



Challenges and opportunities in learning Earth system dynamics from observational networks

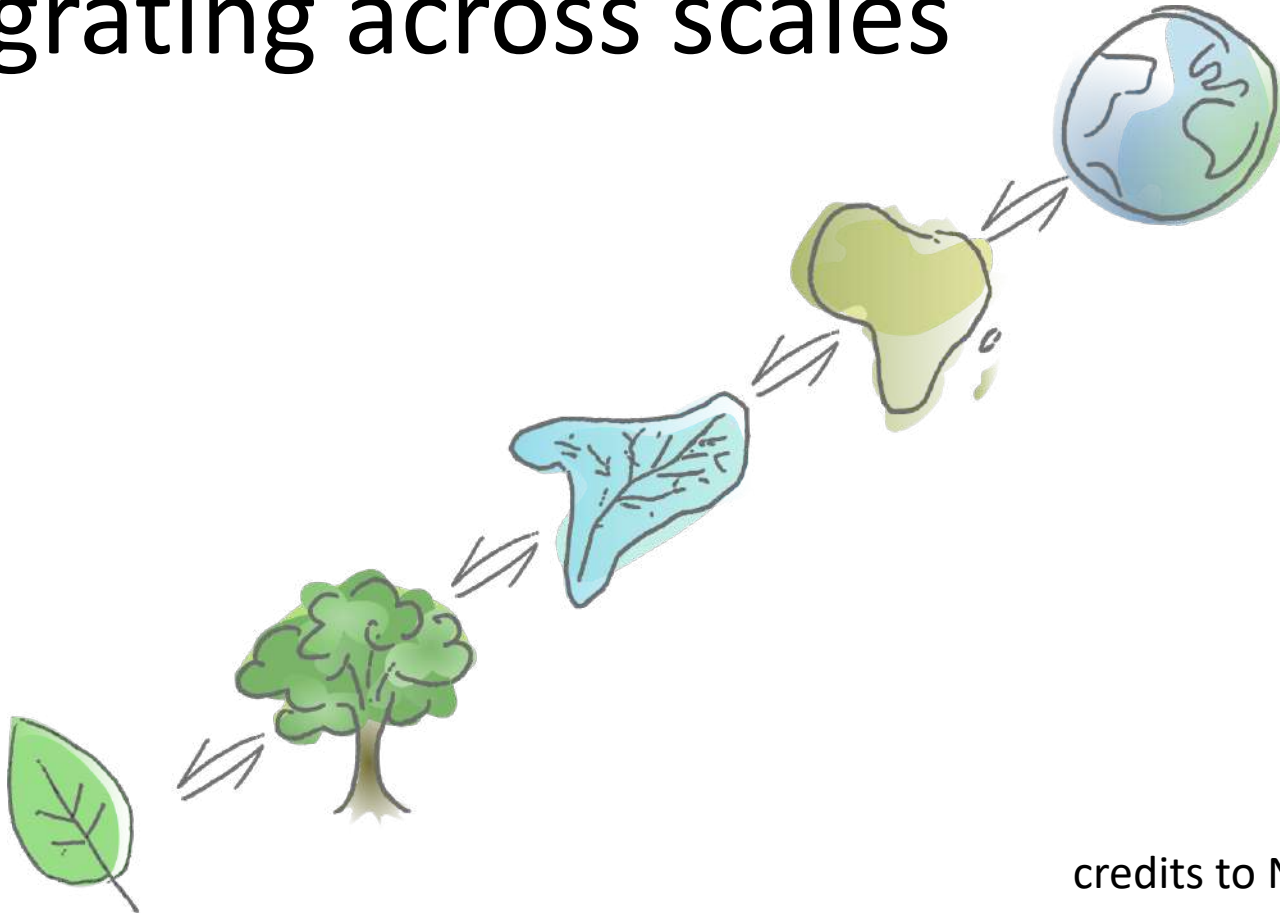
Nuno Carvalhais

Mitigation / adaptation

→ understanding on short term sensitivities of terrestrial ecosystems to changes in meteorological conditions

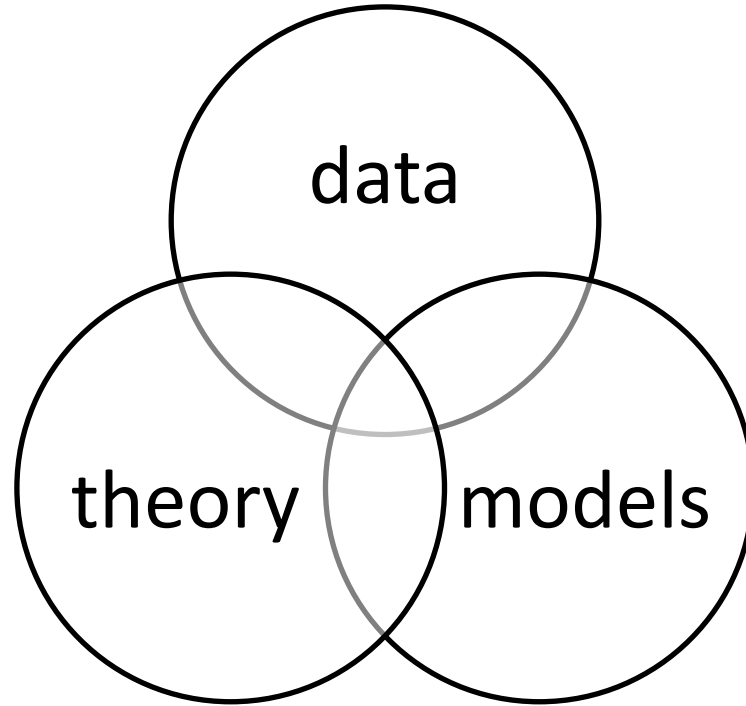
& how these affect the long term responses of ecosystem compositions

integrating across scales

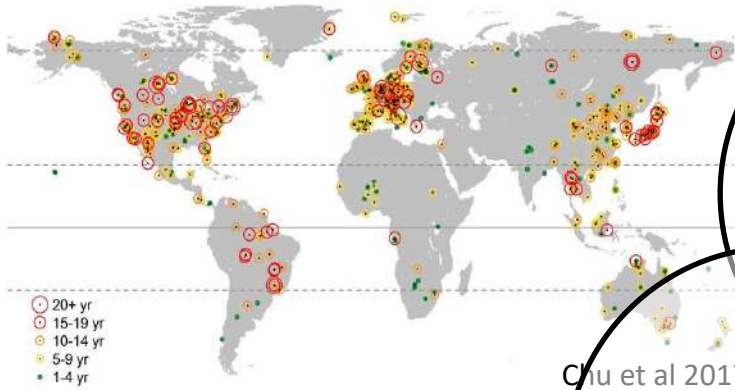


credits to Nora Linscheid

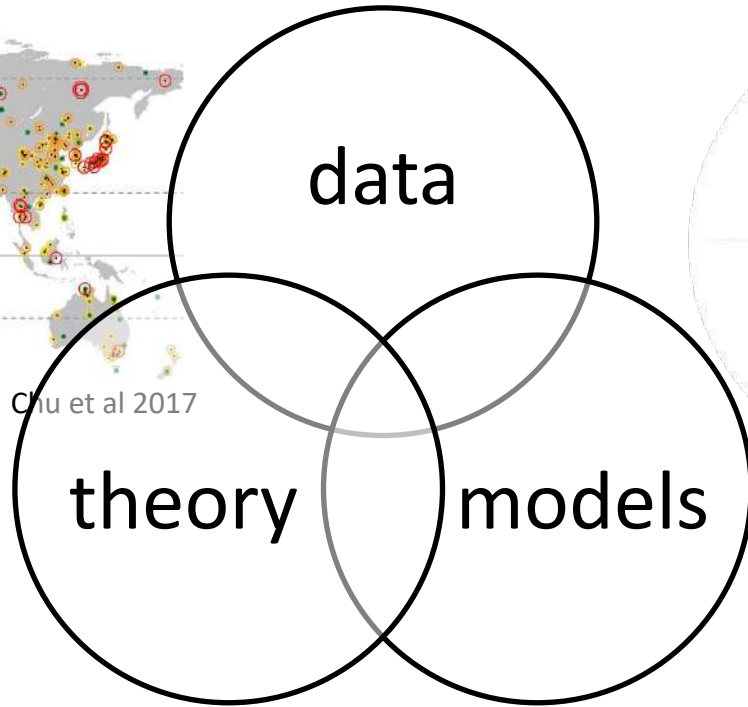
data + models



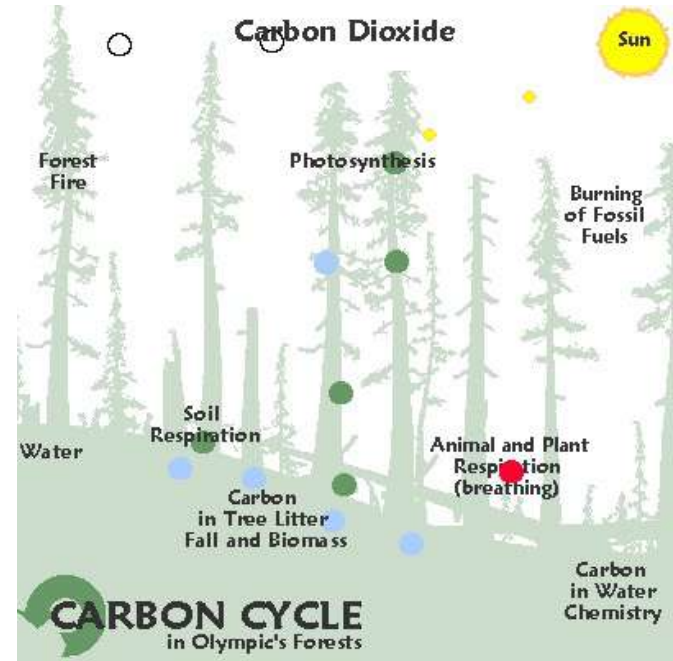
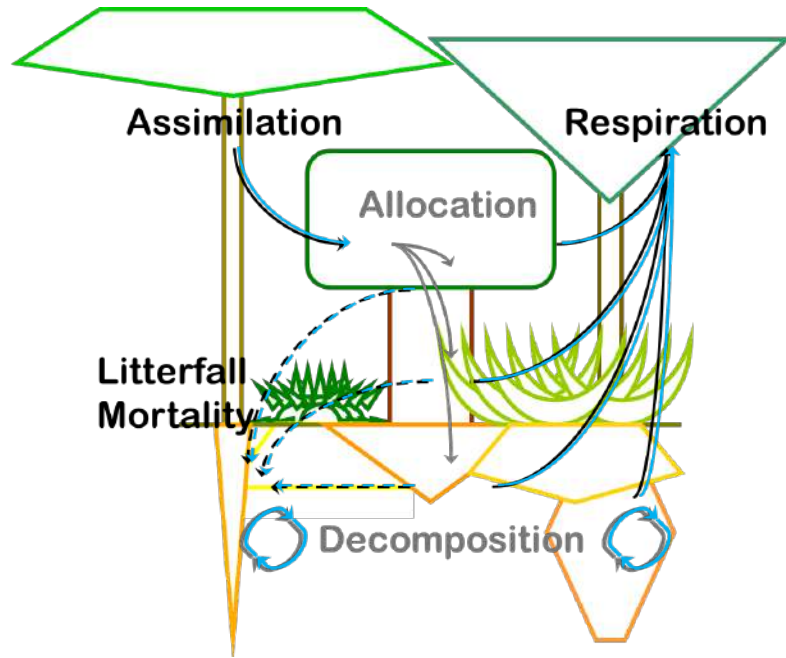
observation networks



Chu et al 2017

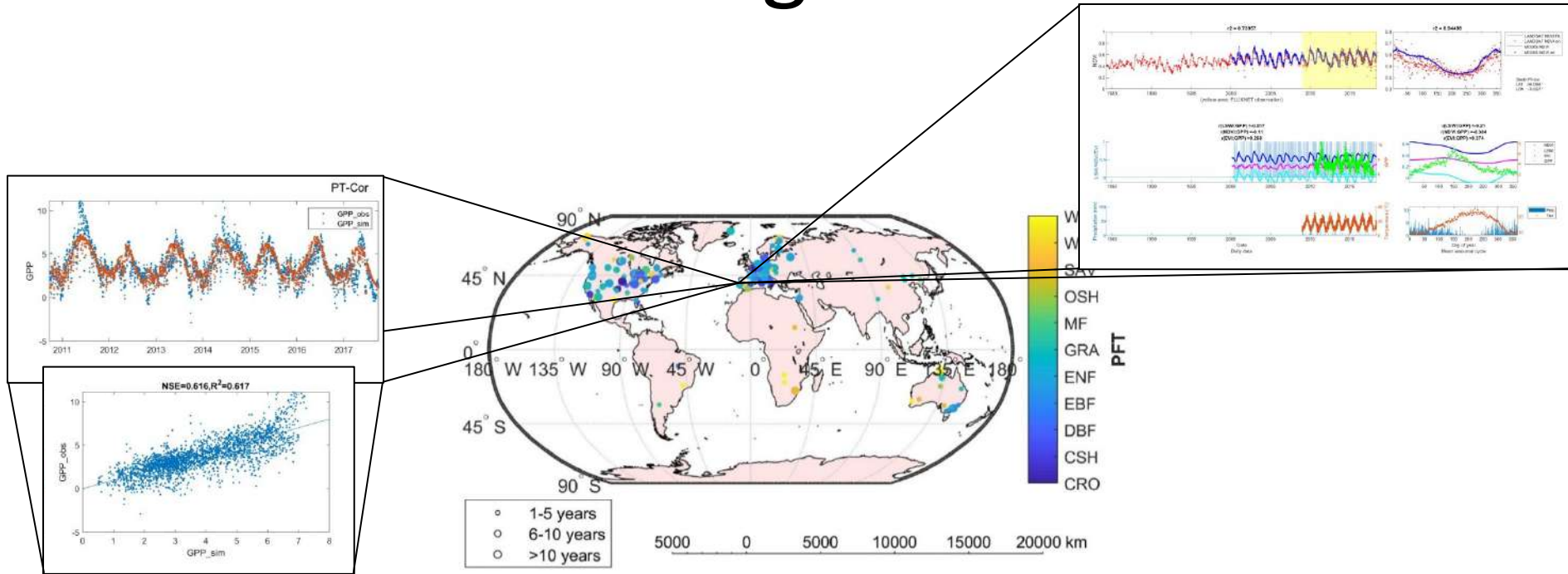


C-H₂O cycles in terrestrial ecosystems



<http://en.wikipedia.org/wiki/FluxNet>

insights

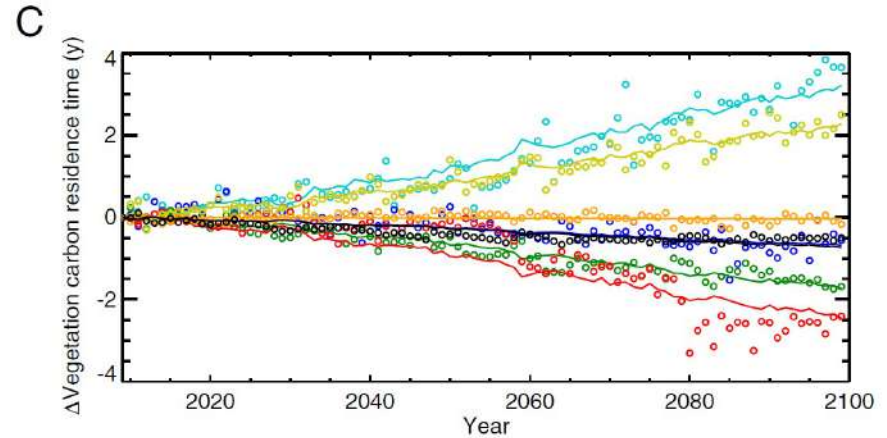
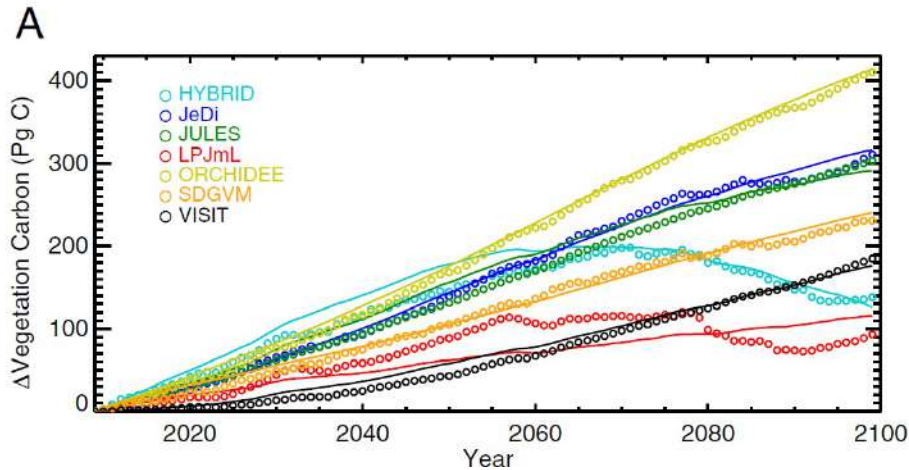


insights

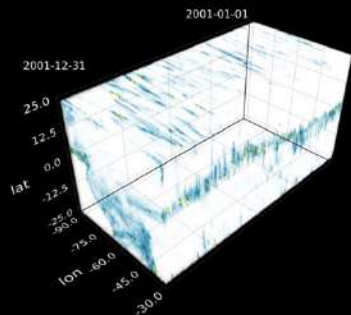
- how the sensitivity of photosynthesis to meteorology and CO₂ changes in space - between different bioclimatic regions - and in time
- controls of water availability and temperature on soil decomposition processes
- ...

challenges

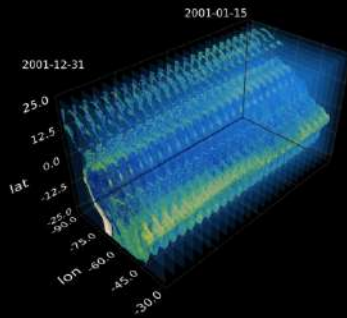
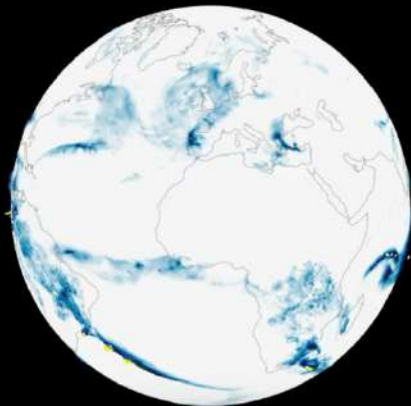
- Non stationarity \rightarrow different sensitivities?
- Futures controls on plant mortality / recovery



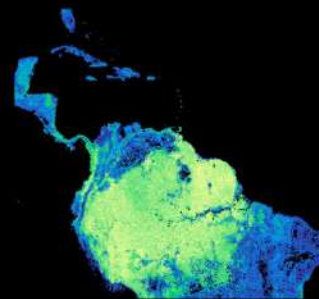
EOpportunities



Precipitation



NDVI



Biomass



credits to Lazaro Alonso

EOpportunities

- plethora of datasets to
 - evaluate our models against : ESMs
 - build new / improved models : ESMs + Machine Learning
- data should be
 - free / accessible / open ; transparent ; uncertainties ; representation ; accountability

overall

- New data + historical data (avoid space for time)
- Earth Observation not exclusive to satellite observations
 - understanding requires ground networks
- New methods for learning from large data: machine learning
- Don't forget the soils!!
- Cautionary principle: conservation + restoration ...

THANK YOU!