PROPOSAL FOR FLUXNET SYNTHESIS PUBLICATION

Initial coordinators:	Gitta Lasslop, Markus Reichstein
Collaborators needing access to data:	Dario Papale
Affiliations:	Max-Planck Institute for Biogeochemistry, Jena

TITLE OF PAPER AND OUTLINE

Extended hyperbolic light response curve including VPD effects to derive GPP estimates mainly based on daytime data

In this paper we want to introduce a new method for fluxpartitioning based on the hyperbolic light response curve. We provide estimates of half hourly GPP and Reco for FLUXNET sites mainly based on daytime data additional to the existing estimates based on nighttime data from Reichstein et al 2005. We use a modified hyperbolic light response curve which is extended

a) by a temperature dependency for the respiration (Lloyd and Taylor model in our case) and

b) by a VPD dependency of GPP at light saturation to account for the decrease in photosynthesis in afternoon due to stomatal closure

Only the temperature sensitivity, not the base respiration parameter, of the Lloyd and Taylor model is estimated with night time NEE data. Thus, the estimate is independent of a possible systematic bias of night time measurements of NEE that may corrupt the derived component fluxes when using the Reichstein et al method and the comparison of the two estimates can serve as an indicator for problematic measurements. We compare the two estimates across sites of various climate and vegetation types.

In addition we compute the statistical uncertainty according to Omlin and Reichert (1999) of the GPP estimate and will analyse the importance of the statistical uncertainty compared to the structural uncertainty of the models and algorithms used.

PROPOSED SITES TO BE INVOLVED

The sites will cover a broad variety of climates and vegetation types. Sites will be selected according to minimum requirements regarding data quality, allow meaningful parameter estimation. Availability of NEE and meteorological data is required.

PROPOSED RULES FOR CO-AUTHORSHIP

The rules of the FLUXNET synthesis terms of reference apply, i.e. additional significant intellectual input leads to co-authorship in this paper.

However, the main focus of the paper is on methodology of the flux partitioning and we aim to submit this paper preferably fast as a documentation of the method. These circumstances narrow the possibility of intellectual input and we think that a co-authorship should not be implied automatically, but acknowledgment and citation of the PI's work. We consider to invite colleagues that have strong experience in light-response curve based flux-partitioning (e.g. authors of Desai et al. 2008).

References:

Reichstein, M.; Falge, E.; Baldocchi, D.; Papale, D.; Aubinet, M.; Berbigier, P.; Bernhofer, C.; Buchmann, N.; Gilmanov, T.; Granier, A.; Grunwald, T.; Havrankova, K.; Ilvesniemi, H.; Janous, D.; Knohl, A.; Laurila, T.; Lohila, A.; Loustau, D.; Matteucci, G.; Meyers, T.; Miglietta, F.; Ourcival, J. M.; Pumpanen, J.; Rambal, S.; Rotenberg, E.; Sanz, M.; Tenhunen, J.; Seufert, G.; Vaccari, F.; Vesala, T.; Yakir, D. & Valentini, R. On the separation of net ecosystem exchange into assimilation and ecosystem respiration: review and improved algorithm, Global Change Biology, 2005, 11, 1424-1439.

Omlin, M. & Reichert, P. A comparison of techniques for the estimation of model prediction uncertainty, Ecological Modelling, 1999, 115, 45-59.