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Monitoring of Ecosystems by Spatial Remote Sensing at INRAe: Les données issues des infrastructures spatiales, un atout européen majeur pour relever les défis systémiques

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Monitoring of Ecosystems by Spatial Remote Sensing at INRAe

Les données issues des infrastructures spatiales, un atout européen majeur pour relever les défis systémiques

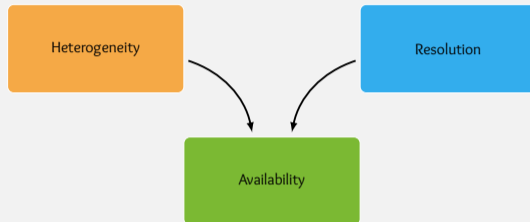
Mathieu FAUVEL* & Anne RICHER de FORGES
INRAe Remote Sensing Network

* CESBIO, Université de Toulouse, CNES/CNRS/INRAe/IRD/UPS, Toulouse, FRANCE

June 20, 2023



Why ?



Remote sensing has a central role to play in many fields of application where science fronts cannot be attacked and overcome without the contribution of satellite products

Remote Sensing Network

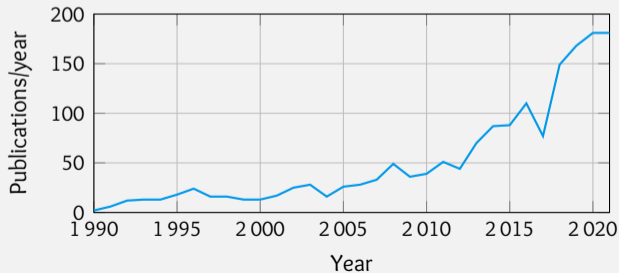
- Inter-divisions network : AE, ECODIV, ACT, AQUA, MathNum ...
- Bring together the community of experts and users of remote sensing data at INRAe.

Space Remote Sensing Research at INRAE

Objectives

- Detect-Classify-Estimate environment variables from space
- Model spatial structures and temporal dynamics
- Forest, crops, grasslands, water, soil

Research



Objectives

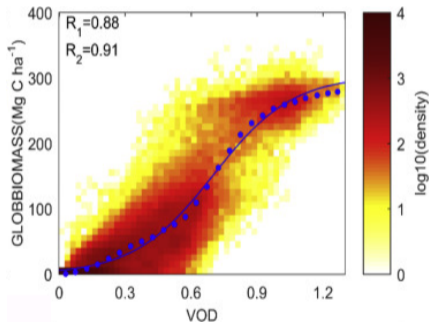
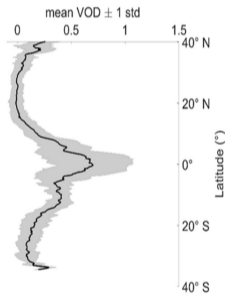
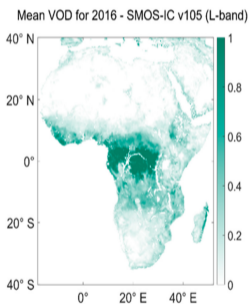
- Detect-Classify-Estimate environment variables from space
- Model spatial structures and temporal dynamics
- Forest, crops, grasslands, water, soil

Research



Above Ground Biomass Estimation from Passive Microwave

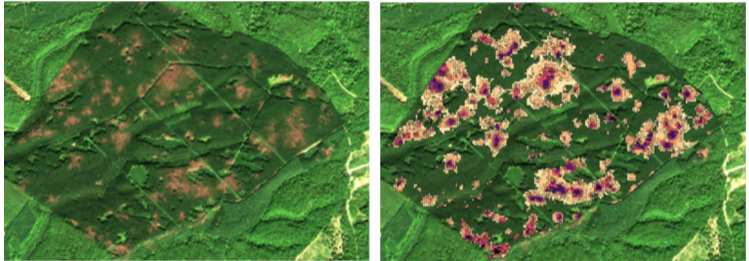
- L-band passive microwave space-borne mission SMOS
- Monitoring time variation of AGB at global scale



INRAe, UMR1391 ISPA, F-33140, Villenave d'Ornon, France

Monitoring Forest Dynamics at scale

- Bark beetle outbreaks



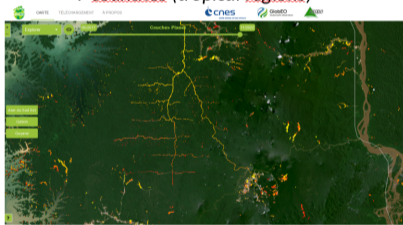
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et Information Spatiale, Montpellier, France

Monitoring Forest Dynamics at scale

- Bark beetle outbreaks
- Deforestation



Fast deforestation mapping
Operational
Based on S1 data
Freely accessible
7 countries (tropical regions)



@ Suriname/French Guiana border

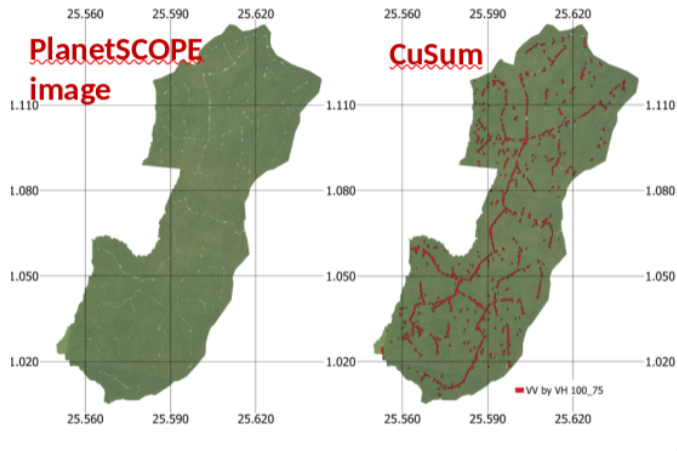


@ Mekong delta, Vietnam

INRAe USC CESBIO, Centre d'Etudes Spatiale de la BIOsphère,
Toulouse, France

Monitoring Forest Dynamics at scale

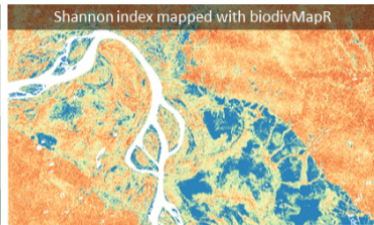
- Bark beetle outbreaks
- Deforestation



INRAe, UMR1391 ISPA, F-33140, Villenave d'Ornon, France

Monitoring Forest Dynamics at scale

- Bark beetle outbreaks
- Deforestation
- Biodiversity



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Monitoring Forest Dynamics at scale

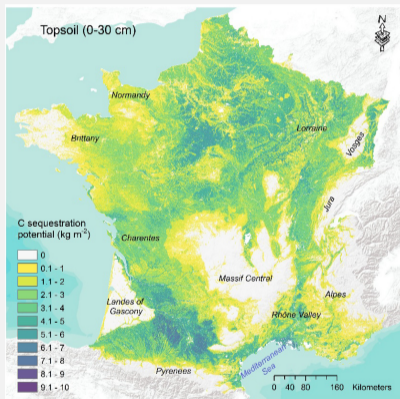
<https://protest.inrae.fr/webgis/>

- Bark beetle outbreaks
- Deforestation
- Biodiversity
- Forest attributes



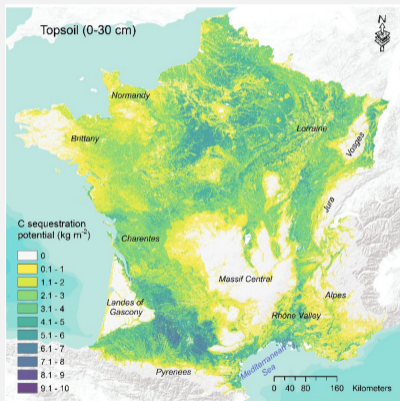
INRAE UMR TETIS - Territoires, Environnement, Télédétection et Information Spatiale, Montpellier, France

Carbon Sequestration Potential



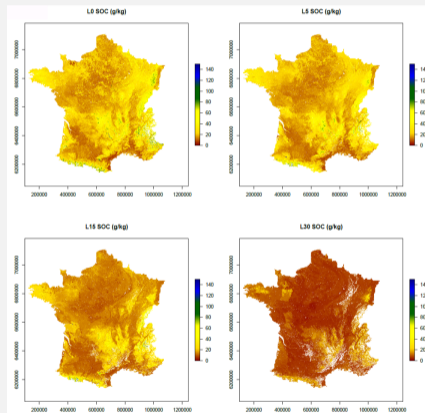
INRAe, US InfoSol, Orleans, France
"Chen et al., 2018 Science of The Total Environment"

Carbon Sequestration Potential



INRAe, US InfoSol, Orleans, France
"Chen et al., 2018 Science of The Total Environment"

Soil Organic Carbon



INRAe, US InfoSol, Orleans, France
"Mulder et al. 2016. Geoderma"

Vegetation Mapping

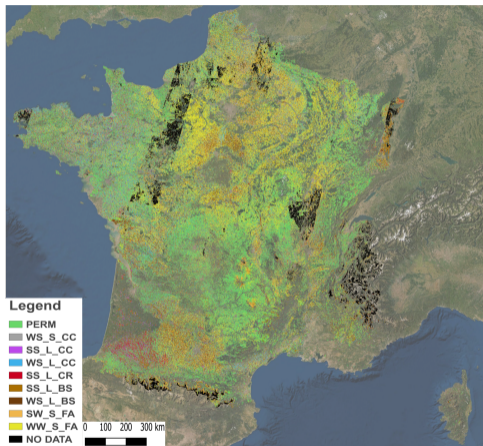
- Global land cover/use



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BIOsphère, Toulouse, France

Vegetation Mapping

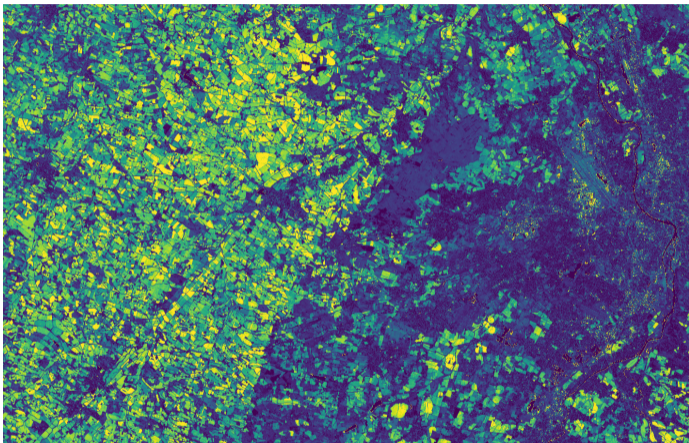
- Global land cover/use
- Intercropping practices



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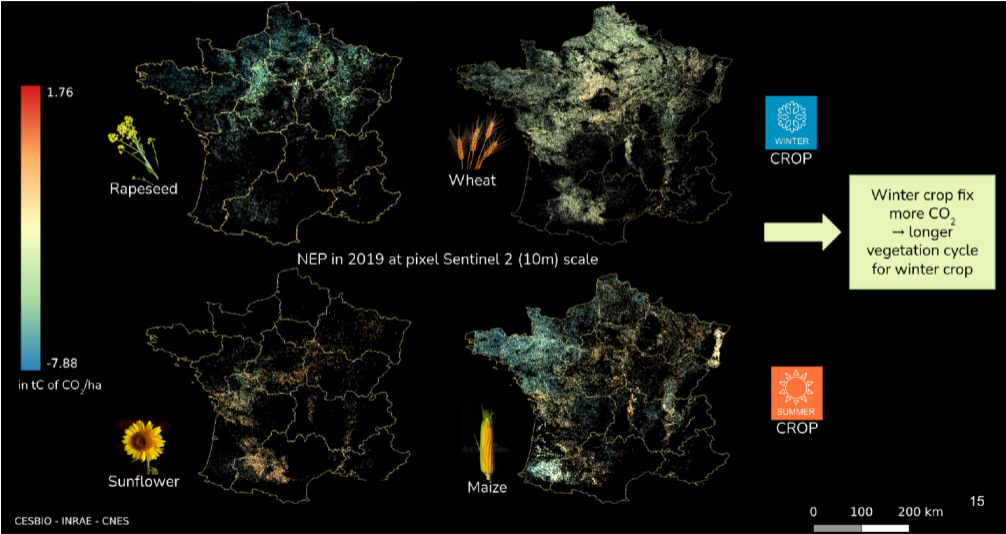
Vegetation Mapping

- Global land cover/use
- Intercropping practices
- Vegetation dynamics



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Carbon Fluxes



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Open Source products

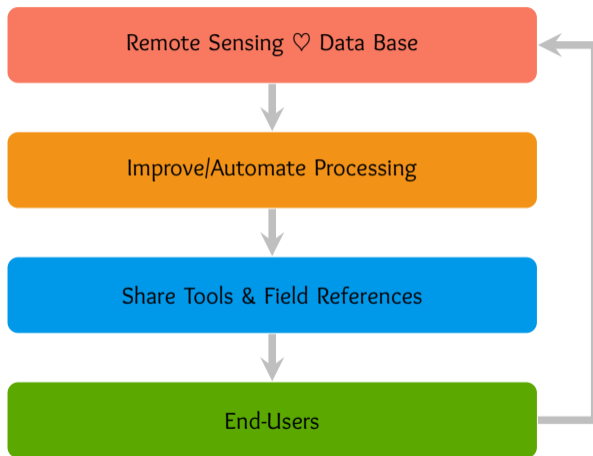
Softwares

- IOTA2
 - ★ Documentation: <https://docs.iota2.net/>
 - ★ Source: <https://framagit.org/iota2-project/>
 - ★ Use by many institutes/companies: INRAe, CNES, IGN & CS, CLS, Magellium ...
- Packages
 - ★ fordead : vegetation anomalies detection from SENTINEL-2 images
https://fordead.gitlab.io/fordead_package/
 - ★ biodivMapR : α - and β -diversity mapping
<https://jbferet.github.io/biodivMapR/index.html>

Scientific Expertise Centres - <https://www.theia-land.fr/en/scientific-expertise-centres>

- Producing: Land Cover, Surface Soil Moisture, Soil moisture with very high spatial resolution
- Prototyping: Vegetation biophysical variables, Evapotranspiration, Digital Soil Mapping, Forest biomass and changes in forest cover,
- Incubating: Changes and Health of Temperate Forests, Variables for Biodiversity

Conclusions



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