

BioSpace25 - Biodiversity insight from Space
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BOSSE, a Biodiversity Observing System Simulation Experiment for assessing Biodiversity-Ecosystem Function relationships

Pacheco-Labrador, Javier; Gomarasca, Ulisse; Pabon-Moreno, Daniel E.; Li, Wantong; Jung, Martin; Migliavacca, Mirco; Duveiller, Gregory

INTRODUCTION



GEOBON

CEOS

esa

σ Spectral Signals

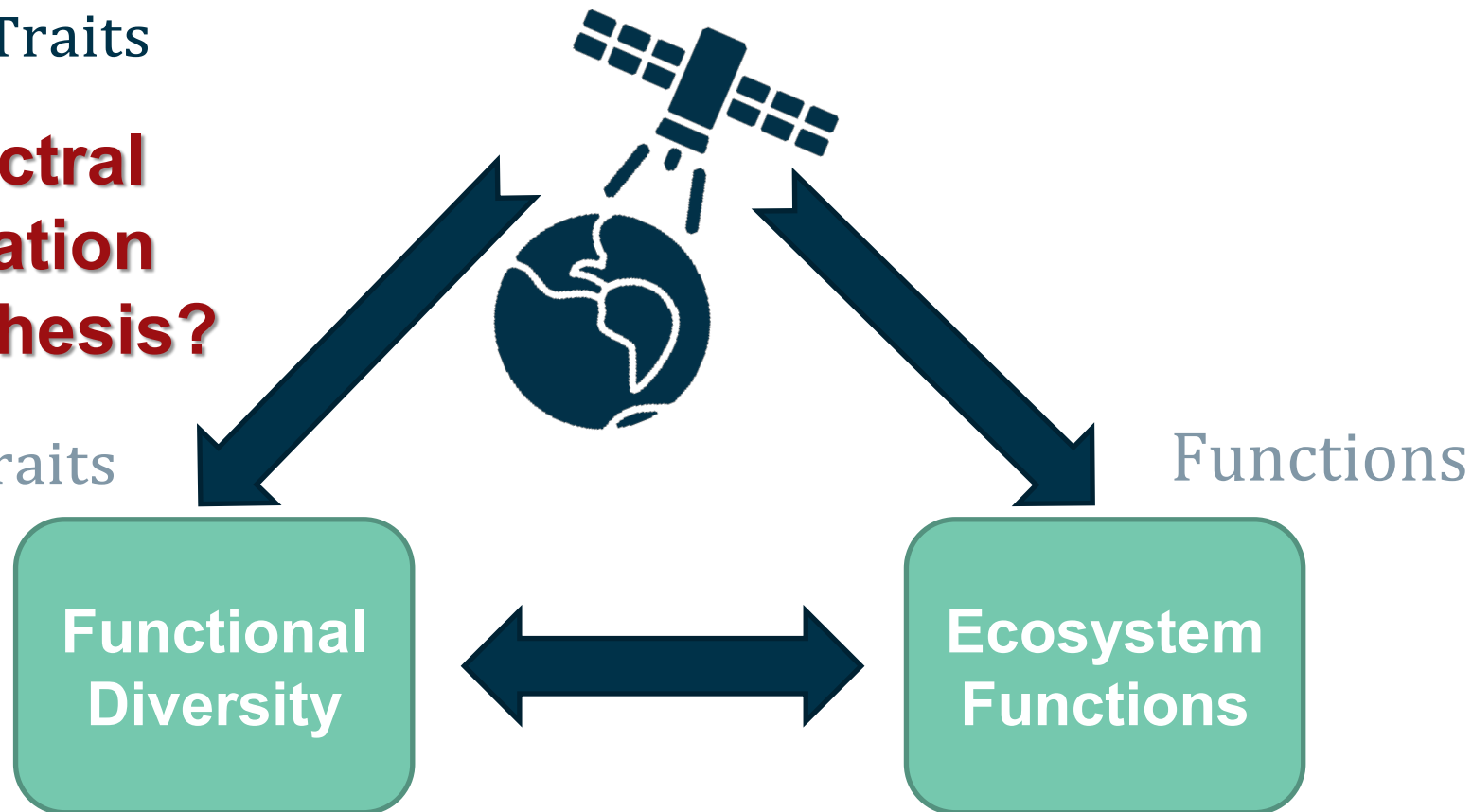
σ Veg. Traits

**Spectral
Variation
Hypothesis?**

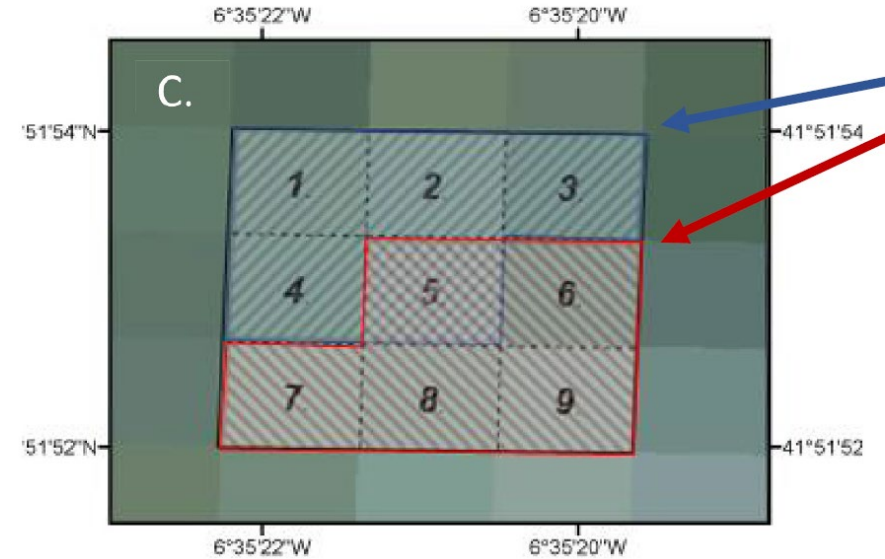
σ Veg. Traits

Functions

LACK OF...
Global
Homogeneous
RS-*ad hoc* sampled
...FIELD DATA

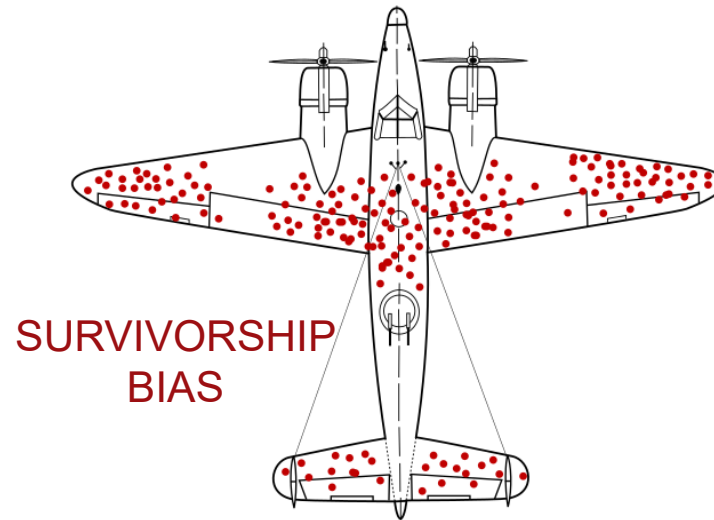


- New methods and products
 - Challenges: Spatial resolution, noise, mismatches, spectral features...
 - Local studies, expensive (n -fold)



Hauser et al. 2021

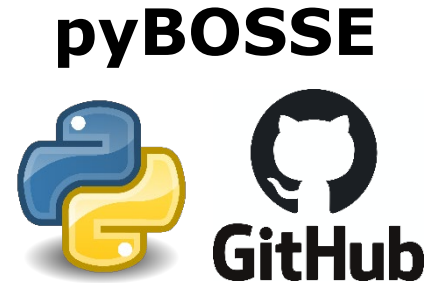
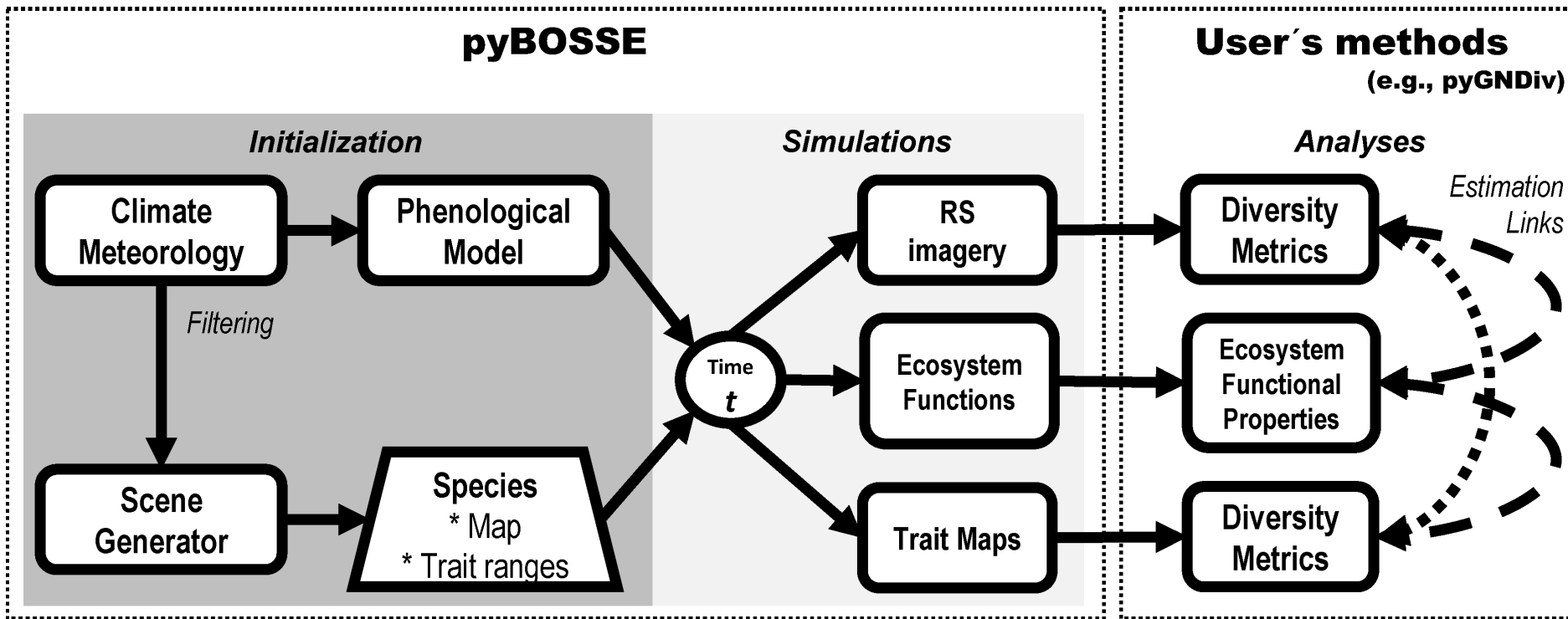
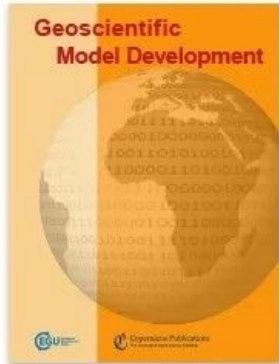
Generalizability?
Spurious correlations?
What is not working?





BOSSE v1.0: the Biodiversity Observing System Simulation Experiment

Javier Pacheco-Labrador ✉, Ulisse Gomasca, Daniel E. Pabon-Moreno, Wantong Li, Mirco Migliavacca, Martin Jung, and Gregory Duveiller



- Scenes

- Spatial patterns

Even, Clustered,
and Intermediate

- Variables

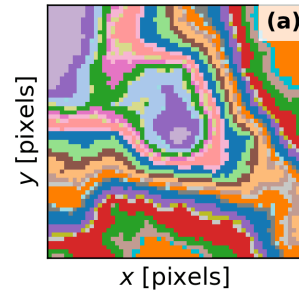
- Species and traits

- Remote sensing

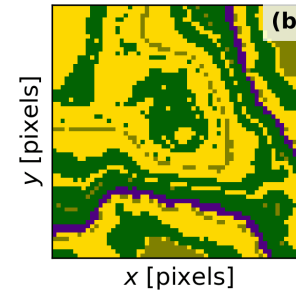
Hyperspectral, SIF,
LST, optical traits

DOY 230

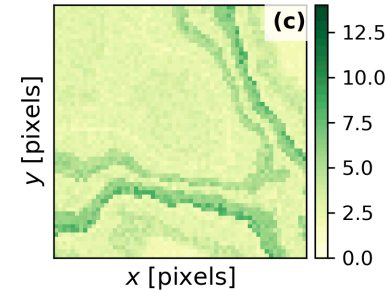
Species map ($S = 30$)



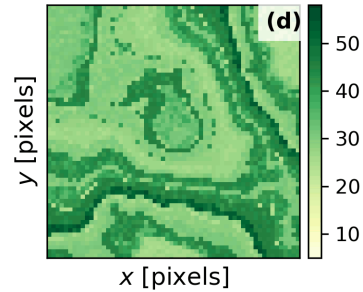
PFTs



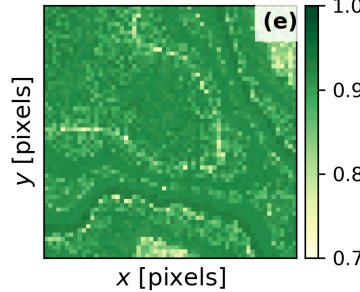
LAI [m^2m^{-2}]



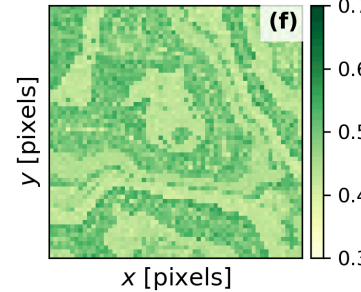
C_{ab} [μgcm^{-2}]



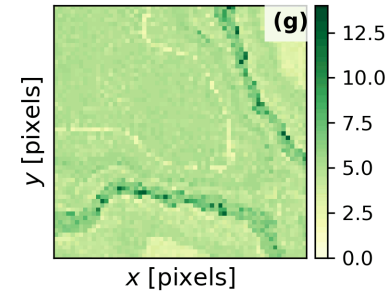
NDVI [-]



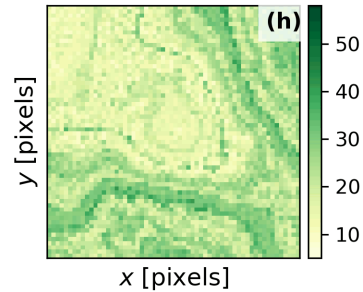
NIRV_v [-]



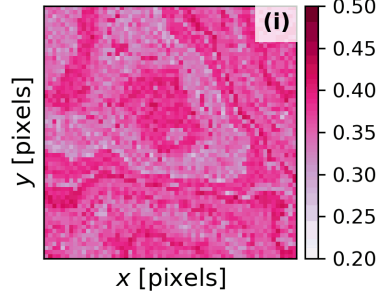
OT_{LAI} [m^2m^{-2}]



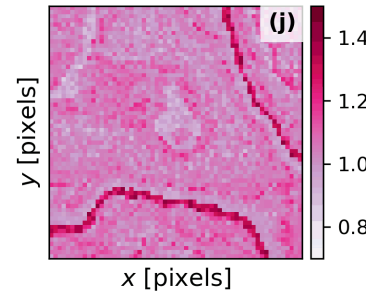
OT_{Cab} [μgcm^{-2}]



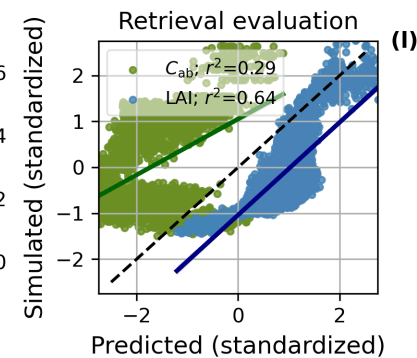
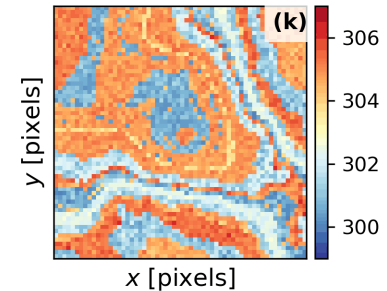
F_{687nm} [$mWm^{-2}sr^{-1}nm^{-1}$]



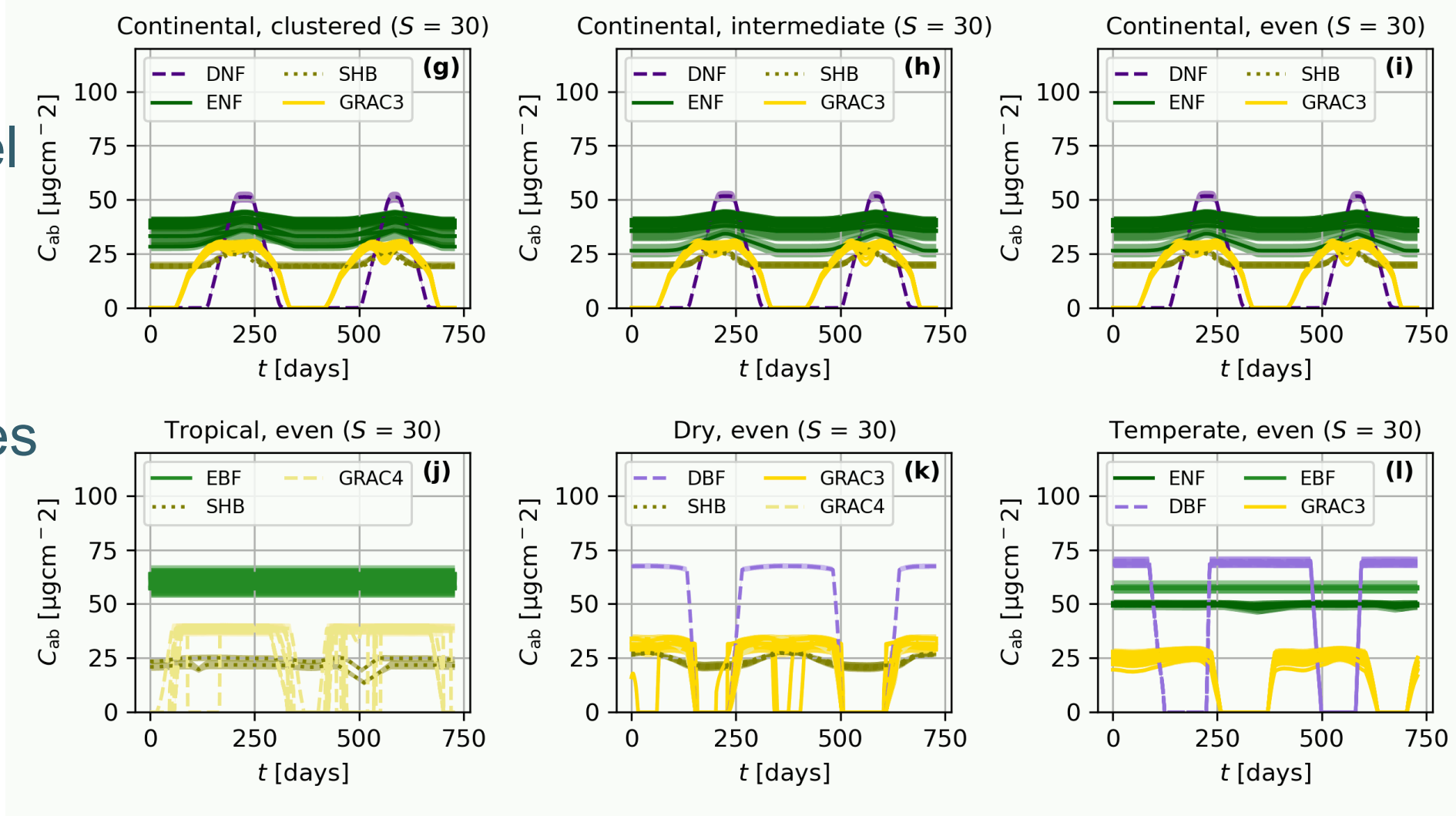
F_{760nm} [$mWm^{-2}sr^{-1}nm^{-1}$]



LST [K]



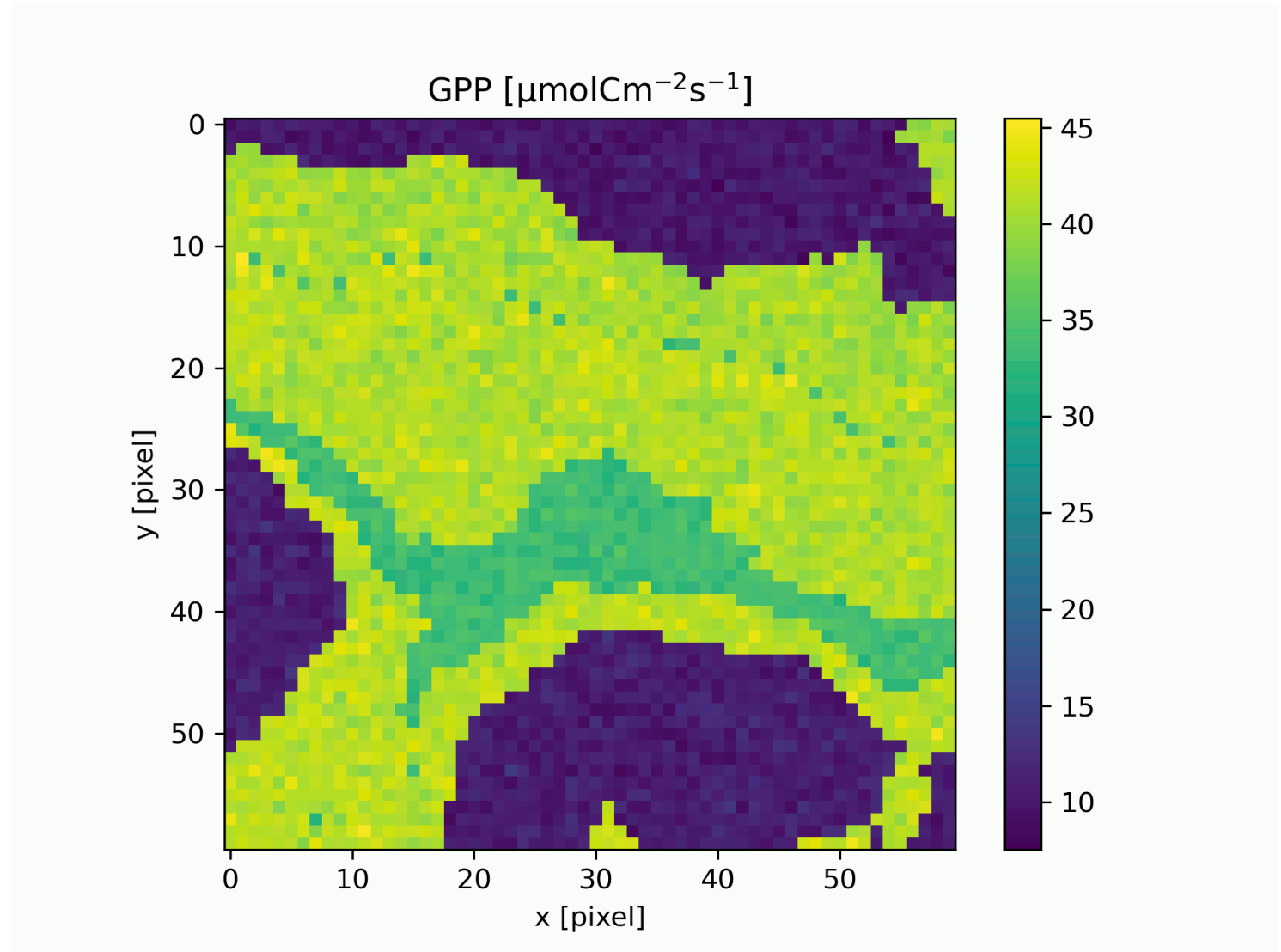
- Phenology
 - Pheno. model
 - ERA5-Land meteo (1h)
 - Climatic zones determine
 - Abundances
 - Trait ranges



- Ecosystem functions

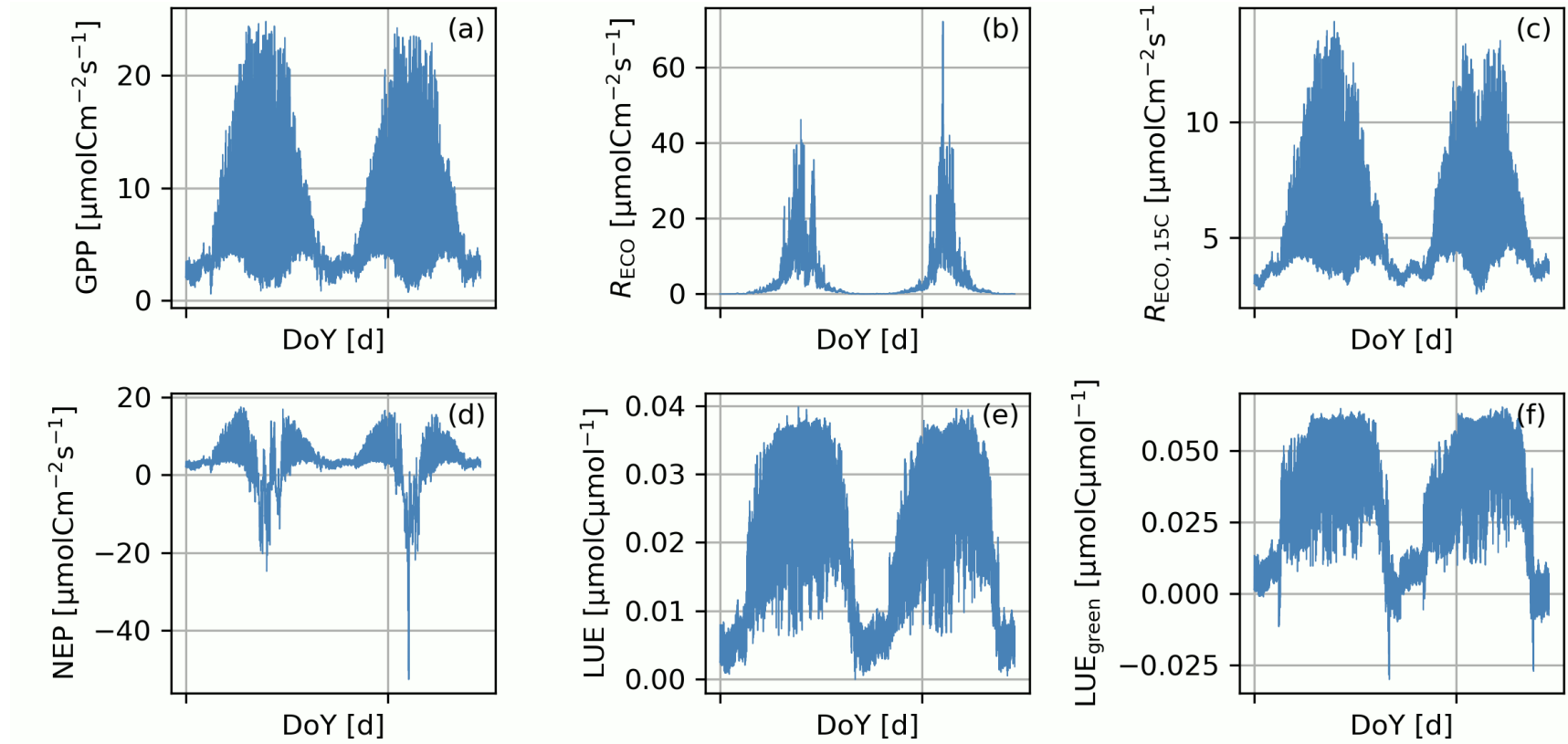
- Carbon fluxes
- Water fluxes
- Energy fluxes

- Maps



- Ecosystem functions

- Carbon fluxes
- Water fluxes
- Energy fluxes
- Hourly

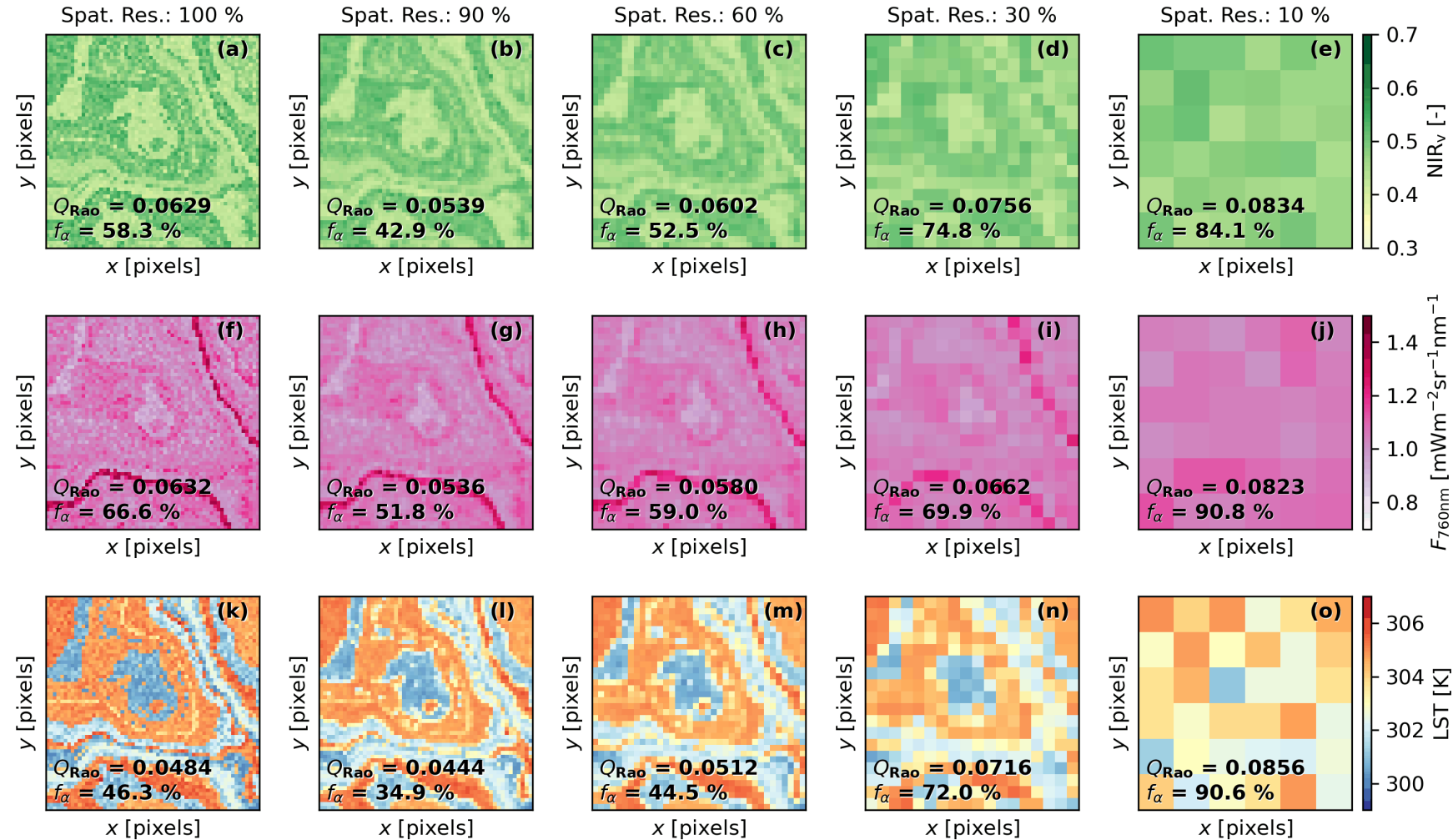


- Spatial resolution

- Relative to plant size

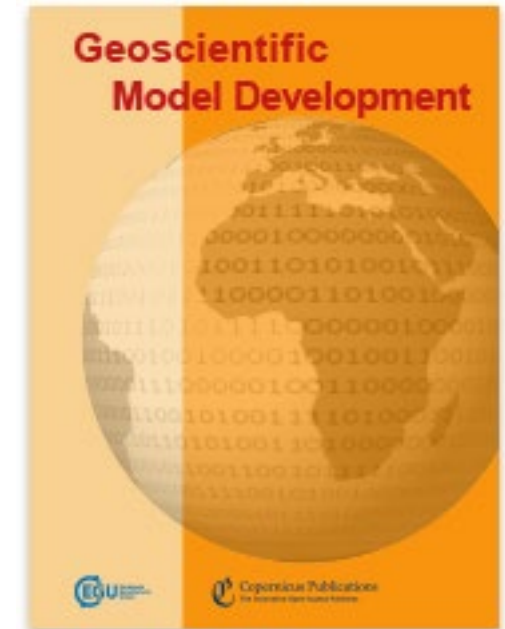
- Spectral resolution

- Hyperspectral
- Multispectral



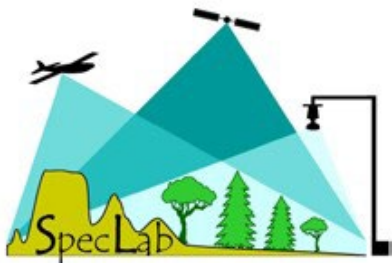
- BOSSE facilitates benchmarking and developing new methods to benchmark the estimation of plant functional diversity and the assessment of biodiversity-ecosystem functions
- BOSSE allow to answer basic methodological questions that are not yet robustly answered
- Next steps: Add more ecological theory and improve the representation of remote sensing data

Soon!



THANKS A LOT FOR YOUR ATTENTION!

QUESTIONS?



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