Initial coordinators::	Markus Reichstein, Dario Papale
Collaborators needing access to data:	Dennis Baldocchi, Alan Barr, Philippe Ciais, Martin Heimann, Sebastian Luyssaert, Andrew Richardson, C. Rödenbeck
Affiliations:	Max-Planck-Institute for Biogeochemistry;; University of Tuscia; LSCE, UC Berkeley, U New Hampshire, University of Antwerp

TITLE OF PAPER AND OUTLINE

Inter-annual variation (IAV) in global terrestrial carbon-water balance derived from network of eddy covariance flux sites: magnitude, controlling processes and climate factors

In this global scale synthesis paper on inter-annual variability (IAV) we want to address the following topics

1. Statistical characterization of IAV
    a. Compare to spatial variability of GPP, TER, NEP?
    b. Does magnitude IAV differ by biome?
2. Which process drives the inter-annual variability of carbon balance depending on climate zone?
    a. GPP or TER ?
    b. Biophysical or physiological responses (fPAR or RUE?)
    c. spring/summer/winter/autumn processes?
3. Which climate factors dominate IAV ?
    a. Water-balance, temperature, radiation? Timing?
    b. Can we derive a map of climate sensitivity, i.e. basically the first derivative to climate change?
    c. Can we detect vulnerable areas to certain variability and trends?
4. Integration with atmospheric inversion and process-modelling results
    a. Does global IAV derived from up-scaling eddy fluxes and its large-scale spatial distribution compare with patterns derived from atmospheric inversion and global process models
    b. Are the same climate factors dominating the IAV?

The methodological approach will rely on direct statistical analysis of the flux data with time series and regression analysis and on an up-scaling approach using diagnostic models as in (Reichstein et al. 2007). For illustration some potential candidate figures are attached below.

Compared to other proposals on IAV, this study will look at very general global patterns and not dig deeply into biome specific patterns. The hope is that interesting general global patterns are emerging that are consistent with signals from atmospheric inversions. In such a submission of a concise paper to Nature should be considered.

PROPOSED SITES TO BE INVOLVED

All sites containing at least 2 full years of flux and meteorological data maybe considered for this analysis.

PROPOSED RULES FOR CO-AUTHORSHIP

The rules as proposed in the disclaimer for the FLUXNET2007 synthesis will be applied. Strong collaboration with colleagues working on other IAV studies in this FLUXNET synthesis context will be sought for and co-leading authorship will be assumed for coordinators of other IAV syntheses.

Reichstein, M., P. Ciais, D. Papale, R. Valentini, S. Running, N. Viovy, W. Cramer, A. Granier, J. Ogée, V. Allard, M. Aubinet, C. Bernhofer, N. Buchmann, A. Carrara, T. Grünwald, B. Heinesch, P. Keronen, A. Knohl, D. Loustau, G. Manca, G. Matteucci, F. Miglietta, J. M. Ourcival, K. Pilegaard, S. Rambal, S. Schaphoff, G. Seufert, J.-F. Soussana, M.-J. Sanz, E. D. Schulze, T. Vesala, and M. Heimann. 2007. A combined eddy covariance, remote sensing and modeling view on the 2003 European summer heatwave. Global Change Biology **13**:634–651.
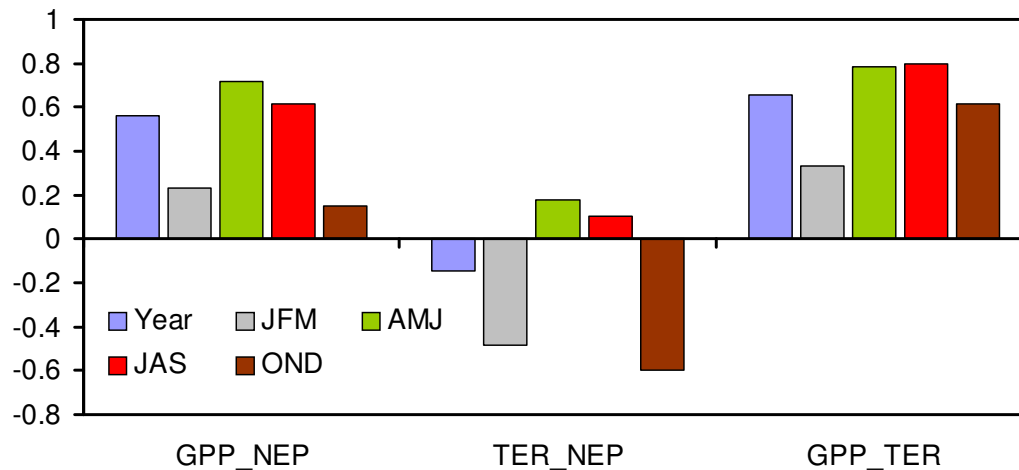
Interannual correlation of carbon fluxes at eddy covariance sites for annual and seasonal totals. NEP variability appears to be driven by GPP
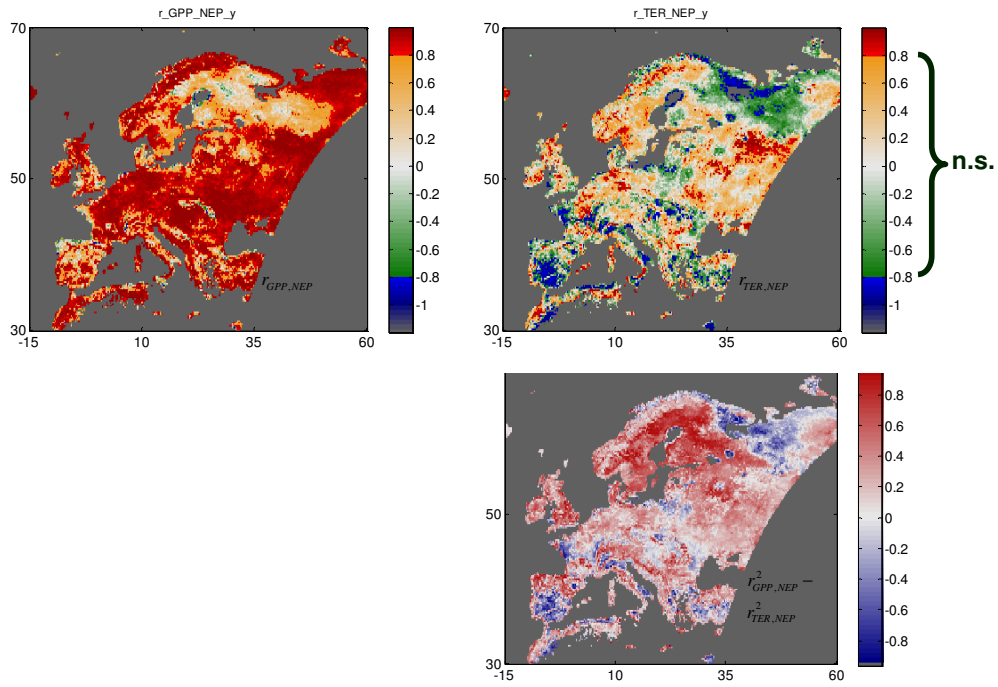
Pixel-by-pixel inter-annual correlation of GPP, TER with NEE, as generalized from flux-towers by a neural network model. The lower left figure shows the variance in NEE explained by GPP minus TER
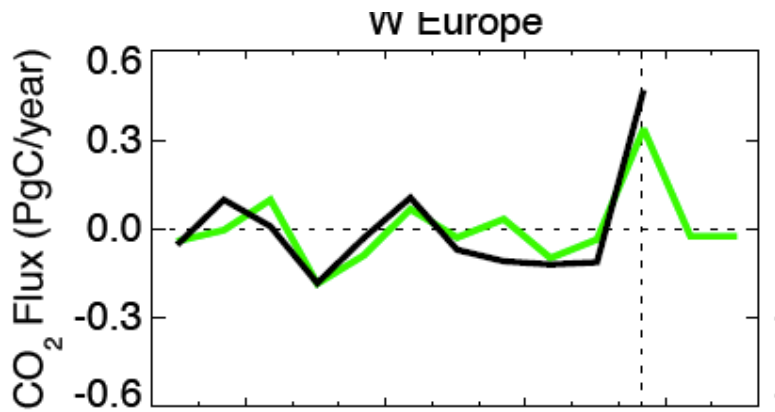
Comparison of bottom-up and top-down estimate of inter-annual CO2 flux anomaly.