Title: Assessing parameter variability in a photosynthesis model within and between plant functional types using global Fluxnet eddy covariance data

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Outline
The vegetation component in climate models has advanced since the late 1960s from a uniform prescription of surface parameters to plant functional types (PFTs). PFTs are used in global land-surface models to provide parameter values for every model grid cell. With a simple photosynthesis model we derive parameters for all site years within the Fluxnet eddy covariance data set. We compare the model parameters within and between PFTs and statistically group the sites. Fluxnet data is used to validate the photosynthesis model parameter variation within a PFT classification.
Our major result is that model parameters appear more variable than assumed in PFTs. Simulated fluxes are of higher quality when model parameters of individual sites or site years are used. A simplification with less variation in model parameters results in poorer simulations. This indicates that a PFT classification introduces uncertainty in the variation of the photosynthesis and transpiration fluxes. Statistically derived groups of sites with comparable model parameters do not share common vegetation types or climates.
A simple PFT classification does not reflect the real photosynthesis and transpiration variation. Although site year parameters give the best predictions, the parameters are generally too specific to be used in a global study. The site year parameters can be further used to explore the possibilities of alternative classification schemes.

Key words: Plant functional types, Model parameters, Photosynthesis, Transpiration, Eddy covariance, Fluxnet

Sites that initially would be involved
All sites with enough and good quality data.

Rules applied for use of site data and co-authorship
The rules as proposed in the disclaimer for the FLUXNET2007 synthesis will be applied.