

## PROPOSAL FOR FLUXNET SYNTHESIS PUBLICATION



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**Collaborators needing access to data:**

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### TITLE OF PAPER AND OUTLINE

#### **Semi-empirical modelling of ecosystem respiration: review, improved algorithm and integration with Earth observation data.**

The objective of the proposal for this global scale synthesis paper is to analyze the daily ecosystem respiration (Reco) with the aim to develop a model able to explain temporal and site-to-site variability of Reco and furthermore link this model with the MODIS-GPP/NPP data stream (e.g MOD17). An application and extension of the models and analysis employed for soil respiration (Reichstein et al. 2003, Hibbard et al. 2005) will be pursued.

More in detail we are going to review, to discuss and to modify some existing semi-empirical Reco models. The selected models are dependent on climatic conditions (e.g. temperature and water availability), site characteristics and productivity (maximum LAI and GPP, respectively).

In the first step we want to investigate the following topics:

1. Functional dependency of Reco to GPP (site-to-site analysis):
  - a. For each functional type (IGBP class), different relations of Reco to the GPP (i.e. linear, exponential, Michaelis-Menten) will be tested in a site-to-site analysis.
  - b. Which is the best model for each functional type?
  - c. Is there a lag time in the response of Reco to the GPP variations?
  - d. Model parameters will be derived through nonlinear regression analysis (Marquardt method) against eddy covariance measurements as in Reichstein et al. 2003<sup>2</sup>.
2. The functional dependency of the reference respiration rate (derived from the site-to-site analysis) on the maximum LAI will be investigated for each IGBP class (inter-site analysis).

In a second step, we analyze both the inter and intra-IGBP class parameters variability. The objectives are to evaluate:

1. The inter-IGBP Class parameters variability
  - a. How the parameters vary between different IGBP Class?
  - b. Which is the sensitivity of each IGBP class to different drivers (e.g. GPP, precipitation, temperature, LAI)?
2. The intra-IGBP class parameters variability:
  - a. Which are the possible factors that could explain this variability? (soil properties?, site history?, nitrogen deposition?)
  - b. Could this variability be generalized into a form that can be used for up-scaling from flux sites to larger scale?

Finally, we try to generalize the results into a model (or models) and link it in the MODIS GPP/NPP data stream for up-scaling Reco from flux sites to global scale.

### **PROPOSED SITES TO BE INVOLVED**

All sites containing more than one year of fluxes and meteorological data as well as having information on leaf area index maybe considered for the analysis.

### **CO-AUTHORSHIP POLICY**

The rules as proposed in the disclaimer for the FLUXNET 2007 synthesis will be applied.