Geophysical Research Abstracts
Vol. 15, EGU2013-7127, 2013
EGU General Assembly 2013

Convergence of potential net ecosystem production among contrasting C3 grasslands

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Metabolic theory and body size constraints on biomass production and decomposition suggest that differences in the intrinsic potential net ecosystem production (NEPpot) should be small among contrasting C3 grasslands and therefore unable to explain the wide range in the annual apparent net ecosystem production (NEPapp) reported by previous studies. We estimated NEPpot for nine C3 grasslands under contrasting climate and management regimes using multi-year eddy covariance data. NEPpot converged within a narrow range suggesting little difference in the net carbon dioxide uptake capacity among C3 grasslands. Our results indicate a unique feature of C3 grasslands compared to other terrestrial ecosystems and suggest a state of stability in NEPpot due to tightly coupled production and respiration processes. Consequently, the annual NEPapp of C3 grasslands is primarily a function of seasonal and short-term environmental and management constraints, and therefore especially susceptible to changes in future climate patterns and associated adaptation of management practices.