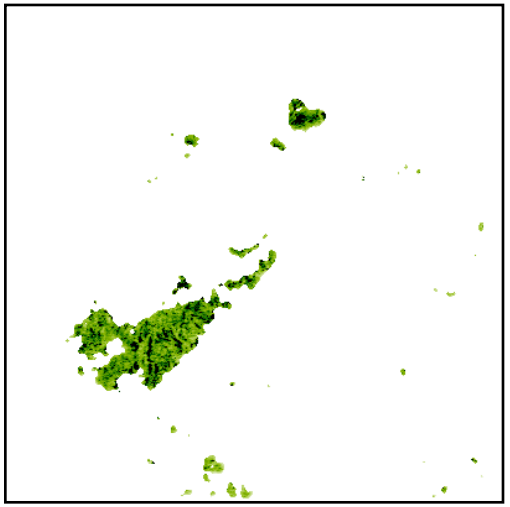
0 in Mg.ha^{-1} 150

Detail: biomass map 2010



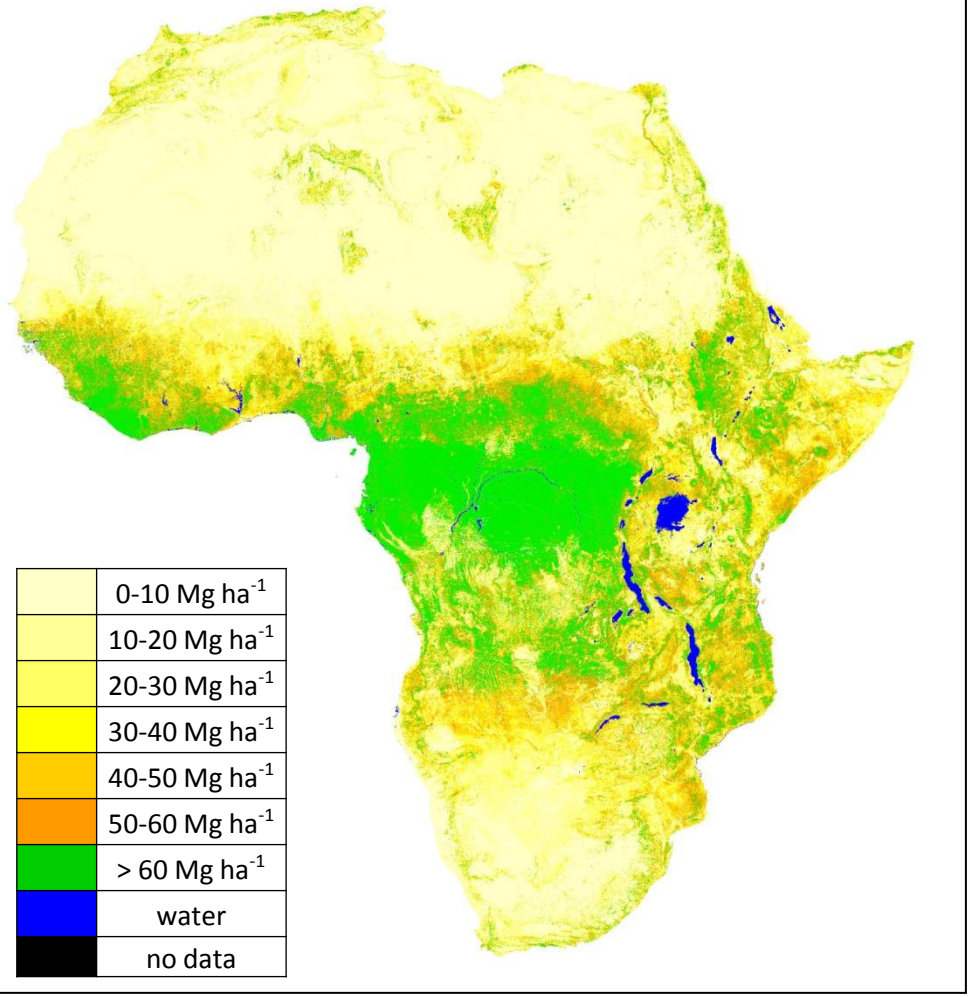
0 in Mg.ha^{-1} 150

Biomass loss 2007-2010

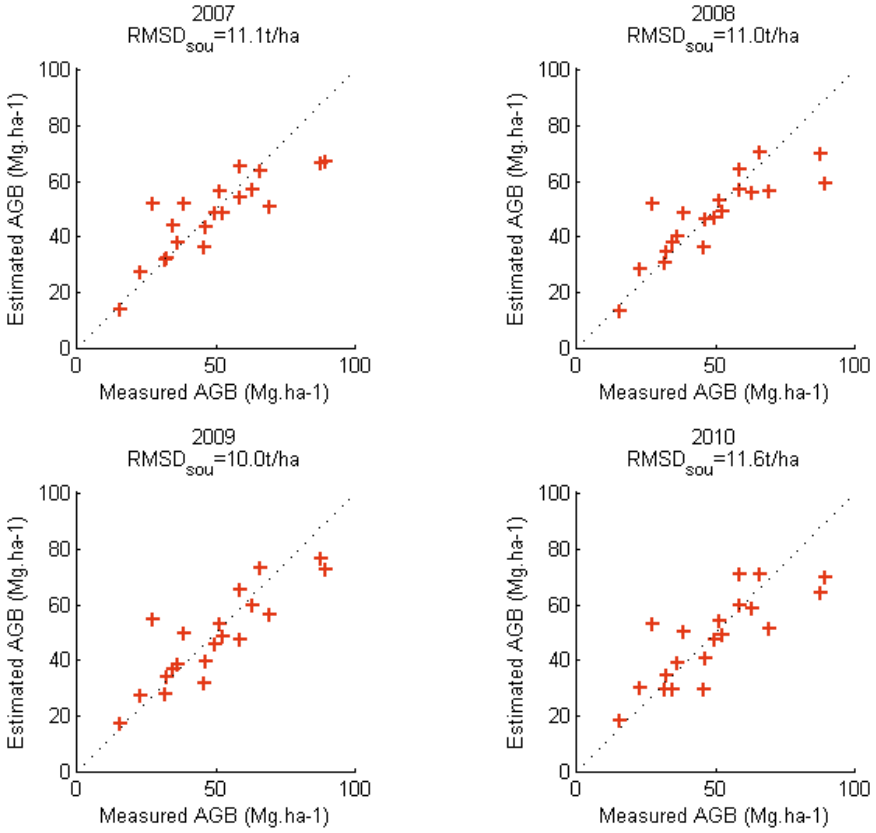


0 in Mg.ha^{-1} 100

Produit ‘Biomasse forestière’ Afrique de l’est et australe



Biomass inversion using the Dry Season ALOS PALSAR data
Validity domain: East and Austral Africa



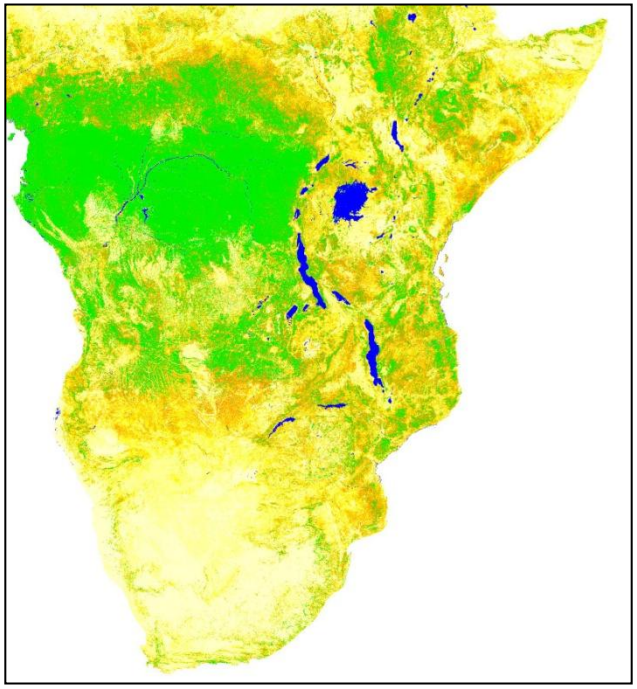
Data from S Africa, Mozambique, Botswana and Uganda

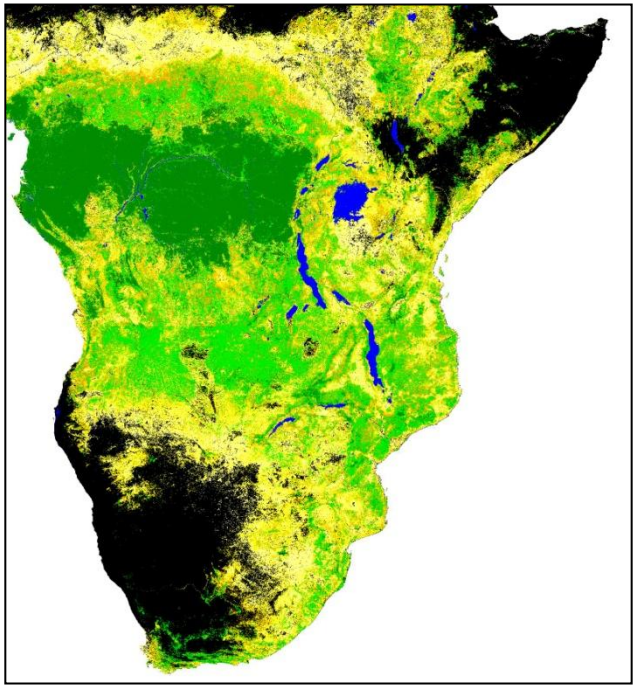
Produit ‘Biomasse forestière’ Afrique de l’est et australe

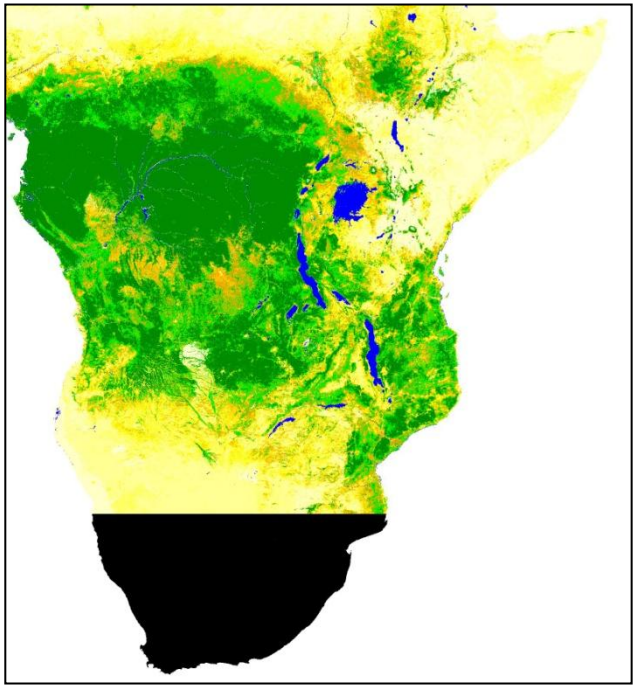
CESBIO map

Saatchi et al., 2011

Baccini et al., 2012







50 m
(from ALOS-PALSAR)

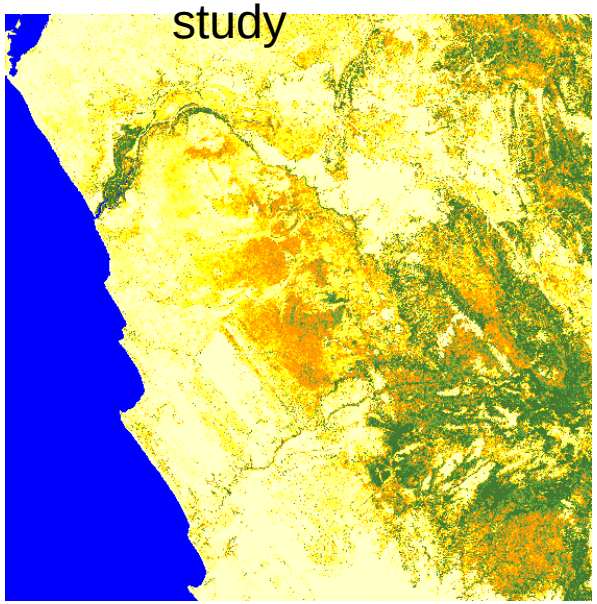
1 km
(from MODIS)

500 m
(from MODIS)

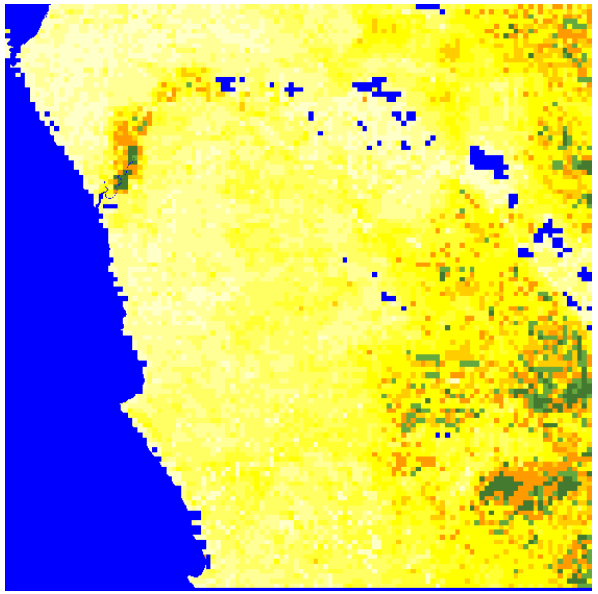
	0-10 Mg ha^{-1}		50-60 Mg ha^{-1}
	10-20 Mg ha^{-1}		60-80 Mg ha^{-1}
	20-30 Mg ha^{-1}		80-100 Mg ha^{-1}
	30-40 Mg ha^{-1}		>100 Mg ha^{-1}
	40-50 Mg ha^{-1}		water

LAT 8°-9°S / LON 13°-14°E (ANGOLA)

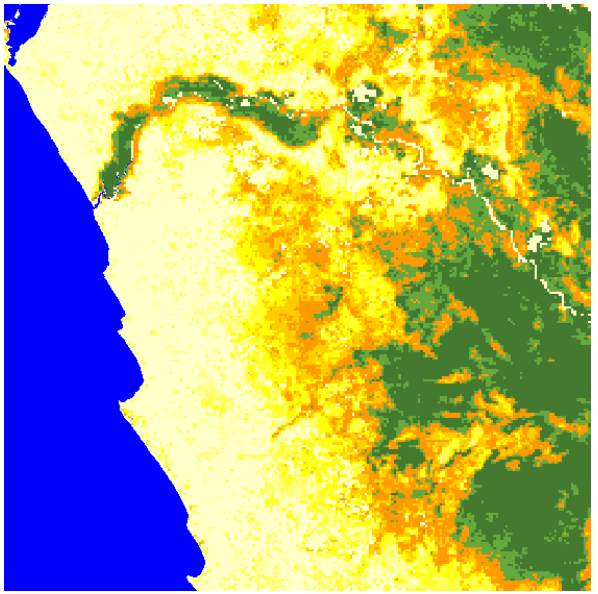
This study



Saatchi et al., 2011



Baccini et al., 2012



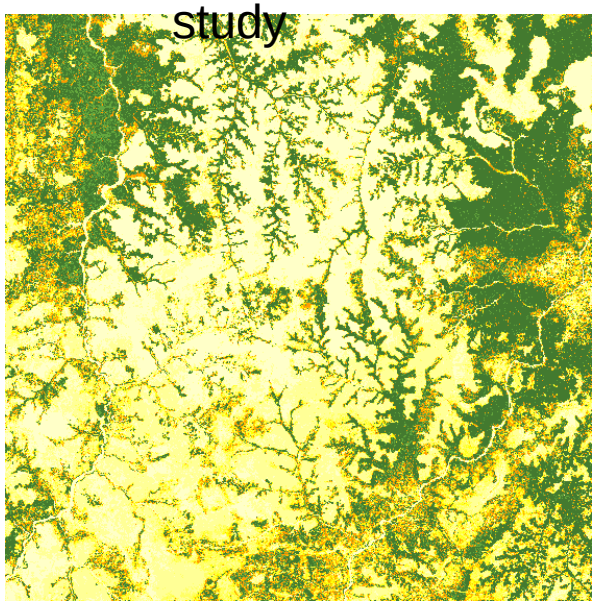
1° x 1° tile
≈ 110km x 110km

	0-10 Mg ha^{-1}
	10-20 Mg ha^{-1}
	20-30 Mg ha^{-1}
	30-40 Mg ha^{-1}
	40-50 Mg ha^{-1}

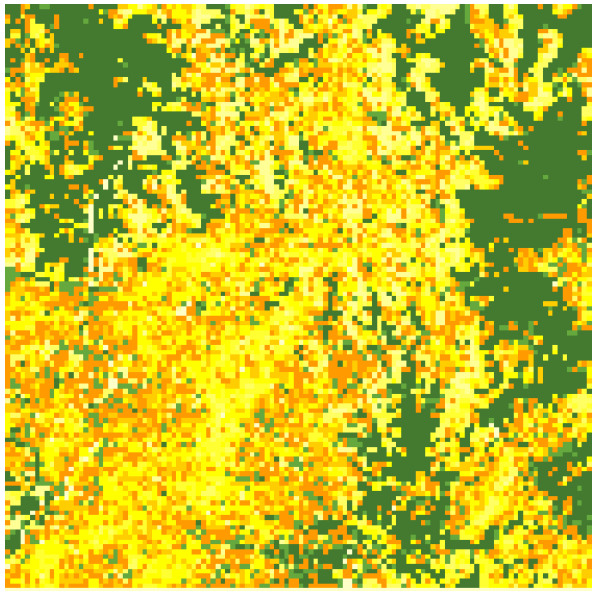
	50-60 Mg ha^{-1}
	60-80 Mg ha^{-1}
	80-100 Mg ha^{-1}
	>100 Mg ha^{-1}
	water

LAT 5°-6°S / LON 20°-21°E (DRC)

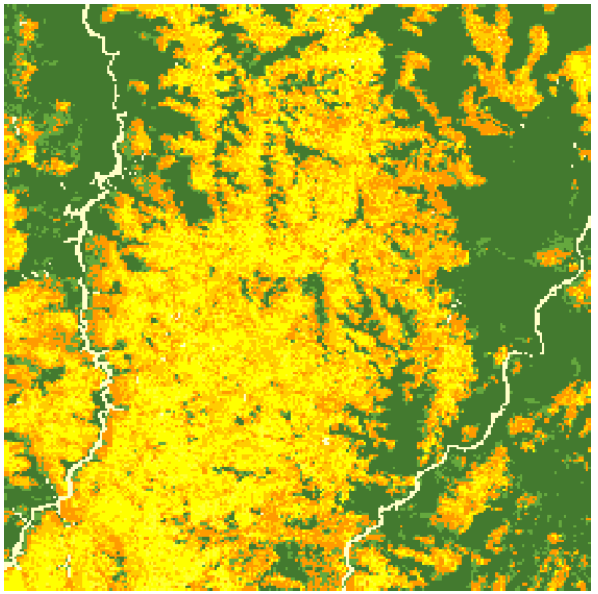
This study



Saatchi et al., 2011



Baccini et al., 2012



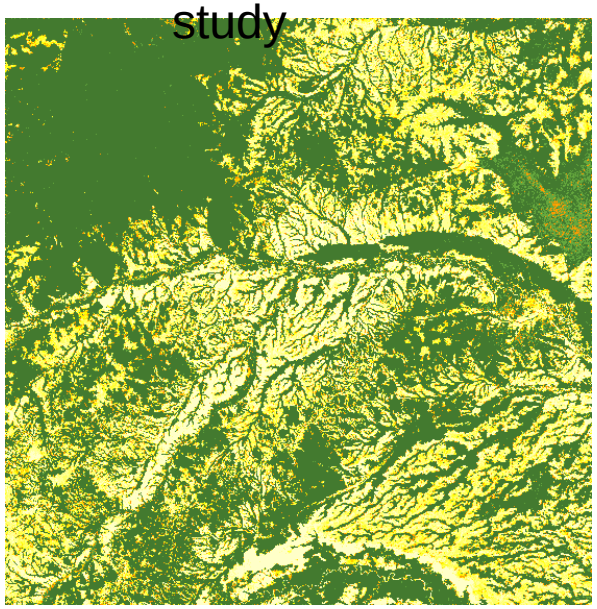
1° x 1° tile
≈ 110km x 110km

	0-10 Mg ha^{-1}
	10-20 Mg ha^{-1}
	20-30 Mg ha^{-1}
	30-40 Mg ha^{-1}
	40-50 Mg ha^{-1}

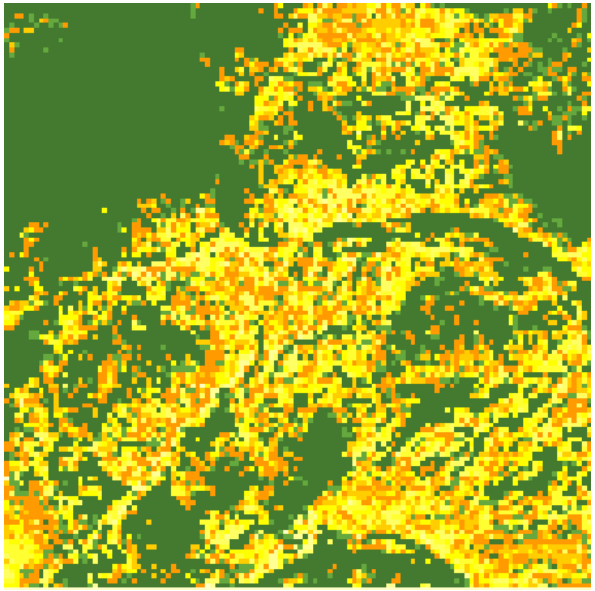
	50-60 Mg ha^{-1}
	60-80 Mg ha^{-1}
	80-100 Mg ha^{-1}
	>100 Mg ha^{-1}
	water

LAT 0°-1°S / LON 15°-16°E (CONGO)

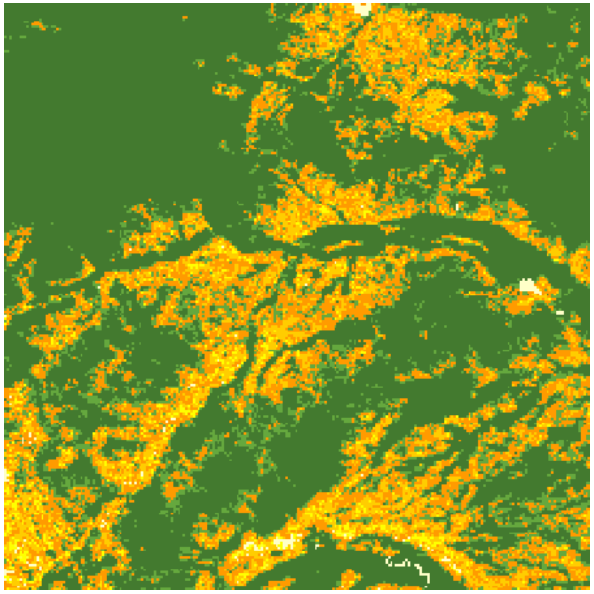
This study



Saatchi et al., 2011



Baccini et al., 2012

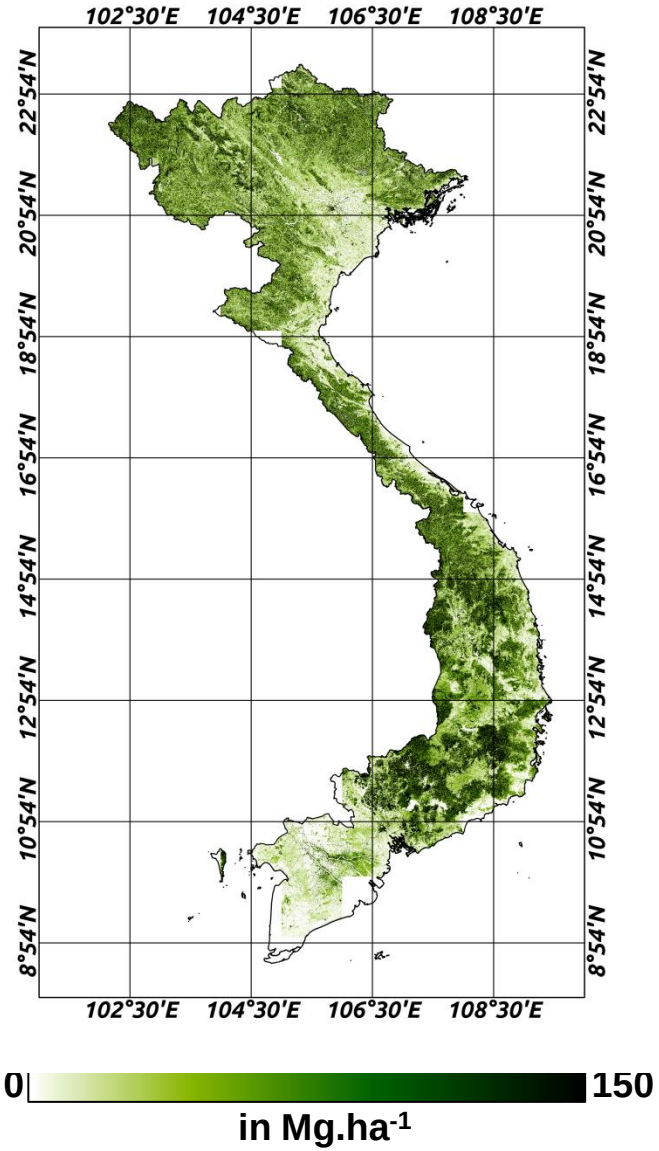


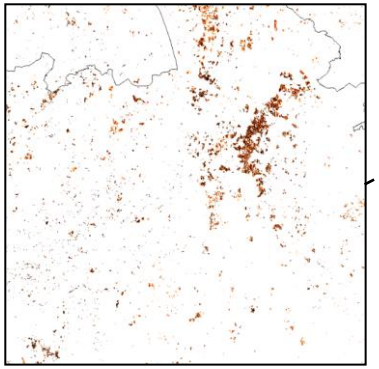
1° x 1° tile
≈ 110km x 110km

	0-10 Mg ha^{-1}
	10-20 Mg ha^{-1}
	20-30 Mg ha^{-1}
	30-40 Mg ha^{-1}
	40-50 Mg ha^{-1}

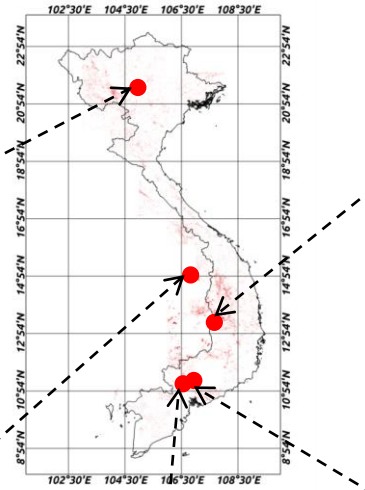
	50-60 Mg ha^{-1}
	60-80 Mg ha^{-1}
	80-100 Mg ha^{-1}
	>100 Mg ha^{-1}
	water

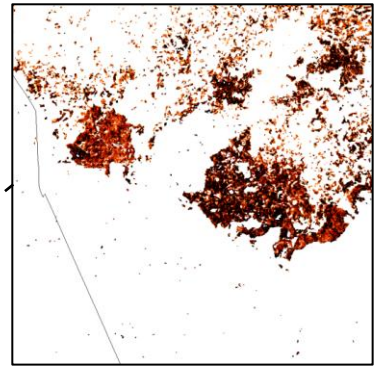
BIOMASSE ET CHANGEMENTS 2007-2010 VIETNAM



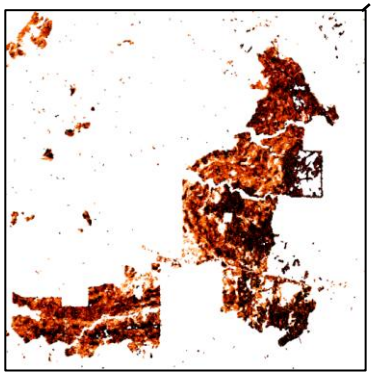


Logging of acacia plantation Hoa Binh

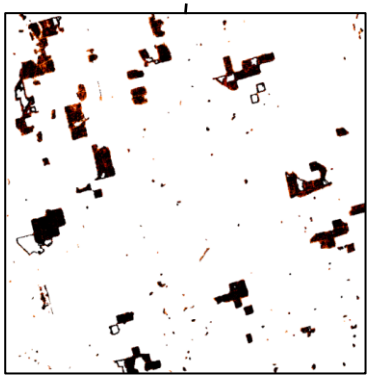




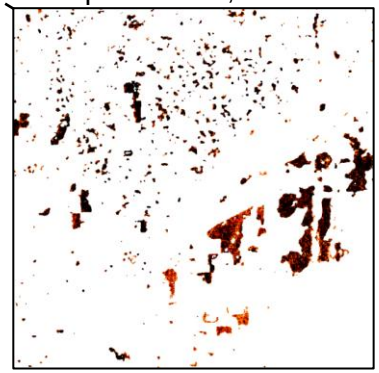
Forest degradation for Rubber and Coffee plantations, Gia Lai



Forest degradation for Coffee plantation Attapeu, Laos



Logging of old Rubber for new plantation, Tay Ninh

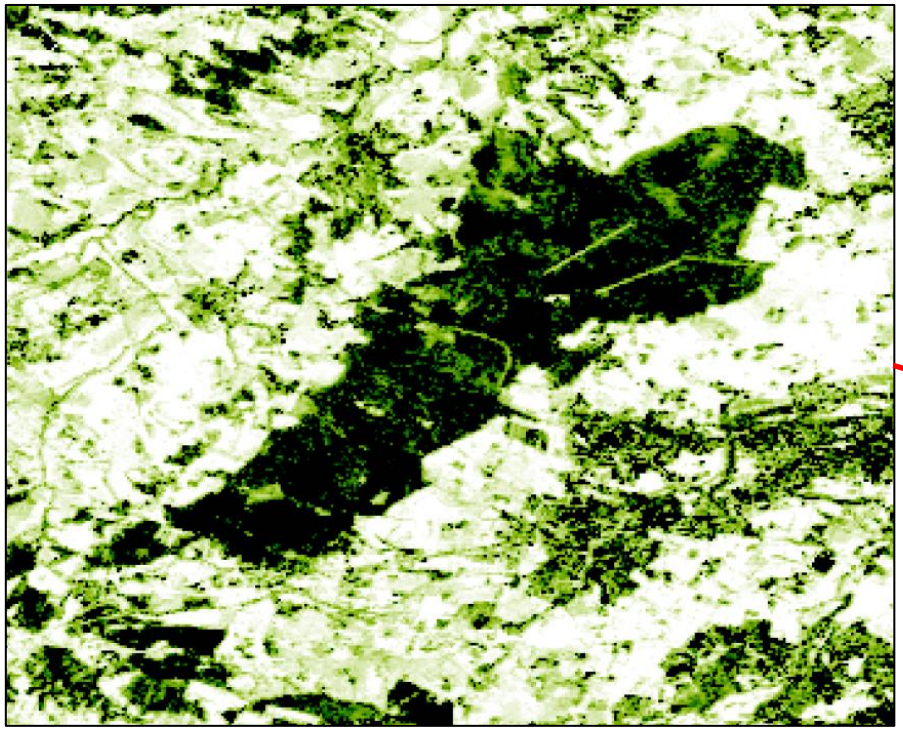


Forest degradation for Rubber (South) and Fruit Tree (N), Binh Duong

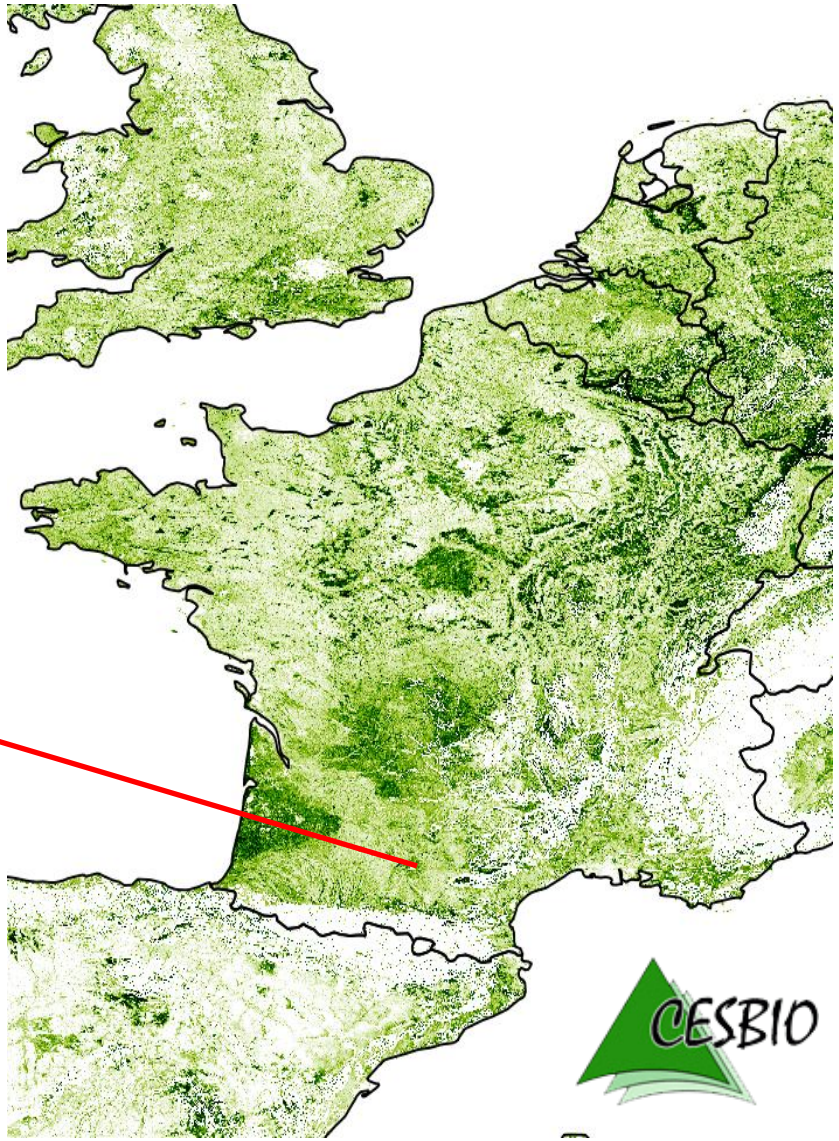
Theia
Pôle Thématique
Surfaces Continentales

Biomasse de la France

En cours de validation



Forêt de Bouconne



0 150 t/ha

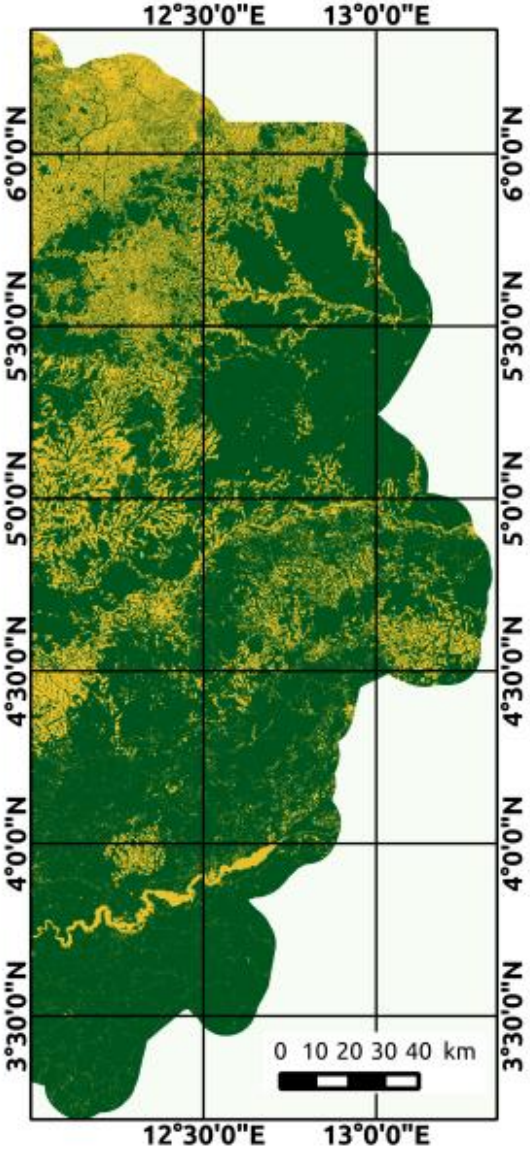
Produit ‘Changement couverture forestière’

- **Carte couverture forestière, 50m, et changement annuel**

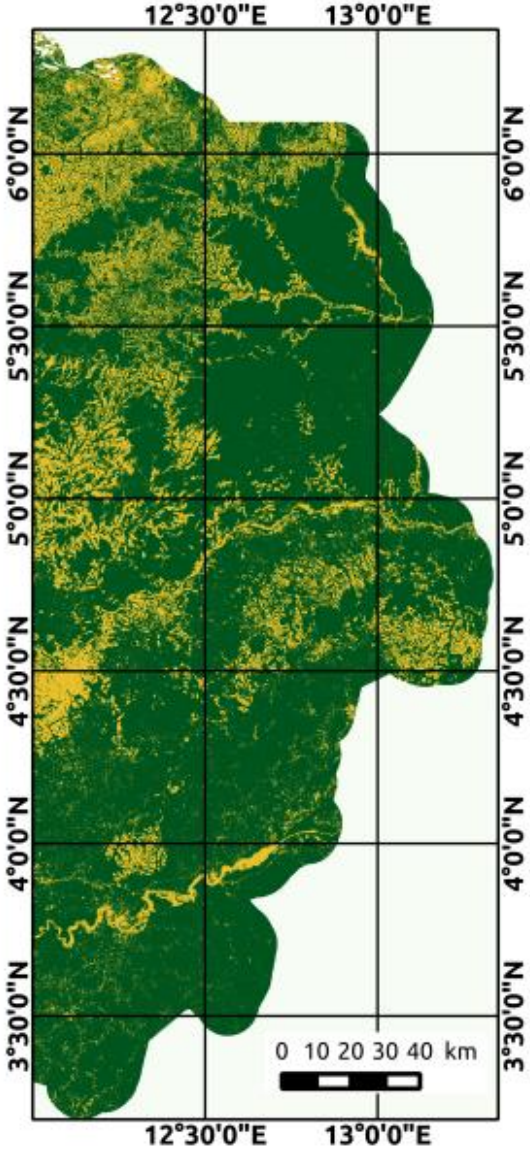
Définition FAO de ‘forêt’ dépendante du pays (> 10 à 30% arbre ..)

- Méthode courante pour REDD+: classification images optiques (SPOT, Landsat 8) basée sur biomasse de référence (interprétation visuelle des images VHR).
- Méthode proposée à partir du SAR: utiliser la biomasse comme indicateur pour obtenir la carte forêt-non forêt. Méthode généralisable globalement.
- Besoin en données auxiliaires: pour produire les résultats comparables à l’optique, besoin d’échantillons forêt-non forêt de VHR en optique
- Potentiel très grand de proposer une nouvelle définition de la forêt en fonction de la biomasse
- Degré de maturité: moyen à élevé. Intervention humaine: limitée

Cartes forêt-non forêt: comparaison optique-radar



From optical data



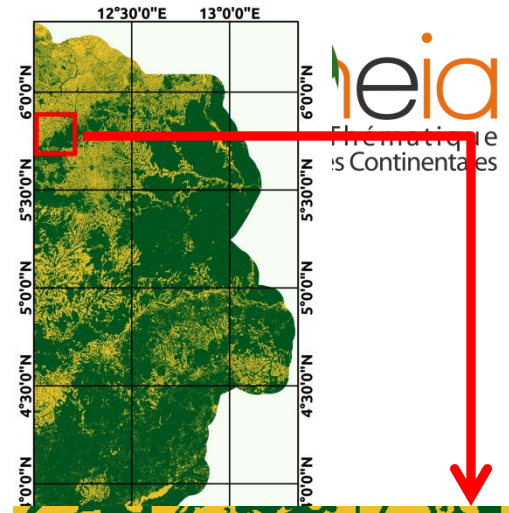
From SAR data

25 m resolution

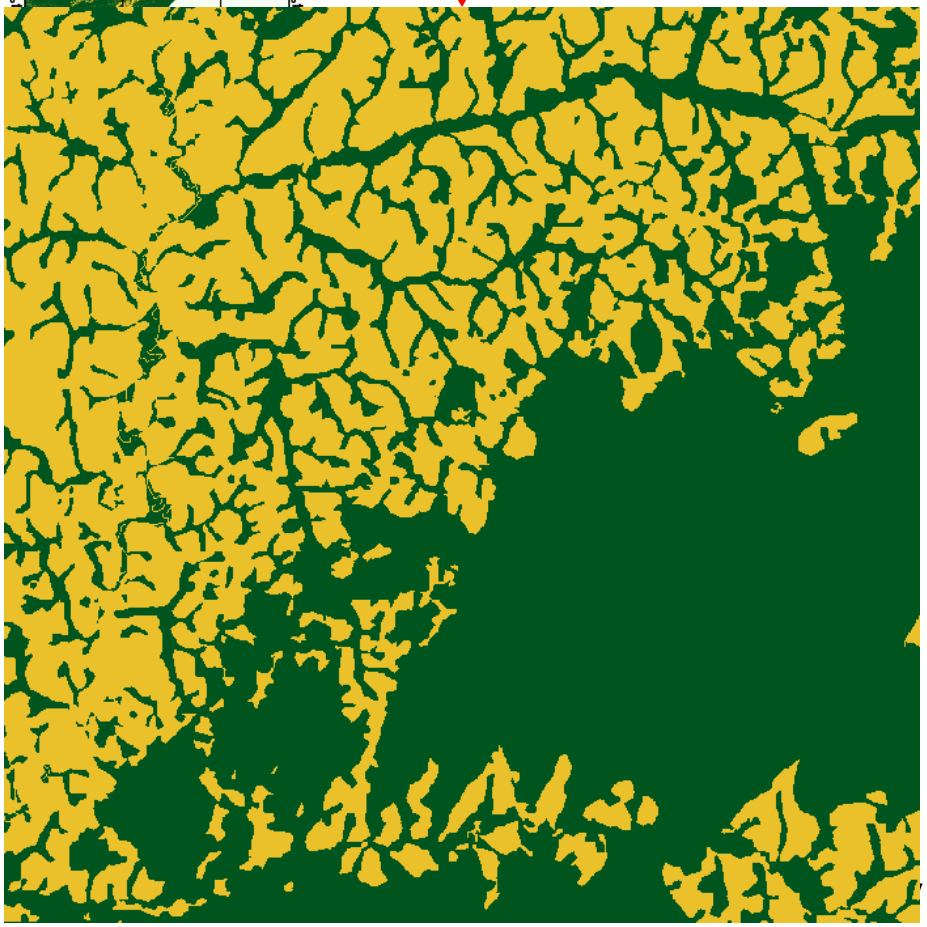
Comparison using ~7000 sampling units

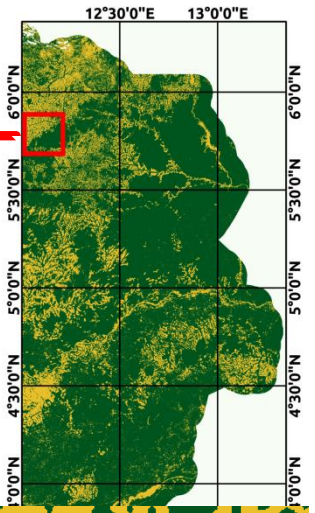
Mean producer accuracy: 87.4%
Mean user accuracy: 86.1%
Overall accuracy: 89.6%.

Cartes forêt-non forêt: comparaison optique-radar

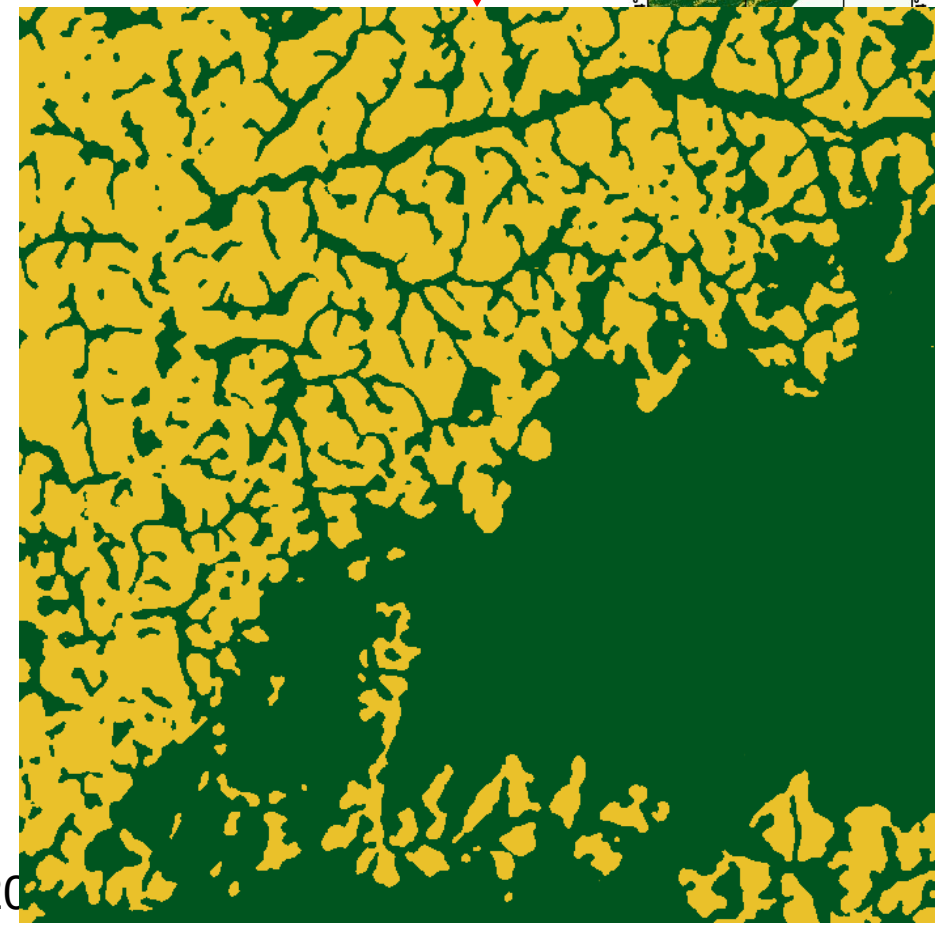


From optical





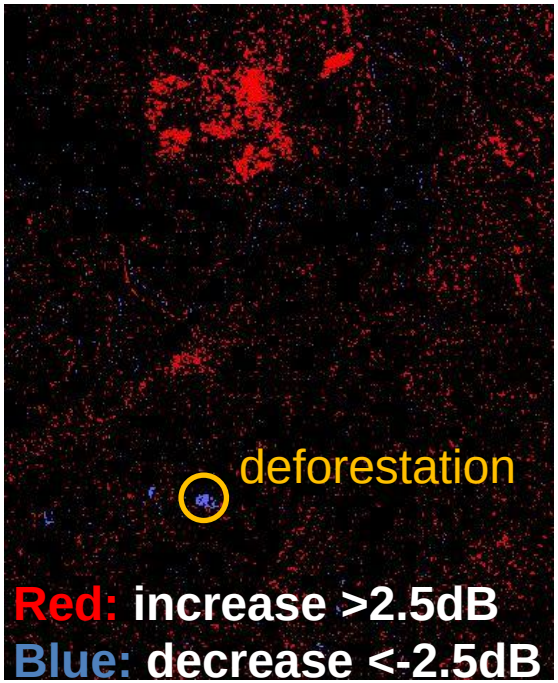
From SAR



Biomasse forestière et changement couverture forestière

- Pertinence/complémentarité du produit/service par rapport aux produits disponibles/prévus dans d'autres programmes
  - produits existants: a) 'BiomasSAR' issus de ENVISAT-ASAR (avant 2010), pour les forêts boréales, à 10 km de résolution, b) Carte de Biomasse de la forêt tropicale issue de MODIS et données de terrain à 1 km (Saatchi et al.) et 500m (Baccini et al.)
- Ressources disponibles/nécessaires et et contraintes
  - Travaux des chercheurs post-doc. Contraintes: financements
- Identifier les financements mobilisables
  - Proposition H2020: pour développer les produits de suivi des forêts à partir de Sentinel-1 (équipe CESBIO partenaire projet NeoFodis sur liste de réserve)
  - Proposition ESA (partenaire GlobBiomass)
  - Financement national: ?
- Etapes du projet/planning des activités:

  2015-2016: résultats Sentinel-1 et ALOS-2, 2017: vers l'opérationnel



Preliminary analysis of Sentinel-1 data

Sumatra, Riau province
Region of active logging

Changes between
11 August and 23 August 2014