



Diurnal and seasonal variability of CO₂ fluxes over a degraded Woodland under a Sudanian climate in Northern Benin (West Africa)

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Turbulent CO₂ exchanges over a degraded woodland were measured during 17 months (from November 2005 to March 2007) by an eddy-covariance system at Nangatchori in the northern part of Benin, West Africa. The site (Lat 9.65°N, Long 1.74°E, Alt: 432 m), under a Sudanian climate, is one of the sites that were equipped in the framework of the international AMMA-CATH program. The site was highly disturbed during preceding years by illegal tree logging, agricultural activities, cattle pasture, and bushfire. The footprint area is mainly formed by herbs and crops with some sparse shrubs and trees. Fluxes data were completed during the same period by meteorological measurements made at the Nalohou site located approximately 20 km from Nangatchori, and by an inventory of dominating species on 1km² area around the tower during the wet season. Fluxes response to climatic variables was analyzed. The annual drought and moisture cycle was found to be the main controlling factor of the ecosystem dynamics. A very clear response of CO₂ fluxes to PPFD appears, but is different according to seasons. During wet season, CO₂ uptake increases with increasing PPFD following a typical curvilinear function and saturates for high PPFD (PPFD > 1000 μmol m⁻² s⁻¹), while during dry season, a very weak linear response of CO₂ fluxes was observed.

No clear dependency of the total ecosystem respiration on temperature was observed. At an annual scale (from November 1st 2005 to October 31st 2006), net carbon sequestered by the ecosystem was 18 ± 5 g C m⁻². Finally, with respect to the water use the ecosystem appeared to be more efficient during morning and wet season than during afternoon and dry period.