

PROPOSAL FOR FLUXNET SYNTHESIS PUBLICATION FOR FLUXNET-LA-THUILE DATA SET



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TITLE OF PAPER AND OUTLINE

TITLE

Spatiotemporal variability of annual gross primary productivity (GPP) as regulated by growing season length and summer plant photosynthesis

PROPOSED SITES TO BE INVOLVED

All the sites will be considered

PROPOSED RULES FOR CO-AUTHORSHIP

1. All the PIs of the sites involved in the analysis will be invited to be co-authors if they would like to be.
2. A group co-authorship 'FLUXNET members' will be included.
3. Those authors give more suggestions and comments on the manuscript will present earlier in the author lists.
4. We will add specific acknowledgment for the data sources if there is no available citation.

OUTLINE

1. Why do we study?

Predicting the variability of gross primary productivity (GPP) under future environmental changes is a critical challenge for keeping safe food and energy supplies from natural ecosystem to human society. However, GPP is striking different on the earth from the tropics to tundra and highly sensitive to changes in climate and atmospheric conditions (Beer et al. 2010). However, it is unknown whether the internal vegetation processes of terrestrial ecosystem is driven by the fundamental rules to determine the spatial and temporal variability of terrestrial annual GPP.

Terrestrial GPP is strongly affected by growing season length and the high plant photosynthesis during summer months. However, it is still unexamined how these two aspects can jointly and differently affect the annual GPP in terrestrial ecosystems over years and across regions.

2. What do we want to look at?

Our aim here was to evaluate how terrestrial annual GPP is corporately regulated by growing season length and summer plant photosynthesis, and whether their roles vary with biome type. We have analyzed the satellite-based GPP product, and found some general relationships among annual GPP, growing season length and summer plant photosynthesis. However, the satellite-based GPP are not from directly measurement but estimated from a relatively simple light use efficiency model. Thus, we aim at examining the flux-based GPP data and compare the results from FLUXNET-based and satellite-based observations.

3. Approaches

The GPP data with daily time step will be used in our analyses. Growing season length and photosynthesis in summer months will be obtained from each site-year by a simple model that describes the general one-peak dynamic of GPP throughout the year. GPP data from those site-years with multiple GPP peaks will be analyzed by a method developed upon the same model. The contributions of growing season length and summer plant photosynthesis to annual GPP will be analyzed for each site-year. The temporal and spatial variability of the contributions will be empirically assessed. The patterns obtained from the FLUXNET data set will be compared with those from the satellite GPP products.

Reference

Beer C, Reichstein M, Tomelleri E, et al. 2010. Terrestrial gross carbon dioxide uptake: global distribution and covariation with climate. *Science*, 329, 834-838.