Towards Understanding the Inter-Annual Variation of Model Parameters Used to Simulate Gross Primary Productivity

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Inter–annual changes in model parameters, while small, are crucial to improve the simulation of annual gross primary production

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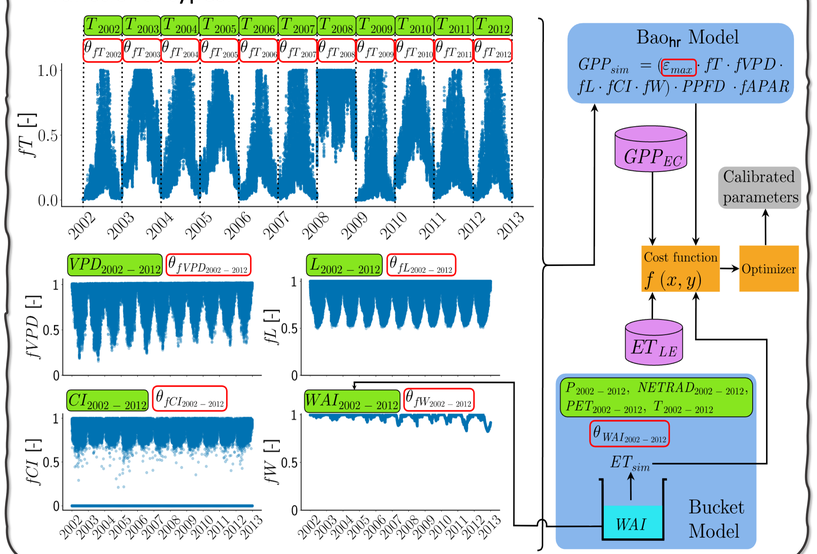
1 BACKGROUND

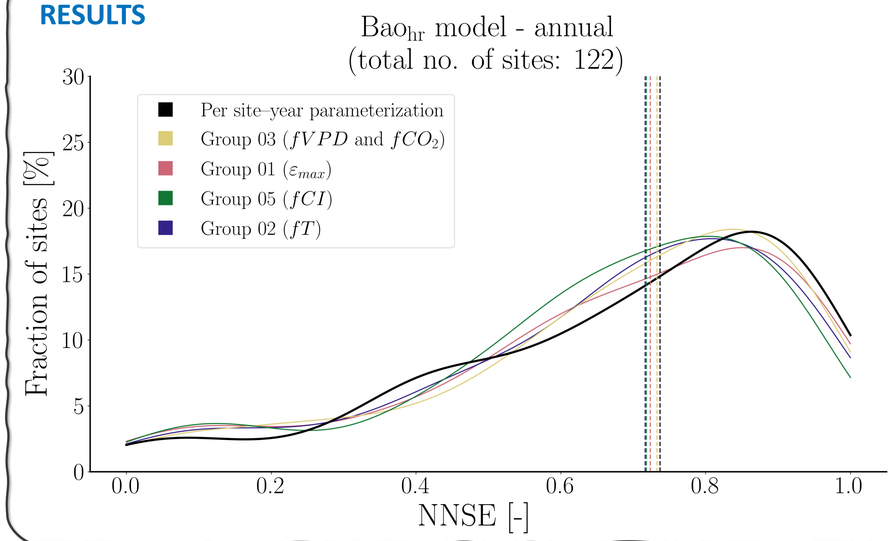
- Simulating inter–annual variability (IAV) of carbon fluxes, such as gross primary productivity (GPP) with land surface models (LSM) is a persisting challenge, and still a key area of interest.
- Limitations in existing models can be missing representation of key ecosystem functions, model parameterization with data of lower temporal resolutions, and assumption of invariance of parameters within a site or plant functional type (PFT).
- We hypothesized that temporal variability of hydrological parameters, particularly related to soil moisture, has a greater influence on the IAV of GPP.

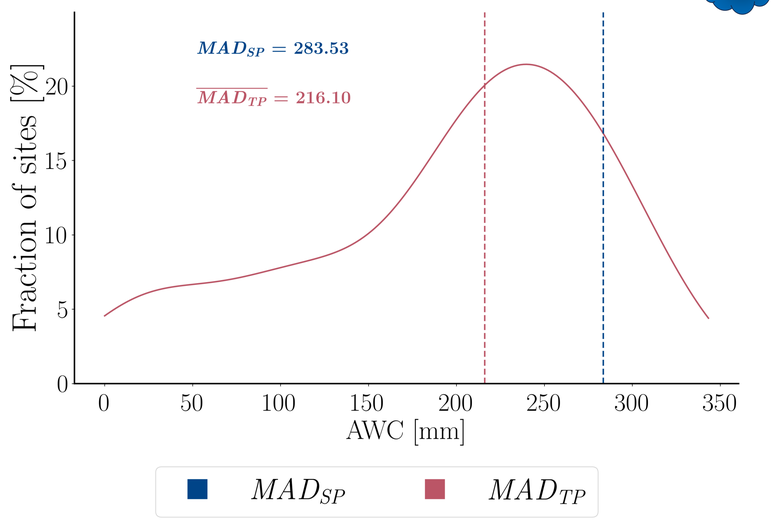
2 METHODS

- Inverted a group of annually varying parameters for a specific environmental response function (in a light use efficiency model), while estimating year-invariant parameters for all other functions for a site.
- Model calibrations were performed for 8 different groups of parameters.
- Applied across 198 FLUXNET sites, representing 13 different plant functional types.



3 RESULTS





4 CONCLUSIONS

- Annual GPP simulation improved when parameters (such as, parameters related to vapor pressure deficit and CO_2 effect) were varied per-year, while other parameters remained constant across a site.
- The variation in parameters across sites was found to be higher than the variation in parameters across site–years for all the parameters.

5 NEXT STEPS

- Explaining temporal variability of model parameters using environmental factors.
- Predicting spatiotemporal variability of parameters, and using them to simulate fluxes in an end-to-end manner.