Introduction to BIOGEO

January 7, 2026

Biogeo subteams (2026)

ORCHIDEE

- Simon Bowring (fire)
- Hoontaek Lee (fire)
- Yi Xi (permafrost)
- Liyang Liu (peatland)
- Julien Alléon (microbes)
- Bo Yi (land use change)
- Ke Yu (cropland)
- Haoran Xu (cropland)
- Ana Idiaquez-Valbuena (C emissions)
- Dorra Zribi (C emissions)
- Noélie Borghino (agriculture)
- Lei Zhu (tropical forest)
- Hui Li (emissions inversion)
- Tianqi Shi (emissions inversion)

Biomass

Deep Learning

- Martin Schwartz
- Clément Delcourt
- Ibrahim Fayad
- Liang Wan
- Alvin Opler
- Gabriel Belouze
- Thomas Bourdas
- Hugo Rechatin
- Yasmin Fitts
- Sarah Brood
- Yang Su

Carbon Budgeting

- Yidi Xu
- Agnès Pellissier-Tanon
- Rui Ma
- Selim Behloul
- Otto Briner
- Zhongxiang Fang
- Nan Meng
- Shuai Wang

Microbes

- Elsa Abs
- Xianjin He
- Elisa Richard
- Mathilde Bourreau
- Thomas Cortier

Anthropogenic Emissions

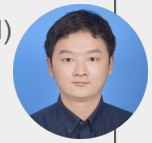
- Chuanlong Zhou (power, residential)
- Cécile Maguin (transport)
- Rohith Mittakola (transport)
- Clément Goldmann (transport, power)
- Irene Dona (power)
- Eloi Lindas (power)
- Piyu Ke (monitoring)

ORCHIDEE

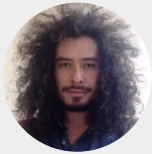
High lats

Yi XI (permafrost)

Liyang Liu (peatland)



Simon Bowring (fire)



Mid- and low lats

Hoontaek Lee (fire)

Julien Alléon (microbes)

Bo Yi (land use change)

Lei Zhu (tropical forest)

Agriculture

Ke Yu

Noélie Borghino

C emissions

Dorra Zribi

Hui Li (inversion)

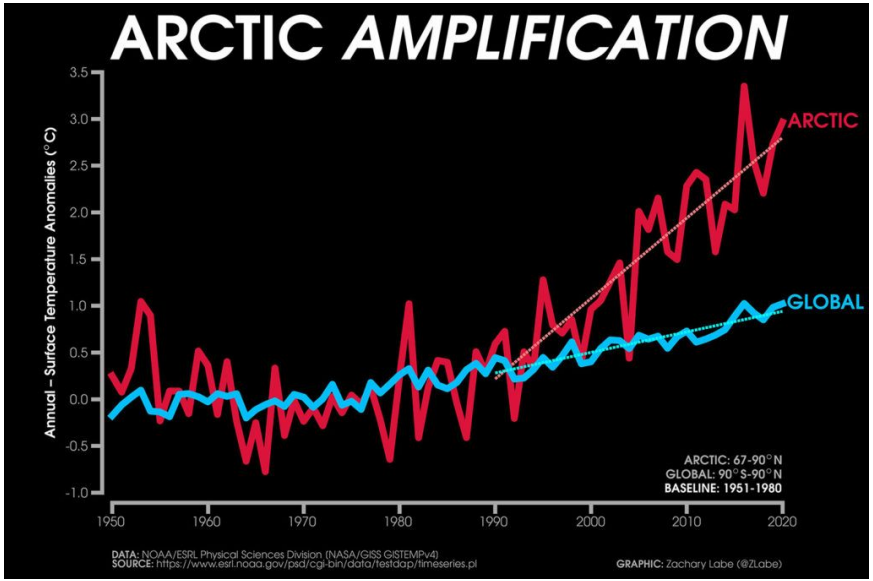
Tianqi Shi (inversion)

Ana Idiaquez-Valbuena

(disturbances)

ORCHIDEE

High lats: warming induced carbon emissions

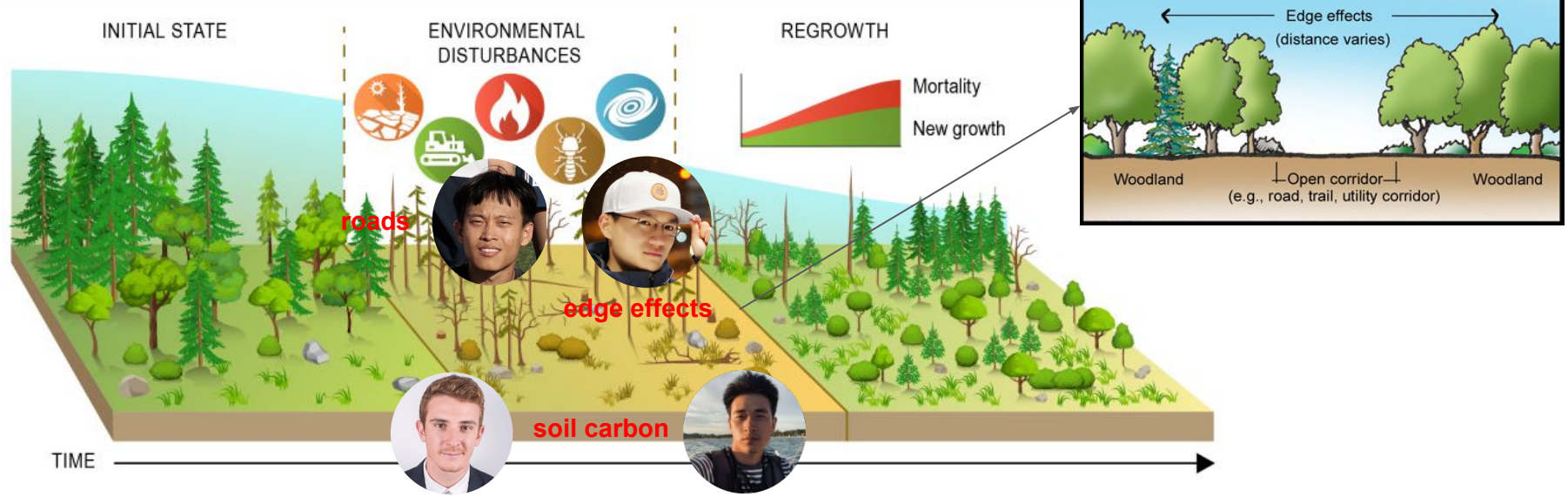


Model version: ORCHIDEE-MICT
Projects involved: CALIPSO (Yi, Simon), WET HORIZONS (Liyang), XFIRE (Simon)

ORCHIDEE

Mid- and low lats: human disturbances on forest and soil

(From Nathan Johnson | PNNL)

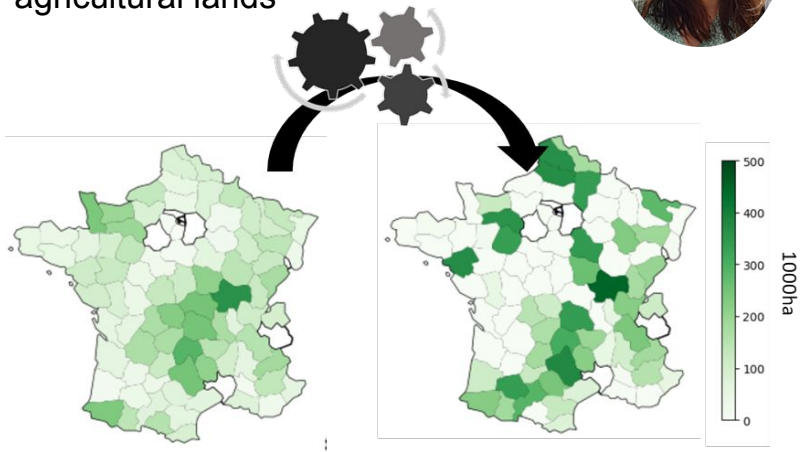


Model version: ORCHIDEE-MICT (Julien), ORCHIDEE-TRUNK v4 (Lei), ORCHIDEE-TRUNK v2_2 (Bo)
Projects involved: CALIPSO (Julien, Lei), EO4BK (Bo), XFIRE (Hoontaek)

ORCHIDEE

Agriculture: intelligent agriculture

Develop a Multi-objective optimisation model for the spatial allocation of agricultural lands



Assess the biophysical climate effects of nature-based solutions in agriculture

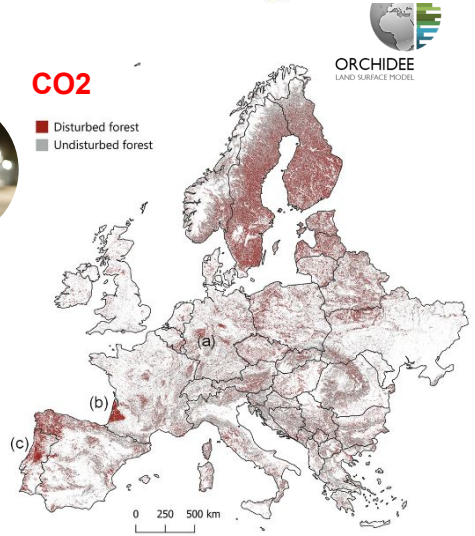
Model version: ORCHIDEE-CROP (Ke)
Projects involved: CLAND & ClieNFarms (Ke) CLAND (Noelie)

ORCHIDEE

C emissions: top-down and bottom-up

CO, CH4, CO2

CO2

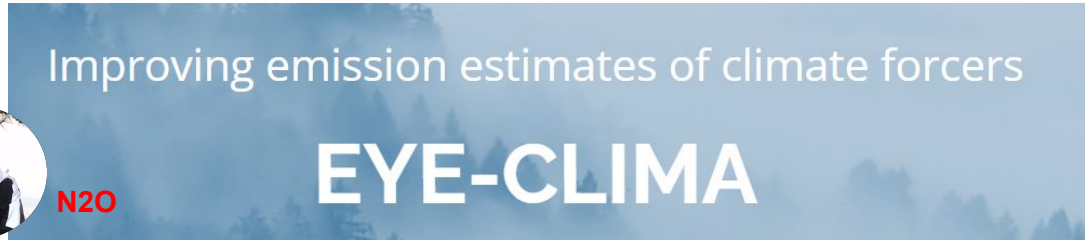


The European Forest Disturbance Atlas: a forest disturbance monitoring system using the Landsat archive

Alba Viana-Soto and Cornelius Senf

Modeling carbon emissions caused by disturbances

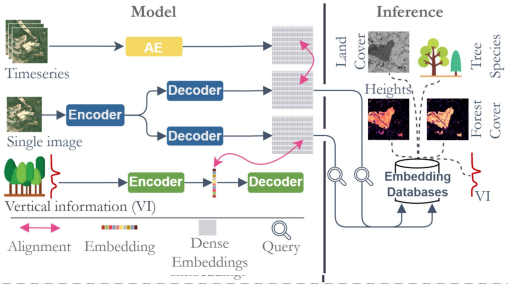
N2O



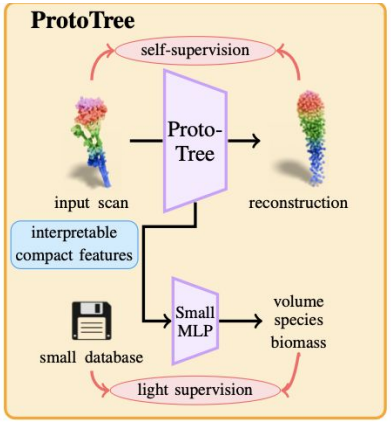
Model version: ORCHIDEE (Ana), LMDZ-INCA (Hui), CIF-CHIMERE (Tianqi)
Projects involved: CLARITY (Ana), EYE-CLIMA (Tianqi), OFVI (Hui)

Deep Learning

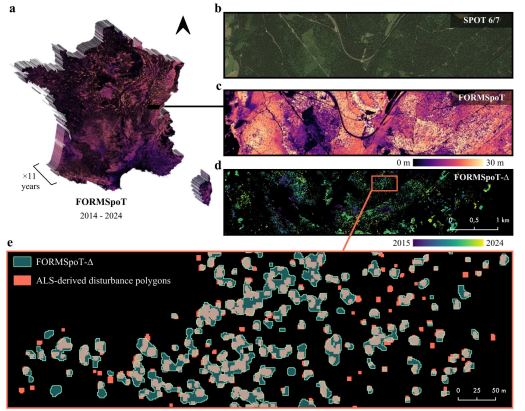
Ibrahim Fayad (permanent)
DUNIA foundation model for vertical forest structure understanding

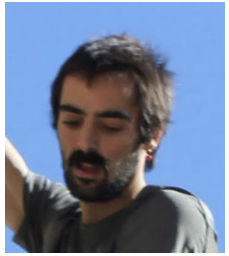


Alvin Opler (PhD)
Proto-Tree 🌳model for biomass estimation from individual tree point clouds



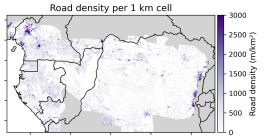
Martin Schwartz (Post-Doc)
FORMSpoT : Tree level forest disturbances 🪓 in the past 10 years in France from SPOT satellite data + Vision Transformers

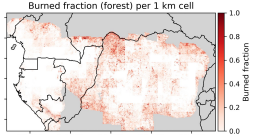




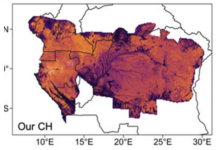
Hugo Rechatin (Research Engineer)
Maintain a common code base (Sprout) ⚙️ and provide technical support to other team members + explore new deep learning training techniques.

Clément Delcourt (Post-Doc)
- Manages the One Forest Vision initiative (OFVi)
- 🔥Explore links between fires and forest fragmentation in African tropical forests



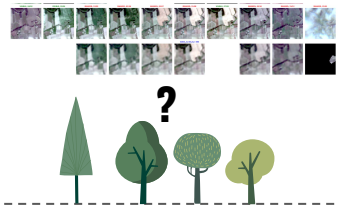


Deep Learning



Liang Wan (Postdoc)
- Forest height and biomass mapping in tropical Africa and Amazon forests.
- Forest carbon change and disturbance estimation

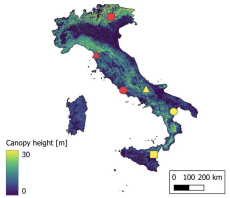
Sarah Brood (PhD)
Multi-Temporal foundation model for tree species segmentation
Focus on generalization, domain shift of self-supervised models



Yasmin Fitts (Post-Doc)
- Map trees in Morocco with Maxar data
- Explore new CO3D data

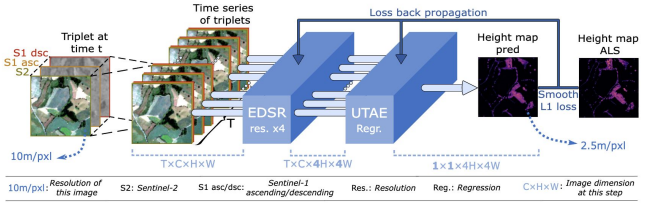
Gabriel Belouze (PhD)
- Forest Height and Biomass in Tanzania
- Build and maintain common code base (Sprout and Geefetch)
- Forest height times series with Landsat Data

geefetch



Yang Su (Post-Doc)
- DL frameworks for Canopy height and biomass estimations (Spain, Italy, Czech Rep., Russia, China)
- Land Surface Temperature analysis (Landsat) for multiple purpose

Thomas Boudras (PhD)
- SERA model : Super-resolution with Sentinel-2 data to map forest height and disturbances in France
- Future project focused on tropical forests



Global Carbon Project

RECCAP2

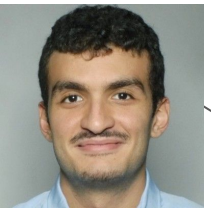
BOFOR/AI4FOREST
RECCAP2/BIOMASS

Carbon Budgeting

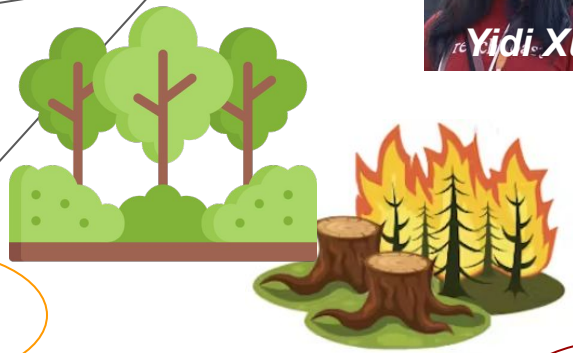
French Forest
Species-level
(Inventory and satellite)

Agnès
Pellissier-Tanon

Global forests
Drivers/Recovery
(Satellite/BK)



Selim Behloul



Structure
(Age
Biomass)

Regrowth
Carbon
changes

Biomass/timber
volume mapping
(Inventory/GEDI)

European Forest Age
Reconstruction (Hybrid)

Siberia forest,
Post-fire recovery
(Satellite)

Fire
Drought…

Amazon
Drought
(ORCHIDEE)

Boreal forest
GPP vs. fire
(Satellite/ML)

Fluxes

European forest
ecosystem CO_2 fluxes (NEE/GPP)
(eddy covariance/ML/Satellite/Model)

💰 Carbon Budgeting

Hybrid team!

Objective

🌳 Structure → Disturbance attribution

🔥 Disturbance → Recovery → Carbon balance

🌧️ Climate extremes & legacy effects

Data → method

🛰️ Earth Observation & data products

🧠 Models & interpretation

📊 Synthesis & carbon budgets

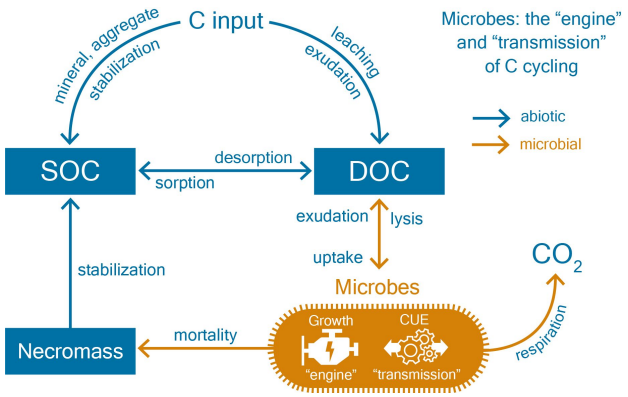
Temporal and Spatial scale

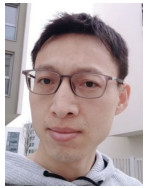
⏰ Hours to days / decades / century

🗺️ Country- Regional-Global

Microbes

Microbial role in soil carbon cycling



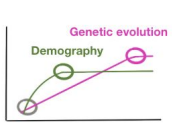


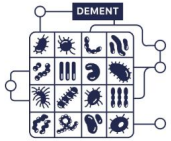
GAMEchange: How does microbial adaptation impact soil carbon projections?

erc Starting Grants

THEORY
microbial adaptation
genomic data

APPLICATION
evolution of soil carbon stocks
biogeochemical models + IA





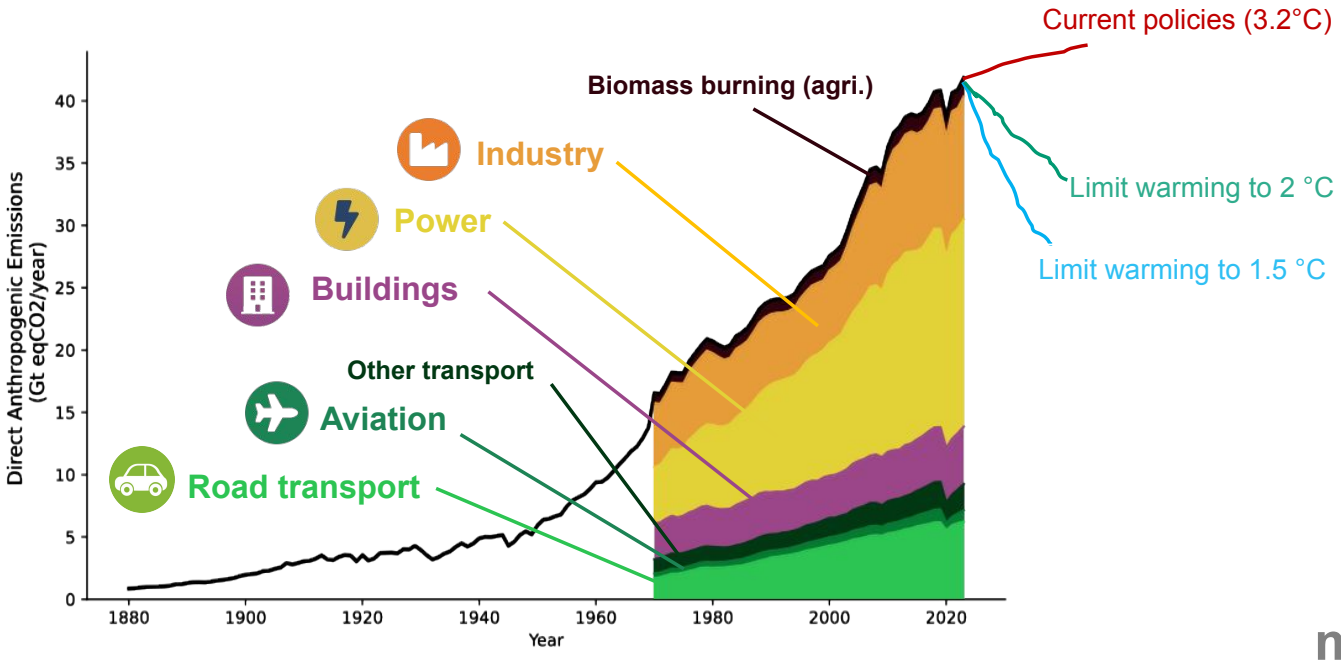
WP1
Adaptive mechanism

WP2
Trait diversity

WP3
Soil biogeochemistry

WP4
Soil-vegetation feedbacks

Anthropogenic Emissions



Global Carbon Budget 2025
EDGAR 2024
IPPC AR6

Monitoring

Low latency + high resolution

Carbon Monitor

Understanding

Insights into mitigation strategies

Anthropogenic Emissions

Piyu Ke

Low-latency Global Carbon Budget

Copernicus Europe's eyes on Earth

Atmosphere Monitoring Service

Cécile Maguin

Road transport in Europe

Éloi Lindas

Power in France, with a focus on forecasting and renewables

EDF

Anthropogenic Emissions

Rohith Teja Mittakola

Road transport

Chuanlong Zhou

Residential and Industry sectors

CHETNA project

Focus on India

https://chetna-indian.netlify.app/

Clément Goldmann

Aviation

(current focus on India)

Small industry and power sector

Irene Dona

Power sector

Focus on renewables

2026 Meetings Calendar

Date	Topic	Contact person	Food
Jan 7	Biogeo intro	Elsa Abs	Galette des rois 
Feb 4	Anthropogenic Emissions	Cécile Maguin	Chandeleur crêpes
Mar 4	Deep Learning	Martin Schwartz	To be defined
Apr 1	ORCHIDEE	Yi Xi	Easter Chocolates 
May 6	EGU		
Jun 3	CALIPSO annual meeting		
Sep 9	Biogeo intro + newcomers	Elsa Abs	Alcohol free spritz for the summer to never ;) 
Oct 7	Microbes	Elsa Abs	Halloween cookies 
Nov 4	Carbon Budgeting	Agnès Pellissier-Tanon	
Dec 2	ORCHIDEE	Yi Xi	