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## SOURCES AND PATTERNS OF THE INTER-ANNUAL VARIABILITY OF THE TERRESTRIAL CARBON BUDGET

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Large uncertainty in predicting future climate trajectories derives from the climate sensitivity of the terrestrial carbon balance and the sign and strength of the land-climate feedbacks. It is therefore of outmost importance to deepen our understanding on the ecosystem responses to climate variability. For this purpose we investigated how recent climate trends have impacted the terrestrial carbon balance using a combination of surface observations of atmospheric CO<sub>2</sub> concentrations and ecosystem fluxes at long-term sites. Using a novel methodology, the inter-annual variability of the C fluxes (IAV) has been separated in climate induced variability, variability due to changes in ecosystem functioning and the interaction of the two.

Results have been corroborated with a global scale analysis based on statistically up-scaled fluxes [1] to highlight the role of temperature and precipitations on the spatial pattern of IAV in the last 30 years. Finally, the spatial/temporal trends of IAV have been confirmed using the signal derived from the global network of atmospheric CO<sub>2</sub> concentrations measurements. This analysis highlights the importance of combined surface networks of CO<sub>2</sub> fluxes and concentrations to support multi-scale analysis of the land-climate interactions and to address key questions on the future trajectories of the land biogeochemistry.

[1] M. Jung *et al.*, 2011, *J. Geophys. Res.* 116, G00J07 (2011).